

**ARMY *TM 9-2355-335-23-1
AIR FORCE TO 36A12-1C-2700-2**

**MAINTENANCE MANUAL
COMMERCIAL-OFF-THE-SHELF (COTS)**

**FOR
MINE RESISTANT AMBUSH PROTECTED
ALL TERRAIN VEHICLE (M-ATV)**

M1240

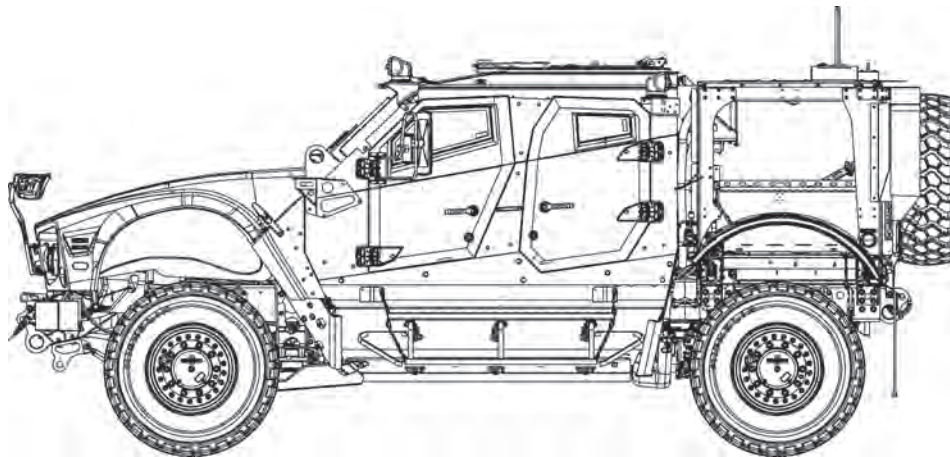
NSN: 2355-01-575-9632 (EIC 1UT)

M1240A1

NSN: 2355-01-596-1330 (EIC 1ZW)

M1245

NSN: 2355-01-586-8070 (EIC 1VE)



*This manual supersedes TM 9-2355-335-23-1, dated 15 June 2011.

COPYRIGHT RELEASE STATEMENT: Oshkosh Corporation states this Commercial Off the Shelf (COTS) manual dated 28 February 2013 is free from copyright restrictions. The Government may edit, reprint, and distribute information in this manual as required.

DISTRIBUTION STATEMENT C: Distribution authorized to US Government agencies and their contractors; proprietary information. This publication is Administrative-Operational Use required for administrative and operational purposes, as determined on 02 October 2009. Other requests for this document shall be referred to U.S. Army TACOM Life Cycle Management Command, PM-MRAP, ATTN: AMSTA-LCC-MM/TECH PUBS, 6501 E. 11 Mile Road, Warren, MI 48397-5000.

DESTRUCTION NOTICE: Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

HEADQUARTERS, DEPARTMENT OF THE ARMY

28 FEBRUARY 2013

SAFETY SUMMARY

This list summarizes critical warnings and cautions in this technical manual. They are listed here for summary purposes and to represent their significance. Study these warnings and cautions carefully. They can save your life and the lives of personnel you work with, as well as preventing damage to equipment. If there is any doubt or questions, contact your Supervisor.

WARNING

395/85R20 tire weighs 380 lbs (172. kg). Do not lift or move 395/85R20 tire without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

5th seat weighs 80 lbs (37 kg). Do not attempt to remove 5th seat from vehicle without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Adequate ventilation shall be provided while using solvents and cleaners. Prolonged breathing of vapors should be avoided. Do not use near heat or open flame. Avoid prolonged contact with skin. Use of rubber gloves conforming to FED SPEC ZZ-G-281, face shield conforming to L-F-36, and other protective equipment are required according to OSHA Standard. Failure to comply may result in injury or death to personnel.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

WARNING

Air compressor weighs 50 lbs (23 kg). Do not lift or move air compressor without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Air lines may be under extreme pressure. Ensure all personnel wear protective goggles when working around compressed air. Failure to comply may result in injury or death to personnel.

WARNING

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

Air system must be drained prior to removing air dryer filter. Failure to comply may result in injury or death to personnel.

WARNING

Air system must be drained prior to removing air system components. Failure to comply may result in injury or death to personnel.

WARNING

All batteries must be disconnected prior to performing battery isolator removal. Failure to comply may result in injury or death to personnel.

WARNING

Allow heat shrink tubing to cool before handling. Failure to comply may result in injury to personnel.

WARNING

Allow solder to cool before handling. Failure to comply may result in injury to personnel.

WARNING

Alternator weighs 115 lbs (52 kg). Do not lift or move alternator without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Always wear heavy leather gloves when handling winch cable. Never let cable run through hands. Broken wires will cause injury to personnel.

WARNING

Antenna platform weighs 200 lbs (91 kg). Do not attempt to lift or move antenna platform without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

WARNING

Avoid electrolyte contact with skin and eyes. Failure to comply may result in injury or death to personnel.

WARNING

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

WARNING

Battery acid is harmful to skin and eyes. Always wear safety goggles, acid-proof gloves, and a rubber apron when performing battery maintenance. Failure to comply may result in injury or death to personnel.

WARNING

Be careful not to short out battery terminal. Do not smoke or use open flame near batteries. Batteries may explode from spark. Failure to comply may result in injury or death to personnel.

WARNING

Brake drum weighs 116 lbs (53 kg). Do not lift or move brake drum without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

WARNING

Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.

WARNING

Brake spring is under extreme tension and can act as projectile when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Cable can become frayed or contain broken wires. Wear heavy leather-palmed gloves when handling cable. Never let moving cable slide through hands, even when wearing gloves. Failure to comply may result in injury or death to personnel.

WARNING

Cable ties must be removed from shoulder belts or shoulder belts will not function properly. Failure to comply may result in injury or death to personnel.

WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Capsule doors weigh 280 lbs (127 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Capsule interior fire suppression system activation rapidly release highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinder. Failure to comply may result in injury to personnel.

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

WARNING

Capsule windshields weigh 210 lbs (95 kg). Do not attempt to lift or move capsule windshield without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck litter door frame weighs 55 lbs (25 kg). Do not move cargo deck litter door frame without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Cargo deck quick lock floor weighs approximately 80 lbs (36 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck side wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift side wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Cargo deck weighs 1950 lbs (885 kg). Do not lift or move cargo body without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck weighs 660 lbs (300 kg). Do not attempt to lift or move cargo deck without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Center belly deflector panel weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Center lifting fixture weighs 100 lbs (45 Kg). Do not attempt to lift or move center lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Clean up all fluid spills to prevent slip and fire hazards. Dispose of material in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment.

WARNING

Cloths or rags saturated with solvent cleaning compound must be disposed of IAW authorized facility's procedures. Failure to comply may result in injury to personnel.

WARNING

Coil spring is under extreme spring tension and can act as a projectile when installed. Raise the lower control arm very slowly to keep spring from releasing uncontrollably. Failure to comply may result in injury or death to personnel.

WARNING

Coil spring weighs 110 lbs (50 kg). Do not lift or move coil spring without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Combined weight of steering gear tray and steering gears is 319 lbs (145 kg). Do not lift or move steering gear tray and steering gears without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc). Failure to comply may result in injury to personnel.

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

WARNING

Coolant may splash during hose removal. Ensure personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Cooling system assembly weighs approximately 400 lbs (182 kg). Do not attempt to lift or move cooling system assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Crossmember weighs 113 lbs (51 kg). Do not attempt to lift or move crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Depending on GFE on CVRJ box shelf, weight may vary. A lifting device may be required to aid in installation. Failure to comply may result in injury or death to personnel.

WARNING

Differential assembly weighs 250 lbs (113 kg). Do not lift differential assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Disconnecting the rear capsule door hardware allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Do not adjust front poppet screw beyond flush with steering gear cover. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Do not attempt to pressure or leak test refrigerant R-134A air conditioning systems with compressed air. Combustible mixtures of air and R-134A may form, resulting in a fire or explosion. Failure to comply may result in injury or death to personnel.

WARNING

Do not exceed 600 lbs (272.4 kg) weight capacity of winch assembly. Failure to comply may result in injury or death to personnel.

WARNING

Do not lower jack completely until tightening sequence is complete. Failure to comply may result in injury or death to personnel.

WARNING

Do not place hand or fingers between bracket and frame when removing mounting cushions. Failure to comply may result in injury or death to personnel.

WARNING

Do not remove clamp from brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Do not remove nut until lower control arm is separated from knuckle. Failure to comply may result in injury or death to personnel.

WARNING

Do not smoke, have open flame, or cause sparks near batteries. Batteries may explode. Failure to comply may result in injury or death to personnel.

WARNING

Do not use improper cleaning methods or unauthorized cleaning solvents. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Do not wear watches or other jewelry when working on winch cable. Jewelry can catch on equipment. Failure to comply may result in injury to personnel.

WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to comply may result in injury to personnel.

WARNING

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Driver side door assembly weighs 185 lbs (84 kg) and passenger side door assembly weighs 170 lbs (77 kg). Do not attempt to lift or move assemblies without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.

WARNING

During normal vehicle operation, cooling system components can become very hot. Allow cooling system to cool prior to servicing. Wear face shield and use extreme care when removing surge tank cap. Sudden release of pressure can cause a steam flash. Slowly loosen surge tank cap to the first stop to relieve pressure before removing surge tank cap completely. Use a clean, thick waste cloth or like material to remove surge tank cap. Avoid using gloves. If hot coolant soaks through gloves, personnel could be burned. Failure to comply may result in injury or death to personnel.

WARNING

During vehicle operation exhaust system can become very hot. Do not touch exhaust system components with bare hands, or allow your body to come in contact with exhaust system components. Failure to comply may result in injury to personnel.

WARNING

Engine belly deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move engine belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Engine components become hot during normal operation. Allow engine to cool completely prior to performing this task. Failure to comply may result in injury or death to personnel.

WARNING

Engine must be shut down prior to working on hydraulic components to drop hydraulic pressure to zero. Potential trapped pressure may be present. Loosen couplings slowly to relieve any remaining hydraulic pressure. Failure to comply may result in injury or death to personnel.

WARNING

Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.

WARNING

Ensure all test equipment is properly connected. Failure to comply may result in injury or death to personnel.

WARNING

Ensure batteries and undercarriage controller connector are disconnected prior to replacing sensor lines. Failure to comply may result in injury or death to personnel.

WARNING

Ensure batteries are disconnected when performing maintenance on or near batteries or electrical systems. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion.

WARNING

Ensure battery disconnect switch is in OFF position. Failure to comply may result in injury or death to personnel.

WARNING

Ensure blue caps are removed from aerosol generators after installation. If blue caps remain installed, aerosol generators may fail to discharge. Failure to comply may result in injury or death to personnel.

WARNING

Ensure engine oil and filter are cool prior to removal. Failure to comply may result in injury to personnel.

WARNING

Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Ensure fire suppression system cylinders are in the OFF position first, then relieve pressure in sensor line system prior to replacing any sensor lines, or accidental discharge may occur. Failure to comply may result in injury or death to personnel.

WARNING

Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

WARNING

Ensure pressure is 0 psi in sensor line system prior to sensor line replacement. Failure to comply may result in injury to personnel.

WARNING

Ensure skid plate is supported during removal to avoid pinching and binding. Failure to comply may result in injury or death to personnel.

WARNING

Ensure transmission oil is cool prior to draining transmission oil. Failure to comply may result in injury to personnel.

WARNING

Ensure valve knob on inflation tool is fully closed (OUT) before proceeding. Failure to comply may result in injury or death to personnel.

WARNING

Ensure valve knob on inflation tool is fully closed (turned out counterclockwise) prior to installation. Failure to comply may result in injury or death to personnel.

WARNING

Ensure vehicle battery disconnect switch is in OFF position before inspecting fire suppression system. Failure to comply may result in injury or death to personnel.

WARNING

Exhaust pipe may be hot. Do not touch hot exhaust pipe. Failure to comply may result in injury to personnel.

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may be present. Failure to comply may result in injury or death to personnel.

WARNING

Fire extinguishers should be placed nearby when using solvent cleaning compound. Failure to comply may result in injury or death to personnel.

WARNING

Front differential housing weighs 250 lbs (113 kg) and rear differential housing weighs 280 lbs (127 kg). Do not lift or move differential housing without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Front seat weighs 112 lbs (51 kg). Do not attempt to move seat without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Front windows weigh 122 lbs (55 kg). Do not attempt to lift or move front windows without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Fuel is flammable and can explode. Keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Fuel is flammable and can explode. Keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Fuel tank is awkward. Do not attempt to lift or move fuel tank without the aid of an assistant and/or lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Halfshaft weighs 50 lbs (23 kg). Do not lift or move halfshaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Hub assembly weighs 60 lbs (27 kg). Do not lift or move hub assembly without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

HVAC assembly and HVAC tray weighs 60 lbs (27.2 kg). Do not move or lift HVAC assembly and HVAC tray without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.

WARNING

If 395/85/20 tire was installed, configure vehicle in accordance with spare tire limp home procedure (TM 9-2355-335-10) prior to operating vehicle. Failure to comply may result in injury or death to personnel.

WARNING

If measurement does not meet acceptable minimum or maximum tolerance, pitman arm and steering gear output shaft must be replaced. Failure to take measurement or replace worn part could result in pitman arm becoming loose, causing injury or death to personnel.

WARNING

If pitman arm is not tightened to proper specifications, pitman arm could work loose or lose its attachment, causing an accident. If pitman arm is found loose, replace pitman arm and steering gear output shaft. Never weld pitman arm or steering gear output shaft. Failure to comply may result in injury or death to personnel.

WARNING

If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.

WARNING

Installing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Keep cargo deck rear doors closed and locked at all times during spare tire stow/unstow operation. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of cargo quick lock floor. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of litter doors. Hands and fingers could get pinched or crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of the cargo deck assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from winch assembly when operating winch. Failure to comply may result in injury or death to personnel.

WARNING

Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands away from pinch point areas of the tire carrier assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep out from under spare tire when lowering and raising spare tire. Spare tire can slip or fall. Failure to comply may result in injury or death to personnel.

WARNING

Ladder panel weighs approximately 800 lbs (363 kg). Do not attempt to lift or move ladder panel without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Lead-acid batteries contain sulfuric acid, which can cause severe burns. Avoid contact with skin, eyes, or clothing. Wear safety goggles and gloves. If battery electrolyte is spilled, take immediate action to stop its corrosive (burning) effects. If battery acid is spilled on clothing or vehicle, wash immediately with cold water. Neutralize with baking soda or household ammonia solution. If battery acid comes in contact with skin, flush with cold water to remove acid. If eyes are contacted, flush with cold water for at least 15 minutes. Seek immediate medical attention. If swallowed, drink large amounts of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Seek immediate medical attention. Failure to comply may result in injury or death to personnel.

WARNING

Litter door and dyneema panel assembly weigh 142 lbs (65 kg). Do not move or lift litter door or dyneema panel without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

WARNING

Loosening of the crossbrace hardware is necessary to prevent binding of the gunner's platform while height adjustment is being made. Ensure crossbrace hardware is tight prior to using gunner's platform. Failure to comply may result in injury or death to personnel.

WARNING

Lower control arm weighs 90 lbs (41 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

M-ATV is equipped with a capsule interior automatic fire suppression system. Before performing any welding, brazing, grinding, or using open flame in capsule, batteries must be disconnected. In addition, the maintenance circuit breaker located to the right of the main circuit breaker in the dash must be pulled out to prevent accidental activation of automatic fire suppression system in the capsule. System components must also be covered. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel. If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an undercarriage fire suppression system designed to extinguish fires in all wheel wells and in fuel tank area. Before performing any welding, brazing, grinding operation, or using open flame in or around the wheel well/fuel tank areas, batteries must be disconnected. In addition, the automatic fire suppression system for the undercarriage must be disabled to prevent accidental activation of automatic fire suppression system system. Care must be taken to prevent damage to any of the fire suppression sensor lines which, if damaged, may trigger automatic fire suppression system upon system being enabled. Undercarriage fire suppression system is triggered by loss of pressure in sensor lines. Failure to comply may result in injury to personnel.

WARNING

Never apply load on winch with cable fully extended. Keep at least three full turns of cable on the reel. Failure to comply may result in injury or death to personnel.

WARNING

Never use fuel to clean parts. Fuel is highly flammable. Fuel may ignite during cleaning. Failure to comply may result in injury or death to personnel.

WARNING

Never use open flame to apply heat to heat shrink tubing. Heat shrinking tubing may catch fire using open flame. Failure to comply may result in injury to personnel.

WARNING

Nitrogen lines under pressure will move violently when removed. Ensure nitrogen supply is shut off prior to removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

On direct contact, uncured silicone sealant irritates eyes. In case of contact, flush eyes with water and seek medical attention. Avoid prolonged contact with skin. Failure to comply may result in injury or death to personnel.

WARNING

Once tab lock retainer is locked into place, do not retighten. Constant retightening of retainer could cause pitman arm to loosen or retainer to fail, causing an accident at a later date. Failure to comply may result in injury or death to personnel.

WARNING

Once top screws are removed from rear seat mount, the seat will pivot forward. Do not sit in seat after screws are removed. Failure to comply may result in injury or death to personnel.

WARNING

Panel assemblies for cargo body weigh 90 lbs (41 kg). Do not attempt to lift or move assemblies without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Passenger side belly deflector panel weighs 353 lbs (160 kg). Do not attempt to lift or move passenger side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Pitman arm will be extremely tight. Do not pound on pitman arm or apply any source of heat, as damage to pitman arm or output shaft can cause an accident at a later date. Failure to comply may result in injury or death to personnel.

WARNING

Place a jackstand on each side of lifting device centered on ladder panel in case of transmission jack failure. Failure to comply may result in injury or death to personnel.

WARNING

Powertrain weighs 2,300 lbs (1 044 kg). Do not attempt to lift or move powertrain without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure batteries are disconnected. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Primary steering gear weighs 75 lbs (34 kg). Do not lift or move primary steering gear without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Prolonged contact with lubricating oil may cause skin rash. Immediately wash skin and clothing that come in contact with lubricating oil and remove saturated clothing. Keep area well-ventilated to keep fumes at a minimum. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft is awkward. Do not lift or move propeller shaft without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft weighs 60 lbs (27 kg). Do not lift or move propeller shaft without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft weighs 88 lbs (40 kg). Do not lift or move propeller shaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Push bumper is 310 lbs (140 kg). Do not attempt to lift or move push bumper without aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Radiator and transmission oil cooler weigh 65 lbs (29 kg). Do not lift or move radiator and transmission oil cooler without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Rear crossmember weights 110 lbs (50 kg). Do not attempt to lift or move rear crossmember without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Rear seat weighs 83 lbs (38 kg). Do not attempt to move seat without the aid of an assistant and suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Rear wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift rear wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Rear wall assemblies for cargo deck weigh 90 lbs (41 kg). Do not attempt to lift or move assemblies without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Rear windows weigh 46 lbs (21 kg). Do not attempt to lift or move rear window without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Refrigerant R-134a air conditioning systems should not be pressured-tested or leak-tested with compressed air. Combustible mixtures of air and R-134a may form. Failure to comply may result in injury or death to personnel.

WARNING

Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal or positive electrical circuit, a direct short may result in instant heating of tools, injury or death to personnel, or damage to equipment.

WARNING

Removing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Secondary steering gear weighs 70 lbs (32 kg). Do not lift or move secondary steering gear without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Secure transfer case to transmission jack with ratchet strap. Failure to comply may result in injury or death to personnel.

WARNING

Shock absorbers are filled with high pressure gas. Service shock absorbers with adequate ventilation. Do not use or store cylinder near heat or open flame. Cylinder temperature should not exceed 125°F (52°C). Use with equipment rated for cylinder pressure. Open valve slowly. Close valve after each use and in storage. Use in accordance with Material Safety Data Sheet for Nitrogen. If inhaled, move to area with fresh air. Failure to comply may result in injury or death to personnel.

WARNING

Side lifting fixture weighs 95 lbs (43 Kg). Do not attempt to lift or move side lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury of death to personnel.

WARNING

Skid plate weighs 53 lbs (24 kg). Do not lift or move skid plate without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Solvent cleaning compound MIL-PRF-680 Type II and III may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well-ventilated areas. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/massive concentrations can cause coma or be fatal. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. If symptoms persist, seek medical attention. First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If symptoms persist, seek medical attention. First aid for inhalation: move to fresh air. If not breathing, provide artificial respiration. If symptoms persist, seek medical attention. Keep away from open flames and other flames and other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

WARNING

Solvents used with a spray gun must be used in a spray booth with filter. Face shield must be used by personnel operating spray gun. Failure to comply may result in injury to personnel.

WARNING

Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

SPARK bar weighs 97 lbs (44 kg). Do not lift or move SPARK bar without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Spindle may become loose when removing spider. Support spindle when removing spider. Failure to comply may result in injury to personnel.

WARNING

Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Spring may come free from vehicle while lowering jack. Spring may have to be rotated to aid in removal. Failure to comply may result in injury or death to personnel.

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Stand clear of vehicle while wheels are turned. Failure to comply may result in injury or death to personnel.

WARNING

Standard M1240A1 tire assembly weighs 600 lbs (272.4 kg). Do not attempt to lift or move tire assembly without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Starter weighs 50 lbs (23kg). Do not lift or move starter without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Steam cleaning creates hazardous noise levels and severe burn potential. Eye, skin, and ear protection are required. Failure to comply may result in injury to personnel.

WARNING

The flashpoint for Type II solvent cleaning compound is 141 to 198°F (61 to 92°C) and Type III is 200 to 241°F (93 to 116°C).

WARNING

Tip of removal tool is very sharp. Use caution when using tool. Failure to comply may result in injury to personnel.4

WARNING

To prevent arcing, do not allow tools to contact batteries or other battery terminals. Failure to comply may result in injury or death to personnel.

WARNING

Transfer case weighs 312 lbs (142 kg). Do not lift or move transfer case without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Transmission holding bracket weighs 93 lbs (42 kg). Do not attempt to lift or move transmission holding bracket without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Transmission weighs 700 lbs (318 kg). Do not lift or move transmission without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Turn cap on coolant reservoir bottle one half turn and stop prior to removing cap completely. Pressure must be relieved from coolant reservoir bottle prior to removal of cap or injury to personnel may occur.

WARNING

Underbody improvement panel weighs 1,000 lbs (454 kg). Do not attempt to lift or move center deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Upon removal of terminal clamps, avoid accidental contact between terminal clamps and battery terminals. This will prevent accidental shorting, arcing, or sparks. Secure terminal clamps, cables, and wires away from battery terminals with cable ties as required. Failure to comply may result in injury or death to personnel.

WARNING

Upon removal of wires and cables, ensure no contact is made with battery terminals or other wires and cables. Secure wires and cables away from battery terminals and other wires and cables as required. Failure to comply may result in injury or death to personnel or damage to equipment.

WARNING

Upper control arm weighs 80 lbs (36 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Use care to prevent refrigerant from touching skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissues. Failure to comply may result in injury or death to personnel.

WARNING

Use extreme care not to short out battery terminals. Remove all jewelry such as rings, ID tags, bracelets, etc. prior to working on or around vehicle. Jewelry and tools can catch on equipment, contact positive electrical circuits, and cause severe burns or electrical shock. Failure to comply may result in injury or death to personnel.

WARNING

Vehicle must not be driven with brake chambers caged. Caging brakes renders brakes inoperative. Failure to comply may result in injury or death to personnel.

WARNING

Wear proper eye protection and nonleather gloves when servicing air conditioner. Failure to comply may result in injury or death to personnel.

WARNING

Wear proper eye protection and use care when removing or installing springs, retaining rings, and snap rings. Springs, retaining rings, and snap rings are under spring tension and can act as projectiles when released. Spring must be compressed during assembly. Failure to comply may result in injury to personnel.

WARNING

Wear proper eye protection and use care when removing or installing springs, retaining rings, and snap rings. Springs, retaining rings, and snap rings are under spring tension and can act as projectiles when released. Valve is spring loaded. Spring must be compressed during assembly. Failure to comply may result in injury to personnel.

WARNING

Wheel end assembly weighs 550 lbs (249 kg). Do not remove lower and upper control arm ball joints at the same time. Failure to comply may result in injury or death to personnel.

WARNING

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Wheel well deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

When removing air lines, loosen couplings slowly to bleed off air pressure in air lines. Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

When removing relief valves, loosen relief valves slowly to bleed off any trapped pressure that might be present. Ensure personnel wear protective goggles when removing relief valves. Failure to comply may result in injury or death to personnel.

WARNING

When tightening castle nut, do not loosen castle nut to install cotter pin. Continue to tighten castle nut until cotter pin can be installed. Failure to comply may result in injury or death to personnel.

WARNING

When using a punch and ball peen hammer, always wear safety glasses. Never use a punch that is damaged. Failure to comply may result in injury or death to personnel.

WARNING

While engine is running, transmission **MUST** be in N (neutral), **PARKING BRAKE** must be set and properly engaged, and wheels **MUST** be chocked. Failure to comply may result in injury or death to personnel.

WARNING

Winch and front crossmember are removed/installed as an assembly. Winch and front crossmember weigh 214 lbs (97 kg). Do not lift or move winch and crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Winch and winch bracket are removed as an assembly. Winch and winch bracket weigh 167 lbs (76 kg). Do not lift or move winch bracket without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Winch is NOT to be used for lifting or moving of persons. Failure to comply may result in injury or death to personnel.

WARNING

Winch is only to be used to stow/unstow spare tire. Winch is not to be used to lift other components or material. Failure to comply may result in injury or death to personnel.

WARNING

Winch weighs 119 lbs (54 kg). Do not lift or move winch without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

A bearing is located directly behind seal in spindle. When prying seal from spindle, do not damage bearing. Failure to comply may result in damage to equipment.

CAUTION

A resistance load of 175 lbs (79 kg) must be applied to wire rope to overcome internal resistance and operate winch brake properly. Turning winch handle counterclockwise will remove winch handle from drive shaft and reel will not turn. Failure to comply may result in damage to equipment.

CAUTION

After charging, allow charge to set 10 to 15 minutes. This allows time for the gas temperature to stabilize. Failure to comply may result in damage to equipment.

CAUTION

After powertrain is lifted up, front rubber mounts and washers may need to be removed for oil pan clearance. Failure to comply may result in damage to equipment.

CAUTION

All air cleaner element maintenance must be performed above temperatures of -10°F (-23°C). Failure to comply may result in damage to equipment.

CAUTION

Avoid excess removal of surface finish to adjacent area. Failure to comply may result in damage to equipment.

CAUTION

Blower motor cover should be reinstalled prior to HVAC assembly removal to prevent damage to HVAC internal wiring harness and /or components. Failure to comply may result in damage to equipment.

CAUTION

Boot damage will result if hammer is allowed to strike soft boot material. Strike only the metal boot band. Failure to comply may result in damage to equipment.

CAUTION

Butt splice connector sizes vary by wire diameter. To ensure secure repair, use only butt splice connector size specified for the wire being repaired. Do not modify butt splice connector to fit. Failure to comply may result in damage to equipment.

CAUTION

Care must be used when installing 395/85R20 tire on tire carrier. Air valve on 395/85R20 tire is inserted through top driver side slot of tire carrier. Ensure spacer is aligned properly to avoid damage to CTIS valve. Failure to comply may result in damage to equipment.

CAUTION

Cargo deck side wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Caution must be used when installing spare tire on tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

CAUTION

Caution must be used when removing spare tire from tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

CAUTION

Charge air cooler is cumbersome. It should be installed with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Charge air cooler is cumbersome. It should be removed with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Clamp belt above retractor prior to removal to prevent belt from retracting completely. Failure to comply may result in damage to equipment.

CAUTION

CTIS controller and CTIS dash panel must be kept together before CTIS controller connector is connected and during installation in dash. Failure to comply may result in damage to equipment.

CAUTION

CTIS controller and CTIS dash panel must be kept together during removal until CTIS controller connector is removed. Failure to comply may result in damage to equipment.

CAUTION

Cutout for retractor is not centered on mat. Align cutout in mat with cutout in gunner's platform and check for proper positioning prior to cutting. Failure to comply may result in damage to equipment.

CAUTION

Differential housing must be secured to transmission jack with strap. Failure to comply may result in damage to equipment.

CAUTION

Do not allow slip yoke to come off propeller shaft. Failure to comply may result in misalignment of propeller shaft yokes and could cause damage to equipment.

CAUTION

Do not apply excessive heat to heat shrink tubing. Excessive heat may cause heat shrink tubing to split or melt. Failure to comply may result in damage to equipment.

CAUTION

Do not bend locking tabs in pitman arm slots. Failure to comply may result in damage to equipment.

CAUTION

Do not clean tires, rubber hoses, or electrical components with solvent mixture. Failure to comply may result in damage to equipment.

CAUTION

Do not fill ball joint boot with too much grease. If boot is bulging when installed, squeeze out excess grease. Failure to comply may result in damage to equipment.

CAUTION

Do not hold steering wheel at full left or full right for longer than 10 seconds. Oil overheating may occur. Failure to comply may result in damage to equipment.

CAUTION

Do not lubricate A/C system O-rings. O-ring material is only compatible with air conditioning type lubricants. Failure to comply may result damage to equipment.

CAUTION

Do not open cover for farther than is required to disconnect connector. Failure to comply may result in damage to equipment.

CAUTION

Do not operate vehicle system with the panel high-side valve in open position. Failure to comply may result in damage to equipment.

CAUTION

Do not over tighten threaded insert. Failure to comply may result in damage to equipment.

CAUTION

Do not overcharge system. The system is fully charged with 3.5 lbs (1.59 kg) of refrigerant. Failure to comply may result in damage to equipment.

CAUTION

Do not overtighten clamp on heater control valve. Failure to comply may result in damage to equipment.

CAUTION

Do not overtighten locknuts. Failure to comply may result in damage to hood.

CAUTION

Do not overtighten nuts (14). Failure to comply may result in damage to receiver/dryer, loss of refrigerant, and damage to equipment.

CAUTION

Do not overtighten screw. Failure to comply may result in damage to equipment.

CAUTION

Do not permit dirt, dust, or grit to enter transmission filler tube. Thoroughly clean dipstick handle and end of filler tube. Failure to comply may result in damage to equipment.

CAUTION

Do not shorten springs on CTIS seals. Failure to comply may result in damage to equipment.

CAUTION

Do not spray cleaning solvent on the front of the dash panels or gauges. This can cause discoloration and clouding of dash panels and gauges. Failure to comply may result in damage to equipment.

CAUTION

Do not use a hammer to pound halfshaft into wheel end. Failure to comply may result in damage to equipment.

CAUTION

Do not use a removal tool to aid in removal of tie rod from pitman arm. Failure to comply may result in damage to dust cover.

CAUTION

Do not use a removal tool to aid in removal of toe control link from steering arm. Failure to comply may result in damage to dust cover.

CAUTION

Do not use a wrench to tighten oil filter housing. Failure to comply may result in damage to equipment.

CAUTION

Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.

CAUTION

Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.

CAUTION

Do not use mounting screws to draw filter cover to the sump. Failure to comply may result in damage to cover, seals, or sump.

CAUTION

Do not use soap or alkalies for cleaning tank interiors. Failure to comply may result in damage to equipment.

CAUTION

Do not use wrench to tighten fuel filter. Failure to comply may result in damage to equipment.

CAUTION

Drain plug is magnetized and can not be exchanged with fill plug. Failure to comply may result in damage to equipment.

CAUTION

During installation of bottom brake shoe, an assistant is required to support brake shoe until springs are installed. Failure to comply may result in damage to equipment.

CAUTION

Ensure all connectors and wiring are free before lifting hood from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure all connectors remain disconnected while performing Steps (11) through (22). Failure to comply may result in damage to equipment.

CAUTION

Ensure all GFE cables, wire harnesses, fire suppression lines, and connectors are away from antenna platform. Remove antenna platform slowly from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure all GFE is disconnected prior to removal of GFE wire bundles. Failure to comply may result in damage to equipment.

CAUTION

Ensure all hoses, lines, harnesses, cables, and wires are clear of powertrain installation path. Failure to comply may result in damage to equipment.

CAUTION

Ensure all hoses, lines, harnesses, cables, and wires are not attached to powertrain. Failure to comply may result in damage to equipment.

CAUTION

Ensure all wires and cables are clear of HVAC installation path. Failure to comply may result in damage to equipment.

CAUTION

Ensure all wires and cables are clear of HVAC removal path. Failure to comply may result in damage to equipment.

CAUTION

Ensure any open tube, line, or fitting on the turbocharger and its related systems are capped and plugged. Failure to comply may result in damage to equipment.

CAUTION

Ensure assistant is holding knuckle securely. Failure to comply may result in damage to equipment.

CAUTION

Ensure batteries are disconnected. Batteries will discharge during storage if not disconnected. Failure to comply may result in damage to equipment.

CAUTION

Ensure battery disconnect switch is turned OFF prior to performing battery maintenance. Failure to comply may result in damage to equipment.

CAUTION

Ensure cables and hoses are positioned above transmission during installation. Failure to comply may result in damage to equipment.

CAUTION

Ensure cables and hoses are positioned above transmission during removal. Failure to comply may cause damage to equipment.

CAUTION

Ensure cables are installed correctly on NATO slave receptacle. Terminal assembly is offset from center of receptacle. Positive terminal (red cable) is closest to the center of receptacle. Negative (black cable) is farther away from center of receptacle. Failure to comply may result in damage to equipment.

CAUTION

Ensure connectors are completely seated. Failure to comply may result in damage to equipment.

CAUTION

Ensure correct oil level. Low level causes lack of lubrication and reduces durability. High level causes splashing and leads to overheating of transfer case.

CAUTION

Ensure engine is full of oil prior to starting engine. Failure to comply may result in damage to equipment.

CAUTION

Ensure longer bolt is installed in top position. Failure to comply may result in damage to equipment.

CAUTION

Ensure mating surfaces of differential lock chamber, shim plates, and differential assembly are clean to prevent differential leaks. Failure to comply may result in damage to equipment.

CAUTION

Ensure pilot is installed on base prior to removal. Failure to comply may result in damage to equipment.

CAUTION

Ensure retractor straps are secured prior to removing retractors. Failure to comply may result in damage to equipment.

CAUTION

Ensure setscrews are recessed no further than past side belly deflector panel or crossmember will not be held in place and may come off with panel. Failure to comply may result in damage to equipment.

CAUTION

Ensure spline cover is completely covering spindle splines and threads when installing hub assembly. Failure to comply may result in damage to equipment.

CAUTION

Ensure the rear light wire harness, fire suppression sensor wires, fire suppression lines, and Check-6 cables are properly routed prior to installing cargo deck on vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure tires are not resting on surface containing grease or oil. Failure to comply may result in damage to equipment.

CAUTION

Ensure transmission oil level is at normal operating range. Failure to comply may result in damage to transmission.

CAUTION

Ensure wires, harnesses, lines, and hoses are clear from back of power steering reservoir during installation. Failure to comply may result in damage to equipment.

CAUTION

Excess sensor cable must be secured to air line to prevent it from contacting propeller shaft. Failure to comply may result in damage to equipment.

CAUTION

Failure to perform Step (1) may result in damage to equipment.

CAUTION

Failure to perform Step (3) may result in damage to equipment.

CAUTION

Fan shroud housing and fan are difficult to install. Use care not to damage radiator. Install with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Fan shroud housing and fan are difficult to remove. Remove with the aid of an assistant and use care not to damage radiator. Failure to comply may result in damage to equipment.

CAUTION

Fill fuel filter with clean fuel before installing. Failure to comply may result in damage to equipment.

CAUTION

Fill shock slowly. Failure to comply may result in damage to equipment.

CAUTION

For installation of differential in housing, install 3/8 x 1/2 inch screw into differential lock-up screw hole prior to installing differential assembly into housing. Failure to comply may result in damage to equipment.

CAUTION

For removal of differential from housing, install 3/8 x 1/2 in. screw into differential assembly lock-up screw hole prior to removing inner shaft. Failure to comply may result in damage to equipment.

CAUTION

Front and rear brake drums are not interchangeable. Ensure brake drums are not switched during removal and installation. Failure to comply may result in damage to equipment.

CAUTION

Front rubber mounts may need to remain uninstalled until oil pan has cleared front mounting position. Failure to comply may result in damage to equipment.

CAUTION

Have an assistant monitor powertrain-to-chassis clearance during installation. Failure to comply may result in damage to equipment.

CAUTION

Have an assistant monitor powertrain-to-chassis clearance during removal. Failure to comply may result in damage to equipment.

CAUTION

HVAC hose needs at least one inch (2.54 cm) clearance from drive belt. Failure to comply may result in damage to equipment.

CAUTION

If coolant is being replaced, mix coolant into 50/50 mixture of coolant and distilled water. Do not have more than 60% coolant in mixture. Failure to comply may result in damage to equipment.

CAUTION

If tabs and notches do not line up, tighten beyond specified torque value until two tabs align. Never back off the retainer to align restraining tabs. Failure to comply may result in damage to equipment.

CAUTION

Install same number of shim plates as was removed. Failure to comply may result in damage to equipment.

CAUTION

Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while lifting into place on vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while removing from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Litter door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Loosen jam nut prior to removal of setscrew from differential lock chamber. Failure to comply may result in damage to equipment.

CAUTION

Only remove hood support bracket far enough away from capsule for access of remaining hardware. Failure to comply may result in damage to equipment.

CAUTION

Overtightening will cause deformation of the pipe fitting and damage to the joining fitting, flange, or component. Failure to comply may result in damage to equipment.

CAUTION

Perform Steps (5) through (8) for operation checks. Failure to comply may cause damage to vehicle.

CAUTION

Position tire assembly so that CTIS hole in tire assembly is aligned with CTIS port. Damage to CTIS system may result if tire assembly is not correctly installed. Failure to comply may result in damage to equipment.

CAUTION

Powertrain must be installed carefully with a combination of downward and rearward movements. Failure to comply may result in damage to equipment.

CAUTION

Powertrain must be removed carefully with a combination of forward and upward movements. Failure to comply may result in damage to equipment.

CAUTION

Prior to installing and adjusting setscrew, air system must be charged. Failure to comply may result in damage to equipment.

CAUTION

Prior to performing the installation process, ensure inside of canister and housing are clean. Place clean cloth on hard surface. Failure to comply may result in damage to equipment.

CAUTION

Prior to removing sensor, carefully remove sealant from cable and knuckle. Failure to comply may result in damage to equipment.

CAUTION

Raise transmission only enough to release pressure on spring support. Failure to comply will result in damage to equipment.

CAUTION

Rear cargo door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Rear wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Remove old sealing remainders from threads on the shift cylinder cover, adjustment screw, and locknut. Failure to comply may result in damage to equipment.

CAUTION

Remove remaining gasket remnants from top surface of thermostat housing and bottom surface of thermostat outlet weldment. Prepare both surfaces for new gasket. Failure to comply may result in damage to equipment.

CAUTION

Retaining springs may fit loosely in seals. Ensure retaining springs are installed during installation of seals. Failure to comply may result in damage to equipment.

CAUTION

Small piece of tape wound around end of cable will aid in installation.

CAUTION

Strip wire after placing it through seal to prevent damage to individual wire strands. Failure to comply may result in damage to equipment.

CAUTION

Support ignition relay during installation to prevent relay from hanging by wires. Failure to comply may result in damage to equipment.

CAUTION

Support ignition relay during removal to prevent relay from hanging by wires. Failure to comply may result in damage to equipment.

CAUTION

Support power steering reservoir during front bracket removal. Power steering reservoir could shift when front bracket is removed. Failure to comply may result in damage to equipment.

CAUTION

Support power steering reservoir until mounting bracket is secured. Failure to comply may result in damage to equipment.

CAUTION

Take care to prevent kinks from forming in cable, as this will weaken cable. Failure to comply may result in damage to equipment.

CAUTION

Take care when removing brackets from hood. Hood will no longer be secured if removing both brackets. Failure to comply may result in damage to equipment.

CAUTION

Tension rods are loosened and not removed in Step (1). Failure to comply may result in damage to equipment.

CAUTION

Terminals come in different styles and sizes. To prevent damage, be sure to use only the exact replacements. Do not attempt to modify terminal to fit. Failure to comply may result in damage to equipment.

CAUTION

The life of a cable directly relates to its use and to the care it receives. A cable must be “stretched” or spooled onto the drum under a load of at least 500 lbs (227 kg). The objective of “stretching” is to produce tight, even wraps on the inner and outer layers of the cable, thus preventing binding or kinking. Failure to comply may result in damage to equipment.

CAUTION

The transmission must not be operated for extended periods of time until a hot check has verified proper oil level. Do not operate transmission for extended periods at improper oil level conditions. Failure to comply may result in damage to equipment.

CAUTION

Tighten screws in a crisscross pattern. Failure to comply may result in damage to equipment.

CAUTION

Torque adapter must be 90° to torque wrench. Failure to comply may result in damage to equipment.

CAUTION

Tube must be fully removed from tie down pass through prior to lifting cargo deck. Failure to comply may result in damage to equipment.

CAUTION

Turn battery disconnect switch to the OFF position prior to inspecting and/or disconnecting any electrical connector for the fire suppression system. Failure to comply may result in damage to equipment.

CAUTION

Use brass drift to tap in bearing cups. Failure to comply may result in damage to equipment.

CAUTION

Use care not to damage components while prying apart. Failure to comply may result in damage to equipment.

CAUTION

Use care when connecting connectors. Failure to comply may result in damage to equipment.

CAUTION

Use care when installing new bearing, to prevent accidental damage to bearing. Failure to comply may result in damage to equipment.

CAUTION

Use care when installing screws into threaded blocks for front seat. If a threaded block is loosened, removal of belly armor is required to properly secure the seat.

CAUTION

Use care when installing wheel/tire assembly. Dragging wheel/tire assembly across studs may result in damage to studs. Failure to comply may result in damage to equipment.

CAUTION

Use caution when inserting tension rods through vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

CAUTION

Use caution when removing tension rods from vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

CAUTION

Use caution while installing cargo deck on vehicle. Ensure nothing becomes caught or bound during installation. Failure to comply may result in damage to equipment.

CAUTION

Use caution while removing cargo deck from vehicle. Ensure wire harness, fire suppression sensor wires, fire suppression lines, and Check-6 cables do not become caught or bound during removal. Failure to comply may result in damage to equipment.

CAUTION

Vehicle armor is threaded; do not attempt to force screw out. Screw must be turned out. Failure to comply may result in damage to equipment.

CAUTION

Vehicles must not have ballistic glass cleaned with solvent or other strong cleaning compounds. Ballistic glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.

CAUTION

Washer (5) and washer (8) are not interchangeable. Note their location. Failure to comply may result in damage to equipment.

CAUTION

Washers (5 and 8) are not interchangeable. Switching washers during installation may cause damage to equipment.

CAUTION

When drilling out threaded insert, do not enlarge existing hole. The new threaded insert will not seat properly if hole is enlarged. Failure to comply may result in damage to equipment.

CAUTION

When installing hub assembly on spindle, install hub assembly in one straight, smooth, continuous process. Do not stop during process and relax hub assembly on CTIS seals. Use care not to drag hub assembly along spindle shaft. Failure to comply may result in damage to equipment.

CAUTION

When installing pitman arm, timing marks on pitman arm and steering output shaft must be aligned as noted prior to removal. Failure to comply may result in damage to equipment.

CAUTION

When installing propeller shaft on yoke, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

CAUTION

When one brake shoe needs to be replaced, all brake shoes for that axle must be replaced. Failure to comply may result in damage to equipment.

CAUTION

When removing and installing battery terminals and cables from batteries, ensure they are removed and installed in proper sequence as described below. Failure to comply may result in damage to equipment.

CAUTION

When removing differential lock chamber from differential assembly, note number of shims removed. Same number of shims must be used when installing lock chamber. Failure to comply may result in damage to equipment.

CAUTION

When removing propeller shaft from yokes, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

CAUTION

When removing seal from spindle, do not damage spindle bore where seal is seated. Failure to comply may result in damage to equipment.

CAUTION

When removing washer from sun gear, do not damage surface of sun gear. Failure to comply may result in damage to equipment.

CAUTION

When tightening A/C hoses and fittings, always use a backup wrench. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean capsule interior, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean capsule interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean vehicle, do not allow water stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.

CAUTION

While tightening nuts, hold screws with wrench. Failure to comply may result in damage to equipment.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 9-2355-335-23-1 dated 15 June 2011. Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original 28 February 2013

**TOTAL NUMBER OF VOLUMES IS 2, TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 232
AND TOTAL NUMBER OF WORK PACKAGES IS 297, CONSISTING OF THE FOLLOWING:**

Page/WP No.	Change No.	Page/WP No.	Change No.
Volume 1		WP 0027 (4 pgs)	0
Cover	0	WP 0028 (6 pgs)	0
Safety Summary (38 pgs)	0	WP 0029 (8 pgs)	0
i through xvi	0	WP 0030 (8 pgs)	0
Chp 1 Title page	0	WP 0031 (10 pgs)	0
WP 0001 (4 pgs)	0	WP 0032 (18 pgs)	0
WP 0002 (12 pgs)	0	WP 0033 (2 pgs)	0
WP 0003 (20 pgs)	0	WP 0034 (4 pgs)	0
WP 0004 (4 pgs)	0	WP 0035 (6 pgs)	0
WP 0005 (6 pgs)	0	WP 0036 (8 pgs)	0
WP 0006 (8 pgs)	0	WP 0037 (2 pgs)	0
WP 0007 (8 pgs)	0	WP 0038 (6 pgs)	0
Chp 2 Title page	0	WP 0039 (6 pgs)	0
WP 0008 (6 pgs)	0	WP 0040 (12 pgs)	0
WP 0009 (22 pgs)	0	WP 0041 (4 pgs)	0
WP 0010 (8 pgs)	0	WP 0042 (8 pgs)	0
WP 0011 (2 pgs)	0	WP 0043 (6 pgs)	0
WP 0012 (54 pgs)	0	WP 0044 (4 pgs)	0
WP 0013 (26 pgs)	0	WP 0045 (4 pgs)	0
WP 0014 (26 pgs)	0	WP 0046 (4 pgs)	0
WP 0015 (4 pgs)	0	WP 0047 (8 pgs)	0
WP 0016 (4 pgs)	0	WP 0048 (4 pgs)	0
Chp 3 Title page	0	WP 0049 (4 pgs)	0
WP 0017 (2 pgs)	0	WP 0050 (4 pgs)	0
WP 0018 (24 pgs)	0	WP 0051 (2 pgs)	0
Chp 4 Title page	0	WP 0052 (4 pgs)	0
WP 0019 (4 pgs)	0	WP 0053 (2 pgs)	0
WP 0020 (8 pgs)	0	WP 0054 (2 pgs)	0
WP 0021 (4 pgs)	0	WP 0055 (2 pgs)	0
WP 0022 (2 pgs)	0	WP 0056 (24 pgs)	0
WP 0023 (4 pgs)	0	WP 0057 (6 pgs)	0
WP 0024 (6 pgs)	0	WP 0058 (4 pgs)	0
WP 0025 (54 pgs)	0	WP 0059 (4 pgs)	0
WP 0026 (4 pgs)	0	WP 0060 (6 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0061 (8 pgs)	0	WP 0110 (6 pgs)	0
WP 0062 (2 pgs)	0	WP 0111 (6 pgs)	0
WP 0063 (4 pgs)	0	WP 0112 (4 pgs)	0
WP 0064 (8 pgs)	0	WP 0113 (10 pgs)	0
WP 0065 (4 pgs)	0	WP 0114 (8 pgs)	0
WP 0066 (10 pgs)	0	WP 0115 (4 pgs)	0
WP 0067 (10 pgs)	0	WP 0116 (4 pgs)	0
WP 0068 (14 pgs)	0	WP 0117 (4 pgs)	0
WP 0069 (4 pgs)	0	WP 0118 (4 pgs)	0
WP 0070 (4 pgs)	0	WP 0119 (4 pgs)	0
WP 0071 (4 pgs)	0	WP 0120 (4 pgs)	0
WP 0072 (2 pgs)	0	WP 0121 (10 pgs)	0
WP 0073 (6 pgs)	0	WP 0122 (4 pgs)	0
WP 0074 (6 pgs)	0	WP 0123 (4 pgs)	0
WP 0075 (16 pgs)	0	WP 0124 (4 pgs)	0
WP 0076 (2 pgs)	0	WP 0125 (2 pgs)	0
WP 0077 (2 pgs)	0	WP 0126 (4 pgs)	0
WP 0078 (6 pgs)	0	WP 0127 (4 pgs)	0
WP 0079 (6 pgs)	0	WP 0128 (4 pgs)	0
WP 0080 (10 pgs)	0	WP 0129 (2 pgs)	0
WP 0081 (18 pgs)	0	WP 0130 (2 pgs)	0
WP 0082 (4 pgs)	0	WP 0131 (2 pgs)	0
WP 0083 (6 pgs)	0	WP 0132 (2 pgs)	0
WP 0084 (6 pgs)	0	WP 0133 (8 pgs)	0
WP 0085 (4 pgs)	0	WP 0134 (4 pgs)	0
WP 0086 (6 pgs)	0	WP 0135 (6 pgs)	0
WP 0087 (4 pgs)	0	WP 0136 (4 pgs)	0
WP 0088 (2 pgs)	0	WP 0137 (4 pgs)	0
WP 0089 (4 pgs)	0	WP 0138 (2 pgs)	0
WP 0090 (14 pgs)	0	WP 0139 (8 pgs)	0
WP 0091 (2 pgs)	0	WP 0140 (2 pgs)	0
WP 0092 (4 pgs)	0	WP 0141 (14 pgs)	0
WP 0093 (10 pgs)	0	WP 0142 (2 pgs)	0
WP 0094 (2 pgs)	0	WP 0143 (4 pgs)	0
WP 0095 (10 pgs)	0	WP 0144 (10 pgs)	0
WP 0096 (10 pgs)	0	WP 0145 (6 pgs)	0
WP 0097 (2 pgs)	0	WP 0146 (2 pgs)	0
WP 0098 (4 pgs)	0	WP 0147 (4 pgs)	0
WP 0099 (6 pgs)	0	WP 0148 (6 pgs)	0
WP 0100 (4 pgs)	0	WP 0149 (2 pgs)	0
WP 0101 (4 pgs)	0	WP 0150 (4 pgs)	0
WP 0102 (6 pgs)	0	WP 0151 (32 pgs)	0
WP 0103 (8 pgs)	0	WP 0152 (2 pgs)	0
WP 0104 (4 pgs)	0	WP 0153 (2 pgs)	0
WP 0105 (4 pgs)	0	WP 0154 (4 pgs)	0
WP 0106 (2 pgs)	0	WP 0155 (2 pgs)	0
WP 0107 (4 pgs)	0	WP 0156 (30 pgs)	0
WP 0108 (6 pgs)	0	WP 0157 (24 pgs)	0
WP 0109 (6 pgs)	0	WP 0158 (16 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0159 (2 pgs)	0	WP 0204 (2 pgs)	0
WP 0160 (4 pgs)	0	WP 0205 (2 pgs)	0
WP 0161 (14 pgs)	0	WP 0206 (4 pgs)	0
WP 0162 (12 pgs)	0	WP 0207 (2 pgs)	0
WP 0163 (10 pgs)	0	WP 0208 (2 pgs)	0
WP 0164 (4 pgs)	0	WP 0209 (4 pgs)	0
WP 0165 (6 pgs)	0	WP 0210 (4 pgs)	0
WP 0166 (6 pgs)	0	WP 0211 (2 pgs)	0
WP 0167 (8 pgs)	0	WP 0212 (6 pgs)	0
WP 0168 (4 pgs)	0	WP 0213 (2 pgs)	0
WP 0169 (6 pgs)	0	WP 0214 (10 pgs)	0
WP 0170 (4 pgs)	0	WP 0215 (2 pgs)	0
WP 0171 (4 pgs)	0	WP 0216 (2 pgs)	0
WP 0172 (2 pgs)	0	WP 0217 (4 pgs)	0
WP 0173 (4 pgs)	0	WP 0218 (34 pgs)	0
WP 0174 (4 pgs)	0	WP 0219 (6 pgs)	0
WP 0175 (12 pgs)	0	WP 0220 (2 pgs)	0
WP 0176 (4 pgs)	0	WP 0221 (2 pgs)	0
WP 0177 (4 pgs)	0	WP 0222 (4 pgs)	0
WP 0178 (4 pgs)	0	WP 0223 (8 pgs)	0
WP 0179 (8 pgs)	0	WP 0224 (4 pgs)	0
WP 0180 (8 pgs)	0	WP 0225 (2 pgs)	0
WP 0181 (6 pgs)	0	WP 0226 (2 pgs)	0
WP 0182 (10 pgs)	0	WP 0227 (46 pgs)	0
WP 0183 (4 pgs)	0	WP 0228 (12 pgs)	0
Volume 2		WP 0229 (2 pgs)	0
Cover	0	WP 0230 (2 pgs)	0
Safety Summary (42 pgs)	0	WP 0231 (2 pgs)	0
i thru vi	0	WP 0232 (4 pgs)	0
WP 0184 (2 pgs)	0	WP 0233 (2 pgs)	0
WP 0185 (6 pgs)	0	WP 0234 (2 pgs)	0
WP 0186 (4 pgs)	0	WP 0235 (8 pgs)	0
WP 0187 (10 pgs)	0	WP 0236 (2 pgs)	0
WP 0188 (4 pgs)	0	WP 0237 (2 pgs)	0
WP 0189 (6 pgs)	0	WP 0238 (4 pgs)	0
WP 0190 (4 pgs)	0	WP 0239 (2 pgs)	0
WP 0191 (8 pgs)	0	WP 0240 (4 pgs)	0
WP 0192 (4 pgs)	0	WP 0241 (6 pgs)	0
WP 0193 (4 pgs)	0	WP 0242 (4 pgs)	0
WP 0194 (10 pgs)	0	WP 0243 (46 pgs)	0
WP 0195 (4 pgs)	0	WP 0244 (26 pgs)	0
WP 0196 (6 pgs)	0	WP 0245 (6 pgs)	0
WP 0197 (2 pgs)	0	WP 0246 (4 pgs)	0
WP 0198 (2 pgs)	0	WP 0247 (8 pgs)	0
WP 0199 (4 pgs)	0	WP 0248 (24 pgs)	0
WP 0200 (2 pgs)	0	WP 0249 (8 pgs)	0
WP 0201 (2 pgs)	0	WP 0250 (12 pgs)	0
WP 0202 (2 pgs)	0	WP 0251 (10 pgs)	0
WP 0203 (4 pgs)	0	WP 0252 (12 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0253 (2 pgs)	0	WP 0277 (14 pgs)	0
WP 0254 (6 pgs)	0	WP 0278 (4 pgs)	0
WP 0255 (8 pgs)	0	WP 0279 (4 pgs)	0
WP 0256 (4 pgs)	0	WP 0280 (4 pgs)	0
WP 0257 (2 pgs)	0	WP 0281 (4 pgs)	0
WP 0258 (4 pgs)	0	WP 0282 (12 pgs)	0
WP 0259 (4 pgs)	0	WP 0283 (4 pgs)	0
WP 0260 (10 pgs)	0	WP 0284 (4 pgs)	0
WP 0261 (8 pgs)	0	WP 0285 (6 pgs)	0
WP 0262 (2 pgs)	0	WP 0286 (4 pgs)	0
WP 0263 (4 pgs)	0	WP 0287 (4 pgs)	0
WP 0264 (8 pgs)	0	WP 0288 (4 pgs)	0
WP 0265 (4 pgs)	0	WP 0289 (4 pgs)	0
WP 0266 (4 pgs)	0	WP 0290 (6 pgs)	0
WP 0267 (4 pgs)	0	WP 0291 (16 pgs)	0
WP 0268 (2 pgs)	0	WP 0292 (16 pgs)	0
WP 0269 (4 pgs)	0	Chp 5 Title page	0
WP 0270 (8 pgs)	0	WP 0293 (2 pgs)	0
WP 0271 (8 pgs)	0	WP 0294 (4 pgs)	0
WP 0272 (2 pgs)	0	WP 0295 (24 pgs)	0
WP 0273 (4 pgs)	0	WP 0296 (4 pgs)	0
WP 0274 (4 pgs)	0	WP 0297 (10 pgs)	0
WP 0275 (2 pgs)	0	Schematics (98 pgs)	0
WP 0276 (4 pgs)	0		

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February 2013

MAINTENANCE MANUAL
COMMERCIAL-OFF-THE-SHELF (COTS)
for
MINE RESISTANT AMBUSH PROTECTED
ALL TERRAIN VEHICLE (M-ATV)

M1240
NSN: 2355-01-575-9632 (EIC 1UT)

M1240A1
NSN: 2355-01-596-1330 (EIC 1ZW)

M1245
NSN: 2355-01-586-8070 (EIC 1VE)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

(A) Army - You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is <https://tulsa.tacom.army.mil>. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and to better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/ TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

(F) Air Force - For users without access to JCALS, submit AFTO Form 22 directly to WR/ALC/GRVEB, Robins AFB GA. Send in your recommended changes via electronic mail. Our e-mail address is robins.ce.afto22@robins.af.mil.

*This manual supersedes TM 9-2355-335-23-1, 15 dated June 2011.

COPYRIGHT RELEASE STATEMENT: Oshkosh Corporation states this Commercial Off the Shelf (COTS) manual dated 28 February 2013 is free from copyright restrictions. The Government may edit, reprint, and distribute information in this manual as required.

DISTRIBUTION STATEMENT C: Distribution authorized to US Government agencies and their contractors; proprietary information. This publication is Administrative-Operational Use required for administrative and operational purposes, as determined on 02 October 2009. Other requests for this document shall be referred to U.S. Army TACOM Life Cycle Management Command, PM-MRAP, ATTN: AMSTA-LCC-MM/TECH PUBS, 6501 E. 11 Mile Road, Warren, MI 48397-5000.

DESTRUCTION NOTICE: Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

TABLE OF CONTENTS

WP Sequence No.

VOLUME 1

CHAPTER 1	GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION	
	General Information	WP 0001
	Model Configuration Identification	WP 0002
	Equipment Description and Data	WP 0003
	Mechanical Theory	WP 0004
	Electrical Theory	WP 0005
	Service Upon Receipt	WP 0006
	Preparation For Storage Or Shipment	WP 0007
CHAPTER 2	TROUBLESHOOTING PROCEDURES	
	Air Conditioner Troubleshooting	WP 0008
	Anti-Lock Brake System (ABS) Troubleshooting	WP 0009
	Brake System Troubleshooting	WP 0010
	Cooling System Troubleshooting	WP 0011
	Electrical Troubleshooting	WP 0012
	Engine/Transmission Troubleshooting	WP 0013
	Fire Suppression System Troubleshooting	WP 0014
	Steering System Troubleshooting	WP 0015
	Drive Line Troubleshooting	WP 0016
CHAPTER 3	PMCS MAINTENANCE INSTRUCTIONS	
	Preventive Maintenance Checks and Services (PMCS) Introduction	WP 0017
	Preventive Maintenance Checks and Services (PMCS)	WP 0018
CHAPTER 4	MAINTENANCE INSTRUCTIONS	
	ACCESSORIES	
	Air Conditioner Compressor Replacement (Original Compressor)	WP 0019
	Air Conditioner Compressor Replacement (Updated Compressor)	WP 0020
	Air Conditioner Condenser Replacement	WP 0021
	Air Conditioner Leak Detection	WP 0022
	Air Conditioner Receiver/Dryer Replacement	WP 0023
	Air Conditioner Refrigerant R-134A Recovery/Evacuation and Recharging	WP 0024

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

ACCESSORIES (continued)

Antenna Platform Replacement (M1240/M1240A1)	WP 0025
Coupler Box Replacement (M1240/M1240A1)	WP 0026
Crew Vehicle Receiver/Jammer (CVRJ) Box Replacement (M1240/M1240A1)	WP 0027
Driver Side Splash Guard Replacement (AFES Nitrogen Detection)	WP 0028
Driver Side Splash Guard Replacement (AFES Linear Wire Detection)	WP 0029
Front Mud Flap Replacement	WP 0030
HVAC Replacement (Front)	WP 0031
HVAC Replacement, Rear (M1240/M1240A1)	WP 0032
Lower Plenum Replacement	WP 0033
Passenger Side Splash Guard Replacement (AFES Nitrogen Detection)	WP 0034
Passenger Side Splash Guard Replacement (AFES Linear Wire Detection)	WP 0035
Rear Air Conditioner Replacement (M1245)	WP 0036
Rear Fender Extension Replacement (Mud Protection)	WP 0037
Spare Tire Unstow/Stow (For 395/85R20 Spare Tire Carrier)	WP 0038
Spare Tire Unstow/Stow (For Upgraded Spare Tire Carrier)	WP 0039
Spare Tire Unstow/Stow (M1245)	WP 0040
Tire Carrier Replacement (For 395/85R20 Spare Tire Carrier)	WP 0041
Tire Carrier Replacement (For Upgraded Spare Tire Carrier)	WP 0042
Tire Carrier Replacement (M1245)	WP 0043
Windshield Wiper Arm Replacement	WP 0044
Windshield Wiper Motor Replacement	WP 0045

ARMOR

Belly Deflector Crossmember Weldment Replacement	WP 0046
Capsule Armor Replacement	WP 0047
Center Belly Deflector Panel Replacement (M1240/M1245)	WP 0048
Driver Side Belly Deflector Panel Replacement (M1240/M1245)	WP 0049
Engine Belly Deflector Panel Replacement	WP 0050
Litter Door Dyneema Panel Replacement (M1245)	WP 0051
Passenger Side Belly Deflector Panel Replacement (M1240/M1245)	WP 0052
Rear Cargo Door Dyneema Panel Replacement (M1245)	WP 0053
Rear Wall Dyneema Panel Replacement (M1245)	WP 0054

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

ARMOR (continued)

Side Wall Dyneema Panel Replacement (M1245)	WP 0055
Underbody Improvement and Belly Deflector Armor Panels Replacement (M1240A1)	WP 0056
Wheel Well Deflector Panel, Front, Replacement (M1240A1).	WP 0057
Wheel Well Deflector Panel, Rear, Replacement (M1240A1)	WP 0058
Wheel Well Deflector Panel Replacement (M1240/M1245)	WP 0059

AUTOMATIC FIRE EXTINGUISHING SYSTEM (AFES)

Fire Suppression System Aerosol Generator Replacement, Engine Compartment (Four Generator AFES System)	WP 0060
Fire Suppression System Aerosol Generator Replacement, Engine Compartment (Five Generator AFES System).	WP 0061
Fire Suppression System Chassis, Switch Replacement	WP 0062
Fire Suppression System Actuation 4-Way Junction Replacement.	WP 0063
Fire Suppression System Control Replacement	WP 0064
Fire Suppression System Cylinder Replacement, Capsule (Platform Mount)	WP 0065
Fire Suppression System Cylinder Replacement, Capsule (Wall Mount)	WP 0066
Fire Suppression System Cylinder Replacement, Undercarriage (AFES Nitrogen Detection)	WP 0067
Fire Suppression System Cylinder Replacement, Undercarriage (AFES Linear Wire Detection)	WP 0068
Fire Suppression System Front Optical Sensor Replacement	WP 0069
Fire Suppression System Power Supply Replacement	WP 0070
Fire Suppression System Rear Optical Sensor Replacement	WP 0071
Fire Suppression System Sensor Line Replacement Chart, Undercarriage (AFES Nitrogen Detection)	WP 0072
Fire Suppression System Sensor Line Replacement Chart, Undercarriage/Engine (AFES Linear Wire Detection)	WP 0073
Fire Suppression System Service and Gauge Replacement, Undercarriage (AFES Nitrogen Detection)	WP 0074
Fire Suppression Systems Testing	WP 0075
Fire Suppression System Tube and Diffuser Replacement (Wall Mount Cylinder) . . .	WP 0076

AXLES

Axle Differential Drain/Fill	WP 0077
Wheel/Tire Assembly Replacement.	WP 0078
Coil Spring and Seat Replacement	WP 0079

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

AXLES (continued)

Control Arm Ball Joint Replacement	WP 0080
Differential Housing and Differential Replacement	WP 0081
Differential Lock Replacement	WP 0082
Differential Yoke and Seal Replacement	WP 0083
Halfshaft and Seal Replacement	WP 0084
Hub Repair	WP 0085
Hub Replacement	WP 0086
Inner Shaft Replacement	WP 0087
Jounce Bumper Replacement	WP 0088
Knuckle Replacement	WP 0089
Propeller Shaft Replacement	WP 0090
Rebound Bumper Replacement	WP 0091
Shock Absorber Replacement (M1240/M1245)	WP 0092
Shock Absorber Replacement (M1240A1)	WP 0093
Skid Plate Replacement	WP 0094
Spider/Spindle Replacement	WP 0095
Transfer Case Assembly Replacement	WP 0096
Transfer Case Drain/Fill	WP 0097
Transfer Case Shift Stop Switch Replacement/Adjustment	WP 0098
Upper and Lower Control Arm Replacement	WP 0099
Wheel End Drain/Fill	WP 0100
Wheel End Replacement	WP 0101

BRAKES

Air Dryer Filter Replacement	WP 0102
Air Dryer Replacement	WP 0103
Air Governor Adjustment	WP 0104
Air Governor Replacement	WP 0105
Air Pressure Alarm Replacement	WP 0106
Air Reservoir Check Valve Replacement	WP 0107
Air Reservoir Replacement, Primary (Four Tank System)	WP 0108
Air Reservoir Replacement, Secondary (Four Tank System)	WP 0109
Air Reservoir Replacement, Secondary (Two Tank System)	WP 0110

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
BRAKES (continued)	
Air Reservoir Replacement, Supply No. 1 (Four Tank System)	WP 0111
Air Reservoir Replacement, Supply No. 2 (Four Tank System)	WP 0112
Air Reservoir Replacement, Supply/Primary (Two Tank System)	WP 0113
Air Solenoid Manifolds Replacement.	WP 0114
Anti-Lock Brake System (ABS) Electronic Control Unit (ECU) Replacement	WP 0115
Anti-Lock Brake System (ABS) Valve Replacement, Axle No. 1.	WP 0116
Anti-Lock Brake System (ABS) Valve Replacement, Axle No. 2.	WP 0117
Automatic Traction Control (ATC) Valve Double Check Valve Replacement	WP 0118
Automatic Traction Control (ATC) Valve Replacement	WP 0119
Brake Chamber Replacement, Axle No. 1.	WP 0120
Brake Chamber Replacement, Axle No. 2.	WP 0121
Brake Drum Replacement	WP 0122
Brake Inspection and Adjustment, Axle No. 1 and Axle No. 2.	WP 0123
Brake Shoe Replacement	WP 0124
Caging/Uncaging Brakes.	WP 0125
Pressure Protection Valve Replacement, Emergency Supply.	WP 0126
Pressure Protection Valve Replacement, Secondary Air Reservoir	WP 0127
Quick Release Valve Replacement, Axle No. 1.	WP 0128
Quick Release Valve Replacement, Axle No. 2.	WP 0129
Rear Gladhands Quick Release Valve Replacement	WP 0130
Safety Relief Valve Replacement	WP 0131
Service Brake Relay Double Check Valve Replacement	WP 0132
Service Brake Relay Valve Replacement	WP 0133
Spring Brake Double Check Valve Replacement	WP 0134
Spring Brake Relay Valve Replacement	WP 0135
Spring Brake Valve Replacement	WP 0136
Tractor Protection Valve Replacement	WP 0137
CAPSULE	
5th Seat Replacement (M1245).	WP 0138
Auxiliary Mirror Replacement.	WP 0139
B-Pillar Handle Replacement	WP 0140
Capsule Door Replacement	WP 0141

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
CAPSULE (continued)	
Capsule Step Replacement (M1240/M1245)	WP 0142
Capsule Step Replacement (M1240A1)	WP 0143
Capsule Window Replacement	WP 0144
Capsule Windshield Replacement (M1240/M1240A1)	WP 0145
Check-6 Control Boxes Replacement	WP 0146
Dash Control Replacement, HVAC	WP 0147
Dash Panel Replacement, Air System	WP 0148
Dash Panel Replacement, Instrument Panel	WP 0149
Dash Panel Replacement, Transmission	WP 0150
Dash Replacement	WP 0151
Floor Mat Replacement	WP 0152
Gunner's Platform Adjustment	WP 0153
Gunner's Platform Mat Replacement (M1240A1)	WP 0154
Gunner Harness Retractor Replacement	WP 0155
Hood and Grill Replacement (M1245)	WP 0156
Hood Replacement (AFES Linear Wire Detection)	WP 0157
Hood Replacement (AFES Nitrogen Detection)	WP 0158
Hood Latch Replacement	WP 0159
Mirror Replacement	WP 0160
Rear Capsule Doors Replacement (M1245)	WP 0161
Seat Replacement (M1240/M1245)	WP 0162
Seat Replacement (M1240A1)	WP 0163
Seatbelt Replacement, Driver (M1240/M1245)	WP 0164
Seatbelt Replacement, Passenger (M1240/M1245)	WP 0165
Seatbelt Replacement (M1240A1)	WP 0166
Spotlight Bracket Replacement	WP 0167
CENTRAL TIRE INFLATION SYSTEM (CTIS)	
Dash Panel Replacement, CTIS	WP 0168
CTIS Manifold Replacement	WP 0169
CTIS Quick Release Valve Replacement Axle No. 1	WP 0170
CTIS Quick Release Valve Replacement Axle No. 2	WP 0171

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

COOLING

Charge Air Cooler Replacement	WP 0172
Coolant Reservoir Replacement	WP 0173
Cooling Shroud Replacement	WP 0174
Cooling System Assembly and Supports Removal/Installation	WP 0175
Cooling System Drain/Fill (Reservoir Equipped)	WP 0176
Cooling System Drain/Fill (Surge Tank Equipped)	WP 0177
Fan Clutch Replacement	WP 0178
Fan and Fan Shroud Replacement	WP 0179
Radiator and Transmission Oil Cooler Replacement.	WP 0180
Radiator Baffle Replacement.	WP 0181
Surge Tank Replacement	WP 0182
Thermostat Replacement	WP 0183

VOLUME 2

ELECTRICAL

12-Volt Power Convertor Replacement	WP 0184
Alternator Replacement.	WP 0185
Batteries Disconnect/Connect (M1240/M1240A1).	WP 0186
Batteries Disconnect/Connect (M1245).	WP 0187
Battery Disconnect Switch Replacement.	WP 0188
Battery Isolator Replacement	WP 0189
Battery PDU Box Replacement (M1245).	WP 0190
Battery Replacement (M1240/M1240A1)	WP 0191
Blackout Drivelight Replacement.	WP 0192
Check-6 Rear Composite Light Replacement	WP 0193
Circuit Breaker Replacement, Auxiliary (M1240/M1240A1)	WP 0194
Circuit Breaker Replacement, Dash	WP 0195
Clearance Lights Replacement	WP 0196
Deicer Circuit Breaker Replacement	WP 0197
Dimmer Replacement	WP 0198
Electromagnetic Interference (EMI) Filter Replacement	WP 0199
Flasher Replacement	WP 0200
Front Composite Light Replacement	WP 0201

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
ELECTRICAL (continued)	
Headlight Replacement	WP 0202
Ignition Relay Replacement	WP 0203
Infrared (IR) Light Replacement (M1245)	WP 0204
Mk-44 Receptacle Replacement (M1245)	WP 0205
NATO Slave Receptacle Replacement (For Vehicles With Updated SPARK Or M1245)	WP 0206
Parking Brake Stoplight Switch Replacement	WP 0207
PDU Deck Box Replacement (M1245)	WP 0208
Pressure Switch Replacement	WP 0209
Rear Composite Light Replacement	WP 0210
Reverse Light Replacement (M1240/M1240A1)	WP 0211
Spotlight Controller Replacement	WP 0212
Spotlight Replacement	WP 0213
Starter Replacement	WP 0214
Stoplight Switch Replacement	WP 0215
Transmission Control Module (TCM) Replacement	WP 0216
Voltage Regulator Replacement	WP 0217
Wiring Harness Repair	WP 0218
ENGINE/TRANSMISSION	
Air Compressor Replacement	WP 0219
Air Conditioner Drive Belt Replacement	WP 0220
Alternator Drive Belt Replacement	WP 0221
Crankshaft Rear Seal Replacement	WP 0222
Engine Electronic Control Module (ECM) Replacement	WP 0223
Engine Oil Drain/Fill	WP 0224
Engine Oil Filter Replacement	WP 0225
Passenger Side Engine Panel Replacement (M1240/M1245)	WP 0226
Powertrain Replacement	WP 0227
Engine/Transmission Assembly/Disassembly	WP 0228
Ring Gear and Flexplate Adapter Replacement	WP 0229
Transmission Breather Replacement	WP 0230
Transmission Cooler Replacement	WP 0231

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
ENGINE/TRANSMISSION (continued)	
Transmission Drain/Fill	WP 0232
Transmission Filter Replacement	WP 0233
Transmission Spring Support and Bracket Replacement	WP 0234
Turbocharger Assembly Replacement	WP 0235
Vehicle Interface Module (VIM) Replacement	WP 0236
Water Pump Belt Adjustment	WP 0237
Water Pump Belt Replacement	WP 0238
EXHAUST	
Exhaust Pipe Replacement (M1240/M1245)	WP 0239
Exhaust Pipe Replacement (M1240A1)	WP 0240
Muffler Replacement (M1240/M1245)	WP 0241
Muffler Replacement (M1240A1)	WP 0242
FRAME	
Cargo Deck Replacement (M1245)	WP 0243
Cargo Deck Replacement (M1240/M1240A1)	WP 0244
Cargo Deck Litter Door Replacement (M1245)	WP 0245
Cargo Deck Litter Door Frame Replacement (M1245)	WP 0246
Cargo Deck Rear Wall Replacement (M1245)	WP 0247
Cargo Deck Rear Door Replacement (M1245)	WP 0248
Cargo Deck Side Wall Replacement (M1245)	WP 0249
Front Bumper Replacement (Standard SPARK)	WP 0250
Front Bumper Replacement (Updated SPARK)	WP 0251
GFE Cabinet Replacement (M1245)	WP 0252
Push Bumper Replacement (M1245)	WP 0253
Quick Lock Floor Replacement (M1245)	WP 0254
Rear Crossmember Replacement (M1240/M1240A1)	WP 0255
Spark Bar and Strut Replacement (Updated SPARK)	WP 0256
FUEL	
Air Cleaner Assembly Replacement (M1240/M1245)	WP 0257
Air Cleaner Assembly Replacement (M1240A1)	WP 0258
Air Filter Replacement	WP 0259
Air Intake Hoses Replacement (M1240/M1245)	WP 0260

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
FUEL (continued)	
Air Intake Hoses Replacement (M1240A1)	WP 0261
Fuel Filter Replacement	WP 0262
Fuel Lines Replacement.	WP 0263
Fuel Tank Replacement	WP 0264
Fuel/Water Separator Base Replacement	WP 0265
Fuel/Water Separator Filter Replacement	WP 0266
WINCH	
Winch Cable Guide and Guard Replacement	WP 0267
Winch Cable Replacement (Standard SPARK)	WP 0268
Winch Cable Replacement (Updated SPARK)	WP 0269
Winch/Front Crossmember Replacement (Updated SPARK)	WP 0270
Winch Replacement (Standard SPARK)	WP 0271
STEERING	
Lower Steering Shaft Replacement	WP 0272
Middle Steering Shaft Replacement	WP 0273
Pitman Arm Replacement.	WP 0274
Power Steering Filter Replacement	WP 0275
Power Steering Pump Replacement	WP 0276
Power Steering Reservoir and Bracket Replacement	WP 0277
Power Steering Reservoir Drain/Fill	WP 0278
Primary Steering Gear Replacement	WP 0279
Secondary Steering Gear Replacement.	WP 0280
Steering Arm Replacement	WP 0281
Steering Column and Bracket Replacement	WP 0282
Steering Gear Mitre Replacement	WP 0283
Steering Gear Relief Adjustment	WP 0284
Steering Gear Tray Replacement.	WP 0285
Steering Wheel Replacement.	WP 0286
Tie Rod Replacement.	WP 0287
Toe Control Link Replacement, Axle No. 1	WP 0288
Toe Control Link Replacement, Axle No. 2	WP 0289
Upper Steering Shaft Replacement	WP 0290

TABLE OF CONTENTS (CONTINUED)

		<u>WP Sequence No.</u>
	TECHNICAL SUPPORT	
	General Maintenance	WP 0291
	Torque Instructions	WP 0292
CHAPTER 5	SUPPORTING INFORMATION	
	References	WP 0293
	Introduction For Standard Two-Level Maintenance Allocation Chart (MAC)	WP 0294
	Maintenance Allocation Chart (MAC)	WP 0295
	Expendable and Durable Items List	WP 0296
	Schematics Symbols	WP 0297
	Schematics	Foldouts

HOW TO USE THIS MANUAL

This two-volume manual is divided into CHAPTERS and WORK PACKAGES. For a specific Chapter or Work Package, refer to the TABLE OF CONTENTS (page iii).

For ordering replacement parts, note the major component or assembly the part is associated with. Use the major component or assembly name to find the matching figure in TM 9-2355-335-24P - REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL) MANUAL COMMERCIAL-OFF-THE SHELF (COTS) for MINE RESISTANT AMBUSH PROTECTED (MRAP) ALL TERRAIN VEHICLE (M-ATV). Match the part to the callout in the RPSTL figure. Find the callout number in column 2 (Item Number) of the RPSTL figure parts list.

This manual contains troubleshooting procedures for the M1240, M1245, and M1240A1. The troubleshooting section is setup by work package for each system. Within each work package, symptoms are listed for each system. Following a prescribed flow path through making decisions will lead to a solution to remedy the symptom. The first column contains the probable caused for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. Some systems have an additions column for blink codes. Blink codes are used to assist in troubleshooting without the use of special diagnostic equipment. Refer to the specific system troubleshooting work package for detailed instructions on troubleshooting with blink codes.

This manual contains maintenance instructions for the M1240, M1245, and M1240A1, refer to (WP 0002) for information about differences between models and configurations.

Items or instructions unique to a specific model or configuration are called out through the use of titles, notes or steps. If no variant is called out the procedure is for all M-ATV variants.

Consult Operators Manual (TM 9-2355-335-10) when looking for information on performing operator's Preconditions and Follow-On procedures listed at the beginning of each maintenance work package. Procedures listed without a link number are operator's procedures.

The TABLE OF CONTENTS lists the titles of each Chapter and Work Package.

CHAPTER 1 provides general information, equipment description, and theory of operation.

CHAPTER 2 provides troubleshooting procedures. These work packages can be used to determine causes of malfunctions encountered when operating the vehicle.

CHAPTER 3 provides Preventive Maintenance Checks and Services (PMCS) instructions.

CHAPTER 4 provides maintenance instructions. These work packages can be used to perform maintenance on the vehicle.

CHAPTER 5 contains supporting information. Refer to vehicle schematics to identify hose codes, connector numbers, and wire numbers.

The illustrations throughout this manual contain circled and non-circled numerical callouts pointing to various components mentioned in the procedural steps. A circled callout indicates a mandatory replacement part. Mandatory replacement parts must be discarded after removal and replaced with a new part, which is listed in the Materials/Parts section located at the beginning of the task.

Prior to performing any maintenance functions on the M-ATV vehicle, ALWAYS do the following:

- Read and follow the WARNINGS, CAUTIONS, and NOTES in all work packages.
- Read the Safety Summary.
- Read the Equipment Description and Data located in Chapter 1.
- Read completely through the maintenance procedure to familiarize yourself with the procedure and the affected parts before beginning work.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION FOR M1240, M1240A1, AND M1245

GENERAL INFORMATION

PURPOSE

This manual is provided to maximize use of the M-ATV by presenting clear maintenance and troubleshooting instructions. Read these instructions thoroughly before operating vehicle.

SCOPE

This manual is used for field maintenance and troubleshooting of the Mine Resistant Ambush Protected-All Terrain Vehicle (M-ATV). The M-ATV is a multi-terrain vehicle used to transport military personnel and equipment.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

Army: If your M-ATV needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance.

All non-Aviation/Missile EIRs and PQDRs must be submitted through the Product Data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: <https://www.pdrep.csd.disa.mil/>.

If you do not have internet access, you may submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified (DA PAM 750-8, The Army Maintenance Management System (TAMMS)). We will send you a reply.

Air Force: Submit QDR per Technical Order 00-35D-54, USAF Deficiency Reporting and Investigating System.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastic, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF FORM 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE

Procedures for destruction of equipment to prevent enemy use can be found in TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment To Prevent Enemy Use (U.S. Army TACOM Life Cycle Management Command).

ABBREVIATIONS/ACRONYMS

Abbreviations and acronyms used in this manual are listed below:

AAL	Additional Authorized List
ABS	Anti-lock Brake System
AC	Alternating Current
A/C	Air Conditioner
ADM	Autonomous Diagnostic Manager
ATC	Automatic Traction Control
BII	Basic Issue Items
C	Celsius
CAGE	Commercial and Government Entity
CARC	Chemical Agent Resist Coating
CC	Cross Country
CCA	Cold Cranking Amps
CCB	Camera Control Box
CCGVW	Cross Country Gross Vehicle Weight
CID	Cubic Inch Displacement
COEI	Components of End Item
CPU	Central Processing Unit
cm	Centimeters
CTIS	Central Tire Inflation System
ea.	Each
ECM	Electronic Control Module (pertains to engine)
ECU	Electronic Control Unit
EFP	Explosively Formed Penetrator
EMER	Emergency
F	Fahrenheit
FMIS	Failure Mode Identifiers
FSCM	Federal Supply Code for Manufacturer
ft.	Feet
GAA	Grease Automotive and Artillery
gal.	Gallon
GCW	Gross Combination Weight
GCWR	Gross Combination Weight Rating
GVW	Gross Vehicle Weight
hp.	Horsepower
HWY	Highway
IAW	In Accordance With
in.	inches
ISO	International Organization for Standardization
kg.	Kilogram

km	Kilometer
kmh	Kilometer Per Hour
kPa	Kilopascals
kW	Kilowatt
L	Liter
lb-ft	Pounds - Foot
lbs	Pounds
LCD	Liquid Crystal Display
LI	Lubrication Instructions
m	Meters
M-ATV	MRAP All-Terrain Vehicle
Max	Maximum
mm	Millimeter
mph	Miles per Hour
MRAP	Mine Resistant Ambush Protected
MSD	Maintenance Support Device
MSS	Mud/Sand/Snow
NATO	North Atlantic Treaty Organization
N•m	Newton-Meters
NSN	National Stock Number
No.	Number
OE/HDO	OIL Engine/Heavy Duty Oil
P.A.G.	Polyalkylene Glycol Oil
PMCS	Preventive Maintenance Checks and Services
psi	Pounds per Square Inch
qt.	Quart
qty	Quantity
rpm	Revolutions per Minute
rqr	Required
SAE	Society of Automotive Engineers
SOP	Standard Operating Procedure
SPARK	Self-Protection Adaptive Roller Kit
SPD	Speed
SST	Start-Up Self Test
TGRS	Turret Gunner Restraint System
U/I	Unit of Issue
U/M	Unit of Measure
VCM	Vehicle Curb Weight
VDC	Voltage Direct Current
VIM	Vehicle Interface Module

END OF WORK PACKAGE

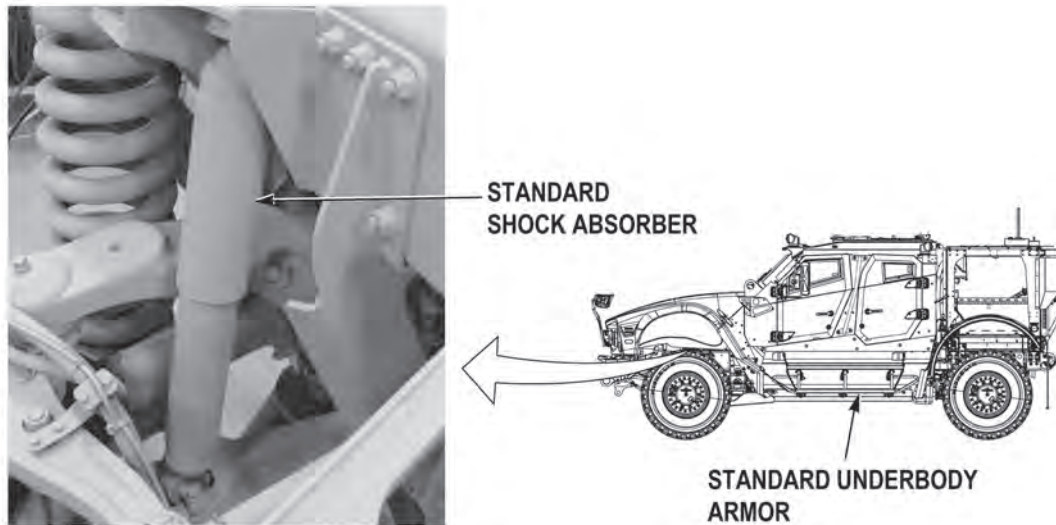
MODEL CONFIGURATION IDENTIFICATION

This work package will aid in identifying what model/configuration of M-ATV is being serviced.

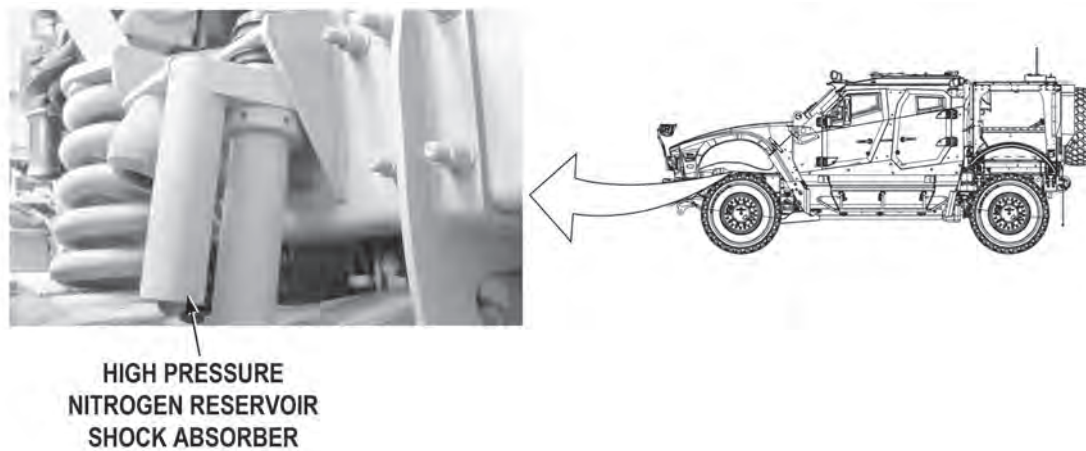
Shown below are ways to identify models/configurations.

M1240

The M1240 can be quickly identified by the presence of standard hydraulic shock absorbers.

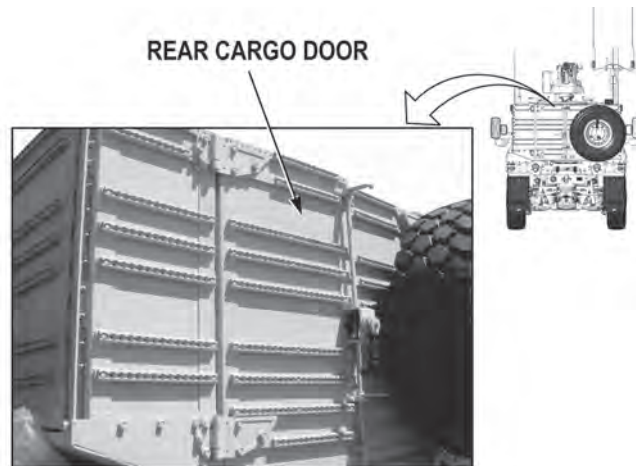
**M1240A1**

The M1240A1 can be quickly identified by the presence of high pressure nitrogen reservoir shock absorbers.



M1245

The M1245 can be quickly identified by the presence of rear cargo doors.



The following sections help to identify the different configurations that can be found on the M1240, M1240A1, and the M1245.

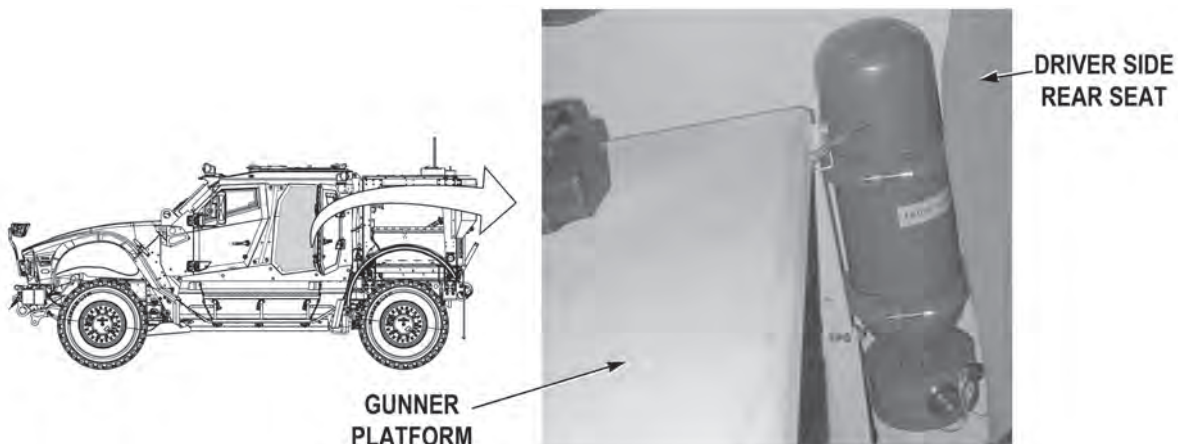
- The Description briefly describes the unique configuration being addressed.
- The Key Word(s) identify how this configuration will be identified in the Preconditions, Follow-On Maintenance, and body of the work packages contained in this manual.
- The Key Identification Item(s) identifies a unique item that can be used to determine if the vehicle being serviced incorporates the configuration being addressed in this section.

The following items cover the differences in the Automatic Fire Extinguishing System (AFES) areas of the vehicle:

Description: Vehicles equipped with capsule AFES using cylinder mounted on the gunner platform, driver side rear inside the capsule

Key Words: Cylinder, Platform Mount

Key Identification Item: Fire suppression capsule cylinder located in the capsule mounted on the driver side rear of the gunner platform



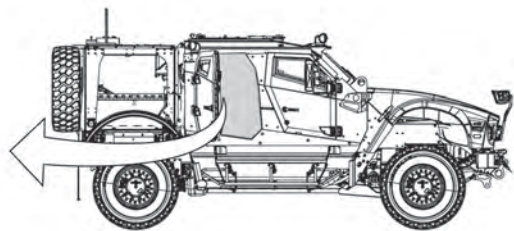
Description: Vehicles equipped with capsule AFES using cylinder mounted high on the rear wall inside the capsule

Key Words: Cylinder, Wall Mount

Key Identification Item: Fire suppression system capsule cylinder is located in the capsule mounted high on the rear wall of the capsule



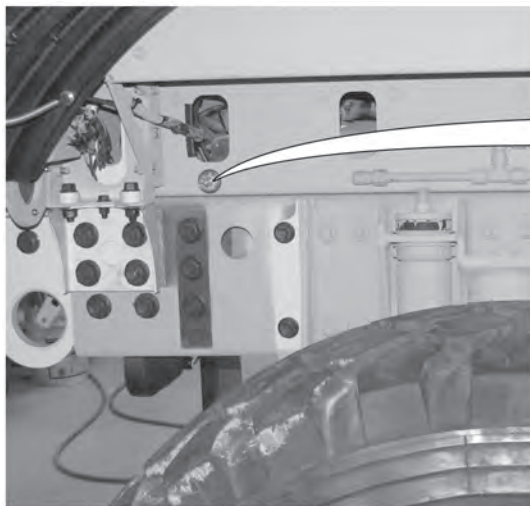
CAPSULE REAR WALL



Description: Vehicles equipped with undercarriage AFES using nitrogen sensor Lines

Key Words: AFES Nitrogen Detection

Key Identification Item: Nitrogen Pressure Gauge on Passenger Side Rear of Cargo Deck



PASSENGER SIDE REAR

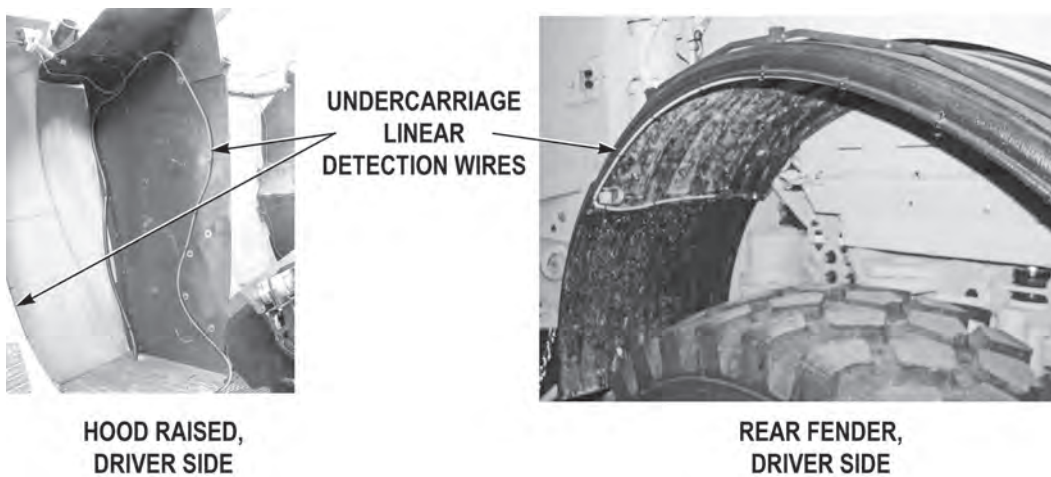


NITROGEN PRESSURE GAUGE

Description: Vehicles equipped with undercarriage AFES using linear wire detection (Updated M1240, M1240A1, M1245)

Key Words: AFES Linear Detection Wire

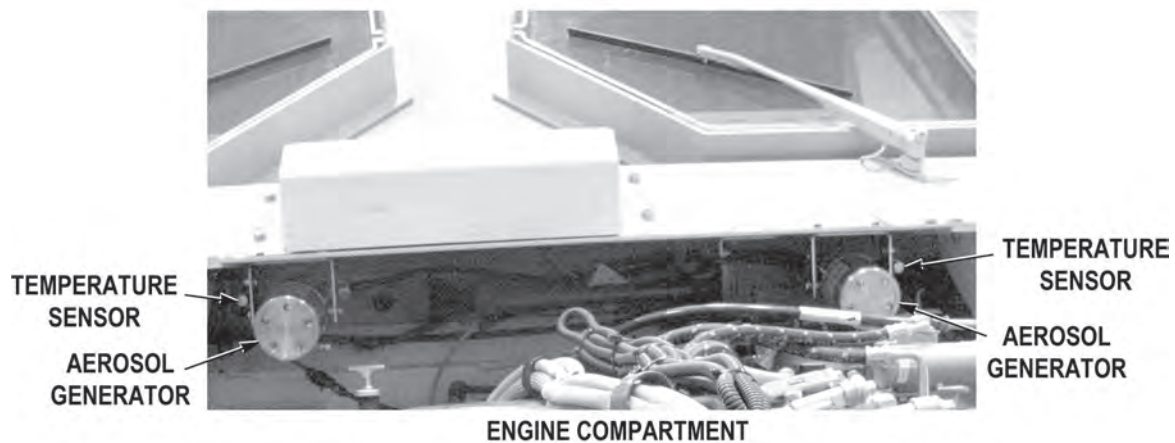
Key Identification Items: Blue linear detection wires in place of orange nitrogen tubing located on underside of rear fenders and on hood splash guards



Description: Vehicles equipped with engine compartment AFES using Four Aerosol Generators

Key Words: Four Generator System

Key Identification Items: Four equally sized aerosol generators; two mounted high on firewall and two mounted on either side of the cooling pack, each aerosol generator will have a temperature sensor near each of the four aerosol generators



Description: Vehicles equipped with engine compartment AFES using five aerosol generators

Key Words: Five Generator System

Key Identification Items: Passenger side firewall aerosol generator is larger than other four aerosol generators, additional aerosol generator on passenger side of engine, and linear detection wires on underside of hood instead of temperature sensors near each aerosol generator



**PASSENGER SIDE FIREWALL
AEROSOL GENERATOR**



**DRIVER SIDE FIREWALL
AEROSOL GENERATOR**



**PASSENGER SIDE
ENGINE AEROSOL
GENERATOR**

TURBOCHARGER



**ENGINE COMPARTMENT
LINEAR DETECTION
WIRE**

UNDERSIDE OF HOOD

The items below cover the differences in the cooling system of the vehicle:

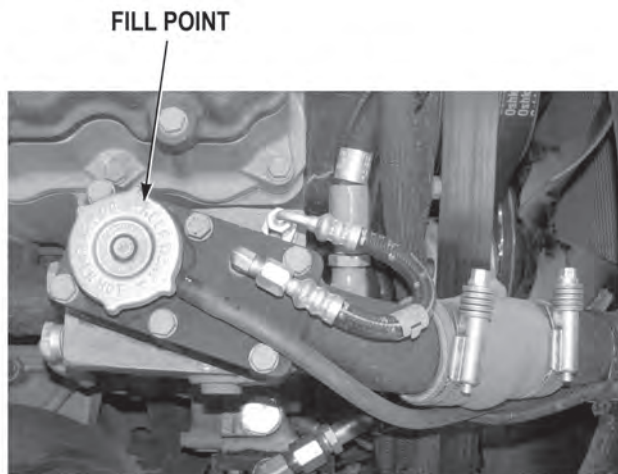
Description: Vehicles equipped with coolant reservoir

Key Words: Reservoir Equipped

Key Identification Items: Coolant reservoir is located on passenger side of the cooling pack. The fill point for the coolant reservoir equipped vehicles is the coolant manifold.



COOLANT RESERVOIR

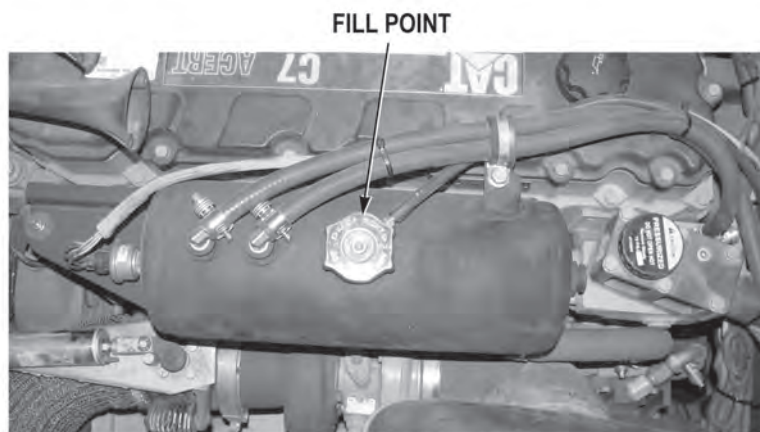


COOLANT RESERVOIR FILL POINT

Description: Vehicles equipped with surge tank

Key Words: Surge Tank Equipped

Key Identification Items: The surge tank is located on the passenger side of the valve cover on the engine. The fill point for the surge tank is the cap of the surge tank.



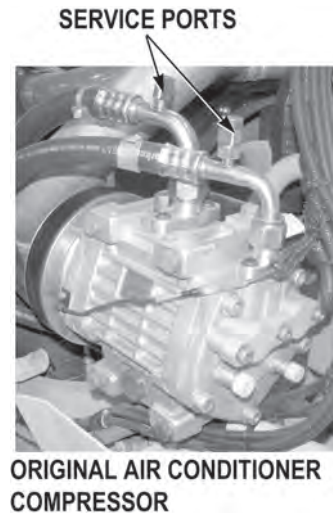
SURGE TANK AND FILL POINT

The item below covers the differences in the air conditioning system of the vehicle:

Description: Vehicles Equipped with Original Air Conditioner Compressor

Key Words: Original Air Conditioner Compressor

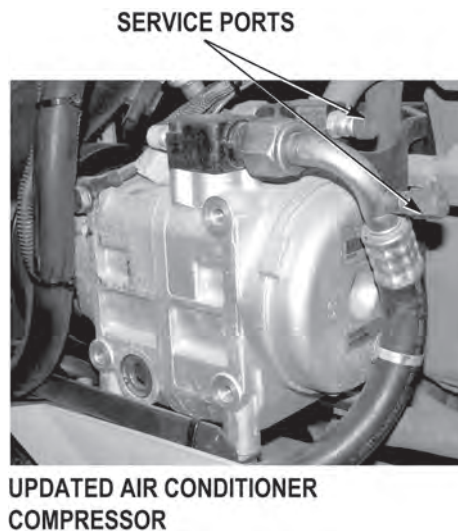
Key Identification Item: If equipped, the original air conditioner compressor service ports are located on the top side of the compressor with the ports in a vertical position and two test ports on the back of the compressor.



Description: Vehicles Equipped with Updated Air Conditioner Compressor

Key Words: Updated Air Conditioner Compressor

Key Identification Item: If equipped, the updated air conditioner compressor service ports are horizontal, facing the rear of the vehicle and no test ports on the rear of the compressor.



The item below covers the differences in the air system of the vehicle:

Description: Vehicles equipped with four air tank reservoir system

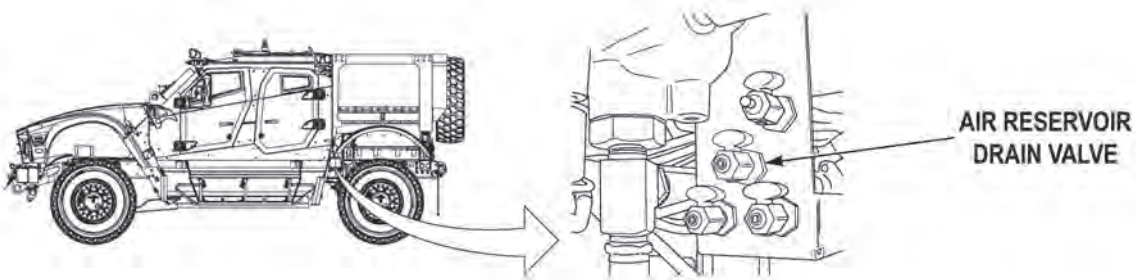
Key Words: Four Tank System

Key Identification Items: To identify which air reservoir configuration is on the M-ATV, count the number of air reservoir drain valves located on driver side rear of vehicle. Four valves (shown) designate a four tank air reservoir system.

Description: Vehicles equipped with two air tank reservoir system

Key Words: Two Tank System

Key Identification Items: To identify which air reservoir configuration is on the M-ATV, count the number of air reservoir drain valves located on driver side rear of vehicle. Three valves designate a two tank air reservoir system. (The two tank air reservoir system incorporates a supply tank within the primary tank that is able to be drained separately.)

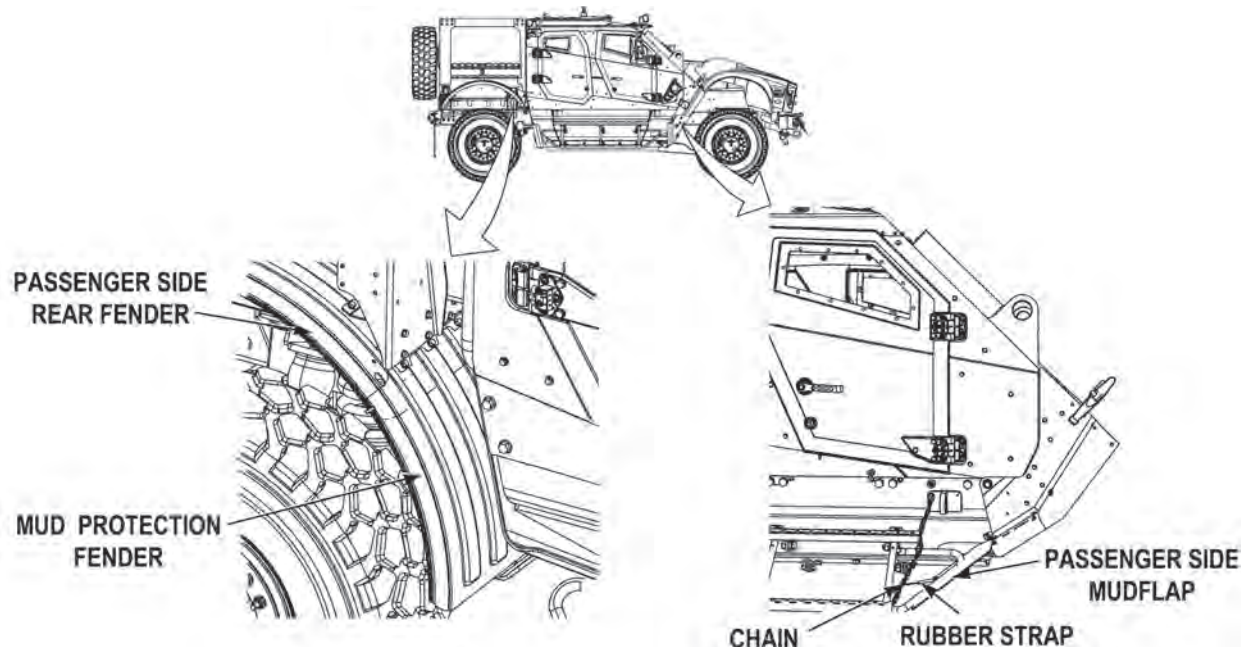


The item below covers the differences in the wheel areas of the vehicle:

Description: Vehicles equipped with mud protection kit

Key Words: Mud Protection

Key Identification Items: The mud protection kit is identified by the rear fender extension located on the front side of the rear fender and by the front flap extension that hooks into the capsule step chain using a rubber strap.

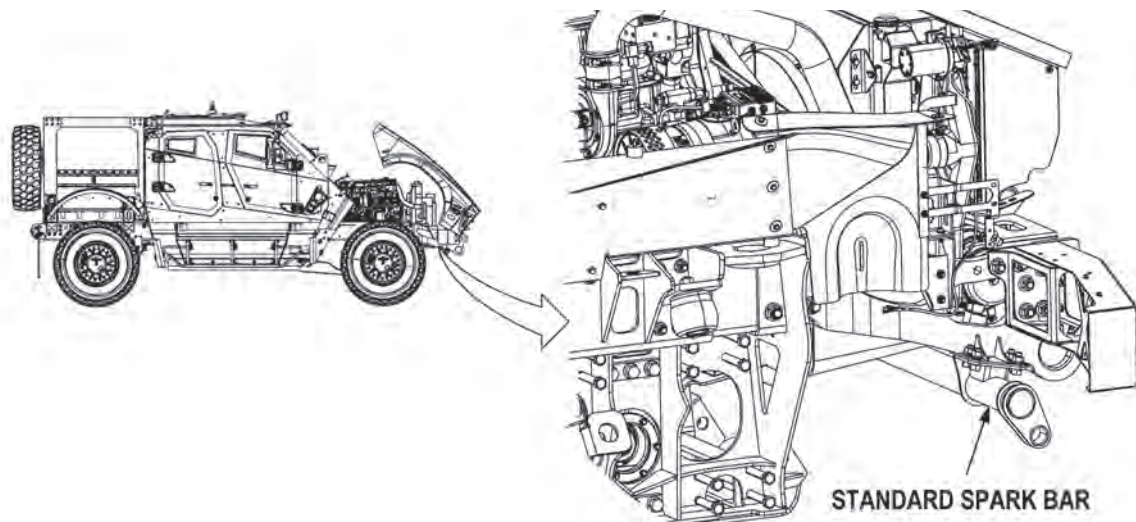


The item below covers the differences in the front of the vehicle:

Description: Vehicles Equipped with Standard SPARK Bar

Key Words: Standard SPARK

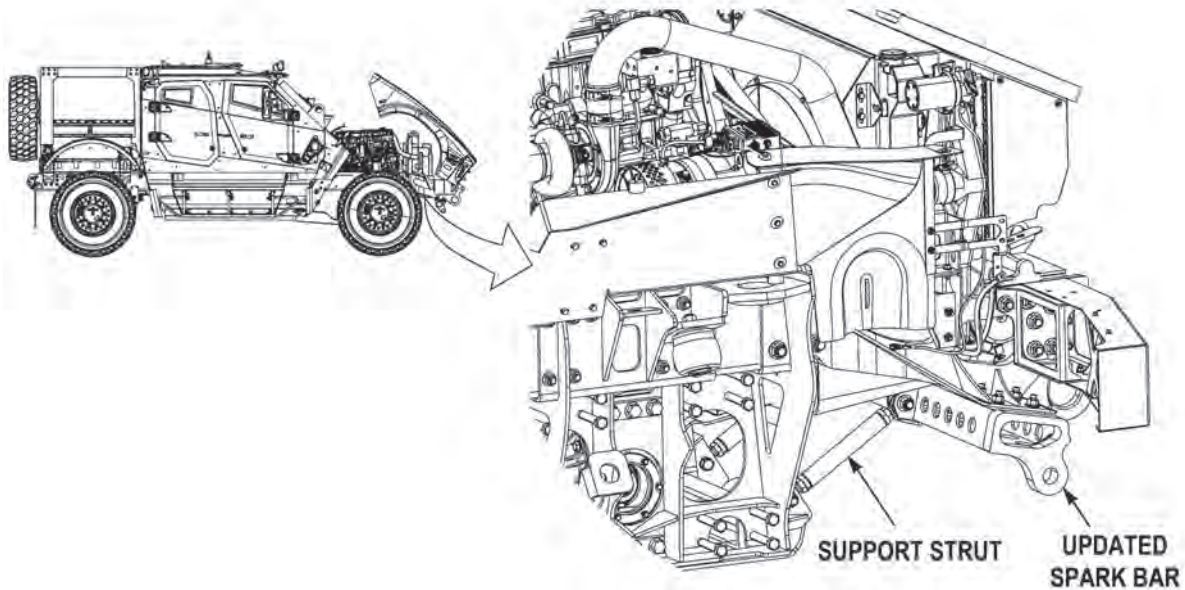
Key Identification Items: The standard spark bar is a round tube type bar with no support struts.



Description: Vehicles Equipped with Updated SPARK Bar

Key Words: Updated SPARK

Key Identification Items: The updated spark bar can most easily be identified by the presence of two support struts and a larger, more rigid bar.



The item below covers the differences on the sides of the vehicle:

Description: Vehicles Equipped with B-Pillar Handle

Key Words: B-Pillar Handle

Key Identification Item: If equipped, the B-Pillar handle is located on the capsule between the front and rear doors on either side of the vehicle.

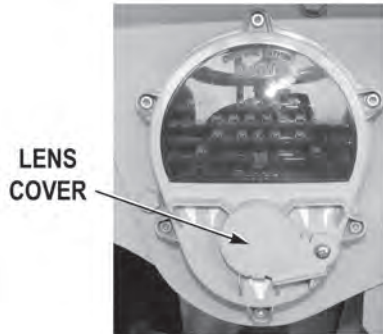


The item below covers the differences in the rear of the vehicle:

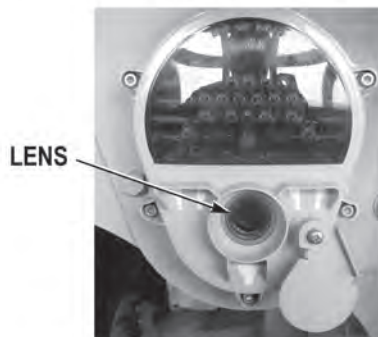
Description: Vehicles equipped with Check 6 rear lights

Key Words: Check 6 Lights

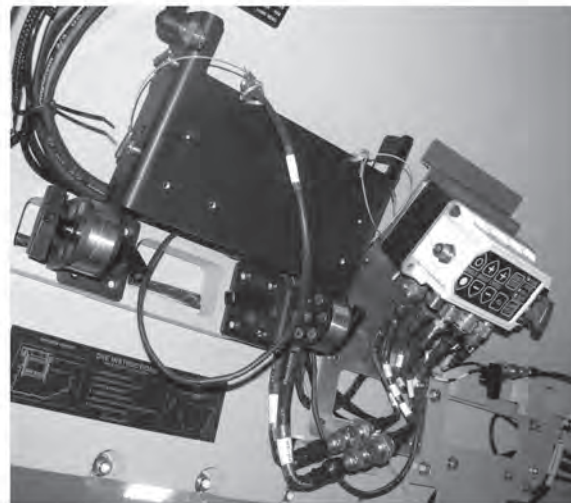
Key Identification Items: Check 6 lights have a built-in camera with a lens cover that protects the camera lens. The Check 6 control box is located in the capsule centered and above the windshield.



**CHECK 6 LIGHT
(COVER CLOSED)**



**CHECK 6 LIGHT
(COVER OPENED)**



CHECK 6 CONTROL BOX

The item below covers the difference in the spare tire carriers for the M1240A1:

Description: Vehicles equipped with spare tire carrier for a 395/85R20 tire.

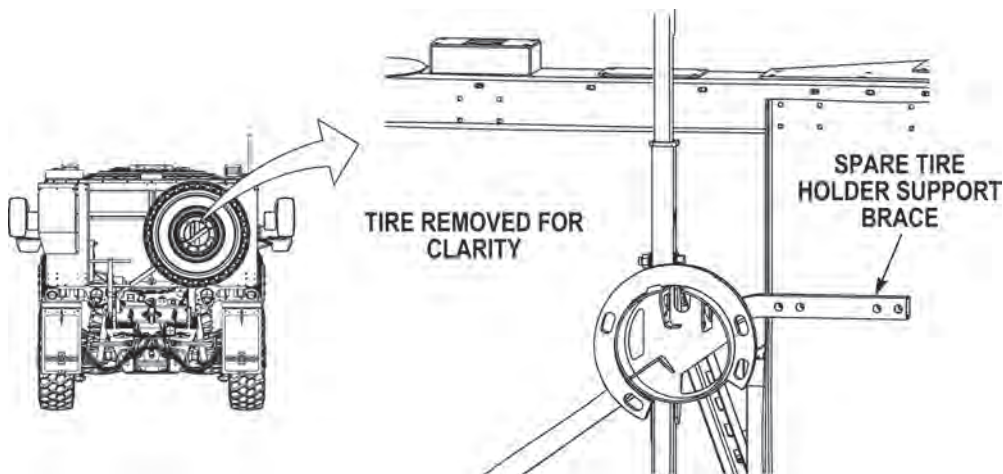
Key Words: 395/85R20 Spare Tire Carrier

Key Identification Items: If there is not a support brace extending from the spare tire carrier towards the passenger side of the vehicle, the spare tire carrier will support a 395/85R20 tire.

Description: Vehicles equipped with spare tire carrier for a 16.00R20 tire.

Key Words: Upgraded Spare Tire Carrier

Key Identification Items: If the spare tire carrier has a support brace extending from the spare tire carrier towards the passenger side of the vehicle, the spare tire carrier will support a 16.00R20 tire and spare tire will be 395/85R20.



END OF TASK

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

PHYSICAL DESCRIPTION

The M-ATV is designed for use on all types of roads, highways, and cross-country terrain. These vehicles also operate in extreme conditions and temperatures. Major subsystems of the vehicles are capsule, engine, transmission, drivetrain, suspension, electrical system, pneumatic (air) system, and Central Tire Inflation System (CTIS).

FUNCTIONAL DESCRIPTION

1. The M-ATV is capable of operating in temperatures from -25 to 130°F (-32 to 54°C).
2. The M-ATV is capable of fording 36 in. (91.4 cm) of water. It can also travel at 65 mph (105 km/h) on paved surfaces.
3. The M-ATV (M1240/M1245) is capable of traversing a 60% grade and a 40% side slope up to 5 mph (8 km/h).
4. The M-ATV (M1240A1) is capable of traversing a 60% grade and a 30% side slope up to 5 mph (8 km/h).

NOTE

The M-ATV is capable of traveling 65 mph (105 km/h). However, the operator **MUST** adhere to the speed limits set by unit Standard Operating Procedure (SOP).

5. The M-ATV is provided with sufficient tiedown points located so that the vehicle can be restrained in all directions for shipment.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1240/M1240A1)

Major components and accessories found on the updated M1240 and M1240A1 are illustrated in Figure 1 and Figure 2 described as follows:

1. **ENGINE.** Engine supplies power to move vehicle and operate equipment and accessories.
2. **CAPSULE.** Provides protection from weather for crew, vehicle controls, gauges, and indicators. The capsule also has environmental control capability and provides blast protection for the crew.
3. **GLADHANDS.** Couples air supply to towed vehicle or trailer.
4. **PINTLE HOOK.** Allows connection to a towed vehicle or trailer.
5. **AXLE NO. 2.** Transmits power to hubs to turn wheels.
6. **FUEL TANK.** Stores fuel to operate vehicle.
7. **BATTERY BOXES.** Stores four batteries for normal operating conditions and auxiliary equipment. Two battery boxes are located within the cargo deck.
8. **WINCH.** Used to free vehicle from mired conditions. The winch is located on front of vehicle.
9. **EXHAUST PIPING.** Used to remove noise and direct exhaust fumes from engine.
10. **TOWING EYES.** Attachment points for safety chains, towing shackles, and vehicle towing.
11. **AXLE NO. 1.** Controls direction of vehicle when in motion. Transmits power to hubs to turn wheels.
12. **AIR CLEANER.** Filters out dust and debris from entering air induction system.
13. **TIEDOWN EYES.** Attaching points for securing the vehicle for shipment.
14. **CHECK-6 CAMERAS (If Equipped).** Provides crew with a view rear of vehicle.
15. **NATO SLAVE CONNECTOR (M1240A1 and M1240 with UIK. M1240 without UIK has NATO SLAVE connector attached to driver side cooling pack support under hood).** Used to help start vehicle with dead batteries.
16. **B PILLAR HANDLE (If Equipped).** Used to help crew get in and out of vehicle.
17. **AUXILIARY MIRRORS.** Provides driver with increased field of view. Auxiliary mirrors are located on the hood.
18. **UNDERBODY IMPROVEMENT PANEL (M1240A1).** Enhances the survivability and durability of the M-ATV.

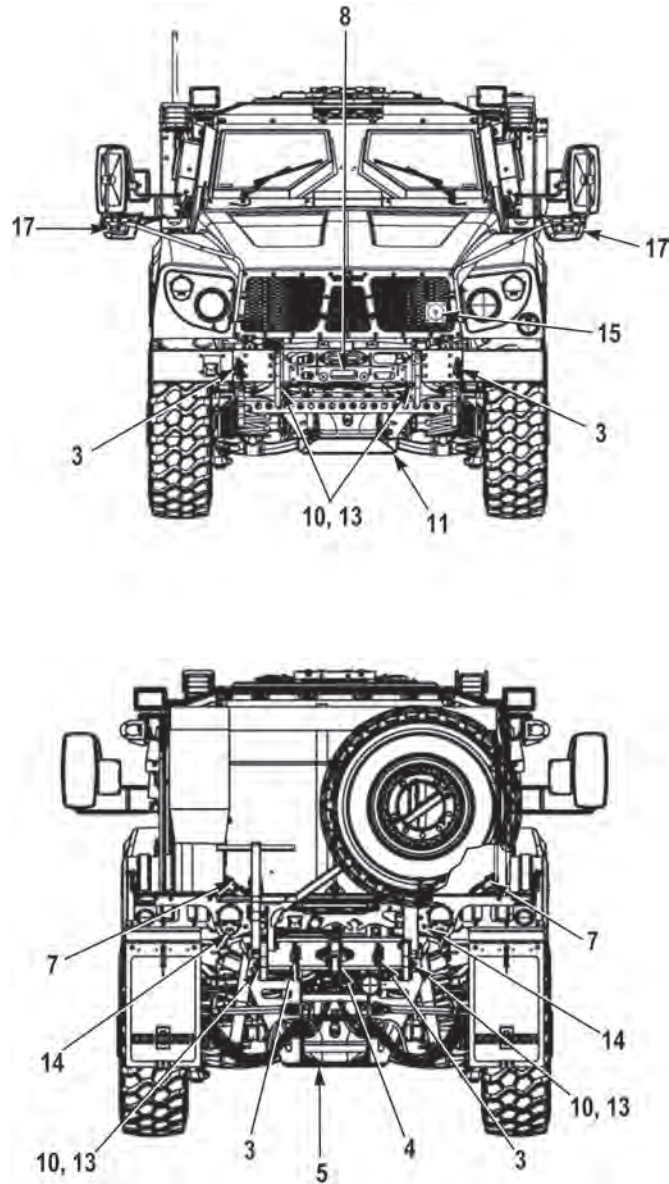


Figure 1. Location and Description of Major Components (M1240/M1240A1).

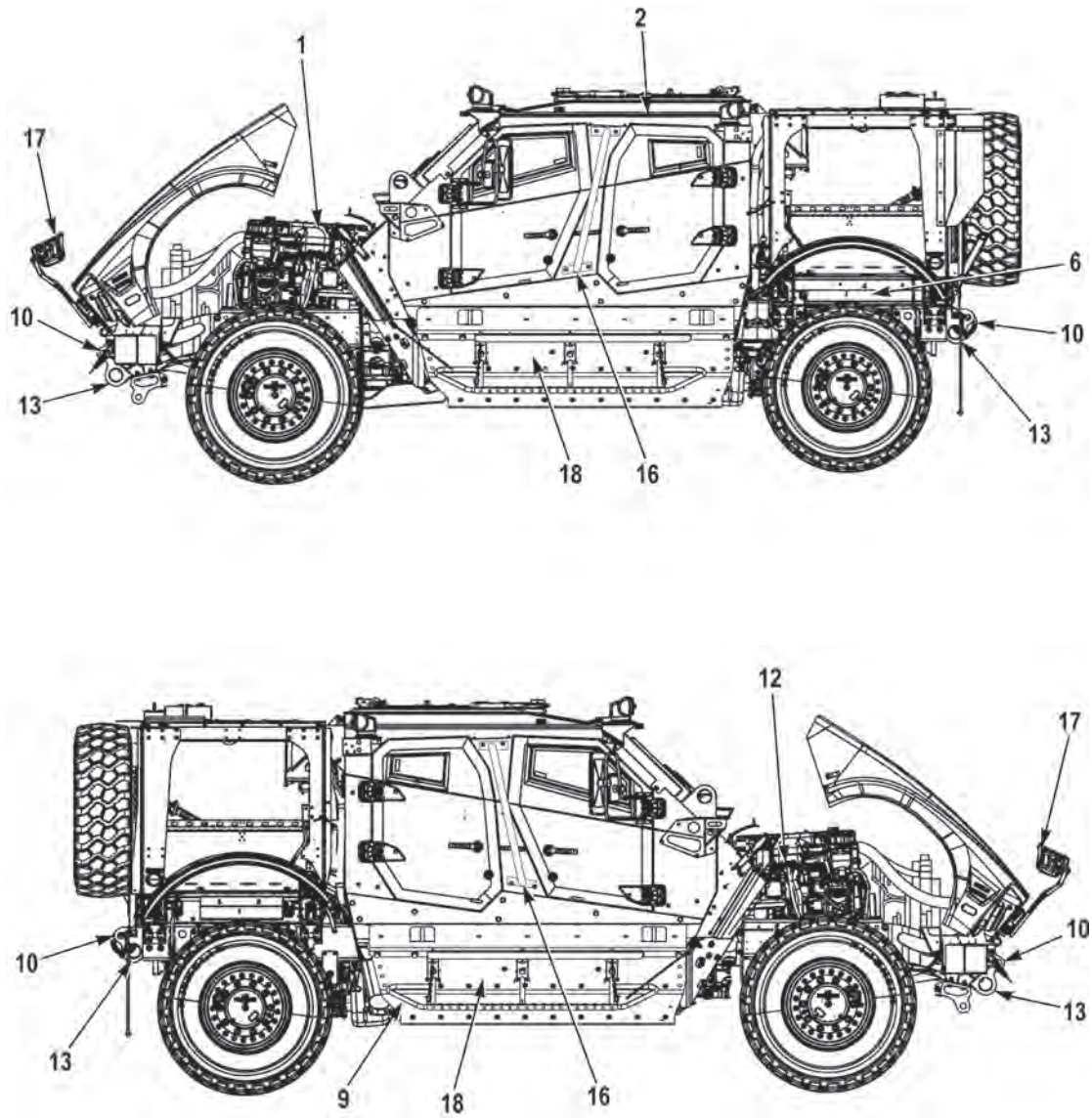


Figure 2. Location and Description of Major Components (M1240/M1240A1).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1245)

Major components and accessories found on the M1245 are illustrated in Figure 2, Figure 3, and Figure 4 and are described as follows:

1. **PUSH BUMPER.** Heavy duty bumper able to withstand higher forces than the standard bumper.
2. **COMBAT LOCK KEY.** Emergency tool used to disengage the combat lock from outside the vehicle.
3. **SIDE LITTER DOOR.** Side doors to facilitate the extraction of the litter from rear cargo deck.
4. **LEFT BATTERY BOX.** Stores two batteries for engine operation.
5. **RIGHT BATTERY BOX.** Stores two batteries for operation of Government Furnished Equipment.
6. **HOOD ACCESS STEPS.** Side steps and hand point on hood to allow access to the capsule roof.
7. **INFRARED (IR) LIGHTS.** Lights used to provide infrared light.
8. **REAR CARGO DOOR.** Rear door allowing access to the cargo deck.
9. **DYNEEMA PANELS.** Removable panels used for protection of rear cargo deck.
10. **FIRE EXTINGUISHERS.** Dry chemical fire extinguisher used to extinguish liquid and electrical fires (located inside).

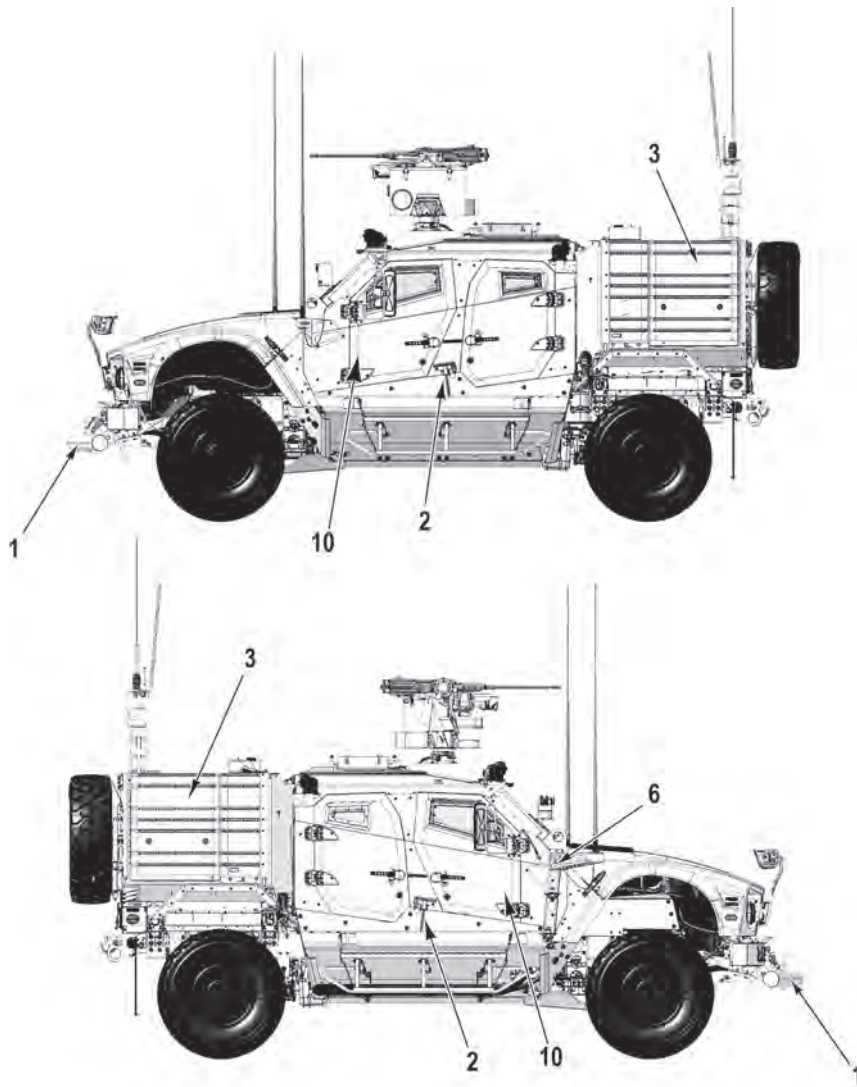


Figure 3. Location and Description of Major Components (M1245).

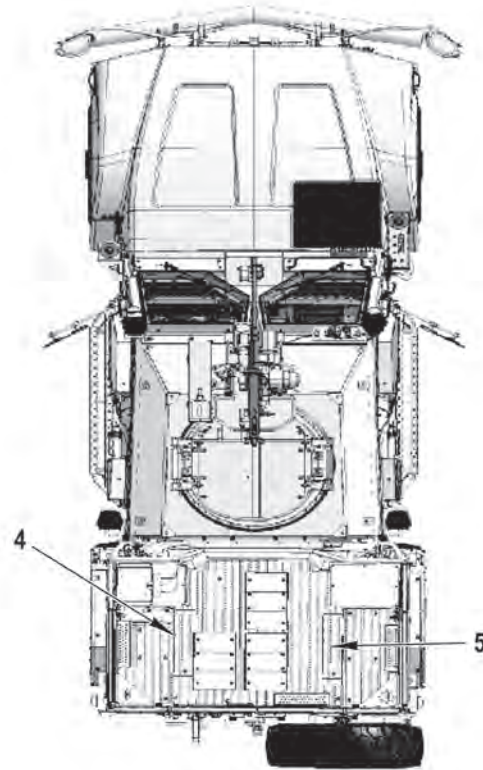


Figure 4. Location and Description of Major Components (M1245).

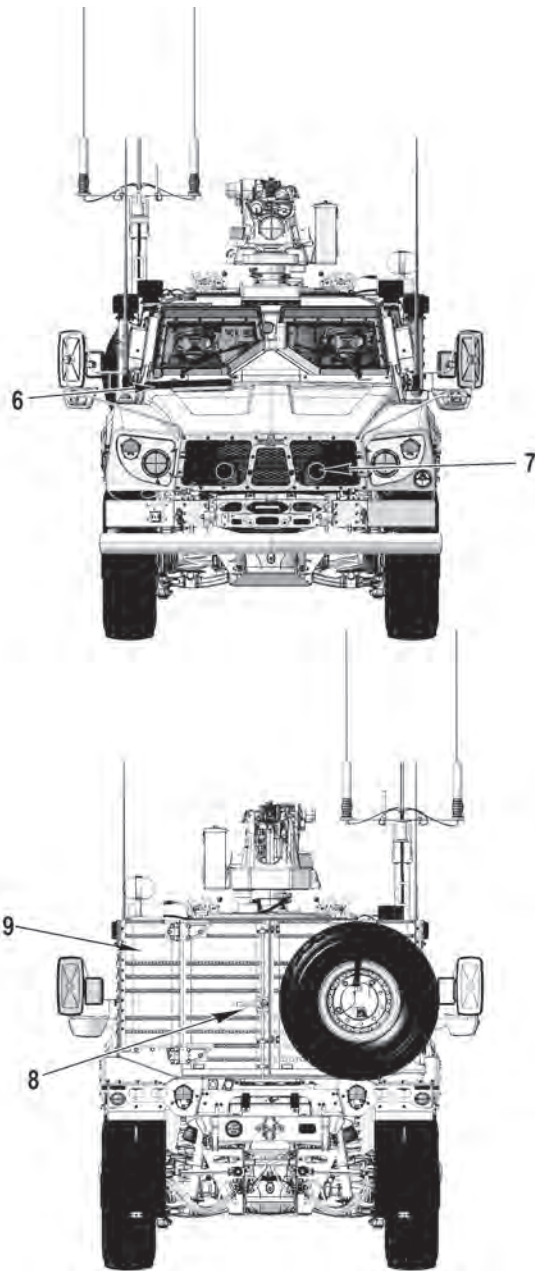
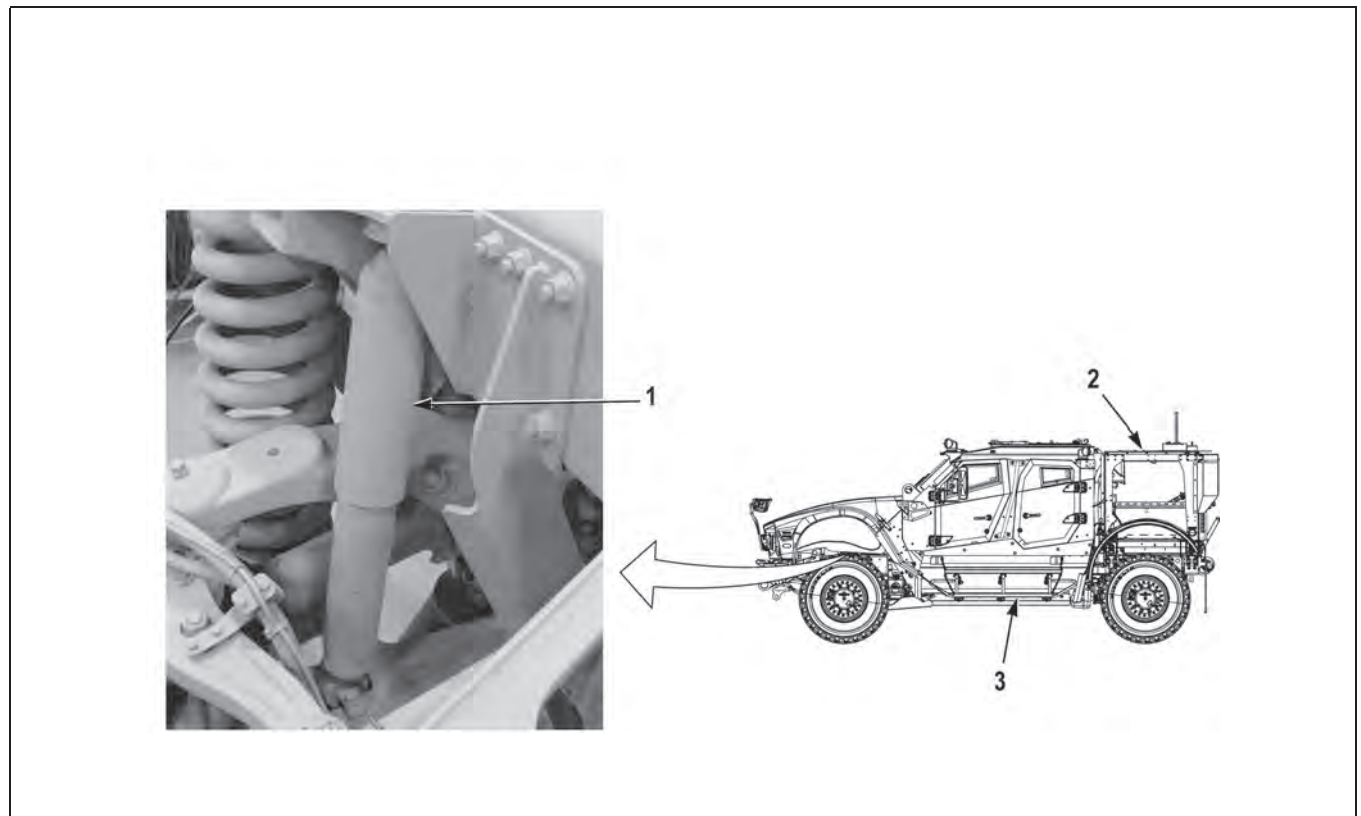


Figure 5. Location and Description of Major components (M1245).

DIFFERENCES BETWEEN MODELS

This section will illustrate the differences between the different models of the M-ATV. This section is designed to be a quick visual reference for the most distinctive differences between the M-ATV M1240, M1240A1, and M1245.

Table 1. M1240.

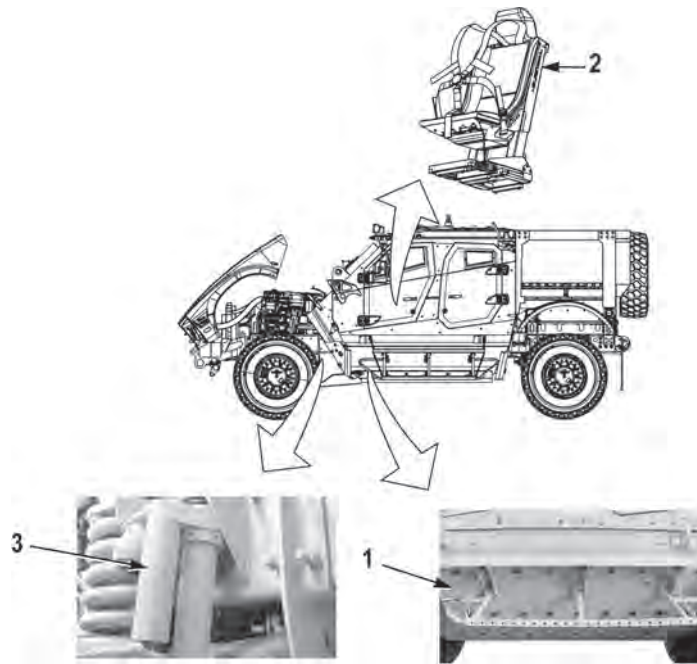


NOTE

The M1240 can be identified by the presence of ALL noted components.

Item Number	Item
1	Standard Shock Absorber
2	Antenna Platform
3	Standard Underbody Armor

Table 2. M1240A1.

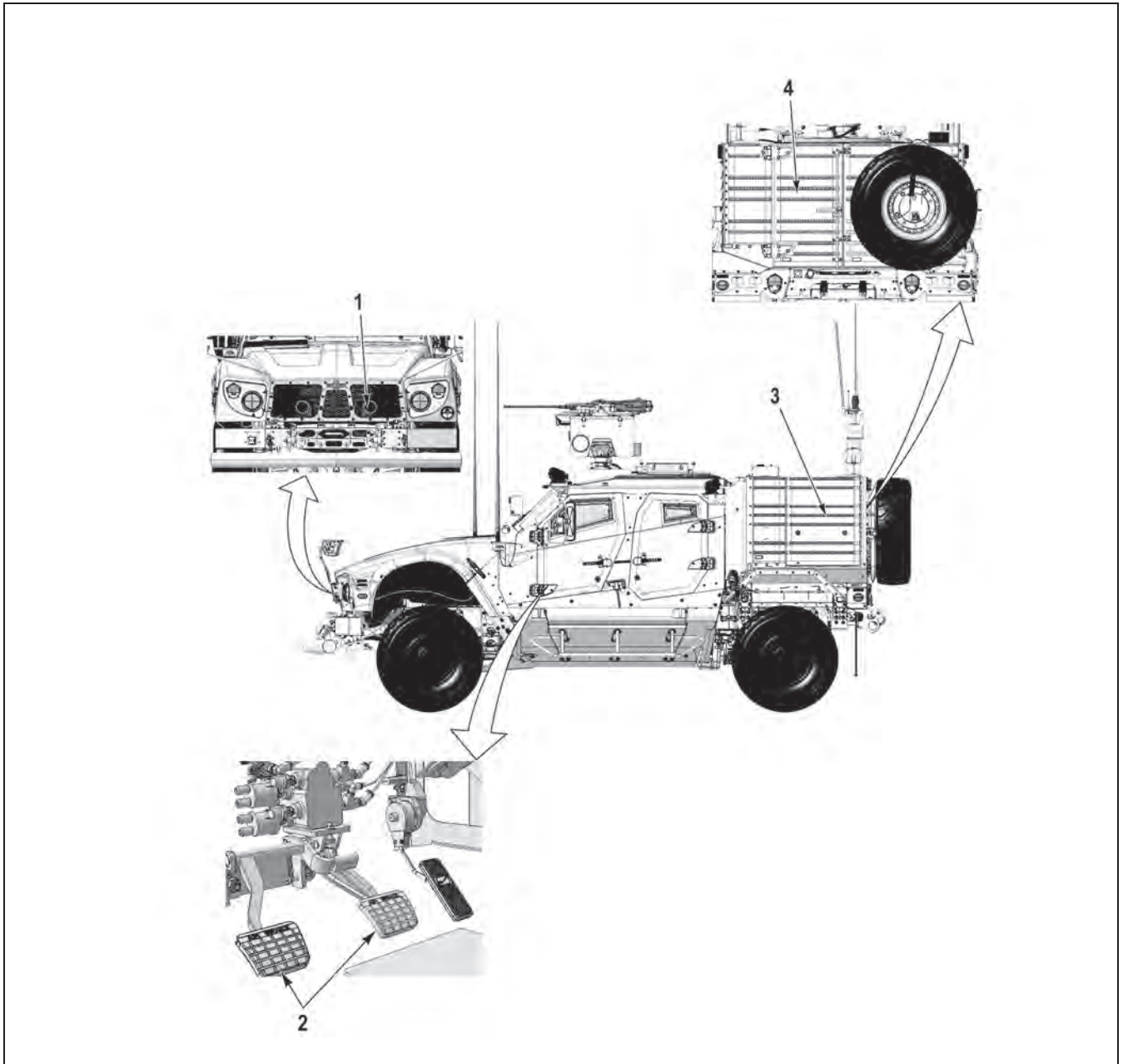


NOTE

These components are unique to the M1240A1.

Item Number	Item
1	Underbody Improvement Panel
2	Blast Seats
3	High Pressure Nitrogen Reservoir Shock Absorber

Table 3. M1245.



NOTE

These components are unique to the M1245.

Item Number	Item
1	Infrared (IR) Lights
2	Two Service Brake Pedals
3	Litter Doors On Cargo Deck
4	Rear Cargo Doors

REFERENCE DATA TABLES

Refer to the following tables for specific equipment data:

Table 4. Dimensions.

Item	Specification
Width	98.0 in. (248.9 cm)
Height (M1240)	102 in. (259 cm)
Height (M1240A1)	108.9 in. (276.6 cm)
Height (M1245)	105 in. (266.7 cm)
Length (M1240/M1240A1)	246.8 in. (626.9 cm)
Length (M1245)	265.1 in. (673.4 cm)

Table 5. Weight.

Item	Specification
Vehicle Curb Weight (VCW) (M1240)	24,500 lbs (11 123 kg)
Vehicle Curb Weight (VCW) (M1240A1)	28,500 lbs (12 940 kg)
Vehicle Curb Weight (VCW) (M1245)	27,174 lbs (12 325 kg)
Gross Vehicle Weight Rating (GVWR)	37,000 lbs (16 798 kg)

Table 6. Performance.

Item	Specification
Gradient (Grade)	
Longitudinal (Up Slope)	60%
Side Slope (M1240/M1245)	40%
Side Slope (M1240A1)	30%
Environmental Operation	-25 to 130°F (150°F storage) [-32 to 54°C (66°C storage)]
Speed, Maximum GVW Road	65 mph (105 km/h)
Fording	36 in. (91.4 cm)
Cruising Range	310 miles (499 km)
Turning Radius	66.5 ft. (20.3 m) wall to wall 31.6 ft. (9.6 m) curb to curb

Table 7. Axles.

Item	Specification
Axles Configuration	4 x 4 - Two axles
Make	Oshkosh Defense
Rated Capacity	
Front Axle	17,000 lbs (7 718 kg)
Rear Axle	20,000 lbs (9 080 kg)
Type	Full-time all-wheel drive Fixed center differential and planetary hub reduction
Inter-axle Differential Lock	CTIS-controlled terrain selection with manual override
Intra-axle Differential Lock	Controlled by CTIS terrain selection on all axles with manual override

Table 8. Parking Brakes.

Item	Specification
Type	Spring brakes on Axle No. 2 Modulated emergency system
Make	Arvin Meritor

Table 9. Service Brakes.

Item	Specification
Type	Drum with internal shoe Dual actuator air wedge
Make	
Front Axle	Meritor RDA type - 12 wedge
Rear Axle	Meritor RDA type - 12 wedge

Table 13. Cooling System.

Item	Specification
Type	Cross flow fin and tube type radiator, includes internal transmission cooler and external charge air cooler
Frontal Area	810 in ² (5 226 cm ²)
Construction	One piece assembly with integral side tanks
Fan	32 in. (81 cm), nine blade, serpentine belt driven
Fan Clutch	Temperature controlled

Table 14. Electrical System.

Item	Specification
Alternator	570 amp
Voltage	24 volts with 12 volt accessory provision in capsule
Battery	Four, 12 volt (800 CCA ea. at -18°F [-28°C])

Table 15. Steering System.

Item	Specification
Type	R.H. Shepard integral power steering with booster and separate fluid reservoir includes primary and secondary gears
Steering Gear Ratio	18:1

Table 16. Engine.

Item	Specification
Make and Model	Caterpillar C-7 electronic control
Type	4-stroke, in-line, six cylinder, electronic
Bore	4.33 in. (11 cm)
Stroke	5 in. (12.7 cm)
Displacement	441 in ³ (7.2 L)
Maximum Horsepower	370 hp (276 kW)
Peak Torque	925 lb-ft (1 254 N•m)
Exhaust brake/retarder	PAC engine brake

Table 17. Suspension.

Item	Specification
Type	Oshkosh Modular Independent Suspension, coil spring, control arm
Wheel Travel	
Front Axle	16 in. (40.6 cm)
Rear Axle	16 in. (40.6 cm)

Table 18. Tires.

Item	Specification
Type	395/85R20 (M1240/M1245) 16.00 R20 XZLT LRM (M1240A1)
Quantity	Four
Additional Capability	Run flat capability in case of flat tire where CTIS cannot maintain pressure.

Table 19. Transfer Case.

Item	Specification
Make and Model	Marmon - Herrington MVG - 750
Type	Three-shaft, two-speed with Neutral
Ratio	1:1 High 2:1 Low
Torque Split (unlocked drive line)	30% Front, 70% Rear

Table 20. Transmission.

Item	Specification
Make and Model	Allison 3500 SP, automatic electronic control, GEN IV
Type	Six-speed automatic with TC 418 torque converter, second gear start
Ratios	
Sixth	0.65:1
Fifth	0.75:1
Fourth	1.0:1
Third	1.5:1
Second	2.3:1
First	4.6:1
Reverse	5.0:1

Table 21. Wheels.

Item	Specification
Type	Two-piece bolt together, aluminum disc
Size	20 x 10 in. (50.8 x 25.4 cm)

Table 22. Winch.

Item	Specification
Make and Model	WARN Severe Duty 18
Wire Rope	8 Strand Steel Cable
Diameter	0.44 in. (11.2 mm)
Length	75 ft. (22.9 m)
Deployment	Front only
Maximum Load Rating	18,000 lbs (8 172 kg)
Drum Barrel Diameter	4 in. (10.16 cm)
Overload Interrupt Module	Digital Limiter
Sensing Current (Set Point) Range	50 to 400 amps
Supply Voltage	8.5 to 32 VDC

Table 23. Winch Electric Performance Data.

Line Load (First Layer) lbs	Line Load kg	Line Speed Layer 1 ft./min.	Line Speed Layer 1 m/min.	Motor Current amps
0	0	18.5	5.6	58.1
3000	1362	11.0	3.4	104.0
6000	2724	8.6	2.6	137.8
9000	4086	7.1	2.2	169.4
12000	5448	6.0	1.8	209.7
15000	6810	4.9	1.5	253.2
18000	8172	4.6	1.4	278.2

Table 24. Winch Performance Data.

Layer 1	Line Load lbs	Layer 2	Line Load lbs	Layer 3	Line Load lbs	Layer 4	Line Load lbs
18.5	0	22.6	0.0	26.7	0.0	30.8	0.0
11.0	3000	13.4	2454.5	15.9	2076.9	18.3	1800.0
8.6	6000	10.5	4909.1	12.4	4153.8	14.3	3600.0
7.1	9000	8.7	7363.6	10.3	6230.8	11.9	5400.0
6.0	12000	7.3	9818.2	8.6	8307.7	9.9	7200.0
4.9	15000	6.0	12272.7	7.1	10384.6	8.2	9000.0
4.6	18000	5.6	14727.3	6.6	12461.5	7.7	10800.0

Table 25. Petroleums, Oils, and Lubricant (POL) Capacities.

Item	Specification
Engine	20 qt (18.9 L) With Filter
Transmission	16 qt (15.1 L) Drain and Refill
Transfer Case	5.6 qt (5.3 L)
Power Steering Reservoir	10.75 qt (10.17 L)
Cooling System	31 qt (29.3 L)
Axles No. 1 and No. 2	10.5 qt (9.9 L)
Wheel Ends	1.6 qt (1.5 L)
Fuel Tank	47 gal (177.9 L)

Table 26. Recommended Modes of CTIS Operation.

Road Condition	CTIS SETTING			
	HWY	CC	MSS	Emer
Highway/Paved & Smooth	X			
Gravel/Smooth	1	2		
Gravel/Dirt W/ Potholes or Washboard		X		
Cobblestone/ Belgium Block	X			
Mud/Sand/Snow		1	2	
Fording-Hard Bottom		X		
Fording-Soft Bottom		1	2	
Grade-Slight (<10%)	X			
Grade-Moderate (10%-25%)		X		
Grade-Steep (>25%)		1	2	

Where more than one CTIS terrain setting is identified above, first try choice 1. If wheelspin occurs, remove power to stop the spin and try choice 2.

Where conditions are a combination of the above classifications (such as a moderate grade with mud/sand/snow), it is likely that choice 2 will be needed to complete the required task.

This table cannot cover all possible terrain and considerations. If you do not see a table choice that addresses your particular situation, choose a terrain/road condition CTIS setting that suggests a worse environment than the one you will encounter.

END OF WORK PACKAGE

MECHANICAL THEORY

This work package explains the mechanical theory of operation for the M-ATV.

The engine generates power to move the vehicle. This power is transferred to the transmission, which converts the power into a controllable speed. The transmission transfers this controlled speed to the transfer case, which transfers this speed to the axles. The axles then transfer this speed to the right and left wheels of the vehicle.

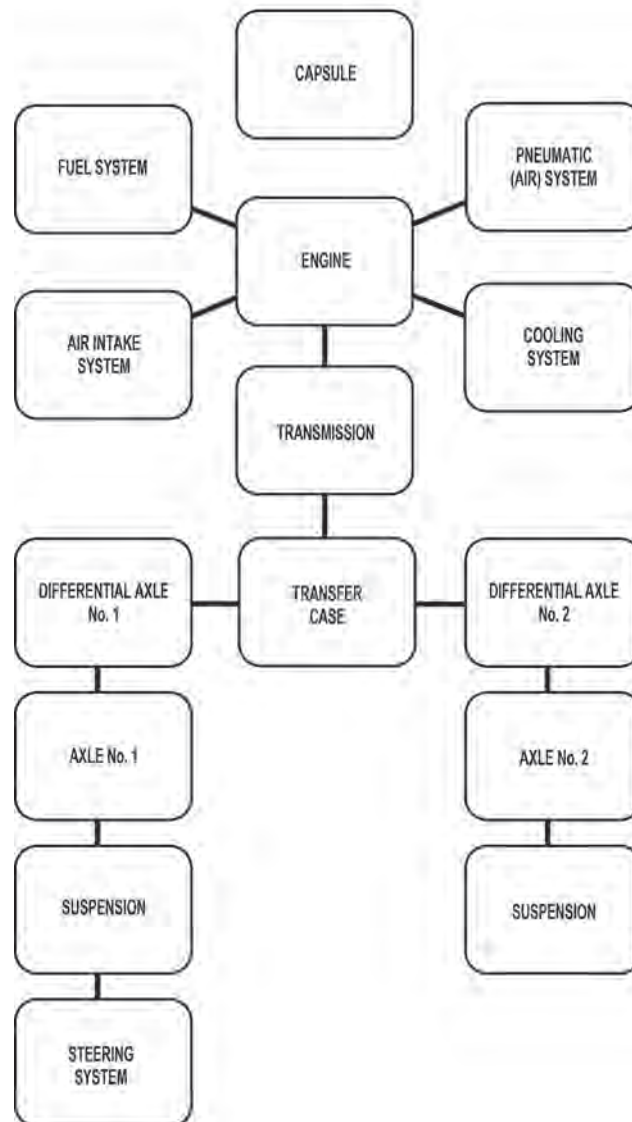


Figure 1. Mechanical Theory.

CAPSULE

The capsule features a full-width configuration and is positioned rearward of axle No. 1. The capsule controls and operating mechanisms are designed to accommodate a crew of up to five. Heating, ventilation, noise control, and vibration and shock control are provided to the occupants. The capsule also provides blast protection for the crew as well as protection from small arms fire. The cab contains all of the driving controls, gauges, and warning lights and indicators.

DRIVE TRAIN

Power for the M-ATV is provided by a diesel engine, which is coupled directly to an automatic transmission. Power from the transmission is transferred to the transfer case and onto the drive and drive/steering axles through a series of prop shafts and universal joints. The M-ATV drive train is enhanced through the use of electronic control modules for both the Caterpillar engine and Allison transmission.

TRANSFER CASE

The transfer case incorporates a differential. The transfer case differential provides full time all wheel drive, and supplies torque to the front and rear axles. The differential has an operator controlled, air actuated, drive line lock mechanism, which consists of a sliding lockout collar that locks the differential housing to the output shaft. The differential drive line lock mechanism provides increased mobility in adverse operating conditions.

SUSPENSION

The M-ATV incorporates TAK-4[®] independent suspension system with battle tested technology. This suspension system incorporates halfshafts, springs, shock absorbers, jounce bumpers, rebound bumpers, and upper and lower control arms in the independent suspension design. This suspension system design maintains tire/ground contact under adverse terrain profiles and conditions. This design equalizes loads between axles and provides roll stability. The halfshafts incorporated into this design move up and down independently of each other. This independent motion allows for a smoother ride than a standard walking beam suspension design.

AXLES

The M-ATV incorporates four halfshafts in the vehicle's independent suspensions design. The halfshafts of the front axle work in conjunction with the wheel ends and hub assemblies to drive and steer the vehicle. The halfshafts of the rear axle work in conjunction with the hub assemblies to drive the vehicle. The four halfshafts incorporated into this design move up and down independently of each other. This allows the halfshafts to maintain tire/ground contact under adverse terrain profiles and conditions.

COOLING SYSTEM

The pressure type cooling system protects the engine by removing heat generated by the engine during the combustion process. Pressure within the cooling system is regulated by a pressure release in the filler cap. The hot coolant flows from the engine to the radiator and through the radiator core where a stream of air removes heat from the coolant. This stream of air is drawn through the radiator core by the engine fan. The water pump on the engine draws the coolant from the radiator, pushes it through the engine, past the thermostats, and back into the radiator. This process is repeated continuously.

AIR INTAKE SYSTEM

The air intake system consists of a dry-type air cleaner, ducting, turbocharger, and charge air cooler. Engine exhaust gases flow through the turbocharger driving a turbine wheel. A compressor wheel on the opposite end of the turbine shaft rotates and draws in fresh air through the air cleaner. The air is then compressed by the turbocharger and pushed into the charge air cooler to cool the compressed air. The air then flows into the intake manifold of the engine to be used for combustion.

If the air pressure inside the turbocharger reaches a predetermined pressure, the wastegate on the turbocharger will open to relieve excess pressure. When the pressure returns to the safe operating range, the wastegate will close.

FUEL SYSTEM

In the fuel system, fuel is drawn from the fuel tank, through the fuel/water separator, and into the fuel pump. The fuel pump then pushes the fuel through a fuel filter and into the engine. Surplus fuel from the electronic injectors is returned to the fuel tank through a return line.

PNEUMATIC (AIR) SYSTEM

The air system consists of an engine-driven air compressor and two or four air reservoirs. The system includes valves and air lines to control the vehicle's air-operated devices, including the brakes. Pressurized air from the air compressor is passed through the air dryer to the reservoir. The air dryer removes moisture and dirt from the compressed air.

STEERING SYSTEM

The steering system power is supplied to the steering gears by a hydraulic steering pump. The steering wheel, which is mechanically linked to the primary steering gear, manipulates, and controls the hydraulic pressures in the steering gear. The primary steering gear is hydraulically connected to the secondary steering gear. The secondary steering gear mirrors the movements of the primary steering gear. The steering gears pivot pitman arms, which in turn move a tie rod and two toe control links. This action causes the tires to move left or right causing the vehicle to steer left or right.

ANTILOCK BRAKE SYSTEM

The brake system for the M-ATV incorporates an Antilock Brake System (ABS) into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will in effect, pulse the brakes, through four ABS valves, to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service.

END OF WORK PACKAGE

ELECTRICAL THEORY

The alternator generates electricity and distributes the load as necessary (i.e., to batteries, lights, winch, etc.). The batteries store generated electricity which is used to start the vehicle. The electricity then transfers to the circuit breakers, which safeguards the electrical components from power surges. From there, the electricity is distributed throughout the vehicle. The main electrical components are comprised of six components.

The subordinate circuits operate all the lights, the winch controls, heater controls, etc. The engine Electronic Control Module (ECM) primarily controls the fuel injection by monitoring temperature, oil pressure, RPMs, etc. The CTIS system operates tire inflation, deflation, and driveline lockups. The Anti-Lock Brake System (ABS) prevents tires from locking up during braking and aids in traction control. The Transmission Control Module (TCM) controls the shifting for the GEN IV transmission. The J1708/J1939 data bus is used for diagnostic purposes.

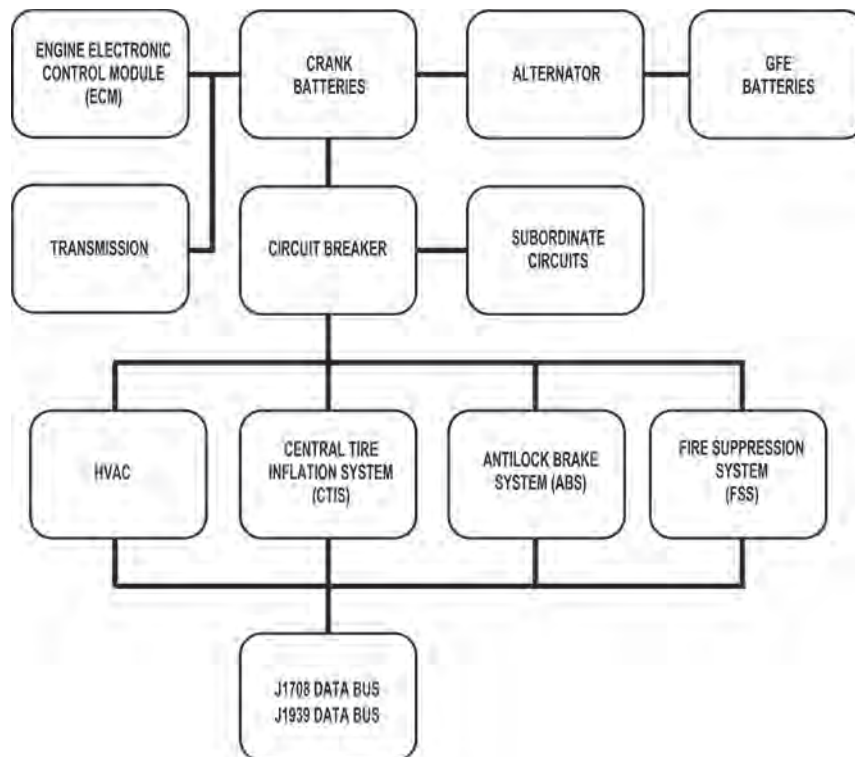


Figure 1. Electrical Theory (M1240/M1240A1).

ANTILOCK BRAKE SYSTEM (ABS)

NOTE

When operating vehicle in CC, MSS, or EMER CTIS settings (TM 9-2355-335-10), ABS and ATC systems are disabled.

The brake system for the M-ATV incorporates an ABS into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will, in effect, pulse the brakes to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service brakes.

ANTILOCK BRAKE SYSTEM (ABS) LIGHT

The ABS light (TM 9-2355-335-10) on the dash will illuminate steadily for a two-second bulb check whenever the ignition switch is turned ON. The ABS light turns off after the two-second bulb check if there are no ABS malfunctions. If the light remains on after the two-second bulb check, or if the light comes on and illuminates steadily while operating the vehicle, there is a malfunction with the ABS.

NOTE

If the ABS light indicates a malfunction, the ABS and possibly the ATC system may be disabled. If the ABS and/or ATC is disabled, the emergency and service brake systems remain functional.

The ABS light will flash slowly when CTIS is set to CC, MSS, or EMER terrain settings (TM 9-2355-335-10) to indicate that the ABS is disabled. This indication is normal and does not indicate a malfunction in the ABS.

AUTOMATIC TRACTION CONTROL (ATC)

NOTE

When operating vehicle in CC, MSS, or EMER CTIS settings (TM 9-2355-335-10), ABS and ATC systems are disabled.

The M-ATV incorporates an ATC system. The ATC system helps improve traction on slippery or unstable driving surfaces by reducing drive wheel slippage.

The ATC system constantly monitors the wheel for a wheel slip condition. If a wheel slip condition occurs, the ATC system activates and throttles back the engine to help reduce wheel slip. If the vehicle is traveling at a speed of less than 25 mph (40 km/h), the ATC will also pulse the service brake system to aid in reducing wheel slip. Once the ATC system detects that the wheel slip condition is no longer present, it will return the engine and service brake system to normal operating condition.

AUTOMATIC TRACTION CONTROL (ATC) LIGHT

The ATC light (TM 9-2355-335-10) will illuminate steadily when the ignition switch is turned ON. The light will remain on until the service brake pedal is engaged for the first time. The light will then turn off.

When operating the vehicle with CTIS set to HWY terrain setting (TM 9-2355-335-10), the ATC light will remain off unless the ATC system detects a wheel slip condition and activates. The light will then flash rapidly until the wheel slip condition is no longer present.

If the ATC light illuminates steadily when operating the vehicle in the HWY CTIS setting (TM 9-2355-335-10), the ATC is malfunctioning.

NOTE

If the ATC light indicates a malfunction, the ATC and possibly the ABS system may be disabled. If the ATC and/or ABS is disabled, the emergency and service brake systems remain functional.

The ATC light will illuminate steadily when CTIS is set to CC, MSS, or EMER terrain settings (TM 9-2355-335-10) to indicate that the ATC system is disabled. This indication is normal and does not indicate a malfunction in the ATC.

ENGINE ELECTRONIC CONTROL MODULE (ECM)

The M-ATV is equipped with a Caterpillar diesel engine, Model C-7. The Caterpillar engine incorporates an electronic control system.

The main components of the electronic control system are the Engine Control Module (ECM) and multiple engine sensors. The ECM is the computer that controls the engine.

The ECM determines when and how much fuel to deliver to the cylinders, based on the actual and desired conditions at any given time.

The ECM uses a sensor on the throttle pedal to determine the desired engine speed and compares this to the actual engine speed as determined by the engine crankshaft position sensor. If the desired engine speed is greater than the actual engine speed, the ECM injects more fuel to increase engine speed. If desired engine speed is less than the actual engine speed, the ECM injects less fuel to decrease engine speed.

Once the ECM has determined how much fuel is required, it must next determine when to inject the fuel. Injection timing is determined by the ECM after considering input from the coolant temperature sensor, intake manifold air temperature sensor, atmospheric pressure sensor, and boost pressure sensor.

The ECM determines where top dead center on cylinder number one is located from the engine camshaft position sensor signal. The ECM decides when injection should occur relative to top center and provides the signal to the injector at the desired time. The ECM adjusts timing for best engine performance, fuel economy, and white smoke control.

The ECM controls the amount of fuel injected by varying high voltage signals to the injectors. The injectors will pump fuel only when the injector solenoid is energized. By controlling the timing and duration of the high voltage signal, the ECM can control injection timing and the amount of fuel injected.

Included with the ECM is an engine monitoring system. The Caterpillar engine monitoring system monitors engine oil pressure, coolant temperature, and intake manifold air temperature. If the engine monitoring system detects a sensor reading outside of the normal operating parameters, the ECM causes the Warning Lamp to turn on and the Check Engine Lamp to flash to indicate a problem has been detected.

TRANSMISSION

The M-ATV uses an Allison 3500 series, six speed, automatic transmission. The transmission is directly coupled to the Caterpillar C-7 engine. The main components of the transmission are the transmission assembly, Transmission Control Module (TCM), and Transmission Range Selector.

The TCM, which contains the microprocessor based electronics, is located in the dash near the circuit breaker/relay panel. The TCM receives information, in the form of signals from switches and sensors, processes the information, and sends electrical signals to the appropriate solenoids inside the transmission. These solenoids control the operation to the transmission. The TCM also protects the transmission from cold weather start-ups by inhibiting normal shifting functions until a minimum sump oil temperature of 19°F (-7°C) is attained.

The Transmission Range Selector is totally electronic. When the M-ATV is started, the Range Selector automatically defaults to N (neutral). Range selection is achieved by means of six buttons located on the face of the transmission range selector. When D (drive) is selected, the truck will start in first gear and will automatically up shift to a high gear as output speed increases. As the truck slows down, output speed decreases and the transmission automatically downshifts to the appropriate gear. When R (reverse) is selected, the transmission will shift to reverse and the range selector will also activate the reverse light and reverse alarm.

By using the up arrow button or down arrow button on the Transmission Range Selector, the operator can adjust the range of gears he wishes to operate in.

ELECTRICAL SYSTEM

The M-ATV has a 24 VDC electrical system that is waterproof and includes a 12 VDC auxiliary receptacle located on the dash, inside the cab. Manual and automatic resetting circuit breakers are used throughout the system. The voltage of the electrical system is indicated by a voltmeter located on the dash, inside the cab.

The electrical system is powered by four 12-volt batteries located in the cargo deck. Two batteries are for cranking power and two batteries power GFE (Government Furnished Equipment) in silent watch mode.

A battery disconnect switch is located inside the cab behind the driver's seat and the passenger's seat. The battery disconnect switch provides power to operating and control circuits throughout the vehicle.

A 570 amp alternator delivers up to full alternator output on demand to any single or combined 24 VDC load requirement. The alternator provides sufficient amperage to operate all electrical components and charge the batteries when the engine is running.

A connector is provided at the rear of the truck to supply power to towed loads. Another connector is located at the front of the truck to provide access for incoming auxiliary power when vehicle is being towed.

Part of the electrical system includes a heavy-duty starting motor mounted on the engine flywheel housing. The starting motor provides the cranking power necessary for starting the engine.

CENTRAL TIRE INFLATION SYSTEM (CTIS)

The CTIS is designed to adjust the pressure of all tires on the truck for different terrain conditions. The CTIS controller has four terrain settings, three load settings, and a run flat setting which the operator selects and activates in the cab. The main components of the CTIS consist of control valves for air supply and distribution, a dash mounted electrical controller that adjusts tire pressure, associated air tubing, and electrical cables.

The drive line lock controls are integrated with the CTIS to simplify operation of the M-ATV. The CTIS will engage a specific driveline lock configuration based on the terrain and load settings chosen by the operator.

FIRE SUPPRESSION SYSTEM

The M-ATV incorporates three fire suppression systems into its design: capsule, engine compartment, and undercarriage fire suppression systems.

The capsule fire suppression system covers the interior of the capsule. This system can be triggered manually from inside the capsule, or automatic sensors that monitor for hot spots and air particles (smoke) inside the capsule. When triggered, the system activates a cylinder that releases a fire suppression agent throughout the interior of the capsule.

The M-ATV has one of the two engine compartment fire suppression configurations listed below:

- The engine compartment fire suppression system covers the interior of the engine compartment. This system can be triggered manually from inside the capsule, or automatically by thermosensors that monitor the temperature of the engine compartment. When triggered, the system activates four aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

or

- The engine compartment fire suppression system covers the interior of the engine compartment. This system can be triggered manually from inside the capsule, or automatically when fire activates a sensor line. The sensor line runs under the hood and is coated in a heat sensitive polymer. When the polymer melts, two wires within the sensor line touch and complete the circuit. When triggered, the system activates five aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

The M-ATV has one of the two undercarriage fire suppression configurations listed below:

- Undercarriage fire suppression system covers the underside of vehicle. It can be triggered manually from inside the capsule, or automatically when fire activates a sensor line. The sensor lines are pressurized with nitrogen gas and are divided into two separate systems, front and rear. When a sensor line loses pressure the system activates cylinders that release a fire suppression agent. When triggered automatically, the front and rear systems can operate independently from each other. If triggered manually from inside the capsule, both front and rear systems will discharge.
- Undercarriage fire suppression system covers the underside of the vehicle. It can be triggered manually from inside the capsule, or automatically when fire acts on a sensor line. The sensor lines are coated with a heat sensitive polymer and are divided into two separate systems, front and rear. When the polymer melts, two wires inside the sensor line complete a circuit, and the system activates cylinders that release a fire suppression agent. When triggered automatically, the front and rear systems can operate independently from each other. If triggered manually from inside the capsule, both front and rear systems will discharge.

END OF WORK PACKAGE

SERVICE UPON RECEIPT

HANDLING

Check equipment against packing slip to ensure that shipment is complete. Remove all Basic Issue Items (BII) and Components of End Item (COEI). Conduct a complete inventory against COEI and BII, lists then stow in accordance with Stowage Guide (TM 9-2355-335-10).

END OF TASK**SERVICING****1. Removal of Protective Components.**

Upon receipt of the M-ATV, inspect vehicle for obvious damage. Undo any tie downs, shackles, or banding that are securing the M-ATV.

2. Cleaning.**WARNING**

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

CAUTION

- **Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.**
 - **Vehicles must not have ballistic glass cleaned with solvent or other strong cleaning compounds. Ballistic glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.**
 - **Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.**
- a. Air intake opening may be covered with tape, and windshield may be protected with packing material. Remove any protective tape and packing material that may be installed for transport.
 - b. Using a clean cloth, wash vehicle with cool or warm water. Do not use strong detergents or abrasives.

CAUTION

- **When using a pressure washer to clean capsule interior, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.**
- **When using a pressure washer to clean capsule interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.**

- c. Using clean cloth, wipe loose dust and dirt from capsule interior.
- d. Clean seats and seatbelts using a mild solution of warm water and soap solution. Never use solvents or abrasives.

3. Lubrication.

Refer to Lubrication Instructions (TM 9-2355-335-10) for all lubrication requirements for the M-ATV.

END OF TASK

INITIAL CHECKOUT AND ADJUSTMENT

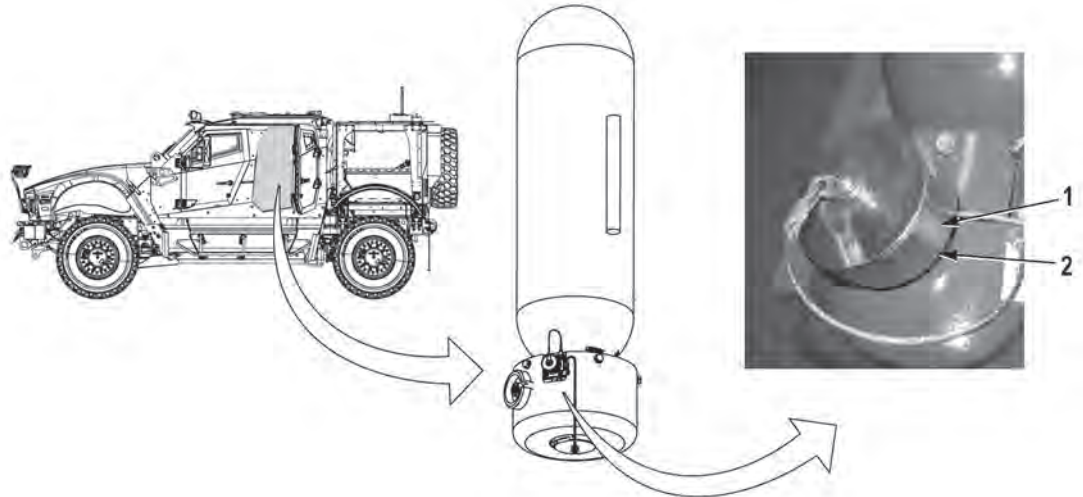
This paragraph includes instructions for the initial checkout and adjustment values for the M-ATV. Complete inspection of the vehicle must be performed to ensure there are no loose wires or bent pin contacts that would cause a short circuit when power is applied.

1. Perform all Operator Level PMCS (TM 9-2355-335-10) and Field Level PMCS (WP 0018).
2. Check tires for proper inflation, refer to Central Tire Inflation System (CTIS) (TM 9-2355-335-10).
3. Inspect starter for loose connections and insecure mounting.

END OF TASK

INITIAL FIRE SUPPRESSION SYSTEM ACTIVATION

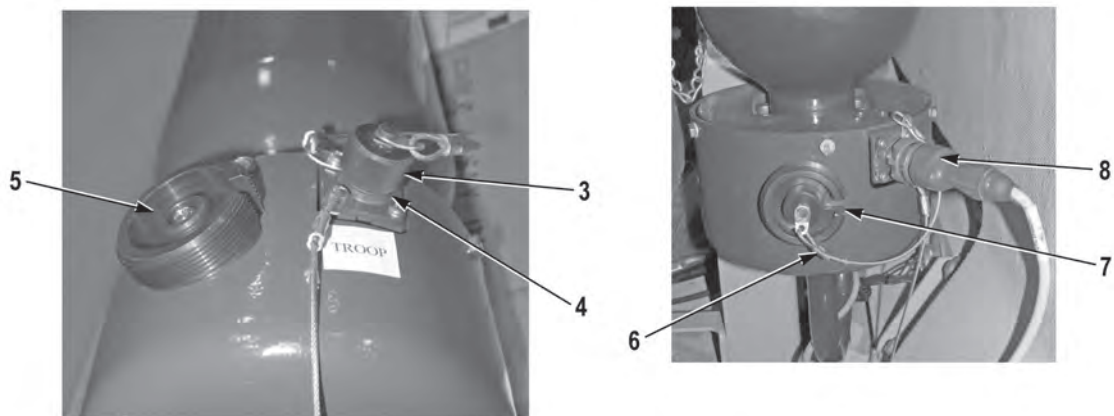
This paragraph includes instructions for the initial setup of the Fire Suppression Systems for the M-ATV. Fire suppression system must be activated prior to operation of M-ATV.



WARNING

Ensure vehicle battery disconnect switch is in OFF position before inspecting fire suppression system. Failure to comply may result in injury or death to personnel.

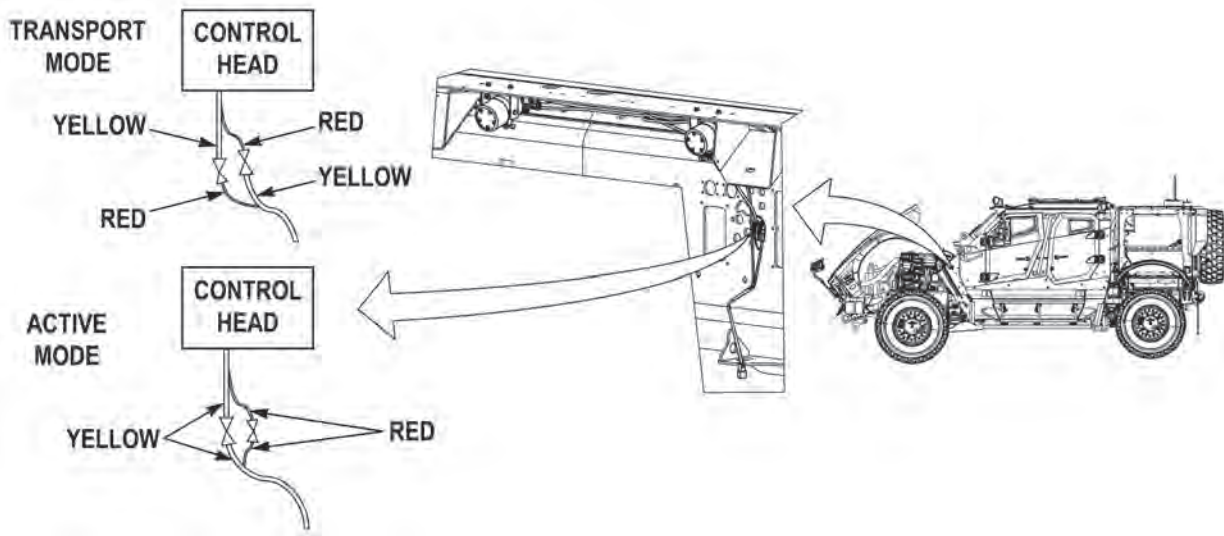
1. Remove large cap (1) from fitting (2).



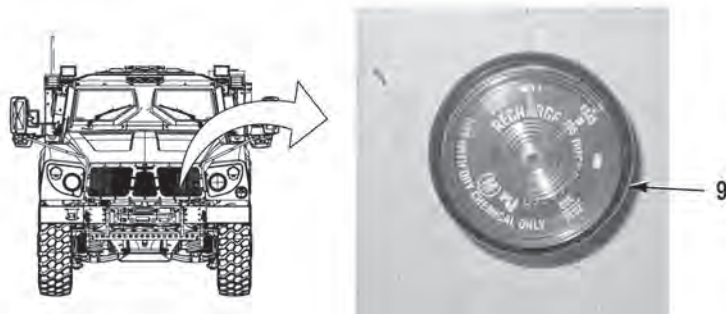
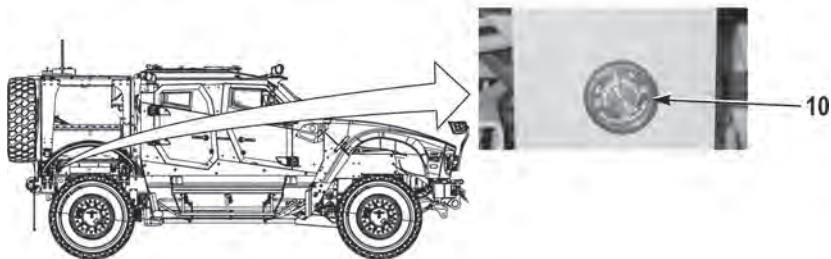
NOTE

Power connector is located on rear of bottle.

2. Remove cap (3) from power connector (4) and install on fitting (5) with lanyard (6) routed through slot (7).
3. Connect power harness (8) to power connector (4).



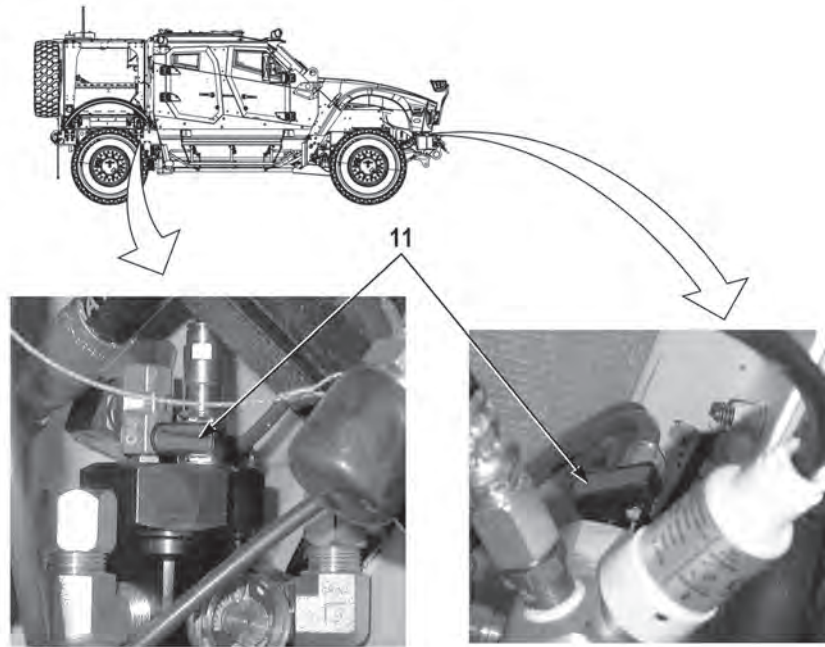
4. Place engine fire suppression system in active mode.
 - a. Disconnect connectors 454 YELLOW.
 - b. Disconnect connectors 454 RED.
 - c. Connect connector 454 YELLOW to connector 454 YELLOW.
 - d. Connect connector 454 RED to connector 454 RED.



NOTE

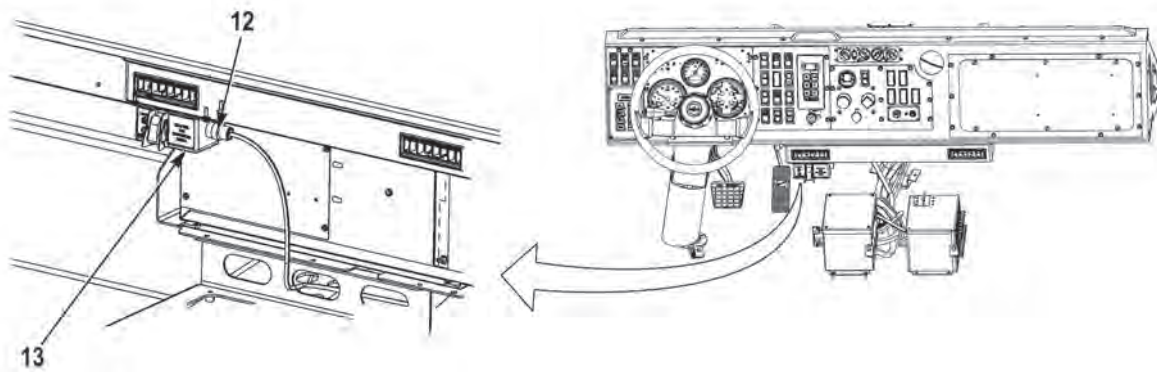
Perform Steps (5) through (7) if equipped with AFES nitrogen detection system.

5. Check front undercarriage fire suppression system detection tubing pressure gauge (9) for correct pressure (indicator in green range of dial).
6. Check rear detection tubing pressure gauge (10) for correct pressure (indicator in green range of dial). If needed, pressurize detection tubing using the instructions in the fire suppression system Nitrogen Fill Kit.

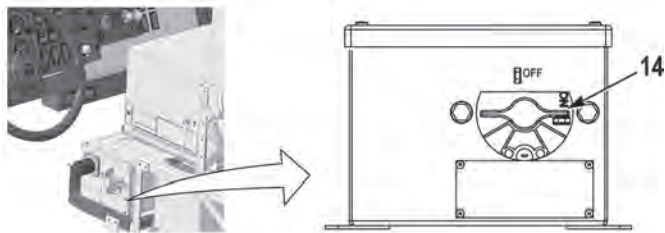
**WARNING**

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

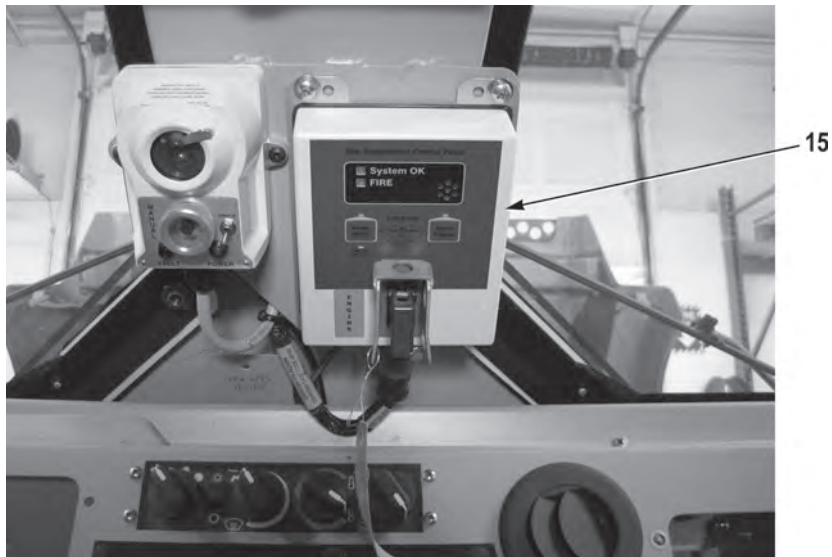
7. When detection tubing pressure gauges (9 and 10) show proper pressure (indicator in the green range of dial), turn four undercarriage fire suppression cylinder ball valves (11) to OPEN position.



8. Connect connector (12) to undercarriage controller (13).



9. Turn battery disconnect switch (14) to ON position.



10. Place ignition switch to the ON position and check fire suppression system control panel (15) for illumination of system OK light.

END OF TASK

SPARE TIRE WINCH ASSEMBLY

WARNING

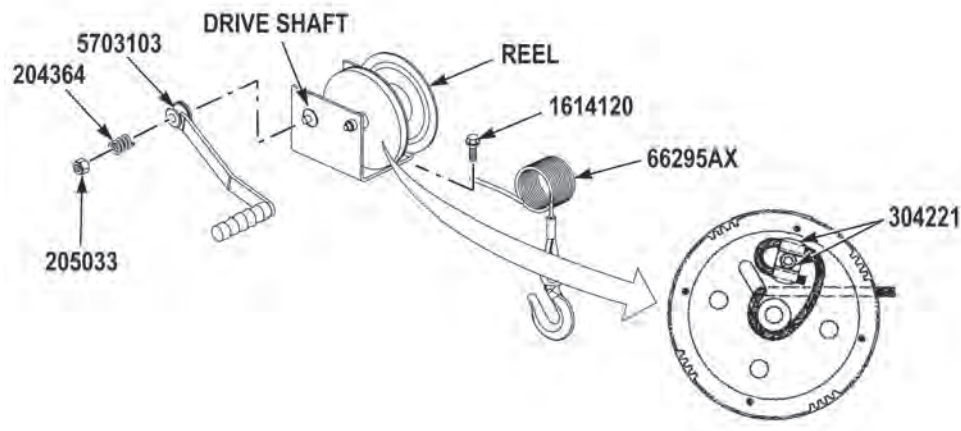
- Never apply load on winch with cable fully extended. Keep at least three full turns of cable on the reel. Failure to comply may result in injury or death to personnel.
- Do not exceed 600 lbs (272.4 kg) weight capacity of winch assembly. Failure to comply may result in injury or death to personnel.
- Keep hands and fingers away from winch assembly when operating winch. Failure to comply may result in injury or death to personnel.
- Winch is only to be used to stow/unstow spare tire. Winch is not to be used to lift other components or material. Failure to comply may result in injury or death to personnel.
- Always wear heavy leather gloves when handling winch cable. Never let cable run through hands. Broken wires will cause injury to personnel.
- Winch is NOT to be used for lifting or moving of persons. Failure to comply may result in injury or death to personnel.

CAUTION

A resistance load of 175 lbs (79 kg) must be applied to wire rope to overcome internal resistance and operate winch brake properly. Turning winch handle counterclockwise will remove winch handle from drive shaft and reel will not turn. Failure to comply may result in damage to equipment.

NOTE

Remove winch assembly and winch bracket from BII.

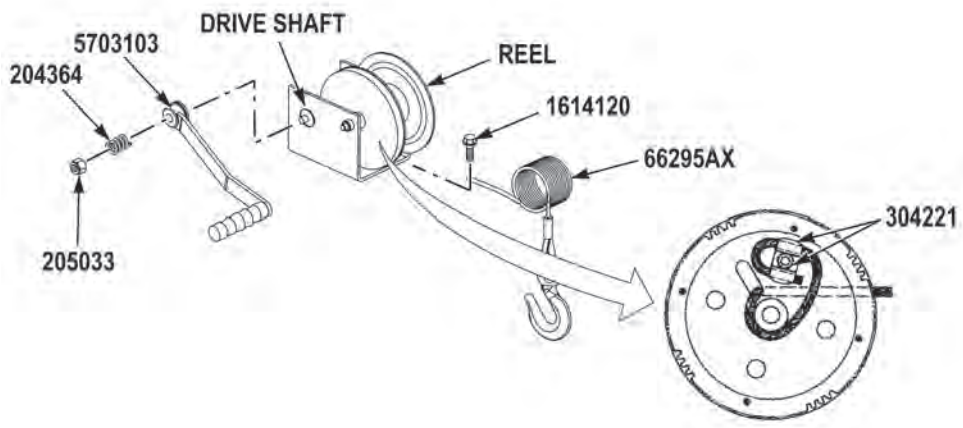


1. Install winch handle (5703103) on drive shaft.
2. Install spring (204364) and locknut (205033) on end of drive shaft.

NOTE

Ensure clicking noise is produced when handle is turned clockwise.

3. Feed wire rope (66295AX) from inside of reel through slot and around reel mounting shaft.

**NOTE**

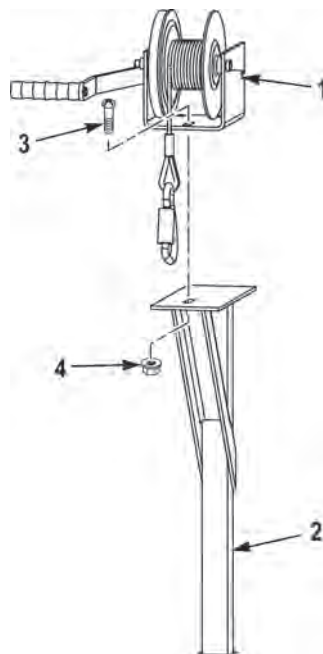
Rope clamp kit (304221) includes clamp, screw, and self-locking nut.

4. Install screw from inside of reel and secure wire rope (66295AX) and clamp with self-locking nut.

NOTE

Ensure that wire rope is evenly wound on reel.

5. Turn winch handle clockwise to wind wire rope onto reel.



6. Install winch (1) on winch bracket (2) with three screws (3) and locknuts (4).

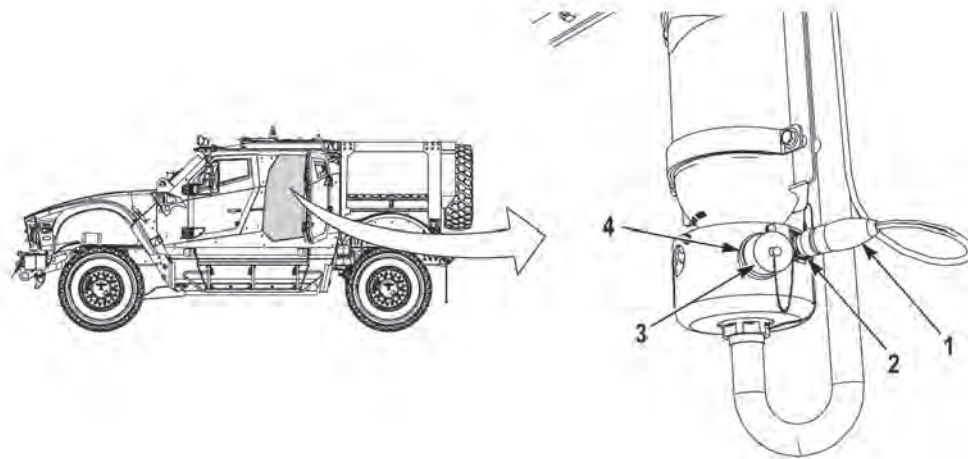
END OF TASK

END OF WORK PACKAGE

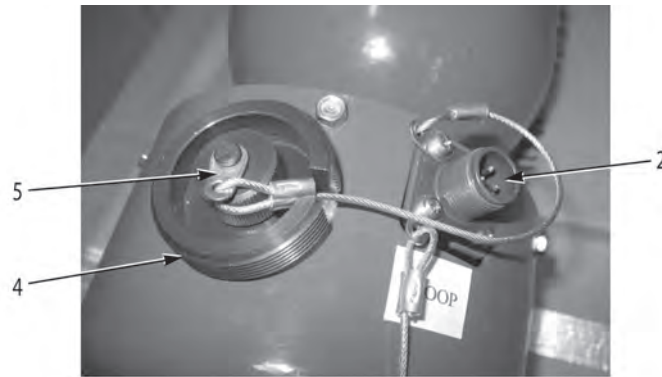
PREPARATION FOR STORAGE OR SHIPMENT

PREPARATION**NOTE**

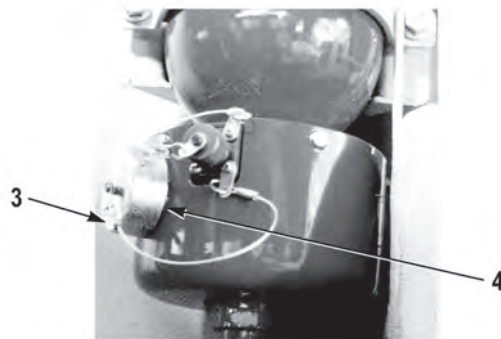
- Perform Step (1) if vehicle is being prepared for storage.
 - Perform Step (2) if vehicle is being prepared for shipment.
1. Before placing a vehicle in storage, perform the following tasks:
 - a. Perform operator level PMCS (TM 9-2355-335-10) and field level PMCS (WP 0018).
 - b. Correct all deficiencies noted during inspection.
 - c. Store and secure Basic Issue Items (BII).
 2. Perform operator level PMCS (TM 9-2355-335-10).
 - a. Prepare vehicle for shipment (TM 9-2355-335-10).
 3. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
 4. Disconnect capsule fire suppression system.



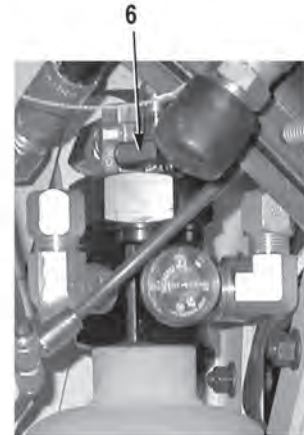
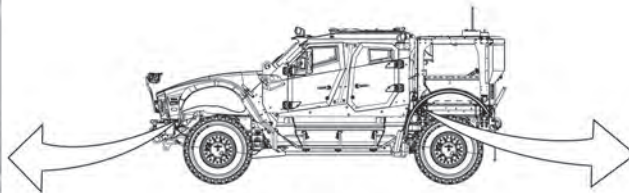
- a. Disconnect power harness (1) from power connector (2).
- b. Remove anti-recoil device (3) from fitting (4).



c. Remove cap (5) from fitting (4) and install cap (5) on power connector (2).



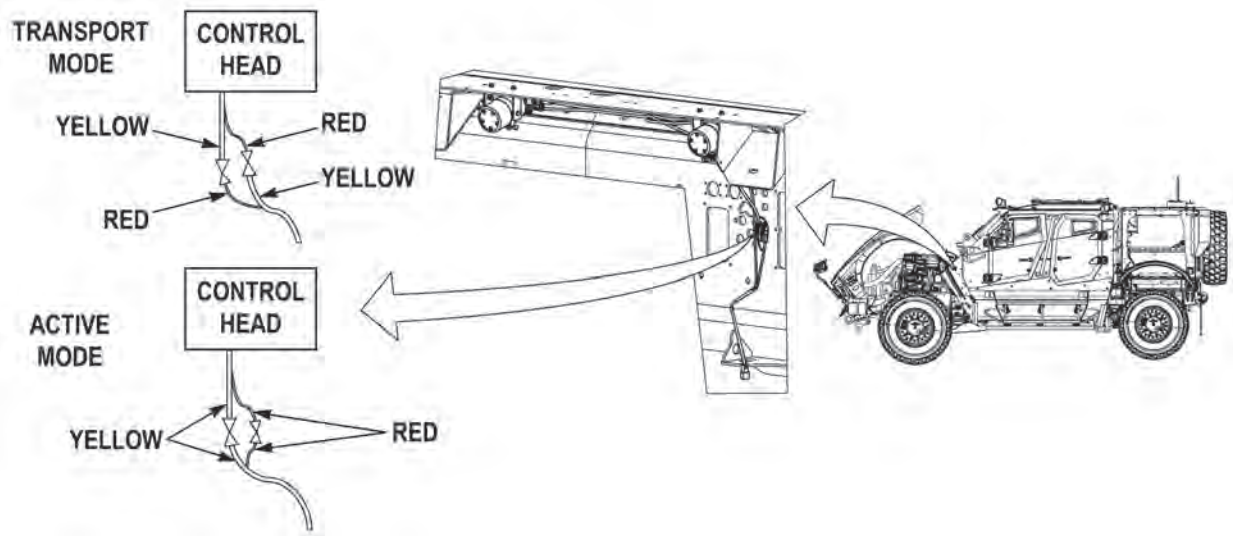
d. Reinstall anti-recoil device (3) on fitting (4).



NOTE

Perform Step (e) if equipped with AFES nitrogen detection.

e. Turn four undercarriage fire suppression cylinder ball valves (6) to OFF position.



5. Place engine fire suppression system in transport mode.
 - a. Disconnect connector 454 YELLOW from connector 454 YELLOW.
 - b. Disconnect connector 454 RED from connector 454 RED.
 - c. Connect connector 454 to YELLOW connector 454 RED.
 - d. Connect connector 454 RED to connector 454 YELLOW.
6. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

END OF TASK

STORAGE

1. While storing vehicle, perform the following tasks:

CAUTION

Ensure tires are not resting on surface containing grease or oil. Failure to comply may result in damage to equipment.

- a. Park vehicle on a suitable surface.

CAUTION

Ensure batteries are disconnected. Batteries will discharge during storage if not disconnected. Failure to comply may result in damage to equipment.

- b. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

END OF TASK

STORAGE MAINTENANCE

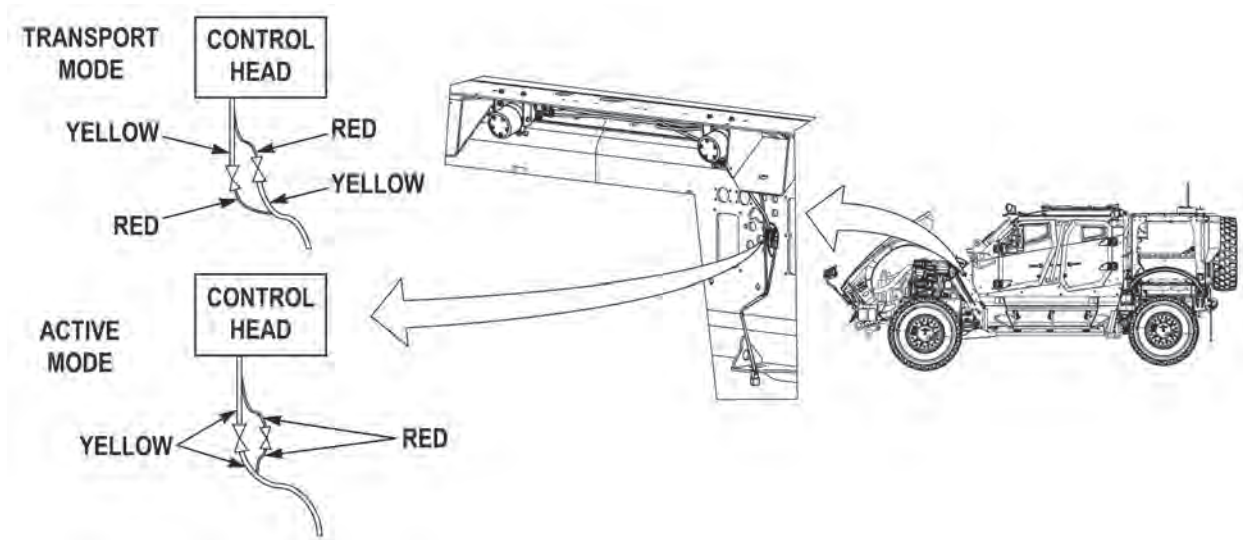
1. While vehicle is in storage, perform the following tasks monthly:
 - a. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
 - b. Conduct visual inspection of the vehicle. Check for oil leaks, lubricant levels, coolant level, and tire pressures. Correct any deficiencies.
 - c. Inspect oil can points. Lubricate if necessary according to Lubrication Instructions (LI) (TM 9-2355-355-10).
 - d. Shift transfer case to neutral, start engine, and idle for 10 minutes. After 10 minutes of engine idle, operate engine for five minutes at 1500 rpm or until the engine water temperature reaches 180°F (82°C). Shift the transmission slowly through all gear selector positions. Return the transmission to neutral and the transfer case to high range.
 - e. Move vehicle 30 feet (9 m) forward and reverse.
 - f. Idle engine 10 minutes before shutdown.
 - g. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
2. While vehicle is in storage, perform the following tasks quarterly:
 - a. Perform all monthly PMCS (TM 9-2355-355-10).
 - b. Exercise all auxiliary equipment. While operating winch, lubricate wire rope.
 - c. Drive vehicle at least 1/4 mile (0.4 km). While driving, shift transmission through all gear ranges.
3. While vehicle is in storage, perform the following tasks yearly:
 - a. Clean the exterior, interior of cab, engine, and undercarriage. Wash any oil, grease, or mud from tires.
 - b. Clean batteries and battery cables with a baking soda solution and rinse with fresh water. Keep the batteries fully charged and clean.
 - c. Completely lubricate the chassis and all auxiliary equipment in accordance with LI (TM 9-2355-355-10).
 - d. Check the coolant level. Test the coolant to ensure that the cooling system is protected against corrosion and temperatures down to -30°F (-34°C). Add antifreeze or corrosion inhibitors compatible with ethylene glycol base antifreeze if cooling system is not adequately protected.
 - e. Change engine oil and oil filter. Change fuel filter element and fuel-water separator filter.

END OF TASK

REMOVAL FROM STORAGE OR SHIPMENT

When removing vehicle from storage, perform the following tasks:

1. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
2. Conduct a visual inspection of the vehicle and remove moisture proof tape (if equipped) from engine, transmission, transfer case, and fuel system.
3. Conduct a visual inspection for damage to vehicle prior to moving vehicle to maintenance facility.
4. Move vehicle to maintenance facility.
5. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

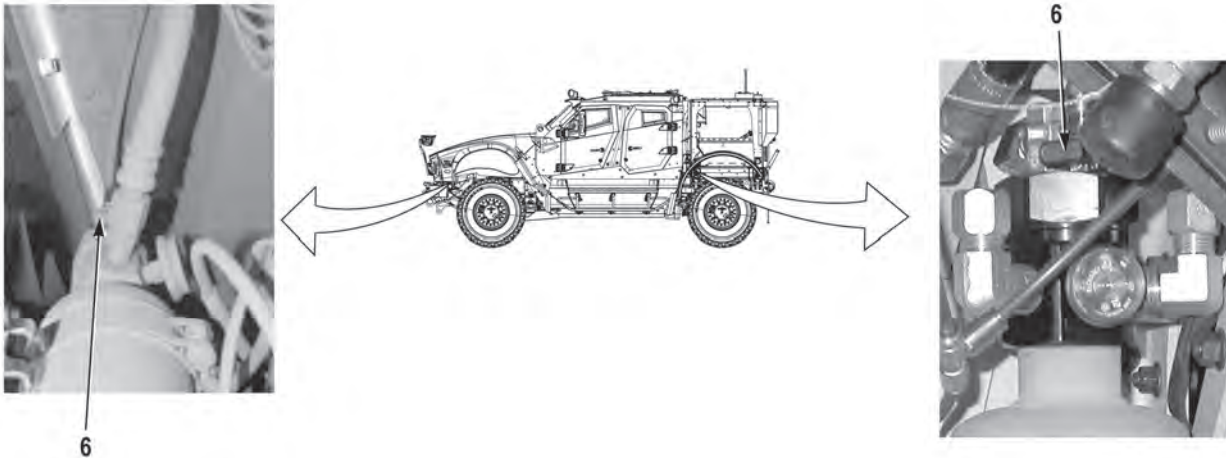


6. Place engine fire suppression system in active mode.
 - a. Disconnect connectors 454 YELLOW
 - b. Disconnect connectors 454 RED
 - c. Connect connector 454 YELLOW to connector 454 YELLOW.
 - d. Connect connector 454 RED to connector 454 RED.

NOTE

Perform Steps (7 and 8) if equipped with AFES nitrogen detection.

7. Inspect undercarriage AFES nitrogen detection tube pressure gauges for proper pressure (indicator in green range of dial) (TM 9-2355-335-10).



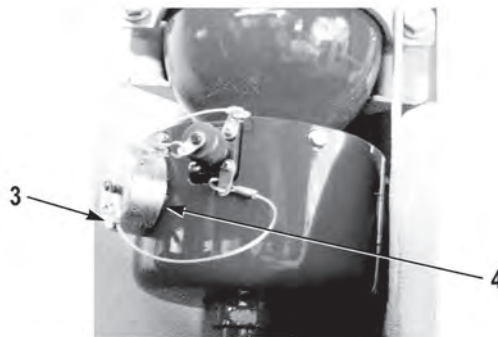
WARNING

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

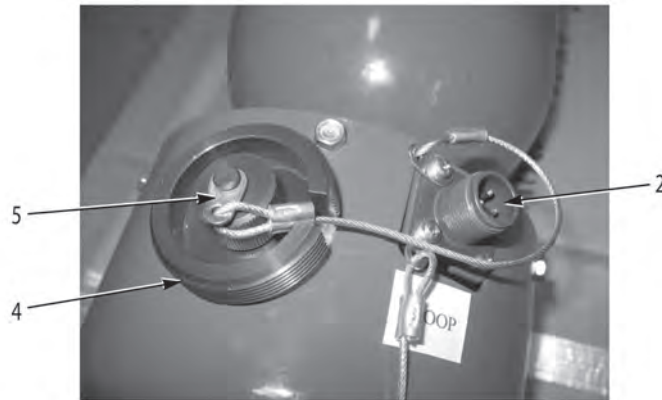
NOTE

All four fire suppression cylinders are turned on the same way. Driver side shown.

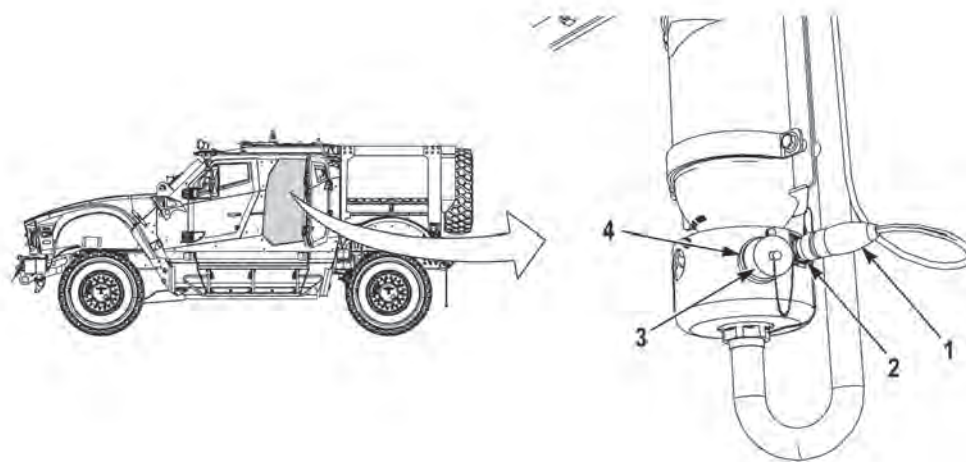
8. Turn four undercarriage fire suppression cylinder ball valves (6) to ON position.
9. Connect capsule fire suppression system



- a. Remove anti-recoil device (3) from fitting (4).



- b. Remove cap (5) from power connector (2) and install cap (5) on fitting (4).



- c. Install anti-recoil device (3) on fitting (4).
- d. Connect power harness (1) to power connector (2).

NOTE

- Perform Step (10) for vehicles being removed from storage.
- Perform Step (11) for vehicles being removed from shipment.

10. Perform operator level PMCS (TM 9-2355-335-10) and field level PMCS (WP 0018).

11. Perform operator level PMCS (TM 9-2355-335-10).

END OF TASK

END OF WORK PACKAGE

CHAPTER 2

TROUBLESHOOTING PROCEDURES FOR M1240, M1240A1, AND M1245

AIR CONDITIONER TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Air conditioner excessively noisy.		
Air conditioner compressor mounting hardware loose or missing.		Tighten and replace air conditioner compressor mounting hardware original (WP 0019), updated (WP 0020).
Air conditioner compressor belt loose or faulty.		Replace air conditioner compressor belt (WP 0220).
Air conditioner compressor faulty.		Replace compressor original (WP 0019), updated (WP 0020).
2. Air conditioner compressor does not shut off or cycles constantly.		
Air conditioner condensers blocked.		Clear blockage from air conditioner condensers.
Engine accessory belt loose or faulty.		Replace engine accessory belt (WP 0221).
Air conditioner compressor belt loose or faulty.		Replace engine air conditioner compressor belt (WP 0220).
Air conditioner unit coolant circuit faulty.		Repair coolant circuit (WP 0024).
Front air conditioner evaporator blocked.		Remove cover from HVAC assembly (WP 0031). Clear blockage from front of evaporator.
3. Air conditioner operates when FAN FORD switch is on.		
FAN FORD switch faulty.	Check for continuity across FAN FORD switch (S6) between terminals 5b and 4.	If test fails, replace FAN FORD switch.
4. Front HVAC blower motor does not operate correctly.		
Front heater motor controls faulty.		Troubleshoot cab heater motor does not operate correctly (WP 0012).

Probable Cause	Test	Action
5. Front HVAC blower operates but no cold air is produced.		
Right switch panel FAN FORD switch ON.		Turn FAN FORD switch OFF.
Front heater/air conditioner temperature controls not set correctly.		Adjust front heater/air conditioner temperature controls.
Air conditioner condenser blocked.		Clear blockage from front air conditioner.
Engine accessory belt loose or faulty.		Replace engine accessory belt (WP 0221).
Air conditioner belt loose or faulty.		Replace air conditioner compressor belt (WP 0220).
Air conditioner compressor electrical connections loose or faulty.	Inspect connectors M25+ and M25- for corrosion, bent or broken pins or broken wires.	Clean and tighten air conditioner compressor electrical connections (WP 0218).
Air conditioner relay faulty.	Replace relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) with relay RI (reverse light/alarm). Check to see if the compressor runs.	If the test passes, replace relay R4 (for M1240 models) or K4 (for M1245 models) (air compressor relay).
Engine wiring harness faulty.	Check for continuity between relay R4 (for M1240 models) or K4 (for M1245 models) terminal 85 and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for continuity between CB4, wire 1082 and terminal 30 (wire 1081) of relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay).	
	Check for continuity between cab bulk head connector C2 terminal 27 and connector C210 terminal A (wire 1752) of the binary switches.	If tests pass, replace binary switch.
	Check for continuity between connector C210 terminal B and relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) terminal 86 (wire 1753).	

Probable Cause	Test	Action
5. Front HVAC blower operates but no cold air is produced. (Continued)		
Cab wiring harness faulty.	Check for continuity between terminal 30 (wire 1081) of relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) and circuit breaker CB4 (wire 1081).	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C6 terminal 31 and heater control connector C17 terminal C (wire 1751).	
	Check for continuity across circuit breaker CB4.	
	Check for continuity between connector C2 and heater control connector C17 terminal A (wire 1082).	If test fails replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C2 and right hand switch panel connector C6 terminal 30 (wire 1752).	
	Check for continuity across the fan ford switch S6 from terminal 4 to terminal 5B.	
	Check for continuity between connector S6 (fan ford switch) terminal 5B and C6 terminal 31 (wire 1751).	
	Check for continuity between connector C6 terminal 30 and fan ford switch connector S6 terminal 4 (wire 1752).	
Front heat control valve faulty or binding (stuck open).		Replace front heat control valve or control cable.
Cab vent control cable faulty or binding.		Replace cab vent control cable.
Cab directional (defrost) control cable faulty or binding.		Replace cab directional (defrost) control cable.
Front air conditioner evaporator blocked.		Remove cover from HVAC assembly (WP 0031). Clear blockage from front of evaporator.
Front air conditioner unit refrigerant circuit faulty.		Repair refrigerant circuit.

Probable Cause	Test	Action
6. Rear heater/air conditioner blower motor does not operate.		
Right switch panel REAR HEATER switch OFF.		Turn REAR HEATER switch ON.
Circuit breaker CB7 faulty.	Check for continuity across circuit breaker CB7.	If test fails, replace circuit breaker CB7 (WP 0195).
Rear heater relay RK faulty.	Replace relay RK (rear HVAC relay) with relay RI (reverse light/alarm).	If test passes, replace relay RK.
	Check to see if the rear heater/air conditioner blower motor operates.	
Dash panel Rear Heater switch faulty.	Check for continuity across Rear Heater switch S8 terminal 2B and 3.	If test fails replace dash panel Rear Heater switch S8.
Cab wiring harness faulty.	Check for continuity between connector C427 terminal 2 and a known good ground (wire 1435E).	If test fails replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C427 terminal 1 and relay RK terminal 87 (wire 2031).	
	Check for continuity between circuit breaker CB7 (rear air conditioner) and relay RK terminal 30 (wire 2031A).	
	Check for continuity between relay RK terminal 85 (wire 1435D) and a known good ground.	
	Check for continuity between relay RK terminal 86 and connector C6 terminal 4 (wire 2030).	
Right switch panel wiring harness faulty.	Check for continuity between right hand switch panel connector C6 terminal 4 and rear HVAC switch S8 terminal 3 (wire 2030).	If test fails replace/repair right switch panel wiring harness (WP 0218).
	Check for continuity between right hand switch panel connector C6 terminal 19 and rear HVAC switch S8 terminal 2B (wire 1076).	
7. Rear heater/air conditioner blower operates but no cold air from duct.		
Front air conditioner not operating properly.		Troubleshoot front HVAC blower operates but no cold air from duct (symptom 5 in this section).
Rear heater/air conditioner temperature controls not set correctly (M1240, M1240A1 only).		Adjust rear heater/air conditioner temperature controls.

Probable Cause	Test	Action
7. Rear heater/air conditioner blower operates but no cold air from duct. (Continued)		
Air conditioner condenser blocked.		Clear blockage from air conditioner condenser.
Rear heat control valve faulty or binding (stuck open) (M1240, M1240A1 only).		Repair or replace rear heat control valve.
Rear air conditioner evaporator blocked.		Clear blockage form rear air conditioner evaporator.
Rear air conditioner wire harness faulty.	Check for 22 to 28 VDC between rear HVAC unit air conditioner solenoid terminal A and a known good ground.	If test fails, replace rear air conditioner wiring harness.
	Check for continuity between rear HVAC unit air conditioner solenoid terminal B and a known good ground.	
Rear air conditioner control solenoid valve faulty.	With the front and the rear air conditioner switch in the ON position, check for 22 to 28 VDC at the rear air conditioner solenoid.	If the test fails, replace rear air conditioner control solenoid valve.
Rear air conditioner unit refrigerant circuit faulty.		Repair rear air conditioner unit refrigerant circuit (WP 0024).
Rear heater unit faulty.		Replace rear heater unit (WP 0032).

END OF TASK

END OF WORK PACKAGE

ANTI-LOCK BRAKE SYSTEM (ABS) TROUBLESHOOTING

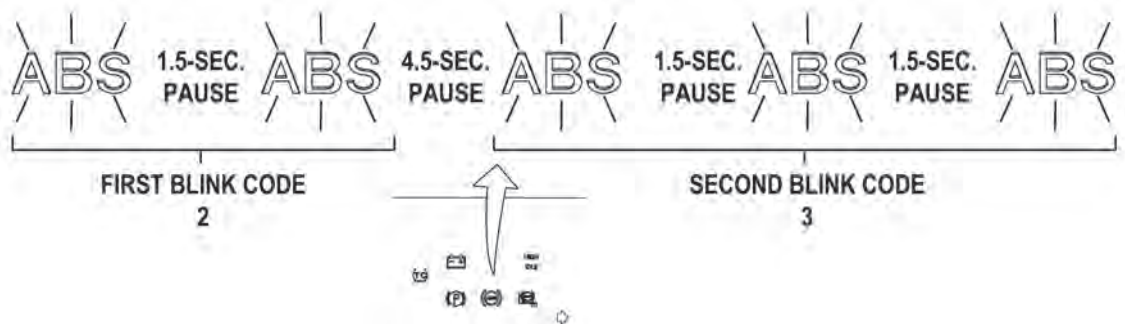
INTRODUCTION

Blink codes allow personnel to troubleshoot Anti-Lock Brake System (ABS) problems without diagnostic equipment. Information about ABS faults can be accessed by using ABS light to display fault codes. This workpackage contains the most probable faults for the ABS blink codes. The first numbers in blink codes are listed by subsystem and/or location of malfunction. The second blink code (highlighted) and description of the fault is listed in subsequent table. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a blink code is not listed, notify Supervisor.

1. Blink Code Timing:

ABS light will blink with a 1.5 second pause between blink code digits and 4.5 second pauses between blink codes.

Example:



2. Blink Code Activation:

- a. Move ENGINE switch to ON position to activate ABS diagnostic switch.
- b. Press and release the brake pedal.
- c. Press and hold the ABS diagnostic switch for two seconds, then release.
- d. Record number of blinks for trouble codes. Use charts to determine direction of troubleshooting.
- e. A blink code of 01 01 indicates no fault present.

3. Clearing Blink Codes:

- a. Move ENGINE switch to OFF position.
- b. Press and hold ABS diagnostic switch.
- c. Move ENGINE switch to ON position while holding ABS diagnostic switch.
- d. Wait two seconds and release ABS diagnostics switch.
- e. Press and release the brake pedal.
- f. Road test vehicle to verify fault(s) have been repaired.

END OF TASK

WHEEL SPEED SENSOR TROUBLE CODES

NOTE

- All references to speed sensor in this work package and SPD SENSOR in the schematics refer to the ABS sensor in (WP 0086). Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0048, WP 0047, WP 0056).

First Blink Code	Location
02	Driver side axle No. 1 wheel speed sensor.
03	Passenger side axle No. 1 wheel speed sensor.
04	Driver side axle No. 2 wheel speed sensor.
05	Passenger side axle No. 2 wheel speed sensor.

Second Blink Code	Probable Cause	Test	Action
01	1. Sensor air gap too large.		
	ABS speed sensor to tone wheel gap faulty.		Clean and adjust associated ABS speed sensor.
02	2. Air gap too large or sensor shorted.		
	ABS speed sensor faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated ABS speed sensor. Refer to (WP 0086) for ABS sensor replacement.
	ABS wiring harness faulty.	For associated speed sensor, disconnect associated ABS CPU connector. Check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminals 1 and 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Speed sensor to tone wheel gap faulty.		Clean and adjust associated speed sensor.
03	3. Speed sensor signal noisy.		
	Tone wheel faulty.		Replace associated hub assembly (WP 0086).
	Wheel bearings are loose.	Inspect air line and fittings for damage.	Tighten loose wheel bearings (WP 0085).
04	4. Wheel locked for excessive period of time during ABS cycle.		
	Brakes out of adjustment.		Inspect and adjust brakes (WP 0123).
	Air line(s) between ABS relay valve and brake chamber faulty.		Inspect air line and fittings, repair/replace as necessary.

Second Blink Code	Probable Cause	Test	Action
05	5. Excessive rate of deceleration found at a wheel site or sensor shorted.		
	ABS speed sensor is faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated speed sensor. Refer to (WP 0086).
	Wheel seals leaking.		Clean brakes and replace wheel seal (WP 0085).
	Tone wheel faulty.		Replace hub assembly (WP 0086).
	Wheel bearing are loose.		Tighten wheel bearings (WP 0085).
06	6. Sensor connected shorted low or high or sensor is open.		
	ABS speed sensor is faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated speed sensor. Refer to (WP 0086).
	ABS wiring harness faulty.	For right front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X2, terminal 6.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For right front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X2, terminal 5.	
		For left front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X2, terminal 7.	
		For left front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X2, terminal 8.	
		For left rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X3, terminal 1.	

Second Blink Code	Probable Cause	Test	Action
06	7. Sensor connected shorted low or high or sensor is open. (Continued)		
		For left rear speed sensor, check for less than 200 ohms between speed sensor connector, terminal 2 and connector X3, terminal 2.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For right rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X3, terminal 3.	
		For right rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X3, terminal 4.	
		For associated speed sensor, check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminal 1 and a known good ground.	
		For associated speed sensor, check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X1, terminal 1.	
07	8. Internal error at sensor port of ECU.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).
08	9. Wrong sensor found in location.		
	Speed sensor wired in wrong.	Check if ABS wiring harness speed sensor connectors are connected to correct speed sensors.	Switch connectors on sensors as necessary.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK

ABS RELAY VALVE TROUBLE CODES

NOTE

- All references to ABS relay valve in this work package and RIGHT PMV and LEFT PMV in the schematics, refer to the ABS valve in (WP 0116 and WP 0117). Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
08	Driver side axle No. 1 ABS relay valve.
09	Passenger side axle No. 1 ABS relay valve.
10	Driver side axle No. 2 ABS relay valve.
11	Passenger side axle No. 2 ABS relay valve.

Second Blink Code	Probable Cause	Test	Action
1	1. Short between release solenoid and supply voltage.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X1, terminal 1.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
2	2. Short between release solenoid and ground.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminals 1 and 2.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 2 and a known good ground.	
ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).	

Second Blink Code	Probable Cause	Test	Action
3	3. Open circuit at release solenoid.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X2, terminal 3.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X2, terminal 10.	
3. Open circuit at release solenoid.			
3	ABS wiring harness faulty. (Continued)	For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X3, terminal 10.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
4	4. Open circuit in common line to valve.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X2, terminal 9.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X2, terminal 11.	
	For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X3, terminal 8.		

Second Blink Code	Probable Cause	Test	Action
4	5. Open circuit in common line to valve.		
	ABS wiring harness faulty.	For left ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X3, terminal 11.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
5	6. Short between hold solenoid and supply voltage.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
6	7. Short between hold solenoid and ground.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS relay valve connector, terminals 1 and 3.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For associated ABS relay valve, check for greater than 10,000 ohms between ABS relay valve connector, terminal 3 and a known good ground.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
7	8. Open at hold solenoid.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X2, terminal 4.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X2, terminal 2.	

Second Blink Code	Probable Cause	Test	Action
7	7. Open at hold solenoid. (Continued)		
		For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X3, terminal 9.	
		For left rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X3, terminal 12.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
8	8. Wrong valve found in location.		
	ABS relay valve wired in wrong.	Check if ASB wiring harness relay valve connectors are connected to correct relay valves.	Switch connectors at ABS relay valve as necessary.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK**AUTOMATIC TRACTION CONTROL (ATC) TROUBLE CODES****NOTE**

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
14	Automatic Traction Control (ATC) Valve

Second Blink Code	Probable Cause	Test	Action	
5	1. Solenoid in Automatic Traction Control (ATC) valve shorted high.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X3, terminal 5.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X1, terminal 1.		
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X1, terminal 1.		
ATC valve faulty.		Replace ATC valve (WP 0119).		
6	2. Solenoid in ATC valve shorted to ground.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X3, terminal 6.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminals 1 and 2.		
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 1 and a known good ground.		
ATC valve faulty.		Replace ATC valve (WP 0119).		
7	3. ATC valve open circuit.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X3, terminal 6.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X3, terminal 5.		
ATC valve faulty.		Replace ATC valve (WP 0119).		

Second Blink Code	Probable Cause	Test	Action
9	4. Engine interface shorted to ground or supply voltage.		
	ABS wiring harness faulty.	Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 1.	If test fails, disconnect ABS wiring harness J1939 connector and retest. If test fails with connector disconnected, replace ABS wiring harness. If not, troubleshoot J1939 bus. Refer to (WP 0086) for ABS sensor replacement.
		Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 11.	
		Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 1.	
		Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 11.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
10	5. Error reported from engine data link.		
	Powertrain data link faulty.		Troubleshoot engine ECU J1939 bus interface.

Second Blink Code	Probable Cause	Test	Action
11	6. Engine interface shorted to ground or supply voltage.		
	ABS wiring harness faulty.	Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 1.	If test fails, disconnect ABS wiring harness J1939 connector and retest. If test fails with connector disconnected, replace associated ABS wiring harness. If not, troubleshoot J1939 bus. Refer to (WP 0086) for ABS sensor replacement.
		Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 11.	
		Check for greater than 10,000 ohms between wire J1939- at connector X1, terminal 6 and connector X1, terminal 1.	
	Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 11.		
12	7. Timeout or no connection found in engine link (J1939).		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	Powertrain data link faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.			
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
All (1-11)	8. Electronic Control Unit (ECU) internal fault.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK

ELECTRONIC CONTROL UNIT (ECU) INTERNAL FAULT TROUBLE CODES

First Blink Code	Location
15	Electronic Control Unit (ECU).

Second Blink Code	Probable Cause	Test	Action
05	1. Electronic Control Unit (ECU) internal fault.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK**ELECTRONIC CONTROL UNIT (ECU) TROUBLE CODES****NOTE**

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
16	Power circuits.

Second Blink Code	Probable Cause	Test	Action
1	1. Excessive voltage found on ABS ECU connector X1, terminal 1.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
2	2. Low voltage found on ABS ECU connector X1, terminal 1.		
	Charging system faulty	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging.
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
3	3. No voltage found on ABS ECU connector X1, terminal 1.		
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
4	4. No ground found on ABS ECU connector X1, terminal 11.		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1435 between ABS wiring harness connectors X1, terminal 11 and C3, terminal G.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1435 between cab wiring harness connector C3, terminal G and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
5	5. Excessive voltage found on ABS ECU connector X1, terminal 2.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
6	6. Low voltage found on ABS ECU connector X1, terminal 2.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1201 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).
7	7. No voltage found on ABS ECU connector X1, terminal 2.		
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
8	8. No ground found on ABS ECU connector X1, terminal 12.		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1435 between ABS wiring harness connectors X1, terminal 12 and C3, terminal H.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1435 between cab wiring harness connector C3, terminal H and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
9	9. Excessive voltage found on switched ignition input.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1. Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
9	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connector C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
		Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connector C3, terminal B.	

Second Blink Code	Probable Cause	Test	Action
10	10. Low voltage found on switched ignition input.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).	
	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal A.		
11	11. Voltage difference between ABS ECU connector X1, terminals 1 and 2.		
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.

Second Blink Code	Probable Cause	Test	Action
11	11. Voltage difference between ABS ECU connector X1, terminals 1 and 2. (Continued)		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connector C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connector C3, terminal B.		

END OF TASK

MISCELLANEOUS TROUBLE CODES

NOTE

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050, WP 0047).

First Blink Code	Location
17	Miscellaneous Trouble Codes.

Second Blink Code	Probable Cause	Test	Action
3	1. J1939 data link not functioning.		
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	J1939 data link wiring harness faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
		Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	

Second Blink Code	Probable Cause	Test	Action
4	2. J1939 data link timeout.		
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	J1939 data link wiring harness faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
		Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
5	3. Tire size front to rear out of range		
	Wrong or worn tire(s).	Inspect tires.	Refer to TM 9-2355-335-10.
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
6	4. Tire size out of range or parameter.		
	Wrong or worn tire(s).	Inspect tires.	Refer to TM 9-2355-335-10.
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	

Second Blink Code	Probable Cause	Test	Action
7	5. Brake light signal not found at this power cycle.		
	Stoplight circuit faulty.	Start engine and allow system pressure to build. Apply brakes and verify brake lights illuminate.	If test fails, troubleshoot brake lights do not operate (WP 0012).
	ABS ECU is faulty.	Check for 22 to 28 VDC between wire 1025 ABS wiring harness connector X2, terminal 1, and a known good ground, when brakes are applied.	If test passes and fault occurs, replace ABS ECU (WP 0115).
	ABS wiring harness faulty.	Check for less than 200 ohms across ABS harness wire OR5 from connector C3, terminal N, to connector X2, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.		Replace/repair cab wiring harness (WP 0218).

END OF TASK

END OF WORK PACKAGE

BRAKE SYSTEM TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Air compressor excessively noisy.		
Compressor loose on mountings.		Re-torque mounting bolts and brackets, replace as necessary (WP 0219).
Lack of lubrication.	Inspect oil supply lines from engine.	If test fails, replace as necessary.
Loose or worn drive gear.	Remove air compressor and inspect drive gear.	If test fails, replace as necessary (WP 0219).
Air compressor faulty.	Inspect compressor for damage or failure.	If test fails, repair/replace as necessary (WP 0219).
2. Air compressor runs hot.		
Air line 2114 faulty.	Inspect air line for damage.	If test fails, replace as necessary.
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air compressor faulty.	Inspect compressor.	If test fails, replace as necessary (WP 0219).
Improper flow of coolant through compressor.	Inspect coolant lines to air compressor.	If test fails, replace as necessary.
3. Air dryer purges continually.		
Air dryer(s) purge valve frozen.		Troubleshoot air dryer freezes (Step 4).
Air governor adjustment faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air dryer purge valve faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).

Probable Cause	Test	Action
4. Air dryer freezes.		
Air dryer heater not working.	Are 22 to 28 VDC measured on wire 1538 at chassis harness connector C32, terminal 1?	If test passes, replace air dryer (WP 0103).
Service overdue on air dryer.		Change air dryer filter element (WP 0102).
Chassis wiring harness faulty.	Are less than 200 ohms measured on wire 1538 between C32, terminal 1 and C79, terminal C?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1538 between C79, terminal C and circuit breaker CB2?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB2?	If test fails, replace circuit breaker CB2 (WP 0194).
5. Air dryer will not purge.		
Air lines between air reservoir and air dryer and/or fittings faulty.	Inspect air lines and fittings between air dryer and air reservoir.	If test fails, remove and replace air lines as necessary.
Purge valve clogged, frozen, or damaged.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air dryer faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
6. Air pressure buildup is slow or air pressure is low.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings for audible leaks.	If test fails, repair/replace as necessary.
Air reservoir drain valve(s) faulty.	Inspect drain valves.	If test fails, replace drain valves.
Air dryer purge valve stuck open, constant leaking from base of filter dryer body.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air pressure gauge faulty.		Replace pressure gauge.
Restricted air intake to compressor.	Check inlet hose and fittings from manifold for blockage or restriction.	If test fails, repair/replace air line as required.
Air compressor discharge port faulty.	Inspect discharge port for clog or damage.	If test fails, repair/replace as necessary (WP 0219).

Probable Cause	Test	Action
6. Air pressure buildup is slow or air pressure is low. (Continued)		
Air compressor faulty.	Inspect compressor for damage or failure.	If test fails, repair/replace as necessary (WP 0219).
Air reservoir supply tank No. 1 faulty.	Inspect air reservoir supply tank No. 1.	If test fails, repair/replace as necessary (WP 0111).
7. Air pressure drops rapidly after engine shutdown.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Air reservoir inlet check valves faulty.	Inspect inlet check valves on air reservoirs.	If test fails, repair/replace as necessary (WP 0107).
Air reservoir drain valve(s) faulty.	Inspect drain valves for operation.	If test fails, replace drain valves (WP 0108, WP 0113).
Air reservoir supply tank No. 1 faulty.	Inspect air reservoir supply tank No. 1.	If test fails, repair/replace as necessary (WP 0111).
Secondary air reservoir faulty.	Inspect secondary air reservoir.	If test fails, repair/replace as necessary (WP 0109, WP 0110).
8. Air pressure rises above specified cut-out pressure of 125 psi (860 kPa).		
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air pressure gauge faulty.		Replace pressure gauge.
Air compressor faulty.		Inspect compressor and repair/replace as necessary (WP 0219).
9. Excessive loss of air pressure when braking.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings for wear and damage.	If test fails, repair/replace as necessary.
Service brake relay valve faulty.	Check for audible air leak from valve.	If test fails, replace service brake relay valve (WP 0133).
Treadle valve faulty.	Check for audible air leak from valve.	If test fails, repair/replace as necessary.
Front or rear gladhand faulty.	Inspect front and rear gladhands.	If test fails, repair/replace if necessary.
Spring brake relay double check valve faulty.	Check for audible air leak from valve.	If test fails, replace spring brake double check valve (WP 0134).
Spring brake valve faulty.	Check for audible air leak from valve.	If test fails, replace spring brake valve (WP 0136).
Tractor protection faulty.		Replace tractor protection valve (WP 0137).
Quick release valve (axle No. 1) faulty.	Check for audible air leak from valve.	If test fails, replace quick release valve (axle No. 1) (WP 0128).

Probable Cause	Test	Action
9. Excessive loss of air pressure when braking. (Continued)		
Front brake chamber faulty.	Inspect front brake chambers.	If test fails, repair/replace as necessary (WP 0120).
Rear brake chamber faulty.	Inspect rear brake chambers.	If test fails, repair/replace as necessary (WP 0121).
10. Large quantity of moisture expelled from reservoirs.		
Air dryer faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
11. ABS light does not operate correctly.		
Circuit breaker CB13 faulty.	Are less than 200 ohms measured across circuit breaker CB13?	If test fails, replace circuit breaker CB13 (WP 0194).
Relay_E faulty.	Are less than 200 ohms measured on relay_E between terminals 87A and 30.	If test fails, replace relay_E.
Indicator light circuit board faulty.	Are 22 to 28 VDC measured on wire X103 at chassis harness connector C4, terminal 5?	If test passes, repair/replace indicator light circuit board.
Indicator light circuit board wiring harness faulty.	Are 22 to 28 VDC measured on wire X103 at capsule harness connector C4, terminal 5?	If test passes, replace/repair indicator light circuit board wiring harness (WP 0218).
	Are less than 200 ohms measured on wire X103 between capsule harness connector C4, terminal 5 and relay_E connector, terminal 30?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1527 between relay_E connector, terminal 87A and circuit breaker CB13?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB2?	If test fails, replace circuit breaker CB2 (WP 0194).
ABS ECU faulty.		Replace ABS ECU (WP 0115).
12. ABS does not operate.		
ABS control system faulty.		Check for blink codes (WP 0009).
13. ATC Light does not operate.		
Indicator light circuit board faulty.	Are 22 to 28 VDC measured on wire X101 at chassis harness connector C4, terminal 6?	If test passes, replace indicator light circuit board.
Indicator light circuit board wiring harness faulty.	Are 22 to 28 VDC measured on wire X101 at capsule harness connector C4, terminal 6?	If test passes, replace/repair indicator light circuit board wiring harness (WP 0218).

Probable Cause	Test	Action
13. ATC Light does not operate. (Continued)		
Indicator light circuit board wiring harness faulty.	Are less than 200 ohms measured on wire X103 between capsule harness connector C4, terminal 5 and relay_E connector, terminal 30?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1527 between relay_E connector, terminal 87A and circuit breaker CB13?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB13?	If test fails, replace circuit breaker CB13 (WP 0194).
ABS ECU faulty.		Troubleshoot ABS system (WP 0009).
14. Parking brake does not hold vehicle.		
Air line(s) and/or fitting(s) faulty	Inspect air lines for audible leaks.	If test fails, repair/replace as necessary.
Brake chamber(s) faulty		Inspect axle No. 2 (WP 0121) brake chambers and repair/replace as necessary.
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake(s) caged		Inspect brake assemblies and uncage brakes as necessary.
15. Parking brake(s) drag or will not release.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Spring brake relay valve R-14 faulty.		Inspect spring brake relay valve and repair/replace as necessary (WP 0135).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Spring brake relay double check valve faulty.		Replace spring brake relay double check valve (WP 0134).
Spring brake valve faulty		Inspect spring brake valve and repair/replace as necessary (WP 0136).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
Quick release valve faulty.		Replace quick release valve (WP 0128, WP 0129).

Probable Cause	Test	Action
15. Parking brake(s) drag or will not release. (Continued)		
Dash manifold assembly faulty.		Inspect dash manifold assembly and repair/replace as necessary.
16. Parking brake(s) will not apply.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
17. Service brake (on one wheel only) not releasing.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
ABS valve(s) faulty.		Troubleshoot ABS system (WP 0009).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
18. Service brake(s) fails to release properly.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Spring brake relay valve R-14 faulty.	Inspect spring brake relay valve.	If test fails, repair/replace as necessary (WP 0135).
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Quick release valve(s) faulty.	Inspect quick release valves.	If test fails, repair/replace as necessary (WP 0128, WP 0129).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).

Probable Cause	Test	Action
19. Service brake(s) grabbing.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Brake shoes worn.	Inspect brake shoes.	If test fails, replace as necessary (WP 0124).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
20. Service brake(s) overheats.		
Rear brakes are damaged or require adjustment.	Inspect and adjust brakes (WP 0123).	If test fails, replace as necessary (WP 0124).
21. Service brakes apply too slowly.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Excess clearance between brake shoes and brake drums.	Inspect brakes.	Perform adjustment as necessary (WP 0123).
22. Service brakes(s) will not apply.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Quick release valve(s) faulty.	Inspect quick release valves.	If test fails, repair/replace as necessary (WP 0128, WP 0129).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect brakes and repair/replace as necessary (WP 0121, WP 0120).
23. Poor braking performance.		
Worn or incorrect brake pads.	Inspect brake shoes.	Replace as necessary (WP 0123).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.

Probable Cause	Test	Action
24. Uneven braking (pulling).		
Brake(s) caged.	Inspect brake assemblies.	Uncage brakes as necessary.
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	Repair/replace as necessary.
Brake shoes worn	Inspect brake shoes.	If test fails, replace as necessary (WP 0124).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
Brake drum(s) warped, damaged, or dirty.	Inspect brake drums.	If test fails, repair/replace as necessary (WP 0122).
Grease or oil on brake drums or pads.	Inspect brake drums and pads (WP 0123).	Repair/replace as necessary (WP 0122, WP 0124).

END OF TASK

END OF WORK PACKAGE

COOLING SYSTEM TROUBLESHOOTING

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

COOLING SYSTEM TROUBLESHOOTING

Probable Cause	Test	Action
1. Capsule heater not functioning.		
Loss of coolant due to leakage.	Check for leaks at all hoses, fittings, freeze plugs, water pump, low coolant level switch, sight glass, radiator, surge tank or reservoir cap (depending on vehicle configuration), heater core or head gasket.	If test fails, tighten clamps or replace hoses as necessary.
Blower motor does not operate.	Check if blower motor operates correctly.	If test fails, troubleshoot blower motor does not operate correctly (WP 0012).
Defrost control does not operate.	Test for defrost control operation.	If test fails, replace heater controls as necessary (WP 0147).
Heater core, radiator, hose, or valve blocked internally.		Flush coolant system (WP 0176, WP 0177).
Cable for heater control.	With second person visually inspect water shut off valve for operation.	If test fails, replace heater controls as necessary (WP 0147).
Heater core blocked externally.	Inspect for external blockage in heater core.	Clean or replace obstructed component.
2. Engine overheats water temp gauge continuously reads over 220°F (104°C).		
FAN FORD switch activated.		Turn FAN FORD switch off.
	Are 22 to 28 VDC measured on wire 1751 Fan ford switch connector, terminal 5B.	If test fails, replace wire 1751 from fan ford switch to heater control connector C17, terminal C (WP 0218).
	Are less than 200 ohms measured between fan ford switch connector, terminals 4 and 5B.	If test fails, remove and replace defective fan ford switch.
		If test fails, replace wire 1452 from fan ford switch connector, terminal 4 to engine harness connector C210, terminal A. (WP 0218).

Probable Cause	Test	Action
2. Engine overheats water temp gauge continuously reads over 220°F (104°C). (Continued)		
Water pump belt broken.	Inspect engine pulleys for damage.	If test fails, replace damaged pulleys.
		If test fails, install new belt (WP 0238).
Air solenoid manifold assembly faulty.	If fan can be rotated with engine off, air solenoid manifold valve may be faulty. Inspect.	If test fails, replace air solenoid manifold assembly (WP 0114).
Shroud missing or broken.	Visually inspect fan shroud for damage.	If test fails, replace fan shroud (WP 0179).
Fan clutch faulty.	If fan can be rotated with engine off, fan clutch may be faulty.	If test fails, replace fan clutch (WP 0178).
Blocked air flow through charge air cooler.		If test fails, replace charge air cooler (WP 0172).
Radiator fins damaged or obstructed.		If test fails, correct obstruction or damage.
Loss of coolant due to leakage.	Check for leaks at all hoses, fittings, freeze plugs, water pump, low coolant level switch, sight glass, radiator, surge tank or reservoir cap (depending on vehicle configuration), heater core or head gasket.	If test fails, tighten clamps or replace hoses as necessary.
Radiator cap faulty.	Test radiator cap.	If test fails, replace radiator cap.
Temperature gauge faulty.		If test fails, replace temperature gauge.
Thermostat failure.	Remove and test thermostat.	If test fails, replace as necessary (WP 0183).
Check engine light is on.	Check for active engine fault codes.	Correct faults shown in ECM.
Water pump failure.	Test and examine water pump.	If test fails, replace water pump as necessary.
	Examine water pump pulley for operation.	If test fails, replace pulley as necessary.
Radiator blocked internally.		If test fails, flush coolant system (WP 0176, WP 0177).
3. Engine runs too cool.		
Fan clutch remains engaged.	If fan can be rotated with engine off, fan clutch may be faulty.	If test fails, replace fan clutch as necessary (WP 0178).
Thermostat stuck open.	Remove and test thermostat.	If test fails, replace thermostat (WP 0183).
Check engine light is on.	Check for active engine fault codes.	Correct faults shown in ECM.

END OF TASK

END OF WORK PACKAGE

ELECTRICAL TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Charging system overcharging (instrument panel voltmeter).		
Ignition relay R1 faulty.	Check for less than 200 ohms across ignition relay R1, terminals 86 (wire 1075) and 85 (wire 1435E).	If test fails, replace ignition relay R1.
Circuit breaker CB12 faulty.	Check for less than 200 ohms across circuit breaker CB12.	If test fails, replace circuit breaker CB12 (WP 0195).
Battery cables damaged or connections are loose or corroded.		Replace damaged cable or clean and tighten battery terminals as necessary (WP 0191).
Batteries faulty.	Check for 22 to 28 VDC across batteries.	If test fails, charge battery with external charger. If battery charges, go to alternator belt loose or faulty. If not, replace battery (WP 0191).
Alternator belt loose or faulty.		Replace alternator belt and adjust tension as necessary (WP 0221).
Engine wiring harness faulty.	Turn ignition switch on and check for 22 to 28 VDC on wire J906 between engine wiring harness alternator IGN terminal and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
Alternator voltage regulator faulty.	Start engine and check for 26 to 30 VDC between alternator +24 VDC terminal and a known good ground.	If test passes, go to instrument panel voltmeter gauge faulty. If test fails, replace voltage regulator (WP 0217) and go to alternator faulty.
Alternator faulty.	Start engine and check for 26 to 30 VDC between alternator +24 VDC terminal and a known good ground.	If test fails, replace alternator (WP 0185).
Instrument panel voltmeter gauge faulty.		Replace instrument panel (WP 0149).

Probable Cause	Test	Action
2. All electrical components do not operate.		
Battery cables damaged or connections are loose or corroded.		Replace damaged cable or clean and tighten battery terminals as necessary (WP 0189, WP 0191).
Batteries faulty.	Check for 22 to 28 VDC across batteries.	If test fails, charge battery with external charger. If battery does not charge, replace battery (WP 0191).
Battery disconnect switch connections loose or corroded.		Disconnect batteries and clean and tighten connections as necessary (WP 0188).
Cab pass thru stud connections loose or corroded.		Disconnect batteries and clean and tighten connections as necessary.
Battery cable 1139 between batteries and battery disconnect switch faulty.	Check for 22 to 28 VDC on battery cable 1139 between battery disconnect switch, terminal wire 1139 and a known good ground.	If test fails, replace battery cable 1139 (WP 0191).
Battery disconnect switch faulty.	Turn battery disconnect switch on and check for 22 to 28 VDC from battery disconnect switch, terminal wire 1975, to a known good ground.	If test fails, replace battery disconnect switch (WP 0188).
Cable 1975 between battery disconnect switch and cab pass thru stud faulty.	Check for 22 to 28 VDC on cable 1975 between cab pass-thru stud and a known good ground.	If test fails, replace cable 1975.
3. No voltage present at power distribution unit 12-volt outlet(s).		
Cab wiring harness faulty.	With battery disconnect switch off, check for continuity on wire 1860 between cab power M1 pass-thru stud and cab wiring harness connector C15, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C15, terminals 1 and 6.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1088 between cab wiring harness connectors C15, terminal 5 and C7, terminal 3.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C7 terminal 2 and a known good ground.	

Probable Cause	Test	Action
3. No voltage present at power distribution unit 12-volt outlet(s). (Continued)		
Air panel wiring harness faulty.	Check for less than 200 ohms on wire 1088 between air panel wiring harness connector C7, terminal 3 and 12-volt outlet, terminal wire 1088.	If test fails, replace/repair air panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between air panel wiring harness connector C7 terminal 2 and 12-volt outlet, terminal wire 1435F.	
12-volt power converter faulty.	Connect connectors and check for 10 to 14 VDC on wire 1088 between air panel wiring harness 12-volt power out terminals, wire 1088 and 1435F.	If test fails, replace 12-volt power converter.
12-volt power outlet faulty.		Replace 12-volt power outlet.
4. All instrument panel gauges and indicators do not operate.		
Circuit breaker CB19 faulty.	Check for less than 200 ohms across circuit breaker CB19.	If test fails, replace circuit breaker CB19.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1276 between cab wiring harness connector C4, terminal 31 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C4, terminal 11 and a known good ground.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature and voltmeter).		
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1276 between cab wiring harness connector C4, terminal 31 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C4, terminal 11 and a known good ground.	
Voltmeter faulty.		If voltmeter is not operating correctly, Replace instrument panel (WP 0149).
Air lines faulty.	If air pressure gauge(s) are not operating correctly, check air lines 2073 and 2641 for leaks crimps and damage.	If test fails, replace air lines as necessary.

Probable Cause	Test	Action
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature and voltmeter). (Continued)		
Air pressure gauge(s) faulty.		If air pressure gauges are not operating correctly, replace instrument panel (WP 0149).
Cab wiring harness faulty.	If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1319 between cab wiring harness connectors C1, terminal 15 and C4, terminal 22.	If test fails, replace/repair cab wiring harness (WP 0218).
	If transmission oil temperature gauge is not operating correctly, check for less than 200 ohms on wire 1449 between cab wiring harness connectors C2, terminal 20 and C4, terminal 28.	
Chassis wiring harness faulty.	If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1319 between chassis wiring harness connectors C1, terminal 15 and C30, terminal B.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1435 between chassis wiring harness connector C30, terminal A and a known good ground.	
Fuel gauge faulty.	If fuel gauge does not operate, connect jumper between chassis harness connector C30 terminal B (wire 1319) to terminal A (wire 1435) and check if fuel gauge deflects full scale.	If test fails, replace instrument panel (WP 0149).
Fuel sending unit faulty.		If fuel gauge is not operating correctly, replace fuel sending unit.
Engine wiring harness faulty.	If transmission oil temperature gauge is not operating correctly, check for less than 200 ohms on wire 1449 between engine wiring harness connector C2, terminal 20 and transmission oil temperature sensor SU9, terminal wire 1449.	If test fails, replace/repair engine wiring harness (WP 0218).
Transmission oil temperature sending unit faulty.		If transmission oil temperature gauge is not operating correctly, replace transmission oil temperature sending unit and go to transmission oil temperature gauge faulty.

Probable Cause	Test	Action
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature, and voltmeter). (Continued)		
Transmission oil temperature gauge faulty.	Check operation of transmission oil temp gauge.	If transmission oil temperature gauge is not operating correctly, replace instrument panel (WP 0149).
6. Instrument panel gauge(s) does not operate or inaccurate (engine coolant temperature, engine oil pressure, speedometer and tachometer).		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Transmission fault code(s) present.	If speedometer is not operating correctly, check for transmission diagnostic codes.	If diagnostic codes are active, troubleshoot transmission diagnostic codes.
Cab wiring harness faulty.	Check for less than 200 ohms on wire J1939+ between cab wiring harness connectors C4, terminal 34 and C406 terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire J1939- between cab wiring harness connectors C4, terminal 35 and C406 terminal B.	
Engine coolant temperature gauge faulty.		Replace instrument panel (WP 0149).
Engine oil temperature gauge faulty.		Replace instrument panel (WP 0149).
Speedometer faulty.		Replace instrument panel (WP 0149).
Tachometer faulty.		Replace instrument panel (WP 0149).
7. Instrument panel driveline lock indicator(s) do not operate.		
Instrument panel driveline lock indicator light(s) faulty.	Turn ignition switch on and verify instrument panel drive line lock indicators illuminates for 2 seconds during startup self-test.	If test fails, replace instrument panel (WP 0149).
Transmission fault code(s) present.	Check for transmission diagnostic codes.	If diagnostic codes are active, troubleshoot transmission diagnostic codes.
Transfer case lock does not engage front axle.	With ignition switch on. Select drive line lock switch to engage T-CASE lock. Check for 22 to 26 VDC between CTIS wiring harness connector C63, terminals 1 (wire 1701) and 2 (wire 1435G).	If test fails, troubleshoot transfer case does not engage front axle (WP 0016).

Probable Cause	Test	Action
7. Instrument panel driveline lock indicator(s) do not operate. (Continued)		
Axle 2 differential lock does not engage.	Select drive line lock switch to engage axle 2 differential lock. Check for 22 to 26 VDC between CTIS wiring harness connector C62, terminals 1 (wire 1704) and 2 (wire 1435G).	If test fails, troubleshoot differential lock will not engage (WP 0016).
Axle 1 differential lock does not engage.	Select drive line lock switch to engage axle 1 differential lock. Check for 22 to 26 VDC between CTIS wiring harness connector C60, terminals 1 (wire 1333) and 2 (wire 1435G) (on solenoid on firewall).	If test fails, troubleshoot differential lock will not engage (WP 0016).
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 2023 between chassis wiring harness connectors C41, terminal 17 and C410, terminal 1 (on transfer case).	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1135 between chassis wiring harness connectors C41, terminal 19 and C410, terminal 2 (on transfer case).	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2023 between cab wiring harness connectors C41, terminal 17 and C4, terminal 17.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1135 between cab wiring harness connectors C55, terminal K1 and C41, terminal 19.	
	Check for less than 200 ohms on wire 1333 between cab wiring harness connectors C55, terminal E3 and C4, terminal 19.	
	Check for less than 200 ohms on wire 1704 between cab wiring harness connectors C55, terminal E2 and C4, terminal 18.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Transfer case faulty.	Start engine. Operate vehicle per SOP and verify transfer case lock indicator illuminates when transfer case lock is selected.	If test fails, troubleshoot transfer case does not engage front axle (WP 0016).

Probable Cause	Test	Action
8. Instrument panel high beam indicator does not operate.		
Instrument panel high beam indicator light faulty.	Turn ignition switch on and verify instrument panel high beam indicator illuminates for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1007 between cab wiring harness relay A connector, terminal 87A and connector C4, terminal 13.	If test fails, replace/repair cab wiring harness (WP 0218).
Instrument panel faulty.		Replace instrument panel (WP 0149).
9. Instrument panel parking brake indicator does not operate.		
Instrument panel parking brake indicator light faulty.	Turn ignition switch on and verify instrument panel parking brake indicator illuminates for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1049 between cab wiring harness connectors PS4 , terminal 1 and C4, terminal 20.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector PS4, terminal 2 and a known good ground.	
Parking brake switch faulty.	Apply parking brakes and check for less than 200 ohms between parking brake switch PS4 terminals.	If test fails, replace parking brake switch (WP 0207).
Instrument panel faulty.		Replace instrument panel (WP 0149).
10. Instrument panel turn signal indicator(s) do not operate properly.		
Turn signals do not operate.		Troubleshoot turn signals do not operate.
Instrument panel turn signal indicator light faulty.	Turn ignition switch on and verify instrument panel turn signal indicators illuminate for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1001 between cab wiring harness connectors C18, terminal 1 and C4, terminal 12.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1002 between cab wiring harness connectors C18, terminal 3 and C4, terminal 21.	
Instrument panel faulty.		Replace instrument panel (WP 0149).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate.		
Clearance lights do not operate.		Troubleshoot clearance lights do not operate.
Blackout lights do not operate.		Troubleshoot blackout lights do not operate.
Left hand switch panel wires 1008, 1150 or 1012 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between left hand switch panel wiring harness connectors C408, terminal 4 and C5, terminal V.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Left hand switch panel wires 1008, 1150 or 1012 faulty.	If all panel backlights do not operate when blackout lights are on, check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and C408, terminal 3.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all panel backlights do not operate when clearance lights are on, check for less than 200 ohms on wire 1012 between left hand switch panel wiring harness connectors S12, terminal 3 and C408, terminal 2.	
Diode pack D7 faulty.	If all panel backlights operate when clearance lights or blackout lights are on, but not both, diode pack is faulty.	Replace diode pack D7.
Right hand switch panel wires 1008 or 1052 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between right hand switch panel wiring harness connectors C6, terminal 28 and S9, terminals 2B and 5B.	If test fails, replace/repair right hand switch panel wiring harness (WP 0218).
	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1052 between right hand switch panel wiring harness connectors S9 terminal 6 and C6, terminal 23.	
Cab wiring harness wire 1008 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between cab wiring harness connectors C5, terminal V and C6, terminal 28.	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1052 faulty.	If right hand switch panel backlights operate and all others do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C5, terminal K.	If test fails, replace/repair cab wiring harness (WP 0218).
	If heater / air conditioner control panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C25, terminal B.	
Cab wiring harness wire 1052 faulty.	If left hand switch panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C5, terminal K.	If test fails, replace/repair cab wiring harness (WP 0218).
	If instrument panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C4, terminal 14.	
	If air panel air restriction indicator and de-icer switch backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C7, terminal 1.	
	If air panel GOLIGHT (spotlight) switch backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C428, terminal 3.	
	If transmission control backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C10, terminal 3.	
	If CTIS control backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connector C6, terminal 23 and relay J connector, terminal 87.	

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1052 faulty.	If CTIS control backlights do not operate when lights are on, check for less than 200 ohms on wire 1052 between cab wiring harness connector C6, terminal 23 and relay J connector, terminal 87.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1076 faulty.	If CTIS control backlights do not operate when lights are off, check for less than 200 ohms on wire 1076 between cab wiring harness C6, terminal 19 and relay J connector, terminal 87A.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1053 faulty.	If CTIS control backlights do not operate, check for less than 200 ohms on wire 1053 between cab wiring harness relay J connector, terminal 30 and connector C55, terminal J1.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1435 faulty.	<p>If heater / air conditioner control panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C25, terminal L and a known good ground.</p> <p>If left hand switch panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C5, terminal D and a known good ground.</p> <p>If air panel air restriction indicator and de-icer switch backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C7, terminal 8 and a known good ground.</p> <p>If air panel GOLIGHT (spotlight) switch backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C428, terminal 2 and a known good ground.</p> <p>If right hand switch panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C6, terminal 21 and a known good ground.</p>	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1435 faulty.	If CTIS control backlights do not operate when clearance lights are on, check for less than 200 ohms on wire 1435 between cab wiring harness relay J connector, terminal 85 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
Dash light dimmer faulty.	If all panel backlights do not operate when clearance and blackout lights are on, dimmer switch is faulty.	Replace dash light dimmer switch.
Left hand switch panel wire 1052 or 1435 faulty.	If more than one left hand switch panel backlights do not operate, left hand switch panel wiring harness is faulty.	Replace/repair left hand switch panel wiring harness (WP 0218).
Right hand switch panel wire 1052 or 1435 faulty	If more than one right hand switch panel backlights do not operate, right hand switch panel wiring harness is faulty.	Replace/repair right hand switch panel wiring harness (WP 0218).
Air panel wire 1052 or 1435 faulty.	If air restriction indicator and de-icer switch backlights do not operate, air panel wiring harness is faulty.	Replace/repair air panel wiring harness (WP 0218).
Air panel wire 1052 or 1435 faulty.	If GOLIGHT (spotlight) switch backlight does not operate, check for less than 200 ohms on wire 1052 between air panel wiring harness connectors C428, terminal 3 and S19 terminal 7.	If test fails, replace/repair air panel wiring harness (WP 0218).
	If GOLIGHT (spotlight) switch backlight does not operate, check for less than 200 ohms on wire 1435 between air panel wiring harness connectors S19, terminal 9 and C428, terminal 2.	
Heater / air conditioner control faulty.	If heater / air conditioner control backlights do not operate, heater / air conditioner control is faulty.	Replace Heater / air conditioner control (WP 0147).
Instrument panel faulty.	If instrument panel backlights do not operate, check for 22 to 28 VDC on between wire 1052 at chassis harness connector C4, terminal 14 and a known good ground, when panel lights are set for full intensity.	If test passes, replace instrument panel (WP 0149).
Transmissions shift selector faulty.	If transmission shift selector panel backlights do not operate, check for 22 to 28 VDC on between wire 1052 at chassis harness connector C10, terminal 3 and a known good ground, when panel lights are set for full intensity.	If test passes, replace shift selector panel (WP 0150).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
CTIS control faulty.	If CTIS control backlights do not operate, check for 22 to 28 VDC on between wire 1053 at chassis harness connector C55, terminal J1 and a known good ground, when panel lights are set for full intensity.	If test passes, replace CTIS control (WP 0168).
Panel switch backlight bulb faulty.		Replace switch non-operating backlight bulb.
Panel switch faulty.		Replace panel switch.
12. Instrument panel low air warning light and/or alarm do not operate when front air pressure is below 64 to 76 PSI (441 to 524 KPA).		
Instrument panel brake system failure indicator light faulty	Turn ignition switch on and verify instrument panel brake system failure indicators illuminate for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Front air supply pressure switch faulty.	Drain air system and check for less than 200 ohms between front air supply pressure switch PS5 terminals	If test fails, replace front air supply pressure switch PS5.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1520 between cab wiring harness connectors C4, terminal 4 and PS5, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness connector PS5, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1076 between cab wiring harness connectors C4, terminal 7 and LS1, pos (+) terminal (backup alarm).	
	Check for less than 200 ohms on wire 1121 between cab wiring harness connectors C4, terminal 16 and LS1, neg (-) terminal (backup alarm).	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Alarm faulty.		Replace alarm.

Probable Cause	Test	Action
13. Instrument panel low air warning light and/or alarm do not operate when rear air pressure is below 64 to 76 PSI (441 to 524 KPA).		
Instrument panel brake system failure indicator light faulty.	Turn ignition switch on and verify instrument panel brake system failure indicators illuminate for 2 seconds during startup self-test.	If test fails, replace instrument panel (WP 0149).
Rear air supply pressure switch faulty.	Drain air system and check for less than 200 ohms between rear air supply pressure switch PS6 terminals	If test fails, replace rear air supply pressure switch PS6.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1521 between cab wiring harness connectors C4, terminal 3 and PS6, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness connector PS6, terminal 2 and a known good ground.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1076 between cab wiring harness connectors C4, terminal 7 and LS1 (backup alarm), pos (+) terminal.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1121 between cab wiring harness connectors C4, terminal 16 and LS1 (backup alarm), neg (-) terminal.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Alarm faulty.		Replace alarm.
14. All blackout lights do not operate.		
Headlight do not operate.		Troubleshoot headlights do not operate.
Brake lights do not operate.		Troubleshoot brake lights do not operate.
Blackout select switch faulty.	Check for less than 200 ohms across blackout select switch S13 from terminal 2B to 1 when switch is in the blackout select position.	If test fails, replace blackout select switch.
	Check for less than 200 ohms across blackout select switch S13 from terminal 5B to 4 when switch is in the blackout select position.	

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate.		
Circuit breaker CB22 faulty.	Check for less than 200 ohms across circuit breaker CB22.	If test fails, replace circuit breaker CB22.
Chassis wiring harness cab trailer ISO connector C23A disconnected.		Connect chassis wiring harness cab trailer ISO connector C23A
Driver side rear composite light faulty.	If driver side brake light does not operate, check for 22 to 28 VDC on wire 1003 between rear light wiring harness connector L17, terminals wire 1003 and wire 1435, when brakes are applied.	If test passes, replace composite light.
Passenger side rear composite light faulty.	If passenger side brake light does not operate, check for 22 to 28 VDC on wire 1004 between rear light wiring harness connector L16, terminals wire 1004 and wire 1435, when brakes are applied.	If test passes, replace composite light.
Front stoplight pressure switch PS2 faulty.	If all brake lights do not operate, start engine and charge air system to 100 psi (689 kPa). Then, shut down system, turn battery disconnect switch off, and check for less than 200 ohms across front stoplight pressure switch PS2, when brakes are applied.	If test fails, replace front stoplight pressure switch PS2.
Rear stoplight pressure switch PS3 faulty.	If all brake lights do not operate. Start engine and charge air system to 100 psi (689 kPa). Then, shut down system, turn battery disconnect switch off, and check for less than 200 ohms across rear stoplight pressure switch PS3, when brakes are applied.	If test fails, replace rear stoplight pressure switch PS3.
Blackout select switch faulty.	If all brake lights do not operate, replace blackout select switch and check operation of brake lights.	If test fails, go to diode pack D6 faulty.
Diode pack D6 faulty.	If all brake lights do not operate, replace diode pack D6 and check operation of brake lights.	If test fails, go to left hand switch panel wiring harness faulty.

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate. (Continued)		
Left hand switch panel wiring harness faulty.	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between left hand switch panel wiring harness connectors C5, terminal F and S13, terminal 5B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all brake lights do not operate, check for less than 200 ohms on wire 1005A between left hand switch panel wiring harness connectors S13, terminal 6 and C5 terminal E.	
Turn signal switch faulty.	Check for less than 200 ohms across turn signal switch connector from terminal 5 (wire 1005B) to terminal 4 (wire 1003) when switch is in the neutral position.	If test fail, replace turn signal switch.
	Check for less than 200 ohms across turn signal switch connector from terminal 5 (wire 1005B) to terminal 2 (wire 1004) when switch is in the neutral position.	
Cab wiring harness faulty.	If all brake lights do not operate, turn battery disconnect switch off and check for less than 200 ohms on wire 1009 between cab wiring harness circuit breaker CB22 connector and connector PS2.	If test fails, replace/repair cab wiring harness (WP 0218).
	If all brake lights do not operate, turn battery disconnect switch off and check for less than 200 ohms on wire 1009 between cab wiring harness circuit breaker CB22 connector and connector PS3.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between cab wiring harness connectors PS2 and C5, terminal F.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between cab wiring harness connectors PS3 and C5, terminal F.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005A between cab wiring harness connectors C5, terminal E and C97 terminal 2.	

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate. (Continued)		
Cab wiring harness faulty.	If all brake lights do not operate, check for less than 200 ohms on wire 1005B between cab wiring harness connectors C97 terminal 1 and C18 terminal 5.	If test fails, replace/repair cab wiring harness (WP 0218).
	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between cab wiring harness connectors C18 terminal 4 and C1, terminal 4.	
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between cab wiring harness connectors C18 terminal 2 and C1, terminal 3.	
Chassis wiring harness faulty.	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between chassis wiring harness connectors C1, terminal 4 and C24, terminal 2.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between chassis wiring harness connectors C1, terminal 3 and C24, terminal 1.	
Rear light wiring harness faulty.	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between rear light wiring harness connectors C24, terminal 2 and L16, terminal wire 1003.	If test fails, replace/repair rear body/taillight wiring harness (WP 0218).
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between rear light wiring harness connectors C24, terminal 1 and L17, terminal wire 1004.	
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	

Probable Cause	Test	Action
16. Blackout brake lights do not operate.		
Brake lights do not operate.		Troubleshoot brake lights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1678 between rear light wiring harness non-operating light connector, terminals wire 1678 and wire 1435, when system is in blackout mode and brakes are applied.	If test passes, replace composite light.
Blackout select switch faulty.		Replace blackout select switch.
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1678 between left hand switch panel wiring harness connectors S13, terminal 4 and C5 terminal D.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1678 between cab wiring harness connectors C5 terminal D and C1, terminal 2.	If test fails replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1678 between chassis wiring harness connectors C1, terminal 2 and C24, terminal 4.	If test fails replace/repair chassis wiring harness (WP 0218).
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1678 between rear light wiring harness connectors C24, terminal 4 and non-operating light connector, terminal wire 1678.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	
17. Clearance, parking, or tail lights do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1008 between rear light wiring harness non-operating light connector, terminals wire 1008 and wire 1435.	If test passes, replace composite light.
Rear clearance light(s) faulty.	Check for 22 to 28 VDC on wire 1008 between rear light wiring harness non-operating light connector, terminals wire 1008 and wire 1435.	If test passes, replace clearance lights.

Probable Cause	Test	Action
17. Clearance, parking, or tail lights do not operate. (Continued)		
Front composite light faulty.	Check for 22 to 28 VDC on wire 1012 between chassis wiring harness non-operating light connector, terminals wire 1012 and wire 1435.	If test passes, replace composite light.
Front clearance light(s) faulty.	Check for 22 to 28 VDC on wire 1012 between chassis wiring harness non-operating light connector, terminals wire 1012 and wire 1435.	If test passes, replace clearance lights.
Master light switch faulty.		Replace master light switch.
Left hand switch panel wiring harness faulty.	If all clearance and taillights do not operate, check for less than 200 ohms on wire 1084A between left hand switch panel wiring harness connectors S13, terminal 3 and S12, terminal 2B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all clearance and taillights do not operate, check for less than 200 on wire 1012 between left hand switch panel wiring harness connectors S12, terminal 3 and C5, terminal B.	
Cab wiring harness faulty.	If all clearance and taillights do not operate, check for less than 200 on wire 1012 between cab wiring harness connectors C5, terminal B and C1, terminal 8.	If test fails, replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	If front clearance light does not operate, check for less than 200 ohms on 1012 between chassis wiring harness connectors C1, terminal 8 and C403, terminal 1.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If rear clearance/taillight does not operate, check for less than 200 ohms on wire 1008/1012 between connectors C1, terminal 8 and C24, terminal 2.	
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1008 between rear light wiring harness connectors C24, terminal 3 and non-operating light connector, terminal wire 1008.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	

Probable Cause	Test	Action
17. Clearance, parking, or tail lights do not operate. (Continued)		
Front light wiring harness faulty.	<p>Check for less than 200 ohms on wire 1012 between front light wiring harness connector C403, terminal 1 and non-operating light connector, terminal wire 1012.</p> <p>Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.</p>	If test fails, replace/repair front light wiring harness (WP 0218).
18. Front blackout marking lights and/or blackout tail lights do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1680 between rear light wiring harness non-operating light connector, terminals wire 1680 and wire 1435.	If test passes, replace composite light.
Front composite light faulty.	Check for 22 to 28 VDC on wire 1680 between chassis wiring harness non-operating light connector, terminals wire 1680 and wire 1435.	If test passes, replace composite light.
Blackout light switch faulty.		Replace blackout light switch.
Blackout select switch faulty.		Replace blackout select switch.
Left hand switch panel wiring harness faulty.	<p>Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and S14, terminal 3.</p> <p>Check for less than 200 ohms on wire 1680 between left hand switch panel wiring harness connectors S14, terminal 2B and C5 terminal H.</p>	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1680 between cab wiring harness connectors C5 terminal H and C1, terminal 5.	If test fails, replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	<p>If front blackout marker light does not operate, check for less than 200 ohms on 1680 between connectors C1, terminal 5 and C403, terminal 2.</p> <p>If rear blackout taillight does not operate, check for less than 200 ohms on wire 1680 between connectors C1, terminal 5 and C24, terminal 5.</p>	If test fails, replace/repair chassis wiring harness (WP 0218).

Probable Cause	Test	Action
18. Front blackout marking lights and/or blackout tail lights do not operate. (Continued)		
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1680 between rear light wiring harness connectors C24, terminal 5 and non-operating light connector, terminal wire 1680.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1680 between front light wiring harness connector C403, terminal 2 and non-operating light connector, terminal wire 1680.	If test fails, replace/repair front light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.	
19. Both headlights do not illuminate.		
Circuit breaker CB21 faulty.	Check for less than 200 ohms across circuit breaker CB21.	If test fails, replace circuit breaker CB21.
Relay B (headlight on/off relay) faulty.	Swap relay B with a known good relay and check if headlights operate.	If test passes, replace relays in original position and replace relay B (headlight on/off relay).
Relay A (headlight high/low relay) faulty.	Swap relay A with a known good relay and check if headlights operate.	If test passes, replace relays in original position and replace relay A (headlight high/low relay).
Headlight switch faulty.		Replace headlight switch.
Master lighting switch faulty.	With blackout select switch in OFF position and master lighting switch in the headlight position, check for less than 200 ohms between connector C5, terminal 6 (wire 1084) and lighting switch S12 from terminal 6 (wire 1084).	If test fails, replace master lighting switch.
Blackout select switch faulty.		Replace blackout select switch.

Probable Cause	Test	Action
19. Both headlights do not illuminate. (Continued)		
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1084 between left hand switch panel wiring harness connectors C5, terminal G and S13, terminal 2B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1084A between left hand switch panel wiring harness connectors S13, terminal 3 and S12, terminal 5B.	
	Check for less than 200 ohms on wire 1017 between left hand switch panel wiring harness connectors S12, terminal 6 and C5, terminal A.	
Cab wiring harness faulty.	With circuit breaker CB22 installed, check for 22 to 28 VDC on wire 1084 between cab wiring harness connector C5, terminal G and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	With circuit breaker CB22 installed, check for 22 to 28 VDC on wire 1084 between cab wiring harness relay B connector, terminal 30 and a known good ground.	
	Check for less than 200 ohms on wire 1017 between cab wiring harness connector C5, terminal A and relay B connector, terminal 86.	
	Check for less than 200 ohms on wire 1017A between cab wiring harness relay B connector, terminal 87 and relay A connector, terminal 30.	
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay B connector, terminal 85 and a known good ground.	
20. Headlight(s) does not illuminate in high beam or in low beam.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Headlight lamp faulty.	If low beam does not operate, check for 22 to 28 VDC on wire 1006 between chassis wiring harness non-operating headlight connector, terminals wire 1006 and wire 1435.	If test passes, replace non-operating headlight lamp (WP 0202).

Probable Cause	Test	Action
20. Headlight(s) does not illuminate in high beam or in low beam. (Continued)		
Headlight lamp faulty.	If high beam does not operate, check for 22 to 28 VDC on wire 1007 between chassis wiring harness non-operating headlight connector, terminals wire 1007 and wire 1435.	If test passes, replace non-operating headlight lamp (WP 0202).
Relay A (headlight high/low relay) faulty.	Swap relay A with relay G and check if headlights operate.	If test passes, replace relays in original position and replace relay A (headlight high/low relay).
Dimmer switch faulty.		Replace dimmer switch.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1017A between cab wiring harness relay A connector, terminal 30 and connector C19, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1017B between cab wiring harness connector C19, terminal B and relay A connector, terminal 86.	
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay A connector, terminal 85 and a known good ground.	
	If low beam headlights do not operate, check for less than 200 ohms on wire 1006 between cab wiring harness relay A connector, terminal 87 and connector C1, terminal 12.	
	If high beam headlights do not operate, check for less than 200 ohms on wire 1007 between cab wiring harness relay A connector, terminal 87A and connector C1, terminal 11.	
Chassis wiring harness faulty.	If low beam headlights do not operate, check for less than 200 ohms on wire 1006 between chassis wiring harness connectors C1, terminal 12 and C403, terminal 3.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If high beam headlights do not operate, check for less than 200 ohms on wire 1007 between chassis wiring harness connectors C1, terminal 11 and C403, terminal 6.	

Probable Cause	Test	Action
20. Headlight(s) does not illuminate in high beam or in low beam. (Continued)		
Front light wiring harness faulty.	If low beam does not operate, check for less than 200 ohms on wire 1006 between front light wiring harness connector C403, terminal 3 and non-operating light connector, terminal wire 1006.	If test fails, replace/repair front light wiring harness (WP 0218).
	If high beam does not operate, check for less than 200 ohms on wire 1007 between front light wiring harness connector C403, terminal 6 and non-operating light connector, terminal wire 1007.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.	
21. Blackout drive light does not operate.		
Blackout marker lights do not operate.		Troubleshoot front blackout marker lights and/or blackout tail lights do not operate.
Blackout drive light faulty.	Check for 22 to 28 VDC on wire 1679 between chassis wiring harness blackout drive light connector, terminals wire 1679 and wire 1435.	If test passes, replace blackout drive light.
Blackout light switch faulty.	With blackout select switch in the ON position and blackout light switch in the blackout drive position, check for less than 200 ohms between connector C5, terminal S (wire 1150) and J (wire 1679).	If test fails, replace blackout light switch.
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connector S14, terminal 3 and S14, terminal 6.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1679 between left hand switch panel wiring harness connectors S14, terminal 5B and C5, terminal J.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1679 between cab wiring harness connectors C5, terminal J and C1, terminal 6.	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
21. Blackout drive light does not operate. (Continued)		
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1679 between chassis wiring harness connectors C1, terminal 6 and C403, terminal 9.	If test fails, replace/repair chassis wiring harness (WP 0218).
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1679 between front light wiring harness connector C403, terminal 9 and blackout drive light connector, terminal wire 1679.	If test fails, replace/repair front light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness blackout drive light connector, terminal wire 1435 and a known good ground.	
22. Reverse light and/or alarm does not operate.		
Blackout lights on.		Turn blackout lights off.
Headlights do not operate.		Troubleshoot headlights do not operate.
Reverse alarm faulty.	If reverse alarm does not operate, check for 22 to 28 VDC on wire 1149 between chassis wiring harness connector M3, terminal wire 1149 and wire 1435.	If test passes, replace reverse alarm.
Reverse light faulty.	If reverse light does not operate, check for 22 to 28 VDC on wire 1149A between chassis wiring harness connector C26, terminal wire 1149 and wire 1435.	If test passes, replace reverse light (WP 0211).
Diode pack D2 faulty.		Replace diode pack D2.
Relay I (reverse light/ alarm relay) faulty.	Swap relay I with relay G and check if reverse light and alarm operate.	If test passes, replace relays in original position and replace relay I (reverse light/alarm relay).
LH switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C8, terminal B1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 313 between cab wiring harness connector C8, terminal A1 and relay I connector, terminal 87A.	

Probable Cause	Test	Action
22. Reverse light and/or alarm does not operate. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1150 between cab wiring harness relay I connector, terminal 86 and connector C5, terminal S.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay I connector, terminal 85 and a known good ground.	
	Check for less than 200 ohms on wire 1149 between cab wiring harness relay I connector, terminal 30 and connector C1, terminal 21.	
	Check for less than 200 ohms on wire 165 between cab wiring harness connectors C11, terminal F2 and C12, terminal 65.	
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1149 between chassis wiring harness connectors C1, and C404, terminal 3.	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1149 between chassis wiring harness connectors C1, and M3, terminal wire 1149.	
	Check for less than 200 ohms on wire 1149A between chassis wiring harness connectors C404, terminal 4 and C26, terminal A.	
	Check for less than 200 ohms on wire 1435 between chassis wiring harness connector C26, terminal B and a known good ground.	
	Check for less than 200 ohms on wire 1435 between chassis wiring harness connector M3, terminal wire 1435 and a known good ground.	
VIM faulty.		Replace VIM (WP 0236).
TCM faulty.		Replace TCM (WP 0216).

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode.		
Instrument and switch panel backlight(s) do not operate.		Troubleshoot Instrument and switch panel backlight(s) do not operate.
Dome light assembly(s) faulty.	If passenger side white dome light is not operating, check for 22 to 28 VDC on wire 2026A between cab wiring harness connector C422, terminals 1 and 2, when white dome lights are on at full intensity.	If test passes, replace non-operating dome light assembly.
Dome light assembly(s) faulty.	If passenger side cyan dome light is not operating, check for 22 to 28 VDC on wire 2027A between cab wiring harness connector C422, terminals 3 and 2, when cyan dome lights are on at full intensity.	If test passes, replace non-operating dome light assembly.
	If driver side white dome light is not operating, check for 22 to 28 VDC on wire 2026A between cab wiring harness connector C423, terminals 1 and 2, when white domes lights are on at full intensity.	
	If driver side cyan dome light is not operating, check for 22 to 28 VDC on wire 2027A between cab wiring harness connector C423, terminals 3 and 2, when cyan dome lights are on at full intensity.	
Circuit breaker CB5 faulty.	Check for less than 200 ohms across circuit breaker CB5.	If test fails, replace circuit breaker CB5.
Relay N (dome light relay) faulty.	Swap relay N with relay G and check if dome light operate.	If test passes, replace relays in original position and replace relay N (dome light relay).
Dome light dimmer switch faulty.		Replace dome light dimmer switch.
Dome light select switch faulty.		Replace dome light select switch.
Passenger side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2026A between passenger side dome light wiring harness connectors C420, terminal 1 and C422, terminal 1.	If test fails, replace/repair passenger side dome light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between passenger side dome light wiring harness connectors C420, terminal 2 and C422, terminal 2.	

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Passenger side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2027A between passenger side dome light wiring harness connectors C420, terminal 3 and C422, terminal 3.	If test fails, replace/repair passenger side dome light wiring harness (WP 0218).
Driver side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2026A between driver side dome light wiring harness connectors C421, terminal 1 and C423, terminal 1.	If test fails, replace/repair driver side dome light wiring harness (WP 0218).
Driver side dome light wiring harness faulty.	Check for less than 200 ohms on wire 1435 between driver side dome light wiring harness connectors C421, terminal 2 and C423, terminal 2.	If test fails, replace/repair driver side dome light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2027A between driver side dome light wiring harness connectors C421, terminal 3 and C423, terminal 3.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2026A between cab wiring harness connector C420, terminal 1 and relay N (dome light relay), connector, terminal 87.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2027A between cab wiring harness connector C421, terminal 3 and relay N (dome light relay), connector, terminal 87A.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C420, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C421, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435D between cab wiring harness relay N (dome light relay), connector, terminal 85 and a known good ground.	
	Check for less than 200 ohms on wire 2026 between cab wiring harness connector C6, terminal 27 and relay N (dome light relay), connector, terminal 86.	

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2028A between cab wiring harness connector C418, terminal 4 and relay N (dome light relay), connector, terminal 30.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2029 between cab wiring harness connectors C6, terminal 22 and C418, terminal 3.	
	Check for less than 200 ohms on wire 2026 between cab wiring harness connectors C6, terminal 27 and C419, terminal 2.	
	Check for less than 200 ohms on wire 2027 between cab wiring harness connectors C6, terminal 14 and C419, terminal 3.	
	Check for less than 200 ohms on wire 2028 between cab wiring harness connectors C418, terminal 4 and C419, terminal 1.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C418, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C6, terminal 21 and a known good ground.	
	Check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C6, terminal 16 .	
	Check for 22 to 28 VDC on wire 1076 between cab wiring harness connector C6, terminal 19 and a known good ground.	
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1076 between right hand switch panel wiring harness connectors C6, terminal 19 and S10, terminal 3.	If test fails, replace/repair as necessary (WP 0218).

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1084A between right hand switch panel wiring harness connectors C6, terminal 16 and S11, terminal 6.	If test fails, replace/repair as necessary (WP 0218).
	Check for less than 200 ohms measured on wire 1084A between right hand switch panel wiring harness connectors S11, terminal 6 and C434, terminal 3.	
	Check for less than 200 ohms on wire 1435F between right hand switch panel wiring harness connectors S10, terminal 1 and C6, terminal 21.	
	Check for less than 200 ohms measured on wire 2026 between right hand switch panel wiring harness connectors C6, terminal 27 and C11, terminal 5B.	
	Check for less than 200 ohms measured on wire 2027 between right hand switch panel wiring harness connectors C6, terminal 14 and S11, terminal 1.	
	Check for less than 200 ohms on wire 2027A between right hand switch panel wiring harness connectors S11, terminal 2B and C434, terminal 4.	
Dome light dimmer module faulty.		Replace dome light dimmer module.
Diode pack D5 faulty.		Replace diode pack D5.
Diode pack D8 faulty.		Replace diode pack D8.
24. Dome light(s) do not work in black out mode.		
<p>NOTE</p> <p>White dome lights do not operate in blackout mode.</p>		
Dome light(s) do not operate in normal mode.		Troubleshoot dome light(s) do not operate in normal mode.
Blackout lights do not operate.		Troubleshoot all blackout lights do not operate.

Probable Cause	Test	Action
24. Dome light(s) do not work in black out mode. (Continued)		
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and C5, terminal S.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1150 between cab wiring harness connectors C5, terminal S and C6, terminal 15.	If test fails, replace/repair cab wiring harness (WP 0218).
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1150 between right hand switch panel wiring harness connectors C6, terminal 15 and C434, terminal 2.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Blackout select switch faulty.	Check for less than 200 ohms measured on wire 2029 between dome light dimmer switch connector, terminal 2B and capsule harness connector C6, terminal 22.	If test fails, replace blackout select switch.
Diode pack 8 faulty.		Replace diode pack D8.
25. Emergency flashers do not operate.		
Turn signals do not operate.		Troubleshoot turn signals do not operate.
Flasher module faulty.		Replace flasher module (WP 0200).
26. Spotlight controls do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Circuit breaker CB9 faulty.		If test fails, replace circuit breaker CB9.
Spotlight relay M faulty.		If test passes, replace relays in original position and replace relay M (GOLIGHT relay).
Spotlight switch faulty.	If all spotlights do not operate, check for less than 200 ohms across circuit breaker CB9.	Replace spotlight switch if all spotlights do not operate.
LH switch panel wiring harness faulty.	If all spotlights do not operate, swap relay M with relay G and check if spotlights operate.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Air switch panel wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair air switch panel wiring harness (WP 0218).

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Cab wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between air switch panel wiring harness connectors C428, terminal 4 and S19, terminal 2B.	If test fails, replace/repair cab wiring harness (WP 0218).
	If all spotlights do not operate, check for less than 200 ohms on wire 2035 between air switch panel wiring harness connectors S19, terminal 3 and C428, terminal 5.	
	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between connectors C5, terminal C and C428, terminal 4.	
	If all spotlights do not operate, check for less than 200 ohms on wire 2000 between cab wiring harness connector C428, terminal 5 and relay M (GOLIGHT) connector, terminal 30.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 2001 between relay M (GOLIGHT) connector, terminal 87 and connector C400, terminal 1	
	If all spotlights do not operate, check for less than 200 ohms on wire 2035 between cab wiring harness CB9 connector, terminal wire 2000 and relay M (GOLIGHT), terminal 86.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 1435 between relay M (GOLIGHT) connector, terminal 85 and a known good ground.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 1435 between connector C400, terminal 2 and a known good ground.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on red/white wire between cab wiring harness connectors C400, terminal 7 and C409, terminal 1.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Cab wiring harness faulty.	If front spotlight controller does not operate correctly, check for less than 200 ohms on black wire between cab wiring harness connectors C400, terminal 9 and C409, terminal 2.	If test fails, replace/repair cab wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on brown wire between cab wiring harness connectors C400, terminal 8 and C409, terminal 3.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on green wire between cab wiring harness connectors C400, terminal 5 and C409, terminal 4.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on yellow wire between cab wiring harness connectors C400, terminal 6 and C409, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on blue wire between cab wiring harness connectors C400, terminal 4 and C409, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on violet wire between cab wiring harness connectors C400, terminal 3 and C409, terminal 7.	
Chassis wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on chassis wiring harness wire 2001 between connectors C400, terminal 1 and C402, terminal 1.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If all spotlights do not operate, check for less than 200 ohms on chassis wiring harness wire 1435 between connectors C400, terminal 2 and C402, terminal 2.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2002 between chassis wiring harness connectors C400, terminal 3 and C402, terminal 3.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Chassis wiring harness faulty. (Continued)	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2003 between chassis wiring harness connectors C400, terminal 4 and C402, terminal 4.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2004 between chassis wiring harness connectors C400, terminal 5 and C402, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2005 between chassis wiring harness connectors C400, terminal 6 and C402, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2006 between chassis wiring harness connectors C400, terminal 7 and C402, terminal 7.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2007 between chassis wiring harness connectors C400, terminal 8 and C402, terminal 8.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2008 between cab wiring harness connectors C400, terminal 9 and C402, terminal 9.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2009 between chassis wiring harness connectors C401, terminal 1 and C402, terminal 25.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2010 between chassis wiring harness connectors C401, terminal 2 and C402, terminal 26.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Chassis wiring harness faulty. (Continued)	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2011 between chassis wiring harness connectors C401, terminal 3 and C402, terminal 27.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2012 between chassis wiring harness connectors C401, terminal 4 and C402, terminal 28.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2013 between chassis wiring harness connectors C401, terminal 5 and C402, terminal 29.	
Spotlight control wiring harness faulty.	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2014 between chassis wiring harness connectors C401, terminal 6 and C402, terminal 30.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2015 between chassis wiring harness connectors C401, terminal 7 and C402, terminal 31.	
	If front spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 2001 between connector C402, terminal 1 and connector L23, terminal 1.	
	If front spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 1435 between connector C402, terminal 2 and connector L23, terminal 2.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Spotlight control wiring harness faulty. (Continued)	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2002 between spotlight control wiring harness connector C402, terminal 3 and non-operating spotlight connector, terminal 7.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2003 between spotlight control wiring harness connector C402, terminal 4 and non-operating spotlight connector, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2004 between spotlight control wiring harness connectors C402, terminal 5 and non-operating spotlight connector, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2005 between spotlight control wiring harness connector C402, terminal 6 and non-operating spotlight connector, terminal 4.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2006 between spotlight control wiring harness connectors C402, terminal 7 and non-operating spotlight connector, terminal 3.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2007 between spotlight control wiring harness connectors C402, terminal 8 and non-operating spotlight connector, terminal 2.	

SAFETY SUMMARY

This list summarizes critical warnings and cautions in this technical manual. They are listed here for summary purposes and to represent their significance. Study these warnings and cautions carefully. They can save your life and the lives of personnel you work with, as well as preventing damage to equipment. If there is any doubt or questions, contact your Supervisor.

WARNING

395/85R20 tire weighs 380 lbs (172. kg). Do not lift or move 395/85R20 tire without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

5th seat weighs 80 lbs (37 kg). Do not attempt to remove 5th seat from vehicle without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Adequate ventilation shall be provided while using solvents and cleaners. Prolonged breathing of vapors should be avoided. Do not use near heat or open flame. Avoid prolonged contact with skin. Use of rubber gloves conforming to FED SPEC ZZ-G-281, face shield conforming to L-F-36, and other protective equipment are required according to OSHA Standard. Failure to comply may result in injury or death to personnel.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

WARNING

Air compressor weighs 50 lbs (23 kg). Do not lift or move air compressor without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Air lines may be under extreme pressure. Ensure all personnel wear protective goggles when working around compressed air. Failure to comply may result in injury or death to personnel.

WARNING

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

Air system must be drained prior to removing air dryer filter. Failure to comply may result in injury or death to personnel.

WARNING

Air system must be drained prior to removing air system components. Failure to comply may result in injury or death to personnel.

WARNING

All batteries must be disconnected prior to performing battery isolator removal. Failure to comply may result in injury or death to personnel.

WARNING

Allow heat shrink tubing to cool before handling. Failure to comply may result in injury to personnel.

WARNING

Allow solder to cool before handling. Failure to comply may result in injury to personnel.

WARNING

Alternator weighs 115 lbs (52 kg). Do not lift or move alternator without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Always wear heavy leather gloves when handling winch cable. Never let cable run through hands. Broken wires will cause injury to personnel.

WARNING

Antenna platform weighs 200 lbs (91 kg). Do not attempt to lift or move antenna platform without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

WARNING

Avoid electrolyte contact with skin and eyes. Failure to comply may result in injury or death to personnel.

WARNING

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

WARNING

Battery acid is harmful to skin and eyes. Always wear safety goggles, acid-proof gloves, and a rubber apron when performing battery maintenance. Failure to comply may result in injury or death to personnel.

WARNING

Be careful not to short out battery terminal. Do not smoke or use open flame near batteries. Batteries may explode from spark. Failure to comply may result in injury or death to personnel.

WARNING

Brake drum weighs 116 lbs (53 kg). Do not lift or move brake drum without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

WARNING

Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.

WARNING

Brake spring is under extreme tension and can act as projectile when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Cable can become frayed or contain broken wires. Wear heavy leather-palmed gloves when handling cable. Never let moving cable slide through hands, even when wearing gloves. Failure to comply may result in injury or death to personnel.

WARNING

Cable ties must be removed from shoulder belts or shoulder belts will not function properly. Failure to comply may result in injury or death to personnel.

WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Capsule doors weigh 280 lbs (127 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Capsule interior fire suppression system activation rapidly release highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinder. Failure to comply may result in injury to personnel.

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

WARNING

Capsule windshields weigh 210 lbs (95 kg). Do not attempt to lift or move capsule windshield without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck litter door frame weighs 55 lbs (25 kg). Do not move cargo deck litter door frame without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Cargo deck quick lock floor weighs approximately 80 lbs (36 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck side wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift side wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Cargo deck weighs 1950 lbs (885 kg). Do not lift or move cargo body without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Cargo deck weighs 660 lbs (300 kg). Do not attempt to lift or move cargo deck without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Center belly deflector panel weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Center lifting fixture weighs 100 lbs (45 Kg). Do not attempt to lift or move center lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Clean up all fluid spills to prevent slip and fire hazards. Dispose of material in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment.

WARNING

Cloths or rags saturated with solvent cleaning compound must be disposed of IAW authorized facility's procedures. Failure to comply may result in injury to personnel.

WARNING

Coil spring is under extreme spring tension and can act as a projectile when installed. Raise the lower control arm very slowly to keep spring from releasing uncontrollably. Failure to comply may result in injury or death to personnel.

WARNING

Coil spring weighs 110 lbs (50 kg). Do not lift or move coil spring without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Combined weight of steering gear tray and steering gears is 319 lbs (145 kg). Do not lift or move steering gear tray and steering gears without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc). Failure to comply may result in injury to personnel.

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

WARNING

Coolant may splash during hose removal. Ensure personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Cooling system assembly weighs approximately 400 lbs (182 kg). Do not attempt to lift or move cooling system assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Crossmember weighs 113 lbs (51 kg). Do not attempt to lift or move crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Depending on GFE on CVRJ box shelf, weight may vary. A lifting device may be required to aid in installation. Failure to comply may result in injury or death to personnel.

WARNING

Differential assembly weighs 250 lbs (113 kg). Do not lift differential assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Disconnecting the rear capsule door hardware allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Do not adjust front poppet screw beyond flush with steering gear cover. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Do not attempt to pressure or leak test refrigerant R-134A air conditioning systems with compressed air. Combustible mixtures of air and R-134A may form, resulting in a fire or explosion. Failure to comply may result in injury or death to personnel.

WARNING

Do not exceed 600 lbs (272.4 kg) weight capacity of winch assembly. Failure to comply may result in injury or death to personnel.

WARNING

Do not lower jack completely until tightening sequence is complete. Failure to comply may result in injury or death to personnel.

WARNING

Do not place hand or fingers between bracket and frame when removing mounting cushions. Failure to comply may result in injury or death to personnel.

WARNING

Do not remove clamp from brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Do not remove nut until lower control arm is separated from knuckle. Failure to comply may result in injury or death to personnel.

WARNING

Do not smoke, have open flame, or cause sparks near batteries. Batteries may explode. Failure to comply may result in injury or death to personnel.

WARNING

Do not use improper cleaning methods or unauthorized cleaning solvents. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Do not wear watches or other jewelry when working on winch cable. Jewelry can catch on equipment. Failure to comply may result in injury to personnel.

WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to comply may result in injury to personnel.

WARNING

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Driver side door assembly weighs 185 lbs (84 kg) and passenger side door assembly weighs 170 lbs (77 kg). Do not attempt to lift or move assemblies without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.

WARNING

During normal vehicle operation, cooling system components can become very hot. Allow cooling system to cool prior to servicing. Wear face shield and use extreme care when removing surge tank cap. Sudden release of pressure can cause a steam flash. Slowly loosen surge tank cap to the first stop to relieve pressure before removing surge tank cap completely. Use a clean, thick waste cloth or like material to remove surge tank cap. Avoid using gloves. If hot coolant soaks through gloves, personnel could be burned. Failure to comply may result in injury or death to personnel.

WARNING

During vehicle operation exhaust system can become very hot. Do not touch exhaust system components with bare hands, or allow your body to come in contact with exhaust system components. Failure to comply may result in injury to personnel.

WARNING

Engine belly deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move engine belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Engine components become hot during normal operation. Allow engine to cool completely prior to performing this task. Failure to comply may result in injury or death to personnel.

WARNING

Engine must be shut down prior to working on hydraulic components to drop hydraulic pressure to zero. Potential trapped pressure may be present. Loosen couplings slowly to relieve any remaining hydraulic pressure. Failure to comply may result in injury or death to personnel.

WARNING

Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.

WARNING

Ensure all test equipment is properly connected. Failure to comply may result in injury or death to personnel.

WARNING

Ensure batteries and undercarriage controller connector are disconnected prior to replacing sensor lines. Failure to comply may result in injury or death to personnel.

WARNING

Ensure batteries are disconnected when performing maintenance on or near batteries or electrical systems. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion.

WARNING

Ensure battery disconnect switch is in OFF position. Failure to comply may result in injury or death to personnel.

WARNING

Ensure blue caps are removed from aerosol generators after installation. If blue caps remain installed, aerosol generators may fail to discharge. Failure to comply may result in injury or death to personnel.

WARNING

Ensure engine oil and filter are cool prior to removal. Failure to comply may result in injury to personnel.

WARNING

Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Ensure fire suppression system cylinders are in the OFF position first, then relieve pressure in sensor line system prior to replacing any sensor lines, or accidental discharge may occur. Failure to comply may result in injury or death to personnel.

WARNING

Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

WARNING

Ensure pressure is 0 psi in sensor line system prior to sensor line replacement. Failure to comply may result in injury to personnel.

WARNING

Ensure skid plate is supported during removal to avoid pinching and binding. Failure to comply may result in injury or death to personnel.

WARNING

Ensure transmission oil is cool prior to draining transmission oil. Failure to comply may result in injury to personnel.

WARNING

Ensure valve knob on inflation tool is fully closed (OUT) before proceeding. Failure to comply may result in injury or death to personnel.

WARNING

Ensure valve knob on inflation tool is fully closed (turned out counterclockwise) prior to installation. Failure to comply may result in injury or death to personnel.

WARNING

Ensure vehicle battery disconnect switch is in OFF position before inspecting fire suppression system. Failure to comply may result in injury or death to personnel.

WARNING

Exhaust pipe may be hot. Do not touch hot exhaust pipe. Failure to comply may result in injury to personnel.

WARNING

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may be present. Failure to comply may result in injury or death to personnel.

WARNING

Fire extinguishers should be placed nearby when using solvent cleaning compound. Failure to comply may result in injury or death to personnel.

WARNING

Front differential housing weighs 250 lbs (113 kg) and rear differential housing weighs 280 lbs (127 kg). Do not lift or move differential housing without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Front seat weighs 112 lbs (51 kg). Do not attempt to move seat without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Front windows weigh 122 lbs (55 kg). Do not attempt to lift or move front windows without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Fuel is flammable and can explode. Keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Fuel is flammable and can explode. Keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Fuel tank is awkward. Do not attempt to lift or move fuel tank without the aid of an assistant and/or lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Halfshaft weighs 50 lbs (23 kg). Do not lift or move halfshaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Hub assembly weighs 60 lbs (27 kg). Do not lift or move hub assembly without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

HVAC assembly and HVAC tray weighs 60 lbs (27.2 kg). Do not move or lift HVAC assembly and HVAC tray without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.

WARNING

If 395/85/20 tire was installed, configure vehicle in accordance with spare tire limp home procedure (TM 9-2355-335-10) prior to operating vehicle. Failure to comply may result in injury or death to personnel.

WARNING

If measurement does not meet acceptable minimum or maximum tolerance, pitman arm and steering gear output shaft must be replaced. Failure to take measurement or replace worn part could result in pitman arm becoming loose, causing injury or death to personnel.

WARNING

If pitman arm is not tightened to proper specifications, pitman arm could work loose or lose its attachment, causing an accident. If pitman arm is found loose, replace pitman arm and steering gear output shaft. Never weld pitman arm or steering gear output shaft. Failure to comply may result in injury or death to personnel.

WARNING

If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.

WARNING

Installing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Keep cargo deck rear doors closed and locked at all times during spare tire stow/unstow operation. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of cargo quick lock floor. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of litter doors. Hands and fingers could get pinched or crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of the cargo deck assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from winch assembly when operating winch. Failure to comply may result in injury or death to personnel.

WARNING

Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep hands away from pinch point areas of the tire carrier assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

WARNING

Keep out from under spare tire when lowering and raising spare tire. Spare tire can slip or fall. Failure to comply may result in injury or death to personnel.

WARNING

Ladder panel weighs approximately 800 lbs (363 kg). Do not attempt to lift or move ladder panel without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Lead-acid batteries contain sulfuric acid, which can cause severe burns. Avoid contact with skin, eyes, or clothing. Wear safety goggles and gloves. If battery electrolyte is spilled, take immediate action to stop its corrosive (burning) effects. If battery acid is spilled on clothing or vehicle, wash immediately with cold water. Neutralize with baking soda or household ammonia solution. If battery acid comes in contact with skin, flush with cold water to remove acid. If eyes are contacted, flush with cold water for at least 15 minutes. Seek immediate medical attention. If swallowed, drink large amounts of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Seek immediate medical attention. Failure to comply may result in injury or death to personnel.

WARNING

Litter door and dyneema panel assembly weigh 142 lbs (65 kg). Do not move or lift litter door or dyneema panel without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

WARNING

Loosening of the crossbrace hardware is necessary to prevent binding of the gunner's platform while height adjustment is being made. Ensure crossbrace hardware is tight prior to using gunner's platform. Failure to comply may result in injury or death to personnel.

WARNING

Lower control arm weighs 90 lbs (41 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

M-ATV is equipped with a capsule interior automatic fire suppression system. Before performing any welding, brazing, grinding, or using open flame in capsule, batteries must be disconnected. In addition, the maintenance circuit breaker located to the right of the main circuit breaker in the dash must be pulled out to prevent accidental activation of automatic fire suppression system in the capsule. System components must also be covered. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel. If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.

WARNING

M-ATV is equipped with an undercarriage fire suppression system designed to extinguish fires in all wheel wells and in fuel tank area. Before performing any welding, brazing, grinding operation, or using open flame in or around the wheel well/fuel tank areas, batteries must be disconnected. In addition, the automatic fire suppression system for the undercarriage must be disabled to prevent accidental activation of automatic fire suppression system system. Care must be taken to prevent damage to any of the fire suppression sensor lines which, if damaged, may trigger automatic fire suppression system upon system being enabled. Undercarriage fire suppression system is triggered by loss of pressure in sensor lines. Failure to comply may result in injury to personnel.

WARNING

Never apply load on winch with cable fully extended. Keep at least three full turns of cable on the reel. Failure to comply may result in injury or death to personnel.

WARNING

Never use fuel to clean parts. Fuel is highly flammable. Fuel may ignite during cleaning. Failure to comply may result in injury or death to personnel.

WARNING

Never use open flame to apply heat to heat shrink tubing. Heat shrinking tubing may catch fire using open flame. Failure to comply may result in injury to personnel.

WARNING

Nitrogen lines under pressure will move violently when removed. Ensure nitrogen supply is shut off prior to removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

On direct contact, uncured silicone sealant irritates eyes. In case of contact, flush eyes with water and seek medical attention. Avoid prolonged contact with skin. Failure to comply may result in injury or death to personnel.

WARNING

Once tab lock retainer is locked into place, do not retighten. Constant retightening of retainer could cause pitman arm to loosen or retainer to fail, causing an accident at a later date. Failure to comply may result in injury or death to personnel.

WARNING

Once top screws are removed from rear seat mount, the seat will pivot forward. Do not sit in seat after screws are removed. Failure to comply may result in injury or death to personnel.

WARNING

Panel assemblies for cargo body weigh 90 lbs (41 kg). Do not attempt to lift or move assemblies without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Passenger side belly deflector panel weighs 353 lbs (160 kg). Do not attempt to lift or move passenger side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Pitman arm will be extremely tight. Do not pound on pitman arm or apply any source of heat, as damage to pitman arm or output shaft can cause an accident at a later date. Failure to comply may result in injury or death to personnel.

WARNING

Place a jackstand on each side of lifting device centered on ladder panel in case of transmission jack failure. Failure to comply may result in injury or death to personnel.

WARNING

Powertrain weighs 2,300 lbs (1 044 kg). Do not attempt to lift or move powertrain without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure batteries are disconnected. Failure to comply may result in discharge of cylinder or injury to personnel.

WARNING

Primary steering gear weighs 75 lbs (34 kg). Do not lift or move primary steering gear without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Prolonged contact with lubricating oil may cause skin rash. Immediately wash skin and clothing that come in contact with lubricating oil and remove saturated clothing. Keep area well-ventilated to keep fumes at a minimum. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft is awkward. Do not lift or move propeller shaft without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft weighs 60 lbs (27 kg). Do not lift or move propeller shaft without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Propeller shaft weighs 88 lbs (40 kg). Do not lift or move propeller shaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Push bumper is 310 lbs (140 kg). Do not attempt to lift or move push bumper without aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Radiator and transmission oil cooler weigh 65 lbs (29 kg). Do not lift or move radiator and transmission oil cooler without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Rear crossmember weights 110 lbs (50 kg). Do not attempt to lift or move rear crossmember without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Rear seat weighs 83 lbs (38 kg). Do not attempt to move seat without the aid of an assistant and suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Rear wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift rear wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Rear wall assemblies for cargo deck weigh 90 lbs (41 kg). Do not attempt to lift or move assemblies without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Rear windows weigh 46 lbs (21 kg). Do not attempt to lift or move rear window without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Refrigerant R-134a air conditioning systems should not be pressured-tested or leak-tested with compressed air. Combustible mixtures of air and R-134a may form. Failure to comply may result in injury or death to personnel.

WARNING

Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal or positive electrical circuit, a direct short may result in instant heating of tools, injury or death to personnel, or damage to equipment.

WARNING

Removing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

WARNING

Secondary steering gear weighs 70 lbs (32 kg). Do not lift or move secondary steering gear without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Secure transfer case to transmission jack with ratchet strap. Failure to comply may result in injury or death to personnel.

WARNING

Shock absorbers are filled with high pressure gas. Service shock absorbers with adequate ventilation. Do not use or store cylinder near heat or open flame. Cylinder temperature should not exceed 125°F (52°C). Use with equipment rated for cylinder pressure. Open valve slowly. Close valve after each use and in storage. Use in accordance with Material Safety Data Sheet for Nitrogen. If inhaled, move to area with fresh air. Failure to comply may result in injury or death to personnel.

WARNING

Side lifting fixture weighs 95 lbs (43 Kg). Do not attempt to lift or move side lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury of death to personnel.

WARNING

Skid plate weighs 53 lbs (24 kg). Do not lift or move skid plate without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Solvent cleaning compound MIL-PRF-680 Type II and III may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well-ventilated areas. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/massive concentrations can cause coma or be fatal. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. If symptoms persist, seek medical attention. First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If symptoms persist, seek medical attention. First aid for inhalation: move to fresh air. If not breathing, provide artificial respiration. If symptoms persist, seek medical attention. Keep away from open flames and other flames and other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

WARNING

Solvents used with a spray gun must be used in a spray booth with filter. Face shield must be used by personnel operating spray gun. Failure to comply may result in injury to personnel.

WARNING

Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

SPARK bar weighs 97 lbs (44 kg). Do not lift or move SPARK bar without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Spindle may become loose when removing spider. Support spindle when removing spider. Failure to comply may result in injury to personnel.

WARNING

Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

Spring may come free from vehicle while lowering jack. Spring may have to be rotated to aid in removal. Failure to comply may result in injury or death to personnel.

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

WARNING

Stand clear of vehicle while wheels are turned. Failure to comply may result in injury or death to personnel.

WARNING

Standard M1240A1 tire assembly weighs 600 lbs (272.4 kg). Do not attempt to lift or move tire assembly without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Starter weighs 50 lbs (23kg). Do not lift or move starter without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Steam cleaning creates hazardous noise levels and severe burn potential. Eye, skin, and ear protection are required. Failure to comply may result in injury to personnel.

WARNING

The flashpoint for Type II solvent cleaning compound is 141 to 198°F (61 to 92°C) and Type III is 200 to 241°F (93 to 116°C).

WARNING

Tip of removal tool is very sharp. Use caution when using tool. Failure to comply may result in injury to personnel.4

WARNING

To prevent arcing, do not allow tools to contact batteries or other battery terminals. Failure to comply may result in injury or death to personnel.

WARNING

Transfer case weighs 312 lbs (142 kg). Do not lift or move transfer case without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Transmission holding bracket weighs 93 lbs (42 kg). Do not attempt to lift or move transmission holding bracket without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Transmission weighs 700 lbs (318 kg). Do not lift or move transmission without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Turn cap on coolant reservoir bottle one half turn and stop prior to removing cap completely. Pressure must be relieved from coolant reservoir bottle prior to removal of cap or injury to personnel may occur.

WARNING

Underbody improvement panel weighs 1,000 lbs (454 kg). Do not attempt to lift or move center deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Upon removal of terminal clamps, avoid accidental contact between terminal clamps and battery terminals. This will prevent accidental shorting, arching, or sparks. Secure terminal clamps, cables, and wires away from battery terminals with cable ties as required. Failure to comply may result in injury or death to personnel.

WARNING

Upon removal of wires and cables, ensure no contact is made with battery terminals or other wires and cables. Secure wires and cables away from battery terminals and other wires and cables as required. Failure to comply may result in injury or death to personnel or damage to equipment.

WARNING

Upper control arm weighs 80 lbs (36 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Use care to prevent refrigerant from touching skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissues. Failure to comply may result in injury or death to personnel.

WARNING

Use extreme care not to short out battery terminals. Remove all jewelry such as rings, ID tags, bracelets, etc. prior to working on or around vehicle. Jewelry and tools can catch on equipment, contact positive electrical circuits, and cause severe burns or electrical shock. Failure to comply may result in injury or death to personnel.

WARNING

Vehicle must not be driven with brake chambers caged. Caging brakes renders brakes inoperative. Failure to comply may result in injury or death to personnel.

WARNING

Wear proper eye protection and nonleather gloves when servicing air conditioner. Failure to comply may result in injury or death to personnel.

WARNING

Wear proper eye protection and use care when removing or installing springs, retaining rings, and snap rings. Springs, retaining rings, and snap rings are under spring tension and can act as projectiles when released. Spring must be compressed during assembly. Failure to comply may result in injury to personnel.

WARNING

Wear proper eye protection and use care when removing or installing springs, retaining rings, and snap rings. Springs, retaining rings, and snap rings are under spring tension and can act as projectiles when released. Valve is spring loaded. Spring must be compressed during assembly. Failure to comply may result in injury to personnel.

WARNING

Wheel end assembly weighs 550 lbs (249 kg). Do not remove lower and upper control arm ball joints at the same time. Failure to comply may result in injury or death to personnel.

WARNING

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Wheel well deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

When removing air lines, loosen couplings slowly to bleed off air pressure in air lines. Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.

WARNING

When removing relief valves, loosen relief valves slowly to bleed off any trapped pressure that might be present. Ensure personnel wear protective goggles when removing relief valves. Failure to comply may result in injury or death to personnel.

WARNING

When tightening castle nut, do not loosen castle nut to install cotter pin. Continue to tighten castle nut until cotter pin can be installed. Failure to comply may result in injury or death to personnel.

WARNING

When using a punch and ball peen hammer, always wear safety glasses. Never use a punch that is damaged. Failure to comply may result in injury or death to personnel.

WARNING

While engine is running, transmission **MUST** be in N (neutral), **PARKING BRAKE** must be set and properly engaged, and wheels **MUST** be chocked. Failure to comply may result in injury or death to personnel.

WARNING

Winch and front crossmember are removed/installed as an assembly. Winch and front crossmember weigh 214 lbs (97 kg). Do not lift or move winch and crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Winch and winch bracket are removed as an assembly. Winch and winch bracket weigh 167 lbs (76 kg). Do not lift or move winch bracket without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

WARNING

Winch is NOT to be used for lifting or moving of persons. Failure to comply may result in injury or death to personnel.

WARNING

Winch is only to be used to stow/unstow spare tire. Winch is not to be used to lift other components or material. Failure to comply may result in injury or death to personnel.

WARNING

Winch weighs 119 lbs (54 kg). Do not lift or move winch without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

A bearing is located directly behind seal in spindle. When prying seal from spindle, do not damage bearing. Failure to comply may result in damage to equipment.

CAUTION

A resistance load of 175 lbs (79 kg) must be applied to wire rope to overcome internal resistance and operate winch brake properly. Turning winch handle counterclockwise will remove winch handle from drive shaft and reel will not turn. Failure to comply may result in damage to equipment.

CAUTION

After charging, allow charge to set 10 to 15 minutes. This allows time for the gas temperature to stabilize. Failure to comply may result in damage to equipment.

CAUTION

After powertrain is lifted up, front rubber mounts and washers may need to be removed for oil pan clearance. Failure to comply may result in damage to equipment.

CAUTION

All air cleaner element maintenance must be performed above temperatures of -10°F (-23°C). Failure to comply may result in damage to equipment.

CAUTION

Avoid excess removal of surface finish to adjacent area. Failure to comply may result in damage to equipment.

CAUTION

Blower motor cover should be reinstalled prior to HVAC assembly removal to prevent damage to HVAC internal wiring harness and /or components. Failure to comply may result in damage to equipment.

CAUTION

Boot damage will result if hammer is allowed to strike soft boot material. Strike only the metal boot band. Failure to comply may result in damage to equipment.

CAUTION

Butt splice connector sizes vary by wire diameter. To ensure secure repair, use only butt splice connector size specified for the wire being repaired. Do not modify butt splice connector to fit. Failure to comply may result in damage to equipment.

CAUTION

Care must be used when installing 395/85R20 tire on tire carrier. Air valve on 395/85R20 tire is inserted through top driver side slot of tire carrier. Ensure spacer is aligned properly to avoid damage to CTIS valve. Failure to comply may result in damage to equipment.

CAUTION

Cargo deck side wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Caution must be used when installing spare tire on tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

CAUTION

Caution must be used when removing spare tire from tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

CAUTION

Charge air cooler is cumbersome. It should be installed with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Charge air cooler is cumbersome. It should be removed with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Clamp belt above retractor prior to removal to prevent belt from retracting completely. Failure to comply may result in damage to equipment.

CAUTION

CTIS controller and CTIS dash panel must be kept together before CTIS controller connector is connected and during installation in dash. Failure to comply may result in damage to equipment.

CAUTION

CTIS controller and CTIS dash panel must be kept together during removal until CTIS controller connector is removed. Failure to comply may result in damage to equipment.

CAUTION

Cutout for retractor is not centered on mat. Align cutout in mat with cutout in gunner's platform and check for proper positioning prior to cutting. Failure to comply may result in damage to equipment.

CAUTION

Differential housing must be secured to transmission jack with strap. Failure to comply may result in damage to equipment.

CAUTION

Do not allow slip yoke to come off propeller shaft. Failure to comply may result in misalignment of propeller shaft yokes and could cause damage to equipment.

CAUTION

Do not apply excessive heat to heat shrink tubing. Excessive heat may cause heat shrink tubing to split or melt. Failure to comply may result in damage to equipment.

CAUTION

Do not bend locking tabs in pitman arm slots. Failure to comply may result in damage to equipment.

CAUTION

Do not clean tires, rubber hoses, or electrical components with solvent mixture. Failure to comply may result in damage to equipment.

CAUTION

Do not fill ball joint boot with too much grease. If boot is bulging when installed, squeeze out excess grease. Failure to comply may result in damage to equipment.

CAUTION

Do not hold steering wheel at full left or full right for longer than 10 seconds. Oil overheating may occur. Failure to comply may result in damage to equipment.

CAUTION

Do not lubricate A/C system O-rings. O-ring material is only compatible with air conditioning type lubricants. Failure to comply may result damage to equipment.

CAUTION

Do not open cover for farther than is required to disconnect connector. Failure to comply may result in damage to equipment.

CAUTION

Do not operate vehicle system with the panel high-side valve in open position. Failure to comply may result in damage to equipment.

CAUTION

Do not over tighten threaded insert. Failure to comply may result in damage to equipment.

CAUTION

Do not overcharge system. The system is fully charged with 3.5 lbs (1.59 kg) of refrigerant. Failure to comply may result in damage to equipment.

CAUTION

Do not overtighten clamp on heater control valve. Failure to comply may result in damage to equipment.

CAUTION

Do not overtighten locknuts. Failure to comply may result in damage to hood.

CAUTION

Do not overtighten nuts (14). Failure to comply may result in damage to receiver/dryer, loss of refrigerant, and damage to equipment.

CAUTION

Do not overtighten screw. Failure to comply may result in damage to equipment.

CAUTION

Do not permit dirt, dust, or grit to enter transmission filler tube. Thoroughly clean dipstick handle and end of filler tube. Failure to comply may result in damage to equipment.

CAUTION

Do not shorten springs on CTIS seals. Failure to comply may result in damage to equipment.

CAUTION

Do not spray cleaning solvent on the front of the dash panels or gauges. This can cause discoloration and clouding of dash panels and gauges. Failure to comply may result in damage to equipment.

CAUTION

Do not use a hammer to pound halfshaft into wheel end. Failure to comply may result in damage to equipment.

CAUTION

Do not use a removal tool to aid in removal of tie rod from pitman arm. Failure to comply may result in damage to dust cover.

CAUTION

Do not use a removal tool to aid in removal of toe control link from steering arm. Failure to comply may result in damage to dust cover.

CAUTION

Do not use a wrench to tighten oil filter housing. Failure to comply may result in damage to equipment.

CAUTION

Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.

CAUTION

Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.

CAUTION

Do not use mounting screws to draw filter cover to the sump. Failure to comply may result in damage to cover, seals, or sump.

CAUTION

Do not use soap or alkalies for cleaning tank interiors. Failure to comply may result in damage to equipment.

CAUTION

Do not use wrench to tighten fuel filter. Failure to comply may result in damage to equipment.

CAUTION

Drain plug is magnetized and can not be exchanged with fill plug. Failure to comply may result in damage to equipment.

CAUTION

During installation of bottom brake shoe, an assistant is required to support brake shoe until springs are installed. Failure to comply may result in damage to equipment.

CAUTION

Ensure all connectors and wiring are free before lifting hood from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure all connectors remain disconnected while performing Steps (11) through (22). Failure to comply may result in damage to equipment.

CAUTION

Ensure all GFE cables, wire harnesses, fire suppression lines, and connectors are away from antenna platform. Remove antenna platform slowly from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure all GFE is disconnected prior to removal of GFE wire bundles. Failure to comply may result in damage to equipment.

CAUTION

Ensure all hoses, lines, harnesses, cables, and wires are clear of powertrain installation path. Failure to comply may result in damage to equipment.

CAUTION

Ensure all hoses, lines, harnesses, cables, and wires are not attached to powertrain. Failure to comply may result in damage to equipment.

CAUTION

Ensure all wires and cables are clear of HVAC installation path. Failure to comply may result in damage to equipment.

CAUTION

Ensure all wires and cables are clear of HVAC removal path. Failure to comply may result in damage to equipment.

CAUTION

Ensure any open tube, line, or fitting on the turbocharger and its related systems are capped and plugged. Failure to comply may result in damage to equipment.

CAUTION

Ensure assistant is holding knuckle securely. Failure to comply may result in damage to equipment.

CAUTION

Ensure batteries are disconnected. Batteries will discharge during storage if not disconnected. Failure to comply may result in damage to equipment.

CAUTION

Ensure battery disconnect switch is turned OFF prior to performing battery maintenance. Failure to comply may result in damage to equipment.

CAUTION

Ensure cables and hoses are positioned above transmission during installation. Failure to comply may result in damage to equipment.

CAUTION

Ensure cables and hoses are positioned above transmission during removal. Failure to comply may cause damage to equipment.

CAUTION

Ensure cables are installed correctly on NATO slave receptacle. Terminal assembly is offset from center of receptacle. Positive terminal (red cable) is closest to the center of receptacle. Negative (black cable) is farther away from center of receptacle. Failure to comply may result in damage to equipment.

CAUTION

Ensure connectors are completely seated. Failure to comply may result in damage to equipment.

CAUTION

Ensure correct oil level. Low level causes lack of lubrication and reduces durability. High level causes splashing and leads to overheating of transfer case.

CAUTION

Ensure engine is full of oil prior to starting engine. Failure to comply may result in damage to equipment.

CAUTION

Ensure longer bolt is installed in top position. Failure to comply may result in damage to equipment.

CAUTION

Ensure mating surfaces of differential lock chamber, shim plates, and differential assembly are clean to prevent differential leaks. Failure to comply may result in damage to equipment.

CAUTION

Ensure pilot is installed on base prior to removal. Failure to comply may result in damage to equipment.

CAUTION

Ensure retractor straps are secured prior to removing retractors. Failure to comply may result in damage to equipment.

CAUTION

Ensure setscrews are recessed no further than past side belly deflector panel or crossmember will not be held in place and may come off with panel. Failure to comply may result in damage to equipment.

CAUTION

Ensure spline cover is completely covering spindle splines and threads when installing hub assembly. Failure to comply may result in damage to equipment.

CAUTION

Ensure the rear light wire harness, fire suppression sensor wires, fire suppression lines, and Check-6 cables are properly routed prior to installing cargo deck on vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ensure tires are not resting on surface containing grease or oil. Failure to comply may result in damage to equipment.

CAUTION

Ensure transmission oil level is at normal operating range. Failure to comply may result in damage to transmission.

CAUTION

Ensure wires, harnesses, lines, and hoses are clear from back of power steering reservoir during installation. Failure to comply may result in damage to equipment.

CAUTION

Excess sensor cable must be secured to air line to prevent it from contacting propeller shaft. Failure to comply may result in damage to equipment.

CAUTION

Failure to perform Step (1) may result in damage to equipment.

CAUTION

Failure to perform Step (3) may result in damage to equipment.

CAUTION

Fan shroud housing and fan are difficult to install. Use care not to damage radiator. Install with the aid of an assistant. Failure to comply may result in damage to equipment.

CAUTION

Fan shroud housing and fan are difficult to remove. Remove with the aid of an assistant and use care not to damage radiator. Failure to comply may result in damage to equipment.

CAUTION

Fill fuel filter with clean fuel before installing. Failure to comply may result in damage to equipment.

CAUTION

Fill shock slowly. Failure to comply may result in damage to equipment.

CAUTION

For installation of differential in housing, install 3/8 x 1/2 inch screw into differential lock-up screw hole prior to installing differential assembly into housing. Failure to comply may result in damage to equipment.

CAUTION

For removal of differential from housing, install 3/8 x 1/2 in. screw into differential assembly lock-up screw hole prior to removing inner shaft. Failure to comply may result in damage to equipment.

CAUTION

Front and rear brake drums are not interchangeable. Ensure brake drums are not switched during removal and installation. Failure to comply may result in damage to equipment.

CAUTION

Front rubber mounts may need to remain uninstalled until oil pan has cleared front mounting position. Failure to comply may result in damage to equipment.

CAUTION

Have an assistant monitor powertrain-to-chassis clearance during installation. Failure to comply may result in damage to equipment.

CAUTION

Have an assistant monitor powertrain-to-chassis clearance during removal. Failure to comply may result in damage to equipment.

CAUTION

HVAC hose needs at least one inch (2.54 cm) clearance from drive belt. Failure to comply may result in damage to equipment.

CAUTION

If coolant is being replaced, mix coolant into 50/50 mixture of coolant and distilled water. Do not have more than 60% coolant in mixture. Failure to comply may result in damage to equipment.

CAUTION

If tabs and notches do not line up, tighten beyond specified torque value until two tabs align. Never back off the retainer to align restraining tabs. Failure to comply may result in damage to equipment.

CAUTION

Install same number of shim plates as was removed. Failure to comply may result in damage to equipment.

CAUTION

Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while lifting into place on vehicle. Failure to comply may result in damage to equipment.

CAUTION

Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while removing from vehicle. Failure to comply may result in damage to equipment.

CAUTION

Litter door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Loosen jam nut prior to removal of setscrew from differential lock chamber. Failure to comply may result in damage to equipment.

CAUTION

Only remove hood support bracket far enough away from capsule for access of remaining hardware. Failure to comply may result in damage to equipment.

CAUTION

Overtightening will cause deformation of the pipe fitting and damage to the joining fitting, flange, or component. Failure to comply may result in damage to equipment.

CAUTION

Perform Steps (5) through (8) for operation checks. Failure to comply may cause damage to vehicle.

CAUTION

Position tire assembly so that CTIS hole in tire assembly is aligned with CTIS port. Damage to CTIS system may result if tire assembly is not correctly installed. Failure to comply may result in damage to equipment.

CAUTION

Powertrain must be installed carefully with a combination of downward and rearward movements. Failure to comply may result in damage to equipment.

CAUTION

Powertrain must be removed carefully with a combination of forward and upward movements. Failure to comply may result in damage to equipment.

CAUTION

Prior to installing and adjusting setscrew, air system must be charged. Failure to comply may result in damage to equipment.

CAUTION

Prior to performing the installation process, ensure inside of canister and housing are clean. Place clean cloth on hard surface. Failure to comply may result in damage to equipment.

CAUTION

Prior to removing sensor, carefully remove sealant from cable and knuckle. Failure to comply may result in damage to equipment.

CAUTION

Raise transmission only enough to release pressure on spring support. Failure to comply will result in damage to equipment.

CAUTION

Rear cargo door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Rear wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

CAUTION

Remove old sealing remainders from threads on the shift cylinder cover, adjustment screw, and locknut. Failure to comply may result in damage to equipment.

CAUTION

Remove remaining gasket remnants from top surface of thermostat housing and bottom surface of thermostat outlet weldment. Prepare both surfaces for new gasket. Failure to comply may result in damage to equipment.

CAUTION

Retaining springs may fit loosely in seals. Ensure retaining springs are installed during installation of seals. Failure to comply may result in damage to equipment.

CAUTION

Small piece of tape wound around end of cable will aid in installation.

CAUTION

Strip wire after placing it through seal to prevent damage to individual wire strands. Failure to comply may result in damage to equipment.

CAUTION

Support ignition relay during installation to prevent relay from hanging by wires. Failure to comply may result in damage to equipment.

CAUTION

Support ignition relay during removal to prevent relay from hanging by wires. Failure to comply may result in damage to equipment.

CAUTION

Support power steering reservoir during front bracket removal. Power steering reservoir could shift when front bracket is removed. Failure to comply may result in damage to equipment.

CAUTION

Support power steering reservoir until mounting bracket is secured. Failure to comply may result in damage to equipment.

CAUTION

Take care to prevent kinks from forming in cable, as this will weaken cable. Failure to comply may result in damage to equipment.

CAUTION

Take care when removing brackets from hood. Hood will no longer be secured if removing both brackets. Failure to comply may result in damage to equipment.

CAUTION

Tension rods are loosened and not removed in Step (1). Failure to comply may result in damage to equipment.

CAUTION

Terminals come in different styles and sizes. To prevent damage, be sure to use only the exact replacements. Do not attempt to modify terminal to fit. Failure to comply may result in damage to equipment.

CAUTION

The life of a cable directly relates to its use and to the care it receives. A cable must be “stretched” or spooled onto the drum under a load of at least 500 lbs (227 kg). The objective of “stretching” is to produce tight, even wraps on the inner and outer layers of the cable, thus preventing binding or kinking. Failure to comply may result in damage to equipment.

CAUTION

The transmission must not be operated for extended periods of time until a hot check has verified proper oil level. Do not operate transmission for extended periods at improper oil level conditions. Failure to comply may result in damage to equipment.

CAUTION

Tighten screws in a crisscross pattern. Failure to comply may result in damage to equipment.

CAUTION

Torque adapter must be 90° to torque wrench. Failure to comply may result in damage to equipment.

CAUTION

Tube must be fully removed from tie down pass through prior to lifting cargo deck. Failure to comply may result in damage to equipment.

CAUTION

Turn battery disconnect switch to the OFF position prior to inspecting and/or disconnecting any electrical connector for the fire suppression system. Failure to comply may result in damage to equipment.

CAUTION

Use brass drift to tap in bearing cups. Failure to comply may result in damage to equipment.

CAUTION

Use care not to damage components while prying apart. Failure to comply may result in damage to equipment.

CAUTION

Use care when connecting connectors. Failure to comply may result in damage to equipment.

CAUTION

Use care when installing new bearing, to prevent accidental damage to bearing. Failure to comply may result in damage to equipment.

CAUTION

Use care when installing screws into threaded blocks for front seat. If a threaded block is loosened, removal of belly armor is required to properly secure the seat.

CAUTION

Use care when installing wheel/tire assembly. Dragging wheel/tire assembly across studs may result in damage to studs. Failure to comply may result in damage to equipment.

CAUTION

Use caution when inserting tension rods through vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

CAUTION

Use caution when removing tension rods from vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

CAUTION

Use caution while installing cargo deck on vehicle. Ensure nothing becomes caught or bound during installation. Failure to comply may result in damage to equipment.

CAUTION

Use caution while removing cargo deck from vehicle. Ensure wire harness, fire suppression sensor wires, fire suppression lines, and Check-6 cables do not become caught or bound during removal. Failure to comply may result in damage to equipment.

CAUTION

Vehicle armor is threaded; do not attempt to force screw out. Screw must be turned out. Failure to comply may result in damage to equipment.

CAUTION

Vehicles must not have ballistic glass cleaned with solvent or other strong cleaning compounds. Ballistic glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.

CAUTION

Washer (5) and washer (8) are not interchangeable. Note their location. Failure to comply may result in damage to equipment.

CAUTION

Washers (5 and 8) are not interchangeable. Switching washers during installation may cause damage to equipment.

CAUTION

When drilling out threaded insert, do not enlarge existing hole. The new threaded insert will not seat properly if hole is enlarged. Failure to comply may result in damage to equipment.

CAUTION

When installing hub assembly on spindle, install hub assembly in one straight, smooth, continuous process. Do not stop during process and relax hub assembly on CTIS seals. Use care not to drag hub assembly along spindle shaft. Failure to comply may result in damage to equipment.

CAUTION

When installing pitman arm, timing marks on pitman arm and steering output shaft must be aligned as noted prior to removal. Failure to comply may result in damage to equipment.

CAUTION

When installing propeller shaft on yoke, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

CAUTION

When one brake shoe needs to be replaced, all brake shoes for that axle must be replaced. Failure to comply may result in damage to equipment.

CAUTION

When removing and installing battery terminals and cables from batteries, ensure they are removed and installed in proper sequence as described below. Failure to comply may result in damage to equipment.

CAUTION

When removing differential lock chamber from differential assembly, note number of shims removed. Same number of shims must be used when installing lock chamber. Failure to comply may result in damage to equipment.

CAUTION

When removing propeller shaft from yokes, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

CAUTION

When removing seal from spindle, do not damage spindle bore where seal is seated. Failure to comply may result in damage to equipment.

CAUTION

When removing washer from sun gear, do not damage surface of sun gear. Failure to comply may result in damage to equipment.

CAUTION

When tightening A/C hoses and fittings, always use a backup wrench. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean capsule interior, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean capsule interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean vehicle, do not allow water stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.

CAUTION

While tightening nuts, hold screws with wrench. Failure to comply may result in damage to equipment.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 9-2355-335-23-1 dated 15 June 2011. Zero in the "Change No." column indicates an original page or work package.

Date of issue for the original manual is:

Original 28 February 2013

**TOTAL NUMBER OF VOLUMES IS 2, TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 232
AND TOTAL NUMBER OF WORK PACKAGES IS 297, CONSISTING OF THE FOLLOWING:**

Page/WP No.	Change No.	Page/WP No.	Change No.
Volume 1		WP 0027 (4 pgs)	0
Cover	0	WP 0028 (6 pgs)	0
Safety Summary (38 pgs)	0	WP 0029 (8 pgs)	0
i through xvi	0	WP 0030 (8 pgs)	0
Chp 1 Title page	0	WP 0031 (10 pgs)	0
WP 0001 (4 pgs)	0	WP 0032 (18 pgs)	0
WP 0002 (12 pgs)	0	WP 0033 (2 pgs)	0
WP 0003 (20 pgs)	0	WP 0034 (4 pgs)	0
WP 0004 (4 pgs)	0	WP 0035 (6 pgs)	0
WP 0005 (6 pgs)	0	WP 0036 (8 pgs)	0
WP 0006 (8 pgs)	0	WP 0037 (2 pgs)	0
WP 0007 (8 pgs)	0	WP 0038 (6 pgs)	0
Chp 2 Title page	0	WP 0039 (6 pgs)	0
WP 0008 (6 pgs)	0	WP 0040 (12 pgs)	0
WP 0009 (22 pgs)	0	WP 0041 (4 pgs)	0
WP 0010 (8 pgs)	0	WP 0042 (8 pgs)	0
WP 0011 (2 pgs)	0	WP 0043 (6 pgs)	0
WP 0012 (54 pgs)	0	WP 0044 (4 pgs)	0
WP 0013 (26 pgs)	0	WP 0045 (4 pgs)	0
WP 0014 (26 pgs)	0	WP 0046 (4 pgs)	0
WP 0015 (4 pgs)	0	WP 0047 (8 pgs)	0
WP 0016 (4 pgs)	0	WP 0048 (4 pgs)	0
Chp 3 Title page	0	WP 0049 (4 pgs)	0
WP 0017 (2 pgs)	0	WP 0050 (4 pgs)	0
WP 0018 (24 pgs)	0	WP 0051 (2 pgs)	0
Chp 4 Title page	0	WP 0052 (4 pgs)	0
WP 0019 (4 pgs)	0	WP 0053 (2 pgs)	0
WP 0020 (8 pgs)	0	WP 0054 (2 pgs)	0
WP 0021 (4 pgs)	0	WP 0055 (2 pgs)	0
WP 0022 (2 pgs)	0	WP 0056 (24 pgs)	0
WP 0023 (4 pgs)	0	WP 0057 (6 pgs)	0
WP 0024 (6 pgs)	0	WP 0058 (4 pgs)	0
WP 0025 (54 pgs)	0	WP 0059 (4 pgs)	0
WP 0026 (4 pgs)	0	WP 0060 (6 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0061 (8 pgs)	0	WP 0110 (6 pgs)	0
WP 0062 (2 pgs)	0	WP 0111 (6 pgs)	0
WP 0063 (4 pgs)	0	WP 0112 (4 pgs)	0
WP 0064 (8 pgs)	0	WP 0113 (10 pgs)	0
WP 0065 (4 pgs)	0	WP 0114 (8 pgs)	0
WP 0066 (10 pgs)	0	WP 0115 (4 pgs)	0
WP 0067 (10 pgs)	0	WP 0116 (4 pgs)	0
WP 0068 (14 pgs)	0	WP 0117 (4 pgs)	0
WP 0069 (4 pgs)	0	WP 0118 (4 pgs)	0
WP 0070 (4 pgs)	0	WP 0119 (4 pgs)	0
WP 0071 (4 pgs)	0	WP 0120 (4 pgs)	0
WP 0072 (2 pgs)	0	WP 0121 (10 pgs)	0
WP 0073 (6 pgs)	0	WP 0122 (4 pgs)	0
WP 0074 (6 pgs)	0	WP 0123 (4 pgs)	0
WP 0075 (16 pgs)	0	WP 0124 (4 pgs)	0
WP 0076 (2 pgs)	0	WP 0125 (2 pgs)	0
WP 0077 (2 pgs)	0	WP 0126 (4 pgs)	0
WP 0078 (6 pgs)	0	WP 0127 (4 pgs)	0
WP 0079 (6 pgs)	0	WP 0128 (4 pgs)	0
WP 0080 (10 pgs)	0	WP 0129 (2 pgs)	0
WP 0081 (18 pgs)	0	WP 0130 (2 pgs)	0
WP 0082 (4 pgs)	0	WP 0131 (2 pgs)	0
WP 0083 (6 pgs)	0	WP 0132 (2 pgs)	0
WP 0084 (6 pgs)	0	WP 0133 (8 pgs)	0
WP 0085 (4 pgs)	0	WP 0134 (4 pgs)	0
WP 0086 (6 pgs)	0	WP 0135 (6 pgs)	0
WP 0087 (4 pgs)	0	WP 0136 (4 pgs)	0
WP 0088 (2 pgs)	0	WP 0137 (4 pgs)	0
WP 0089 (4 pgs)	0	WP 0138 (2 pgs)	0
WP 0090 (14 pgs)	0	WP 0139 (8 pgs)	0
WP 0091 (2 pgs)	0	WP 0140 (2 pgs)	0
WP 0092 (4 pgs)	0	WP 0141 (14 pgs)	0
WP 0093 (10 pgs)	0	WP 0142 (2 pgs)	0
WP 0094 (2 pgs)	0	WP 0143 (4 pgs)	0
WP 0095 (10 pgs)	0	WP 0144 (10 pgs)	0
WP 0096 (10 pgs)	0	WP 0145 (6 pgs)	0
WP 0097 (2 pgs)	0	WP 0146 (2 pgs)	0
WP 0098 (4 pgs)	0	WP 0147 (4 pgs)	0
WP 0099 (6 pgs)	0	WP 0148 (6 pgs)	0
WP 0100 (4 pgs)	0	WP 0149 (2 pgs)	0
WP 0101 (4 pgs)	0	WP 0150 (4 pgs)	0
WP 0102 (6 pgs)	0	WP 0151 (32 pgs)	0
WP 0103 (8 pgs)	0	WP 0152 (2 pgs)	0
WP 0104 (4 pgs)	0	WP 0153 (2 pgs)	0
WP 0105 (4 pgs)	0	WP 0154 (4 pgs)	0
WP 0106 (2 pgs)	0	WP 0155 (2 pgs)	0
WP 0107 (4 pgs)	0	WP 0156 (30 pgs)	0
WP 0108 (6 pgs)	0	WP 0157 (24 pgs)	0
WP 0109 (6 pgs)	0	WP 0158 (16 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0159 (2 pgs)	0	WP 0204 (2 pgs)	0
WP 0160 (4 pgs)	0	WP 0205 (2 pgs)	0
WP 0161 (14 pgs)	0	WP 0206 (4 pgs)	0
WP 0162 (12 pgs)	0	WP 0207 (2 pgs)	0
WP 0163 (10 pgs)	0	WP 0208 (2 pgs)	0
WP 0164 (4 pgs)	0	WP 0209 (4 pgs)	0
WP 0165 (6 pgs)	0	WP 0210 (4 pgs)	0
WP 0166 (6 pgs)	0	WP 0211 (2 pgs)	0
WP 0167 (8 pgs)	0	WP 0212 (6 pgs)	0
WP 0168 (4 pgs)	0	WP 0213 (2 pgs)	0
WP 0169 (6 pgs)	0	WP 0214 (10 pgs)	0
WP 0170 (4 pgs)	0	WP 0215 (2 pgs)	0
WP 0171 (4 pgs)	0	WP 0216 (2 pgs)	0
WP 0172 (2 pgs)	0	WP 0217 (4 pgs)	0
WP 0173 (4 pgs)	0	WP 0218 (34 pgs)	0
WP 0174 (4 pgs)	0	WP 0219 (6 pgs)	0
WP 0175 (12 pgs)	0	WP 0220 (2 pgs)	0
WP 0176 (4 pgs)	0	WP 0221 (2 pgs)	0
WP 0177 (4 pgs)	0	WP 0222 (4 pgs)	0
WP 0178 (4 pgs)	0	WP 0223 (8 pgs)	0
WP 0179 (8 pgs)	0	WP 0224 (4 pgs)	0
WP 0180 (8 pgs)	0	WP 0225 (2 pgs)	0
WP 0181 (6 pgs)	0	WP 0226 (2 pgs)	0
WP 0182 (10 pgs)	0	WP 0227 (46 pgs)	0
WP 0183 (4 pgs)	0	WP 0228 (12 pgs)	0
Volume 2		WP 0229 (2 pgs)	0
Cover	0	WP 0230 (2 pgs)	0
Safety Summary (42 pgs)	0	WP 0231 (2 pgs)	0
i thru vi	0	WP 0232 (4 pgs)	0
WP 0184 (2 pgs)	0	WP 0233 (2 pgs)	0
WP 0185 (6 pgs)	0	WP 0234 (2 pgs)	0
WP 0186 (4 pgs)	0	WP 0235 (8 pgs)	0
WP 0187 (10 pgs)	0	WP 0236 (2 pgs)	0
WP 0188 (4 pgs)	0	WP 0237 (2 pgs)	0
WP 0189 (6 pgs)	0	WP 0238 (4 pgs)	0
WP 0190 (4 pgs)	0	WP 0239 (2 pgs)	0
WP 0191 (8 pgs)	0	WP 0240 (4 pgs)	0
WP 0192 (4 pgs)	0	WP 0241 (6 pgs)	0
WP 0193 (4 pgs)	0	WP 0242 (4 pgs)	0
WP 0194 (10 pgs)	0	WP 0243 (46 pgs)	0
WP 0195 (4 pgs)	0	WP 0244 (26 pgs)	0
WP 0196 (6 pgs)	0	WP 0245 (6 pgs)	0
WP 0197 (2 pgs)	0	WP 0246 (4 pgs)	0
WP 0198 (2 pgs)	0	WP 0247 (8 pgs)	0
WP 0199 (4 pgs)	0	WP 0248 (24 pgs)	0
WP 0200 (2 pgs)	0	WP 0249 (8 pgs)	0
WP 0201 (2 pgs)	0	WP 0250 (12 pgs)	0
WP 0202 (2 pgs)	0	WP 0251 (10 pgs)	0
WP 0203 (4 pgs)	0	WP 0252 (12 pgs)	0

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0253 (2 pgs)	0	WP 0277 (14 pgs)	0
WP 0254 (6 pgs)	0	WP 0278 (4 pgs)	0
WP 0255 (8 pgs)	0	WP 0279 (4 pgs)	0
WP 0256 (4 pgs)	0	WP 0280 (4 pgs)	0
WP 0257 (2 pgs)	0	WP 0281 (4 pgs)	0
WP 0258 (4 pgs)	0	WP 0282 (12 pgs)	0
WP 0259 (4 pgs)	0	WP 0283 (4 pgs)	0
WP 0260 (10 pgs)	0	WP 0284 (4 pgs)	0
WP 0261 (8 pgs)	0	WP 0285 (6 pgs)	0
WP 0262 (2 pgs)	0	WP 0286 (4 pgs)	0
WP 0263 (4 pgs)	0	WP 0287 (4 pgs)	0
WP 0264 (8 pgs)	0	WP 0288 (4 pgs)	0
WP 0265 (4 pgs)	0	WP 0289 (4 pgs)	0
WP 0266 (4 pgs)	0	WP 0290 (6 pgs)	0
WP 0267 (4 pgs)	0	WP 0291 (16 pgs)	0
WP 0268 (2 pgs)	0	WP 0292 (16 pgs)	0
WP 0269 (4 pgs)	0	Chp 5 Title page	0
WP 0270 (8 pgs)	0	WP 0293 (2 pgs)	0
WP 0271 (8 pgs)	0	WP 0294 (4 pgs)	0
WP 0272 (2 pgs)	0	WP 0295 (24 pgs)	0
WP 0273 (4 pgs)	0	WP 0296 (4 pgs)	0
WP 0274 (4 pgs)	0	WP 0297 (10 pgs)	0
WP 0275 (2 pgs)	0	Schematics (98 pgs)	0
WP 0276 (4 pgs)	0		

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February 2013

MAINTENANCE MANUAL
COMMERCIAL-OFF-THE-SHELF (COTS)
for
MINE RESISTANT AMBUSH PROTECTED
ALL TERRAIN VEHICLE (M-ATV)

M1240
NSN: 2355-01-575-9632 (EIC 1UT)

M1240A1
NSN: 2355-01-596-1330 (EIC 1ZW)

M1245
NSN: 2355-01-586-8070 (EIC 1VE)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

(A) Army - You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is <https://tulsa.tacom.army.mil>. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and to better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/ TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

(F) Air Force - For users without access to JCALS, submit AFTO Form 22 directly to WR/ALC/GRVEB, Robins AFB GA. Send in your recommended changes via electronic mail. Our e-mail address is robins.ce.afto22@robins.af.mil.

*This manual supersedes TM 9-2355-335-23-1, 15 dated June 2011.

COPYRIGHT RELEASE STATEMENT: Oshkosh Corporation states this Commercial Off the Shelf (COTS) manual dated 28 February 2013 is free from copyright restrictions. The Government may edit, reprint, and distribute information in this manual as required.

DISTRIBUTION STATEMENT C: Distribution authorized to US Government agencies and their contractors; proprietary information. This publication is Administrative-Operational Use required for administrative and operational purposes, as determined on 02 October 2009. Other requests for this document shall be referred to U.S. Army TACOM Life Cycle Management Command, PM-MRAP, ATTN: AMSTA-LCC-MM/TECH PUBS, 6501 E. 11 Mile Road, Warren, MI 48397-5000.

DESTRUCTION NOTICE: Destroy by any method that will prevent disclosure of contents or reconstruction of the document.

TABLE OF CONTENTS

WP Sequence No.

VOLUME 1

CHAPTER 1 GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION

General Information	WP 0001
Model Configuration Identification	WP 0002
Equipment Description and Data	WP 0003
Mechanical Theory	WP 0004
Electrical Theory	WP 0005
Service Upon Receipt	WP 0006
Preparation For Storage Or Shipment	WP 0007

CHAPTER 2 TROUBLESHOOTING PROCEDURES

Air Conditioner Troubleshooting	WP 0008
Anti-Lock Brake System (ABS) Troubleshooting	WP 0009
Brake System Troubleshooting	WP 0010
Cooling System Troubleshooting	WP 0011
Electrical Troubleshooting	WP 0012
Engine/Transmission Troubleshooting	WP 0013
Fire Suppression System Troubleshooting	WP 0014
Steering System Troubleshooting	WP 0015
Drive Line Troubleshooting	WP 0016

CHAPTER 3 PMCS MAINTENANCE INSTRUCTIONS

Preventive Maintenance Checks and Services (PMCS) Introduction	WP 0017
Preventive Maintenance Checks and Services (PMCS)	WP 0018

CHAPTER 4 MAINTENANCE INSTRUCTIONS

ACCESSORIES

Air Conditioner Compressor Replacement (Original Compressor)	WP 0019
Air Conditioner Compressor Replacement (Updated Compressor)	WP 0020
Air Conditioner Condenser Replacement	WP 0021
Air Conditioner Leak Detection	WP 0022
Air Conditioner Receiver/Dryer Replacement	WP 0023
Air Conditioner Refrigerant R-134A Recovery/Evacuation and Recharging	WP 0024

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

ACCESSORIES (continued)

Antenna Platform Replacement (M1240/M1240A1)	WP 0025
Coupler Box Replacement (M1240/M1240A1)	WP 0026
Crew Vehicle Receiver/Jammer (CVRJ) Box Replacement (M1240/M1240A1)	WP 0027
Driver Side Splash Guard Replacement (AFES Nitrogen Detection)	WP 0028
Driver Side Splash Guard Replacement (AFES Linear Wire Detection)	WP 0029
Front Mud Flap Replacement	WP 0030
HVAC Replacement (Front)	WP 0031
HVAC Replacement, Rear (M1240/M1240A1)	WP 0032
Lower Plenum Replacement	WP 0033
Passenger Side Splash Guard Replacement (AFES Nitrogen Detection)	WP 0034
Passenger Side Splash Guard Replacement (AFES Linear Wire Detection)	WP 0035
Rear Air Conditioner Replacement (M1245)	WP 0036
Rear Fender Extension Replacement (Mud Protection)	WP 0037
Spare Tire Unstow/Stow (For 395/85R20 Spare Tire Carrier)	WP 0038
Spare Tire Unstow/Stow (For Upgraded Spare Tire Carrier)	WP 0039
Spare Tire Unstow/Stow (M1245)	WP 0040
Tire Carrier Replacement (For 395/85R20 Spare Tire Carrier)	WP 0041
Tire Carrier Replacement (For Upgraded Spare Tire Carrier)	WP 0042
Tire Carrier Replacement (M1245)	WP 0043
Windshield Wiper Arm Replacement	WP 0044
Windshield Wiper Motor Replacement	WP 0045

ARMOR

Belly Deflector Crossmember Weldment Replacement	WP 0046
Capsule Armor Replacement	WP 0047
Center Belly Deflector Panel Replacement (M1240/M1245)	WP 0048
Driver Side Belly Deflector Panel Replacement (M1240/M1245)	WP 0049
Engine Belly Deflector Panel Replacement	WP 0050
Litter Door Dyneema Panel Replacement (M1245)	WP 0051
Passenger Side Belly Deflector Panel Replacement (M1240/M1245)	WP 0052
Rear Cargo Door Dyneema Panel Replacement (M1245)	WP 0053
Rear Wall Dyneema Panel Replacement (M1245)	WP 0054

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

ARMOR (continued)

Side Wall Dyneema Panel Replacement (M1245)	WP 0055
Underbody Improvement and Belly Deflector Armor Panels Replacement (M1240A1)	WP 0056
Wheel Well Deflector Panel, Front, Replacement (M1240A1).	WP 0057
Wheel Well Deflector Panel, Rear, Replacement (M1240A1)	WP 0058
Wheel Well Deflector Panel Replacement (M1240/M1245)	WP 0059

AUTOMATIC FIRE EXTINGUISHING SYSTEM (AFES)

Fire Suppression System Aerosol Generator Replacement, Engine Compartment (Four Generator AFES System)	WP 0060
Fire Suppression System Aerosol Generator Replacement, Engine Compartment (Five Generator AFES System).	WP 0061
Fire Suppression System Chassis, Switch Replacement	WP 0062
Fire Suppression System Actuation 4-Way Junction Replacement.	WP 0063
Fire Suppression System Control Replacement	WP 0064
Fire Suppression System Cylinder Replacement, Capsule (Platform Mount)	WP 0065
Fire Suppression System Cylinder Replacement, Capsule (Wall Mount)	WP 0066
Fire Suppression System Cylinder Replacement, Undercarriage (AFES Nitrogen Detection)	WP 0067
Fire Suppression System Cylinder Replacement, Undercarriage (AFES Linear Wire Detection)	WP 0068
Fire Suppression System Front Optical Sensor Replacement	WP 0069
Fire Suppression System Power Supply Replacement	WP 0070
Fire Suppression System Rear Optical Sensor Replacement	WP 0071
Fire Suppression System Sensor Line Replacement Chart, Undercarriage (AFES Nitrogen Detection)	WP 0072
Fire Suppression System Sensor Line Replacement Chart, Undercarriage/Engine (AFES Linear Wire Detection)	WP 0073
Fire Suppression System Service and Gauge Replacement, Undercarriage (AFES Nitrogen Detection)	WP 0074
Fire Suppression Systems Testing	WP 0075
Fire Suppression System Tube and Diffuser Replacement (Wall Mount Cylinder) . . .	WP 0076

AXLES

Axle Differential Drain/Fill	WP 0077
Wheel/Tire Assembly Replacement.	WP 0078
Coil Spring and Seat Replacement	WP 0079

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
AXLES (continued)	
Control Arm Ball Joint Replacement	WP 0080
Differential Housing and Differential Replacement	WP 0081
Differential Lock Replacement	WP 0082
Differential Yoke and Seal Replacement	WP 0083
Halfshaft and Seal Replacement	WP 0084
Hub Repair	WP 0085
Hub Replacement	WP 0086
Inner Shaft Replacement	WP 0087
Jounce Bumper Replacement	WP 0088
Knuckle Replacement	WP 0089
Propeller Shaft Replacement	WP 0090
Rebound Bumper Replacement	WP 0091
Shock Absorber Replacement (M1240/M1245)	WP 0092
Shock Absorber Replacement (M1240A1)	WP 0093
Skid Plate Replacement	WP 0094
Spider/Spindle Replacement	WP 0095
Transfer Case Assembly Replacement	WP 0096
Transfer Case Drain/Fill	WP 0097
Transfer Case Shift Stop Switch Replacement/Adjustment	WP 0098
Upper and Lower Control Arm Replacement	WP 0099
Wheel End Drain/Fill	WP 0100
Wheel End Replacement	WP 0101
BRAKES	
Air Dryer Filter Replacement	WP 0102
Air Dryer Replacement	WP 0103
Air Governor Adjustment	WP 0104
Air Governor Replacement	WP 0105
Air Pressure Alarm Replacement	WP 0106
Air Reservoir Check Valve Replacement	WP 0107
Air Reservoir Replacement, Primary (Four Tank System)	WP 0108
Air Reservoir Replacement, Secondary (Four Tank System)	WP 0109
Air Reservoir Replacement, Secondary (Two Tank System)	WP 0110

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
BRAKES (continued)	
Air Reservoir Replacement, Supply No. 1 (Four Tank System)	WP 0111
Air Reservoir Replacement, Supply No. 2 (Four Tank System)	WP 0112
Air Reservoir Replacement, Supply/Primary (Two Tank System)	WP 0113
Air Solenoid Manifolds Replacement	WP 0114
Anti-Lock Brake System (ABS) Electronic Control Unit (ECU) Replacement	WP 0115
Anti-Lock Brake System (ABS) Valve Replacement, Axle No. 1	WP 0116
Anti-Lock Brake System (ABS) Valve Replacement, Axle No. 2	WP 0117
Automatic Traction Control (ATC) Valve Double Check Valve Replacement	WP 0118
Automatic Traction Control (ATC) Valve Replacement	WP 0119
Brake Chamber Replacement, Axle No. 1	WP 0120
Brake Chamber Replacement, Axle No. 2	WP 0121
Brake Drum Replacement	WP 0122
Brake Inspection and Adjustment, Axle No. 1 and Axle No. 2	WP 0123
Brake Shoe Replacement	WP 0124
Caging/Uncaging Brakes	WP 0125
Pressure Protection Valve Replacement, Emergency Supply	WP 0126
Pressure Protection Valve Replacement, Secondary Air Reservoir	WP 0127
Quick Release Valve Replacement, Axle No. 1	WP 0128
Quick Release Valve Replacement, Axle No. 2	WP 0129
Rear Gladhands Quick Release Valve Replacement	WP 0130
Safety Relief Valve Replacement	WP 0131
Service Brake Relay Double Check Valve Replacement	WP 0132
Service Brake Relay Valve Replacement	WP 0133
Spring Brake Double Check Valve Replacement	WP 0134
Spring Brake Relay Valve Replacement	WP 0135
Spring Brake Valve Replacement	WP 0136
Tractor Protection Valve Replacement	WP 0137
CAPSULE	
5th Seat Replacement (M1245)	WP 0138
Auxiliary Mirror Replacement	WP 0139
B-Pillar Handle Replacement	WP 0140
Capsule Door Replacement	WP 0141

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
CAPSULE (continued)	
Capsule Step Replacement (M1240/M1245)	WP 0142
Capsule Step Replacement (M1240A1)	WP 0143
Capsule Window Replacement	WP 0144
Capsule Windshield Replacement (M1240/M1240A1)	WP 0145
Check-6 Control Boxes Replacement	WP 0146
Dash Control Replacement, HVAC	WP 0147
Dash Panel Replacement, Air System	WP 0148
Dash Panel Replacement, Instrument Panel	WP 0149
Dash Panel Replacement, Transmission	WP 0150
Dash Replacement	WP 0151
Floor Mat Replacement	WP 0152
Gunner's Platform Adjustment	WP 0153
Gunner's Platform Mat Replacement (M1240A1)	WP 0154
Gunner Harness Retractor Replacement	WP 0155
Hood and Grill Replacement (M1245)	WP 0156
Hood Replacement (AFES Linear Wire Detection)	WP 0157
Hood Replacement (AFES Nitrogen Detection)	WP 0158
Hood Latch Replacement	WP 0159
Mirror Replacement	WP 0160
Rear Capsule Doors Replacement (M1245)	WP 0161
Seat Replacement (M1240/M1245)	WP 0162
Seat Replacement (M1240A1)	WP 0163
Seatbelt Replacement, Driver (M1240/M1245)	WP 0164
Seatbelt Replacement, Passenger (M1240/M1245)	WP 0165
Seatbelt Replacement (M1240A1)	WP 0166
Spotlight Bracket Replacement	WP 0167
CENTRAL TIRE INFLATION SYSTEM (CTIS)	
Dash Panel Replacement, CTIS	WP 0168
CTIS Manifold Replacement	WP 0169
CTIS Quick Release Valve Replacement Axle No. 1	WP 0170
CTIS Quick Release Valve Replacement Axle No. 2	WP 0171

TABLE OF CONTENTS (CONTINUED)

WP Sequence No.

COOLING

Charge Air Cooler Replacement	WP 0172
Coolant Reservoir Replacement	WP 0173
Cooling Shroud Replacement	WP 0174
Cooling System Assembly and Supports Removal/Installation	WP 0175
Cooling System Drain/Fill (Reservoir Equipped)	WP 0176
Cooling System Drain/Fill (Surge Tank Equipped)	WP 0177
Fan Clutch Replacement	WP 0178
Fan and Fan Shroud Replacement	WP 0179
Radiator and Transmission Oil Cooler Replacement.	WP 0180
Radiator Baffle Replacement.	WP 0181
Surge Tank Replacement	WP 0182
Thermostat Replacement	WP 0183

VOLUME 2

ELECTRICAL

12-Volt Power Convertor Replacement	WP 0184
Alternator Replacement.	WP 0185
Batteries Disconnect/Connect (M1240/M1240A1).	WP 0186
Batteries Disconnect/Connect (M1245).	WP 0187
Battery Disconnect Switch Replacement.	WP 0188
Battery Isolator Replacement	WP 0189
Battery PDU Box Replacement (M1245).	WP 0190
Battery Replacement (M1240/M1240A1)	WP 0191
Blackout Drivelight Replacement.	WP 0192
Check-6 Rear Composite Light Replacement	WP 0193
Circuit Breaker Replacement, Auxiliary (M1240/M1240A1)	WP 0194
Circuit Breaker Replacement, Dash	WP 0195
Clearance Lights Replacement	WP 0196
Deicer Circuit Breaker Replacement	WP 0197
Dimmer Replacement	WP 0198
Electromagnetic Interference (EMI) Filter Replacement	WP 0199
Flasher Replacement	WP 0200
Front Composite Light Replacement	WP 0201

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
ELECTRICAL (continued)	
Headlight Replacement	WP 0202
Ignition Relay Replacement	WP 0203
Infrared (IR) Light Replacement (M1245)	WP 0204
Mk-44 Receptacle Replacement (M1245)	WP 0205
NATO Slave Receptacle Replacement (For Vehicles With Updated SPARK Or M1245)	WP 0206
Parking Brake Stoplight Switch Replacement	WP 0207
PDU Deck Box Replacement (M1245)	WP 0208
Pressure Switch Replacement	WP 0209
Rear Composite Light Replacement	WP 0210
Reverse Light Replacement (M1240/M1240A1)	WP 0211
Spotlight Controller Replacement	WP 0212
Spotlight Replacement	WP 0213
Starter Replacement	WP 0214
Stoplight Switch Replacement	WP 0215
Transmission Control Module (TCM) Replacement	WP 0216
Voltage Regulator Replacement	WP 0217
Wiring Harness Repair	WP 0218
ENGINE/TRANSMISSION	
Air Compressor Replacement	WP 0219
Air Conditioner Drive Belt Replacement	WP 0220
Alternator Drive Belt Replacement	WP 0221
Crankshaft Rear Seal Replacement	WP 0222
Engine Electronic Control Module (ECM) Replacement	WP 0223
Engine Oil Drain/Fill	WP 0224
Engine Oil Filter Replacement	WP 0225
Passenger Side Engine Panel Replacement (M1240/M1245)	WP 0226
Powertrain Replacement	WP 0227
Engine/Transmission Assembly/Disassembly	WP 0228
Ring Gear and Flexplate Adapter Replacement	WP 0229
Transmission Breather Replacement	WP 0230
Transmission Cooler Replacement	WP 0231

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
ENGINE/TRANSMISSION (continued)	
Transmission Drain/Fill	WP 0232
Transmission Filter Replacement	WP 0233
Transmission Spring Support and Bracket Replacement	WP 0234
Turbocharger Assembly Replacement	WP 0235
Vehicle Interface Module (VIM) Replacement	WP 0236
Water Pump Belt Adjustment	WP 0237
Water Pump Belt Replacement	WP 0238
EXHAUST	
Exhaust Pipe Replacement (M1240/M1245)	WP 0239
Exhaust Pipe Replacement (M1240A1)	WP 0240
Muffler Replacement (M1240/M1245)	WP 0241
Muffler Replacement (M1240A1)	WP 0242
FRAME	
Cargo Deck Replacement (M1245)	WP 0243
Cargo Deck Replacement (M1240/M1240A1)	WP 0244
Cargo Deck Litter Door Replacement (M1245)	WP 0245
Cargo Deck Litter Door Frame Replacement (M1245)	WP 0246
Cargo Deck Rear Wall Replacement (M1245)	WP 0247
Cargo Deck Rear Door Replacement (M1245)	WP 0248
Cargo Deck Side Wall Replacement (M1245)	WP 0249
Front Bumper Replacement (Standard SPARK)	WP 0250
Front Bumper Replacement (Updated SPARK)	WP 0251
GFE Cabinet Replacement (M1245)	WP 0252
Push Bumper Replacement (M1245)	WP 0253
Quick Lock Floor Replacement (M1245)	WP 0254
Rear Crossmember Replacement (M1240/M1240A1)	WP 0255
Spark Bar and Strut Replacement (Updated SPARK)	WP 0256
FUEL	
Air Cleaner Assembly Replacement (M1240/M1245)	WP 0257
Air Cleaner Assembly Replacement (M1240A1)	WP 0258
Air Filter Replacement	WP 0259
Air Intake Hoses Replacement (M1240/M1245)	WP 0260

TABLE OF CONTENTS (CONTINUED)

	<u>WP Sequence No.</u>
FUEL (continued)	
Air Intake Hoses Replacement (M1240A1)	WP 0261
Fuel Filter Replacement	WP 0262
Fuel Lines Replacement.	WP 0263
Fuel Tank Replacement	WP 0264
Fuel/Water Separator Base Replacement	WP 0265
Fuel/Water Separator Filter Replacement	WP 0266
WINCH	
Winch Cable Guide and Guard Replacement	WP 0267
Winch Cable Replacement (Standard SPARK)	WP 0268
Winch Cable Replacement (Updated SPARK)	WP 0269
Winch/Front Crossmember Replacement (Updated SPARK)	WP 0270
Winch Replacement (Standard SPARK)	WP 0271
STEERING	
Lower Steering Shaft Replacement	WP 0272
Middle Steering Shaft Replacement	WP 0273
Pitman Arm Replacement.	WP 0274
Power Steering Filter Replacement	WP 0275
Power Steering Pump Replacement	WP 0276
Power Steering Reservoir and Bracket Replacement	WP 0277
Power Steering Reservoir Drain/Fill	WP 0278
Primary Steering Gear Replacement	WP 0279
Secondary Steering Gear Replacement.	WP 0280
Steering Arm Replacement	WP 0281
Steering Column and Bracket Replacement	WP 0282
Steering Gear Mitre Replacement	WP 0283
Steering Gear Relief Adjustment	WP 0284
Steering Gear Tray Replacement.	WP 0285
Steering Wheel Replacement.	WP 0286
Tie Rod Replacement.	WP 0287
Toe Control Link Replacement, Axle No. 1	WP 0288
Toe Control Link Replacement, Axle No. 2	WP 0289
Upper Steering Shaft Replacement	WP 0290

TABLE OF CONTENTS (CONTINUED)

		<u>WP Sequence No.</u>
	TECHNICAL SUPPORT	
	General Maintenance	WP 0291
	Torque Instructions	WP 0292
CHAPTER 5	SUPPORTING INFORMATION	
	References	WP 0293
	Introduction For Standard Two-Level Maintenance Allocation Chart (MAC)	WP 0294
	Maintenance Allocation Chart (MAC)	WP 0295
	Expendable and Durable Items List	WP 0296
	Schematics Symbols	WP 0297
	Schematics	Foldouts

HOW TO USE THIS MANUAL

This two-volume manual is divided into CHAPTERS and WORK PACKAGES. For a specific Chapter or Work Package, refer to the TABLE OF CONTENTS (page iii).

For ordering replacement parts, note the major component or assembly the part is associated with. Use the major component or assembly name to find the matching figure in TM 9-2355-335-24P - REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL) MANUAL COMMERCIAL-OFF-THE SHELF (COTS) for MINE RESISTANT AMBUSH PROTECTED (MRAP) ALL TERRAIN VEHICLE (M-ATV). Match the part to the callout in the RPSTL figure. Find the callout number in column 2 (Item Number) of the RPSTL figure parts list.

This manual contains troubleshooting procedures for the M1240, M1245, and M1240A1. The troubleshooting section is setup by work package for each system. Within each work package, symptoms are listed for each system. Following a prescribed flow path through making decisions will lead to a solution to remedy the symptom. The first column contains the probable caused for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. Some systems have an additions column for blink codes. Blink codes are used to assist in troubleshooting without the use of special diagnostic equipment. Refer to the specific system troubleshooting work package for detailed instructions on troubleshooting with blink codes.

This manual contains maintenance instructions for the M1240, M1245, and M1240A1, refer to (WP 0002) for information about differences between models and configurations.

Items or instructions unique to a specific model or configuration are called out through the use of titles, notes or steps. If no variant is called out the procedure is for all M-ATV variants.

Consult Operators Manual (TM 9-2355-335-10) when looking for information on performing operator's Preconditions and Follow-On procedures listed at the beginning of each maintenance work package. Procedures listed without a link number are operator's procedures.

The TABLE OF CONTENTS lists the titles of each Chapter and Work Package.

CHAPTER 1 provides general information, equipment description, and theory of operation.

CHAPTER 2 provides troubleshooting procedures. These work packages can be used to determine causes of malfunctions encountered when operating the vehicle.

CHAPTER 3 provides Preventive Maintenance Checks and Services (PMCS) instructions.

CHAPTER 4 provides maintenance instructions. These work packages can be used to perform maintenance on the vehicle.

CHAPTER 5 contains supporting information. Refer to vehicle schematics to identify hose codes, connector numbers, and wire numbers.

The illustrations throughout this manual contain circled and non-circled numerical callouts pointing to various components mentioned in the procedural steps. A circled callout indicates a mandatory replacement part. Mandatory replacement parts must be discarded after removal and replaced with a new part, which is listed in the Materials/Parts section located at the beginning of the task.

Prior to performing any maintenance functions on the M-ATV vehicle, ALWAYS do the following:

- Read and follow the WARNINGS, CAUTIONS, and NOTES in all work packages.
- Read the Safety Summary.
- Read the Equipment Description and Data located in Chapter 1.
- Read completely through the maintenance procedure to familiarize yourself with the procedure and the affected parts before beginning work.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION FOR M1240, M1240A1, AND M1245

GENERAL INFORMATION

PURPOSE

This manual is provided to maximize use of the M-ATV by presenting clear maintenance and troubleshooting instructions. Read these instructions thoroughly before operating vehicle.

SCOPE

This manual is used for field maintenance and troubleshooting of the Mine Resistant Ambush Protected-All Terrain Vehicle (M-ATV). The M-ATV is a multi-terrain vehicle used to transport military personnel and equipment.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

Army: If your M-ATV needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance.

All non-Aviation/Missile EIRs and PQDRs must be submitted through the Product Data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: <https://www.pdrep.csd.disa.mil/>.

If you do not have internet access, you may submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified (DA PAM 750-8, The Army Maintenance Management System (TAMMS)). We will send you a reply.

Air Force: Submit QDR per Technical Order 00-35D-54, USAF Deficiency Reporting and Investigating System.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastic, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. SF FORM 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE

Procedures for destruction of equipment to prevent enemy use can be found in TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment To Prevent Enemy Use (U.S. Army TACOM Life Cycle Management Command).

ABBREVIATIONS/ACRONYMS

Abbreviations and acronyms used in this manual are listed below:

AAL	Additional Authorized List
ABS	Anti-lock Brake System
AC	Alternating Current
A/C	Air Conditioner
ADM	Autonomous Diagnostic Manager
ATC	Automatic Traction Control
BII	Basic Issue Items
C	Celsius
CAGE	Commercial and Government Entity
CARC	Chemical Agent Resist Coating
CC	Cross Country
CCA	Cold Cranking Amps
CCB	Camera Control Box
CCGVW	Cross Country Gross Vehicle Weight
CID	Cubic Inch Displacement
COEI	Components of End Item
CPU	Central Processing Unit
cm	Centimeters
CTIS	Central Tire Inflation System
ea.	Each
ECM	Electronic Control Module (pertains to engine)
ECU	Electronic Control Unit
EFP	Explosively Formed Penetrator
EMER	Emergency
F	Fahrenheit
FMIS	Failure Mode Identifiers
FSCM	Federal Supply Code for Manufacturer
ft.	Feet
GAA	Grease Automotive and Artillery
gal.	Gallon
GCW	Gross Combination Weight
GCWR	Gross Combination Weight Rating
GVW	Gross Vehicle Weight
hp.	Horsepower
HWY	Highway
IAW	In Accordance With
in.	inches
ISO	International Organization for Standardization
kg.	Kilogram

km	Kilometer
kmh	Kilometer Per Hour
kPa	Kilopascals
kW	Kilowatt
L	Liter
lb-ft	Pounds - Foot
lbs	Pounds
LCD	Liquid Crystal Display
LI	Lubrication Instructions
m	Meters
M-ATV	MRAP All-Terrain Vehicle
Max	Maximum
mm	Millimeter
mph	Miles per Hour
MRAP	Mine Resistant Ambush Protected
MSD	Maintenance Support Device
MSS	Mud/Sand/Snow
NATO	North Atlantic Treaty Organization
N•m	Newton-Meters
NSN	National Stock Number
No.	Number
OE/HDO	OIL Engine/Heavy Duty Oil
P.A.G.	Polyalkylene Glycol Oil
PMCS	Preventive Maintenance Checks and Services
psi	Pounds per Square Inch
qt	Quart
qty	Quantity
rpm	Revolutions per Minute
rqr	Required
SAE	Society of Automotive Engineers
SOP	Standard Operating Procedure
SPARK	Self-Protection Adaptive Roller Kit
SPD	Speed
SST	Start-Up Self Test
TGRS	Turret Gunner Restraint System
U/I	Unit of Issue
U/M	Unit of Measure
VCM	Vehicle Curb Weight
VDC	Voltage Direct Current
VIM	Vehicle Interface Module

END OF WORK PACKAGE

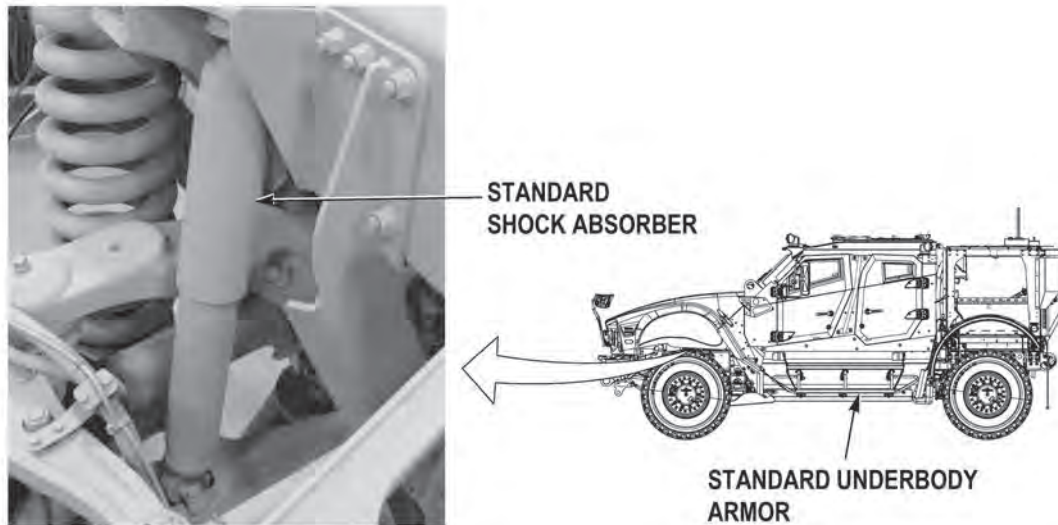
MODEL CONFIGURATION IDENTIFICATION

This work package will aid in identifying what model/configuration of M-ATV is being serviced.

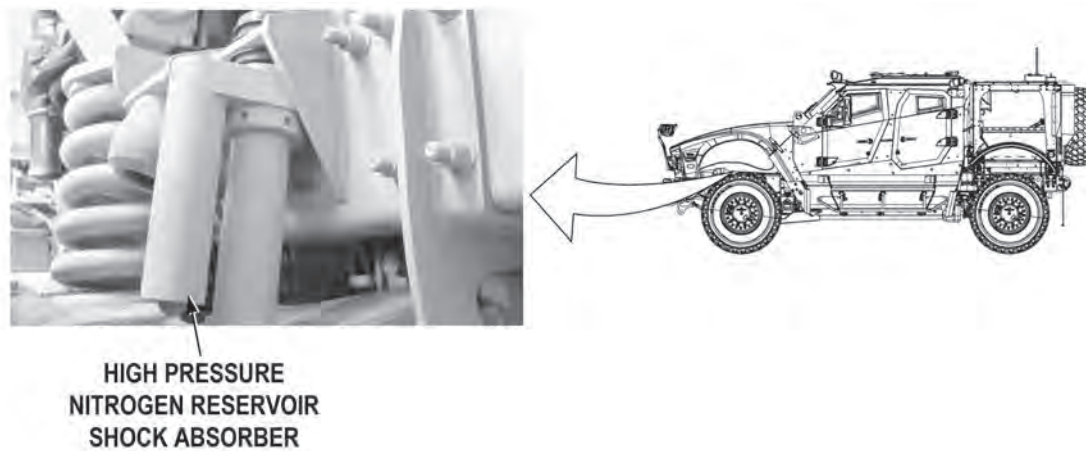
Shown below are ways to identify models/configurations.

M1240

The M1240 can be quickly identified by the presence of standard hydraulic shock absorbers.

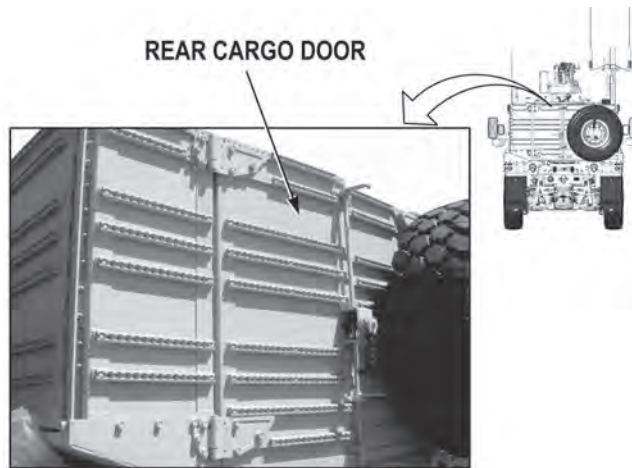
**M1240A1**

The M1240A1 can be quickly identified by the presence of high pressure nitrogen reservoir shock absorbers.



M1245

The M1245 can be quickly identified by the presence of rear cargo doors.



The following sections help to identify the different configurations that can be found on the M1240, M1240A1, and the M1245.

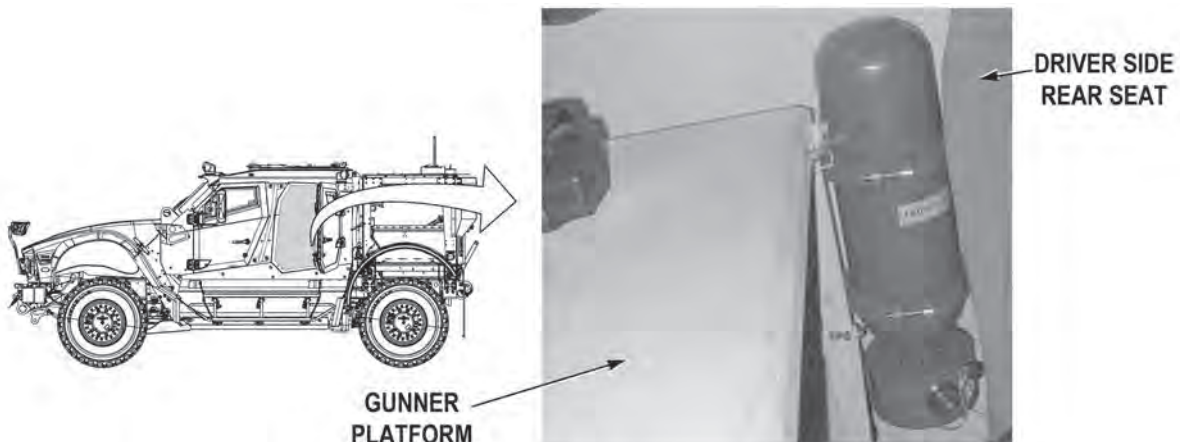
- The Description briefly describes the unique configuration being addressed.
- The Key Word(s) identify how this configuration will be identified in the Preconditions, Follow-On Maintenance, and body of the work packages contained in this manual.
- The Key Identification Item(s) identifies a unique item that can be used to determine if the vehicle being serviced incorporates the configuration being addressed in this section.

The following items cover the differences in the Automatic Fire Extinguishing System (AFES) areas of the vehicle:

Description: Vehicles equipped with capsule AFES using cylinder mounted on the gunner platform, driver side rear inside the capsule

Key Words: Cylinder, Platform Mount

Key Identification Item: Fire suppression capsule cylinder located in the capsule mounted on the driver side rear of the gunner platform



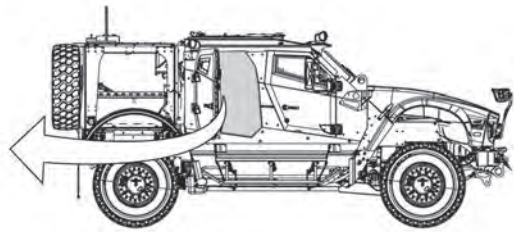
Description: Vehicles equipped with capsule AFES using cylinder mounted high on the rear wall inside the capsule

Key Words: Cylinder, Wall Mount

Key Identification Item: Fire suppression system capsule cylinder is located in the capsule mounted high on the rear wall of the capsule



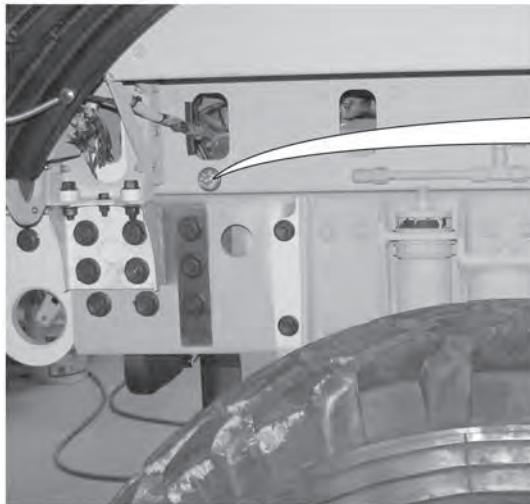
CAPSULE REAR WALL



Description: Vehicles equipped with undercarriage AFES using nitrogen sensor Lines

Key Words: AFES Nitrogen Detection

Key Identification Item: Nitrogen Pressure Gauge on Passenger Side Rear of Cargo Deck



PASSENGER SIDE REAR

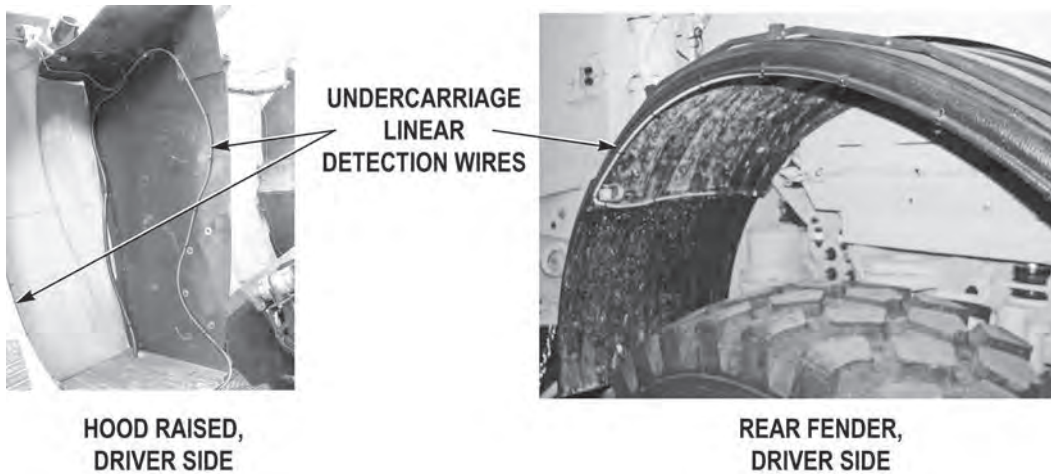


NITROGEN PRESSURE GAUGE

Description: Vehicles equipped with undercarriage AFES using linear wire detection (Updated M1240, M1240A1, M1245)

Key Words: AFES Linear Detection Wire

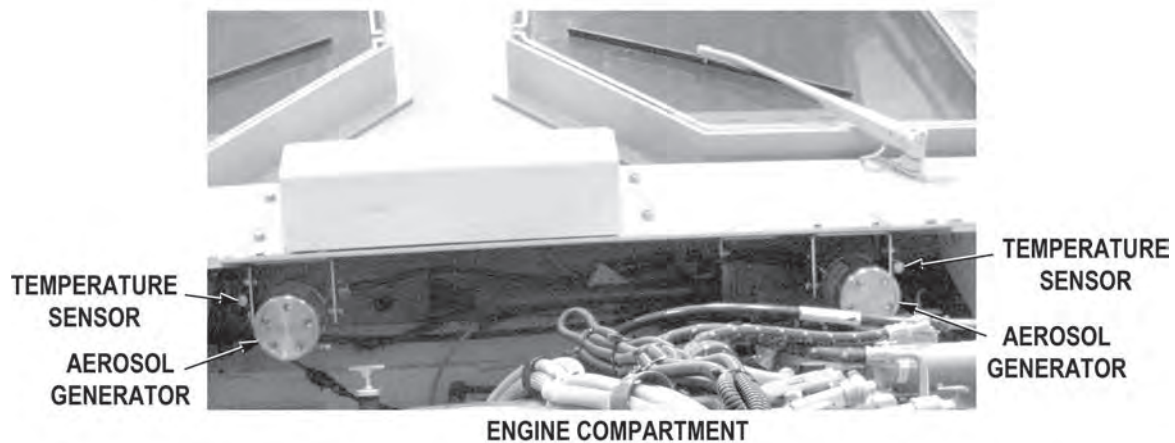
Key Identification Items: Blue linear detection wires in place of orange nitrogen tubing located on underside of rear fenders and on hood splash guards



Description: Vehicles equipped with engine compartment AFES using Four Aerosol Generators

Key Words: Four Generator System

Key Identification Items: Four equally sized aerosol generators; two mounted high on firewall and two mounted on either side of the cooling pack, each aerosol generator will have a temperature sensor near each of the four aerosol generators



Description: Vehicles equipped with engine compartment AFES using five aerosol generators

Key Words: Five Generator System

Key Identification Items: Passenger side firewall aerosol generator is larger than other four aerosol generators, additional aerosol generator on passenger side of engine, and linear detection wires on underside of hood instead of temperature sensors near each aerosol generator



**PASSENGER SIDE FIREWALL
AEROSOL GENERATOR**



**DRIVER SIDE FIREWALL
AEROSOL GENERATOR**



**PASSENGER SIDE
ENGINE AEROSOL
GENERATOR**

TURBOCHARGER



**ENGINE COMPARTMENT
LINEAR DETECTION
WIRE**

UNDERSIDE OF HOOD

The items below cover the differences in the cooling system of the vehicle:

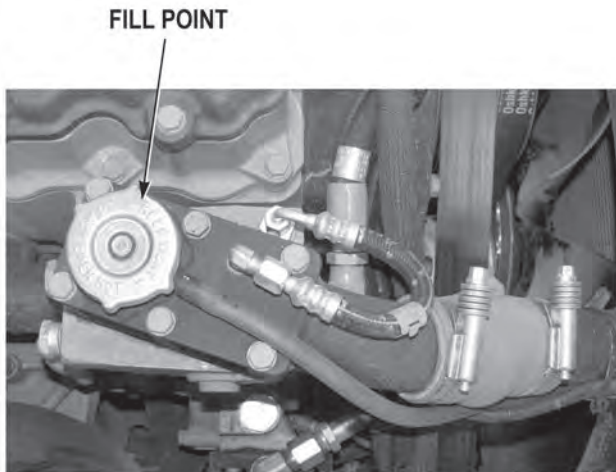
Description: Vehicles equipped with coolant reservoir

Key Words: Reservoir Equipped

Key Identification Items: Coolant reservoir is located on passenger side of the cooling pack. The fill point for the coolant reservoir equipped vehicles is the coolant manifold.



COOLANT RESERVOIR

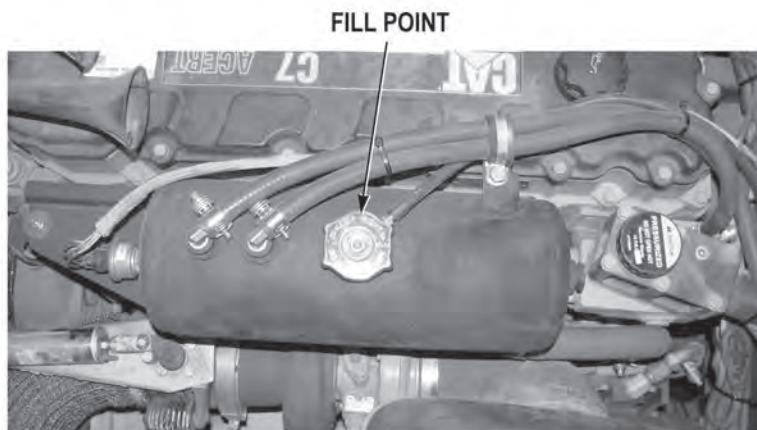


COOLANT RESERVOIR FILL POINT

Description: Vehicles equipped with surge tank

Key Words: Surge Tank Equipped

Key Identification Items: The surge tank is located on the passenger side of the valve cover on the engine. The fill point for the surge tank is the cap of the surge tank.



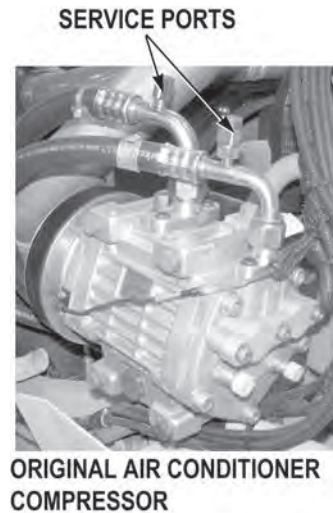
SURGE TANK AND FILL POINT

The item below covers the differences in the air conditioning system of the vehicle:

Description: Vehicles Equipped with Original Air Conditioner Compressor

Key Words: Original Air Conditioner Compressor

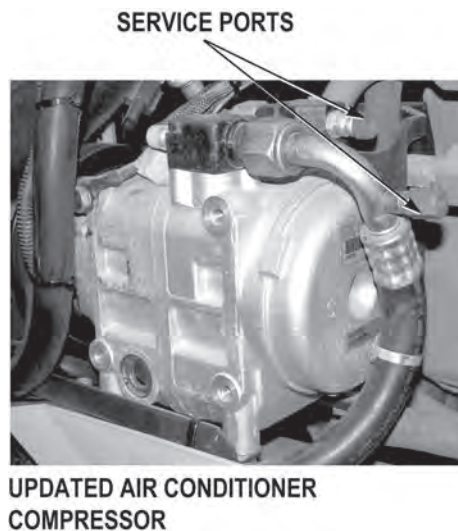
Key Identification Item: If equipped, the original air conditioner compressor service ports are located on the top side of the compressor with the ports in a vertical position and two test ports on the back of the compressor.



Description: Vehicles Equipped with Updated Air Conditioner Compressor

Key Words: Updated Air Conditioner Compressor

Key Identification Item: If equipped, the updated air conditioner compressor service ports are horizontal, facing the rear of the vehicle and no test ports on the rear of the compressor.



The item below covers the differences in the air system of the vehicle:

Description: Vehicles equipped with four air tank reservoir system

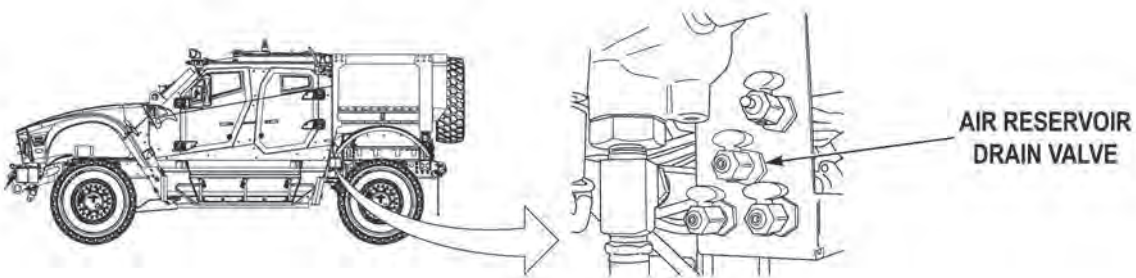
Key Words: Four Tank System

Key Identification Items: To identify which air reservoir configuration is on the M-ATV, count the number of air reservoir drain valves located on driver side rear of vehicle. Four valves (shown) designate a four tank air reservoir system.

Description: Vehicles equipped with two air tank reservoir system

Key Words: Two Tank System

Key Identification Items: To identify which air reservoir configuration is on the M-ATV, count the number of air reservoir drain valves located on driver side rear of vehicle. Three valves designate a two tank air reservoir system. (The two tank air reservoir system incorporates a supply tank within the primary tank that is able to be drained separately.)

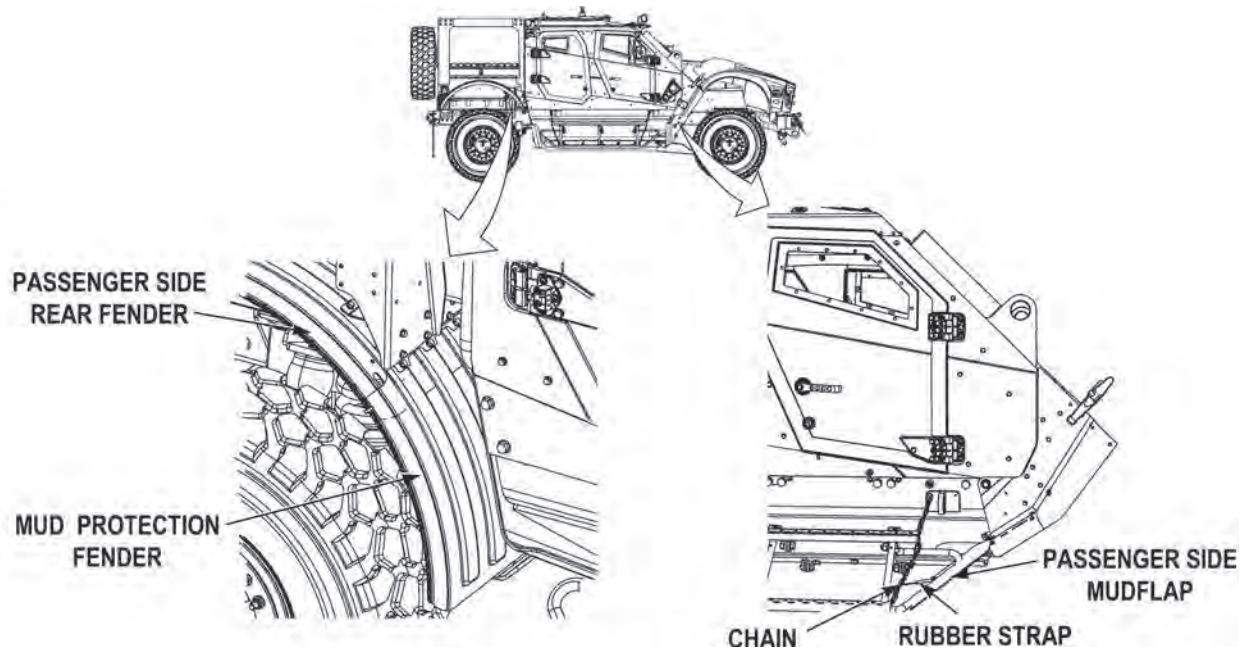


The item below covers the differences in the wheel areas of the vehicle:

Description: Vehicles equipped with mud protection kit

Key Words: Mud Protection

Key Identification Items: The mud protection kit is identified by the rear fender extension located on the front side of the rear fender and by the front flap extension that hooks into the capsule step chain using a rubber strap.

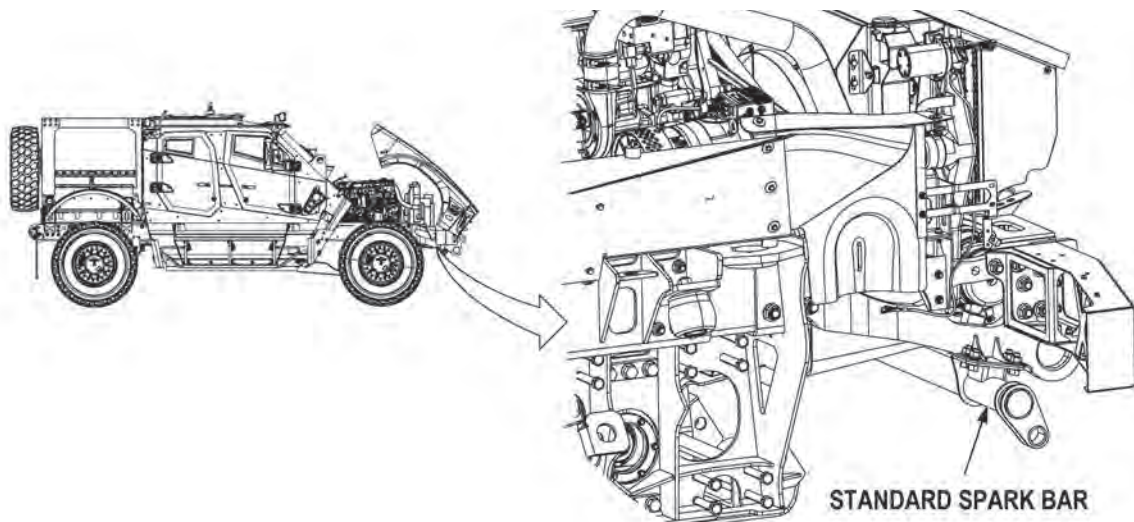


The item below covers the differences in the front of the vehicle:

Description: Vehicles Equipped with Standard SPARK Bar

Key Words: Standard SPARK

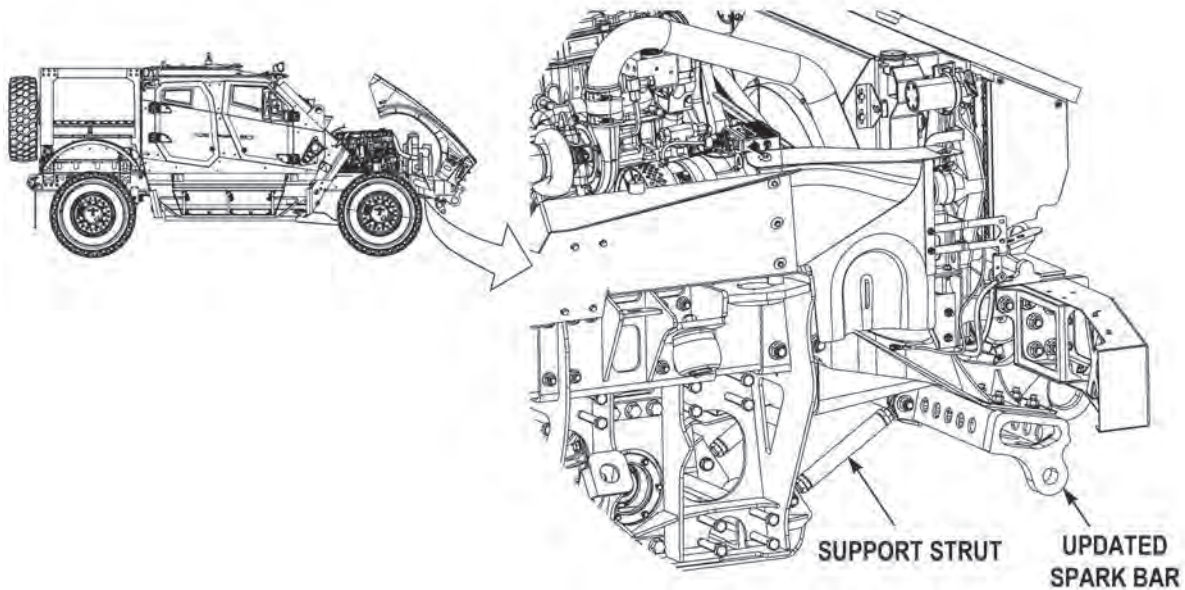
Key Identification Items: The standard spark bar is a round tube type bar with no support struts.



Description: Vehicles Equipped with Updated SPARK Bar

Key Words: Updated SPARK

Key Identification Items: The updated spark bar can most easily be identified by the presence of two support struts and a larger, more rigid bar.



The item below covers the differences on the sides of the vehicle:

Description: Vehicles Equipped with B-Pillar Handle

Key Words: B-Pillar Handle

Key Identification Item: If equipped, the B-Pillar handle is located on the capsule between the front and rear doors on either side of the vehicle.



The item below covers the differences in the rear of the vehicle:

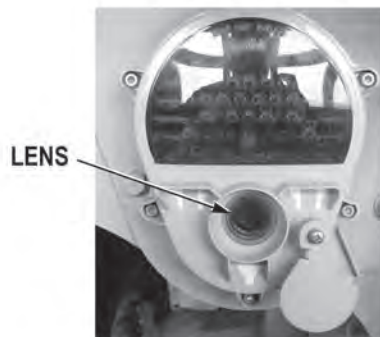
Description: Vehicles equipped with Check 6 rear lights

Key Words: Check 6 Lights

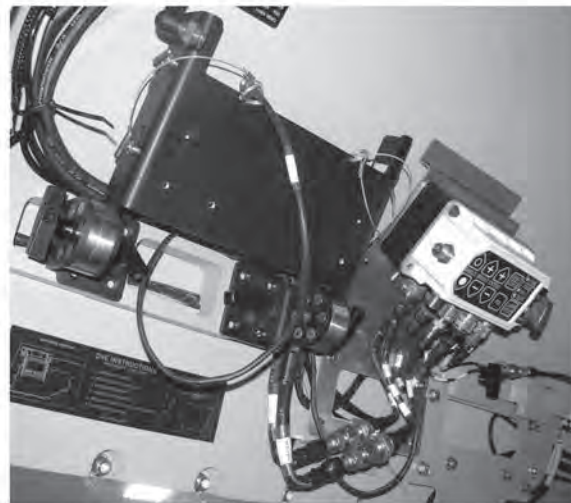
Key Identification Items: Check 6 lights have a built-in camera with a lens cover that protects the camera lens. The Check 6 control box is located in the capsule centered and above the windshield.



CHECK 6 LIGHT
(COVER CLOSED)



CHECK 6 LIGHT
(COVER OPENED)



CHECK 6 CONTROL BOX

The item below covers the difference in the spare tire carriers for the M1240A1:

Description: Vehicles equipped with spare tire carrier for a 395/85R20 tire.

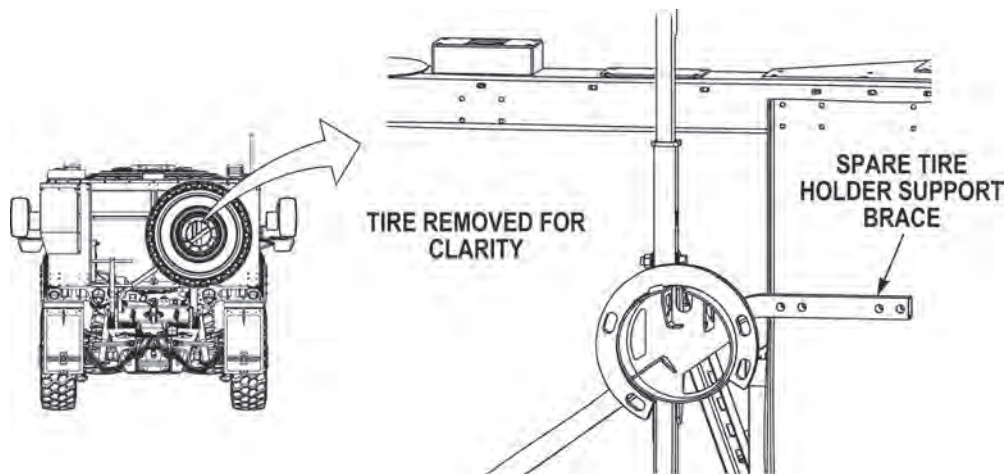
Key Words: 395/85R20 Spare Tire Carrier

Key Identification Items: If there is not a support brace extending from the spare tire carrier towards the passenger side of the vehicle, the spare tire carrier will support a 395/85R20 tire.

Description: Vehicles equipped with spare tire carrier for a 16.00R20 tire.

Key Words: Upgraded Spare Tire Carrier

Key Identification Items: If the spare tire carrier has a support brace extending from the spare tire carrier towards the passenger side of the vehicle, the spare tire carrier will support a 16.00R20 tire and spare tire will be 395/85R20.



END OF TASK

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

PHYSICAL DESCRIPTION

The M-ATV is designed for use on all types of roads, highways, and cross-country terrain. These vehicles also operate in extreme conditions and temperatures. Major subsystems of the vehicles are capsule, engine, transmission, drivetrain, suspension, electrical system, pneumatic (air) system, and Central Tire Inflation System (CTIS).

FUNCTIONAL DESCRIPTION

1. The M-ATV is capable of operating in temperatures from -25 to 130°F (-32 to 54°C).
2. The M-ATV is capable of fording 36 in. (91.4 cm) of water. It can also travel at 65 mph (105 km/h) on paved surfaces.
3. The M-ATV (M1240/M1245) is capable of traversing a 60% grade and a 40% side slope up to 5 mph (8 km/h).
4. The M-ATV (M1240A1) is capable of traversing a 60% grade and a 30% side slope up to 5 mph (8 km/h).

NOTE

The M-ATV is capable of traveling 65 mph (105 km/h). However, the operator **MUST** adhere to the speed limits set by unit Standard Operating Procedure (SOP).

5. The M-ATV is provided with sufficient tiedown points located so that the vehicle can be restrained in all directions for shipment.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1240/M1240A1)

Major components and accessories found on the updated M1240 and M1240A1 are illustrated in Figure 1 and Figure 2 described as follows:

1. **ENGINE.** Engine supplies power to move vehicle and operate equipment and accessories.
2. **CAPSULE.** Provides protection from weather for crew, vehicle controls, gauges, and indicators. The capsule also has environmental control capability and provides blast protection for the crew.
3. **GLADHANDS.** Couples air supply to towed vehicle or trailer.
4. **PINTLE HOOK.** Allows connection to a towed vehicle or trailer.
5. **AXLE NO. 2.** Transmits power to hubs to turn wheels.
6. **FUEL TANK.** Stores fuel to operate vehicle.
7. **BATTERY BOXES.** Stores four batteries for normal operating conditions and auxiliary equipment. Two battery boxes are located within the cargo deck.
8. **WINCH.** Used to free vehicle from mired conditions. The winch is located on front of vehicle.
9. **EXHAUST PIPING.** Used to remove noise and direct exhaust fumes from engine.
10. **TOWING EYES.** Attachment points for safety chains, towing shackles, and vehicle towing.
11. **AXLE NO. 1.** Controls direction of vehicle when in motion. Transmits power to hubs to turn wheels.
12. **AIR CLEANER.** Filters out dust and debris from entering air induction system.
13. **TIEDOWN EYES.** Attaching points for securing the vehicle for shipment.
14. **CHECK-6 CAMERAS (If Equipped).** Provides crew with a view rear of vehicle.
15. **NATO SLAVE CONNECTOR (M1240A1 and M1240 with UIK. M1240 without UIK has NATO SLAVE connector attached to driver side cooling pack support under hood).** Used to help start vehicle with dead batteries.
16. **B PILLAR HANDLE (If Equipped).** Used to help crew get in and out of vehicle.
17. **AUXILIARY MIRRORS.** Provides driver with increased field of view. Auxiliary mirrors are located on the hood.
18. **UNDERBODY IMPROVEMENT PANEL (M1240A1).** Enhances the survivability and durability of the M-ATV.

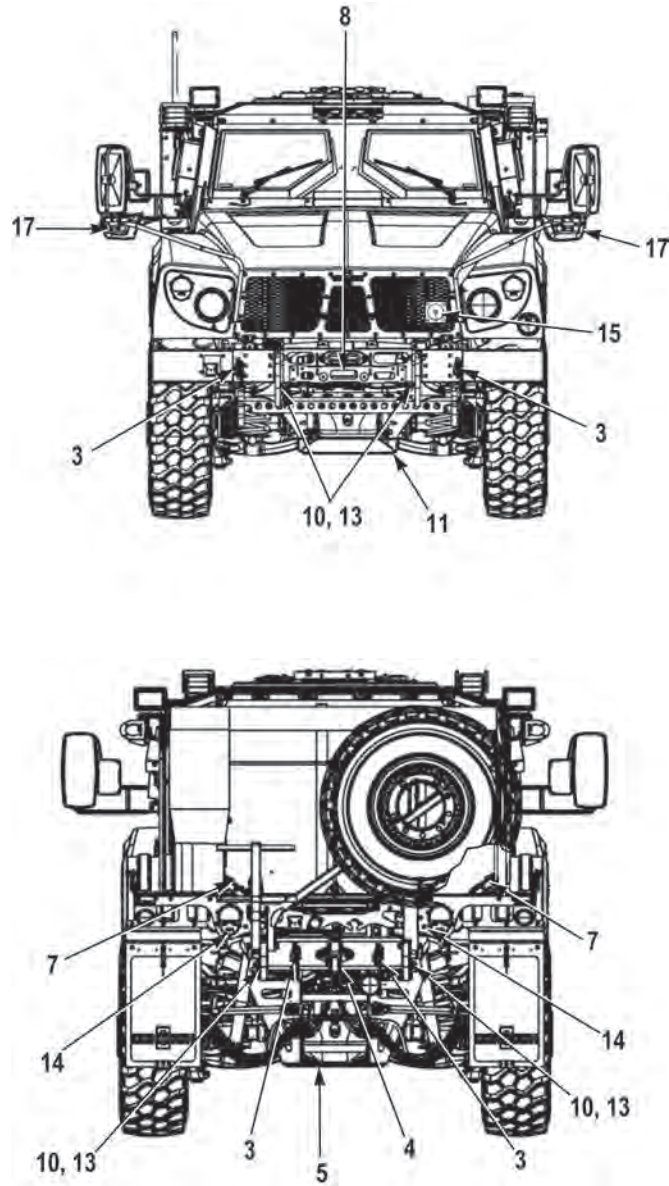


Figure 1. Location and Description of Major Components (M1240/M1240A1).

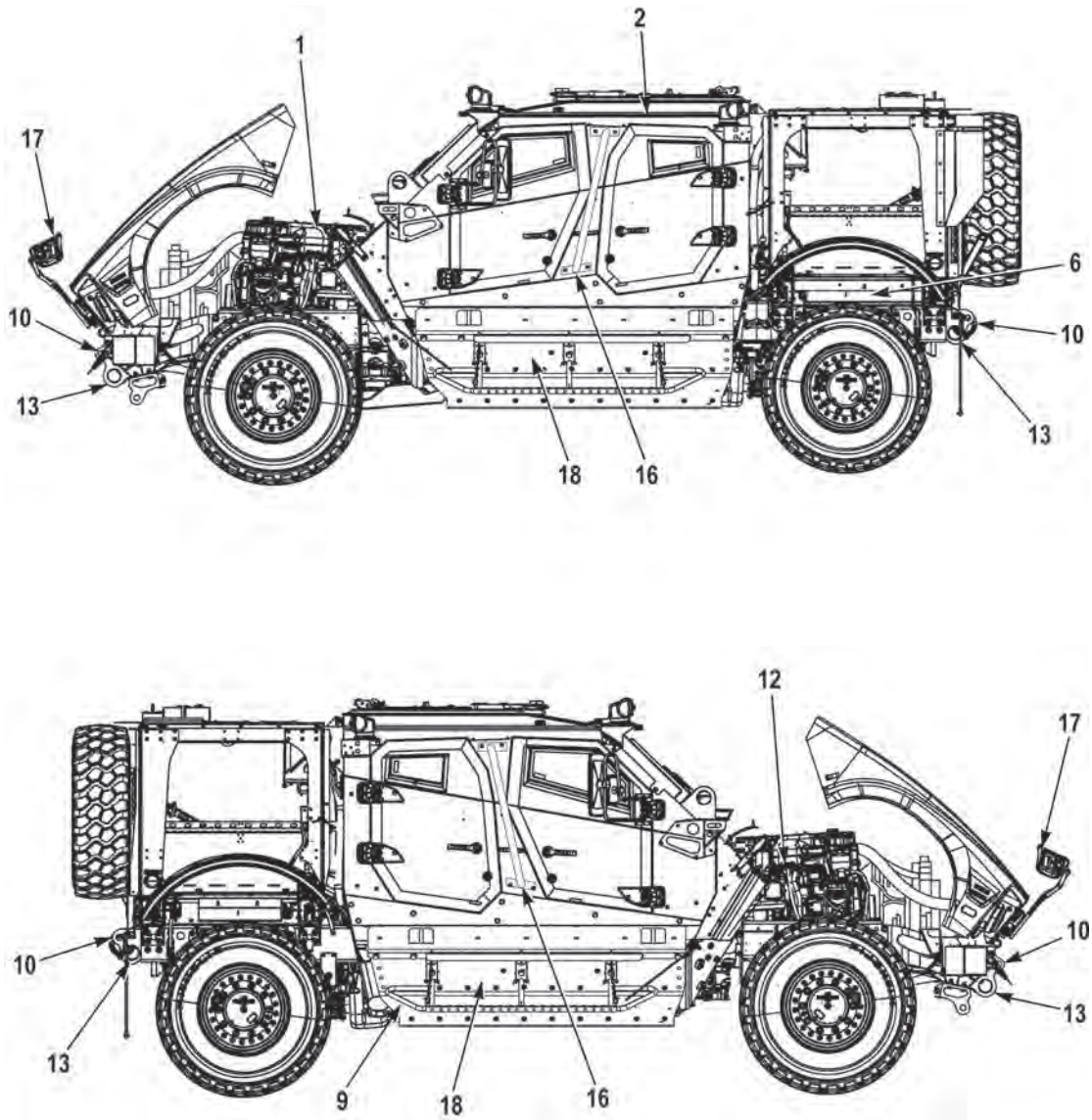


Figure 2. Location and Description of Major Components (M1240/M1240A1).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1245)

Major components and accessories found on the M1245 are illustrated in Figure 2, Figure 3, and Figure 4 and are described as follows:

1. **PUSH BUMPER.** Heavy duty bumper able to withstand higher forces than the standard bumper.
2. **COMBAT LOCK KEY.** Emergency tool used to disengage the combat lock from outside the vehicle.
3. **SIDE LITTER DOOR.** Side doors to facilitate the extraction of the litter from rear cargo deck.
4. **LEFT BATTERY BOX.** Stores two batteries for engine operation.
5. **RIGHT BATTERY BOX.** Stores two batteries for operation of Government Furnished Equipment.
6. **HOOD ACCESS STEPS.** Side steps and hand point on hood to allow access to the capsule roof.
7. **INFRARED (IR) LIGHTS.** Lights used to provide infrared light.
8. **REAR CARGO DOOR.** Rear door allowing access to the cargo deck.
9. **DYNEEMA PANELS.** Removable panels used for protection of rear cargo deck.
10. **FIRE EXTINGUISHERS.** Dry chemical fire extinguisher used to extinguish liquid and electrical fires (located inside).

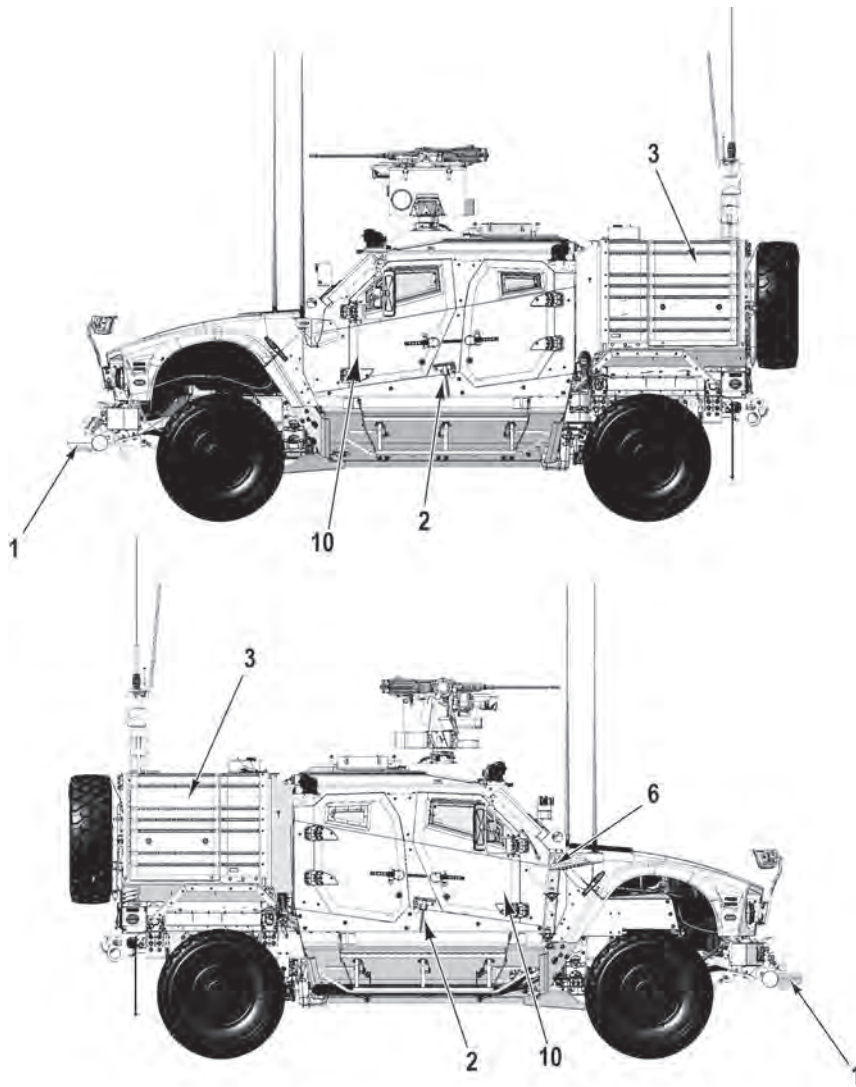


Figure 3. Location and Description of Major Components (M1245).

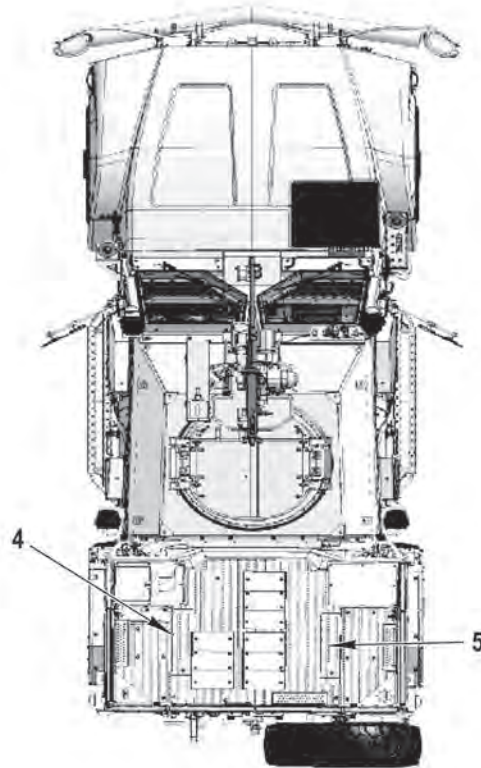


Figure 4. Location and Description of Major Components (M1245).

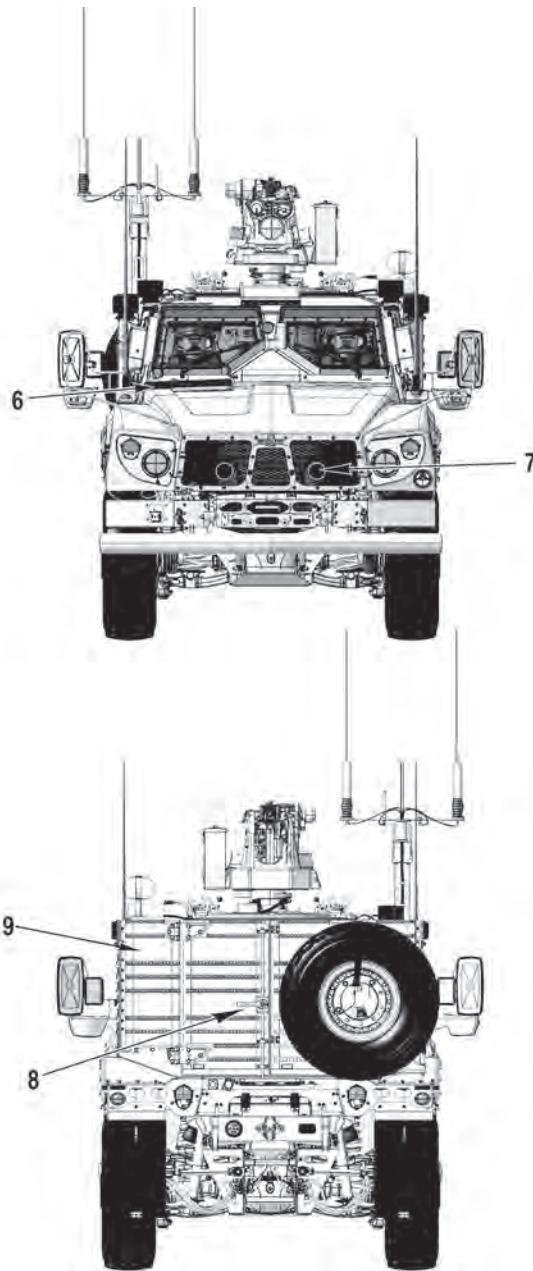
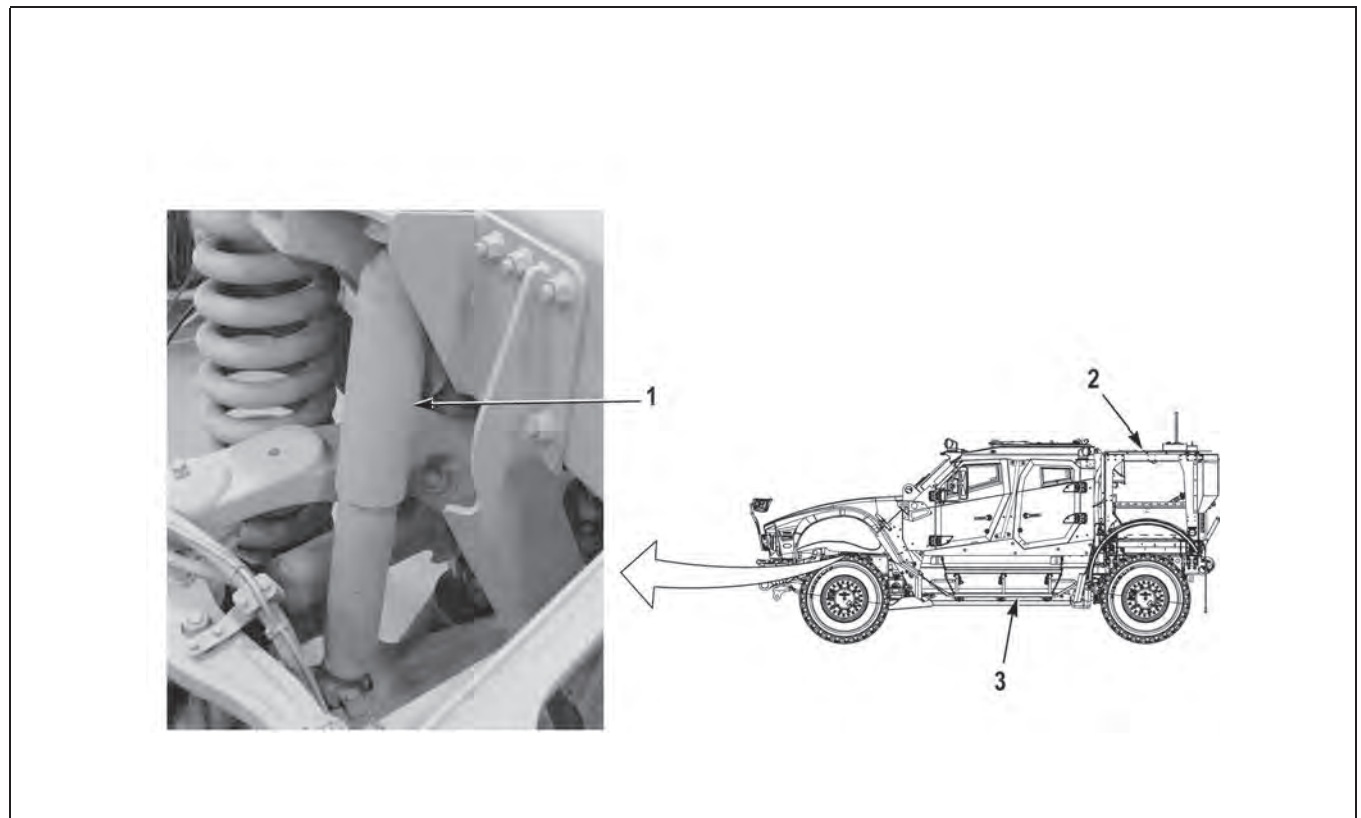


Figure 5. Location and Description of Major components (M1245).

DIFFERENCES BETWEEN MODELS

This section will illustrate the differences between the different models of the M-ATV. This section is designed to be a quick visual reference for the most distinctive differences between the M-ATV M1240, M1240A1, and M1245.

Table 1. M1240.

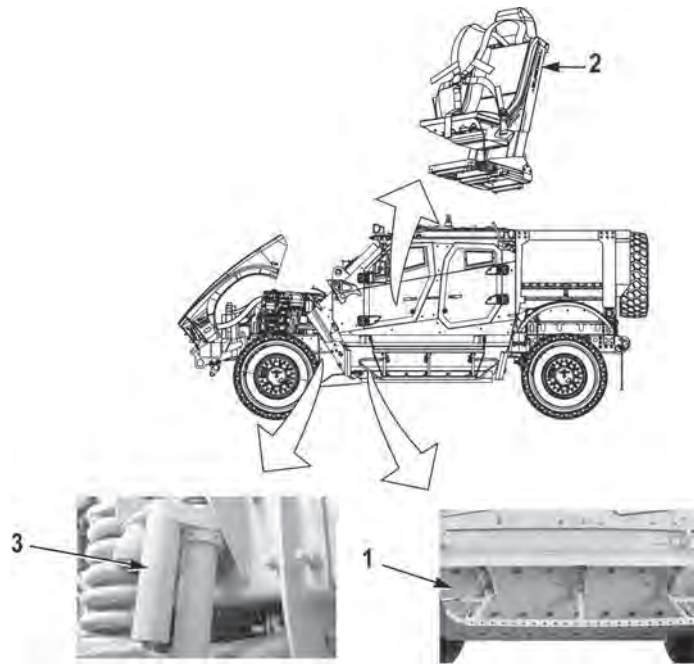


NOTE

The M1240 can be identified by the presence of ALL noted components.

Item Number	Item
1	Standard Shock Absorber
2	Antenna Platform
3	Standard Underbody Armor

Table 2. M1240A1.

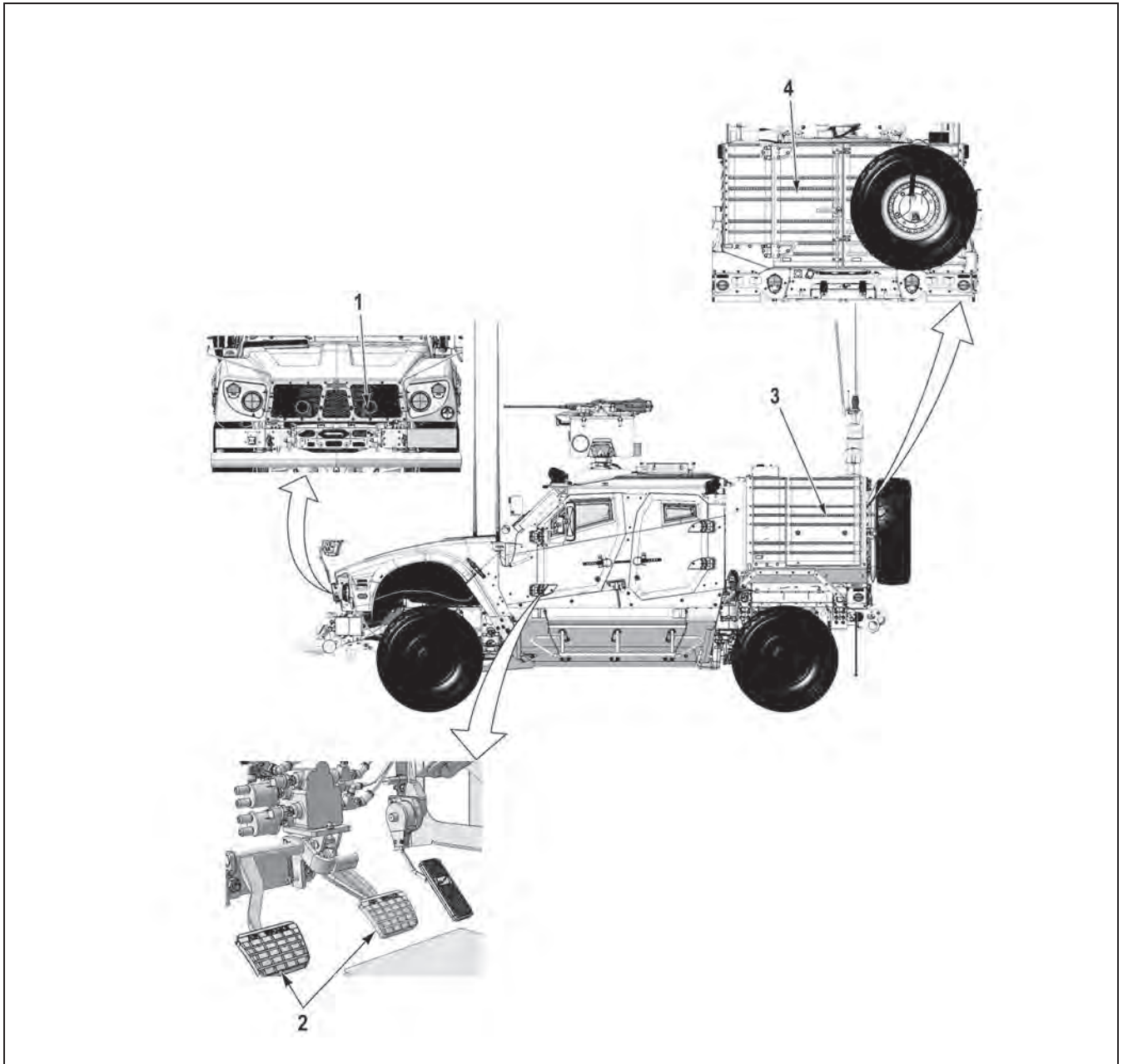


NOTE

These components are unique to the M1240A1.

Item Number	Item
1	Underbody Improvement Panel
2	Blast Seats
3	High Pressure Nitrogen Reservoir Shock Absorber

Table 3. M1245.



NOTE

These components are unique to the M1245.

Item Number	Item
1	Infrared (IR) Lights
2	Two Service Brake Pedals
3	Litter Doors On Cargo Deck
4	Rear Cargo Doors

REFERENCE DATA TABLES

Refer to the following tables for specific equipment data:

Table 4. Dimensions.

Item	Specification
Width	98.0 in. (248.9 cm)
Height (M1240)	102 in. (259 cm)
Height (M1240A1)	108.9 in. (276.6 cm)
Height (M1245)	105 in. (266.7 cm)
Length (M1240/M1240A1)	246.8 in. (626.9 cm)
Length (M1245)	265.1 in. (673.4 cm)

Table 5. Weight.

Item	Specification
Vehicle Curb Weight (VCW) (M1240)	24,500 lbs (11 123 kg)
Vehicle Curb Weight (VCW) (M1240A1)	28,500 lbs (12 940 kg)
Vehicle Curb Weight (VCW) (M1245)	27,174 lbs (12 325 kg)
Gross Vehicle Weight Rating (GVWR)	37,000 lbs (16 798 kg)

Table 6. Performance.

Item	Specification
Gradient (Grade)	
Longitudinal (Up Slope)	60%
Side Slope (M1240/M1245)	40%
Side Slope (M1240A1)	30%
Environmental Operation	-25 to 130°F (150°F storage) [-32 to 54°C (66°C storage)]
Speed, Maximum GVW Road	65 mph (105 km/h)
Fording	36 in. (91.4 cm)
Cruising Range	310 miles (499 km)
Turning Radius	66.5 ft. (20.3 m) wall to wall 31.6 ft. (9.6 m) curb to curb

Table 7. Axles.

Item	Specification
Axles Configuration	4 x 4 - Two axles
Make	Oshkosh Defense
Rated Capacity	
Front Axle	17,000 lbs (7 718 kg)
Rear Axle	20,000 lbs (9 080 kg)
Type	Full-time all-wheel drive Fixed center differential and planetary hub reduction
Inter-axle Differential Lock	CTIS-controlled terrain selection with manual override
Intra-axle Differential Lock	Controlled by CTIS terrain selection on all axles with manual override

Table 8. Parking Brakes.

Item	Specification
Type	Spring brakes on Axle No. 2 Modulated emergency system
Make	Arvin Meritor

Table 9. Service Brakes.

Item	Specification
Type	Drum with internal shoe Dual actuator air wedge
Make	
Front Axle	Meritor RDA type - 12 wedge
Rear Axle	Meritor RDA type - 12 wedge

Table 10. Capsule.

Item	Specification
Construction and Accessories	Welded Armor Steel Hull Replaceable Underbelly Armor Two-Piece Armored Windshield Replaceable Armored Side Doors
Instrumentation	Modular Dash Panels Multiplex Gauge Control J1708 and J1939 Data Bus Communications US/Metric Color Band Gauges

Table 11. Central Tire Inflation System (CTIS).

Item	Specification
Type	Eaton, electronic controlled, terrain and payload biased, automatic upon operator selection
Control	Transfer case and rear axle side-to-side lockup control, with manual override
Features	Preset tire pressures for highway, cross-country, mud/sand/snow, and emergency Over speed function with warning and automatic tire pressure and driveline lock corrections Run flat function provides continuous air to punctured tire Utilizes SAE J1708 and 1939 data bus for external control functions
Tire Pressure Settings	Refer to Tables 19 and 20 for all tire pressure settings

Table 12. Air System.

Item	Specification
Air Governor	Bendix
Air Dryer	HALDEX #N500 11 H

Table 13. Cooling System.

Item	Specification
Type	Cross flow fin and tube type radiator, includes internal transmission cooler and external charge air cooler
Frontal Area	810 in ² (5 226 cm ²)
Construction	One piece assembly with integral side tanks
Fan	32 in. (81 cm), nine blade, serpentine belt driven
Fan Clutch	Temperature controlled

Table 14. Electrical System.

Item	Specification
Alternator	570 amp
Voltage	24 volts with 12 volt accessory provision in capsule
Battery	Four, 12 volt (800 CCA ea. at -18°F [-28°C])

Table 15. Steering System.

Item	Specification
Type	R.H. Shepard integral power steering with booster and separate fluid reservoir includes primary and secondary gears
Steering Gear Ratio	18:1

Table 16. Engine.

Item	Specification
Make and Model	Caterpillar C-7 electronic control
Type	4-stroke, in-line, six cylinder, electronic
Bore	4.33 in. (11 cm)
Stroke	5 in. (12.7 cm)
Displacement	441 in ³ (7.2 L)
Maximum Horsepower	370 hp (276 kW)
Peak Torque	925 lb-ft (1 254 N•m)
Exhaust brake/retarder	PAC engine brake

Table 17. Suspension.

Item	Specification
Type	Oshkosh Modular Independent Suspension, coil spring, control arm
Wheel Travel	
Front Axle	16 in. (40.6 cm)
Rear Axle	16 in. (40.6 cm)

Table 18. Tires.

Item	Specification
Type	395/85R20 (M1240/M1245) 16.00 R20 XZLT LRM (M1240A1)
Quantity	Four
Additional Capability	Run flat capability in case of flat tire where CTIS cannot maintain pressure.

Table 19. Transfer Case.

Item	Specification
Make and Model	Marmon - Herrington MVG - 750
Type	Three-shaft, two-speed with Neutral
Ratio	1:1 High 2:1 Low
Torque Split (unlocked drive line)	30% Front, 70% Rear

Table 20. Transmission.

Item	Specification
Make and Model	Allison 3500 SP, automatic electronic control, GEN IV
Type	Six-speed automatic with TC 418 torque converter, second gear start
Ratios	Sixth 0.65:1 Fifth 0.75:1 Fourth 1.0:1 Third 1.5:1 Second 2.3:1 First 4.6:1 Reverse 5.0:1

Table 21. Wheels.

Item	Specification
Type	Two-piece bolt together, aluminum disc
Size	20 x 10 in. (50.8 x 25.4 cm)

Table 22. Winch.

Item	Specification
Make and Model	WARN Severe Duty 18
Wire Rope	8 Strand Steel Cable
Diameter	0.44 in. (11.2 mm)
Length	75 ft. (22.9 m)
Deployment	Front only
Maximum Load Rating	18,000 lbs (8 172 kg)
Drum Barrel Diameter	4 in. (10.16 cm)
Overload Interrupt Module	Digital Limiter
Sensing Current (Set Point) Range	50 to 400 amps
Supply Voltage	8.5 to 32 VDC

Table 23. Winch Electric Performance Data.

Line Load (First Layer) lbs	Line Load kg	Line Speed Layer 1 ft./min.	Line Speed Layer 1 m/min.	Motor Current amps
0	0	18.5	5.6	58.1
3000	1362	11.0	3.4	104.0
6000	2724	8.6	2.6	137.8
9000	4086	7.1	2.2	169.4
12000	5448	6.0	1.8	209.7
15000	6810	4.9	1.5	253.2
18000	8172	4.6	1.4	278.2

Table 24. Winch Performance Data.

Layer 1	Line Load lbs	Layer 2	Line Load lbs	Layer 3	Line Load lbs	Layer 4	Line Load lbs
18.5	0	22.6	0.0	26.7	0.0	30.8	0.0
11.0	3000	13.4	2454.5	15.9	2076.9	18.3	1800.0
8.6	6000	10.5	4909.1	12.4	4153.8	14.3	3600.0
7.1	9000	8.7	7363.6	10.3	6230.8	11.9	5400.0
6.0	12000	7.3	9818.2	8.6	8307.7	9.9	7200.0
4.9	15000	6.0	12272.7	7.1	10384.6	8.2	9000.0
4.6	18000	5.6	14727.3	6.6	12461.5	7.7	10800.0

Table 25. Petroleums, Oils, and Lubricant (POL) Capacities.

Item	Specification
Engine	20 qt (18.9 L) With Filter
Transmission	16 qt (15.1 L) Drain and Refill
Transfer Case	5.6 qt (5.3 L)
Power Steering Reservoir	10.75 qt (10.17 L)
Cooling System	31 qt (29.3 L)
Axles No. 1 and No. 2	10.5 qt (9.9 L)
Wheel Ends	1.6 qt (1.5 L)
Fuel Tank	47 gal (177.9 L)

Table 26. Recommended Modes of CTIS Operation.

Road Condition	CTIS SETTING			
	HWY	CC	MSS	Emer
Highway/Paved & Smooth	X			
Gravel/Smooth	1	2		
Gravel/Dirt W/ Potholes or Washboard		X		
Cobblestone/ Belgium Block	X			
Mud/Sand/Snow		1	2	
Fording-Hard Bottom		X		
Fording-Soft Bottom		1	2	
Grade-Slight (<10%)	X			
Grade-Moderate (10%-25%)		X		
Grade-Steep (>25%)		1	2	

Where more than one CTIS terrain setting is identified above, first try choice 1. If wheelspin occurs, remove power to stop the spin and try choice 2.

Where conditions are a combination of the above classifications (such as a moderate grade with mud/sand/snow), it is likely that choice 2 will be needed to complete the required task.

This table cannot cover all possible terrain and considerations. If you do not see a table choice that addresses your particular situation, choose a terrain/road condition CTIS setting that suggests a worse environment than the one you will encounter.

END OF WORK PACKAGE

MECHANICAL THEORY

This work package explains the mechanical theory of operation for the M-ATV.

The engine generates power to move the vehicle. This power is transferred to the transmission, which converts the power into a controllable speed. The transmission transfers this controlled speed to the transfer case, which transfers this speed to the axles. The axles then transfer this speed to the right and left wheels of the vehicle.

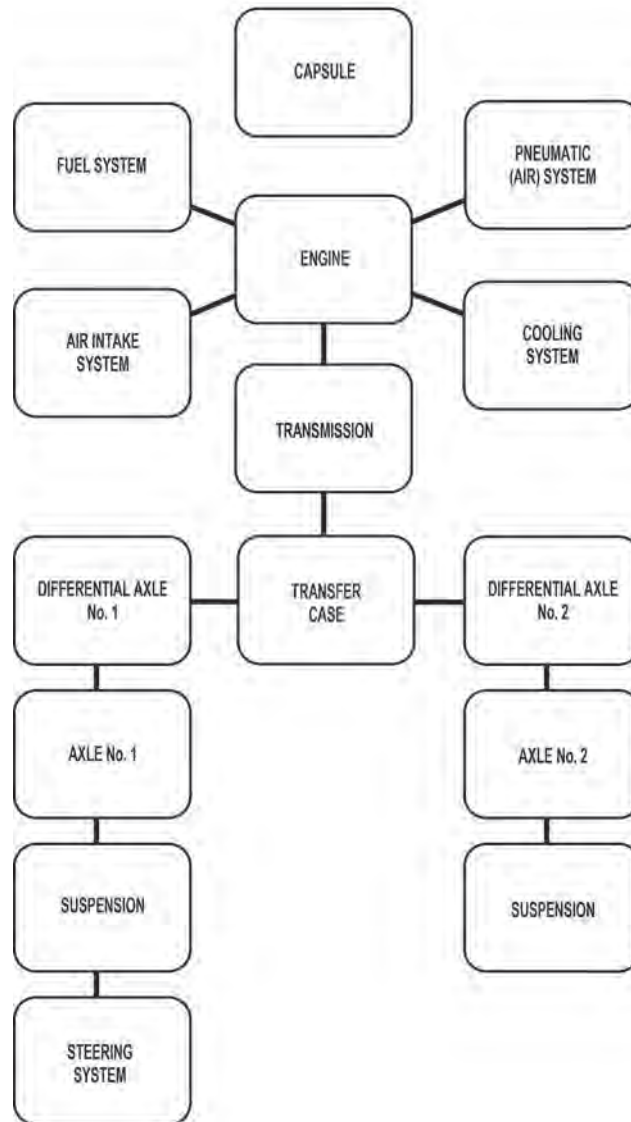


Figure 1. Mechanical Theory.

CAPSULE

The capsule features a full-width configuration and is positioned rearward of axle No. 1. The capsule controls and operating mechanisms are designed to accommodate a crew of up to five. Heating, ventilation, noise control, and vibration and shock control are provided to the occupants. The capsule also provides blast protection for the crew as well as protection from small arms fire. The cab contains all of the driving controls, gauges, and warning lights and indicators.

DRIVE TRAIN

Power for the M-ATV is provided by a diesel engine, which is coupled directly to an automatic transmission. Power from the transmission is transferred to the transfer case and onto the drive and drive/steering axles through a series of prop shafts and universal joints. The M-ATV drive train is enhanced through the use of electronic control modules for both the Caterpillar engine and Allison transmission.

TRANSFER CASE

The transfer case incorporates a differential. The transfer case differential provides full time all wheel drive, and supplies torque to the front and rear axles. The differential has an operator controlled, air actuated, drive line lock mechanism, which consists of a sliding lockout collar that locks the differential housing to the output shaft. The differential drive line lock mechanism provides increased mobility in adverse operating conditions.

SUSPENSION

The M-ATV incorporates TAK-4[®] independent suspension system with battle tested technology. This suspension system incorporates halfshafts, springs, shock absorbers, jounce bumpers, rebound bumpers, and upper and lower control arms in the independent suspension design. This suspension system design maintains tire/ground contact under adverse terrain profiles and conditions. This design equalizes loads between axles and provides roll stability. The halfshafts incorporated into this design move up and down independently of each other. This independent motion allows for a smoother ride than a standard walking beam suspension design.

AXLES

The M-ATV incorporates four halfshafts in the vehicle's independent suspensions design. The halfshafts of the front axle work in conjunction with the wheel ends and hub assemblies to drive and steer the vehicle. The halfshafts of the rear axle work in conjunction with the hub assemblies to drive the vehicle. The four halfshafts incorporated into this design move up and down independently of each other. This allows the halfshafts to maintain tire/ground contact under adverse terrain profiles and conditions.

COOLING SYSTEM

The pressure type cooling system protects the engine by removing heat generated by the engine during the combustion process. Pressure within the cooling system is regulated by a pressure release in the filler cap. The hot coolant flows from the engine to the radiator and through the radiator core where a stream of air removes heat from the coolant. This stream of air is drawn through the radiator core by the engine fan. The water pump on the engine draws the coolant from the radiator, pushes it through the engine, past the thermostats, and back into the radiator. This process is repeated continuously.

AIR INTAKE SYSTEM

The air intake system consists of a dry-type air cleaner, ducting, turbocharger, and charge air cooler. Engine exhaust gases flow through the turbocharger driving a turbine wheel. A compressor wheel on the opposite end of the turbine shaft rotates and draws in fresh air through the air cleaner. The air is then compressed by the turbocharger and pushed into the charge air cooler to cool the compressed air. The air then flows into the intake manifold of the engine to be used for combustion.

If the air pressure inside the turbocharger reaches a predetermined pressure, the wastegate on the turbocharger will open to relieve excess pressure. When the pressure returns to the safe operating range, the wastegate will close.

FUEL SYSTEM

In the fuel system, fuel is drawn from the fuel tank, through the fuel/water separator, and into the fuel pump. The fuel pump then pushes the fuel through a fuel filter and into the engine. Surplus fuel from the electronic injectors is returned to the fuel tank through a return line.

PNEUMATIC (AIR) SYSTEM

The air system consists of an engine-driven air compressor and two or four air reservoirs. The system includes valves and air lines to control the vehicle's air-operated devices, including the brakes. Pressurized air from the air compressor is passed through the air dryer to the reservoir. The air dryer removes moisture and dirt from the compressed air.

STEERING SYSTEM

The steering system power is supplied to the steering gears by a hydraulic steering pump. The steering wheel, which is mechanically linked to the primary steering gear, manipulates, and controls the hydraulic pressures in the steering gear. The primary steering gear is hydraulically connected to the secondary steering gear. The secondary steering gear mirrors the movements of the primary steering gear. The steering gears pivot pitman arms, which in turn move a tie rod and two toe control links. This action causes the tires to move left or right causing the vehicle to steer left or right.

ANTILOCK BRAKE SYSTEM

The brake system for the M-ATV incorporates an Antilock Brake System (ABS) into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will in effect, pulse the brakes, through four ABS valves, to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service.

END OF WORK PACKAGE

ELECTRICAL THEORY

The alternator generates electricity and distributes the load as necessary (i.e., to batteries, lights, winch, etc.). The batteries store generated electricity which is used to start the vehicle. The electricity then transfers to the circuit breakers, which safeguards the electrical components from power surges. From there, the electricity is distributed throughout the vehicle. The main electrical components are comprised of six components.

The subordinate circuits operate all the lights, the winch controls, heater controls, etc. The engine Electronic Control Module (ECM) primarily controls the fuel injection by monitoring temperature, oil pressure, RPMs, etc. The CTIS system operates tire inflation, deflation, and driveline lockups. The Anti-Lock Brake System (ABS) prevents tires from locking up during braking and aids in traction control. The Transmission Control Module (TCM) controls the shifting for the GEN IV transmission. The J1708/J1939 data bus is used for diagnostic purposes.

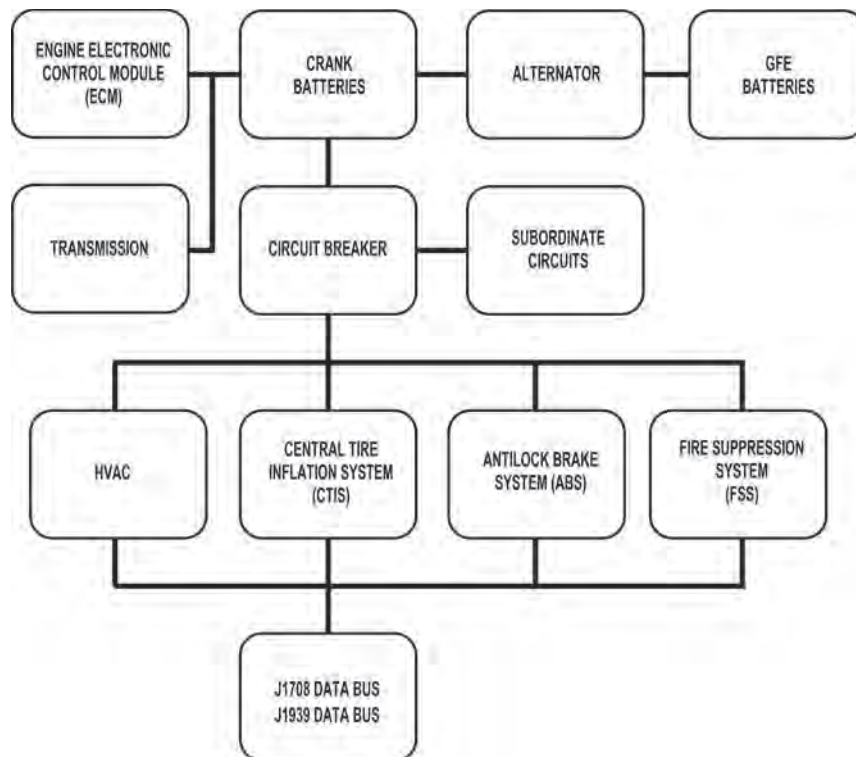


Figure 1. Electrical Theory (M1240/M1240A1).

ANTILOCK BRAKE SYSTEM (ABS)

NOTE

When operating vehicle in CC, MSS, or EMER CTIS settings (TM 9-2355-335-10), ABS and ATC systems are disabled.

The brake system for the M-ATV incorporates an ABS into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will, in effect, pulse the brakes to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service brakes.

ANTILOCK BRAKE SYSTEM (ABS) LIGHT

The ABS light (TM 9-2355-335-10) on the dash will illuminate steadily for a two-second bulb check whenever the ignition switch is turned ON. The ABS light turns off after the two-second bulb check if there are no ABS malfunctions. If the light remains on after the two-second bulb check, or if the light comes on and illuminates steadily while operating the vehicle, there is a malfunction with the ABS.

NOTE

If the ABS light indicates a malfunction, the ABS and possibly the ATC system may be disabled. If the ABS and/or ATC is disabled, the emergency and service brake systems remain functional.

The ABS light will flash slowly when CTIS is set to CC, MSS, or EMER terrain settings (TM 9-2355-335-10) to indicate that the ABS is disabled. This indication is normal and does not indicate a malfunction in the ABS.

AUTOMATIC TRACTION CONTROL (ATC)

NOTE

When operating vehicle in CC, MSS, or EMER CTIS settings (TM 9-2355-335-10), ABS and ATC systems are disabled.

The M-ATV incorporates an ATC system. The ATC system helps improve traction on slippery or unstable driving surfaces by reducing drive wheel slippage.

The ATC system constantly monitors the wheel for a wheel slip condition. If a wheel slip condition occurs, the ATC system activates and throttles back the engine to help reduce wheel slip. If the vehicle is traveling at a speed of less than 25 mph (40 km/h), the ATC will also pulse the service brake system to aid in reducing wheel slip. Once the ATC system detects that the wheel slip condition is no longer present, it will return the engine and service brake system to normal operating condition.

AUTOMATIC TRACTION CONTROL (ATC) LIGHT

The ATC light (TM 9-2355-335-10) will illuminate steadily when the ignition switch is turned ON. The light will remain on until the service brake pedal is engaged for the first time. The light will then turn off.

When operating the vehicle with CTIS set to HWY terrain setting (TM 9-2355-335-10), the ATC light will remain off unless the ATC system detects a wheel slip condition and activates. The light will then flash rapidly until the wheel slip condition is no longer present.

If the ATC light illuminates steadily when operating the vehicle in the HWY CTIS setting (TM 9-2355-335-10), the ATC is malfunctioning.

NOTE

If the ATC light indicates a malfunction, the ATC and possibly the ABS system may be disabled. If the ATC and/or ABS is disabled, the emergency and service brake systems remain functional.

The ATC light will illuminate steadily when CTIS is set to CC, MSS, or EMER terrain settings (TM 9-2355-335-10) to indicate that the ATC system is disabled. This indication is normal and does not indicate a malfunction in the ATC.

ENGINE ELECTRONIC CONTROL MODULE (ECM)

The M-ATV is equipped with a Caterpillar diesel engine, Model C-7. The Caterpillar engine incorporates an electronic control system.

The main components of the electronic control system are the Engine Control Module (ECM) and multiple engine sensors. The ECM is the computer that controls the engine.

The ECM determines when and how much fuel to deliver to the cylinders, based on the actual and desired conditions at any given time.

The ECM uses a sensor on the throttle pedal to determine the desired engine speed and compares this to the actual engine speed as determined by the engine crankshaft position sensor. If the desired engine speed is greater than the actual engine speed, the ECM injects more fuel to increase engine speed. If desired engine speed is less than the actual engine speed, the ECM injects less fuel to decrease engine speed.

Once the ECM has determined how much fuel is required, it must next determine when to inject the fuel. Injection timing is determined by the ECM after considering input from the coolant temperature sensor, intake manifold air temperature sensor, atmospheric pressure sensor, and boost pressure sensor.

The ECM determines where top dead center on cylinder number one is located from the engine camshaft position sensor signal. The ECM decides when injection should occur relative to top center and provides the signal to the injector at the desired time. The ECM adjusts timing for best engine performance, fuel economy, and white smoke control.

The ECM controls the amount of fuel injected by varying high voltage signals to the injectors. The injectors will pump fuel only when the injector solenoid is energized. By controlling the timing and duration of the high voltage signal, the ECM can control injection timing and the amount of fuel injected.

Included with the ECM is an engine monitoring system. The Caterpillar engine monitoring system monitors engine oil pressure, coolant temperature, and intake manifold air temperature. If the engine monitoring system detects a sensor reading outside of the normal operating parameters, the ECM causes the Warning Lamp to turn on and the Check Engine Lamp to flash to indicate a problem has been detected.

TRANSMISSION

The M-ATV uses an Allison 3500 series, six speed, automatic transmission. The transmission is directly coupled to the Caterpillar C-7 engine. The main components of the transmission are the transmission assembly, Transmission Control Module (TCM), and Transmission Range Selector.

The TCM, which contains the microprocessor based electronics, is located in the dash near the circuit breaker/relay panel. The TCM receives information, in the form of signals from switches and sensors, processes the information, and sends electrical signals to the appropriate solenoids inside the transmission. These solenoids control the operation to the transmission. The TCM also protects the transmission from cold weather start-ups by inhibiting normal shifting functions until a minimum sump oil temperature of 19°F (-7°C) is attained.

The Transmission Range Selector is totally electronic. When the M-ATV is started, the Range Selector automatically defaults to N (neutral). Range selection is achieved by means of six buttons located on the face of the transmission range selector. When D (drive) is selected, the truck will start in first gear and will automatically up shift to a high gear as output speed increases. As the truck slows down, output speed decreases and the transmission automatically downshifts to the appropriate gear. When R (reverse) is selected, the transmission will shift to reverse and the range selector will also activate the reverse light and reverse alarm.

By using the up arrow button or down arrow button on the Transmission Range Selector, the operator can adjust the range of gears he wishes to operate in.

ELECTRICAL SYSTEM

The M-ATV has a 24 VDC electrical system that is waterproof and includes a 12 VDC auxiliary receptacle located on the dash, inside the cab. Manual and automatic resetting circuit breakers are used throughout the system. The voltage of the electrical system is indicated by a voltmeter located on the dash, inside the cab.

The electrical system is powered by four 12-volt batteries located in the cargo deck. Two batteries are for cranking power and two batteries power GFE (Government Furnished Equipment) in silent watch mode.

A battery disconnect switch is located inside the cab behind the driver's seat and the passenger's seat. The battery disconnect switch provides power to operating and control circuits throughout the vehicle.

A 570 amp alternator delivers up to full alternator output on demand to any single or combined 24 VDC load requirement. The alternator provides sufficient amperage to operate all electrical components and charge the batteries when the engine is running.

A connector is provided at the rear of the truck to supply power to towed loads. Another connector is located at the front of the truck to provide access for incoming auxiliary power when vehicle is being towed.

Part of the electrical system includes a heavy-duty starting motor mounted on the engine flywheel housing. The starting motor provides the cranking power necessary for starting the engine.

CENTRAL TIRE INFLATION SYSTEM (CTIS)

The CTIS is designed to adjust the pressure of all tires on the truck for different terrain conditions. The CTIS controller has four terrain settings, three load settings, and a run flat setting which the operator selects and activates in the cab. The main components of the CTIS consist of control valves for air supply and distribution, a dash mounted electrical controller that adjusts tire pressure, associated air tubing, and electrical cables.

The drive line lock controls are integrated with the CTIS to simplify operation of the M-ATV. The CTIS will engage a specific driveline lock configuration based on the terrain and load settings chosen by the operator.

FIRE SUPPRESSION SYSTEM

The M-ATV incorporates three fire suppression systems into its design: capsule, engine compartment, and undercarriage fire suppression systems.

The capsule fire suppression system covers the interior of the capsule. This system can be triggered manually from inside the capsule, or automatic sensors that monitor for hot spots and air particles (smoke) inside the capsule. When triggered, the system activates a cylinder that releases a fire suppression agent throughout the interior of the capsule.

The M-ATV has one of the two engine compartment fire suppression configurations listed below:

- The engine compartment fire suppression system covers the interior of the engine compartment. This system can be triggered manually from inside the capsule, or automatically by thermosensors that monitor the temperature of the engine compartment. When triggered, the system activates four aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

or

- The engine compartment fire suppression system covers the interior of the engine compartment. This system can be triggered manually from inside the capsule, or automatically when fire activates a sensor line. The sensor line runs under the hood and is coated in a heat sensitive polymer. When the polymer melts, two wires within the sensor line touch and complete the circuit. When triggered, the system activates five aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

The M-ATV has one of the two undercarriage fire suppression configurations listed below:

- Undercarriage fire suppression system covers the underside of vehicle. It can be triggered manually from inside the capsule, or automatically when fire activates a sensor line. The sensor lines are pressurized with nitrogen gas and are divided into two separate systems, front and rear. When a sensor line loses pressure the system activates cylinders that release a fire suppression agent. When triggered automatically, the front and rear systems can operate independently from each other. If triggered manually from inside the capsule, both front and rear systems will discharge.
- Undercarriage fire suppression system covers the underside of the vehicle. It can be triggered manually from inside the capsule, or automatically when fire acts on a sensor line. The sensor lines are coated with a heat sensitive polymer and are divided into two separate systems, front and rear. When the polymer melts, two wires inside the sensor line complete a circuit, and the system activates cylinders that release a fire suppression agent. When triggered automatically, the front and rear systems can operate independently from each other. If triggered manually from inside the capsule, both front and rear systems will discharge.

END OF WORK PACKAGE

SERVICE UPON RECEIPT

HANDLING

Check equipment against packing slip to ensure that shipment is complete. Remove all Basic Issue Items (BII) and Components of End Item (COEI). Conduct a complete inventory against COEI and BII, lists then stow in accordance with Stowage Guide (TM 9-2355-335-10).

END OF TASK**SERVICING****1. Removal of Protective Components.**

Upon receipt of the M-ATV, inspect vehicle for obvious damage. Undo any tie downs, shackles, or banding that are securing the M-ATV.

2. Cleaning.**WARNING**

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

CAUTION

- **Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.**
 - **Vehicles must not have ballistic glass cleaned with solvent or other strong cleaning compounds. Ballistic glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.**
 - **Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.**
- a. Air intake opening may be covered with tape, and windshield may be protected with packing material. Remove any protective tape and packing material that may be installed for transport.
 - b. Using a clean cloth, wash vehicle with cool or warm water. Do not use strong detergents or abrasives.

CAUTION

- **When using a pressure washer to clean capsule interior, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.**
- **When using a pressure washer to clean capsule interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.**

- c. Using clean cloth, wipe loose dust and dirt from capsule interior.
- d. Clean seats and seatbelts using a mild solution of warm water and soap solution. Never use solvents or abrasives.

3. Lubrication.

Refer to Lubrication Instructions (TM 9-2355-335-10) for all lubrication requirements for the M-ATV.

END OF TASK

INITIAL CHECKOUT AND ADJUSTMENT

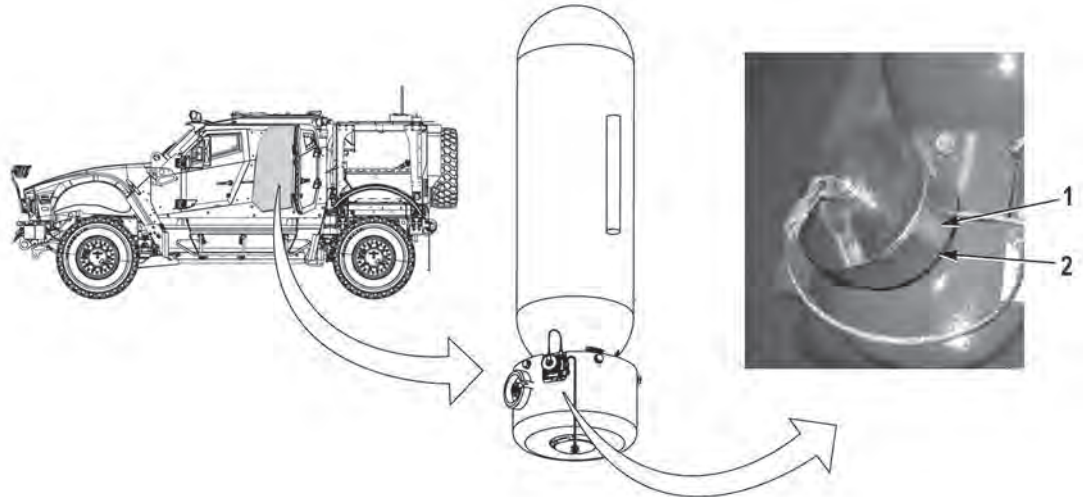
This paragraph includes instructions for the initial checkout and adjustment values for the M-ATV. Complete inspection of the vehicle must be performed to ensure there are no loose wires or bent pin contacts that would cause a short circuit when power is applied.

1. Perform all Operator Level PMCS (TM 9-2355-335-10) and Field Level PMCS (WP 0018).
2. Check tires for proper inflation, refer to Central Tire Inflation System (CTIS) (TM 9-2355-335-10).
3. Inspect starter for loose connections and insecure mounting.

END OF TASK

INITIAL FIRE SUPPRESSION SYSTEM ACTIVATION

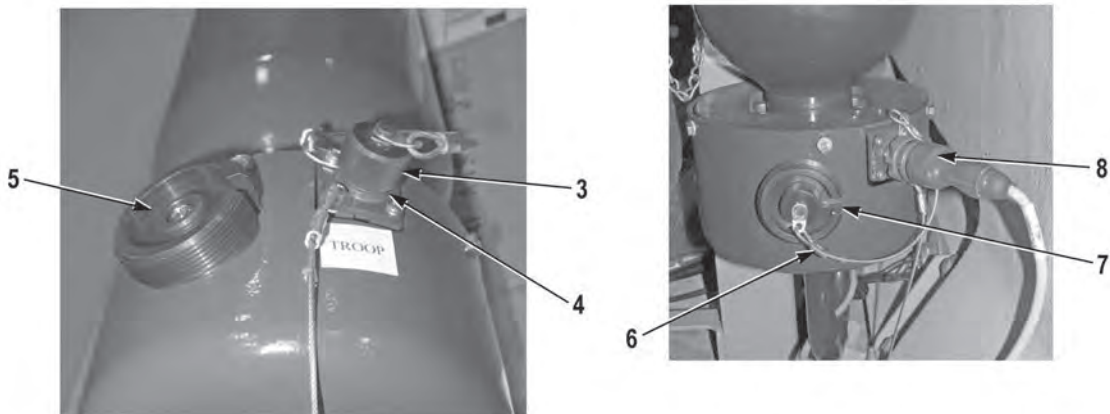
This paragraph includes instructions for the initial setup of the Fire Suppression Systems for the M-ATV. Fire suppression system must be activated prior to operation of M-ATV.



WARNING

Ensure vehicle battery disconnect switch is in OFF position before inspecting fire suppression system. Failure to comply may result in injury or death to personnel.

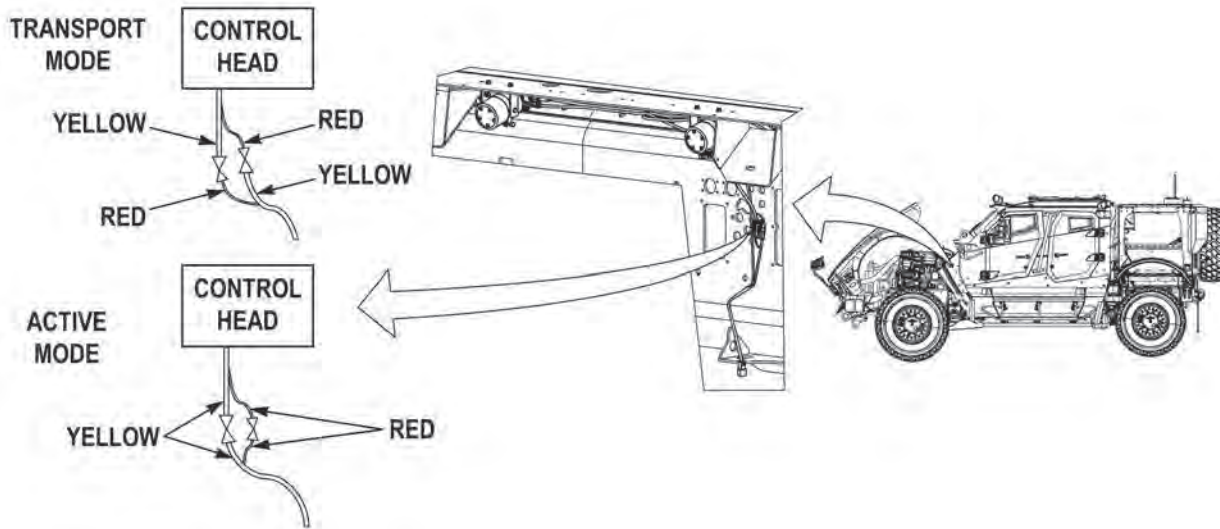
1. Remove large cap (1) from fitting (2).



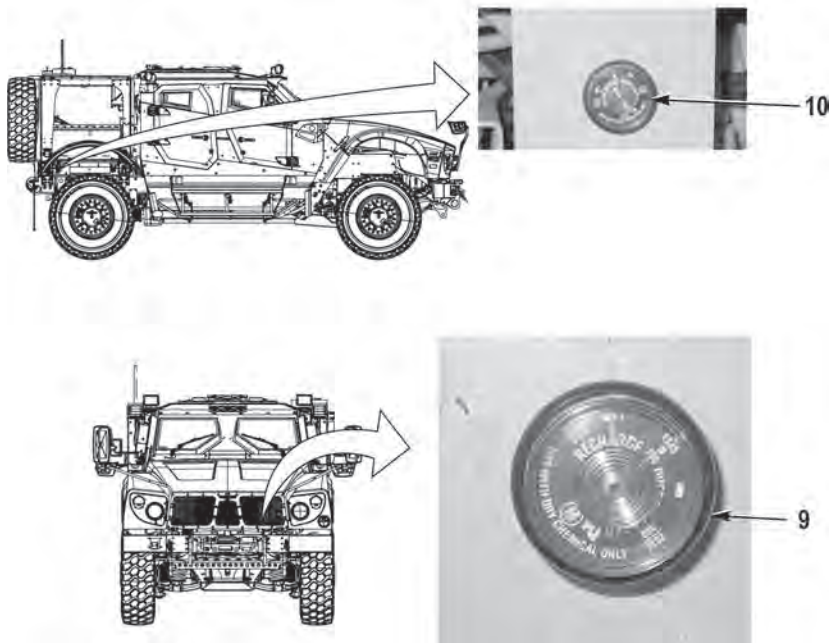
NOTE

Power connector is located on rear of bottle.

2. Remove cap (3) from power connector (4) and install on fitting (5) with lanyard (6) routed through slot (7).
3. Connect power harness (8) to power connector (4).



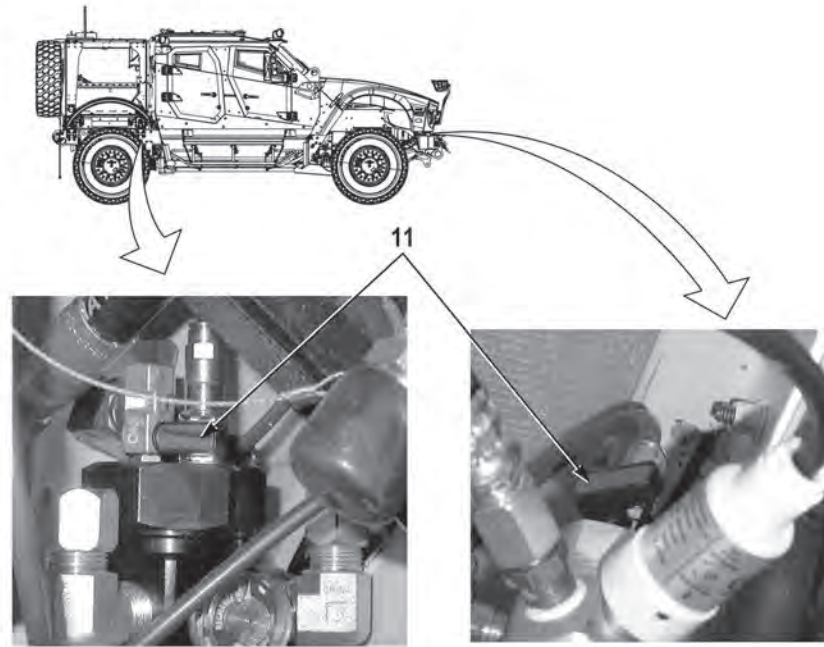
4. Place engine fire suppression system in active mode.
 - a. Disconnect connectors 454 YELLOW.
 - b. Disconnect connectors 454 RED.
 - c. Connect connector 454 YELLOW to connector 454 YELLOW.
 - d. Connect connector 454 RED to connector 454 RED.



NOTE

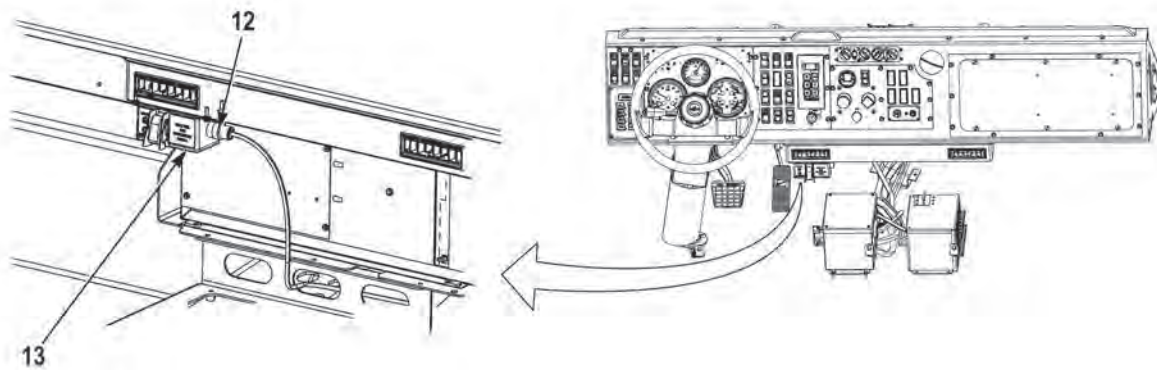
Perform Steps (5) through (7) if equipped with AFES nitrogen detection system.

5. Check front undercarriage fire suppression system detection tubing pressure gauge (9) for correct pressure (indicator in green range of dial).
6. Check rear detection tubing pressure gauge (10) for correct pressure (indicator in green range of dial). If needed, pressurize detection tubing using the instructions in the fire suppression system Nitrogen Fill Kit.

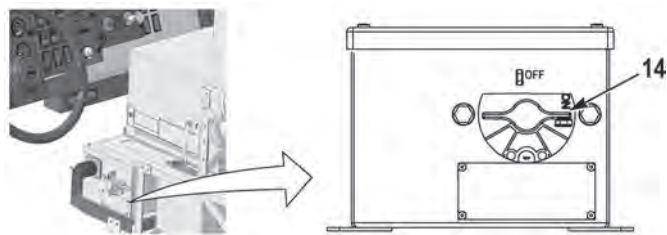
**WARNING**

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

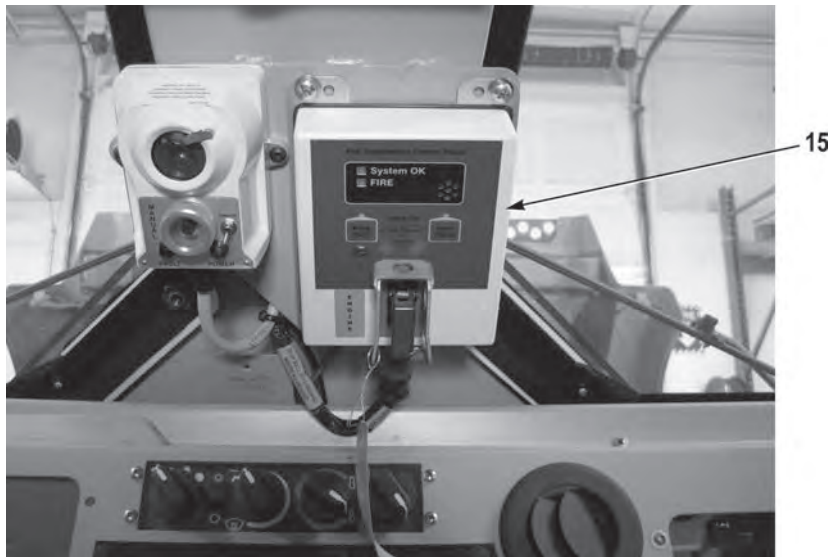
7. When detection tubing pressure gauges (9 and 10) show proper pressure (indicator in the green range of dial), turn four undercarriage fire suppression cylinder ball valves (11) to OPEN position.



8. Connect connector (12) to undercarriage controller (13).



9. Turn battery disconnect switch (14) to ON position.



10. Place ignition switch to the ON position and check fire suppression system control panel (15) for illumination of system OK light.

END OF TASK

SPARE TIRE WINCH ASSEMBLY

WARNING

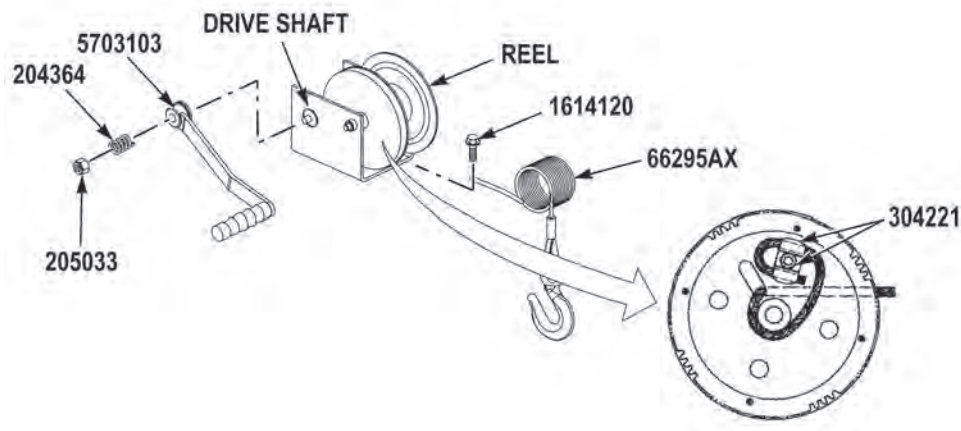
- Never apply load on winch with cable fully extended. Keep at least three full turns of cable on the reel. Failure to comply may result in injury or death to personnel.
- Do not exceed 600 lbs (272.4 kg) weight capacity of winch assembly. Failure to comply may result in injury or death to personnel.
- Keep hands and fingers away from winch assembly when operating winch. Failure to comply may result in injury or death to personnel.
- Winch is only to be used to stow/unstow spare tire. Winch is not to be used to lift other components or material. Failure to comply may result in injury or death to personnel.
- Always wear heavy leather gloves when handling winch cable. Never let cable run through hands. Broken wires will cause injury to personnel.
- Winch is NOT to be used for lifting or moving of persons. Failure to comply may result in injury or death to personnel.

CAUTION

A resistance load of 175 lbs (79 kg) must be applied to wire rope to overcome internal resistance and operate winch brake properly. Turning winch handle counterclockwise will remove winch handle from drive shaft and reel will not turn. Failure to comply may result in damage to equipment.

NOTE

Remove winch assembly and winch bracket from BII.

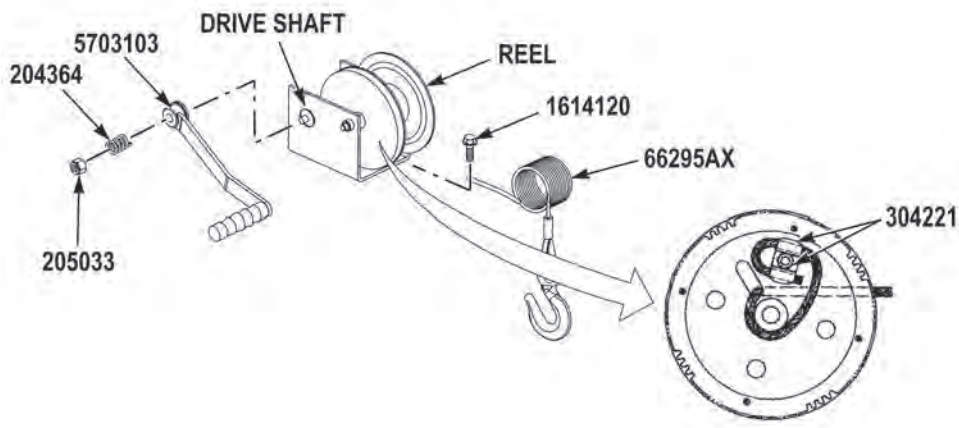


1. Install winch handle (5703103) on drive shaft.
2. Install spring (204364) and locknut (205033) on end of drive shaft.

NOTE

Ensure clicking noise is produced when handle is turned clockwise.

3. Feed wire rope (66295AX) from inside of reel through slot and around reel mounting shaft.

**NOTE**

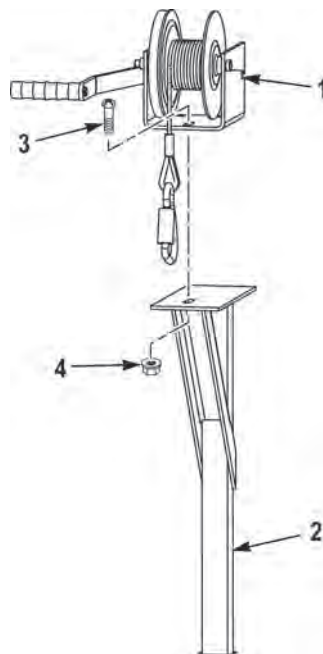
Rope clamp kit (304221) includes clamp, screw, and self-locking nut.

4. Install screw from inside of reel and secure wire rope (66295AX) and clamp with self-locking nut.

NOTE

Ensure that wire rope is evenly wound on reel.

5. Turn winch handle clockwise to wind wire rope onto reel.



6. Install winch (1) on winch bracket (2) with three screws (3) and locknuts (4).

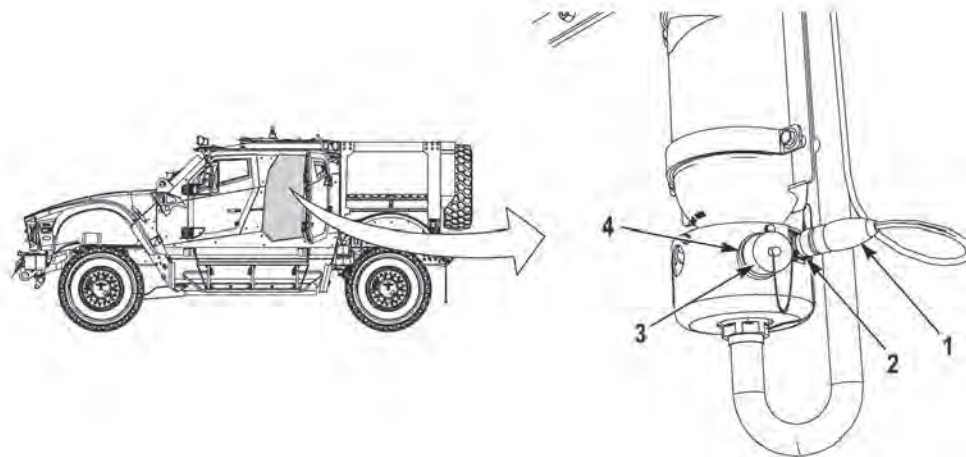
END OF TASK

END OF WORK PACKAGE

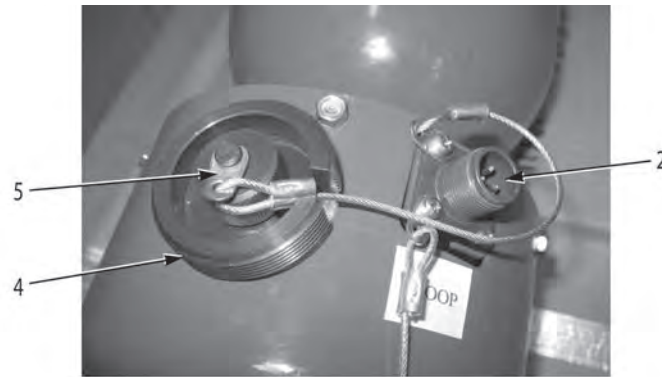
PREPARATION FOR STORAGE OR SHIPMENT

PREPARATION**NOTE**

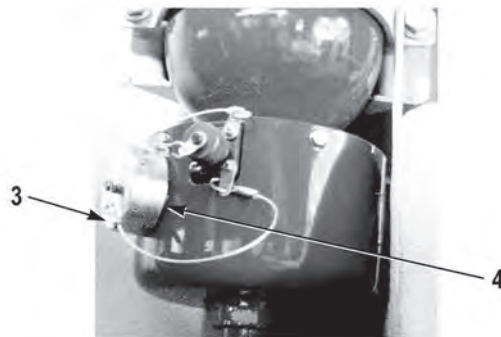
- Perform Step (1) if vehicle is being prepared for storage.
 - Perform Step (2) if vehicle is being prepared for shipment.
1. Before placing a vehicle in storage, perform the following tasks:
 - a. Perform operator level PMCS (TM 9-2355-335-10) and field level PMCS (WP 0018).
 - b. Correct all deficiencies noted during inspection.
 - c. Store and secure Basic Issue Items (BII).
 2. Perform operator level PMCS (TM 9-2355-335-10).
 - a. Prepare vehicle for shipment (TM 9-2355-335-10).
 3. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
 4. Disconnect capsule fire suppression system.



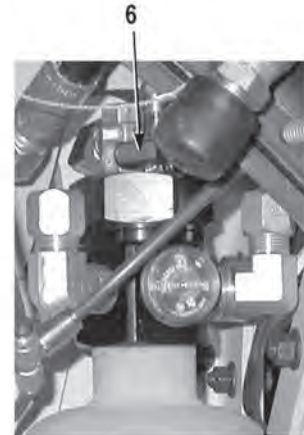
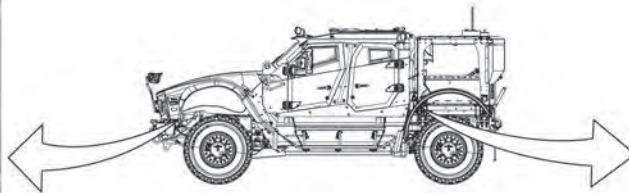
- a. Disconnect power harness (1) from power connector (2).
- b. Remove anti-recoil device (3) from fitting (4).



c. Remove cap (5) from fitting (4) and install cap (5) on power connector (2).



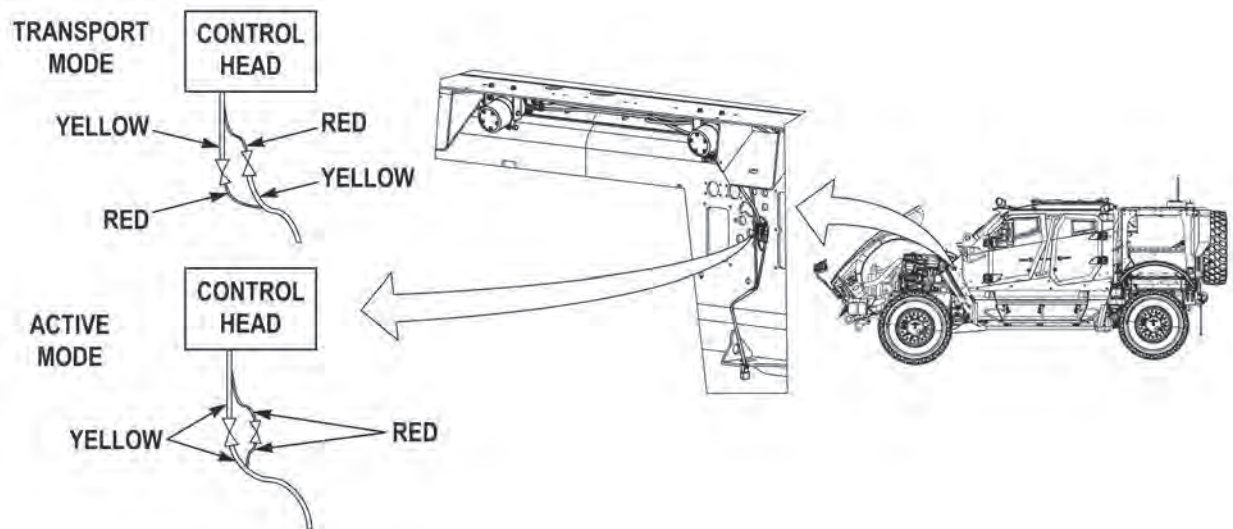
d. Reinstall anti-recoil device (3) on fitting (4).



NOTE

Perform Step (e) if equipped with AFES nitrogen detection.

e. Turn four undercarriage fire suppression cylinder ball valves (6) to OFF position.



5. Place engine fire suppression system in transport mode.
 - a. Disconnect connector 454 YELLOW from connector 454 YELLOW.
 - b. Disconnect connector 454 RED from connector 454 RED.
 - c. Connect connector 454 to YELLOW connector 454 RED.
 - d. Connect connector 454 RED to connector 454 YELLOW.
6. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

END OF TASK

STORAGE

1. While storing vehicle, perform the following tasks:

CAUTION

Ensure tires are not resting on surface containing grease or oil. Failure to comply may result in damage to equipment.

- a. Park vehicle on a suitable surface.

CAUTION

Ensure batteries are disconnected. Batteries will discharge during storage if not disconnected. Failure to comply may result in damage to equipment.

- b. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

END OF TASK

STORAGE MAINTENANCE

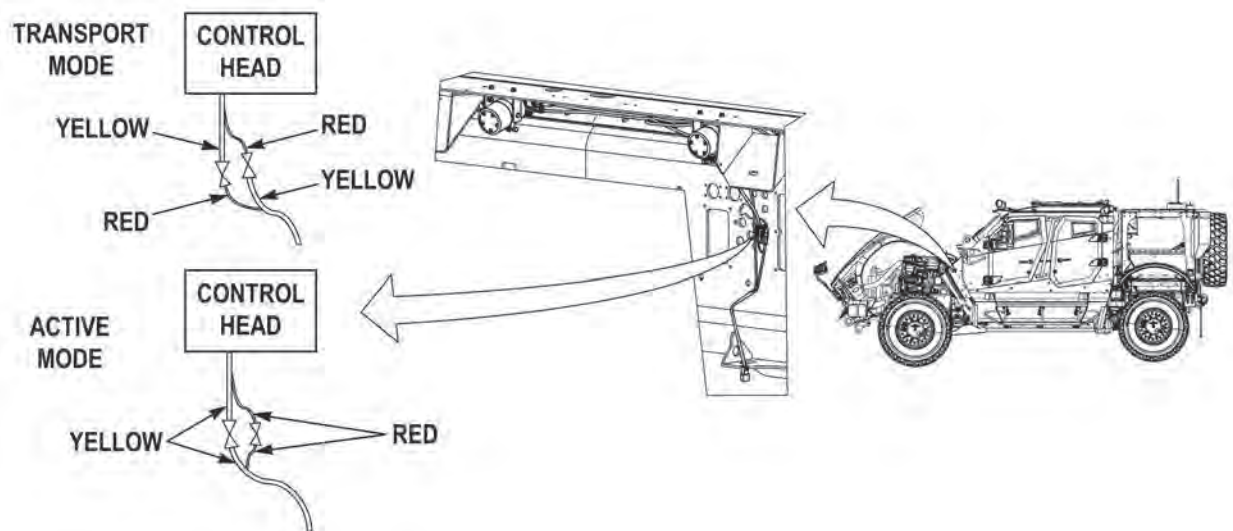
1. While vehicle is in storage, perform the following tasks monthly:
 - a. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
 - b. Conduct visual inspection of the vehicle. Check for oil leaks, lubricant levels, coolant level, and tire pressures. Correct any deficiencies.
 - c. Inspect oil can points. Lubricate if necessary according to Lubrication Instructions (LI) (TM 9-2355-355-10).
 - d. Shift transfer case to neutral, start engine, and idle for 10 minutes. After 10 minutes of engine idle, operate engine for five minutes at 1500 rpm or until the engine water temperature reaches 180°F (82°C). Shift the transmission slowly through all gear selector positions. Return the transmission to neutral and the transfer case to high range.
 - e. Move vehicle 30 feet (9 m) forward and reverse.
 - f. Idle engine 10 minutes before shutdown.
 - g. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
2. While vehicle is in storage, perform the following tasks quarterly:
 - a. Perform all monthly PMCS (TM 9-2355-355-10).
 - b. Exercise all auxiliary equipment. While operating winch, lubricate wire rope.
 - c. Drive vehicle at least 1/4 mile (0.4 km). While driving, shift transmission through all gear ranges.
3. While vehicle is in storage, perform the following tasks yearly:
 - a. Clean the exterior, interior of cab, engine, and undercarriage. Wash any oil, grease, or mud from tires.
 - b. Clean batteries and battery cables with a baking soda solution and rinse with fresh water. Keep the batteries fully charged and clean.
 - c. Completely lubricate the chassis and all auxiliary equipment in accordance with LI (TM 9-2355-355-10).
 - d. Check the coolant level. Test the coolant to ensure that the cooling system is protected against corrosion and temperatures down to -30°F (-34°C). Add antifreeze or corrosion inhibitors compatible with ethylene glycol base antifreeze if cooling system is not adequately protected.
 - e. Change engine oil and oil filter. Change fuel filter element and fuel-water separator filter.

END OF TASK

REMOVAL FROM STORAGE OR SHIPMENT

When removing vehicle from storage, perform the following tasks:

1. Connect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).
2. Conduct a visual inspection of the vehicle and remove moisture proof tape (if equipped) from engine, transmission, transfer case, and fuel system.
3. Conduct a visual inspection for damage to vehicle prior to moving vehicle to maintenance facility.
4. Move vehicle to maintenance facility.
5. Disconnect batteries (WP 0186, M1240/M1240A1) or (WP 0187, M1245).

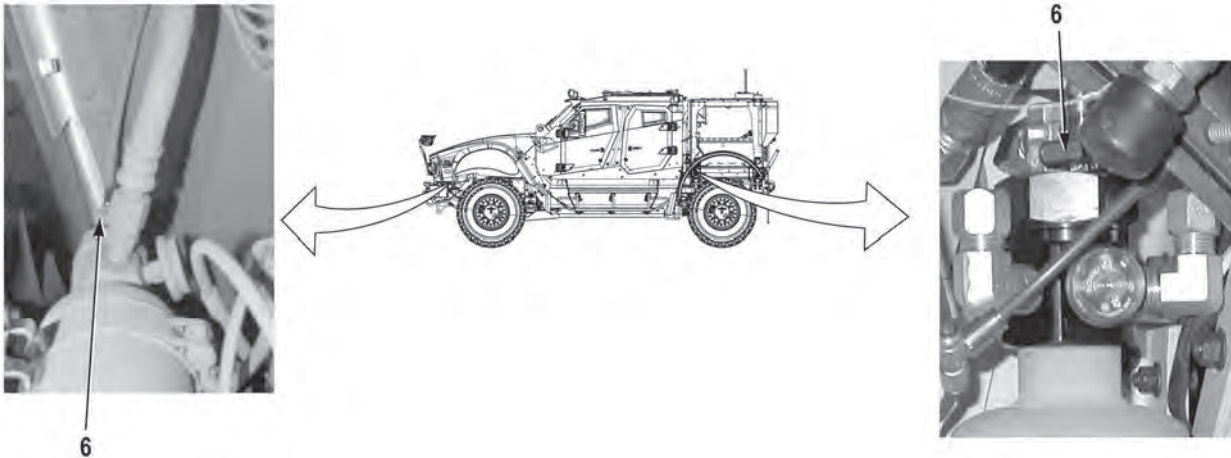


6. Place engine fire suppression system in active mode.
 - a. Disconnect connectors 454 YELLOW
 - b. Disconnect connectors 454 RED
 - c. Connect connector 454 YELLOW to connector 454 YELLOW.
 - d. Connect connector 454 RED to connector 454 RED.

NOTE

Perform Steps (7 and 8) if equipped with AFES nitrogen detection.

7. Inspect undercarriage AFES nitrogen detection tube pressure gauges for proper pressure (indicator in green range of dial) (TM 9-2355-335-10).



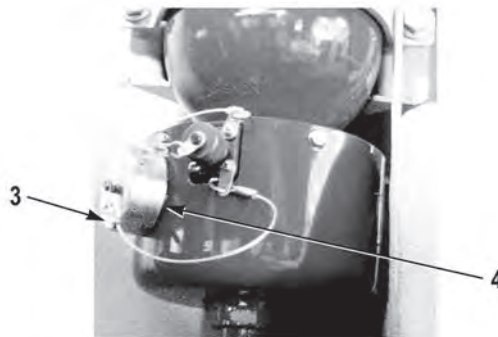
WARNING

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

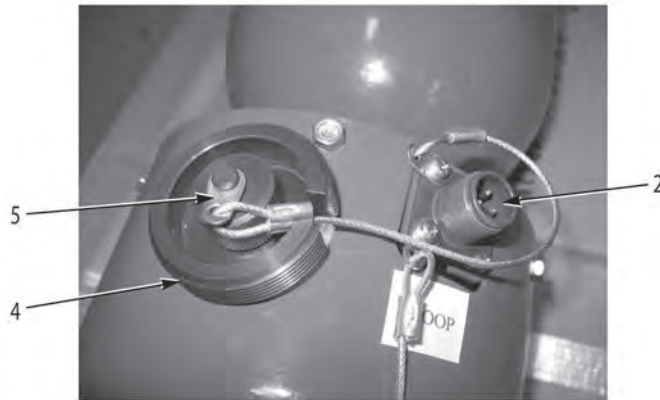
NOTE

All four fire suppression cylinders are turned on the same way. Driver side shown.

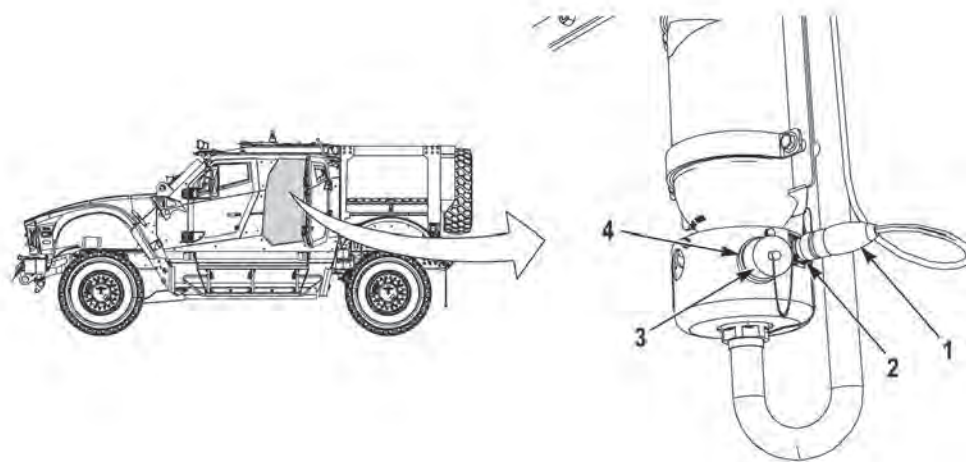
8. Turn four undercarriage fire suppression cylinder ball valves (6) to ON position.
9. Connect capsule fire suppression system



- a. Remove anti-recoil device (3) from fitting (4).



- b. Remove cap (5) from power connector (2) and install cap (5) on fitting (4).



- c. Install anti-recoil device (3) on fitting (4).
- d. Connect power harness (1) to power connector (2).

NOTE

- Perform Step (10) for vehicles being removed from storage.
- Perform Step (11) for vehicles being removed from shipment.

10. Perform operator level PMCS (TM 9-2355-335-10) and field level PMCS (WP 0018).

11. Perform operator level PMCS (TM 9-2355-335-10).

END OF TASK

END OF WORK PACKAGE

CHAPTER 2

TROUBLESHOOTING PROCEDURES FOR M1240, M1240A1, AND M1245

AIR CONDITIONER TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Air conditioner excessively noisy.		
Air conditioner compressor mounting hardware loose or missing.		Tighten and replace air conditioner compressor mounting hardware original (WP 0019), updated (WP 0020).
Air conditioner compressor belt loose or faulty.		Replace air conditioner compressor belt (WP 0220).
Air conditioner compressor faulty.		Replace compressor original (WP 0019), updated (WP 0020).
2. Air conditioner compressor does not shut off or cycles constantly.		
Air conditioner condensers blocked.		Clear blockage from air conditioner condensers.
Engine accessory belt loose or faulty.		Replace engine accessory belt (WP 0221).
Air conditioner compressor belt loose or faulty.		Replace engine air conditioner compressor belt (WP 0220).
Air conditioner unit coolant circuit faulty.		Repair coolant circuit (WP 0024).
Front air conditioner evaporator blocked.		Remove cover from HVAC assembly (WP 0031). Clear blockage from front of evaporator.
3. Air conditioner operates when FAN FORD switch is on.		
FAN FORD switch faulty.	Check for continuity across FAN FORD switch (S6) between terminals 5b and 4.	If test fails, replace FAN FORD switch.
4. Front HVAC blower motor does not operate correctly.		
Front heater motor controls faulty.		Troubleshoot cab heater motor does not operate correctly (WP 0012).

Probable Cause	Test	Action
5. Front HVAC blower operates but no cold air is produced.		
Right switch panel FAN FORD switch ON.		Turn FAN FORD switch OFF.
Front heater/air conditioner temperature controls not set correctly.		Adjust front heater/air conditioner temperature controls.
Air conditioner condenser blocked.		Clear blockage from front air conditioner.
Engine accessory belt loose or faulty.		Replace engine accessory belt (WP 0221).
Air conditioner belt loose or faulty.		Replace air conditioner compressor belt (WP 0220).
Air conditioner compressor electrical connections loose or faulty.	Inspect connectors M25+ and M25- for corrosion, bent or broken pins or broken wires.	Clean and tighten air conditioner compressor electrical connections (WP 0218).
Air conditioner relay faulty.	Replace relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) with relay RI (reverse light/alarm). Check to see if the compressor runs.	If the test passes, replace relay R4 (for M1240 models) or K4 (for M1245 models) (air compressor relay).
Engine wiring harness faulty.	Check for continuity between relay R4 (for M1240 models) or K4 (for M1245 models) terminal 85 and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for continuity between CB4, wire 1082 and terminal 30 (wire 1081) of relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay).	
	Check for continuity between cab bulk head connector C2 terminal 27 and connector C210 terminal A (wire 1752) of the binary switches.	If tests pass, replace binary switch.
	Check for continuity between connector C210 terminal B and relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) terminal 86 (wire 1753).	

Probable Cause	Test	Action
5. Front HVAC blower operates but no cold air is produced. (Continued)		
Cab wiring harness faulty.	Check for continuity between terminal 30 (wire 1081) of relay R4 (for M1240 models) or K4 (for M1245 models) (compressor relay) and circuit breaker CB4 (wire 1081).	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C6 terminal 31 and heater control connector C17 terminal C (wire 1751).	
	Check for continuity across circuit breaker CB4.	
	Check for continuity between connector C2 and heater control connector C17 terminal A (wire 1082).	If test fails replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C2 and right hand switch panel connector C6 terminal 30 (wire 1752).	
	Check for continuity across the fan ford switch S6 from terminal 4 to terminal 5B.	
	Check for continuity between connector S6 (fan ford switch) terminal 5B and C6 terminal 31 (wire 1751).	
	Check for continuity between connector C6 terminal 30 and fan ford switch connector S6 terminal 4 (wire 1752).	
Front heat control valve faulty or binding (stuck open).		Replace front heat control valve or control cable.
Cab vent control cable faulty or binding.		Replace cab vent control cable.
Cab directional (defrost) control cable faulty or binding.		Replace cab directional (defrost) control cable.
Front air conditioner evaporator blocked.		Remove cover from HVAC assembly (WP 0031). Clear blockage from front of evaporator.
Front air conditioner unit refrigerant circuit faulty.		Repair refrigerant circuit.

Probable Cause	Test	Action
6. Rear heater/air conditioner blower motor does not operate.		
Right switch panel REAR HEATER switch OFF.		Turn REAR HEATER switch ON.
Circuit breaker CB7 faulty.	Check for continuity across circuit breaker CB7.	If test fails, replace circuit breaker CB7 (WP 0195).
Rear heater relay RK faulty.	Replace relay RK (rear HVAC relay) with relay RI (reverse light/alarm).	If test passes, replace relay RK.
	Check to see if the rear heater/air conditioner blower motor operates.	
Dash panel Rear Heater switch faulty.	Check for continuity across Rear Heater switch S8 terminal 2B and 3.	If test fails replace dash panel Rear Heater switch S8.
Cab wiring harness faulty.	Check for continuity between connector C427 terminal 2 and a known good ground (wire 1435E).	If test fails replace/repair cab wiring harness (WP 0218).
	Check for continuity between connector C427 terminal 1 and relay RK terminal 87 (wire 2031).	
	Check for continuity between circuit breaker CB7 (rear air conditioner) and relay RK terminal 30 (wire 2031A).	
	Check for continuity between relay RK terminal 85 (wire 1435D) and a known good ground.	
	Check for continuity between relay RK terminal 86 and connector C6 terminal 4 (wire 2030).	
Right switch panel wiring harness faulty.	Check for continuity between right hand switch panel connector C6 terminal 4 and rear HVAC switch S8 terminal 3 (wire 2030).	If test fails replace/repair right switch panel wiring harness (WP 0218).
	Check for continuity between right hand switch panel connector C6 terminal 19 and rear HVAC switch S8 terminal 2B (wire 1076).	
7. Rear heater/air conditioner blower operates but no cold air from duct.		
Front air conditioner not operating properly.		Troubleshoot front HVAC blower operates but no cold air from duct (symptom 5 in this section).
Rear heater/air conditioner temperature controls not set correctly (M1240, M1240A1 only).		Adjust rear heater/air conditioner temperature controls.

Probable Cause	Test	Action
7. Rear heater/air conditioner blower operates but no cold air from duct. (Continued)		
Air conditioner condenser blocked.		Clear blockage from air conditioner condenser.
Rear heat control valve faulty or binding (stuck open) (M1240, M1240A1 only).		Repair or replace rear heat control valve.
Rear air conditioner evaporator blocked.		Clear blockage form rear air conditioner evaporator.
Rear air conditioner wire harness faulty.	Check for 22 to 28 VDC between rear HVAC unit air conditioner solenoid terminal A and a known good ground.	If test fails, replace rear air conditioner wiring harness.
	Check for continuity between rear HVAC unit air conditioner solenoid terminal B and a known good ground.	
Rear air conditioner control solenoid valve faulty.	With the front and the rear air conditioner switch in the ON position, check for 22 to 28 VDC at the rear air conditioner solenoid.	If the test fails, replace rear air conditioner control solenoid valve.
Rear air conditioner unit refrigerant circuit faulty.		Repair rear air conditioner unit refrigerant circuit (WP 0024).
Rear heater unit faulty.		Replace rear heater unit (WP 0032).

END OF TASK

END OF WORK PACKAGE

ANTI-LOCK BRAKE SYSTEM (ABS) TROUBLESHOOTING

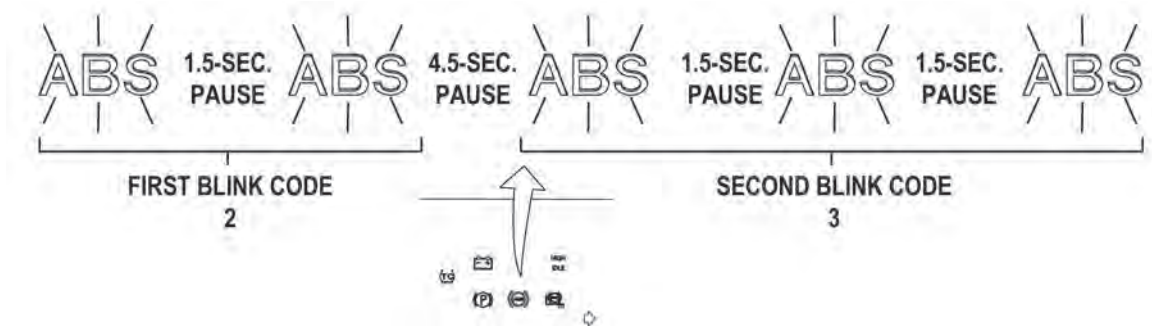
INTRODUCTION

Blink codes allow personnel to troubleshoot Anti-Lock Brake System (ABS) problems without diagnostic equipment. Information about ABS faults can be accessed by using ABS light to display fault codes. This workpackage contains the most probable faults for the ABS blink codes. The first numbers in blink codes are listed by subsystem and/or location of malfunction. The second blink code (highlighted) and description of the fault is listed in subsequent table. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a blink code is not listed, notify Supervisor.

1. Blink Code Timing:

ABS light will blink with a 1.5 second pause between blink code digits and 4.5 second pauses between blink codes.

Example:



2. Blink Code Activation:

- a. Move ENGINE switch to ON position to activate ABS diagnostic switch.
- b. Press and release the brake pedal.
- c. Press and hold the ABS diagnostic switch for two seconds, then release.
- d. Record number of blinks for trouble codes. Use charts to determine direction of troubleshooting.
- e. A blink code of 01 01 indicates no fault present.

3. Clearing Blink Codes:

- a. Move ENGINE switch to OFF position.
- b. Press and hold ABS diagnostic switch.
- c. Move ENGINE switch to ON position while holding ABS diagnostic switch.
- d. Wait two seconds and release ABS diagnostics switch.
- e. Press and release the brake pedal.
- f. Road test vehicle to verify fault(s) have been repaired.

END OF TASK

WHEEL SPEED SENSOR TROUBLE CODES

NOTE

- All references to speed sensor in this work package and SPD SENSOR in the schematics refer to the ABS sensor in (WP 0086). Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0048, WP 0047, WP 0056).

First Blink Code	Location
02	Driver side axle No. 1 wheel speed sensor.
03	Passenger side axle No. 1 wheel speed sensor.
04	Driver side axle No. 2 wheel speed sensor.
05	Passenger side axle No. 2 wheel speed sensor.

Second Blink Code	Probable Cause	Test	Action
01	1. Sensor air gap too large.		
	ABS speed sensor to tone wheel gap faulty.		Clean and adjust associated ABS speed sensor.
02	2. Air gap too large or sensor shorted.		
	ABS speed sensor faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated ABS speed sensor. Refer to (WP 0086) for ABS sensor replacement.
	ABS wiring harness faulty.	For associated speed sensor, disconnect associated ABS CPU connector. Check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminals 1 and 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Speed sensor to tone wheel gap faulty.		Clean and adjust associated speed sensor.
03	3. Speed sensor signal noisy.		
	Tone wheel faulty.		Replace associated hub assembly (WP 0086).
	Wheel bearings are loose.	Inspect air line and fittings for damage.	Tighten loose wheel bearings (WP 0085).
04	4. Wheel locked for excessive period of time during ABS cycle.		
	Brakes out of adjustment.		Inspect and adjust brakes (WP 0123).
	Air line(s) between ABS relay valve and brake chamber faulty.		Inspect air line and fittings, repair/replace as necessary.

Second Blink Code	Probable Cause	Test	Action
05	5. Excessive rate of deceleration found at a wheel site or sensor shorted.		
	ABS speed sensor is faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated speed sensor. Refer to (WP 0086).
	Wheel seals leaking.		Clean brakes and replace wheel seal (WP 0085).
	Tone wheel faulty.		Replace hub assembly (WP 0086).
	Wheel bearing are loose.		Tighten wheel bearings (WP 0085).
06	6. Sensor connected shorted low or high or sensor is open.		
	ABS speed sensor is faulty.	For associated speed sensor, check for 950 to 1900 ohms between speed sensor connector, terminals 1 and 2.	If test fails, replace associated speed sensor. Refer to (WP 0086).
	ABS wiring harness faulty.	For right front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X2, terminal 6.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For right front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X2, terminal 5.	
		For left front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X2, terminal 7.	
		For left front speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X2, terminal 8.	
		For left rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X3, terminal 1.	

Second Blink Code	Probable Cause	Test	Action
06	7. Sensor connected shorted low or high or sensor is open. (Continued)		
		For left rear speed sensor, check for less than 200 ohms between speed sensor connector, terminal 2 and connector X3, terminal 2.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For right rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X3, terminal 3.	
		For right rear speed sensor, check for less than 200 ohms between ABS wiring harness speed sensor connector, terminal 2 and connector X3, terminal 4.	
		For associated speed sensor, check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminal 1 and a known good ground.	
		For associated speed sensor, check for greater than 10,000 ohms between ABS wiring harness speed sensor connector, terminal 1 and connector X1, terminal 1.	
07	8. Internal error at sensor port of ECU.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).
08	9. Wrong sensor found in location.		
	Speed sensor wired in wrong.	Check if ABS wiring harness speed sensor connectors are connected to correct speed sensors.	Switch connectors on sensors as necessary.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK

ABS RELAY VALVE TROUBLE CODES

NOTE

- All references to ABS relay valve in this work package and RIGHT PMV and LEFT PMV in the schematics, refer to the ABS valve in (WP 0116 and WP 0117). Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
08	Driver side axle No. 1 ABS relay valve.
09	Passenger side axle No. 1 ABS relay valve.
10	Driver side axle No. 2 ABS relay valve.
11	Passenger side axle No. 2 ABS relay valve.

Second Blink Code	Probable Cause	Test	Action
1	1. Short between release solenoid and supply voltage.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X1, terminal 1.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
2	2. Short between release solenoid and ground.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminals 1 and 2.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 2 and a known good ground.	
ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).	

Second Blink Code	Probable Cause	Test	Action
3	3. Open circuit at release solenoid.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X2, terminal 3.	If test fails, replace associated ABS wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X2, terminal 10.	
3. Open circuit at release solenoid.			
3	ABS wiring harness faulty. (Continued)	For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 2 and connector X3, terminal 10.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
4	4. Open circuit in common line to valve.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X2, terminal 9.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X2, terminal 11.	
For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X3, terminal 8.			

Second Blink Code	Probable Cause	Test	Action
4	5. Open circuit in common line to valve.		
	ABS wiring harness faulty.	For left ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 1 and connector X3, terminal 11.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
5	6. Short between hold solenoid and supply voltage.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
6	7. Short between hold solenoid and ground.		
	ABS wiring harness faulty.	For associated ABS relay valve, check for greater than 10,000 ohms between ABS relay valve connector, terminals 1 and 3.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For associated ABS relay valve, check for greater than 10,000 ohms between ABS relay valve connector, terminal 3 and a known good ground.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
7	8. Open at hold solenoid.		
	ABS wiring harness faulty.	For right front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X2, terminal 4.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		For left front ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X2, terminal 2.	

Second Blink Code	Probable Cause	Test	Action
7	7. Open at hold solenoid. (Continued)		
		For right rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X3, terminal 9.	
		For left rear ABS relay valve, check for less than 200 ohms between ABS wiring harness relay valve connector, terminal 3 and connector X3, terminal 12.	
	ABS relay valve faulty.		Replace associated ABS relay valve on axle No. 1 (WP 0116) or axle No. 2 (WP 0117).
8	8. Wrong valve found in location.		
	ABS relay valve wired in wrong.	Check if ASB wiring harness relay valve connectors are connected to correct relay valves.	Switch connectors at ABS relay valve as necessary.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK**AUTOMATIC TRACTION CONTROL (ATC) TROUBLE CODES****NOTE**

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
14	Automatic Traction Control (ATC) Valve

Second Blink Code	Probable Cause	Test	Action	
5	1. Solenoid in Automatic Traction Control (ATC) valve shorted high.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X3, terminal 5.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X1, terminal 1.		
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X1, terminal 1.		
ATC valve faulty.		Replace ATC valve (WP 0119).		
6	2. Solenoid in ATC valve shorted to ground.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X3, terminal 6.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminals 1 and 2.		
		Check for greater than 10,000 ohms between ABS wiring harness ATC valve connector, terminal 1 and a known good ground.		
ATC valve faulty.		Replace ATC valve (WP 0119).		
7	3. ATC valve open circuit.			
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 1 and connector X3, terminal 6.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.	
		Check for less than 200 ohms between ABS wiring harness ATC valve connector, terminal 2 and connector X3, terminal 5.		
ATC valve faulty.		Replace ATC valve (WP 0119).		

Second Blink Code	Probable Cause	Test	Action
9	4. Engine interface shorted to ground or supply voltage.		
	ABS wiring harness faulty.	Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 1.	If test fails, disconnect ABS wiring harness J1939 connector and retest. If test fails with connector disconnected, replace ABS wiring harness. If not, troubleshoot J1939 bus. Refer to (WP 0086) for ABS sensor replacement.
		Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 11.	
		Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 1.	
		Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 11.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
10	5. Error reported from engine data link.		
	Powertrain data link faulty.		Troubleshoot engine ECU J1939 bus interface.

Second Blink Code	Probable Cause	Test	Action
11	6. Engine interface shorted to ground or supply voltage.		
	ABS wiring harness faulty.	Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 1.	If test fails, disconnect ABS wiring harness J1939 connector and retest. If test fails with connector disconnected, replace associated ABS wiring harness. If not, troubleshoot J1939 bus. Refer to (WP 0086) for ABS sensor replacement.
		Check for greater than 10,000 ohms between wire J1939+ at ABS wiring harness connector X1, terminal 7 and connector X1, terminal 11.	
		Check for greater than 10,000 ohms between wire J1939- at connector X1, terminal 6 and connector X1, terminal 1.	
	Check for greater than 10,000 ohms between wire J1939- at ABS wiring harness connector X1, terminal 6 and connector X1, terminal 11.		
12	7. Timeout or no connection found in engine link (J1939).		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	Powertrain data link faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.			
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
All (1-11)	8. Electronic Control Unit (ECU) internal fault.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK

ELECTRONIC CONTROL UNIT (ECU) INTERNAL FAULT TROUBLE CODES

First Blink Code	Location
15	Electronic Control Unit (ECU).

Second Blink Code	Probable Cause	Test	Action
05	1. Electronic Control Unit (ECU) internal fault.		
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

END OF TASK**ELECTRONIC CONTROL UNIT (ECU) TROUBLE CODES****NOTE**

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050 and WP 0047).

First Blink Code	Location
16	Power circuits.

Second Blink Code	Probable Cause	Test	Action
1	1. Excessive voltage found on ABS ECU connector X1, terminal 1.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
2	2. Low voltage found on ABS ECU connector X1, terminal 1.		
	Charging system faulty	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging.
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
3	3. No voltage found on ABS ECU connector X1, terminal 1.		
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
4	4. No ground found on ABS ECU connector X1, terminal 11.		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1435 between ABS wiring harness connectors X1, terminal 11 and C3, terminal G.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1435 between cab wiring harness connector C3, terminal G and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
5	5. Excessive voltage found on ABS ECU connector X1, terminal 2.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
6	6. Low voltage found on ABS ECU connector X1, terminal 2.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1201 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).
7	7. No voltage found on ABS ECU connector X1, terminal 2.		
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal B.	If test fails, replace/repair cab wiring harness (WP 0218).

Second Blink Code	Probable Cause	Test	Action
8	8. No ground found on ABS ECU connector X1, terminal 12.		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1435 between ABS wiring harness connectors X1, terminal 12 and C3, terminal H.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1435 between cab wiring harness connector C3, terminal H and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
9	9. Excessive voltage found on switched ignition input.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system overcharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1. Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
9	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connector C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
		Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connector C3, terminal B.	

Second Blink Code	Probable Cause	Test	Action
10	10. Low voltage found on switched ignition input.		
	Charging system faulty.	Start engine. Check for 22 to 28 volts on dash panel voltmeter.	If test fails, troubleshoot electrical system undercharging (WP 0012).
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connectors C3, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connectors C3, terminal A.			
11	11. Voltage difference between ABS ECU connector X1, terminals 1 and 2.		
	Circuit breaker CB14 faulty.	Check for less than 200 ohms across circuit breaker CB14.	If test fails, replace circuit breaker CB14.
	Circuit breaker CB15 faulty.	Check for less than 200 ohms across circuit breaker CB15.	If test fails, replace circuit breaker CB15.

Second Blink Code	Probable Cause	Test	Action
11	11. Voltage difference between ABS ECU connector X1, terminals 1 and 2. (Continued)		
	ABS wiring harness faulty.	Check for less than 200 ohms on wire 1200 between ABS wiring harness connectors C3, terminal A and X1, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms on wire 1220 between ABS wiring harness connector C3, terminal B and X1, terminal 2.	
	Cab wiring harness faulty.	Check for less than 200 ohms on wire 1200 between cab wiring harness circuit breaker CB14 terminal and connector C3, terminal A.	
	Check for less than 200 ohms on wire 1220 between cab wiring harness circuit breaker CB15 terminal and connector C3, terminal B.		

END OF TASK

MISCELLANEOUS TROUBLE CODES

NOTE

- Refer to schematics as required for harness and component identification.
- Remove armor plating as required to gain access to ABS system components (WP 0050, WP 0047).

First Blink Code	Location
17	Miscellaneous Trouble Codes.

Second Blink Code	Probable Cause	Test	Action
3	1. J1939 data link not functioning.		
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	J1939 data link wiring harness faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
		Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	

Second Blink Code	Probable Cause	Test	Action
4	2. J1939 data link timeout.		
	ABS wiring harness faulty.	Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal A and connector X3, terminal 7.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
		Check for less than 200 ohms between ABS wiring harness J1939 connector, terminal B and connector X3, terminal 6.	
	J1939 data link wiring harness faulty.	Check for less than 200 ohms across J1939 bus between ABS connector, terminal A and engine connector, terminal A.	If test fails, replace J1939 bus between ABS ECU and engine ECU.
		Check for less than 200 ohms across J1939 bus between ABS connector, terminal B and engine connector, terminal B.	
ABS ECU is faulty.		Replace ABS ECU (WP 0115).	
5	3. Tire size front to rear out of range		
	Wrong or worn tire(s).	Inspect tires.	Refer to TM 9-2355-335-10.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).
6	4. Tire size out of range or parameter.		
	Wrong or worn tire(s).	Inspect tires.	Refer to TM 9-2355-335-10.
	ABS ECU is faulty.		Replace ABS ECU (WP 0115).

Second Blink Code	Probable Cause	Test	Action
7	5. Brake light signal not found at this power cycle.		
	Stoplight circuit faulty.	Start engine and allow system pressure to build. Apply brakes and verify brake lights illuminate.	If test fails, troubleshoot brake lights do not operate (WP 0012).
	ABS ECU is faulty.	Check for 22 to 28 VDC between wire 1025 ABS wiring harness connector X2, terminal 1, and a known good ground, when brakes are applied.	If test passes and fault occurs, replace ABS ECU (WP 0115).
	ABS wiring harness faulty.	Check for less than 200 ohms across ABS harness wire OR5 from connector C3, terminal N, to connector X2, terminal 1.	If test fails, replace ABS associated wiring harness. Refer to (WP 0086) for ABS sensor replacement.
	Cab wiring harness faulty.		Replace/repair cab wiring harness (WP 0218).

END OF TASK

END OF WORK PACKAGE

BRAKE SYSTEM TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Air compressor excessively noisy.		
Compressor loose on mountings.		Re-torque mounting bolts and brackets, replace as necessary (WP 0219).
Lack of lubrication.	Inspect oil supply lines from engine.	If test fails, replace as necessary.
Loose or worn drive gear.	Remove air compressor and inspect drive gear.	If test fails, replace as necessary (WP 0219).
Air compressor faulty.	Inspect compressor for damage or failure.	If test fails, repair/replace as necessary (WP 0219).
2. Air compressor runs hot.		
Air line 2114 faulty.	Inspect air line for damage.	If test fails, replace as necessary.
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air compressor faulty.	Inspect compressor.	If test fails, replace as necessary (WP 0219).
Improper flow of coolant through compressor.	Inspect coolant lines to air compressor.	If test fails, replace as necessary.
3. Air dryer purges continually.		
Air dryer(s) purge valve frozen.		Troubleshoot air dryer freezes (Step 4).
Air governor adjustment faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air dryer purge valve faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).

Probable Cause	Test	Action
4. Air dryer freezes.		
Air dryer heater not working.	Are 22 to 28 VDC measured on wire 1538 at chassis harness connector C32, terminal 1?	If test passes, replace air dryer (WP 0103).
Service overdue on air dryer.		Change air dryer filter element (WP 0102).
Chassis wiring harness faulty.	Are less than 200 ohms measured on wire 1538 between C32, terminal 1 and C79, terminal C?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1538 between C79, terminal C and circuit breaker CB2?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB2?	If test fails, replace circuit breaker CB2 (WP 0194).
5. Air dryer will not purge.		
Air lines between air reservoir and air dryer and/or fittings faulty.	Inspect air lines and fittings between air dryer and air reservoir.	If test fails, remove and replace air lines as necessary.
Purge valve clogged, frozen, or damaged.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air dryer faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
6. Air pressure buildup is slow or air pressure is low.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings for audible leaks.	If test fails, repair/replace as necessary.
Air reservoir drain valve(s) faulty.	Inspect drain valves.	If test fails, replace drain valves.
Air dryer purge valve stuck open, constant leaking from base of filter dryer body.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air pressure gauge faulty.		Replace pressure gauge.
Restricted air intake to compressor.	Check inlet hose and fittings from manifold for blockage or restriction.	If test fails, repair/replace air line as required.
Air compressor discharge port faulty.	Inspect discharge port for clog or damage.	If test fails, repair/replace as necessary (WP 0219).

Probable Cause	Test	Action
6. Air pressure buildup is slow or air pressure is low. (Continued)		
Air compressor faulty.	Inspect compressor for damage or failure.	If test fails, repair/replace as necessary (WP 0219).
Air reservoir supply tank No. 1 faulty.	Inspect air reservoir supply tank No. 1.	If test fails, repair/replace as necessary (WP 0111).
7. Air pressure drops rapidly after engine shutdown.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Air reservoir inlet check valves faulty.	Inspect inlet check valves on air reservoirs.	If test fails, repair/replace as necessary (WP 0107).
Air reservoir drain valve(s) faulty.	Inspect drain valves for operation.	If test fails, replace drain valves (WP 0108, WP 0113).
Air reservoir supply tank No. 1 faulty.	Inspect air reservoir supply tank No. 1.	If test fails, repair/replace as necessary (WP 0111).
Secondary air reservoir faulty.	Inspect secondary air reservoir.	If test fails, repair/replace as necessary (WP 0109, WP 0110).
8. Air pressure rises above specified cut-out pressure of 125 psi (860 kPa).		
Air governor faulty.	Adjust air governor (WP 0104).	If test fails, replace air governor (WP 0105).
Air pressure gauge faulty.		Replace pressure gauge.
Air compressor faulty.		Inspect compressor and repair/replace as necessary (WP 0219).
9. Excessive loss of air pressure when braking.		
Air line(s) and/or fitting(s) faulty.	Inspect air lines and fittings for wear and damage.	If test fails, repair/replace as necessary.
Service brake relay valve faulty.	Check for audible air leak from valve.	If test fails, replace service brake relay valve (WP 0133).
Treadle valve faulty.	Check for audible air leak from valve.	If test fails, repair/replace as necessary.
Front or rear gladhand faulty.	Inspect front and rear gladhands.	If test fails, repair/replace if necessary.
Spring brake relay double check valve faulty.	Check for audible air leak from valve.	If test fails, replace spring brake double check valve (WP 0134).
Spring brake valve faulty.	Check for audible air leak from valve.	If test fails, replace spring brake valve (WP 0136).
Tractor protection faulty.		Replace tractor protection valve (WP 0137).
Quick release valve (axle No. 1) faulty.	Check for audible air leak from valve.	If test fails, replace quick release valve (axle No. 1) (WP 0128).

Probable Cause	Test	Action
9. Excessive loss of air pressure when braking. (Continued)		
Front brake chamber faulty.	Inspect front brake chambers.	If test fails, repair/replace as necessary (WP 0120).
Rear brake chamber faulty.	Inspect rear brake chambers.	If test fails, repair/replace as necessary (WP 0121).
10. Large quantity of moisture expelled from reservoirs.		
Air dryer faulty.	Inspect air dryer.	If test fails, replace air dryer as necessary (WP 0103).
11. ABS light does not operate correctly.		
Circuit breaker CB13 faulty.	Are less than 200 ohms measured across circuit breaker CB13?	If test fails, replace circuit breaker CB13 (WP 0194).
Relay_E faulty.	Are less than 200 ohms measured on relay_E between terminals 87A and 30.	If test fails, replace relay_E.
Indicator light circuit board faulty.	Are 22 to 28 VDC measured on wire X103 at chassis harness connector C4, terminal 5?	If test passes, repair/replace indicator light circuit board.
Indicator light circuit board wiring harness faulty.	Are 22 to 28 VDC measured on wire X103 at capsule harness connector C4, terminal 5?	If test passes, replace/repair indicator light circuit board wiring harness (WP 0218).
	Are less than 200 ohms measured on wire X103 between capsule harness connector C4, terminal 5 and relay_E connector, terminal 30?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1527 between relay_E connector, terminal 87A and circuit breaker CB13?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB2?	If test fails, replace circuit breaker CB2 (WP 0194).
ABS ECU faulty.		Replace ABS ECU (WP 0115).
12. ABS does not operate.		
ABS control system faulty.		Check for blink codes (WP 0009).
13. ATC Light does not operate.		
Indicator light circuit board faulty.	Are 22 to 28 VDC measured on wire X101 at chassis harness connector C4, terminal 6?	If test passes, replace indicator light circuit board.
Indicator light circuit board wiring harness faulty.	Are 22 to 28 VDC measured on wire X101 at capsule harness connector C4, terminal 6?	If test passes, replace/repair indicator light circuit board wiring harness (WP 0218).

Probable Cause	Test	Action
13. ATC Light does not operate. (Continued)		
Indicator light circuit board wiring harness faulty.	Are less than 200 ohms measured on wire X103 between capsule harness connector C4, terminal 5 and relay_E connector, terminal 30?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 1527 between relay_E connector, terminal 87A and circuit breaker CB13?	If test fails, replace/repair wiring harness as necessary (WP 0218).
	Are less than 200 ohms measured across circuit breaker CB13?	If test fails, replace circuit breaker CB13 (WP 0194).
ABS ECU faulty.		Troubleshoot ABS system (WP 0009).
14. Parking brake does not hold vehicle.		
Air line(s) and/or fitting(s) faulty	Inspect air lines for audible leaks.	If test fails, repair/replace as necessary.
Brake chamber(s) faulty		Inspect axle No. 2 (WP 0121) brake chambers and repair/replace as necessary.
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake(s) caged		Inspect brake assemblies and uncage brakes as necessary.
15. Parking brake(s) drag or will not release.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Spring brake relay valve R-14 faulty.		Inspect spring brake relay valve and repair/replace as necessary (WP 0135).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Spring brake relay double check valve faulty.		Replace spring brake relay double check valve (WP 0134).
Spring brake valve faulty		Inspect spring brake valve and repair/replace as necessary (WP 0136).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
Quick release valve faulty.		Replace quick release valve (WP 0128, WP 0129).

Probable Cause	Test	Action
15. Parking brake(s) drag or will not release. (Continued)		
Dash manifold assembly faulty.		Inspect dash manifold assembly and repair/replace as necessary.
16. Parking brake(s) will not apply.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
17. Service brake (on one wheel only) not releasing.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
ABS valve(s) faulty.		Troubleshoot ABS system (WP 0009).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
18. Service brake(s) fails to release properly.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Spring brake relay valve R-14 faulty.	Inspect spring brake relay valve.	If test fails, repair/replace as necessary (WP 0135).
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Quick release valve(s) faulty.	Inspect quick release valves.	If test fails, repair/replace as necessary (WP 0128, WP 0129).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).

Probable Cause	Test	Action
19. Service brake(s) grabbing.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Brake shoes worn.	Inspect brake shoes.	If test fails, replace as necessary (WP 0124).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
20. Service brake(s) overheats.		
Rear brakes are damaged or require adjustment.	Inspect and adjust brakes (WP 0123).	If test fails, replace as necessary (WP 0124).
21. Service brakes apply too slowly.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Excess clearance between brake shoes and brake drums.	Inspect brakes.	Perform adjustment as necessary (WP 0123).
22. Service brakes(s) will not apply.		
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.
Service brake relay valve R-12 faulty.	Inspect service brake relay valve R-12.	If test fails, repair/replace as necessary (WP 0133).
Quick release valve(s) faulty.	Inspect quick release valves.	If test fails, repair/replace as necessary (WP 0128, WP 0129).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect brakes and repair/replace as necessary (WP 0121, WP 0120).
23. Poor braking performance.		
Worn or incorrect brake pads.	Inspect brake shoes.	Replace as necessary (WP 0123).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	If test fails, repair/replace as necessary.

Probable Cause	Test	Action
24. Uneven braking (pulling).		
Brake(s) caged.	Inspect brake assemblies.	Uncage brakes as necessary.
Air line(s) and/or fitting(s) to spring brake chambers faulty.	Inspect air lines and fittings.	Repair/replace as necessary.
Brake shoes worn	Inspect brake shoes.	If test fails, replace as necessary (WP 0124).
Brake adjustment faulty.		Inspect brakes and perform adjustment (WP 0123).
Brake chamber(s) faulty.		Inspect axle No. 2 brake chambers and repair/replace as necessary (WP 0121).
Brake drum(s) warped, damaged, or dirty.	Inspect brake drums.	If test fails, repair/replace as necessary (WP 0122).
Grease or oil on brake drums or pads.	Inspect brake drums and pads (WP 0123).	Repair/replace as necessary (WP 0122, WP 0124).

END OF TASK

END OF WORK PACKAGE

COOLING SYSTEM TROUBLESHOOTING

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

COOLING SYSTEM TROUBLESHOOTING

Probable Cause	Test	Action
1. Capsule heater not functioning.		
Loss of coolant due to leakage.	Check for leaks at all hoses, fittings, freeze plugs, water pump, low coolant level switch, sight glass, radiator, surge tank or reservoir cap (depending on vehicle configuration), heater core or head gasket.	If test fails, tighten clamps or replace hoses as necessary.
Blower motor does not operate.	Check if blower motor operates correctly.	If test fails, troubleshoot blower motor does not operate correctly (WP 0012).
Defrost control does not operate.	Test for defrost control operation.	If test fails, replace heater controls as necessary (WP 0147).
Heater core, radiator, hose, or valve blocked internally.		Flush coolant system (WP 0176, WP 0177).
Cable for heater control.	With second person visually inspect water shut off valve for operation.	If test fails, replace heater controls as necessary (WP 0147).
Heater core blocked externally.	Inspect for external blockage in heater core.	Clean or replace obstructed component.
2. Engine overheats water temp gauge continuously reads over 220°F (104°C).		
FAN FORD switch activated.		Turn FAN FORD switch off.
	Are 22 to 28 VDC measured on wire 1751 Fan ford switch connector, terminal 5B.	If test fails, replace wire 1751 from fan ford switch to heater control connector C17, terminal C (WP 0218).
	Are less than 200 ohms measured between fan ford switch connector, terminals 4 and 5B.	If test fails, remove and replace defective fan ford switch.
		If test fails, replace wire 1452 from fan ford switch connector, terminal 4 to engine harness connector C210, terminal A. (WP 0218).

Probable Cause	Test	Action
2. Engine overheats water temp gauge continuously reads over 220°F (104°C). (Continued)		
Water pump belt broken.	Inspect engine pulleys for damage.	If test fails, replace damaged pulleys.
		If test fails, install new belt (WP 0238).
Air solenoid manifold assembly faulty.	If fan can be rotated with engine off, air solenoid manifold valve may be faulty. Inspect.	If test fails, replace air solenoid manifold assembly (WP 0114).
Shroud missing or broken.	Visually inspect fan shroud for damage.	If test fails, replace fan shroud (WP 0179).
Fan clutch faulty.	If fan can be rotated with engine off, fan clutch may be faulty.	If test fails, replace fan clutch (WP 0178).
Blocked air flow through charge air cooler.		If test fails, replace charge air cooler (WP 0172).
Radiator fins damaged or obstructed.		If test fails, correct obstruction or damage.
Loss of coolant due to leakage.	Check for leaks at all hoses, fittings, freeze plugs, water pump, low coolant level switch, sight glass, radiator, surge tank or reservoir cap (depending on vehicle configuration), heater core or head gasket.	If test fails, tighten clamps or replace hoses as necessary.
Radiator cap faulty.	Test radiator cap.	If test fails, replace radiator cap.
Temperature gauge faulty.		If test fails, replace temperature gauge.
Thermostat failure.	Remove and test thermostat.	If test fails, replace as necessary (WP 0183).
Check engine light is on.	Check for active engine fault codes.	Correct faults shown in ECM.
Water pump failure.	Test and examine water pump.	If test fails, replace water pump as necessary.
	Examine water pump pulley for operation.	If test fails, replace pulley as necessary.
Radiator blocked internally.		If test fails, flush coolant system (WP 0176, WP 0177).
3. Engine runs too cool.		
Fan clutch remains engaged.	If fan can be rotated with engine off, fan clutch may be faulty.	If test fails, replace fan clutch as necessary (WP 0178).
Thermostat stuck open.	Remove and test thermostat.	If test fails, replace thermostat (WP 0183).
Check engine light is on.	Check for active engine fault codes.	Correct faults shown in ECM.

END OF TASK

END OF WORK PACKAGE

ELECTRICAL TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Charging system overcharging (instrument panel voltmeter).		
Ignition relay R1 faulty.	Check for less than 200 ohms across ignition relay R1, terminals 86 (wire 1075) and 85 (wire 1435E).	If test fails, replace ignition relay R1.
Circuit breaker CB12 faulty.	Check for less than 200 ohms across circuit breaker CB12.	If test fails, replace circuit breaker CB12 (WP 0195).
Battery cables damaged or connections are loose or corroded.		Replace damaged cable or clean and tighten battery terminals as necessary (WP 0191).
Batteries faulty.	Check for 22 to 28 VDC across batteries.	If test fails, charge battery with external charger. If battery charges, go to alternator belt loose or faulty. If not, replace battery (WP 0191).
Alternator belt loose or faulty.		Replace alternator belt and adjust tension as necessary (WP 0221).
Engine wiring harness faulty.	Turn ignition switch on and check for 22 to 28 VDC on wire J906 between engine wiring harness alternator IGN terminal and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
Alternator voltage regulator faulty.	Start engine and check for 26 to 30 VDC between alternator +24 VDC terminal and a known good ground.	If test passes, go to instrument panel voltmeter gauge faulty. If test fails, replace voltage regulator (WP 0217) and go to alternator faulty.
Alternator faulty.	Start engine and check for 26 to 30 VDC between alternator +24 VDC terminal and a known good ground.	If test fails, replace alternator (WP 0185).
Instrument panel voltmeter gauge faulty.		Replace instrument panel (WP 0149).

Probable Cause	Test	Action
2. All electrical components do not operate.		
Battery cables damaged or connections are loose or corroded.		Replace damaged cable or clean and tighten battery terminals as necessary (WP 0189, WP 0191).
Batteries faulty.	Check for 22 to 28 VDC across batteries.	If test fails, charge battery with external charger. If battery does not charge, replace battery (WP 0191).
Battery disconnect switch connections loose or corroded.		Disconnect batteries and clean and tighten connections as necessary (WP 0188).
Cab pass thru stud connections loose or corroded.		Disconnect batteries and clean and tighten connections as necessary.
Battery cable 1139 between batteries and battery disconnect switch faulty.	Check for 22 to 28 VDC on battery cable 1139 between battery disconnect switch, terminal wire 1139 and a known good ground.	If test fails, replace battery cable 1139 (WP 0191).
Battery disconnect switch faulty.	Turn battery disconnect switch on and check for 22 to 28 VDC from battery disconnect switch, terminal wire 1975, to a known good ground.	If test fails, replace battery disconnect switch (WP 0188).
Cable 1975 between battery disconnect switch and cab pass thru stud faulty.	Check for 22 to 28 VDC on cable 1975 between cab pass-thru stud and a known good ground.	If test fails, replace cable 1975.
3. No voltage present at power distribution unit 12-volt outlet(s).		
Cab wiring harness faulty.	With battery disconnect switch off, check for continuity on wire 1860 between cab power M1 pass-thru stud and cab wiring harness connector C15, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C15, terminals 1 and 6.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1088 between cab wiring harness connectors C15, terminal 5 and C7, terminal 3.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C7 terminal 2 and a known good ground.	

Probable Cause	Test	Action
3. No voltage present at power distribution unit 12-volt outlet(s). (Continued)		
Air panel wiring harness faulty.	Check for less than 200 ohms on wire 1088 between air panel wiring harness connector C7, terminal 3 and 12-volt outlet, terminal wire 1088.	If test fails, replace/repair air panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between air panel wiring harness connector C7 terminal 2 and 12-volt outlet, terminal wire 1435F.	
12-volt power converter faulty.	Connect connectors and check for 10 to 14 VDC on wire 1088 between air panel wiring harness 12-volt power out terminals, wire 1088 and 1435F.	If test fails, replace 12-volt power converter.
12-volt power outlet faulty.		Replace 12-volt power outlet.
4. All instrument panel gauges and indicators do not operate.		
Circuit breaker CB19 faulty.	Check for less than 200 ohms across circuit breaker CB19.	If test fails, replace circuit breaker CB19.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1276 between cab wiring harness connector C4, terminal 31 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C4, terminal 11 and a known good ground.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature and voltmeter).		
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1276 between cab wiring harness connector C4, terminal 31 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C4, terminal 11 and a known good ground.	
Voltmeter faulty.		If voltmeter is not operating correctly, Replace instrument panel (WP 0149).
Air lines faulty.	If air pressure gauge(s) are not operating correctly, check air lines 2073 and 2641 for leaks crimps and damage.	If test fails, replace air lines as necessary.

Probable Cause	Test	Action
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature and voltmeter). (Continued)		
Air pressure gauge(s) faulty.		If air pressure gauges are not operating correctly, replace instrument panel (WP 0149).
Cab wiring harness faulty.	<p>If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1319 between cab wiring harness connectors C1, terminal 15 and C4, terminal 22.</p> <p>If transmission oil temperature gauge is not operating correctly, check for less than 200 ohms on wire 1449 between cab wiring harness connectors C2, terminal 20 and C4, terminal 28.</p>	If test fails, replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	<p>If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1319 between chassis wiring harness connectors C1, terminal 15 and C30, terminal B.</p> <p>If fuel gauge is not operating correctly, check for less than 200 ohms on wire 1435 between chassis wiring harness connector C30, terminal A and a known good ground.</p>	If test fails, replace/repair chassis wiring harness (WP 0218).
Fuel gauge faulty.	If fuel gauge does not operate, connect jumper between chassis harness connector C30 terminal B (wire 1319) to terminal A (wire 1435) and check if fuel gauge deflects full scale.	If test fails, replace instrument panel (WP 0149).
Fuel sending unit faulty.		If fuel gauge is not operating correctly, replace fuel sending unit.
Engine wiring harness faulty.	If transmission oil temperature gauge is not operating correctly, check for less than 200 ohms on wire 1449 between engine wiring harness connector C2, terminal 20 and transmission oil temperature sensor SU9, terminal wire 1449.	If test fails, replace/repair engine wiring harness (WP 0218).
Transmission oil temperature sending unit faulty.		If transmission oil temperature gauge is not operating correctly, replace transmission oil temperature sending unit and go to transmission oil temperature gauge faulty.

Probable Cause	Test	Action
5. Instrument panel gauge(s) does not operate or inaccurate (air pressure, fuel gauge, transmission oil temperature, and voltmeter). (Continued)		
Transmission oil temperature gauge faulty.	Check operation of transmission oil temp gauge.	If transmission oil temperature gauge is not operating correctly, replace instrument panel (WP 0149).
6. Instrument panel gauge(s) does not operate or inaccurate (engine coolant temperature, engine oil pressure, speedometer and tachometer).		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Transmission fault code(s) present.	If speedometer is not operating correctly, check for transmission diagnostic codes.	If diagnostic codes are active, troubleshoot transmission diagnostic codes.
Cab wiring harness faulty.	Check for less than 200 ohms on wire J1939+ between cab wiring harness connectors C4, terminal 34 and C406 terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire J1939- between cab wiring harness connectors C4, terminal 35 and C406 terminal B.	
Engine coolant temperature gauge faulty.		Replace instrument panel (WP 0149).
Engine oil temperature gauge faulty.		Replace instrument panel (WP 0149).
Speedometer faulty.		Replace instrument panel (WP 0149).
Tachometer faulty.		Replace instrument panel (WP 0149).
7. Instrument panel driveline lock indicator(s) do not operate.		
Instrument panel driveline lock indicator light(s) faulty.	Turn ignition switch on and verify instrument panel drive line lock indicators illuminates for 2 seconds during startup self-test.	If test fails, replace instrument panel (WP 0149).
Transmission fault code(s) present.	Check for transmission diagnostic codes.	If diagnostic codes are active, troubleshoot transmission diagnostic codes.
Transfer case lock does not engage front axle.	With ignition switch on. Select drive line lock switch to engage T-CASE lock. Check for 22 to 26 VDC between CTIS wiring harness connector C63, terminals 1 (wire 1701) and 2 (wire 1435G).	If test fails, troubleshoot transfer case does not engage front axle (WP 0016).

Probable Cause	Test	Action
7. Instrument panel driveline lock indicator(s) do not operate. (Continued)		
Axle 2 differential lock does not engage.	Select drive line lock switch to engage axle 2 differential lock. Check for 22 to 26 VDC between CTIS wiring harness connector C62, terminals 1 (wire 1704) and 2 (wire 1435G).	If test fails, troubleshoot differential lock will not engage (WP 0016).
Axle 1 differential lock does not engage.	Select drive line lock switch to engage axle 1 differential lock. Check for 22 to 26 VDC between CTIS wiring harness connector C60, terminals 1 (wire 1333) and 2 (wire 1435G) (on solenoid on firewall).	If test fails, troubleshoot differential lock will not engage (WP 0016).
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 2023 between chassis wiring harness connectors C41, terminal 17 and C410, terminal 1 (on transfer case).	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1135 between chassis wiring harness connectors C41, terminal 19 and C410, terminal 2 (on transfer case).	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2023 between cab wiring harness connectors C41, terminal 17 and C4, terminal 17.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1135 between cab wiring harness connectors C55, terminal K1 and C41, terminal 19.	
	Check for less than 200 ohms on wire 1333 between cab wiring harness connectors C55, terminal E3 and C4, terminal 19.	
	Check for less than 200 ohms on wire 1704 between cab wiring harness connectors C55, terminal E2 and C4, terminal 18.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Transfer case faulty.	Start engine. Operate vehicle per SOP and verify transfer case lock indicator illuminates when transfer case lock is selected.	If test fails, troubleshoot transfer case does not engage front axle (WP 0016).

Probable Cause	Test	Action
8. Instrument panel high beam indicator does not operate.		
Instrument panel high beam indicator light faulty.	Turn ignition switch on and verify instrument panel high beam indicator illuminates for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1007 between cab wiring harness relay A connector, terminal 87A and connector C4, terminal 13.	If test fails, replace/repair cab wiring harness (WP 0218).
Instrument panel faulty.		Replace instrument panel (WP 0149).
9. Instrument panel parking brake indicator does not operate.		
Instrument panel parking brake indicator light faulty.	Turn ignition switch on and verify instrument panel parking brake indicator illuminates for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1049 between cab wiring harness connectors PS4 , terminal 1 and C4, terminal 20.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector PS4, terminal 2 and a known good ground.	
Parking brake switch faulty.	Apply parking brakes and check for less than 200 ohms between parking brake switch PS4 terminals.	If test fails, replace parking brake switch (WP 0207).
Instrument panel faulty.		Replace instrument panel (WP 0149).
10. Instrument panel turn signal indicator(s) do not operate properly.		
Turn signals do not operate.		Troubleshoot turn signals do not operate.
Instrument panel turn signal indicator light faulty.	Turn ignition switch on and verify instrument panel turn signal indicators illuminate for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1001 between cab wiring harness connectors C18, terminal 1 and C4, terminal 12.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1002 between cab wiring harness connectors C18, terminal 3 and C4, terminal 21.	
Instrument panel faulty.		Replace instrument panel (WP 0149).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate.		
Clearance lights do not operate.		Troubleshoot clearance lights do not operate.
Blackout lights do not operate.		Troubleshoot blackout lights do not operate.
Left hand switch panel wires 1008, 1150 or 1012 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between left hand switch panel wiring harness connectors C408, terminal 4 and C5, terminal V.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Left hand switch panel wires 1008, 1150 or 1012 faulty.	If all panel backlights do not operate when blackout lights are on, check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and C408, terminal 3.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all panel backlights do not operate when clearance lights are on, check for less than 200 ohms on wire 1012 between left hand switch panel wiring harness connectors S12, terminal 3 and C408, terminal 2.	
Diode pack D7 faulty.	If all panel backlights operate when clearance lights or blackout lights are on, but not both, diode pack is faulty.	Replace diode pack D7.
Right hand switch panel wires 1008 or 1052 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between right hand switch panel wiring harness connectors C6, terminal 28 and S9, terminals 2B and 5B.	If test fails, replace/repair right hand switch panel wiring harness (WP 0218).
	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1052 between right hand switch panel wiring harness connectors S9 terminal 6 and C6, terminal 23.	
Cab wiring harness wire 1008 faulty.	If all panel backlights do not operate when clearance and blackout lights are on, check for less than 200 ohms on wire 1008 between cab wiring harness connectors C5, terminal V and C6, terminal 28.	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1052 faulty.	If right hand switch panel backlights operate and all others do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C5, terminal K.	If test fails, replace/repair cab wiring harness (WP 0218).
	If heater / air conditioner control panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C25, terminal B.	
Cab wiring harness wire 1052 faulty.	If left hand switch panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C5, terminal K.	If test fails, replace/repair cab wiring harness (WP 0218).
	If instrument panel backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C4, terminal 14.	
	If air panel air restriction indicator and de-icer switch backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C7, terminal 1.	
	If air panel GOLIGHT (spotlight) switch backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C428, terminal 3.	
	If transmission control backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connectors C6, terminal 23 and C10, terminal 3.	
	If CTIS control backlights do not operate, check for less than 200 ohms on wire 1052 between cab wiring harness connector C6, terminal 23 and relay J connector, terminal 87.	

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1052 faulty.	If CTIS control backlights do not operate when lights are on, check for less than 200 ohms on wire 1052 between cab wiring harness connector C6, terminal 23 and relay J connector, terminal 87.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1076 faulty.	If CTIS control backlights do not operate when lights are off, check for less than 200 ohms on wire 1076 between cab wiring harness C6, terminal 19 and relay J connector, terminal 87A.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1053 faulty.	If CTIS control backlights do not operate, check for less than 200 ohms on wire 1053 between cab wiring harness relay J connector, terminal 30 and connector C55, terminal J1.	If test fails, replace/repair cab wiring harness (WP 0218).
Cab wiring harness wire 1435 faulty.	<p>If heater / air conditioner control panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C25, terminal L and a known good ground.</p> <p>If left hand switch panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C5, terminal D and a known good ground.</p> <p>If air panel air restriction indicator and de-icer switch backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C7, terminal 8 and a known good ground.</p> <p>If air panel GOLIGHT (spotlight) switch backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C428, terminal 2 and a known good ground.</p> <p>If right hand switch panel backlights do not operate, check for less than 200 ohms on wire 1435 between cab wiring harness connector C6, terminal 21 and a known good ground.</p>	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
Cab wiring harness wire 1435 faulty.	If CTIS control backlights do not operate when clearance lights are on, check for less than 200 ohms on wire 1435 between cab wiring harness relay J connector, terminal 85 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
Dash light dimmer faulty.	If all panel backlights do not operate when clearance and blackout lights are on, dimmer switch is faulty.	Replace dash light dimmer switch.
Left hand switch panel wire 1052 or 1435 faulty.	If more than one left hand switch panel backlights do not operate, left hand switch panel wiring harness is faulty.	Replace/repair left hand switch panel wiring harness (WP 0218).
Right hand switch panel wire 1052 or 1435 faulty	If more than one right hand switch panel backlights do not operate, right hand switch panel wiring harness is faulty.	Replace/repair right hand switch panel wiring harness (WP 0218).
Air panel wire 1052 or 1435 faulty.	If air restriction indicator and de-icer switch backlights do not operate, air panel wiring harness is faulty.	Replace/repair air panel wiring harness (WP 0218).
Air panel wire 1052 or 1435 faulty.	If GOLIGHT (spotlight) switch backlight does not operate, check for less than 200 ohms on wire 1052 between air panel wiring harness connectors C428, terminal 3 and S19 terminal 7.	If test fails, replace/repair air panel wiring harness (WP 0218).
	If GOLIGHT (spotlight) switch backlight does not operate, check for less than 200 ohms on wire 1435 between air panel wiring harness connectors S19, terminal 9 and C428, terminal 2.	
Heater / air conditioner control faulty.	If heater / air conditioner control backlights do not operate, heater / air conditioner control is faulty.	Replace Heater / air conditioner control (WP 0147).
Instrument panel faulty.	If instrument panel backlights do not operate, check for 22 to 28 VDC on between wire 1052 at chassis harness connector C4, terminal 14 and a known good ground, when panel lights are set for full intensity.	If test passes, replace instrument panel (WP 0149).
Transmissions shift selector faulty.	If transmission shift selector panel backlights do not operate, check for 22 to 28 VDC on between wire 1052 at chassis harness connector C10, terminal 3 and a known good ground, when panel lights are set for full intensity.	If test passes, replace shift selector panel (WP 0150).

Probable Cause	Test	Action
11. Instrument and switch panel backlight(s) does not operate. (Continued)		
CTIS control faulty.	If CTIS control backlights do not operate, check for 22 to 28 VDC on between wire 1053 at chassis harness connector C55, terminal J1 and a known good ground, when panel lights are set for full intensity.	If test passes, replace CTIS control (WP 0168).
Panel switch backlight bulb faulty.		Replace switch non-operating backlight bulb.
Panel switch faulty.		Replace panel switch.
12. Instrument panel low air warning light and/or alarm do not operate when front air pressure is below 64 to 76 PSI (441 to 524 KPA).		
Instrument panel brake system failure indicator light faulty	Turn ignition switch on and verify instrument panel brake system failure indicators illuminate for 2 seconds during startup self test.	If test fails, replace instrument panel (WP 0149).
Front air supply pressure switch faulty.	Drain air system and check for less than 200 ohms between front air supply pressure switch PS5 terminals	If test fails, replace front air supply pressure switch PS5.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1520 between cab wiring harness connectors C4, terminal 4 and PS5, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness connector PS5, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1076 between cab wiring harness connectors C4, terminal 7 and LS1, pos (+) terminal (backup alarm).	
	Check for less than 200 ohms on wire 1121 between cab wiring harness connectors C4, terminal 16 and LS1, neg (-) terminal (backup alarm).	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Alarm faulty.		Replace alarm.

Probable Cause	Test	Action
13. Instrument panel low air warning light and/or alarm do not operate when rear air pressure is below 64 to 76 PSI (441 to 524 KPA).		
Instrument panel brake system failure indicator light faulty.	Turn ignition switch on and verify instrument panel brake system failure indicators illuminate for 2 seconds during startup self-test.	If test fails, replace instrument panel (WP 0149).
Rear air supply pressure switch faulty.	Drain air system and check for less than 200 ohms between rear air supply pressure switch PS6 terminals	If test fails, replace rear air supply pressure switch PS6.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1521 between cab wiring harness connectors C4, terminal 3 and PS6, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness connector PS6, terminal 2 and a known good ground.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1076 between cab wiring harness connectors C4, terminal 7 and LS1 (backup alarm), pos (+) terminal.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1121 between cab wiring harness connectors C4, terminal 16 and LS1 (backup alarm), neg (-) terminal.	
Instrument panel faulty.		Replace instrument panel (WP 0149).
Alarm faulty.		Replace alarm.
14. All blackout lights do not operate.		
Headlight do not operate.		Troubleshoot headlights do not operate.
Brake lights do not operate.		Troubleshoot brake lights do not operate.
Blackout select switch faulty.	Check for less than 200 ohms across blackout select switch S13 from terminal 2B to 1 when switch is in the blackout select position.	If test fails, replace blackout select switch.
	Check for less than 200 ohms across blackout select switch S13 from terminal 5B to 4 when switch is in the blackout select position.	

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate.		
Circuit breaker CB22 faulty.	Check for less than 200 ohms across circuit breaker CB22.	If test fails, replace circuit breaker CB22.
Chassis wiring harness cab trailer ISO connector C23A disconnected.		Connect chassis wiring harness cab trailer ISO connector C23A
Driver side rear composite light faulty.	If driver side brake light does not operate, check for 22 to 28 VDC on wire 1003 between rear light wiring harness connector L17, terminals wire 1003 and wire 1435, when brakes are applied.	If test passes, replace composite light.
Passenger side rear composite light faulty.	If passenger side brake light does not operate, check for 22 to 28 VDC on wire 1004 between rear light wiring harness connector L16, terminals wire 1004 and wire 1435, when brakes are applied.	If test passes, replace composite light.
Front stoplight pressure switch PS2 faulty.	If all brake lights do not operate, start engine and charge air system to 100 psi (689 kPa). Then, shut down system, turn battery disconnect switch off, and check for less than 200 ohms across front stoplight pressure switch PS2, when brakes are applied.	If test fails, replace front stoplight pressure switch PS2.
Rear stoplight pressure switch PS3 faulty.	If all brake lights do not operate. Start engine and charge air system to 100 psi (689 kPa). Then, shut down system, turn battery disconnect switch off, and check for less than 200 ohms across rear stoplight pressure switch PS3, when brakes are applied.	If test fails, replace rear stoplight pressure switch PS3.
Blackout select switch faulty.	If all brake lights do not operate, replace blackout select switch and check operation of brake lights.	If test fails, go to diode pack D6 faulty.
Diode pack D6 faulty.	If all brake lights do not operate, replace diode pack D6 and check operation of brake lights.	If test fails, go to left hand switch panel wiring harness faulty.

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate. (Continued)		
Left hand switch panel wiring harness faulty.	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between left hand switch panel wiring harness connectors C5, terminal F and S13, terminal 5B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all brake lights do not operate, check for less than 200 ohms on wire 1005A between left hand switch panel wiring harness connectors S13, terminal 6 and C5 terminal E.	
Turn signal switch faulty.	Check for less than 200 ohms across turn signal switch connector from terminal 5 (wire 1005B) to terminal 4 (wire 1003) when switch is in the neutral position.	If test fail, replace turn signal switch.
	Check for less than 200 ohms across turn signal switch connector from terminal 5 (wire 1005B) to terminal 2 (wire 1004) when switch is in the neutral position.	
Cab wiring harness faulty.	If all brake lights do not operate, turn battery disconnect switch off and check for less than 200 ohms on wire 1009 between cab wiring harness circuit breaker CB22 connector and connector PS2.	If test fails, replace/repair cab wiring harness (WP 0218).
	If all brake lights do not operate, turn battery disconnect switch off and check for less than 200 ohms on wire 1009 between cab wiring harness circuit breaker CB22 connector and connector PS3.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between cab wiring harness connectors PS2 and C5, terminal F.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005 between cab wiring harness connectors PS3 and C5, terminal F.	
	If all brake lights do not operate, check for less than 200 ohms on wire 1005A between cab wiring harness connectors C5, terminal E and C97 terminal 2.	

Probable Cause	Test	Action
15. Brake lights (rear composite lights) do not operate. (Continued)		
Cab wiring harness faulty.	If all brake lights do not operate, check for less than 200 ohms on wire 1005B between cab wiring harness connectors C97 terminal 1 and C18 terminal 5.	If test fails, replace/repair cab wiring harness (WP 0218).
	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between cab wiring harness connectors C18 terminal 4 and C1, terminal 4.	
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between cab wiring harness connectors C18 terminal 2 and C1, terminal 3.	
Chassis wiring harness faulty.	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between chassis wiring harness connectors C1, terminal 4 and C24, terminal 2.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between chassis wiring harness connectors C1, terminal 3 and C24, terminal 1.	
Rear light wiring harness faulty.	If driver side brake lights do not operate, check for less than 200 ohms on wire 1003 between rear light wiring harness connectors C24, terminal 2 and L16, terminal wire 1003.	If test fails, replace/repair rear body/taillight wiring harness (WP 0218).
	If passenger side brake lights do not operate, check for less than 200 ohms on wire 1004 between rear light wiring harness connectors C24, terminal 1 and L17, terminal wire 1004.	
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	

Probable Cause	Test	Action
16. Blackout brake lights do not operate.		
Brake lights do not operate.		Troubleshoot brake lights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1678 between rear light wiring harness non-operating light connector, terminals wire 1678 and wire 1435, when system is in blackout mode and brakes are applied.	If test passes, replace composite light.
Blackout select switch faulty.		Replace blackout select switch.
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1678 between left hand switch panel wiring harness connectors S13, terminal 4 and C5 terminal D.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1678 between cab wiring harness connectors C5 terminal D and C1, terminal 2.	If test fails replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1678 between chassis wiring harness connectors C1, terminal 2 and C24, terminal 4.	If test fails replace/repair chassis wiring harness (WP 0218).
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1678 between rear light wiring harness connectors C24, terminal 4 and non-operating light connector, terminal wire 1678.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	
17. Clearance, parking, or tail lights do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1008 between rear light wiring harness non-operating light connector, terminals wire 1008 and wire 1435.	If test passes, replace composite light.
Rear clearance light(s) faulty.	Check for 22 to 28 VDC on wire 1008 between rear light wiring harness non-operating light connector, terminals wire 1008 and wire 1435.	If test passes, replace clearance lights.

Probable Cause	Test	Action
17. Clearance, parking, or tail lights do not operate. (Continued)		
Front composite light faulty.	Check for 22 to 28 VDC on wire 1012 between chassis wiring harness non-operating light connector, terminals wire 1012 and wire 1435.	If test passes, replace composite light.
Front clearance light(s) faulty.	Check for 22 to 28 VDC on wire 1012 between chassis wiring harness non-operating light connector, terminals wire 1012 and wire 1435.	If test passes, replace clearance lights.
Master light switch faulty.		Replace master light switch.
Left hand switch panel wiring harness faulty.	If all clearance and taillights do not operate, check for less than 200 ohms on wire 1084A between left hand switch panel wiring harness connectors S13, terminal 3 and S12, terminal 2B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	If all clearance and taillights do not operate, check for less than 200 on wire 1012 between left hand switch panel wiring harness connectors S12, terminal 3 and C5, terminal B.	
Cab wiring harness faulty.	If all clearance and taillights do not operate, check for less than 200 on wire 1012 between cab wiring harness connectors C5, terminal B and C1, terminal 8.	If test fails, replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	If front clearance light does not operate, check for less than 200 ohms on 1012 between chassis wiring harness connectors C1, terminal 8 and C403, terminal 1.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If rear clearance/taillight does not operate, check for less than 200 ohms on wire 1008/1012 between connectors C1, terminal 8 and C24, terminal 2.	
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1008 between rear light wiring harness connectors C24, terminal 3 and non-operating light connector, terminal wire 1008.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	

Probable Cause	Test	Action
17. Clearance, parking, or tail lights do not operate. (Continued)		
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1012 between front light wiring harness connector C403, terminal 1 and non-operating light connector, terminal wire 1012.	If test fails, replace/repair front light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.	
18. Front blackout marking lights and/or blackout tail lights do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Rear composite light faulty.	Check for 22 to 28 VDC on wire 1680 between rear light wiring harness non-operating light connector, terminals wire 1680 and wire 1435.	If test passes, replace composite light.
Front composite light faulty.	Check for 22 to 28 VDC on wire 1680 between chassis wiring harness non-operating light connector, terminals wire 1680 and wire 1435.	If test passes, replace composite light.
Blackout light switch faulty.		Replace blackout light switch.
Blackout select switch faulty.		Replace blackout select switch.
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and S14, terminal 3.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1680 between left hand switch panel wiring harness connectors S14, terminal 2B and C5 terminal H.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1680 between cab wiring harness connectors C5 terminal H and C1, terminal 5.	If test fails, replace/repair cab wiring harness (WP 0218).
Chassis wiring harness faulty.	If front blackout marker light does not operate, check for less than 200 ohms on 1680 between connectors C1, terminal 5 and C403, terminal 2.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If rear blackout taillight does not operate, check for less than 200 ohms on wire 1680 between connectors C1, terminal 5 and C24, terminal 5.	

Probable Cause	Test	Action
18. Front blackout marking lights and/or blackout tail lights do not operate. (Continued)		
Rear light wiring harness faulty.	Check for less than 200 ohms on wire 1680 between rear light wiring harness connectors C24, terminal 5 and non-operating light connector, terminal wire 1680.	If test fails, replace/repair rear light wiring harness (WP 0218).
	Connect connector C24 and check for less than 200 ohms on wire 1435 between rear light wiring harness connectors C24, terminal 8 and non-operating light, terminal wire 1435.	
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1680 between front light wiring harness connector C403, terminal 2 and non-operating light connector, terminal wire 1680.	If test fails, replace/repair front light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.	
19. Both headlights do not illuminate.		
Circuit breaker CB21 faulty.	Check for less than 200 ohms across circuit breaker CB21.	If test fails, replace circuit breaker CB21.
Relay B (headlight on/off relay) faulty.	Swap relay B with a known good relay and check if headlights operate.	If test passes, replace relays in original position and replace relay B (headlight on/off relay).
Relay A (headlight high/low relay) faulty.	Swap relay A with a known good relay and check if headlights operate.	If test passes, replace relays in original position and replace relay A (headlight high/low relay).
Headlight switch faulty.		Replace headlight switch.
Master lighting switch faulty.	With blackout select switch in OFF position and master lighting switch in the headlight position, check for less than 200 ohms between connector C5, terminal 6 (wire 1084) and lighting switch S12 from terminal 6 (wire 1084).	If test fails, replace master lighting switch.
Blackout select switch faulty.		Replace blackout select switch.

Probable Cause	Test	Action
19. Both headlights do not illuminate. (Continued)		
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1084 between left hand switch panel wiring harness connectors C5, terminal G and S13, terminal 2B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1084A between left hand switch panel wiring harness connectors S13, terminal 3 and S12, terminal 5B.	
	Check for less than 200 ohms on wire 1017 between left hand switch panel wiring harness connectors S12, terminal 6 and C5, terminal A.	
Cab wiring harness faulty.	With circuit breaker CB22 installed, check for 22 to 28 VDC on wire 1084 between cab wiring harness connector C5, terminal G and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	With circuit breaker CB22 installed, check for 22 to 28 VDC on wire 1084 between cab wiring harness relay B connector, terminal 30 and a known good ground.	
	Check for less than 200 ohms on wire 1017 between cab wiring harness connector C5, terminal A and relay B connector, terminal 86.	
	Check for less than 200 ohms on wire 1017A between cab wiring harness relay B connector, terminal 87 and relay A connector, terminal 30.	
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay B connector, terminal 85 and a known good ground.	
20. Headlight(s) does not illuminate in high beam or in low beam.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Headlight lamp faulty.	If low beam does not operate, check for 22 to 28 VDC on wire 1006 between chassis wiring harness non-operating headlight connector, terminals wire 1006 and wire 1435.	If test passes, replace non-operating headlight lamp (WP 0202).

Probable Cause	Test	Action
20. Headlight(s) does not illuminate in high beam or in low beam. (Continued)		
Headlight lamp faulty.	If high beam does not operate, check for 22 to 28 VDC on wire 1007 between chassis wiring harness non-operating headlight connector, terminals wire 1007 and wire 1435.	If test passes, replace non-operating headlight lamp (WP 0202).
Relay A (headlight high/low relay) faulty.	Swap relay A with relay G and check if headlights operate.	If test passes, replace relays in original position and replace relay A (headlight high/low relay).
Dimmer switch faulty.		Replace dimmer switch.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1017A between cab wiring harness relay A connector, terminal 30 and connector C19, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1017B between cab wiring harness connector C19, terminal B and relay A connector, terminal 86.	
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay A connector, terminal 85 and a known good ground.	
	If low beam headlights do not operate, check for less than 200 ohms on wire 1006 between cab wiring harness relay A connector, terminal 87 and connector C1, terminal 12.	
	If high beam headlights do not operate, check for less than 200 ohms on wire 1007 between cab wiring harness relay A connector, terminal 87A and connector C1, terminal 11.	
Chassis wiring harness faulty.	If low beam headlights do not operate, check for less than 200 ohms on wire 1006 between chassis wiring harness connectors C1, terminal 12 and C403, terminal 3.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If high beam headlights do not operate, check for less than 200 ohms on wire 1007 between chassis wiring harness connectors C1, terminal 11 and C403, terminal 6.	

Probable Cause	Test	Action
20. Headlight(s) does not illuminate in high beam or in low beam. (Continued)		
Front light wiring harness faulty.	If low beam does not operate, check for less than 200 ohms on wire 1006 between front light wiring harness connector C403, terminal 3 and non-operating light connector, terminal wire 1006.	If test fails, replace/repair front light wiring harness (WP 0218).
	If high beam does not operate, check for less than 200 ohms on wire 1007 between front light wiring harness connector C403, terminal 6 and non-operating light connector, terminal wire 1007.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 from non-operating light connector, terminal wire 1435 to a known good ground.	
21. Blackout drive light does not operate.		
Blackout marker lights do not operate.		Troubleshoot front blackout marker lights and/or blackout tail lights do not operate.
Blackout drive light faulty.	Check for 22 to 28 VDC on wire 1679 between chassis wiring harness blackout drive light connector, terminals wire 1679 and wire 1435.	If test passes, replace blackout drive light.
Blackout light switch faulty.	With blackout select switch in the ON position and blackout light switch in the blackout drive position, check for less than 200 ohms between connector C5, terminal S (wire 1150) and J (wire 1679).	If test fails, replace blackout light switch.
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connector S14, terminal 3 and S14, terminal 6.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1679 between left hand switch panel wiring harness connectors S14, terminal 5B and C5, terminal J.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1679 between cab wiring harness connectors C5, terminal J and C1, terminal 6.	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
21. Blackout drive light does not operate. (Continued)		
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1679 between chassis wiring harness connectors C1, terminal 6 and C403, terminal 9.	If test fails, replace/repair chassis wiring harness (WP 0218).
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1679 between front light wiring harness connector C403, terminal 9 and blackout drive light connector, terminal wire 1679.	If test fails, replace/repair front light wiring harness (WP 0218).
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness blackout drive light connector, terminal wire 1435 and a known good ground.	
22. Reverse light and/or alarm does not operate.		
Blackout lights on.		Turn blackout lights off.
Headlights do not operate.		Troubleshoot headlights do not operate.
Reverse alarm faulty.	If reverse alarm does not operate, check for 22 to 28 VDC on wire 1149 between chassis wiring harness connector M3, terminal wire 1149 and wire 1435.	If test passes, replace reverse alarm.
Reverse light faulty.	If reverse light does not operate, check for 22 to 28 VDC on wire 1149A between chassis wiring harness connector C26, terminal wire 1149 and wire 1435.	If test passes, replace reverse light (WP 0211).
Diode pack D2 faulty.		Replace diode pack D2.
Relay I (reverse light/ alarm relay) faulty.	Swap relay I with relay G and check if reverse light and alarm operate.	If test passes, replace relays in original position and replace relay I (reverse light/alarm relay).
LH switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C8, terminal B1.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 313 between cab wiring harness connector C8, terminal A1 and relay I connector, terminal 87A.	

Probable Cause	Test	Action
22. Reverse light and/or alarm does not operate. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1150 between cab wiring harness relay I connector, terminal 86 and connector C5, terminal S.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness relay I connector, terminal 85 and a known good ground.	
	Check for less than 200 ohms on wire 1149 between cab wiring harness relay I connector, terminal 30 and connector C1, terminal 21.	
	Check for less than 200 ohms on wire 165 between cab wiring harness connectors C11, terminal F2 and C12, terminal 65.	
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1149 between chassis wiring harness connectors C1, and C404, terminal 3.	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1149 between chassis wiring harness connectors C1, and M3, terminal wire 1149.	
	Check for less than 200 ohms on wire 1149A between chassis wiring harness connectors C404, terminal 4 and C26, terminal A.	
	Check for less than 200 ohms on wire 1435 between chassis wiring harness connector C26, terminal B and a known good ground.	
	Check for less than 200 ohms on wire 1435 between chassis wiring harness connector M3, terminal wire 1435 and a known good ground.	
VIM faulty.		Replace VIM (WP 0236).
TCM faulty.		Replace TCM (WP 0216).

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode.		
Instrument and switch panel backlight(s) do not operate.		Troubleshoot Instrument and switch panel backlight(s) do not operate.
Dome light assembly(s) faulty.	If passenger side white dome light is not operating, check for 22 to 28 VDC on wire 2026A between cab wiring harness connector C422, terminals 1 and 2, when white dome lights are on at full intensity.	If test passes, replace non-operating dome light assembly.
Dome light assembly(s) faulty.	If passenger side cyan dome light is not operating, check for 22 to 28 VDC on wire 2027A between cab wiring harness connector C422, terminals 3 and 2, when cyan dome lights are on at full intensity.	If test passes, replace non-operating dome light assembly.
	If driver side white dome light is not operating, check for 22 to 28 VDC on wire 2026A between cab wiring harness connector C423, terminals 1 and 2, when white domes lights are on at full intensity.	
	If driver side cyan dome light is not operating, check for 22 to 28 VDC on wire 2027A between cab wiring harness connector C423, terminals 3 and 2, when cyan dome lights are on at full intensity.	
Circuit breaker CB5 faulty.	Check for less than 200 ohms across circuit breaker CB5.	If test fails, replace circuit breaker CB5.
Relay N (dome light relay) faulty.	Swap relay N with relay G and check if dome light operate.	If test passes, replace relays in original position and replace relay N (dome light relay).
Dome light dimmer switch faulty.		Replace dome light dimmer switch.
Dome light select switch faulty.		Replace dome light select switch.
Passenger side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2026A between passenger side dome light wiring harness connectors C420, terminal 1 and C422, terminal 1.	If test fails, replace/repair passenger side dome light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between passenger side dome light wiring harness connectors C420, terminal 2 and C422, terminal 2.	

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Passenger side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2027A between passenger side dome light wiring harness connectors C420, terminal 3 and C422, terminal 3.	If test fails, replace/repair passenger side dome light wiring harness (WP 0218).
Driver side dome light wiring harness faulty.	Check for less than 200 ohms on wire 2026A between driver side dome light wiring harness connectors C421, terminal 1 and C423, terminal 1.	If test fails, replace/repair driver side dome light wiring harness (WP 0218).
Driver side dome light wiring harness faulty.	Check for less than 200 ohms on wire 1435 between driver side dome light wiring harness connectors C421, terminal 2 and C423, terminal 2.	If test fails, replace/repair driver side dome light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2027A between driver side dome light wiring harness connectors C421, terminal 3 and C423, terminal 3.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2026A between cab wiring harness connector C420, terminal 1 and relay N (dome light relay), connector, terminal 87.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2027A between cab wiring harness connector C421, terminal 3 and relay N (dome light relay), connector, terminal 87A.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C420, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C421, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435D between cab wiring harness relay N (dome light relay), connector, terminal 85 and a known good ground.	
	Check for less than 200 ohms on wire 2026 between cab wiring harness connector C6, terminal 27 and relay N (dome light relay), connector, terminal 86.	

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 2028A between cab wiring harness connector C418, terminal 4 and relay N (dome light relay), connector, terminal 30.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2029 between cab wiring harness connectors C6, terminal 22 and C418, terminal 3.	
	Check for less than 200 ohms on wire 2026 between cab wiring harness connectors C6, terminal 27 and C419, terminal 2.	
	Check for less than 200 ohms on wire 2027 between cab wiring harness connectors C6, terminal 14 and C419, terminal 3.	
	Check for less than 200 ohms on wire 2028 between cab wiring harness connectors C418, terminal 4 and C419, terminal 1.	
	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C418, terminal 2 and a known good ground.	
	Check for less than 200 ohms on wire 1435F between cab wiring harness connector C6, terminal 21 and a known good ground.	
	Check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C6, terminal 16 .	
	Check for 22 to 28 VDC on wire 1076 between cab wiring harness connector C6, terminal 19 and a known good ground.	
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1076 between right hand switch panel wiring harness connectors C6, terminal 19 and S10, terminal 3.	If test fails, replace/repair as necessary (WP 0218).

Probable Cause	Test	Action
23. Dome light(s) do not operate in normal mode. (Continued)		
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1084A between right hand switch panel wiring harness connectors C6, terminal 16 and S11, terminal 6.	If test fails, replace/repair as necessary (WP 0218).
	Check for less than 200 ohms measured on wire 1084A between right hand switch panel wiring harness connectors S11, terminal 6 and C434, terminal 3.	
	Check for less than 200 ohms on wire 1435F between right hand switch panel wiring harness connectors S10, terminal 1 and C6, terminal 21.	
	Check for less than 200 ohms measured on wire 2026 between right hand switch panel wiring harness connectors C6, terminal 27 and C11, terminal 5B.	
	Check for less than 200 ohms measured on wire 2027 between right hand switch panel wiring harness connectors C6, terminal 14 and S11, terminal 1.	
	Check for less than 200 ohms on wire 2027A between right hand switch panel wiring harness connectors S11, terminal 2B and C434, terminal 4.	
Dome light dimmer module faulty.		Replace dome light dimmer module.
Diode pack D5 faulty.		Replace diode pack D5.
Diode pack D8 faulty.		Replace diode pack D8.
24. Dome light(s) do not work in black out mode.		
<p>NOTE</p> <p>White dome lights do not operate in blackout mode.</p>		
Dome light(s) do not operate in normal mode.		Troubleshoot dome light(s) do not operate in normal mode.
Blackout lights do not operate.		Troubleshoot all blackout lights do not operate.

Probable Cause	Test	Action
24. Dome light(s) do not work in black out mode. (Continued)		
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1150 between left hand switch panel wiring harness connectors S13, terminal 1 and C5, terminal S.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1150 between cab wiring harness connectors C5, terminal S and C6, terminal 15.	If test fails, replace/repair cab wiring harness (WP 0218).
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms measured on wire 1150 between right hand switch panel wiring harness connectors C6, terminal 15 and C434, terminal 2.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
Blackout select switch faulty.	Check for less than 200 ohms measured on wire 2029 between dome light dimmer switch connector, terminal 2B and capsule harness connector C6, terminal 22.	If test fails, replace blackout select switch.
Diode pack 8 faulty.		Replace diode pack D8.
25. Emergency flashers do not operate.		
Turn signals do not operate.		Troubleshoot turn signals do not operate.
Flasher module faulty.		Replace flasher module (WP 0200).
26. Spotlight controls do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Circuit breaker CB9 faulty.		If test fails, replace circuit breaker CB9.
Spotlight relay M faulty.		If test passes, replace relays in original position and replace relay M (GOLIGHT relay).
Spotlight switch faulty.	If all spotlights do not operate, check for less than 200 ohms across circuit breaker CB9.	Replace spotlight switch if all spotlights do not operate.
LH switch panel wiring harness faulty.	If all spotlights do not operate, swap relay M with relay G and check if spotlights operate.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Air switch panel wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair air switch panel wiring harness (WP 0218).

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Cab wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between air switch panel wiring harness connectors C428, terminal 4 and S19, terminal 2B.	If test fails, replace/repair cab wiring harness (WP 0218).
	If all spotlights do not operate, check for less than 200 ohms on wire 2035 between air switch panel wiring harness connectors S19, terminal 3 and C428, terminal 5.	
	If all spotlights do not operate, check for less than 200 ohms on wire 1084A between connectors C5, terminal C and C428, terminal 4.	
	If all spotlights do not operate, check for less than 200 ohms on wire 2000 between cab wiring harness connector C428, terminal 5 and relay M (GOLIGHT) connector, terminal 30.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 2001 between relay M (GOLIGHT) connector, terminal 87 and connector C400, terminal 1	
	If all spotlights do not operate, check for less than 200 ohms on wire 2035 between cab wiring harness CB9 connector, terminal wire 2000 and relay M (GOLIGHT), terminal 86.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 1435 between relay M (GOLIGHT) connector, terminal 85 and a known good ground.	
	If all spotlights do not operate, check for less than 200 ohms on cab wiring harness wire 1435 between connector C400, terminal 2 and a known good ground.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on red/white wire between cab wiring harness connectors C400, terminal 7 and C409, terminal 1.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Cab wiring harness faulty.	If front spotlight controller does not operate correctly, check for less than 200 ohms on black wire between cab wiring harness connectors C400, terminal 9 and C409, terminal 2.	If test fails, replace/repair cab wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on brown wire between cab wiring harness connectors C400, terminal 8 and C409, terminal 3.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on green wire between cab wiring harness connectors C400, terminal 5 and C409, terminal 4.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on yellow wire between cab wiring harness connectors C400, terminal 6 and C409, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on blue wire between cab wiring harness connectors C400, terminal 4 and C409, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on violet wire between cab wiring harness connectors C400, terminal 3 and C409, terminal 7.	
Chassis wiring harness faulty.	If all spotlights do not operate, check for less than 200 ohms on chassis wiring harness wire 2001 between connectors C400, terminal 1 and C402, terminal 1.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If all spotlights do not operate, check for less than 200 ohms on chassis wiring harness wire 1435 between connectors C400, terminal 2 and C402, terminal 2.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2002 between chassis wiring harness connectors C400, terminal 3 and C402, terminal 3.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Chassis wiring harness faulty. (Continued)	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2003 between chassis wiring harness connectors C400, terminal 4 and C402, terminal 4.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2004 between chassis wiring harness connectors C400, terminal 5 and C402, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2005 between chassis wiring harness connectors C400, terminal 6 and C402, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2006 between chassis wiring harness connectors C400, terminal 7 and C402, terminal 7.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2007 between chassis wiring harness connectors C400, terminal 8 and C402, terminal 8.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2008 between cab wiring harness connectors C400, terminal 9 and C402, terminal 9.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2009 between chassis wiring harness connectors C401, terminal 1 and C402, terminal 25.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2010 between chassis wiring harness connectors C401, terminal 2 and C402, terminal 26.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Chassis wiring harness faulty. (Continued)	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2011 between chassis wiring harness connectors C401, terminal 3 and C402, terminal 27.	If test fails, replace/repair chassis wiring harness (WP 0218).
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2012 between chassis wiring harness connectors C401, terminal 4 and C402, terminal 28.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2013 between chassis wiring harness connectors C401, terminal 5 and C402, terminal 29.	
Spotlight control wiring harness faulty.	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2014 between chassis wiring harness connectors C401, terminal 6 and C402, terminal 30.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2015 between chassis wiring harness connectors C401, terminal 7 and C402, terminal 31.	
	If front spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 2001 between connector C402, terminal 1 and connector L23, terminal 1.	
	If front spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 1435 between connector C402, terminal 2 and connector L23, terminal 2.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Spotlight control wiring harness faulty. (Continued)	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2002 between spotlight control wiring harness connector C402, terminal 3 and non-operating spotlight connector, terminal 7.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2003 between spotlight control wiring harness connector C402, terminal 4 and non-operating spotlight connector, terminal 6.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2004 between spotlight control wiring harness connectors C402, terminal 5 and non-operating spotlight connector, terminal 5.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2005 between spotlight control wiring harness connector C402, terminal 6 and non-operating spotlight connector, terminal 4.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2006 between spotlight control wiring harness connectors C402, terminal 7 and non-operating spotlight connector, terminal 3.	
	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2007 between spotlight control wiring harness connectors C402, terminal 8 and non-operating spotlight connector, terminal 2.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Spotlight control wiring harness faulty. (Continued)	If front spotlight controller does not operate correctly, check for less than 200 ohms on wire 2008 between spotlight control wiring harness connector C402, terminal 9 and non-operating spotlight connector, terminal 1.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
	If rear spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 2001 between connectors C402, terminal 1 and non-operating spotlight connector, terminal 2.	
	If rear spotlights do not operate, check for less than 200 ohms on spotlight control wiring harness wire 1435 between connectors C402, terminal 2 and non-operating spotlight connector, terminal 1.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2009 between spotlight control wiring harness connector C402, terminal 25 and non-operating spotlight connector, terminal 7.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2010 between spotlight control wiring harness connector C402, terminal 26 and non-operating spotlight connector, terminal 6.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2011 between spotlight control wiring harness connector C402, terminal 27 and non-operating spotlight connector, terminal 5.	
	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2012 between spotlight control wiring harness connector C402, terminal 28 and non-operating spotlight connector, terminal 4.	

Probable Cause	Test	Action
26. Spotlight controls do not operate. (Continued)		
Spotlight control wiring harness faulty. (Continued)	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2013 between spotlight control wiring harness connector C402, terminal 29 and non-operating spotlight connector, terminal 3.	If test fails, replace/repair spotlight control wiring harness (WP 0218).
Spotlight controller faulty.	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2014 between spotlight control wiring harness connector C402, terminal 30 and non-operating spotlight connector, terminal 2.	If both front or both rear spotlights do not operate, replace non-operating spotlight controller (WP 0212).
Spotlight assembly faulty.	If rear spotlight controller does not operate correctly, check for less than 200 ohms on wire 2015 between spotlight control wiring harness connector C402, terminal 31 and non-operating spotlight connector, terminal 1.	Replace non-operating spotlight assembly (WP 0213).
27. Spotlight does not illuminate.		
Spotlight controls faulty.		Troubleshoot spotlight controls do not operate.
Spotlight bulb faulty.		Replace spotlight assembly (WP 0213).
Spotlight assembly faulty.	Check if spotlight can be moved with spotlight controls.	Replace spotlight assembly(WP 0213).
28. Turn signals do not operate.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Brake light do not operate.		Troubleshoot brake lights do not operate.
Passenger side front composite light faulty.	With passenger side turn signal on, check for pulsating 22 to 28 VDC on wire 1001 between chassis wiring harness connector L4, terminal wire 1001 and wire 1435.	If test passes, replace composite light.
Passenger side front turn signal light faulty.	With passenger side turn signal on, check for pulsating 22 to 28 VDC on wire 1001 between chassis wiring harness connector L6, terminal wire 1001 and wire 1435.	If test passes, replace turn signal light.

Probable Cause	Test	Action
28. Turn signals do not operate. (Continued)		
Driver side front composite light faulty.	With driver side turn signal on, check for pulsating 22 to 28 VDC on wire 1002 between chassis wiring harness connector L3, terminal wire 1002 and wire 1435.	If test passes, replace composite light.
Driver side front turn signal light faulty.	With driver side turn signal on, check for pulsating 22 to 28 VDC on wire 1002 between chassis wiring harness connector L5, terminal wire 1002 and wire 1435.	If test passes, replace turn signal light.
LH switch panel wiring harness faulty.	If all turn signals do not operate, check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Cab wiring harness faulty.	If all turn signals do not operate, check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C16, terminal A.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1001 between cab wiring harness connectors C18, terminal 1 and C1, terminal 7.	
	Check for less than 200 ohms on wire 1002 between cab wiring harness connectors C18, terminal 3 and C1, terminal 10.	
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1001 between chassis wiring harness connectors C1, terminal 7 and C403, terminal 10.	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1002 between chassis wiring harness connectors C1, terminal 10 and C403, terminal 5.	
Front light wiring harness faulty.	Check for less than 200 ohms on wire 1001 between front light wiring harness connectors C403, terminal 10 and L4 terminal wire 1001.	If test fails, replace/repair front light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1001 between front light wiring harness connectors C403, terminal 10 and L6 terminal wire 1001.	

Probable Cause	Test	Action
28. Turn signals do not operate. (Continued)		
Front light wiring harness faulty. (Continued)	Check for less than 200 ohms on wire 1002 between front light wiring harness connectors C403, terminal 5 and L3 terminal wire 1001.	If test fails, replace/repair front light wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1002 between front light wiring harness connectors C403, terminal 5 and L5 terminal wire 1001.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L4, terminal wire 1435 and a known good ground.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L6, terminal wire 1435 and a known good ground.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L3, terminal wire 1435 and a know good ground.	
	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L5, terminal wire 1435 and a know good ground.	
Flasher module faulty.	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L3, terminal wire 1435 and a known good ground.	Replace flasher module (WP 0200).
Turn signal assembly faulty.	Connect connector C403 and check for less than 200 ohms on wire 1435 between front light wiring harness connector L5, terminal wire 1435 and a known good ground.	Inspect steering column turn signal assembly. Repair/replace as necessary.
29. Cab heater motor does not operate correctly.		
Circuit breaker CB4 faulty.	Check for less than 200 ohms across circuit breaker CB4.	If test fails, replace circuit breaker CB4.
Cab wiring harness faulty.	Check for 22 to 28 VDC measured between wire 1082 between cab harness connector C17, terminal A and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).

Probable Cause	Test	Action
29. Cab heater motor does not operate correctly. (Continued)		
Cab wiring harness faulty. (Continued)	Check for less than 200 ohms on wire 1435E between cab wiring harness connector C17, terminal B and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
Fan control switch faulty.		Replace front HVAC control module (WP 0147).
Fan resistor faulty.		Replace fan resistor.
Heater wiring harness faulty.	Check for less than 200 ohms on red wire between heater wiring harness connector C17, terminal A and control panel connector, terminal B.	Repair wire (WP 0218) or replace HVAC assembly (WP 0031).
	Check for less than 200 ohms on orange wire between heater wiring harness control panel connector, terminal H and heater resistor terminal.	
	Check for less than 200 ohms on yellow wire between heater wiring harness control panel connector, terminal M and heater resistor terminal.	
	Check for less than 200 ohms on violet wire between heater wiring harness control panel connector, terminal L and heater resistor terminal.	
	Check for less than 200 ohms on orange wire between heater wiring harness, heater resistor terminal and motor terminal.	
	Check for less than 200 ohms on black wire between heater wiring harness connector C17, terminal B and motor terminal.	
Heater motor faulty.		Replace HVAC assembly (WP 0031).

Probable Cause	Test	Action
30. Deicer does not work.		
Circuit breaker CB31 Faulty.	Check for less than 200 ohms across circuit breaker CB31.	If test fails, replace circuit breaker CB31 (WP 0197).
Passenger side windshield heater element faulty.	Check for 22 to 28 VDC on wires 1421 between deicer wiring harness connector C441 terminal wires 1421 and 1435.	If test passes, replace passenger side windshield (WP 0145).
Driver side windshield heater element faulty.	Check for 22 to 28 VDC on wires 1420 between deicer wiring harness connector C442 terminal wires 1420 and 1435.	If test passes, replace driver side windshield (WP 0145).
Passenger side door window heater element faulty.	Check for 22 to 28 VDC on wires 1422 between deicer wiring harness connector C443 terminal wires 1422 and 1435.	If test passes, replace passenger side door window (WP 0144).
Driver side door window heater element faulty.	Check for 22 to 28 VDC on wires 1423 between deicer wiring harness connector C445 terminal wires 1423 and 1435.	If test passes, replace driver door window (WP 0144).
Deicer switch faulty.		Replace defective deicer switch.
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1435H between cab wiring harness connector C439, terminal 1 and a known good ground.	If test fails, replace/repair as necessary (WP 0218).
	Check for less than 200 ohms measured on wire 2043 between cab wiring harness connectors C440, terminal 1 and C7, terminal 4.	
	Check for less than 200 ohms on wire 2044 between cab wiring harness connectors C440, terminal 2 and C7, terminal 5.	
	Check for less than 200 ohms on wire 2045 between cab wiring harness connectors C440, terminal 3 and C7, terminal 6.	
	Check for less than 200 ohms on wire 2046 between cab wiring harness connectors C440, terminal 4 and C7, terminal 7.	
	Check for less than 200 ohms on wire 1435 between cab wiring harness connectors C440, terminal 5 and C7, terminal 8.	

Probable Cause	Test	Action
30. Deicer does not work. (Continued)		
Cab wiring harness faulty. (Continued)	Check for less than 200 ohms on wire 1423 between cab wiring harness connectors C444 terminal 1 and C445, terminal 1.	If test fails, replace/repair as necessary (WP 0218).
	Check for less than 200 ohms on wire 1435 between cab wiring harness connectors C444 terminal 2 and C445, terminal 2.	
Air switch panel wiring harness faulty.	Check for less than 200 ohms on wire 2044 between air switch panel wiring harness connectors S18, terminal 3 and C7, terminal 5.	If test fails, replace/repair air switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 2043 between air switch panel wiring harness connectors S18, terminal 1 and capsule harness connector C7, terminal 6.	
	Check for less than 200 ohms on wire 1435D between air switch panel wiring harness connectors S18, terminal 2B and capsule harness connector C7, terminal 8.	
31. Engine fan does not stop rotating when fan ford switch is on.		
Circuit breaker CB5 faulty.	Check for less than 200 ohms across circuit breaker CB5.	If test fails, replace circuit breaker CB5.
Air lines and/or fittings faulty.	Inspect air line 2038 and fittings for damage or leaks.	Repair/replace as necessary.
Fan clutch faulty.		Inspect fan clutch. Replace as necessary (WP 0178).
Fan control solenoid faulty.	Check for 22 to 28 VDC on wire G837 between engine harness connector C46, terminals 1 and 2 (wire 1435).	If test passes, replace fan control solenoid.
FAN FORD switch faulty.	Check for less than 200 ohms between FAN FORD switch terminals 2B and 3.	If test fails, replace FAN FORD switch.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1076 between cab wiring harness connector C6, terminal 19 and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for less than 200 ohms on wire G837 between cab wiring harness connectors C2, terminal 16 and C6, terminal 18.	

Probable Cause	Test	Action
31. Engine fan does not stop rotating when fan ford switch is on. (Continued)		
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1076 between right hand switch panel wiring harness connectors C6, terminal 19 and S6, terminal 2B.	If test fails, replace/repair right hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1076 between right hand switch panel wiring harness connectors C6, terminal 18 and S6, terminal 3.	
Engine wiring harness faulty.	Check for less than 200 ohms on wire 1435 between engine wiring harness connector C46, terminal 2 and a known good ground.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for less than 200 ohms on wire G837 between engine wiring harness connectors C46, terminal 1 and M10, terminal 4.	
	Check for less than 200 ohms on wire G837 between engine wiring harness connectors C2, terminal 16 and M10, terminal 2.	
32. Horn does not operate or operates erratically.		
Headlights do not operate.		Troubleshoot headlights do not operate.
Circuit breaker CB23 faulty.	Check for less than 200 ohms across circuit breaker CB23.	If test fails, replace circuit breaker CB23.
Horn button faulty.	Check for less than 200 ohms between horn button connector, terminal 1 and a known good ground when horn button is pressed.	If test fails, replace horn button.
Air lines and/or fittings faulty.	Inspect air line 2785 and fittings for damage or leaks.	Repair/replace as necessary.
Horn control solenoid faulty.	Check for 22 to 28 VDC between wires 1031 and 1168 at engine wiring harness connector S01, terminals 1 and 2, when the horn button is pressed.	If test passes, replace horn control solenoid.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1031 between cab wiring harness connector C2, terminal 22 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1084A between cab wiring harness connectors C5, terminal C and C6, terminal 16.	

Probable Cause	Test	Action
32. Horn does not operate or operates erratically. (Continued)		
Cab wiring harness faulty. (Continued)	Check for less than 200 ohms on wire 1168 between cab wiring harness connectors C2, terminal 23 and C20, terminal 1.	If test fails, replace/repair cab wiring harness (WP 0218).
LH switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1084A between LH switch panel wiring harness connectors S13, terminal 3 and C5, terminal C.	If test fails, replace/repair LH switch panel wiring harness (WP 0218).
Engine wiring harness faulty.	Check for less than 200 ohms on wire 1168 between engine wiring harness connectors C2, terminal 23 and S02, terminal 2.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1031 between engine wiring harness connectors C2, terminal 22 and S02, terminal 1.	
Horn faulty.		Replace horn.
33. Windshield washer does not operate.		
Windshield washer reservoir damaged or empty.	Inspect windshield washer reservoir for damage and windshield wash fluid level.	Refill or replace as necessary.
Circuit breaker CB3 faulty.	Check for less than 200 ohms across circuit breaker CB3.	If test fails, replace circuit breaker CB3.
Washer hoses and fittings faulty.	Inspect washer hoses and fittings for damage or leaks.	Repair/replace as necessary.
Windshield washer pump faulty.	Check for 22 to 28 VDC on wire 1921 between chassis wiring harness connectors C47, terminal wire 1921 and C47A, terminal wire 1435.	If test passes, replace windshield washer pump.
Windshield washer switch faulty.		Replace washer switch.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1118 between cab wiring harness connectors C5, terminal O and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1921 between cab wiring harness connectors C5, terminal L and C2, terminal 5.	

Probable Cause	Test	Action
33. Windshield washer does not operate. (Continued)		
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1921 between left hand switch panel wiring harness connectors C5, terminal L and S15, terminal 3.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1118 between left hand switch panel wiring harness connectors C5, terminal O and S15, terminal 2B.	
Engine wiring harness faulty.	Check for less than 200 ohms on wire 1921 between engine wiring harness connectors C2, terminal 5 and C47.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between engine wiring harness connector C47A and a known good ground.	
34. Windshield wipers do not operate correctly.		
Circuit breaker CB3 faulty.	Check for less than 200 ohms across circuit breaker CB3.	If test fails, replace circuit breaker CB3.
Wiper motor faulty.	If wiper motor does not operate at low speed, check for 22 to 28 VDC on wire 1917 between chassis harness connectors C21, terminal E and C (wire 1435) when low speed is selected.	If test passes, replace wiper motor.
	If wiper motor does not operate at high speed, check for 22 to 28 VDC on wire 1916 between chassis harness connectors C21, terminal D and C (wire 1435) when high speed is selected.	
	If wipers do not park, check for less than 200 ohms between wiper motor connector C21, terminals A and B, when wipers are not in park position.	
Windshield wiper switch faulty.		Replace windshield wiper switch.
Cab wiring harness faulty.	Check for 22 to 28 VDC on wire 1919 between cab wiring harness connector C400, terminal 11 and a known good ground.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for 22 to 28 VDC on wire 1118 between cab harness connector C5, terminal O and a known good ground.	

Probable Cause	Test	Action
34. Windshield wipers do not operate correctly. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1916 between cab wiring harness connectors C5, terminal N and C400, terminal 13.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1917 between cab wiring harness connectors C5, terminal P and C400, terminal 12.	
	Check for less than 200 ohms on wire 1950 between cab wiring harness connector C5, terminal M and C400, terminal 10.	
Left hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1118 between left hand switch panel wiring harness connectors C5, terminal O and S16, terminal 5B.	If test fails, replace/repair left hand switch panel wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1916 between left hand switch panel wiring harness connectors S16, terminal 6 and C5, terminal N.	
	Check for less than 200 ohms on wire 1950 between left hand switch panel wiring harness connectors S16, terminal 1 and C5, terminal M.	
	Check for less than 200 ohms on wire 1917 between left hand switch panel wiring harness connectors S16, terminal 2B and C5, terminal P.	
	Check for less than 200 ohms on jumper wire between left hand switch panel wiring harness connector S16, terminals 3 and 4.	
Chassis wiring harness faulty.	Check for less than 200 ohms on wire 1919 between chassis wiring harness connectors C400, terminal 11 and C21, terminal A.	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1916 between cab wiring harness connectors C400, terminal 13 and C21, terminal D.	
	Check for less than 200 ohms on wire 1917 between cab wiring harness connectors C400, terminal 12 and C21, terminal F.	

Probable Cause	Test	Action
34. Windshield wipers do not operate correctly. (Continued)		
Chassis wiring harness faulty. (Continued)	Check for less than 200 ohms on wire 1950 between cab wiring harness connector C400, terminal 10 and C21, terminal B.	If test fails, replace/repair chassis wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435 between chassis harness connector C21, terminal C and a known good ground.	
35. Infrared (IR) lights do not illuminate (M1245).		
Circuit breaker CB1 faulty.	Check for less than 200 ohms across circuit breaker CB1.	If greater than 200 ohms are present, replace circuit breaker CB1.
Infrared lights faulty.	When IR light switch is in the ON position, check wire 1014 for 22 to 28 VDC between terminals A and B on driver side IR light connector L22.	If 22 to 28 volts are present, replace IR light that does not illuminate.
	When IR light switch is in the ON position, check wire 1015 for 22 to 28 VDC between terminals A and B on passenger side IR light connector L23.	
IR light switch faulty.		Replace IR light switch.
SOCOM air panel harness faulty.	Check circuit wire 1014 for less than 200 ohms between IR light switch connector S20 terminal 3 and air panel harness connector C428 terminal 7.	If greater than 200 ohms are present, replace/repair SOCOM air panel harness (WP 0218).
	Check circuit wire 1015 for less than 200 ohms between IR light switch connector S20 terminal 6 and air panel harness connector C428 terminal 8.	
	Check circuit wire 1013 for less than 200 ohms between IR light switch connector terminal 2 and air panel harness connector C428 terminal 6.	
Capsule harness faulty.	Check circuit wire 1014 for less than 200 ohms between capsule harness connector C428 terminal 7 and front chassis harness connector C1 terminal 13.	If greater than 200 ohms are present, replace/repair capsule harness (WP 0218).
	Check circuit wire 1015 for less than 200 ohms between capsule harness connector C428 terminal 8 and front chassis harness connector C1 terminal 17.	

Probable Cause	Test	Action
35. Infrared (IR) lights do not illuminate (M1245). (Continued)		
Engine harness faulty.	Check circuit wire 1013 for less than 200 ohms between capsule harness connector C428 terminal 6 and CB1.	
	Check circuit wire 1014 for less than 200 ohms between engine harness connector C1 terminal 13 and hood harness connector C403 terminal 4.	If greater than 200 ohms are present, replace/repair engine harness (WP 0218).
	Check circuit wire 1015 for less than 200 ohms between engine harness connector C1 terminal 17 and hood harness connector C403 terminal 7.	
	Check circuit wire 1435 for less than 200 ohms between hood harness connector C403 terminal 12 and a known good ground.	
Hood harness faulty.	Connect connector C403. Check circuit 1435 for less than 200 ohms between driver side IR light connector L22 terminal B and a known good ground.	If greater than 200 ohms are present, replace/repair hood harness (WP 0218).
	Connect connector C403. Check circuit 1435 for less than 200 ohms between passenger side IR light connector L23 terminal B and a known good ground.	
	Check circuit wire 1014 for less than 200 ohms between driver side IR light connector terminal A and hood harness connector C403 terminal 4.	
	Check circuit wire 1015 for less than 200 ohms between passenger side IR light connector terminal A and hood harness connector C403 terminal 7.	

Probable Cause	Test	Action
36. Check-6 camera system not operating properly (if equipped).		
Loose connectors.	Check camera control box (CCB), advanced control box (ACB), Y power wire harness, Y camera wire harness, rear composite lights, and DVE display connectors.	Tighten loose connectors.
No power or ground at CCB.	Turn Power Distribution Unit (PDU) main and camera circuit breakers ON. Turn CCB power switch ON. Check if POWER indicator illuminates. Turn PDU main circuit breaker OFF.	If POWER indicator illuminates, power to CCB is OK. Go to next probable cause.
	Disconnect Y power wire harness P1 connector from CCB. Turn PDU main circuit breaker ON. Check for 22 to 28 VDC between Y power wire harness connector P1, terminals A and B. Turn PDU main circuit breaker OFF.	If test passes, replace CCB (WP 0146).
	Disconnect Y power wire harness power harness connector. Turn PDU main circuit breaker ON. Check for 22 to 28 VDC between power wire harness connector, terminals A and B. Turn PDU main circuit breaker OFF.	If test passes, check continuity across Y power wire harness from power wire harness connector, terminal A to connector P1, terminal A and power wire harness connector, terminal B to connector P1, terminal B. Repair faulty wire or replace Y power wire harness (WP 0218).
	Check for continuity between power wire harness connector, terminal B and a known good ground.	If test fails, remove cover from auxiliary (passenger side) batteries and disconnect batteries. Then remove PDU cover and check for continuity between power wire harness from connector, terminal B and PDU ground terminal. If there is continuity, replace wire 1436 between PDU and auxiliary batteries. If not, repair wire or replace power wire harness (WP 0218).
	Remove cover from auxiliary (passenger side) batteries. Check for 22 to 28 VDC across auxiliary batteries.	If test fails, check battery cables between isolator and auxiliary batteries. Tighten loose or repair damaged cables and service or replace batteries.
	Disconnect auxiliary (passenger side) batteries. Remove cover from PDU. Ensure PDU camera circuit breaker is in the ON position. Check for continuity across PDU camera circuit breaker.	If test fails, replace camera circuit breaker (WP 0194).

Probable Cause	Test	Action
36. Check-6 camera system not operating properly (if equipped). (Continued)		
No power or ground at CCB. (Continued)	Ensure PDU main circuit breaker is in the ON position. Check for continuity across PDU main circuit breaker.	If test fails, replace PDU main circuit breaker (WP 0194).
	Check continuity across power wire harness from camera circuit breaker terminal to Y power wire harness connector, terminal A.	If test passes, replace cable 1141 between auxiliary batteries and PDU main circuit breaker. If test fails, repair faulty wire between camera circuit breaker terminal and Y power wire harness connector, terminal A, or replace power wire harness (WP 0218).
No power at ACB.	Disconnect Y power wire harness P11 connector from ACB. Turn PDU main circuit breaker ON. Check for 22 to 28 VDC between Y power wire harness connector P11, terminals A and B. Turn PDU main circuit breaker OFF.	If test passes, power to CCB is OK. Go to next probable cause.
	Check continuity across Y power wire harness from power wire harness connector, terminal A to connector P11, terminal A.	If test passes, repair faulty wire between power wire harness connector, terminal B and connector P11, terminal B, or replace wire Y power harness. If test fails, repair faulty wire between power wire harness connector, terminal A and connector P11, terminal A, or replace Y power wire harness (WP 0218).
No power at DVE display.	If connected, disconnect DVE power cable. Turn PDU main and DVE display circuit breaker ON. Check for 22 to 28 VDC between DVE display power wire harness connector, terminals A and B. Turn PDU main circuit breaker OFF.	If test passes, power to DVE display is OK. Go to next probable cause.
No power at DVE display. (Continued)	Remove cover from auxiliary (passenger side) batteries and disconnect batteries. Remove cover from PDU. Ensure PDU DVE display circuit breaker is in the ON position. Check for continuity across PDU DVE display circuit breaker.	If test fails, replace PDU DVE display circuit breaker (WP 0194).
	Check continuity across DVE display power wire harness from DVE display circuit breaker terminal to DVE display power connector, terminal A.	If test passes, repair faulty wire between terminal B and PDU ground terminal or replace power wire harness. If test fails, repair faulty wire between terminal A and DVE display circuit breaker or replace power wire harness (WP 0218).

Probable Cause	Test	Action
36. Check-6 camera system not operating properly (if equipped). (Continued)		
CCB-ACB interface wire harness faulty.	Disconnect CCB-ACB interface wire harness connectors P2 and P12. Check for continuity between CCB-ACB interface wire harness connectors P2 and P12, terminals 1 to 1, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 7, 8 to 8, 10 to 10, 12 to 12, 13 to 13, 18 to 18, and 19 to 19.	If test fails, repair faulty wire or replace CCB-ACB interface wire harness (WP 0218).
Camera Y wire harness driver side camera wire(s) faulty.	Disconnect camera Y wire harness driver side connector J1A and connector P13. Check for continuity between camera Y wire harness connectors J1A and connector P13, terminals 1 to 1, 2 to 2, 3 to 3, 4 to 4, 5 to 5, 6 to 6, 7 to 22, 8 to 21, 9 to 20, 10 to 19, 12 to 8, 13 to 9, 18 to 31 and 19 to 32.	If test fails, repair faulty wire or replace camera Y wire harness (WP 0218).
Camera Y wire harness passenger side camera wire(s) faulty.	Disconnect camera Y wire harness passenger side J1B connector. Check for continuity between camera Y wire harness connectors J1B and connector P13, terminals 1 to 18, 2 to 17, 3 to 16, 4 to 15, 5 to 14, 6 to 13, 7 to 27, 8 to 28, 9 to 29, 10 to 30, 12 to 11, 13 to 10, 18 to 36 and 19 to 35.	If test fails, repair faulty wire or replace camera Y wire harness (WP 0218).
Driver side camera wire harness wire(s) faulty.	Disconnect camera wire harness driver side taillight connector P2. Check for continuity between camera wire harness driver side connector J1 and camera Y wire harness driver side connector, terminals 1 to 15, 4 to 2, 5 to 6, 6 to 7, 7 to 8, 8 to 5, 9 to 19, 10 to 18, 11 to 10, 12 to 9, 13 to 4, 15 to 13, 16 to 12, and 18 to 3.	If test fails, repair faulty wire or replace driver side camera wire harness (WP 0218).
Passenger side camera wire harness wire(s) faulty.	Disconnect camera wire harness passenger side taillight connector P2. Check for continuity between camera wire harness passenger side connector J1 and camera Y wire harness passenger side connector, terminals 1 to 15, 4 to 2, 5 to 6, 6 to 7, 7 to 8, 8 to 5, 9 to 19, 10 to 18, 11 to 10, 12 to 9, 13 to 4, 15 to 13, 16 to 12, and 18 to 3.	If test fails, repair faulty wire or replace passenger side camera wire harness (WP 0218).
DVE video wire harness faulty.	Disconnect DVE video wire harness connectors. Check for continuity across DVE video harness center terminal.	If test fails, replace DVE video wire harness.

Probable Cause	Test	Action
36. Check-6 camera system not operating properly (if equipped). (Continued)		
Camera shield controls faulty.	Connect camera control box (CCB), advanced control box (ACB), Y power wire harness, Y camera wire harness, rear composite lights, and DVE display (if installed) connectors. Turn PDU main and camera circuit breakers ON. Turn CCB power switch ON. Place camera select switch to position A. With the aid of an assistant, verify camera shield on driver side opens and closes when controls are activated. Place camera select switch to position B. With the aid of an assistant, verify camera shield on passenger side opens and closes when controls are activated.	If driver and passenger side camera shield operate, camera shield controls are OK. Go to next probable cause.
	Check if one of the camera shields operates.	If one of the camera shields operates, replace taillight assembly with non-operating camera shield. If both camera shields do not operate, CCB or ACB may be faulty. Notify Supervisor.
VIDEO IN or VIDEO OUT indicators faulty.	Press LAMP TEST switch. Verify VIDEO IN and VIDEO OUT indicators illuminate.	If VIDEO IN or VIDEO OUT indicators do not illuminate, replace CCB.
Camera VIDEO IN signals faulty.	Place camera select switch to position A. Verify VIDEO IN indicator does not illuminate (driver side video). Place camera select switch to position B. Verify VIDEO IN indicator does not illuminate (passenger side video).	If VIDEO IN indicator does illuminate when camera A and B are selected, camera video in signals are OK. Go to next probable cause.
	Check if VIDEO IN indicator illuminates when camera A or B is selected.	If VIDEO IN indicator does not illuminate when camera A or B is selected, replace taillight assembly selected when VIDEO IN indicator illuminates (no video in signal). If VIDEO IN indicator illuminates when camera A or B is selected, CCB or ACB may be faulty. Notify Supervisor.
Camera VIDEO OUT signal faulty.	Place camera select switch to position A or B. Verify VIDEO OUT indicator does not illuminate.	If VIDEO OUT indicator illuminates, replace CCB.

Probable Cause	Test	Action
36. Check-6 camera system not operating properly (if equipped). (Continued)		
No video at DVE display.	If DVE display is available, install DVE display. Turn PDU main, camera, and DVE display circuit breakers ON. Turn CCB power switch ON. Place camera select switch to position A. Select SHIELD OPEN switch. Select RESET CONFIG switch. Verify image is displayed on DVE display.	If video is not displayed on DVE display, CCB or DVE display may be faulty. Notify Supervisor.
Video brightness adjustment controls faulty.	If DVE display is available, select BRIGHT switches. Verify brightness on DVE display can be adjusted.	If video brightness cannot be adjusted, replace CCB.
Video contrast adjustment controls faulty.	If DVE display is available, select CNTRST switches. Verify contrast on DVE display can be adjusted.	If video contrast cannot be adjusted, replace CCB.
Video polarity select switch faulty.	If DVE display is available, select POL switches. Verify DVE display image changes polarity.	If video polarity does not change, replace CCB.
Video overlay select controls faulty.	If DVE display is available, select and hold RESET CONFIG switch for six seconds. Verify overlays are displayed on DVE display.	If overlays are not displayed, replace CCB.

END OF TASK

END OF WORK PACKAGE

ENGINE/TRANSMISSION TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

NOTE

When reading diagnostic codes with the Autonomous Diagnostic Manager (ADM), the Maintenance Support Device (MSD) may not have an exact match for the C7 engine ECM software. If so, the integrity of any changed parameters and displayed data is not guaranteed. If this occurs, choose OK to continue diagnostic code retrieval.

Probable Cause	Test	Action
1. Cannot reach top engine RPM.		
Fuel pressure low.		Troubleshoot fuel pressure low (Step 51).
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Fuel aerated.	Check and tighten all fittings especially on suction side of system.	Bleed fuel system.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine in Cold Mode.	Cold Mode Operation is normal if the problem occurs only after start-up in cold weather. If problem persists after engine is warmed up, engine fault code(s) may be present.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine speed sensor faulty.	Are 22 to 28 VDC measured between engine speed sensor harness connector C72 terminals A (wire 159) and B (wire 139)?	If test passes, replace engine speed sensor.
Engine speed sensor harness faulty.	Are less than 200 ohms measured on wire 159 between connector C72 terminal A and C68 terminal 13?	If test fails, replace/repair speed sensor harness (WP 0218).
	Are less than 200 ohms measured on wire 139 between connector C72 terminal B and engine harness connector C68 terminal 12?	

Probable Cause	Test	Action
1. Cannot reach top engine RPM. (Continued)		
Engine speed sensor harness faulty.	Are less than 200 ohms measured on wire 159 between connector C68 terminal 13 and connector C12 terminal 59?	If test fails, replace/repair speed sensor harness (WP 0218).
	Are less than 200 ohms measured on wire 139 between connector C68, terminal 12 and connector C12 terminal 39?	
Accelerator pedal not calibrated.		Calibrate accelerator pedal.
2. Cannot reach vehicle speed limit.		
Fuel pressure low.		Troubleshoot fuel pressure low (Step 54).
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Fuel aerated.	Check and tighten all fittings especially on suction side of system.	Bleed fuel system.
Engine in Cold Mode.	Cold Mode Operation is normal if the problem occurs only after start-up in cold weather. If problem persists after engine is warmed up, engine fault code(s) may be present.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine diagnostic codes present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Restriction in air intake or exhaust system.	Inspect air intake and exhaust system	Repair/replace as necessary.
Charge air cooler faulty.	Inspect charge air cooler for damage and leaks.	Replace charge air cooler (WP 0172).
Transmission oil level faulty.		Add transmission oil (WP 0232).
Brake system faulty.	Brakes may be partially engaged due to low air pressure at the brake chambers.	Troubleshoot air brake system.
Accelerator pedal not calibrated.		Calibrate accelerator pedal.
Engine speed sensor harness faulty.	Are less than 200 ohms measured on wire 159 between connector C72 terminal A and C68 terminal 13?	If test fails, replace/repair speed sensor harness (WP 0218).
	Are less than 200 ohms measured on wire 139 between connector C72 terminal B and engine harness connector C68 terminal 12?	

Probable Cause	Test	Action
2. Cannot reach vehicle speed limit. (Continued)		
Engine speed sensor harness faulty.	Are less than 200 ohms measured on wire 159 between connector C68 terminal 13 and connector C12 terminal 59?	If test fails, replace/repair speed sensor harness (WP 0218).
	Are less than 200 ohms measured on wire 139 between connector C68, terminal 12 and connector C12 terminal 39?	
3. Excessive RPM (above 2120 RPM) – engine overspeed on full throttle between upshifts.		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	If test fails, replace/repair engine harness as necessary (WP 0218).
Transmission oil level low.	Inspect oil level.	If test fails, add transmission oil (WP 0232).

Probable Cause	Test	Action
4. High idle operates intermittently.		
HIGH IDLE switch faulty.	Are less than 200 ohms measured on high idle switch, terminals 2B and 3?	If test fails, replace HIGH IDLE switch.
Relay_C faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test passes, replace relay_C.
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
Relay_C faulty.	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	If test passes, replace relay_C.
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Transmission Vehicle Interface Module (VIM) faulty.		Replace Transmission VIM (WP 0236).
Transmission shift selector faulty (no neutral signal).	Inspect shift selector and wiring.	Replace/repair as necessary (WP 0150, WP 0218).
Switch panel wiring harness faulty.	Are less than 200 ohms measured on wire L902A between high idle switch connector, terminal 3 and capsule harness connector C6, terminal 8?	If test fails, replace/repair as necessary (WP 0218).
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	

Probable Cause	Test	Action
4. High idle operates intermittently. (Continued)		
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	
5. High idle will not engage.		
HIGH IDLE switch faulty.	Are less than 200 ohms measured on high idle switch, terminals 2B and 3?	If test fails, replace HIGH IDLE switch.
Relay_C faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test passes, replace relay_C.
	Are less than 200 ohms measured on wire L902A between capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Transmission shift selector faulty.		Replace transmission shift selector (WP 0150).
Engine Electronic Control Module (ECM) faulty.		Replace Engine ECM (WP 0223).
Transmission Control Module (TCM) faulty.	Are less than 200 ohms measured on wire 159 between connector C72 terminal A and C68 terminal 13?	If tests pass, replace TCM (WP 0216).
	Are less than 200 ohms measured on wire 139 between connector C72 terminal B and engine harness connector C68 terminal 12?	

Probable Cause	Test	Action
5. High idle will not engage. (Continued)		
Transmission Control Module (TCM) faulty.	Are less than 200 ohms measured on wire 159 between connector C68 terminal 13 and connector C12 terminal 59?	If tests pass, replace TCM (WP 0216).
	Are less than 200 ohms measured on wire 139 between connector C68, terminal 12 and connector C12 terminal 39?	
Engine wiring harness faulty.		Inspect engine wire harness and replace/repair as necessary (WP 0218).
Service brake switch faulty.	Are less than 200 ohms measured across service brake switch connector (PS1), terminals A and B.	Replace service brake switch (WP 0209).
6. Consistent low power or poor response to accelerator.		
Fuel filter faulty.		Replace fuel filter (WP 0262).
Fuel pressure low.		Troubleshoot fuel pressure low Step 51.
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Fuel aerated.	Check and tighten all fittings especially on suction side of system.	Bleed fuel system.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Restriction or leak in air intake system.	Check air filter restriction indicator and correct any blockages, check charge air cooler for internal or external blockage.	Replace air filter as necessary (WP 0259).
Turbocharger faulty.		Replace turbocharger (WP 0235).
Charge air cooler faulty.	Inspect charge air cooler for damage and leaks.	Replace charge air cooler (WP 0172).
Individual cylinder malfunction.	Perform cylinder balance test.	If test fails, replace engine as necessary.
Engine in Cold Mode.	Cold Mode Operation is normal if the problem occurs only after start-up in cold weather. If problem persists after engine is warmed up, engine fault code(s) may be present.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine brake faulty.		Replace engine brake.
Exhaust system damaged.		Inspect exhaust system and repair/replace as necessary (WP 0239, WP 0240, WP 0242, WP 0241).

Probable Cause	Test	Action
7. Poor acceleration or response.		
Engine in Cold Mode.	Cold Mode Operation is normal if the problem occurs only after start-up in cold weather. If problem persists after engine is warmed up, engine fault code(s) may be present.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
8. Engine brake retarder will not engage.		
Engine brake switch faulty.	Are less than 200 ohms measured between engine break switch terminals 2B and 3?	If test fails, replace engine brake switch.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37 terminal 40?	If test fails, replace/repair engine harness as necessary (WP 0218).
Passenger side switch panel wiring harness faulty.	Are less than 200 ohms measured between capsule harness connector C6, terminal 10 (wire 102) and 19 (wire 1076)?	If test fails, replace/repair as necessary (WP 0218).
Accelerator pedal not calibrated.		Calibrate accelerator pedal.

Probable Cause	Test	Action
9. Engine fails to crank.		
Neutral not selected.		Select neutral.
Batteries faulty.	Check for 22 to 28 VDC across battery terminals.	Replace batteries as necessary (WP 0191).
	Inspect batteries connections for fault.	Repair battery connections (WP 0187, WP 0186).
Battery disconnect switch off.		Turn battery disconnect switch on.
Neutral start relay faulty.	Check for less than 200 ohms between capsule wire harness connector C11, terminal P1 and capsule wire harness connector C11, terminal P1 and capsule wire harness connector C11, terminal L1.	If test fails, replace vehicle interface module (WP 0236).
	Check for less than 200 ohms between capsule wire harness connector C11, terminal G1 and capsule wire harness connector C11, terminal F1.	If test passes, replace vehicle interface module (WP 0236).
Circuit breaker CB12 faulty.		Replace circuit breaker CB12.
Fuse F24 faulty.		Replace fuse F24.
Ignition switch faulty.		Replace ignition switch.
Starter solenoid faulty.	Bench test starter.	Replace starter solenoid.
Shift selector faulty.		Replace shift selector (WP 0150).
Starter relay R2 faulty.	Check for less than 200 ohms between starter relay (R2), terminals 86 and 85.	If test fails, replace starter relay (R2).
	Check for less than 200 ohms between starter relay (R2), terminals 87 and 30.	If test passes, replace starter relay (R2).
Ignition relay R1 faulty.	Check for less than 200 ohms between ignition relay R1, terminals 85 and 86.	If test fails, replace ignition relay.
	Check for less than 200 ohms between ignition relay R1, terminals 87 and 30.	If test passes, replace ignition relay.
Starter ground cable faulty.		Repair or replace starter ground cable.
Starter faulty.	Are 22 to 28 VDC measured on starter power stud?	If test passes, replace starter (WP 0214).
Solenoid ground cable faulty.		Repair or replace solenoid ground cable.
TCM plug loose or disconnected.	Check TCM plug connector and wiring.	If test fails, replace/repair as necessary (WP 0218).

Probable Cause	Test	Action
9. Engine fails to crank. (Continued)		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
ECM plug loose or disconnected.	Check ECM plug connector and wiring.	If test fails, replace/repair as necessary (WP 0218).
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	If test fails, replace/repair engine harness as necessary (WP 0218).
Chassis wiring harness faulty.	Inspect chassis wire harness.	If test fails, replace/repair as necessary (WP 0218).
Ring gear damaged.	Inspect ring gear.	If test fails, replace as necessary.
TCM faulty.		Replace TCM (WP 0216).
Transmission Vehicle Interface Module (VIM) faulty.		Replace Transmission VIM (WP 0236).
Internal mechanical problem with engine or internal component.		Replace engine (WP 0227).

Probable Cause	Test	Action
10. Engine cranks, but will not start.		
No fuel.	Check fuel tank level.	If test fails, refill fuel tank with clean fuel.
Fuel system not primed.		Prime fuel system.
Low engine oil level.		Add engine oil (WP 0224) and determine cause of loss.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine oil contaminated or incorrect type (too heavy for air temperature).		Drain and fill engine oil (WP 0224) and replace engine oil filter (WP 0225).
ECM fuse F23 faulty.	Are less than 200 ohms measured across the fuse?	If test fails, replace fuse F23.
Fuel filter faulty.		Replace fuel filter (WP 0262).
Fuel pressure low.		Troubleshoot fuel pressure low (Step 51).
Fuel lines and/or fittings faulty.	Inspect fuel lines and fittings for damage or leaks.	If test fails, replace as necessary (WP 0263).
Fuel aerated.	Check and tighten all fittings especially on suction side of system.	If test fails, bleed fuel system.
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Inlet air heater faulty.		Troubleshoot inlet air heater, section 27 of this work package.
Fuel/water separator filter blocked.	Check for engine diagnostic codes.	Change filter (WP 0266) and prime system.
Water in fuel.		Sample and examine fuel. Drain fuel/water separator. Drain water from tanks.
Fuel supply hose blocked or restricted.		Inspect fuel supply hose, repair or replace as necessary (WP 0263).
Blockage in fuel line.		Check hose and connections.
Fuel pump failure.		Replace fuel pump.
ECM faulty.	Check for continuity across fuse FU2, FU3 and FU4.	If test across fuses fail, replace faulty fuse.
	Check for continuity between connector C37 terminal 48 and fuse FU2.	If continuity tests in the engine harness fail, replace/repair engine harness (WP 0218).
	Check for continuity between connector C37 terminal 52 and fuse FU3.	If the fuse test and the engine harness tests pass, replace ECM (WP 0223).
	Check for continuity between connector C37 terminal 53 and fuse FU3.	

Probable Cause	Test	Action
10. Engine cranks, but will not start. (Continued)		
ECM faulty. (Continued)	Check for continuity between connector C37 terminal 55 and fuse FU4.	If the fuse test and the engine harness tests pass, replace ECM (WP 0223). (Continued)
	Check for continuity between connector C37 terminal 63 and ground.	
	Check for continuity between connector C37 terminal 65 and ground.	
	Check for continuity between connector C37 terminal 67 and ground.	
	Check for continuity between connector C37 terminal 69 and ground.	
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Chassis wiring harness faulty.	Inspect chassis wire harness.	If test fails, replace/repair as necessary (WP 0218).
Loss of compression.		Replace power train (WP 0227).
11. Engine cranks but fails to start below 32°F (0°C).		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Ether start canister empty.		Replace ether start canister.
Inlet air heater faulty.		Troubleshoot inlet air heater, section 27 of this work package.

Probable Cause	Test	Action
11. Engine cranks but fails to start below 32°F (0°C). (Continued)		
Ether start aid hose, nozzle, or fitting faulty.		Inspect ether start aid hose, nozzle, and fittings and replace as necessary.
Engine wiring harness faulty.	Check continuity between ether start connector C37 terminal A and engine harness connector C37 terminal 10. Check continuity between ether start connector C49 terminal B and a known good ground.	If test fails replace/repair engine wiring harness (WP 0218).
Ether start aid valve faulty.	Check for 22 to 28 VDC between connection C49, terminals A and B.	If test fails replace ether start aid valve.
12. Engine knocking.		
Engine fault codes present	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Individual cylinder malfunction.	Perform cylinder balance test.	If test fails, replace engine as necessary (WP 0227).
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Air in fuel system.		Check and tighten all fittings and connections, especially on suction side of system. Bleed system.
Poor quality fuel or water in fuel.		Sample and examine fuel. Drain tanks and check for evidence of water.
Defective injector(s).	Inspect valve lash.	If test fails, adjust valve lash.
Main bearing faulty, rod bearing faulty, bent rods, sticking valves, piston wrist pin faulty or other related fault.		Troubleshoot engine.
13. Engine misfires, runs rough, or is unstable. Stalls at idle.		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Fuel aerated.		Check and tighten all fittings especially on suction side of system. Bleed fuel system.
Fuel contaminated (poor quality or water in fuel).		Drain fuel tank and check for evidence of water or contaminants. Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Accelerator pedal not calibrated.		Calibrate accelerator pedal.

Probable Cause	Test	Action
13. Engine misfires, runs rough, or is unstable. Stalls at idle. (Continued)		
Faulty fuel injector.	Perform cylinder cut-out test and injector solenoid test.	If test fails replace faulty injectors.
Engine wiring harness faulty.	Inspect engine wire harness.	If test fails, replace/repair as necessary (WP 0218).
14. Engine noisy.		
Lubrication problem (insufficient oil pressure or volume).	Check oil level and check oil pressure at idle and high rpm. Check valve compartment for evidence of sufficient flow (should increase and decrease with engine rpm). Possible pump failure or excessive bearing wear.	Replace engine (WP 0227).
Defective belt driven component.	Isolate components to determine fault.	Repair/replace as necessary.
Internal mechanical problem with engine or internal component.		Replace engine (WP 0227).
15. Engine valve train noisy.		
Lubrication problem (insufficient oil pressure or volume).	Check oil level and check oil pressure at idle and high rpm.	Replace engine (WP 0227).
	Check valve compartment for evidence of sufficient flow (should increase and decrease with engine rpm). Possible pump failure or excessive bearing wear. Notify Supervisor.	Replace engine (WP 0227).
Excessive valve clearance.	Check valve adjustment specifications.	Replace engine (WP 0227).
Damage to valves or valve springs.	Carefully examine inside of valve compartment.	Replace engine (WP 0227).
Damage to camshaft.	Carefully examine camshaft.	Replace engine (WP 0227).
16. Excessive vibration.		
Engine running rough.		Check engine misfire or running rough troubleshooting (Step 12).
Driveline damaged.		Troubleshoot transfer case (WP 0016).
Cooling fan damaged.		Repair or replace cooling fan (WP 0179).

Probable Cause	Test	Action
16. Excessive vibration. (Continued)		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine/transmission mounting components faulty.	Inspect engine and transmission mounting components.	If test fails, repair/replace as necessary.
Individual cylinder malfunction.	Perform cylinder balance test.	If test fails, replace engine (WP 0227).
17. Engine uses excessive oil.		
Oil leaks.		Add engine oil (WP 0224) and determine cause of loss. Repair as required.
Oil entering combustion chamber.	Run engine and inspect exhaust for excessive white smoke.	If test fails, trouble shoot excessive white smoke (Step 18).
Cylinder head gasket faulty or cracked cylinder head.	Remove and examine cylinder head.	Replace engine as necessary.
Engine oil contaminated or incorrect type.		Drain and fill engine oil (WP 0224) and replace engine oil filter (WP 0225).
18. Low engine oil pressure.		
Low engine oil level.		Add engine oil (WP 0224) and determine cause of loss.
Defective oil pressure gauge or sender.	Inspect oil pressure gauge and sending unit.	If test fails, replace as necessary.
Oil pressure relief valve stuck open.	Remove and examine oil pressure relief valve.	Clean or replace oil pressure relief valve as necessary.
Oil diluted by fuel.		Determine source of fuel entry and correct. Drain and fill engine oil (WP 0224) and replace filter (WP 0225).
Oil pump or oil pump suction pipe defective.		Replace engine (WP 0227).
Excessive clearance at internal engine bearings (crankshaft, rod bearings).		Replace engine (WP 0227).
19. Excessive white smoke (incomplete combustion).		
It is normal for the engine to produce white smoke when temperatures outside are below freezing.		Ensure engine is reaching proper operating temperature.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine cold.		Ensure engine is reaching proper operating temperature.

Probable Cause	Test	Action
19. Excessive white smoke (incomplete combustion). (Continued)		
Defective inlet air temperature sensor.		Inspect inlet air temperature sensor and repair/replace as necessary.
Fuel pressure low.		Troubleshoot fuel pressure low (Step 51).
Fuel aerated.	Check and tighten all fittings especially on suction side of system.	Bleed fuel system.
Fuel contaminated (poor quality, or water in fuel).	Drain fuel tank and check for evidence of water or contaminants.	Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
Defective injectors or injector signal from ECM.	Perform cylinder cut-out test and injector solenoid test.	Replace engine (WP 0227).
Worn engine components.	Valve guides, valve stem seals or piston rings may be excessively worn or broken. Inspect components.	If test fails, replace engine as necessary (WP 0227).
20. Excessive black smoke.		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Air filter plugged.		Replace air filter (WP 0259).
Restriction or blockage in air inlet system.	Check air filter restriction gauge and correct any blockages, check charge air cooler for internal or external blockage.	If test fails, replace as necessary (WP 0172, WP 0259, WP 0260, WP 0261).
Turbocharger faulty.		Inspect turbocharger for proper operation and repair/replace as necessary (WP 0235).
Defective injector and valve adjustment.		Adjust valves and injector settings.
Engine wiring harness faulty.	Inspect engine wire harness.	If test fails, replace/repair engine harness as necessary (WP 0218).
21. Engine emits blue smoke (lubricating oil entering combustion chamber).		
Engine oil level too high.		Drain excess oil (WP 0224).
Piston rings faulty, scored cylinder faulty, valve seals faulty or other related fault.		Troubleshoot engine.

Probable Cause	Test	Action
22. Intermittent high idle/drop-out/kick-out.		
HIGH IDLE switch faulty.	Are less than 200 ohms measured on high idle switch, terminals 2B and 3?	If test fails, replace HIGH IDLE switch.
Relay_C faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test passes, replace relay_C.
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Battery power or ground wire(s) to ECM faulty.	Inspect engine wire harness.	If test passes, replace ECM as necessary (WP 0223).
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	If test fails, replace/repair engine harness as necessary (WP 0218).
23. Intermittent engine shutdowns.		
Circuit breaker CB12 faulty.	Are less than 200 ohms measured across the circuit breaker CB12?	If test fails, replace circuit breaker CB12.
Battery power or ground wire(s) to ECM faulty.	Inspect engine wire harness.	If test fails, replace/repair as necessary (WP 0218).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	If test fails, replace/repair engine harness as necessary (WP 0218).
Engine Electronic Control Module (ECM) faulty.	Inspect engine wire harness.	If test passes, replace ECM as necessary (WP 0223).

Probable Cause	Test	Action
24. Stalls at high speeds or high RPM.		
Transmission oil level faulty.		Add transmission oil (WP 0232).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
25. Stalls at low speeds.		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
26. Excessive creep in first and reverse gears.		
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Engine idle speed faulty.	Adjust engine idle speed to manufacturer specifications.	If test fails, correct as necessary.
27. Intake air heater system does not operate.		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
125 amp circuit breaker faulty.	Check for continuity across the 125 amp circuit breaker.	If test fails, replace 125 amp circuit breaker.
Engine wiring harness faulty.	Check continuity between intake air heater relay terminal 4 and engine ECM terminal 8.	If test fails, replace/repair engine wiring harness (WP 0218).
	Check continuity between intake air heater relay terminal 2 (wire 1145) and mega fuse FU6.	
Intake air heater relay faulty.	Remove ground wire G850-BU from the intake air heater relay terminal 4 and install a jumper wire between terminal 4 and a known good ground	If the relay does not activate with the jumper wire installed, replace intake air heater relay.
Intake air heater element faulty.	Check for 2 meg - 3 meg ohms across the air intake heater element.	If test fails, replace faulty intake air heater.
28. CHECK ENGINE or warning light is not operating.		
Indicator light faulty.		Replace instrument panel (WP 0149).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.

Probable Cause	Test	Action
28. CHECK ENGINE or warning light is not operating. (Continued)		
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L994 between engine harness connector C2, terminal 4 and engine harness connector C37, terminal 28.	If test fails, replace/repair engine harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 659 between engine harness connector C2, terminal 6 and engine harness connector C37, terminal 39.	
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L994 between capsule harness connector C2, terminal 6 and capsule harness connector C4, terminal 10.	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire 659 between capsule harness connector C2, terminal 4 and capsule harness connector C4, terminal 9.	
ECM Faulty		Replace ECM (WP 0223).
29. CHECK ENGINE, warning, or high idle light not operating.		
Indicator light faulty.		Replace instrument panel (WP 0149).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine Electronic Control Module (ECM) faulty.	Check with CAT ET.	Replace engine ECM (WP 0223).
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L994 between engine harness connector C2, terminal 4 and engine harness connector C37, terminal 28.	If test fails, replace/repair engine harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 659 between engine harness connector C2, terminal 6 and engine harness connector C37, terminal 39.	
	Are less than 200 ohms measured on wire K998 between engine harness connector C2, terminal 19 and engine harness connector C37, terminal 21.	

Probable Cause	Test	Action
29. CHECK ENGINE, warning, or high idle light not operating. (Continued)		
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L994 between capsule harness connector C2, terminal 6 and capsule harness connector C4, terminal 10.	If test fails, replace/repair engine harness as necessary (WP 0218).
	Are less than 200 ohms measured on wire 659 between capsule harness connector C2, terminal 4 and capsule harness connector C4, terminal 9.	
	Are less than 200 ohms measured on wire K998 between capsule harness connector C2, terminal 19 and capsule harness connector C4, terminal 2.	
30. CHECK TRANS light flashes intermittently.		
Indicator light faulty.		Replace instrument panel (WP 0149).
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Transmission Control Module (TCM) faulty.		Replace TCM (WP 0216).
Transmission Vehicle Interface Module (VIM) faulty.		Replace Transmission VIM (WP 0236).
Transmission wiring harness faulty.	Inspect transmission wiring harness wiring and plugs.	If test fails, replace/repair as necessary (WP 0218).
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire 129 between capsule harness connector C12, terminal 29 and capsule harness connector C4, terminal 9.	If test fails, replace/repair capsule harness as needed (WP 0218).
31. CHECK TRANS light will not go out at start-up.		
Indicator light faulty.		Replace instrument panel (WP 0149).
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
TCM faulty.		Replace TCM (WP 0216).
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire 129 between capsule harness connector C12, terminal 29 and capsule harness connector C4, terminal 9.	If test fails, replace/repair capsule harness as needed (WP 0218).

Probable Cause	Test	Action
32. No CHECK TRANS light at ignition.		
Circuit breaker CB19 faulty.	Are less than 200 ohms measured across circuit breaker CB19?	If test fails, replace circuit breaker CB19.
Indicator light faulty.		Replace instrument panel (WP 0149).
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire 129 between capsule harness connector C12, terminal 29 and capsule harness connector C4, terminal 9.	If test fails, replace/repair capsule harness as needed (WP 0218).
Indicator circuit board wiring harness faulty.		Inspect indicator circuit board wire harness and replace/repair as necessary (WP 0218).
33. TCM will not turn off (shift selector display remains illuminated) with ignition switch OFF.		
Ignition switch faulty.	Inspect ignition switch for loose wires and contacts missing.	If test fails, replace ignition switch.
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
TCM faulty.		Replace TCM (WP 0216).
34. Transmission does not shift properly (rough shifts, shifts occurring at too low or too high speed).		
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Tachometer faulty.		Replace dash.
Transmission oil level faulty.		Add transmission oil (WP 0232).
Accelerator pedal not calibrated.		Calibrate accelerator pedal.
35. Transmission has excessive slippage and clutch chatter.		
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
36. No response to transmission range selector.		
Connector C10 improperly connected.	Inspect connector C10.	If test fails, replace as necessary.
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.

Probable Cause	Test	Action
37. Transmission will not make a specific shift.		
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission overheated.		Troubleshoot transmission overheating (Step 43).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
TCM faulty.		Replace TCM (WP 0216).
38. Transmission will not shift to forward or reverse (stays in neutral).		
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Transmission shift selector faulty.		Replace transmission shift selector (WP 0150).
Transmission connector(s) faulty.		Inspect transmission connectors and replace/repair wiring harness as necessary (WP 0218).
Engine fault code(s) present.		Diagnostic tools are required for troubleshooting. Notify Supervisor.
TCM faulty.		Replace TCM (WP 0216).
39. Transmission range selector displays cat eye (--) and vehicle is not operable.		
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Transmission shift selector faulty.		Replace transmission shift selector (WP 0150).
Transmission wiring harness faulty.	Inspect transmission wiring harness wiring and plugs.	If test fails, replace/repair as necessary (WP 0218).
TCM faulty.		Replace TCM (WP 0216).
40. Vehicle moves backward in neutral.		
Transmission faulty (C3 clutch failure).		Replace transmission (WP 0227).

Probable Cause	Test	Action
41. Vehicle will not move when gear selected.		
Parking brakes still applied.		Release parking brakes.
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission fault code(s) present.	Check for diagnostic codes.	If diagnostic codes are active, troubleshoot diagnostic codes.
Transmission shift selector faulty.		Replace transmission shift selector (WP 0150).
TCM faulty.		Replace TCM (WP 0216).
Transmission faulty.		Replace power train (WP 0227).
42. Transmission noise occurring intermittently.		
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission oil contaminated.		Drain and fill transmission oil (WP 0232) and replace transmission oil filter (WP 0233).
Internal mechanical problem with transmission.		Replace power train (WP 0227).
43. Leaking transmission oil (output shaft).		
Output flange seal faulty.		Replace output flange seal.
Flange button O-ring faulty.		Replace flange button o-ring.
Output flange faulty.		Replace output flange and seal.
44. Transmission oil comes out of transmission dipstick tube and/or breather hose.		
Transmission oil level faulty.		Correct transmission oil level (WP 0232).
Transmission breather clogged.	Inspect transmission breather.	If test fails, replace as necessary (WP 0230).
Transmission dipstick tube improperly installed.	Inspect transmission dipstick tube.	If test fails, replace as necessary.
Transmission dipstick tube seal faulty.	Inspect transmission dipstick tube seal.	If test fails, replace as necessary.
45. Transmission oil contaminated.		
Transmission oil cooler faulty.	Inspect transmission oil cooler.	If test fails, replace transmission oil cooler as necessary (WP 0180).
Transmission oil filter faulty.		Replace transmission oil filter (WP 0233).
Transmission oil contaminated.		Drain and fill transmission oil (WP 0232) and replace transmission oil filter (WP 0233).
Transmission operating temperature faulty.		Drain and fill transmission oil (WP 0232), replace transmission oil filter (WP 0233), and troubleshoot transmission overheating in all ranges.

Probable Cause	Test	Action
46. Transmission overheating in all ranges.		
Transmission oil level faulty.		Add transmission oil (WP 0232).
Transmission fault code(s) present.		Diagnostic tools are required for troubleshooting. Notify Supervisor.
Transmission oil filter faulty.		Replace transmission oil filter (WP 0233).
Transmission oil cooler faulty.	Inspect transmission oil cooler.	If test fails, replace as necessary (WP 0180).
Transmission temperature gauge faulty.		Replace transmission temperature gauge.
Transmission hose(s) and/or fitting(s) cracked, leaking, chaffed, or damaged.		Inspect transmission hoses and fittings for damage or leaks and repair/replace as necessary.
47. Oil in cooling system.		
Engine oil cooler faulty.		Replace engine cooler as necessary.
Cylinder head gasket faulty or cracked cylinder head.		Replace engine (WP 0227).
48. Coolant in lubrication oil.		
Failure of cylinder head gasket or cracked cylinder head.		Replace engine (WP 0227).
Cracked cylinder block.		Replace engine (WP 0227).
49. Cooling fan always on.		
Circuit breaker CB5 faulty.	Are less than 200 ohms measured across the circuit breaker CB5?	If test fails, replace circuit breaker CB5.
Cooling fan clutch faulty.	If fan can be rotated with engine off, fan clutch may be faulty.	If test fails, replace fan clutch as necessary (WP 0178).
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Engine wiring harness faulty.		Inspect engine wire harness and replace/repair as necessary (WP 0218).

Probable Cause	Test	Action
50. Cooling fan not working.		
HIGH IDLE switch faulty.	Are less than 200 ohms measured on high idle switch, terminals 2B and 3?	If test fails, replace HIGH IDLE switch.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Capsule wiring harness faulty.	Are less than 200 ohms measured on wire L902 between high idle switch connector, terminal 2B and capsule harness connector C6, terminal 9?	If test fails, replace/repair capsule harness as needed (WP 0218).
	Are less than 200 ohms measured on wire L902A between Capsule harness connector C6, terminal 8 and relay_C connector, terminal 30?	
	Are less than 200 ohms measured on wire L901 between relay_C connector, terminal 87 and engine harness connector C2, terminal 18?	
	Are less than 200 ohms measured on wire L901 between engine harness connector C2, terminal 18 and engine harness connector C37, terminal 18?	
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40?	If test fails, replace/repair engine harness as necessary (WP 0218).
51. Engine overheats (water temperature gauge continuously reads over 220°F) (104°C).		
Cooling system faulty.		Troubleshoot cooling system (WP 0011).
52. Ether starting aid output circuit test.		
No fluid in ether canister.		Replace ether canister.
Ether starting aid valve assembly faulty.		Replace ether starting aid valve assembly.
Engine wiring harness faulty.	Are less than 200 ohms measured on wire L902 between engine harness connector C2, terminal 2 and engine harness connector C37, terminal 40.	If test fails, replace/repair engine harness as necessary (WP 0218).
Engine Electronic Control Module (ECM) faulty.		Replace Engine ECM (WP 0223).

Probable Cause	Test	Action
53. Poor fuel consumption.		
Air Filter clogged.		Replace air filter (WP 0259).
Environmental conditions or driver habits.		Engine will consume abnormally large amount of fuel in extreme cold conditions. Fuel consumption also depends upon how the vehicle is driven.
Engine fault code(s) present.	Check for engine diagnostic codes.	If engine diagnostic codes are active, troubleshoot engine diagnostic codes.
Exhaust system damaged.		Inspect exhaust system and repair/replace as necessary.
Fuel tank leaking.		Inspect fuel tank and repair/replace as necessary (WP 0264).
Fuel lines and/or fittings faulty.		Inspect fuel lines and fittings for damage or leaks and repair/replace as necessary (WP 0263).
Fuel contaminated (poor quality or water in fuel).		Drain fuel tank and check for evidence of water or contaminants. Refill fuel tank with clean fuel and replace fuel filter (WP 0262).
54. Fuel pressure low.		
Fuel filter faulty.		Replace fuel filter (WP 0262).
Water/fuel separator faulty.		Drain water from water/fuel separator or replace (WP 0266).
Fuel lines and/or fittings faulty.		Inspect fuel lines and fittings for damage or leaks and repair/replace as necessary (WP 0263).
Pressure sending unit faulty.	Test with CAT ET.	Replace pressure sending unit.
Fuel priming pump faulty.	Test with CAT ET.	Replace fuel priming pump.
Fuel pump faulty.	Test with CAT ET.	Replace fuel pump.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM TROUBLESHOOTING

INTRODUCTION

Fire suppression system performs automatic test and provides flash codes which allows personnel to troubleshoot the fire suppression system. This work package is split between capsule, engine compartment, and undercarriage fire suppression systems and contains flash codes for troubleshooting capsule, and engine compartment systems. The symptom lists the blink codes and the first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause.

If a malfunction is not listed on the table, notify Supervisor.

CAUTION

Turn battery disconnect switch to the OFF position prior to inspecting and/or disconnecting any electrical connector for the fire suppression system. Failure to comply may result in damage to equipment.

Probable Cause	Test	Action
1. CAPSULE AUTOMATIC FIRE EXTINGUISHING SYSTEM (ALL MODELS)		
a. POWER lamp does not illuminate.		
Circuit breaker CB10 faulty.	Check for less than 200 ohms across circuit breaker CB10.	If test fails replace circuit breaker CB10.
POWER lamp faulty.	Check for 22 to 28 VDC between connector C458 terminals 1 and 2 (harness side).	If test passes, replace fire suppression system front optical sensor (WP 0069). If test fails troubleshoot capsule fire suppression system harness.
Front optical sensor controller faulty.	Check for 22 to 28 VDC between connector C426 terminals 1 and 2 (harness side).	If test passes, replace fire suppression system front optical sensor (WP 0069). If test fails troubleshoot capsule fire suppression system harness.
Cab wire harness faulty.	Check for less than 200 ohms between connector C456 terminal 1 (wire 2100) and circuit breaker CB10.	If test fails, replace/repair cab wire harness (WP 0218).
	Check for less than 200 ohms between connector C426 terminal 2 (wire 1435F) and a known good ground.	If test fails, replace/repair cab wire harness (WP 0218).
b. POWER LED blinks.		
Charging system faulty.		Troubleshoot charging system.

Probable Cause	Test	Action
c. Fault LED blinks once per 2.5 seconds (capsule fire suppression system cylinder fault).		
Capsule fire suppression system cylinder empty.		Replace capsule fire suppression system cylinder (WP 0065, WP 0066).
Capsule fire suppression system wire harness to cylinder is disconnected.		Connect capsule fire suppression system wire harness (WP 0065, WP 0066).
Capsule fire suppression system wire harness faulty.	Check for less than 200 ohms between connector C459 terminal 1 and connector C460 terminal 3 (wire 2122).	If test fails, replace/repair cab fire suppression system wire harness (WP 0218).
	Check for less than 200 ohms between connector C459 terminal 2 and connector C460 terminal 4 (wire 2123).	
	Check for less than 200 ohms between connector C459 terminal 3 and connector C460 terminal 5 (wire 2124).	
d. Fault LED blinks 4 times per 2.5 seconds (Rear Detector Fault).		
Rear detector optical lens is dirty.		Clean fire suppression system optical sensor.
Capsule fire suppression system wire harness to rear detector is disconnected.		Connect capsule fire suppression system wire harness(WP 0065, WP 0066).
Capsule fire suppression system wire harness faulty.	Check for less than 200 ohms between optical controller connector C460 terminal 1 and backup battery connector C456 terminal 1 (wire 2120).	If test fails, replace/repair capsule fire suppression system wire harness (WP 0218).
	Check for less than 200 ohms between optical controller connector C460 terminal 2 and backup battery connector C456 terminal 2 (wire 2121).	
	Check for less than 200 ohms between optical controller connector C460 terminal 8 and optical sensor connector C458 terminal 1 (wire 2125).	
	Check for less than 200 ohms between optical controller connector C460 terminal 9 and optical sensor connector C458 terminal 2 (wire 2126).	
	Check for less than 200 ohms between optical controller connector C460 terminal 10 and optical sensor connector C458 terminal 3 (wire 2127).	

Probable Cause	Test	Action
d. Fault LED blinks 4 times per 2.5 seconds (optical sensor fault). (Continued)		
Capsule fire suppression system front controller or rear detector faulty.	Check for less than 200 ohms between optical controller connector C460 terminal 1 and backup battery connector C456 terminal 1 (wire 2120).	If test passes, replace faulty capsule fire suppression system optical sensor(s) (front WP 0069) (rear WP 0071).
	Check for less than 200 ohms between optical controller connector C460 terminal 2 and backup battery connector C456 terminal 2 (wire 2121).	
	Check for less than 200 ohms between optical controller connector C460 terminal 8 and optical sensor connector C458 terminal 1 (wire 2125).	Replace/repair optical sensor harness/wiring if tests fail (WP 0218).
	Check for less than 200 ohms between optical controller connector C460 terminal 9 and optical sensor connector C458 terminal 2 (wire 2126).	
	Check for less than 200 ohms between optical controller connector C460 terminal 10 and optical sensor connector C458 terminal 3 (wire 2127).	
e. Fault LED blinks 5 times per 2.5 seconds (detection faulty).		
Front controller optical lens is dirty.		Clean detection system window.
Front controller faulty.		Replace front controller (WP 0069).
f. Faulty LED blinks 6 times per 2.5 seconds (multiple faults).		
More than two faults.		Inspect fire suppression system and repair any faults.
2. ENGINE AUTOMATIC FIRE EXTINGUISHING SYSTEM (AFES FOUR GENERATOR SYSTEM)		
a. Fault LED flashes once (main power failure).		
Charging system faulty.		Troubleshoot charging system undercharging (WP 0012).
Cab wire harness faulty.	Check for less than 200 ohms between connector C425 terminal 1 (wire 2100) and circuit breaker CB10.	If test fails, replace/repair cab wire harness(WP 0218).
	Check for less than 200 ohms between connector C425 terminal 2 (wire 1435F) and a known good ground.	
Fire suppression control faulty.		Replace fire suppression control (WP 0064).

Probable Cause	Test	Action
b. Fault LED flashes twice (detection fault).		
Fire suppression thermostat sensor(s) harness connectors loose.		Inspect and connect loose fire suppression thermostat sensor(s) harness connectors.
End of line resistor loose.	Check for less than 200 ohms between fire suppression control panel connector C455 terminal J and connector C430 terminal 4 (wire 2112).	Inspect and connect loose end of line resistor.
Fire suppression wire harness faulty.	Check for less than 200 ohms between fire suppression control panel connector C455 terminal K and connector C430 terminal 1 (wire 2101).	If test fails, replace/repair fire suppression wire harness as necessary (WP 0218). If resistor test fails replace resistor.
	Check for less than 200 ohms between connector C430 terminal 1 and firewall pass through connector C1 terminal 18 (wire 2101).	
	Check for less than 200 ohms between connector C430 terminal 4 (wire 2112) and C453, terminal 1 (wire 2112).	
	Check for less than 200 ohms between connector C430, terminal 3 (wire 2111), and connector C454, terminal 1 (wire 2111).	
	Check for less than 200 ohms in both wires from driver side firewall to passenger side firewall, from passenger side firewall to driver side radiator, from driver side radiator to passenger side radiator, and finally check the resistor at the passenger side radiator sensor for 200 ohms.	
Fire suppression system control head adapter faulty.		Replace fire suppression system control head adapter (WP 0063).
Fire suppression control faulty.		Replace fire suppression control (WP 0064).
c. Fault LED flashes four times (actuation fault).		
Fire suppression aerosol generator harness connector(s) loose.		Inspect and connect fire suppression aerosol generator harness connector(s) (WP 0060).

Probable Cause	Test	Action
c. Fault LED flashes four times (actuation fault). (Continued)		
Fire suppression wire harness faulty.	Check for continuity between fire suppression control panel connector C455 terminal D and connector C430 terminal 2 (wire 2102).	If test fails, replace/repair fire suppression wire harness as necessary (WP 0218).
	Check for continuity between fire suppression control panel connector C455 terminal C and connector C430 terminal 3 (wire 2111).	
	Check less than 200 ohms between connector C430 terminal 2 and connector C429, terminal 2 (wire 2102).	
	Check less than 200 ohms between connector C430 terminal 3 and connector C429, terminal 3 (wire 2111).	
	Check for less than 200 ohms between connector C429 terminal 2 (wire 2102) and the fire suppression aerosol generator splitter connector C454 terminal 2 (wire 2102).	
	Check for less than 200 ohms between connector C429 terminal 3 (wire 2111) and the fire suppression aerosol generator splitter connector C454 terminal 1 (wire 2111).	
Fire suppression wire harness faulty.	Check for less than 200 ohms in both wires from the fire suppression aerosol generator splitter to each fire suppression aerosol generator.	If test fails, replace/repair fire suppression wire harness as necessary (WP 0218).
Fire suppression control faulty.	Check for 22 to 28 VDC at connector C455 between terminals A (wire 2100) and B (wire 1435).	If test fails, replace fire suppression control (WP 0064).
d. Fault LED flashes six times (Battery backup fault).		
Internal backup battery faulty.	Check for 22 to 28 VDC at connector C426 between terminals 1 (wire 2100) and 2 (wire 1435F).	If there is between 22 and 28 VDC at connector C426 but there is not 22 to 28 VDC at connector C456, replace internal backup battery (WP 0070).
	Check for 22 to 28 VDC at connector C456 between terminals 1 (wire 2120) and 2 (wire 2121).	

Probable Cause	Test	Action
d. Fault LED flashes six times (Battery backup fault). (Continued)		
Cab wire harness faulty.	Check for less than 200 ohms between connector C426 terminal 1 (wire 2100) and circuit breaker CB10.	If test fails, replace/repair cab wire harness (WP 0218).
	Check for less than 200 ohms between connector C426 terminal 2 (wire 1435F) and a known good ground.	
e. Fault LED flashes seven times (Pressure switch fault).		
Fire suppression pressure switch harness connector(s) loose.		Inspect and connect fire suppression pressure switch harness connector(s).
3. Undercarriage Automatic Fire Extinguishing System (AFES Nitrogen Detection)		
a. Red light.		
System fired.		Replace cylinders (WP 0067).
Wheel well and fuel tank fire suppression system control box faulty.	Check for 22 to 28 VDC at connector C407 between terminals 1 (wire 2100) and 2 (wire 1435F).	If test passes, replace wheel well and fuel tank fire suppression system control box. If test fails replace/repair cab harness (WP 0218).
Fire suppression system wire harness faulty.	Check for less than 200 ohms between connector C407 terminal 2 (wire 1435) and connector C458 terminal 2.	If test fails, replace/repair appropriate harness (WP 0218).
	Check for less than 200 ohms between connector C407 terminal 1 (wire 2100) and connector C458 terminal 1.	
	Check for less than 200 ohms between connector C450 terminal 1 (wire 2134) and connector C458 terminal 3.	
	Check for less than 200 ohms between connector C450 terminal 2 (wire 2130) and connector C458 terminal 4.	
Fire suppression system wire harness faulty.	Check for less than 200 ohms between connector C450 terminal 3 (wire 1435) and connector C458 terminal 5.	If test fails, replace/repair appropriate harness (WP 0218).
	Check for less than 200 ohms between connector C450 terminal 4 (wire 2131) and connector C458 terminal 6.	

Probable Cause	Test	Action
a. Red light. (Continued)		
Fire suppression system wire harness faulty.	Check for less than 200 ohms between connector C450 terminal 5 (wire 2132) and connector C458 terminal 7.	If test fails, replace/repair appropriate harness (WP 0218).
	Remove rear capsule plate and check for less than 200 ohms between connector C450 pin 1 (wire 2134) and connector C464 pin 1 (wire 2134).	
	Check for less than 200 ohms between connector C450 pin 3 (wire 1435) and connector C462 pin 2 (wire 1435).	
	Check for less than 200 ohms between connector C450 pin 1 (wire 2134) and connector C461 pin 2 (wire 1435).	
	Check for less than 200 ohms between connector C450 pin 3 (wire 1435) and connector C461 pin 2 (wire 1434).	
	Check for less than 200 ohms between connector C465 pin 1 (wire 2134) and connector C463 pin 1 (wire 2134).	
	Check for less than 200 ohms between connector C465 pin 2 (wire 1435) and connector C463 pin 2 (wire 1435).	
	Check for less than 200 ohms between connector C464 pin 1 (wire 2134) and connector C463 pin 1 (wire 2134).	
	Check for less than 200 ohms between connector C464 pin 2 (wire 1435) and connector C464 pin 2 (wire 1435).	
	Check for less than 200 ohms between connector C463 pin 1 (wire 2134) and connector C452 pin 1 (wire 2134).	
	Check for less than 200 ohms between connector C463 pin 2 (wire 1435) and connector C452 pin 3 (wire 1435).	
	Check for less than 200 ohms in connectors C465, C464, C462, and C461 between pin 1 (wire 2134) and pin 2 (wire 1435).	

Probable Cause	Test	Action
4. ENGINE AUTOMATIC FIRE EXTINGUISHING SYSTEM (AFES FIVE GENERATOR SYSTEM)		
a. Engine fire suppression control panel OK LED does not illuminate.		
Engine fire suppression control panel faulty.	Check for 22 to 28 VDC at engine fire suppression control wire harness connector C455, terminals A and B.	If test passes, replace engine fire suppression control panel.
Engine fire suppression control wire harness faulty.	Check for 22 to 28 VDC at engine fire suppression control wire harness connector C425, terminals 1 and 2.	If test passes, replace/repair engine fire suppression control wire harness (WP 0218).
Circuit breaker CB10 faulty.	Check if less than 200 ohms are present between circuit breaker CB10, terminals 1 and 2.	If test fails, replace circuit breaker CB10.
Capsule wire harness faulty.		Replace/repair capsule wire harness (WP 0218).
b. Fault LED flashes once (main power failure).		
Engine fire suppression control panel faulty.	Check for 22 to 28 VDC at engine fire suppression control wire harness connector C455, terminals A and B.	If test passes, replace engine fire suppression control panel.
Engine fire suppression control wire harness faulty.	Check for 22 to 28 VDC at engine fire suppression control wire harness connector C425, terminals 1 and 2.	If test passes, replace/repair engine fire suppression control wire harness (WP 0218).
Circuit breaker CB10 faulty.	Check if less than 200 ohms are present between circuit breaker CB10, terminals 1 and 2.	If test fails, replace circuit breaker CB10.
Capsule wire harness faulty.		Replace/repair capsule wire harness (WP 0218).
c. Fault LED flashes twice (detection fault).		
End of line resistor faulty.	Place connector C454 in transport configuration. Failure to do so will result in inadvertent system activation.	If end of line resistor is missing or test fails, replace end of line resistor (WP 0073).
	Check if end of line resistor is present.	
	If present, remove end of line resistor and check for 2100 to 2300 ohms between terminals 1 and 2.	
Engine fire suppression detection circuit connectors loose.	Check engine fire suppression detection circuit for loose and/or disconnected connectors.	If loose or disconnected, reconnect connectors.
Engine fire suppression control panel faulty.	Install cable test box at engine fire suppression control wire harness connector C455 (WP 0075).	If cable test box does not display a detection fault condition, replace engine fire suppression control wire harness.
	Check if cable test box displays a detection fault condition.	

Probable Cause	Test	Action
c. Fault LED flashes twice (detection fault). (Continued)		
Engine fire suppression sensor wire harness faulty.	Install end of line resistor at splash guard end of engine fire suppression detection wire harness.	If cable test box does not display a detection fault condition, replace engine fire suppression sensor wire harness (WP 0073).
	Check if cable test box displays a detection fault condition.	
Engine fire suppression detection wire harness faulty.	Install end of line resistor at engine fire suppression detection and activation wire harness connector C453.	If cable test box does not display a detection fault condition, replace engine fire suppression detection wire harness.
	Check if cable test box displays a detection fault condition.	
Engine fire suppression detection and activation wire harness faulty.	Install jumper wire at chassis pass through wire harness connector C429, terminals 1 and 4.	If cable test box does not display a detection fault condition, replace engine fire suppression detection and activation wire harness.
	Check if cable test box displays a detection fault condition.	
Engine fire suppression control wire harness faulty.	Install jumper wire at engine fire suppression control wire harness connector C430, terminals 1 and 4.	If test fails, replace engine fire suppression control wire harness.
	Check if cable test box displays a detection fault condition.	
Chassis pass through wire harness faulty.	Check if less than 200 ohms are present between chassis pass through wire harness connectors C1, terminal 18 and C429, terminal 1.	If test fails, replace/repair chassis pass through wire harness (WP 0218).
Chassis pass through wire harness faulty. (continued)	Check if less than 200 ohms are present between chassis pass through wire harness connector C1, terminal 31 and C429, terminal 4.	
Capsule wire harness faulty.		Replace/repair capsule wire harness (WP 0218).
d. Fault LED flashes four times (actuation fault).		
Engine fire suppression actuation circuit connectors loose.	Check engine fire suppression actuation circuit for loose and/or disconnected connectors.	If loose or disconnected, reconnect connectors.

Probable Cause	Test	Action
d. Fault LED flashes four times (actuation fault). (Continued)		
Engine fire suppression wire harness faulty.	Place connector C454 in transport configuration. Failure to do so will result in inadvertent system activation.	If test passes, go to next probable cause.
	Install jumper plug at engine fire suppression detection and actuation wire harness connector C454.	
	Install cable test box at engine fire suppression control wire harness connector C455.	
	Check if cable test box displays an actuation fault condition.	
	Install jumper plug at engine fire suppression control wire harness connector C430, terminals 2 and 3.	If test fails, replace engine fire suppression control wire harness.
	Check if cable test box displays an actuation fault condition.	
	Install jumper plug at engine fire suppression detection and activation wire harness connector C454, terminals 1 and 2.	If test fails, replace engine fire suppression detection and activation wire harness.
	Check if less than 200 ohms are present between engine fire suppression detection and activation wire harness connector C429, terminals 2 and 3.	
	Install jumper wire at chassis pass through wire harness connector 429, terminals 2 and 3.	If test fails, replace/repair chassis pass through wire harness (WP 0218).
	Check if less than 200 ohms are present between chassis pass through wire harness connector C1, terminals 19 and 20.	
	Replace capsule pass through wire harness.	
Engine fire suppression control panel faulty.	Check if less than 200 ohms are present between control head adapter input, terminals 1 and 2.	If test passes, replace fire suppression control panel.
Radiator left generator faulty.	Check if less than 200 ohms are present between radiator left generator connector, terminals 1 and 2.	If test fails, replace radiator left generator (WP 0061).

Probable Cause	Test	Action
d. Fault LED flashes four times (actuation fault). (Continued)		
Radiator right generator faulty.	Check if less than 200 ohms are present between radiator right generator connector, terminals 1 and 2.	If test fails, replace radiator right generator (WP 0061).
Firewall left generator faulty.	Check if less than 200 ohms are present between firewall left generator connector, terminals 1 and 2.	If test fails, replace firewall left generator (WP 0061).
Right frame generator faulty.	Disconnect right frame and firewall right generators.	If test fails, replace right frame generator (WP 0061).
	Check if less than 200 ohms are present between right frame generator connector, terminals 1 and 2.	
Firewall right generator faulty.	Install jumper plug between firewall right generator, right frame generator connector, terminals 1 and 2.	If test fails, replace firewall right generator (WP 0061).
	Check if less than 200 ohms are present between firewall right generator connector, terminals 1 and 2.	
Control head adapter faulty.		Replace control head adapter.
e. Fault LED flashes six times (backup power fault).		
Backup battery faulty.		Replace backup battery.
5. UNDERCARRIAGE AUTOMATIC FIRE EXTINGUISHING SYSTEM (AFES LINEAR WIRE DETECTION)		
a. Front Tires and Rear Tires/Fuel Undercarriage Status LED's Do Not Illuminate.		
Fire suppression sensor wire faulty.		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Agent cylinder tank pressure low.	Check for low agent cylinder pressure. Check six cylinders.	If low, replace agent cylinder(s) (WP 0068).
Undercarriage fire suppression system connectors loose or disconnected.	Check for loose and/or disconnected connectors.	Reconnect loose and/or disconnected connectors.
Circuit breaker CB10 faulty.	Check for less than 200 ohms across circuit breaker CB10.	If test fails, replace circuit breaker CB10.

Probable Cause	Test	Action
a. Front Tires and Rear Tires/Fuel Undercarriage Status LED's Do Not Illuminate. (Continued)		
Undercarriage fire suppression system power faulty.	Install circuit breaker CB10. Check for 22 to 28 VDC between undercarriage fire suppression control wire harness connector C458, terminals 1 and 2.	If test passes go to next probable cause.
	Check for 22 to 28 VDC between capsule harness connector C407, terminals 1 and 2.	If test passes, replace undercarriage fire suppression control wire harness. If test fails, replace capsule wire harness.
Undercarriage fire suppression control module faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 6.	If test passes, replace undercarriage fire suppression control module.
	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 7.	
Undercarriage fire suppression control wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connectors C458, terminal 4 and C450, terminal 2.	If test fails, replace undercarriage fire suppression control wire harness.
Undercarriage fire suppression wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 2 and C463, terminal 3.	If test fails, replace undercarriage fire suppression wire harness.
Undercarriage fire suppression chassis pass through wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connectors C451, terminal 20 and C452, terminal 2.	If test fails, replace undercarriage fire suppression chassis pass through wire harness.
Undercarriage fire suppression capsule pass through wire harness faulty.		Replace undercarriage fire suppression capsule pass through wire harness.
b. Front Undercarriage Status LED Does Not Illuminate.		
Fire suppression sensor wire faulty.		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Undercarriage fire suppression control faulty.	Check if rear tires/fuel undercarriage fire suppression system LED illuminates.	If not, refer to symptom 5a (Front Tires and Rear Tires/Fuel Undercarriage Status LED's Do Not Illuminate) troubleshooting.
Agent cylinder tank pressure low.	Check for low agent cylinder pressure. Check four front cylinders.	If low, replace agent cylinder(s) (WP 0068).

Probable Cause	Test	Action
b. Front Undercarriage Status LED Does Not Illuminate. (Continued)		
Undercarriage fire suppression system connectors loose or disconnected.	Check for loose and/or disconnected connectors.	Reconnect loose and/or disconnected connectors (WP 0073).
Undercarriage fire suppression control module faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 6.	If test passes, replace undercarriage fire suppression control module.
	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 7.	
Undercarriage fire suppression cylinder(s) faulty.	Check for less than 200 ohms between front right agent cylinder connector, terminals 3 and 4.	If test fails, replace front right agent cylinder (WP 0068).
	Check for less than 200 ohms between front right center agent cylinder connector, terminals 3 and 4.	If test fails, replace front right center agent cylinder (WP 0068).
	Check for less than 200 ohms between front left center agent cylinder connector, terminals 3 and 4.	If test fails, replace front left center agent cylinder (WP 0068).
	Check for less than 200 ohms between front left agent cylinder connector, terminals 3 and 4.	If test fails, replace front left agent cylinder (WP 0068).
Undercarriage fire suppression control wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connectors C458, terminal 6 and C450, terminal 4.	If test fails, replace undercarriage fire suppression control wire harness.
Front tires undercarriage fire suppression system arming circuit faulty.	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connector C463, terminals 3 and 4.	If test passes, go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 3 and C464, terminal 4.	If test fails, replace undercarriage fire suppression hood wire harness.
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 4 and C465, terminal 4.	

Probable Cause	Test	Action
b. Front Undercarriage Status LED Does Not Illuminate. (Continued)		
Front tires undercarriage fire suppression system arming circuit faulty. (Continued)	Check for less than 200 ohms between undercarriage fire suppression front left wire harness agent cylinder connector LOC2, terminal 4 and connector C464, terminal 4.	If test fails, replace undercarriage fire suppression hood wire harness.
Undercarriage fire suppression wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 2 and C463, terminal 3.	If test fails, replace undercarriage fire suppression wire harness.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 4 and C463, terminal 4.	
Undercarriage fire suppression chassis pass through wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connectors C451, terminal 24 and C452, terminal 4.	If test fails, replace undercarriage fire suppression chassis pass through wire harness.
Undercarriage fire suppression capsule pass through wire harness faulty.		Replace undercarriage fire suppression capsule pass through wire harness.
c. Rear Tires/Fuel Undercarriage Status LED Does Not Illuminate.		
Fire suppression sensor wire faulty		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor wire Faulty).
Undercarriage fire suppression control faulty.	Check if front tires undercarriage fire suppression system can be armed.	If not, refer to symptom 5a (Front Tires and Rear Tires/Fuel Undercarriage Status LED's Do Not Illuminate) troubleshooting.
Agent cylinder tank pressure low.	Check for low agent cylinder pressure. Check two rear cylinders.	If low, replace agent cylinder(s) (WP 0068).
Undercarriage fire suppression system connectors loose or disconnected.	Check for loose and/or disconnected connectors.	Reconnect loose and/or disconnected connectors (WP 0073).
Undercarriage fire suppression control module faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 6.	If test passes, replace undercarriage fire suppression control module.
	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 4 and 7.	

Probable Cause	Test	Action
c. Rear Tires/Fuel Undercarriage Status LED Does Not Illuminate. (Continued)		
Undercarriage fire suppression control wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connectors C458, terminal 7 and C450, terminal 5.	If test fails, replace undercarriage fire suppression control wire harness
Undercarriage fire suppression cylinder(s) faulty.	Check for less than 200 ohms between rear right agent cylinder connector, terminals 3 and 4.	If test fails, replace rear right agent cylinder (WP 0068).
	Check for less than 200 ohms between rear left agent cylinder connector, terminals 3 and 4.	If test fails, replace rear left agent cylinder (WP 0068).
Rear/tire undercarriage fire suppression system arming circuit faulty.	Check for less than 200 ohms between undercarriage fire suppression wire harness connector C452, terminals 2 and 5.	If test passes, go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 5 and C461, terminal 4.	If test fails, replace undercarriage fire suppression wire harness.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 2 and C462, terminal 4.	
	Check for less than 200 ohms between undercarriage fire suppression rear left wire harness agent cylinder connector LOC2, terminal 3 and fire sensor wire harness connector LOC3, terminal 1.	If test passes, replace undercarriage fire suppression rear right wire harness.
	Check for less than 200 ohms between undercarriage fire suppression rear left wire harness agent cylinder connector LOC2, terminal 4 and connector C461, terminal 4.	If test fails, replace undercarriage fire suppression rear left wire harness.
Undercarriage fire suppression wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 5 and C461, terminal 4.	If test fails, replace undercarriage fire suppression wire harness.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 2 and C462, terminal 4.	

Probable Cause	Test	Action
c. Rear Tires/Fuel Undercarriage Status LED Does Not Illuminate. (Continued)		
Undercarriage fire suppression chassis pass through wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connectors C451, terminal 27 and C452, terminal 5.	If test fails, replace undercarriage fire suppression chassis pass through wire harness.
Undercarriage fire suppression capsule pass through wire harness faulty.		Replace undercarriage fire suppression capsule pass through wire harness.
d. Front Tires Undercarriage Fire Suppression System Does Not Fire When Activated.		
Fire suppression sensor wire faulty.		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Front tires undercarriage fire suppression system not armed.	Check if front tires undercarriage fire suppression system LED is illuminated.	If not, refer to symptom 5b (Front Undercarriage Status LED Does Not Illuminate).
Undercarriage fire suppression system ground circuit faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connector C452, terminal 3 and a known good ground.	If not, refer to symptom 5f (Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated).
Undercarriage fire suppression system manual activation function faulty.	With undercarriage fire suppression chassis pass through wire harness connector C452 disconnected, turn battery disconnect and ignition switch on.	If not, refer to symptom 5f (Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated).
	Place undercarriage fire suppression system override/fire switch to ON position.	
	Check for 22 to 28 VDC between undercarriage fire suppression chassis pass through wire harness connector C452, terminal 1 and a known good ground.	
Undercarriage fire suppression cylinder(s) faulty.	Check for less than 200 ohms between front right agent cylinder connector, terminals 1 and 2.	If test fails, replace front right agent cylinder (WP 0068).
	Check for less than 200 ohms between front right center agent cylinder connector, terminals 1 and 2.	If test fails, replace front right center agent cylinder (WP 0068).
	Check for less than 200 ohms between front left center agent cylinder connector, terminals 1 and 2.	If test fails, replace front left center agent cylinder (WP 0068).

Probable Cause	Test	Action
d. Front Tires Undercarriage Fire Suppression System Does Not Fire When Activated. (Continued)		
Undercarriage fire suppression cylinder(s) faulty. (Continued)	Check for less than 200 ohms between front left agent cylinder connector, terminals 1 and 2.	If test fails, replace front left agent cylinder (WP 0068).
Undercarriage fire suppression wire harness faulty.	Turn ignition and battery disconnect switch off.	If test fails, replace undercarriage fire suppression wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 3 and C463, terminal 2.	
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 1 and C463, terminal 1.	
Undercarriage fire suppression hood wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 2 and C464, terminal 2.	If test fails, replace undercarriage fire suppression hood wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 1 and C464, terminal 1.	
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 2 and C465, terminal 2.	
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C463, terminal 1 and C465, terminal 1.	
	Check for less than 200 ohms between undercarriage fire suppression hood wire harness connectors C464, terminal 3 and C465, terminal 3.	
Undercarriage fire suppression front right wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression front right wire harness front right agent cylinder connector LOC2, terminal 2 and connector C465, terminal 2.	If test fails, replace undercarriage fire suppression front right wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression front right wire harness front right center agent cylinder connector LOC5, terminal 2 and connector C465, terminal 2.	

Probable Cause	Test	Action
d. Front Tires Undercarriage Fire Suppression System Does Not Fire When Activated. (Continued)		
Undercarriage fire suppression front right wire harness faulty. (Continued)	Check for less than 200 ohms between undercarriage fire suppression front right wire harness front right fire sensor harness connector, LOC3 terminal 2 and connector C465, terminal 3.	If test fails, replace undercarriage fire suppression front right wire harness and go to next probable cause.
Undercarriage fire suppression front left wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression front left wire harness front left agent cylinder connector LOC2, terminal 2 and connector C464, terminal 2.	If test fails, replace undercarriage fire suppression front left wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression front left wire harness front left center agent cylinder connector LOC5, terminal 2 and connector C464, terminal 2.	
	Check for less than 200 ohms between undercarriage fire suppression front left center wire harness front left fire sensor harness connector LOC5, terminal 2 and connector C464, terminal 3.	
Front undercarriage fire suppression harness manual activation circuit (wire 2134) faulty.	If all previous checks pass and front undercarriage fire system does not fire using manual fire switch, front undercarriage fire suppression manual activation circuit (wire 2134) is faulty.	Replace undercarriage fire suppression front left and undercarriage fire suppression front right wire harnesses.
Front undercarriage fire suppression activate latch circuit faulty.	If all previous checks pass and front undercarriage fire suppression system does not fire using manual fire switch, or agent cylinders do not completely discharge when fired, front undercarriage fire suppression activate latch circuit faulty.	Replace undercarriage fire suppression front left and undercarriage fire suppression front right wire harnesses.
e. Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated.		
Fire suppression sensor wire faulty.		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Rear tires/fuel undercarriage fire suppression system not armed.	Check if rear tires/fuel undercarriage fire suppression system is properly armed.	If not, arm rear tires/fuel undercarriage fire suppression system.

Probable Cause	Test	Action
e. Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated. (Continued)		
Undercarriage fire suppression system ground circuit faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connector C252, terminal 3 and a known good ground.	If not, refer to symptom 5f (Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated).
Undercarriage fire suppression system manual activate function faulty.	With undercarriage fire suppression chassis pass through wire harness connector C452 disconnected, turn battery disconnect and ignition switch on.	If not, refer to symptom 5f (Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated).
	Place undercarriage fire suppression system override/fire switch to ON position.	
	Check for 22 to 28 VDC between undercarriage fire suppression chassis pass through wire harness connector C452, terminal 1 and a known good ground.	
Undercarriage fire suppression wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 3 and C462, terminal 2.	If test fails, replace undercarriage fire suppression wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 1 and C462, terminal 1.	
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 3 and C461, terminal 2.	
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C452, terminal 1 and C461, terminal 1.	
	Check for less than 200 ohms between undercarriage fire suppression wire harness connectors C461, terminal 3 and C462, terminal 3.	

Probable Cause	Test	Action
e. Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated. (Continued)		
Undercarriage fire suppression rear right wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression rear right wire harness rear right agent cylinder connector LOC2, terminal 2 and connector C462, terminal 2.	If test fails, replace undercarriage fire suppression rear right wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression rear right wire harness rear right fire sensor harness connector LOC3, terminal 2 and connector C462, terminal 3.	
Undercarriage fire suppression rear left wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression rear left wire harness rear left agent cylinder connector, terminal 2 and connector C461, terminal 2.	If test fails, replace undercarriage fire suppression rear left wire harness and go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression rear left wire harness rear left fire sensor harness connector LOC3, terminal 2 and connector C461, terminal 3.	
Rear tires/fuel undercarriage fire suppression harness manual activation circuit (wire 2134) faulty.	If all previous checks pass and rear tires/fuel undercarriage fire suppression system does not fire using manual fire switch, rear undercarriage fire suppression manual activation circuit (wire 2134) is faulty.	Replace undercarriage fire suppression rear left and undercarriage fire suppression rear right wire harnesses.
Rear tires/fuel undercarriage fire suppression activation latch circuit faulty.	If all previous checks pass and rear tires/fuel undercarriage fire suppression system does not fire using manual fire switch, or agent cylinders do not completely discharge when fired, rear undercarriage fire suppression activate latch circuit faulty.	Replace undercarriage fire suppression rear left and undercarriage fire suppression rear right wire harnesses.
f. Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated.		
Fire suppression sensor wire faulty		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Front tires and rear tires/fuel undercarriage fire suppression system not armed.	Check if front tires and rear tires/fuel undercarriage fire suppression status LED's are illuminated.	If LED's do not illuminate, refer to symptom 5a (Front Tires and Rear Tires/Fuel Undercarriage Status LED's Do Not Illuminate) troubleshooting.

Probable Cause	Test	Action
f. Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Does Not Fire When Activated. (Continued)		
Undercarriage fire suppression system ground circuit faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connector C452, terminal 3 and a known good ground.	If test passes go to next probable cause.
	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 2 and 5.	If test fails, replace undercarriage fire suppression control module.
	Check for less than 200 ohms between undercarriage fire suppression control wire harness connectors C458, terminal 5 and C450, terminal 3.	If test fails, replace undercarriage fire suppression control wire harness.
	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connectors C251, terminal 23 and C452, terminal 3.	If test passes, replace undercarriage fire suppression capsule pass through wire harness.
Undercarriage fire suppression control module faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connector C458, terminals 1 and 3, with the undercarriage fire system override/fire switch in ON position.	If test fails, replace undercarriage fire suppression control module.
Undercarriage fire suppression control wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression control wire harness connectors C458, terminal 3 and C450, terminal 1.	If test fails, replace undercarriage fire suppression control wire harness.
Undercarriage fire suppression chassis pass through wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression chassis pass through wire harness connectors C451, terminal 18 and C452, terminal 1.	If test fails, replace undercarriage fire suppression chassis pass through wire harness.
Undercarriage fire suppression capsule pass through wire harness faulty.	Check for less than 200 ohms between undercarriage fire suppression capsule pass through wire harness connectors C450, terminal 18 and C451, terminal 1.	Replace undercarriage fire suppression capsule pass through wire harness.

Probable Cause	Test	Action
g. Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Status LED's are Red (Fired) or System Activates On Power Up.		
Fire suppression sensor wire faulty.		Go to symptom 5h (Potential Undercarriage Fire Suppression Sensor Wire Faulty).
Undercarriage fire suppression system override/fire switch in ON position.	Check if undercarriage fire suppression system override/fire switch is in ON position.	If undercarriage fire suppression system override/fire switch is in ON position, position switch to OFF position.
Undercarriage fire suppression control module faulty.	Check for less than 200 ohms between undercarriage fire suppression control module harness connector, terminals 1 and 3, with undercarriage fire system override/fire switch in the OFF position.	If test fails, replace undercarriage fire suppression control module.
Undercarriage fire suppression front right wire harness faulty.	Disconnect connector C465.	If test fails, replace undercarriage fire suppression front right wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression front right wire harness connector C465, terminals 1 and 4.	
	Check for greater than 10,000 ohms between undercarriage fire suppression front right wire harness connector C465, terminals 3 and 4.	
Undercarriage fire suppression front left wire harness faulty.	Disconnect connector C464.	If test fails, replace undercarriage fire suppression front left wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression front left wire harness connector C464, terminals 1 and 4.	
	Check for greater than 10,000 ohms between undercarriage fire suppression front left wire harness connector C464, terminals 3 and 4.	
Undercarriage fire suppression hood wire harness faulty.	Disconnect connector C463.	If test fails, replace undercarriage fire suppression hood wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression hood wire harness connector C463, terminals 3 and 4.	

Probable Cause	Test	Action
g. Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Status LED's are Red (Fired) or System Activates On Power Up. (Continued)		
Undercarriage fire suppression rear right wire harness faulty.	Disconnect connector C462.	If test fails, replace undercarriage fire suppression rear right wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression rear right wire harness connector C462, terminals 1 and 4.	
	Check for greater than 10,000 ohms between undercarriage fire suppression rear right wire harness connector C462, terminals 3 and 4.	If test fails, replace undercarriage fire suppression rear right wire harness.
Undercarriage fire suppression rear left wire harness faulty.	Disconnect connector C461.	If test fails, replace undercarriage fire suppression rear left wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression rear left wire harness connector C461, terminals 1 and 4.	
	Check for greater than 10,000 ohms between undercarriage fire suppression rear left wire harness connector C461, terminals 3 and 4.	
Undercarriage fire suppression wire harness faulty.	Disconnect connector C452.	If test fails, replace undercarriage fire suppression wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression wire harness connector C452, terminals 1 and 2.	
	Check for greater than 10,000 ohms between undercarriage fire suppression wire harness connector C452, terminals 1 and 4.	
	Check for greater than 10,000 ohms between undercarriage fire suppression wire harness connector C452, terminals 1 and 5.	
Undercarriage fire suppression control wire harness faulty.	Disconnect connector C450.	If test fails, replace undercarriage fire suppression control wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression control wire harness connector C458, terminals 1 and 3.	
	Check for greater than 10,000 ohms between undercarriage fire suppression control wire harness connector C464, terminals 3 and 4.	

Probable Cause	Test	Action
g. Front Tires and Rear Tires/Fuel Undercarriage Fire Suppression System Status LED's are Red (Fired) or System Activates On Power Up. (Continued)		
Undercarriage fire suppression control wire harness faulty. (Continued)	Check for greater than 10,000 ohms between undercarriage fire suppression control wire harness connector C464, terminals 3 and 6.	If test fails, replace undercarriage fire suppression control wire harness.
Undercarriage fire suppression control wire harness faulty. (continued)	Check for greater than 10,000 ohms between undercarriage fire suppression control wire harness connector C464, terminals 3 and 7.	If test fails, replace undercarriage fire suppression control wire harness.
Undercarriage fire suppression chassis pass through wire harness faulty.	Disconnect connector C451.	If test fails, replace undercarriage fire suppression chassis pass through wire harness.
	Check for greater than 10,000 ohms between undercarriage fire suppression chassis pass through wire harness connector C452, terminals 1 and 2.	
	Check for greater than 10,000 ohms between undercarriage fire suppression chassis pass through wire harness connector C452, terminals 1 and 4.	
Check for greater than 10,000 ohms between undercarriage fire suppression chassis pass through wire harness connector C452, terminals 1 and 5.		
Undercarriage fire suppression capsule pass through wire harness faulty.		Replace undercarriage fire suppression capsule pass through wire harness.
h. Potential Undercarriage Fire Suppression Sensor Wire Faulty.		
Front tires fire suppression sensor wires faulty.	Check undercarriage fire suppression sensor wire harnesses for heat and physical damage. Check three harnesses.	If test fails, replace faulty undercarriage fire suppression fire sensor wire harness.
	Disconnect all undercarriage fire suppression cylinder connectors.	
	Disconnect connector LOC6 from driver side sensor wire and connector LOC6 from passenger side sensor wire.	
	Check for less than 200 ohms between connector LOC6 terminals 1 and 2.	If test passes, replace defective sensor wire.

Probable Cause	Test	Action
h. Potential Undercarriage Fire Suppression Sensor Wire Faulty. (Continued)		
Front tires fire suppression sensor wires faulty. (Continued)	Check for less than 200 ohms between driver side connector LOC6 terminal 1 and passenger side connector LOC6 terminal 1.	If test fails, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC6 terminal 2 and passenger side connector LOC6 terminal 2.	
	Disconnect driver side connectors LOC3 and LOC4.	If test passes, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC4 terminals 1 and 2.	
	Check for less than 200 ohms between driver side connector LOC3 terminal 1 and connector LOC4 terminal 1.	If test fails, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC3 terminal 2 and connector LOC4 terminal 2.	
	Disconnect passenger side connectors LOC3 and LOC4.	If test passes, replace defective sensor wire. If test fails, perform fire suppression systems test (WP 0075).
	Check for less than 200 ohms between passenger side connector LOC4 terminals 1 and 2.	
	Check for less than 200 ohms between passenger side connector LOC3 terminal 1 and connector LOC4 terminal 1.	If test fails, replace defective sensor wire.
	Check for less than 200 ohms between passenger side connector LOC3 terminal 2 and connector LOC4 terminal 2.	
Rear tires/fuel fire suppression sensor wire faulty.	Check undercarriage fire suppression sensor wire harnesses for heat and physical damage. Check three harnesses.	If test fails, replace faulty undercarriage fire suppression fire sensor wire harness.
	Disconnect all undercarriage fire suppression cylinder connectors.	
	Disconnect connector LOC2 from driver side center sensor wire and connector LOC2 from passenger side center sensor wire.	

Probable Cause	Test	Action
h. Potential Undercarriage Fire Suppression Sensor Wire Faulty. (Continued)		
Rear tires/fuel fire suppression sensor wire faulty. (Continued)	Check for less than 200 ohms between connector LOC2 terminals 1 and 2.	If test passes, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC2 terminal 1 and passenger side connector LOC2 terminal 1.	If test fails, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC2 terminal 2 and passenger side connector LOC2 terminal 2.	
	Disconnect driver side connectors LOC1 and LOC3.	If test passes, replace defective sensor wire.
	Check for less than 200 ohms between driver side connector LOC1 terminals 1 and 2.	
	Check for less than 200 ohms between driver side connector LOC1 terminal 1 and connector LOC3 terminal 1.	If test fails, replace defective sensor wire. If test passes, perform fire suppression systems test (WP 0075).
	Check for less than 200 ohms between driver side connector LOC1 terminal 2 and connector LOC3 terminal 2.	
	Disconnect passenger side connectors LOC1 and LOC3.	If test passes, replace defective sensor wire.
	Check for less than 200 ohms between passenger side connector LOC1 terminals 1 and 2.	
	Check for less than 200 ohms between passenger side connector LOC2 terminal 1 and connector LOC3 terminal 1.	If test fails, replace defective sensor wire. If test passes, perform fire suppression systems test (WP 0075).
Check for less than 200 ohms between passenger side connector LOC2 terminal 2 and connector LOC3 terminal 2.		

END OF TASK

END OF WORK PACKAGE

STEERING SYSTEM TROUBLESHOOTING

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

Probable Cause	Test	Action
1. Darting, wandering or over steering.		
Loose or worn front end steering components.		Check and repair as required.
Binding tie rod ends and/or toe control links.		Replace damaged tie rods (WP 0287) or toe control links (WP 0288).
One or more steering shafts and/or universal joints are damaged/worn.		Inspect steering shafts and replace upper (WP 0290), middle (WP 0273), or lower (WP 0272) steering shafts as necessary.
Front end alignment incorrect.		Check and align as required.
2. Wander, pulls to one side, or shimmies.		
Tie rod end faulty.		Replace tie rod end (WP 0287).
Control arm ball joint faulty.		Replace control arm ball joint (WP 0080).
Toe control link faulty.		Replace toe control link (axle No. 1) (WP 0288) or toe control link (axle No. 2) (WP 0289) as required.
Control arm bushing faulty.		Replace control arm bushing.
Front coil springs bowed or broken.		Replace front coil springs (WP 0079).
Rear coil springs bowed or broken.		Replace rear coil springs (WP 0079).
3. Excessive backlash or free-play in steering wheel.		
One or more steering shafts and/or universal joints are damaged/worn.		Inspect steering shafts and replace upper (WP 0290), middle (WP 0273), or lower (WP 0272) steering shafts as necessary.
Damaged/worn pitman arm splines.		Replace pitman arm (WP 0274) or steering gear mitre (WP 0283) as needed.

Probable Cause	Test	Action
4. Excessive play or no response when turning steering wheel.		
Tie rod end faulty.		Replace tie rod end (WP 0287).
Toe control link faulty.		Replace toe control link (WP 0288).
Damaged/worn pitman arm splines.		Replace pitman arm (WP 0274).
One or more steering shafts and/or universal joints are damaged/worn.		Inspect steering shafts and replace upper (WP 0290), middle (WP 0273), or lower (WP 0272) steering shafts as necessary.
Steering gear mitre faulty.		Replace steering gear mitre (WP 0283).
5. Excessive turning circle.		
Incorrectly adjusted mechanical or hydraulic steering stops.		Perform a mechanical and hydraulic steering stop adjustment.
6. No attempt to return to straight ahead on release of steering wheel (may also complain of hard steering).		
Toe control link binding or seized.		Replace toe control link (axle No. 1) (WP 0288).
Ball joints binding or seized.		Replace control arm ball joints as required (WP 0080).
Front end alignment incorrect.		Check and align as required.
7. Vehicle does not return to straight ahead after release of steering wheel.		
Power steering fluid low.		Add power steering fluid (WP 0278).
Tie rod end faulty.		Replace tie rod end (WP 0287).
Toe control link faulty.		Replace toe control link (WP 0288).
One or more steering shafts and/or universal joints are damaged/worn.		Inspect steering shafts and replace as necessary; upper (WP 0290), middle (WP 0273), or lower (WP 0272).
Power steering pump faulty.		Replace power steering pump (WP 0276).
Steering gear mitre faulty.		Replace steering gear mitre (WP 0283).
Axle(s) out of alignment.		Perform alignment procedure.
8. Wheel turns hard in one or both directions.		
Power steering fluid low.		Add power steering fluid (WP 0278).

Probable Cause	Test	Action
Air in system.		Find cause of air leak. Bleed steering system.
Bent or damaged control arms or steering links.		Carry out steering component inspection. Correct as required.
Bind in steering column.		Check column drag, correct as required.
9. Hard to steer.		
Power steering fluid low.		Add power steering fluid (WP 0278).
Power steering pump faulty.		Replace power steering pump (WP 0276).
Primary steering gear faulty.		Replace primary steering gear (WP 0279).
Secondary steering gear faulty.		Replace secondary steering gear (WP 0280).
10. Lubricant appears milky or white in appearance.		
Water entry through reservoir cover or dipstick.		Replace cover O-ring, filter, and/or dipstick (WP 0275). Flush and refill system with correct lubricant (WP 0278).

END OF TASK

END OF WORK PACKAGE

DRIVE LINE TROUBLESHOOTING

INTRODUCTION

This work package contains field maintenance troubleshooting procedures. The symptoms of the most common malfunctions are listed. The first column contains the probable causes for the malfunction, listed in order of probability. The second column contains the tests required to isolate and identify the cause, when applicable. The third column list actions that are required to repair the probable cause. If a malfunction is not listed on the table, notify Supervisor.

This work package cannot list all malfunctions that may occur. Nor can it list all tests, inspections, and corrective actions. If a malfunction is not listed, or if listed corrective actions are not adequate, notify Supervisor.

TRANSFER CASE TROUBLESHOOTING

Probable Cause	Test	Action
1. Transfer case does not engage front axle.		
DRIVELINE LOCK switch faulty.	Check for less than 200 ohms between DRIVELINE LOCK switch connector S3, terminals 1 and 2B, when switch is in the up (lock) position.	Replace DRIVELINE LOCK switch.
	Check for less than 200 ohms between DRIVELINE LOCK switch connector S3, terminals 3 and 2B, when switch is in the down (unlock) position.	
Transfer case lock air line faulty.	Inspect air line 2923 for leaks kinks and damage.	Replace damaged air lines.
CTIS controller faulty.		Replace CTIS controller (WP 0168).
Solenoid manifold assembly transfer case lock valve faulty.		Replace transfer case lock valve (WP 0114).
CTIS wiring harness faulty.	Check for less than 200 ohms on wire 1701 between CTIS wiring harness connectors C41, terminal 14 and C63, terminal 1.	If test fails, replace/repair CTIS wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1435G between CTIS wiring harness connectors C63, terminal 2 and C41, terminal 1.	

Probable Cause	Test	Action
1. Transfer case does not engage front axle. (Continued)		
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1701 between cab wiring harness connectors C55, terminal E1 and C41, terminal 14.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1809 between cab wiring harness connectors C414, terminal 8 and C55, terminal K3.	
Right hand switch panel wiring harness faulty.	Check for less than 200 ohms on wire 1809 between RH switch panel wiring harness T-CASE LOCK switch connector S3 and connectors C414, terminal 8.	If test fails, replace/repair RH switch panel wiring harness (WP 0218).
Transfer case faulty.		Replace transfer case (WP 0096).
2. Differential lock will not engage.		
CTIS wiring harness faulty.	Check for less than 200 ohms on wire 1333 between CTIS wiring harness connectors C41, terminal 11 and C60, terminal 1.	If test fails, replace/repair CTIS wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1704 between CTIS wiring harness connectors C41, terminal 13 and C62, terminal 1.	
	Check for less than 200 ohms on wire 1435G between CTIS wiring harness connectors C60, terminal 2 and C41, terminal 1.	
	Check for less than 200 ohms on wire 1435G between CTIS wiring harness connectors C62, terminal 2 and C41, terminal 1.	
Cab wiring harness faulty.	Check for less than 200 ohms on wire 1333 between cab wiring harness connectors C55, terminal E3 and C41, terminal 11.	If test fails, replace/repair cab wiring harness (WP 0218).
	Check for less than 200 ohms on wire 1704 between cab wiring harness connectors C55, terminal E2 and C41, terminal 13.	
Differential lock air lines faulty.	Inspect air lines 2412 and 2413 for leaks kinks and damage.	Replace damaged air lines.

Probable Cause	Test	Action
2. Differential lock will not engage. (Continued)		
Five solenoid manifold assembly front or rear differential lock valve faulty.	If front and rear DRIVELINE LOCK indicators illuminate, check for 22 to 28 VDC on wire 1333 between chassis wiring harness connector (60, terminals 1 and 2, when front DRIVELINE LOCK is selected.	Replace five-position solenoid front or rear differential lock valve (WP 0114).
Five solenoid manifold assembly front or rear differential lock valve faulty.	If front and rear DRIVELINE LOCK indicators illuminate, check for 22 to 28 VDC on wire 1704 between chassis wiring harness C62, terminals 1 and 2 when rear driveline is selected.	Replace five-position solenoid front or rear differential lock valve (WP 0114).
CTIS controller faulty.	Operate driveline lock select with DRIVELINE LOCK switch. Check if front and rear driveline lock indicators illuminate when driveline lock is selected.	If test fails, replace CTIS controller (WP 0168).
Differential lock actuator faulty.		Replace front (WP 0082) or rear (WP 0082) differential lock.
Differential faulty.		Replace front or rear differential (WP 0081).
3. Transfer case neutral will not engage.		
T-CASE neutral valve in OFF position.		Position T-CASE neutral valve to ON position.
T-CASE neutral valve faulty.		Replace T-CASE neutral valve.
Transfer case faulty.		Replace transfer case (WP 0096).
4. Transfer case will not engage (engine and transmission running, vehicle will not move).		
T-CASE neutral valve in ON position.		Position T-CASE neutral valve to OFF position.
Air lines 2868, 2071, or 2071A faulty.	Inspect air lines 2868, 2071, and 2071A for leaks kinks and damage.	Replace damaged air lines.
T-CASE neutral valve faulty.		Replace T-CASE neutral valve.
Transfer case faulty.		Replace transfer case (WP 0096).
5. Transfer case unusually noisy.		
Transfer case oil level is low.		Add transfer case oil to correct level (WP 0097).
Transfer case lube pump tube and/or fittings leaking, crimped.	Inspect transfer case lube pump tube.	Replace leaking or damaged lube pump tube.
Transfer case lube pump faulty.		Replace transfer case lube pump.
Transfer case seal faulty.		Replace transfer case seal.
Transfer case input or output shaft bearings faulty.		Replace transfer case (WP 0096).
Transfer case faulty.		Replace transfer case (WP 0096).

Probable Cause	Test	Action
6. Excess vibration.		
Transfer case mounts loose or defective.	Check transfer case mounting for loose and missing hardware.	Tighten and replace hardware as necessary as necessary (WP 0096).
Propeller shafts ends loose at transfer case yokes or differential input yokes.	Check propeller shaft end for loose hardware.	Tighten propeller shaft ends (WP 0090).
Transfer case yokes loose or improperly installed.	Check transfer case yokes for proper installation.	Remove and align propeller shafts (WP 0090) or replace front or rear differential yokes (WP 0083).
Propeller shafts damaged or out of balance.	Inspect propeller shaft for damage and missing balance weights.	Replace propeller shaft as necessary (WP 0090).
Transfer case faulty.		Replace transfer case (WP 0096).

END OF TASK

END OF WORK PACKAGE

CHAPTER 3

PMCS MAINTENANCE INSTRUCTIONS FOR M1240, M1240A1, AND M1245

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

GENERAL

This paragraph contains the maintenance PMCS requirements for the M-ATV. The PMCS table contains checks and services necessary to ensure that the M-ATV is ready for operation. Using the PMCS table, perform the maintenance at the specified intervals.

USE OF THE PMCS TABLE

1. Interval Column: This column describes when and how often the checks are to be made. Checks and services given in table are for normal operation. Extreme weather conditions, periods of high use, or combat conditions may dictate that the PMCS is performed more often than is mentioned in the PMCS table.
 - Perform (Annual) - perform your Annual PMCS every 12 months. Perform operator PMCS prior to performing annual PMCS.
2. Item to be Inspected Column: This column lists specific items to be checked and a brief description of the procedure by which the check is to be performed.
3. Equipment Not Mission Capable If Column: This column contains the criteria that causes the equipment to be classified as not ready or not available because of the inability to perform its primary mission. If severity of the problem is such that the maintainer thinks the vehicle cannot be operated, the maintainer should contact their Supervisor.
4. Always perform your PMCS in the same order.
5. If you find a problem that is beyond your echelon of repair, report the problem to your Supervisor.

GENERAL PMCS PROCEDURES

1. *Cleanliness.* Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Always perform PMCS on a clean vehicle.
2. *Nuts and Screws.* Check for obvious looseness or missing, bent, or broken condition. You cannot try them all with a tool, but look for chipped paint, bare metal, or rust around screw heads. If you find one you think is loose, tighten it or report it to your Supervisor.
3. *Welds.* Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your Supervisor.
4. *Electrical Wires and Connectors.* Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape. If you find a bad wire or connector, report it to your Supervisor.
5. *Fluid Lines and Fittings.* Look for wear, damage, or leaks and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If any part is broken or worn out, report it to your Supervisor.
6. *Damage.* Damage is defined as any condition that affects safety or would render the vehicle unserviceable for mission requirements.
7. Inspect Basic Issue Items (BII). More frequent BII inspection may be required, depending on usage and unit Standard Operating Procedure (SOP).
8. Drained Fluids. Handle, store, and dispose of drained fluids in accordance with local policies and procedures.

FLUID LEAKAGE

The following are definitions of the types/classes of leakage for determining the status of fluid systems. Become familiar with them, and remember - **WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR.**

1. **Class I.** Seepage of fluid indicated by wetness or discoloration not great enough to form drops.
2. **Class II.** Leakage of fluid great enough to form drops but not enough to cause drops to fall from item being checked/inspected.
3. **Class III.** Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

Vehicle is not mission capable if any evidence of fuel leakage is found.

END OF WORK PACKAGE

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

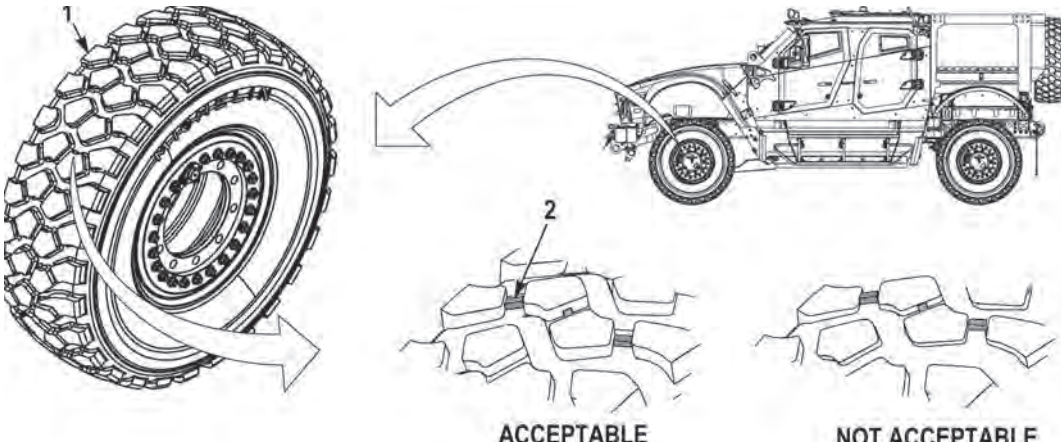
PMCS PREPARATION

NOTE

- Prior to performing PMCS tasks, clean components as required.
 - Handle, store, and dispose of drained fluids in accordance with local policies and procedures.
1. Road test vehicle in accordance with unit SOP.
 2. Ensure vehicle is on a hard, level surface and park vehicle (refer to TM 9-2355-335-10).
 3. Open vehicle hood (refer to TM 9-2355-335-10).

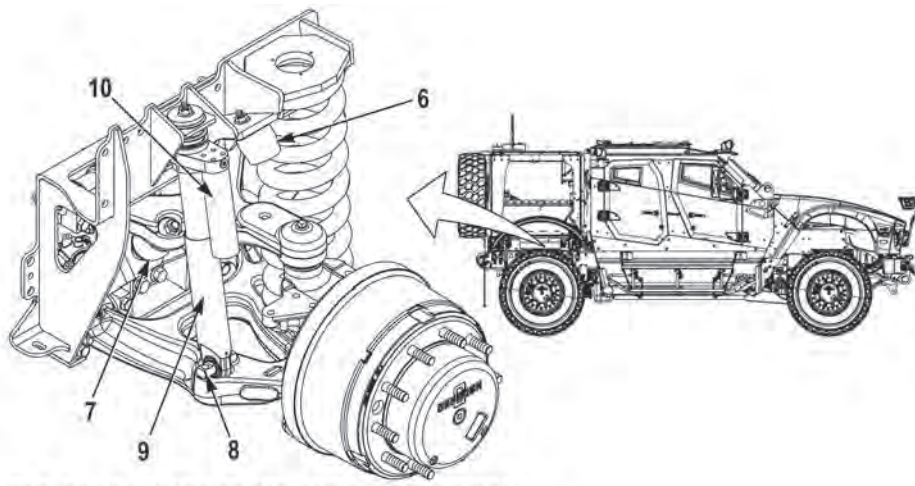
NOTE

- Perform Step (4) for M1240 and M1245.
 - Perform Step (5) for M1240A1.
4. Remove belly deflector panels (WP 0050, WP 0048, WP 0049, and WP 0052).
 5. Remove underbody improvement and belly deflector panels (WP 0056).

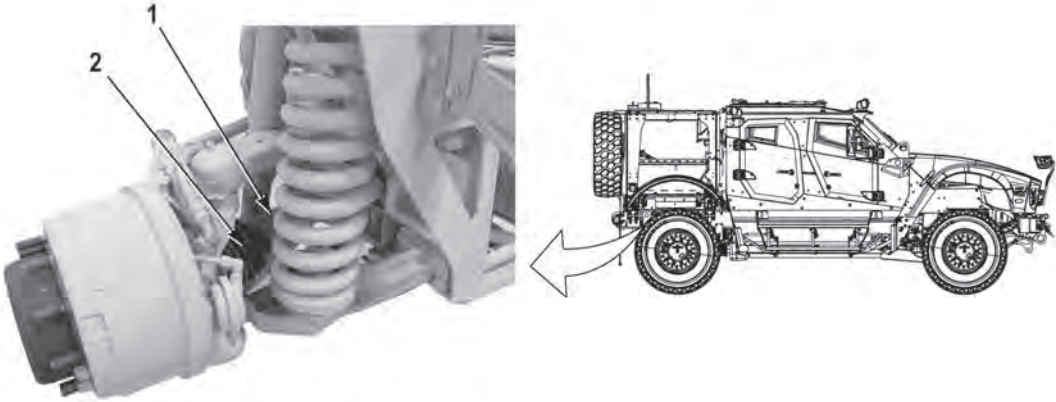
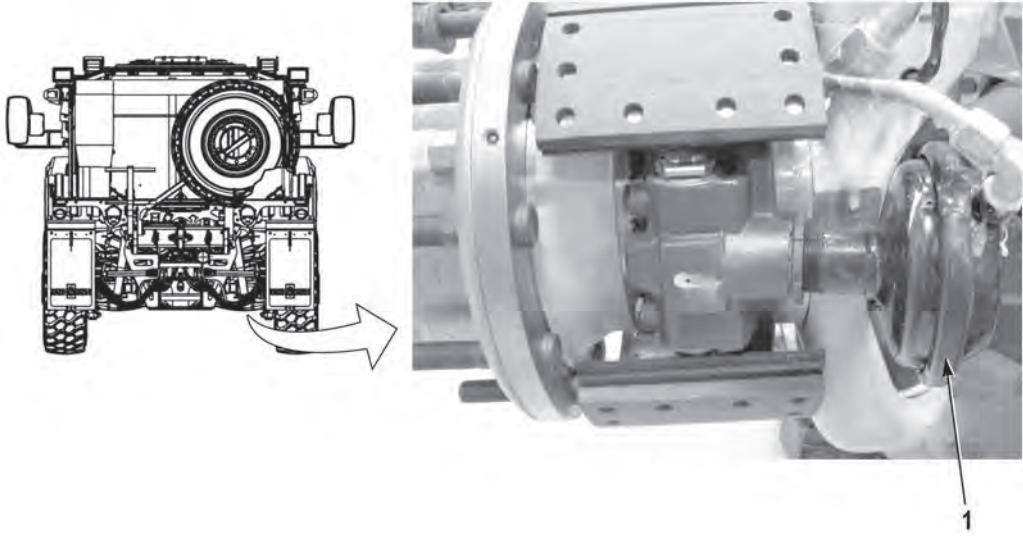
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
1.	Annual	<p>MAKE THE FOLLOWING WALK AROUND CHECKS:</p> <p>TIRES</p> <p>a. Check each tire (1) for wear at wear indicators (2). Check tire tread at approximately 12 o'clock, four o'clock, and eight o'clock positions around outside of tire for proper amount of tread.</p> <p>b. Check each tire (1), particularly sidewalls for cuts, gouges, cracks, or other damage.</p> 	<p>Tread is even with wear indicators.</p> <p>Ply or belt is exposed through sidewall.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
2.	Annual	<p>UNDERCARRIAGE AND FRAME</p> <p>a. Inspect upper control arm (1) and lower control arm (2) control arm bushings (3) for looseness, wear, or damage.</p> <p>b. Inspect upper control arm (1) and lower control arm (2) ball joints (4) for looseness, wear, or damage.</p> <p>c. Inspect drag links (5) for looseness, wear, or damage to boots. No movement should be detected at drag link (5) ends.</p> <div style="text-align: center;"> </div>	<p>Bushings loose or damaged.</p> <p>Ball joints worn or damaged.</p> <p>Drag links damaged or excessively worn.</p>

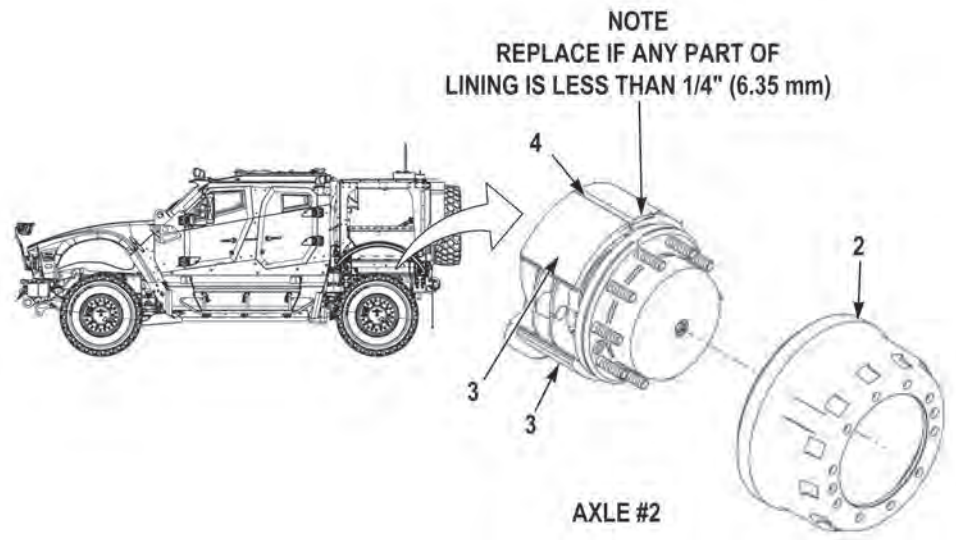
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
2.		<p>UNDERCARRIAGE AND FRAME (Continued)</p> <p>d. Inspect jounce bumper (6) for excessive wear or damage. The minimum free height (not compressed) at any part of jounce bumper (6) is 3-1/8 in. (7.94 cm). Cuts, gouges, or missing chunks should not exceed 3/8 in. (0.95 cm) depth.</p> <p>e. Inspect rebound bumper (7) for excessive wear or damage. The minimum free height (not compressed) at any part of rebound bumper (7) is 2-1/2 in. (6.35 cm). Cuts, gouges, or missing chunks should not exceed 1/4 in. (0.64 cm) depth.</p> <p>f. Inspect shock absorber bearing (8) for excessive wear by holding shock above bearing and move back and forth. If an "audible clunking" is heard, replace shock absorber.</p> <p>g. Check shock absorbers (9) for Class III leaks.</p> <p style="text-align: center;">NOTE</p> <p>Perform Step (H) for M1240A1 only</p> <p>h. Check and charge shock absorber nitrogen reservoirs (10) for correct pressure (WP 0093) as required.</p> <p>i. Check under carriage and frame for obvious signs of damage or missing components.</p>	<p>Jounce bumper damaged or excessively worn, less than 3-1/8 in. (7.94 cm) or gouges exceeding 3/8 in. (0.95 cm).</p> <p>Rebound bumper damaged or excessively worn, less than 2-1/2 in. (6.35 cm) or gouges exceeding 1/4 in. (0.64 cm).</p> <p>If audible "clunking" is heard, replace shock absorber.</p> <p>Shock absorbers with Class III leak, replace shock absorber.</p> <p>Damage that impairs operation of vehicle or missing components.</p>

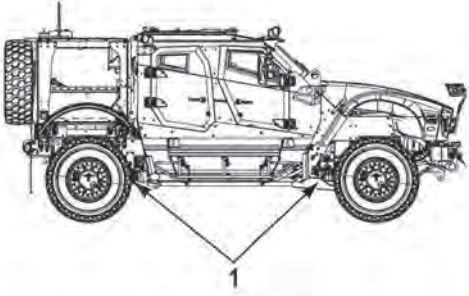
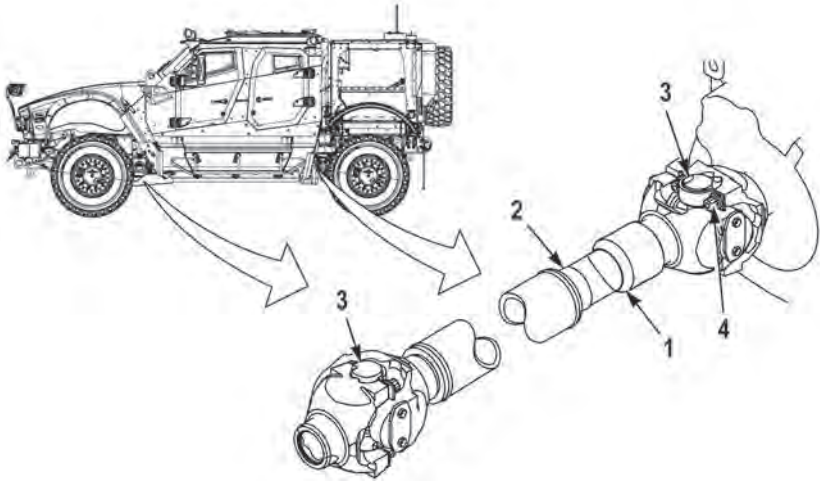


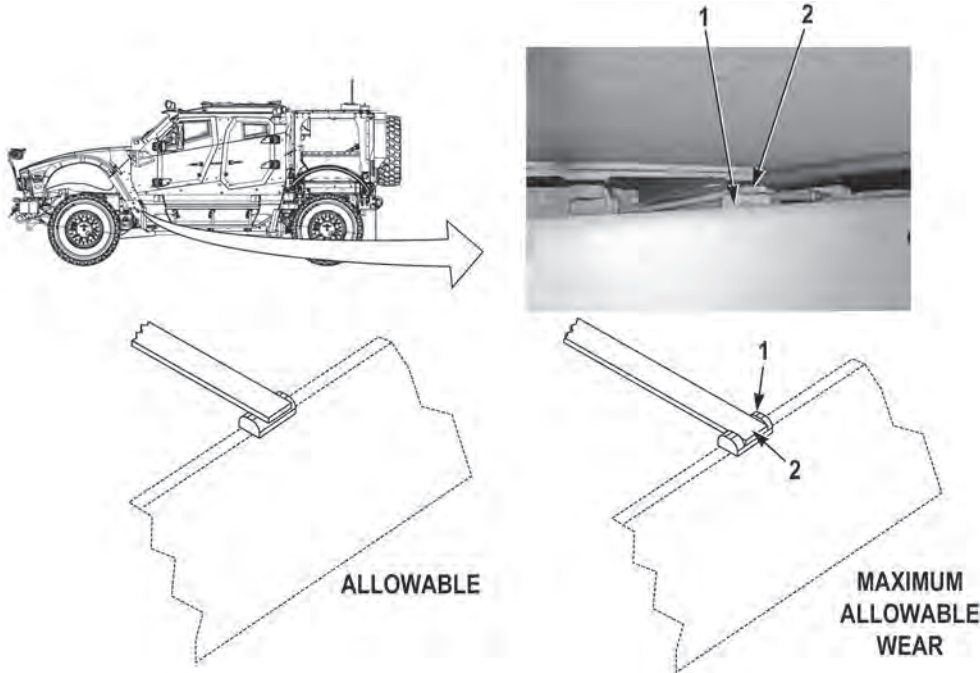
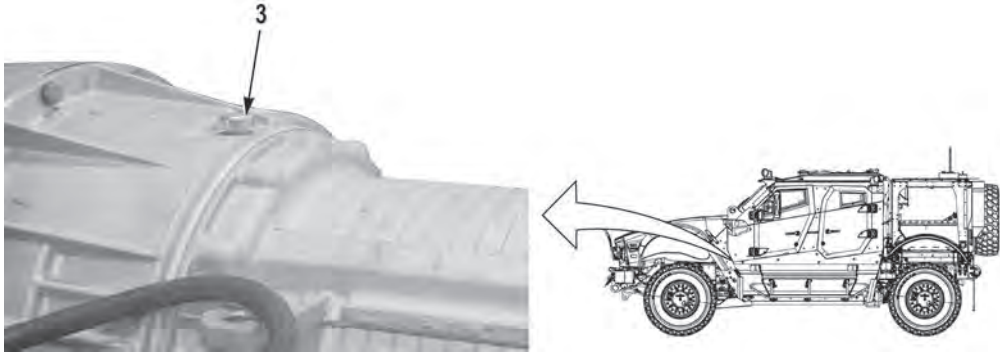
ONE WHEEL/SUSPENSION ASSEMBLY SHOWN. OTHER THREE SIMILAR. M1240A1 SHOWN.

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
3.	Annual	<p>HALF SHAFTS AND UNIVERSAL JOINTS</p> <p>Inspect half shafts (1) and universal joints (2) on both axles for looseness, dents, damage, missing bolts, or damage to boot.</p> 	<p>Half shafts or universal joints loose, damaged or missing bolts. Boot is torn or missing.</p>
4.	Annual	<p>BRAKES</p> <p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • Front and rear brakes are inspected the same way. • Cage bolts are on rear axle chambers only. <p>a. Inspect all brake chambers (1) on both axles for looseness, damage, wear, air leaks, and missing cage bolts.</p> 	<p>Brake chambers loose, damaged, leaking, or cage bolts missing.</p>

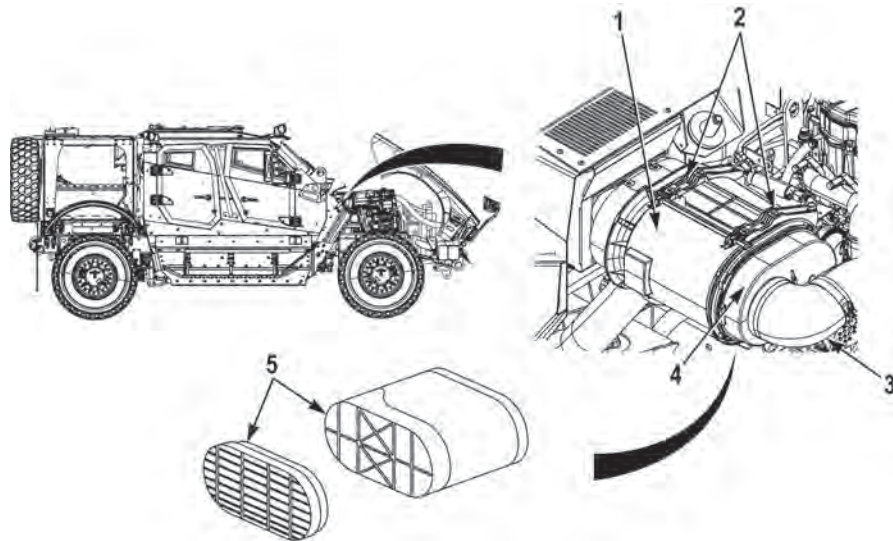
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
4.		<p>Brakes (Continued)</p> <p>b. Remove front and rear brake drums (2) (WP 0122) and inspect brake drums (2) for warping, grooves, damage, and excessive wear.</p> <p>c. Inspect brake shoe linings (3) of both axles for grooves, uneven wear, signs of overheating, oil contamination, and thickness. Replace linings (3) if less than 1/4 in. (6.35 mm) thick, if center step (4) of linings are no longer visible or there are any signs of uneven wear.</p> <p>d. Check brake adjustment and adjust as required. Refer to Brake Inspection and Adjustment, Axle No. 1 and Axle No. 2 (WP 0123).</p>	<p>Brake drums are scored, cracked, pitted or have excessive wear.</p> <p>Brake shoes excessively worn, damaged, or oil contaminated, or the pad lining is separating from the shoe frame.</p>



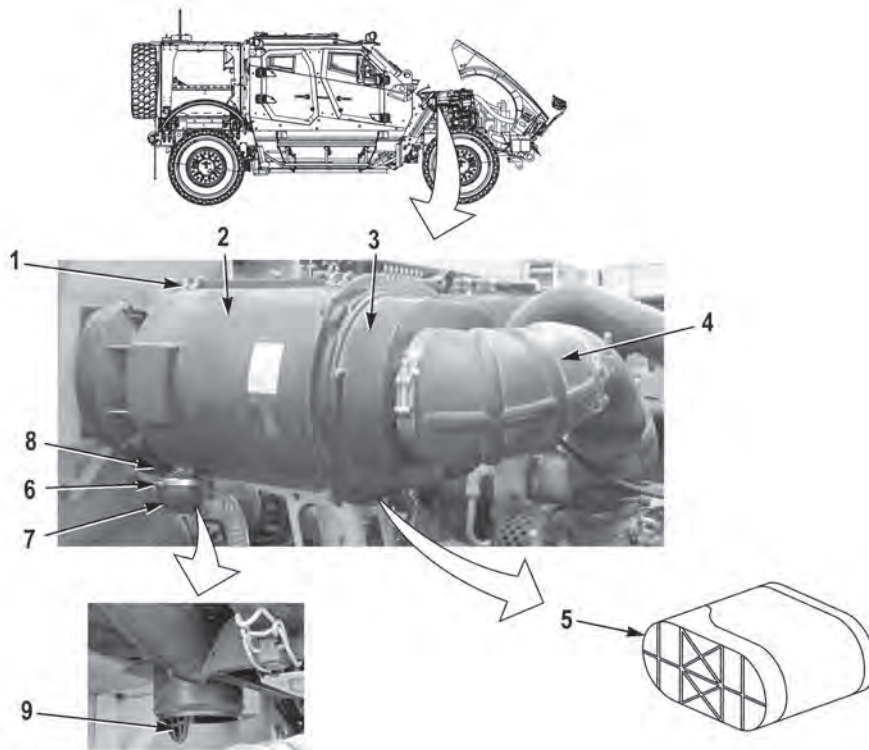
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
5.	Annual	<p>UNDERSIDE OF VEHICLE</p> <p>Inspect hose fittings, bulkhead fittings, and electrical connectors/connections under vehicle (1) for presence of corrosion.</p> 	<p>Fittings severely corroded. Broken, frayed or loose electrical connectors. Split or cracked hoses. Any fuel leak or Class III oil or coolant leak.</p>
6.	Annual	<p>PROPELLER SHAFTS</p> <p>a. Inspect propeller shafts (1) for bends, cracks, and looseness at slip joint (2). No side motion should be detected when pushing on slip joint (2).</p> <p>b. Inspect universal joints (3) of all propeller shafts for play and tight mounting screws (4). There should be no play at universal joints (3).</p> 	<p>Propeller shafts bent, cracked or loose.</p> <p>Universal joints loose.</p>

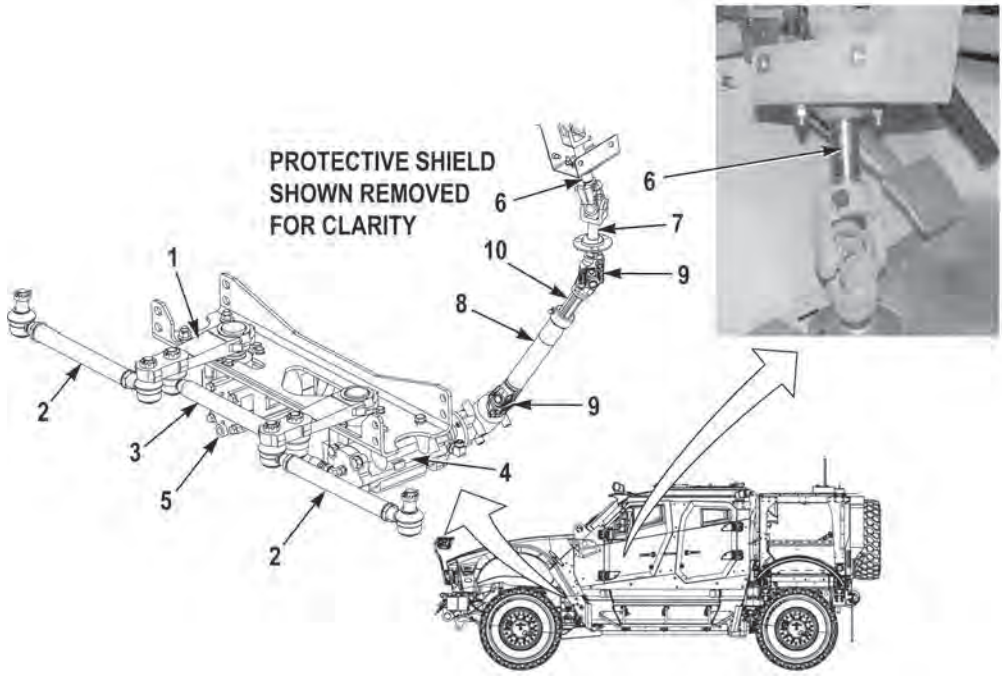
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
7.	Annual	<p>TRANSMISSION</p> <p>a. Check transmission spring wear pad (1) for excessive wear. Transmission support spring's (2) top surface must be higher than top surface of spring wear pad (1).</p>  <p>b. Remove transmission breather (3) (WP 0230) and inspect for dirt or damage. If dirty, clean in solvent. If damaged, replace breather.</p> 	<p>Transmission spring support wear pad excessively worn.</p> <p>Transmission breather is damaged or missing.</p>

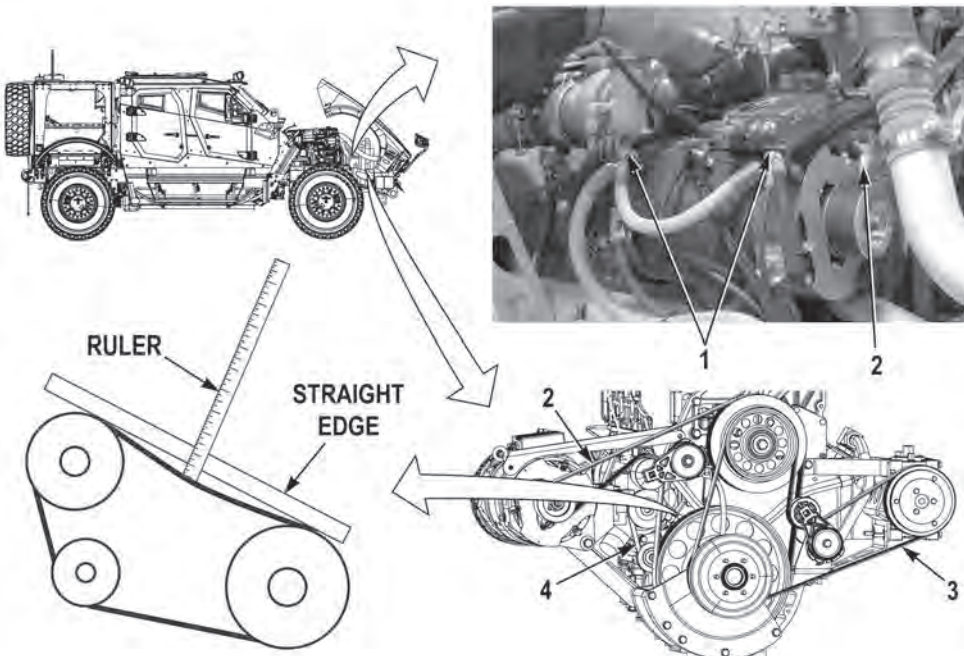
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
8.	Annual	<p>AIR CLEANER (M1240/M1245)</p> <ol style="list-style-type: none"> Unlatch four latches (2) and remove air cleaner cover (1) from air cleaner housing (4). Check air cleaner cover (1), air cleaner housing (4), and hose (3) for cuts, cracks, or damage that will allow unfiltered air to enter system. Replace air filters (5). 	<p>Air intake damage allows unfiltered air into engine.</p>

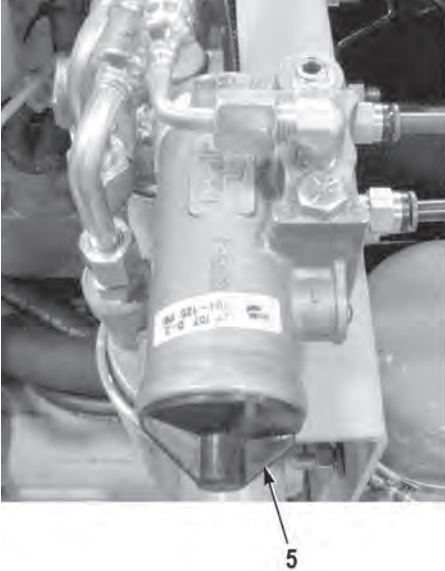
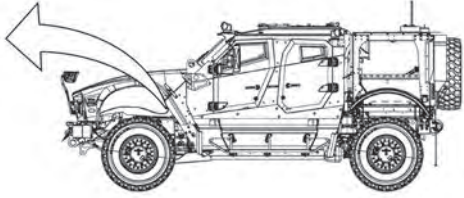


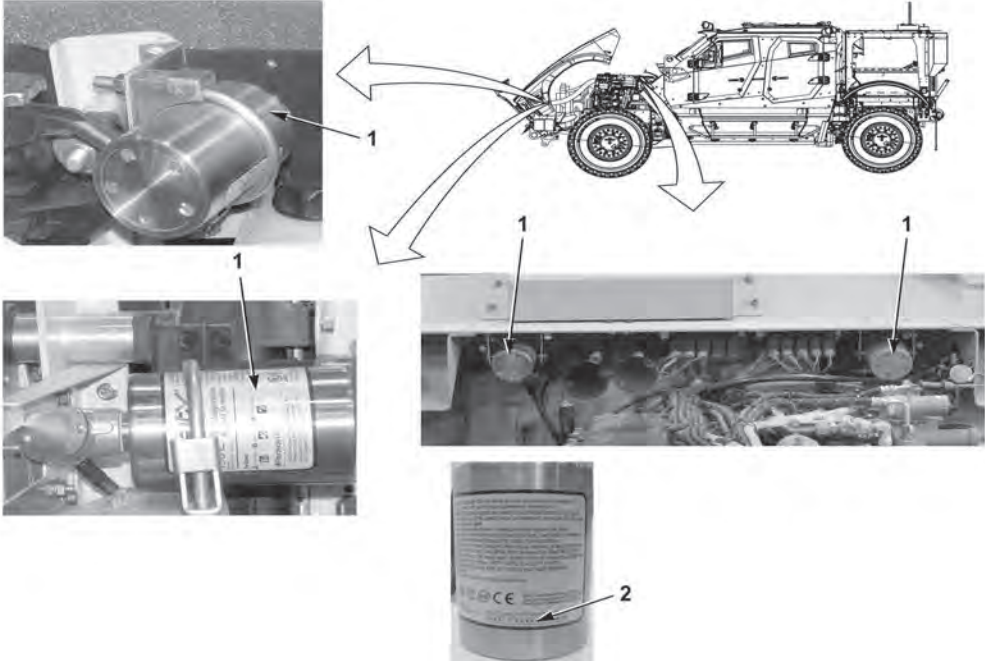
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
9.	Annual	<p>AIR CLEANER (M1240A1)</p> <ol style="list-style-type: none"> Unlatch four latches (1) and remove air cleaner cover (2) from air cleaner housing (3). Check air cleaner cover (2), air cleaner housing (3), and hose (4) for cuts, cracks, or damage that will allow unfiltered air to enter system. Replace air filter (5). Install air cleaner cover (2) on air cleaner housing (3) and fasten four latches (1). Loosen clamp (6) and remove check valve cover (7) from check valve housing (8). Inspect check valve (9) for freedom of movement, blockages, and damage. Install check valve cover (7) on check valve housing (8) with clamp (6). 	<p>Air intake damage allows water or unfiltered air into engine.</p>



Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
10.	Annual	<p>STEERING SYSTEM</p> <ol style="list-style-type: none"> Inspect pitman arms (1) for looseness, breaks, or cracks. Check toe control links (2) and tie rod (3) for looseness, breaks, or cracks. No movement should be detected at toe control links (2) and tie rod (3) ends. Inspect primary steering gear (4) and secondary steering gear (5) for loose mounting screws, damage, or wear. Check upper steering shaft (6), middle steering shaft (7), and lower steering shaft (8) for looseness and wear at universal joints (9) and slip joint (10). 	<p>Pitman arm loose, broken, or cracked.</p> <p>Toe control links or tie rods loose, cracked, or broken.</p> <p>Steering gear loose, damaged, or excessively worn.</p> <p>Steering shaft loose or damaged.</p>
11.	Annual	<p>ENGINE COOLING SYSTEM</p> <p>NOTE</p> <p>All vehicles are equipped with coolant reservoir or surge tank.</p> <p>Check coolant level and condition for protection and acidity levels. Check if solution is adequate for expected climatic conditions. Refer to TB 750-651 for preparation of antifreeze solutions. Tag coolant reservoir or surge tank with type of antifreeze and written degree of protection on it.</p>	<p>Coolant not adequate for conditions, or coolant is not visible on sight glass.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
12.	Annual	<p>ENGINE COMPARTMENT</p> <p>a. Inspect hose fittings, bulkhead fittings, and electrical connectors/connections in engine compartment for presence of corrosion, or loose connections.</p> <p>b. Check alternator wires (1) for frays, splits, missing insulation, or loose terminal connections.</p> <p style="text-align: center;">NOTE</p> <p>Any drive belt that is broken or cracked to the belt fiber, has more than one crack 1/8 in. (3.2 mm) in depth or 50% of belt thickness, or has frays more than 2 in. (51 mm) long, is considered unacceptable.</p> <p>c. Inspect alternator drive belt (2) and air conditioner belt (3), for wear, cracking and proper tension.</p> <p>d. Inspect water pump belt (4) for wear, cracking, and proper tension. Belt deflection should be between 3/8 in. to 9/16 in. (9 - 15 mm).</p> <div style="text-align: center;">  </div>	<p>Frayed, loose, broken or missing wires or connections.</p> <p>Any drive belt missing, broken, cracked or frayed.</p> <p>Belt is missing, broken, cracked, frayed or cannot be adjusted.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
12.		<p>ENGINE COMPARTMENT (Continued)</p> <ul style="list-style-type: none"> e. Check engine compartment wires for frays, splits, missing insulation, or loose terminal connections. f. Check air governor (5) adjustment (WP 0104), and ensure air pressure is 130 psi (869 kPa). <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	<p>Frayed, loose, broken or missing wires or connections.</p> <p>If air pressure range is not between 120 to 130 psi (827 to 869 kPa).</p>
13.	Annual	<p>FRAME AND BODY</p> <ul style="list-style-type: none"> a. Inspect CARC painted surfaces for damage that exposes white primer or bare metal. Spot paint in accordance with TB 43-0209. b. Inspect all bolts connected to the frame and body for looseness. c. Inspect welds on frame and body for cracks. d. Inspect armor and body panels for damage. 	<p>Loose or missing bolts.</p> <p>Cracks on welds.</p> <p>Panels missing. Any armor that has cracks or has been penetrated.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.	Annual	<p>FIRE SUPPRESSION SYSTEM</p> <p>NOTE</p> <ul style="list-style-type: none"> • Perform checks (a) through (f) for M-ATVs with AFES four generator system and AFES nitrogen detection lines. • Perform checks (g) through (i) for M-ATVs with AFES five generator system and AFES linear wire detection. • Perform checks (j) through (m) for all M-ATV configurations. • Use Table 1 to determine generator date. <p>a. Check four aerosol generators (1) for damage, discharged condition, and date stamp (2).</p> 	<p>Aerosol generators are damaged or date stamp is more than ten years old.</p>

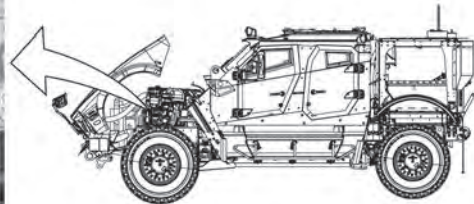
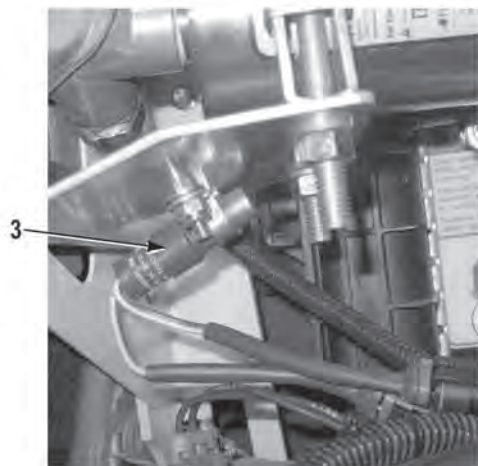
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		FIRE SUPPRESSION (Continued)	

Table 1. Aerosol Generator Date Table.

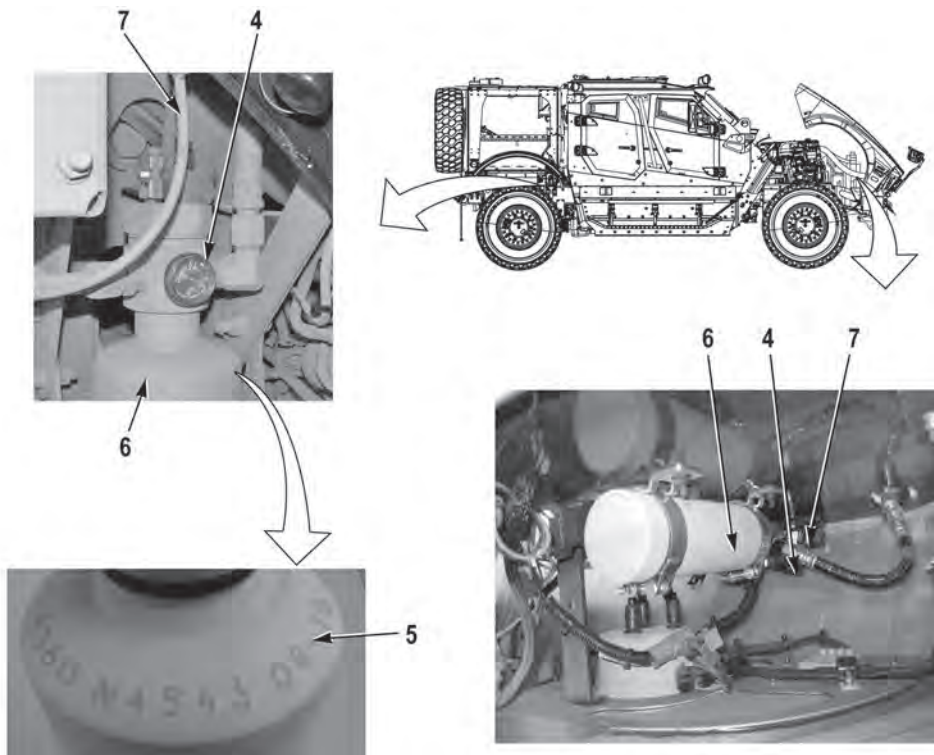
Example: J1 would be January 2011, replacement date of January 2021 or 10 years.																
X	K	L	M		X	2	3	4	5	6	7	8	9	10	11	12

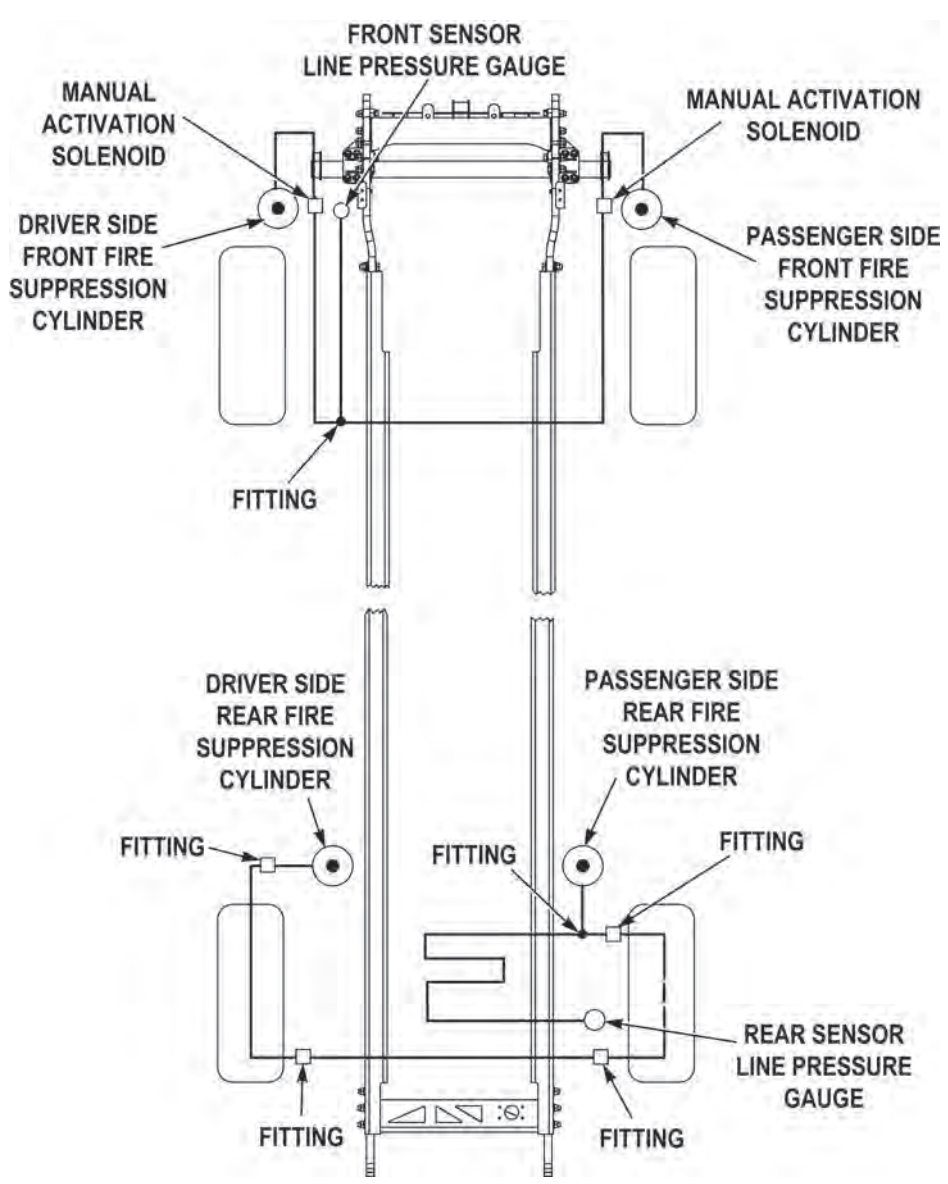
Year	Letter	Month	Number
2010	I	1	Jan
2011	J	2	Feb
2012	K	3	Mar
2013	L	4	Apr
2014	M	5	May
2015	N	6	Jun
2016	O	7	July
2017	P	8	Aug
2018	Q	9	Sep
2019	R	10	Oct
2020	S	11	Nov
2021	T	12	Dec

- b. Visually examine thermosensors (3) for any damage. If any damage is apparent or if they have been in service for three years sensors should be replaced. Thermosensors are damaged or out of service life.



Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		<p>FIRE SUPPRESSION (Continued)</p> <p>NOTE Inspection mirror and flashlight may be required to check date stamp on top of cylinders.</p> <p>c. Check fire suppression cylinder gauge (4) for proper charge and check four-digit stamp (5) on top of cylinders (6).</p> <p>d. Check fire suppression cylinders (6) for damage.</p> <p>e. Check fire suppression system nitrogen detection hoses (7) for kinks or damage.</p>	<p>Pressure indicator is not in green range of gauge, or date stamp on data plate is more than five years old.</p> <p>Cylinder(s) is damaged.</p> <p>Nitrogen detection hoses kinked or damaged.</p>



Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		<p>FIRE SUPPRESSION (Continued)</p> <p>f. Check undercarriage fire suppression system detector lines for kinks or damage.</p>  <p>The diagram illustrates the fire suppression system layout. At the top, a 'FRONT SENSOR LINE PRESSURE GAUGE' is connected to a network of lines. On either side, there are 'MANUAL ACTIVATION SOLENOIDS' and 'FRONT FIRE SUPPRESSION CYLINDERS' (labeled 'DRIVER SIDE' and 'PASSENGER SIDE'). Below these, the system continues with 'DRIVER SIDE REAR FIRE SUPPRESSION CYLINDER' and 'PASSENGER SIDE REAR FIRE SUPPRESSION CYLINDER'. A 'REAR SENSOR LINE PRESSURE GAUGE' is also shown. Numerous 'FITTING' points are indicated throughout the piping system.</p>	Nitrogen detection lines kinked or damaged.

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		<p>FIRE SUPPRESSION (Continued)</p> <p>NOTE</p> <p>Use Table 2 to determine generator date.</p> <p>g. Check five aerosol generators (1) for damage, discharged condition, and date stamp (2)</p> <p>h. Check linear metal detection wire (3) for damage.</p> <div style="text-align: center;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>3</p> </div> <div style="text-align: center;"> <p>1</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>1</p> </div> <div style="text-align: center;"> <p>2</p> </div> </div>	

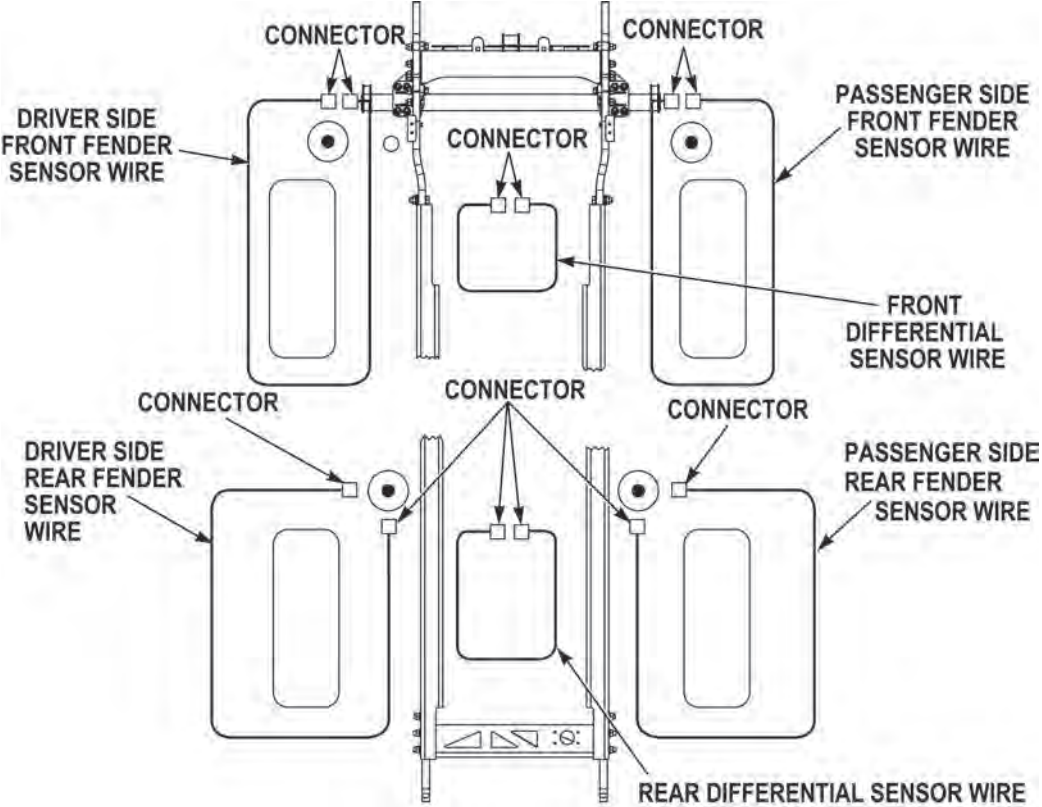
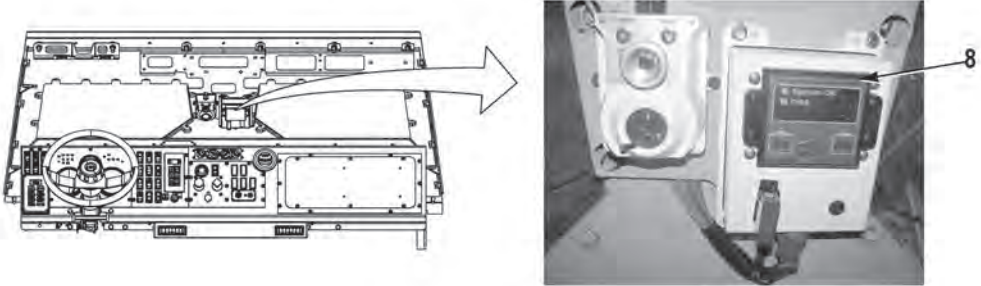
Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		FIRE SUPPRESSION (Continued)	

Table 2. Aerosol Generator Date Table.

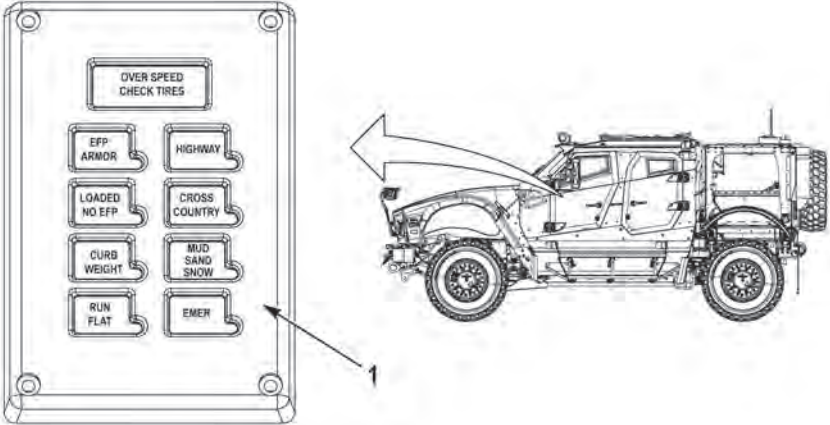
Example: J1 would be January 2011, replacement date of January 2021 or 10 years.

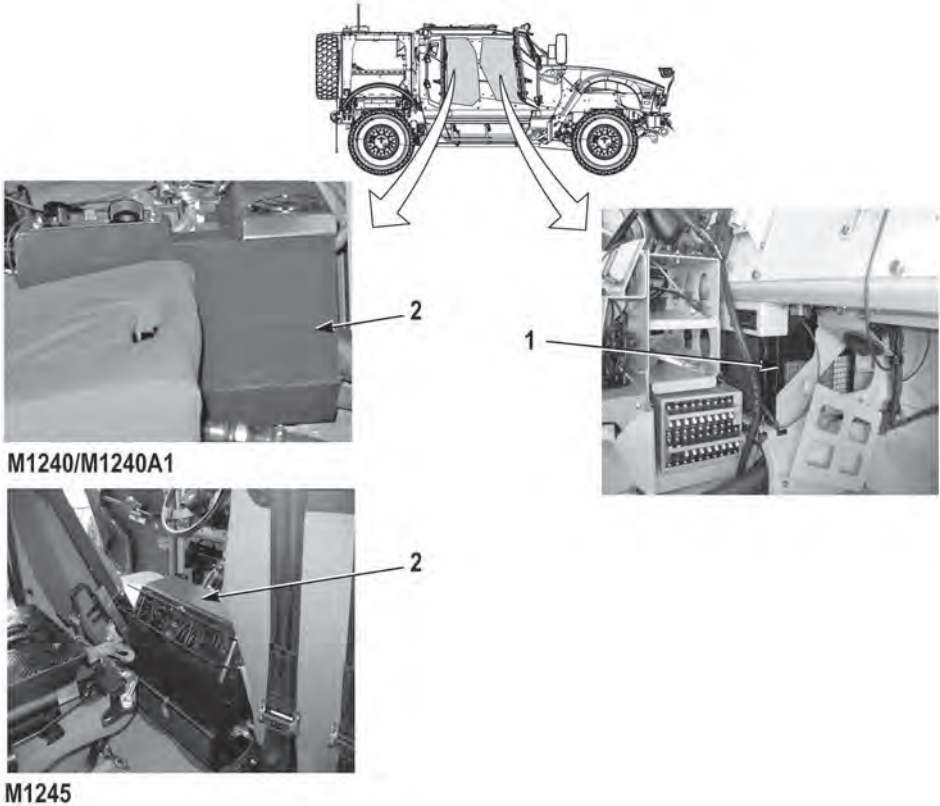
J	K	L	M		1	2	3	4	5	6	7	8	9	10	11	12
--------------	---	---	---	--	--------------	---	---	---	---	---	---	---	---	----	----	----

Year	Letter	Month	Number
2010	I	1	Jan
2011	J	2	Feb
2012	K	3	Mar
2013	L	4	Apr
2014	M	5	May
2015	N	6	Jun
2016	O	7	July
2017	P	8	Aug
2018	Q	9	Sep
2019	R	10	Oct
2020	S	11	Nov
2021	T	12	Dec

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		<p>FIRE SUPPRESSION (Continued)</p> <p>i. Check undercarriage fire suppression system linear detection wires for damage.</p>  <p>Diagram labels: DRIVER SIDE FRONT FENDER SENSOR WIRE, PASSENGER SIDE FRONT FENDER SENSOR WIRE, FRONT DIFFERENTIAL SENSOR WIRE, DRIVER SIDE REAR FENDER SENSOR WIRE, PASSENGER SIDE REAR FENDER SENSOR WIRE, REAR DIFFERENTIAL SENSOR WIRE, and multiple CONNECTOR points.</p> <p>j. Inspect fire suppression system control (8) back up battery service life date in accordance with (WP 0064).</p>  <p>Diagram labels: 8</p>	<p>Linear detection wires kinked or damaged.</p> <p>Backup battery damaged or out of service life.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
14.		<p>FIRE SUPPRESSION (Continued)</p> <p>k. Visually examine crew compartment extinguishing cylinder (10) for obvious damage. Inspect that pressure indicator (11) is in green range of gauge. Check extinguishing cylinder date stamp on data plate (12).</p> <p>l. Remove extinguishing cylinder (10) and weigh extinguishing cylinder (10) (WP 0065) for platform mount (WP 0066) for wall mount. Check extinguishing cylinder (10) weight on data plate (12).</p> <p>m. Install extinguishing cylinder (10) (WP 0065) for platform mount (WP 0066) for wall mount.</p> <div style="text-align: center;"> <p>The diagram illustrates the fire suppression system components. Item 10 is a vertical extinguishing cylinder. Item 11 is a circular pressure gauge mounted on the cylinder. Item 12 is a rectangular data plate with fields for 'PART NO.', 'SERIAL NO.', 'DATE FACTORY FILLED', 'TOTAL CYL FILLED WEIGHT (kg)', 'MINIMUM ALLOWABLE WEIGHT (kg)', and 'LAST HYDROSTATIC TEST DATE'. Arrows point from the labels 10, 11, and 12 to their respective parts in the assembly and the data plate.</p> </div> <p>n. Perform fire suppression systems test (WP 0075).</p>	<p>Extinguishing cylinder is damaged, pressure indicator is not in green range of gauge, or factory filled date stamp on data plate is more than six years old.</p> <p>Extinguishing cylinder weight is less than weight on data plate.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
15.	Annual	<p>CTIS SYSTEM</p> <p>Start engine. Operate CTIS controller (1) and check tire pressure with gauge at each CTIS setting: For correct tire pressure refer to (TM 9-2355-335-10).</p> 	CTIS does not maintain proper pressure.
16.	Annual	<p>CAPSULE EXTERIOR</p> <p>Inspect hose fittings, bulkhead fittings, and electrical connectors/connections on capsule for presence of corrosion.</p>	Class III leaks, broken wires, wires missing insulation.

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
17.	Annual	<p>CAPSULE INTERIOR</p> <p>a. Inspect hose fittings, bulkhead fittings, and electrical connectors/connections inside capsule for presence of corrosion.</p> <p>b. Inspect heater/defroster unit (1) and heater/defroster auxiliary (2) hose fittings and electrical connectors/connections for leaks or presence of corrosion.</p> <p>c. Inspect hose fittings, bulkhead fittings, and electrical connectors/connections inside capsule for presence of corrosion.</p> <div style="text-align: center;">  </div>	<p>Class III leaks, broken wires, wires missing insulation that cannot be removed.</p> <p>Class III leaks, broken wires, wires missing insulation that cannot be removed.</p> <p>Class III leaks, broken wires, wires missing insulation, or presence of corrosion that cannot be removed.</p>

Item No.	Interval	ITEM TO BE INSPECTED/ PROCEDURE: Check for and have repaired, filled, or adjusted as needed.	Not Mission Capable If:
17.		<p>CAPSULE INTERIOR (Continued)</p> <p>d. Inspect battery disconnect switch (5) connections for presence of corrosion or damage.</p> <p>e. Inspect circuit breaker unit (6) and fuse panel (7) for presence of corrosion or damage.</p> <p>The image contains four technical diagrams and photographs. At the top left is a diagram of a battery disconnect switch labeled '5', with a 'BATTERY POWER CAUTION' label below it. At the top right is a photograph of a circuit breaker unit labeled '6'. At the bottom left is a photograph of a fuse panel labeled '6'. At the bottom right is a photograph of a fuse panel labeled '7'. A central technical drawing of the capsule interior shows arrows pointing from these components to their respective locations within the vehicle's chassis.</p>	<p>Battery quick disconnect switch damage that would prevent normal operation or corrosion that cannot be removed.</p> <p>Circuit breaker unit damage that would prevent normal operation or corrosion that cannot be removed.</p>

6. Install belly deflector panels (WP 0050, WP 0048, WP 0049, and WP 0052, M1240/M1245).
7. Install underbody improvement and belly deflector panels (WP 0056, M1240A1).
8. Perform any additional PMCS IAW unit SOP.
9. Road test vehicle IAW unit SOP.

END OF TASK

END OF WORK PACKAGE

CHAPTER 4

MAINTENANCE INSTRUCTIONS FOR M1240, M1240A1, AND M1245

AIR CONDITIONER COMPRESSOR REPLACEMENT (ORIGINAL COMPRESSOR)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured
Batteries disconnected (WP 0186)
Air conditioner drive belt removed (WP 0220)
System refrigerant evacuated (WP 0024)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, 1-5/16 in.

Materials/Parts

O-ring (Item 7)
O-ring (Item 9)
Locknut (4) (Item 10)
Cap and Plug Set
Compound, Corrosion Preventive, Ultra Tef-Gel
05SA2

Materials/Parts (continued)

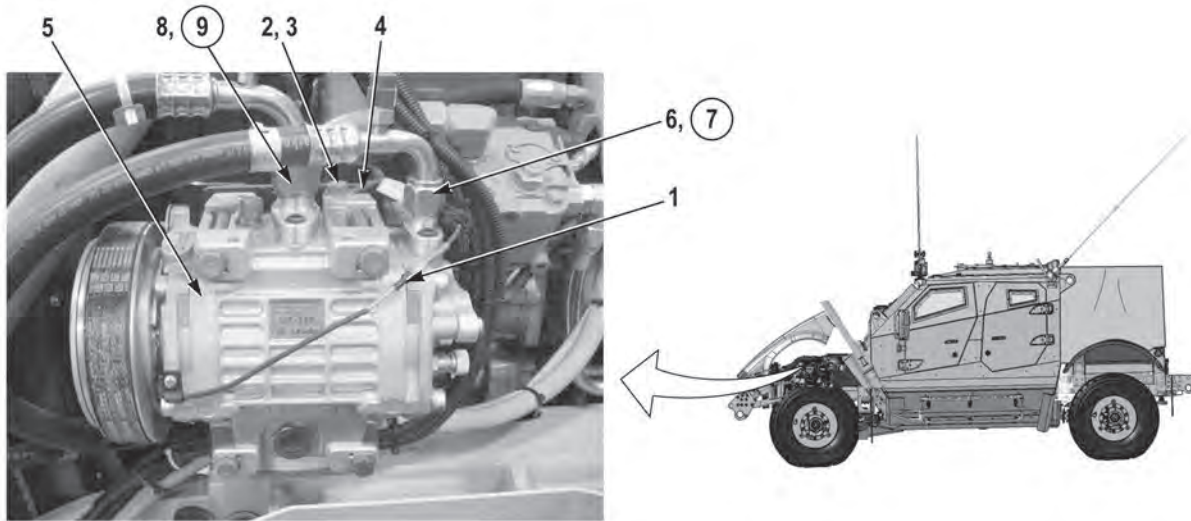
Compound, Sealing, Flowable Silicone Primer,
Dow Corning 1204
Compound, Sealing, Flowable Silicone Sealant,
Dow Corning 3140
Lubricant, Connector, Nyogel 760G
Tags, Identification
Ties, Cable

Personnel Required

AC Mechanic

Follow-On Maintenance

Charge system refrigerant (WP 0024)
Install air conditioner drive belt (WP 0220)
Connect batteries (WP 0186)
Close hood and secure
Remove and stow wheel chocks

REMOVAL**NOTE**

Tag and mark wires prior to removal to ensure proper installation.

1. Disconnect connector (1).

NOTE

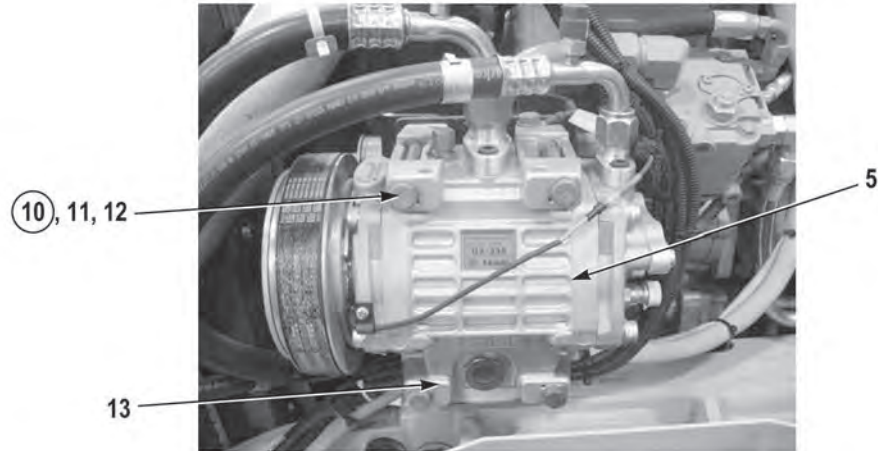
Remove cable ties as required.

2. Remove screw (2), washer (3), and wire (4) from air conditioner compressor (5).

NOTE

- Cap and plug hoses upon removal.
- Remove cushion clips as necessary.

3. Remove hose (6) and O-ring (7) from compressor (5). Discard O-ring (7).
4. Remove hose (8) and O-ring (9) from compressor (5). Discard O-ring (9).



5. Remove four locknuts (10), screws (11), washers (12), and compressor (5) from mounting bracket (13). Discard locknuts (10).

END OF TASK

INSTALLATION

WARNING

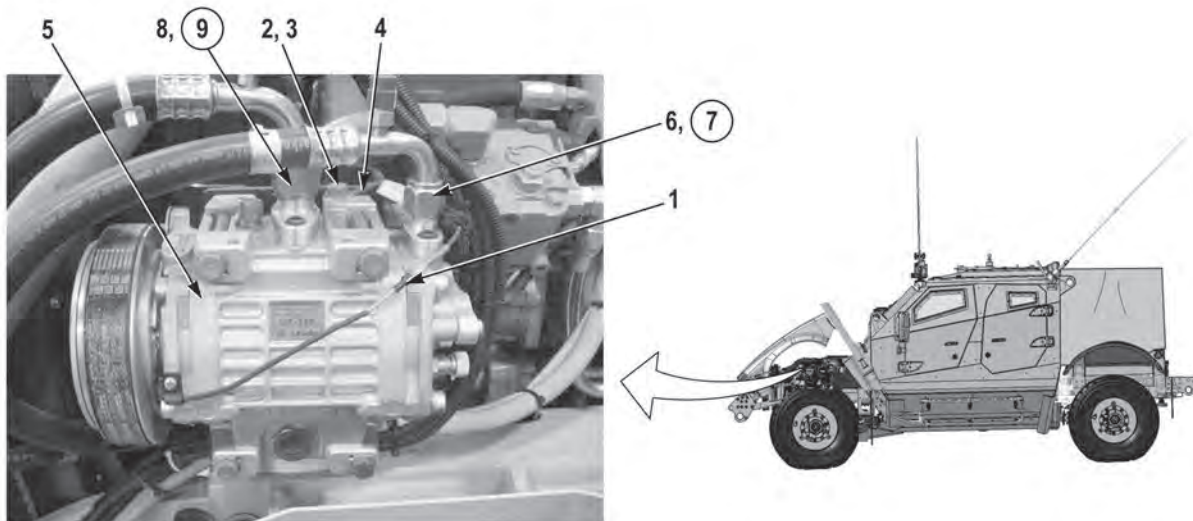
Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

1. Apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to threads of four screws (11).
2. Install compressor (5) on mounting bracket (13) with four washers (12), screws (11), and new locknuts (10).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

3. Apply primer, Dow Corning 1204, and sealing compound, Dow Corning 3140, to hoses (8 and 6).



CAUTION

Do not lubricate A/C system O-rings. O-ring material is only compatible with air conditioning type lubricants. Failure to comply may result damage to equipment.

NOTE

- Install hoses as noted prior to removal.
 - Install cushion clips as required.
4. Install new O-ring (9) and hose (8) on compressor (5).
 5. Install new O-ring (7) and hose (6) on compressor (5).

NOTE

Install cable ties as required.

6. Install wire (4), washer (3), and screw (2) on compressor (5).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply connector lubricant, Nyogel 760G, to connector (1).
8. Connect connector (1).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR CONDITIONER COMPRESSOR REPLACEMENT (UPDATED COMPRESSOR)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Air conditioner drive belt removed (WP 0220)
System refrigerant evacuated (WP 0024)
Driver side radiator baffle removed (if equipped)
(WP 0181)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, 1-5/16 in.

Materials/Parts

Lockwasher (Item 3)
O-ring (Item 8)
O-ring (Item 10)
Lockwasher (6) (Items 12, 18, 29)
Cap and Plug Set

Materials/Parts (continued)

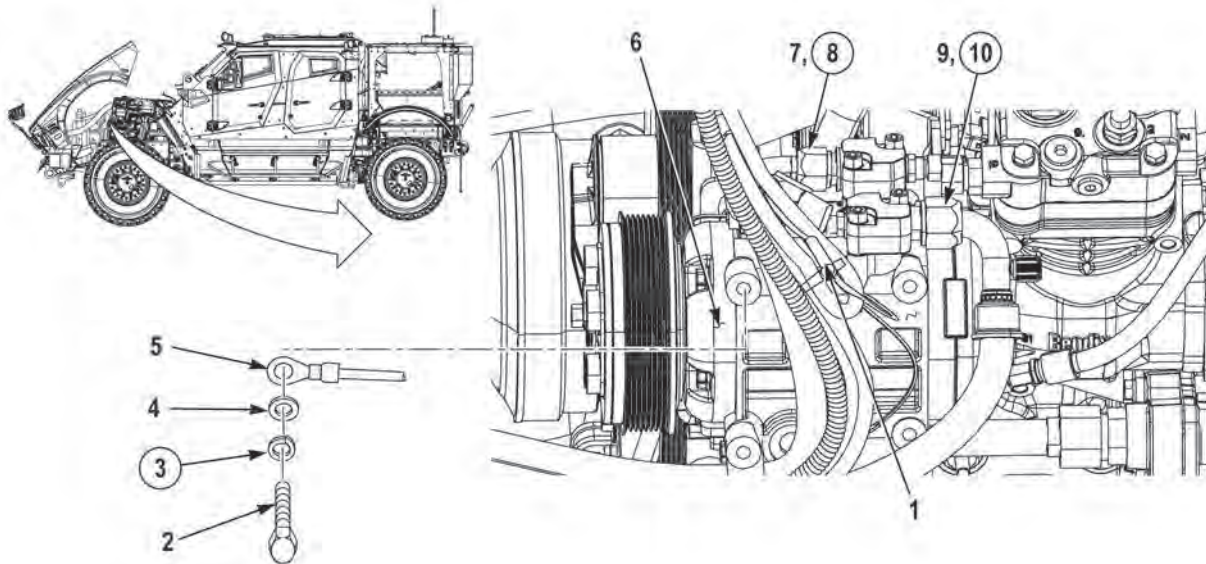
Compound, Sealing, Flowable Silicone Primer,
Dow Corning 1204
Compound, Sealing, Flowable Silicone Sealant,
Dow Corning 3140
Sealant, RTV Electric
Lubricant, Connector, Nyogel 760G
Refrigeration Oil, Type P.A.G.
Tags, Identification
Ties, Cable

Personnel Required

AC Mechanic

Follow-On Maintenance

Install driver side radiator baffle (if equipped)
(WP 0181)
Charge system refrigerant (WP 0024)
Install air conditioner drive belt (WP 0220)
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Close hood and secure
Remove and stow wheel chocks

REMOVAL**NOTE**

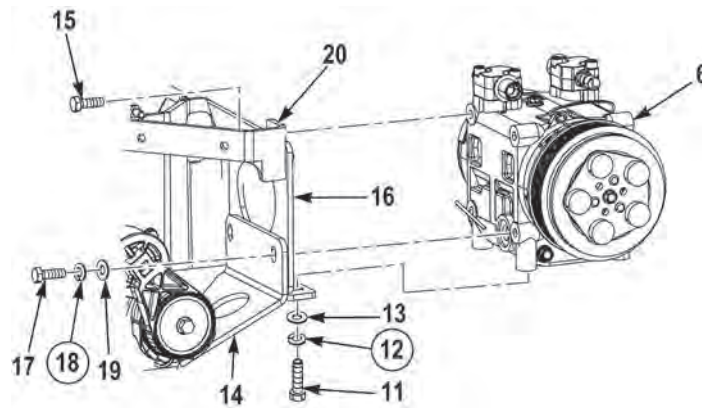
- Tag and mark wires prior to removal to ensure proper installation.
- Remove cable ties as required.

1. Disconnect connector (1).
2. Remove screw (2), lockwasher (3), washer (4), and wire (5) from air conditioner compressor (6). Discard lockwasher (3).

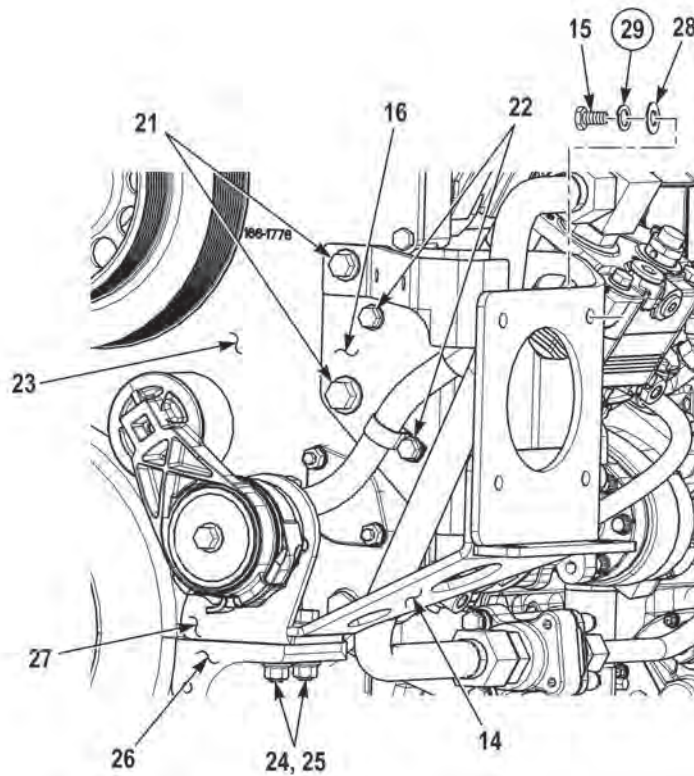
NOTE

Cap and plug hoses upon removal.

3. Remove hose (7) and O-ring (8) from air conditioner compressor (6). Discard O-ring (8).
4. Remove hose (9) and O-ring (10) from air conditioner compressor (6). Discard O-ring (10).



5. Remove two screws (11), lockwashers (12), and washers (13) from air conditioner compressor (6) and lower compressor mounting bracket (14). Discard lockwashers (12).
6. Loosen screw (15) from air conditioner compressor (6) and compressor mounting bracket (16).
7. Remove three screws (17), lockwashers (18), washers (19), and air conditioner compressor (6) from compressor mounting bracket (16), lower compressor mounting bracket (14), and upper mounting strap (20). Discard lockwashers (18).

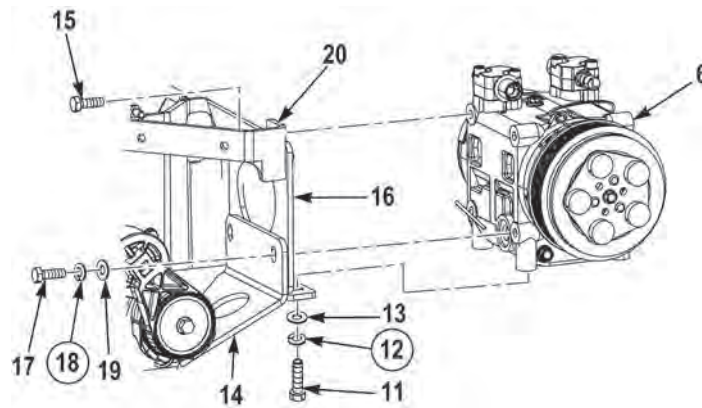


8. Loosen two screws (21) and screws (22) from compressor mounting bracket (16) and engine (23).
9. Loosen two locknuts (24) and screws (25) from bracket (26) lower compressor mounting bracket (14) and bracket (27).
10. Remove screw (15), washer (28), and lockwasher (29) from compressor mounting bracket (16). Discard lockwasher (29).

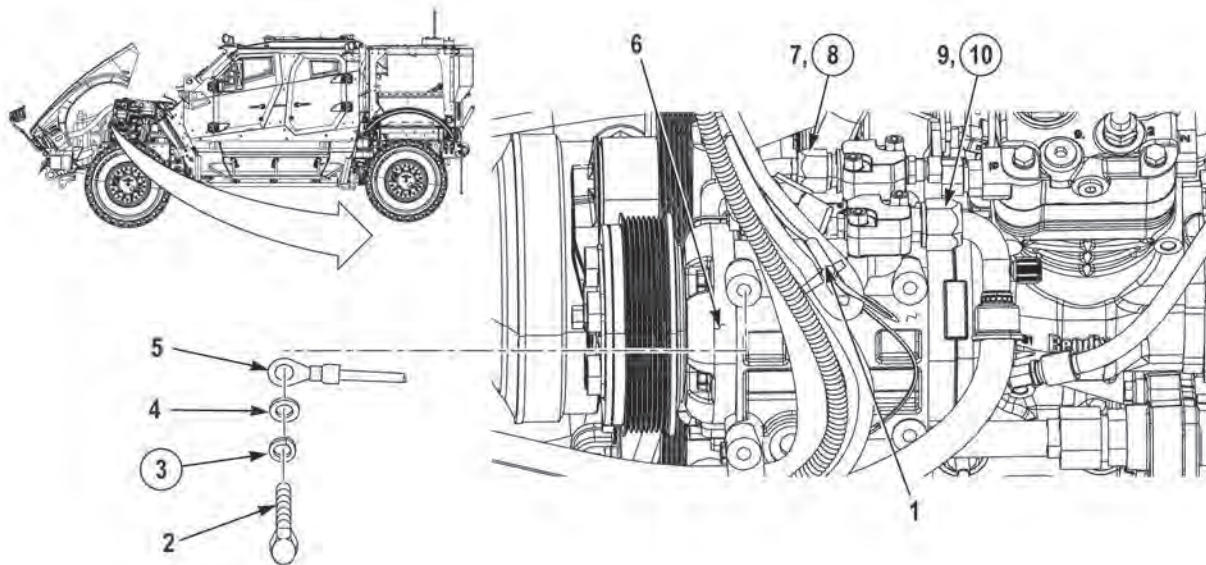
END OF TASK

INSTALLATION

1. Install new lockwasher (29), washer (28), and screw (15) on compressor mounting bracket (16).
2. Tighten two screws (25) and locknuts (24) on bracket (27), lower compressor mounting bracket (14), and bracket (26).
3. Secure compressor mounting bracket (16) on engine (23) two screws (22) and screws (21).



4. Install air conditioner compressor (6) on compressor mounting bracket (16), upper mounting strap (20), and lower compressor mounting bracket (14) with three washers (19), new lockwashers (18), and screws (17).
5. Secure air conditioner compressor (6) on compressor mounting bracket (16) with screw (15).
6. Secure air conditioner compressor (6) on lower compressor mounting bracket (14) with two washers (13), new lockwashers (12), and screws (11).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply primer, Dow Corning 1204, and sealing compound, Dow Corning 3140, to hose (9) and hose (7).

WARNING

Prolonged contact with lubricating oil may cause skin rash. Immediately wash skin and clothing that come in contact with lubricating oil and remove saturated clothing. Keep area well-ventilated to keep fumes at a minimum. Failure to comply may result in injury or death to personnel.

NOTE

Install hoses as noted prior to removal.

8. Lightly lubricate new O-ring (10) with clean PolyAlkylene Glycol (P.A.G.) oil and, install new O-ring (10) and hose (9) on air conditioner compressor (6).
9. Lightly lubricate new O-ring (8) with clean P.A.G. oil and install new O-ring (8) and hose (7) on air conditioner compressor (6).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install cable ties as required.

10. Install wire (5) on air conditioner compressor (6) with washer (4), new lockwasher (3), and screw (2).
11. Apply electrical sealant, RTV, to wire (5).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

12. Apply connector lubricant, Nyogel 760G, to connector (1).
13. Connect connector (1).
14. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR CONDITIONER CONDENSER REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood removed (M1240) (Four Generator AFES System) (WP 0158)
Hood removed (M1240) (Five Generator AFES System) (WP 0157)
Hood removed (M1245) (WP 0156)
System refrigerant evacuated (WP 0024)
Cooling shroud removed (WP 0174)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

O-ring (Item 2)
O-ring (Item 5)
O-ring (Item 6)
O-ring (Item 9)
U-nut (4) (Item 12)
Cap and Plug Set

Materials/Parts (Continued)

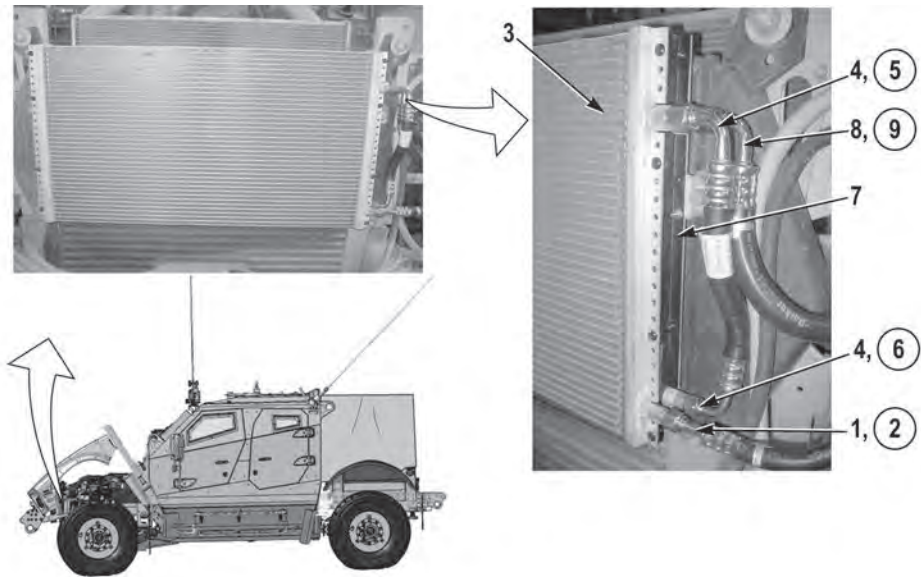
Compound, Sealing
Compound, Sealing, Flowable Silicone Primer, Dow Corning 1204
Compound, Sealing, Flowable Silicone Sealant, Dow Corning 3140
Tags, Identification
Ties, Cable

Personnel Required

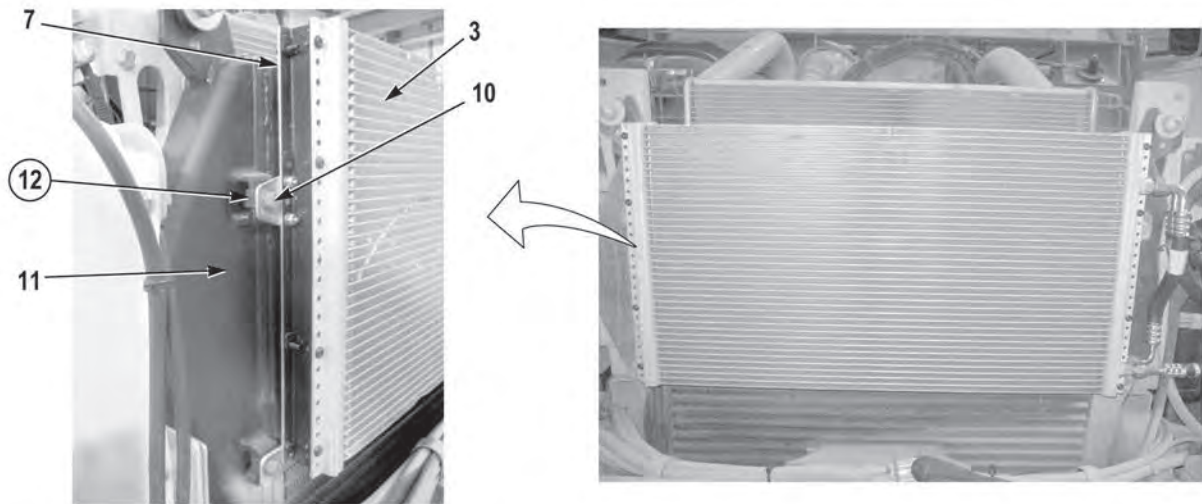
Two AC Mechanics

Follow-On Maintenance

Install cooling shroud (WP 0174)
Charge system refrigerant (WP 0024)
Install hood (M1240) (Four Generator AFES System) (WP 0158)
Install hood (M1240) (Five Generator AFES System) (WP 0157)
Install hood (M1245) (WP 0156)
Remove and stow wheel chocks

REMOVAL**NOTE**

- Remove cable ties as required.
 - Tag and mark hoses prior to removal to ensure proper installation.
 - Cap and plug hoses upon removal.
1. Remove hose (1) and O-ring (2) from front condenser (3). Discard O-ring (2).
 2. Remove hose (4) and O-ring (5) from front condenser (3). Discard O-ring (5).
 3. Remove hose (4) and O-ring (6) from rear condenser (7). Discard O-ring (6).
 4. Remove hose (8) and O-ring (9) from rear condenser (7). Discard O-ring (9).



5. With the aid of an assistant, remove four screws (10) and two condensers (3 and 7) from charge air cooler (11).
6. Remove four U-nuts (12) from charge air cooler (11). Discard U-nuts (12).

END OF TASK

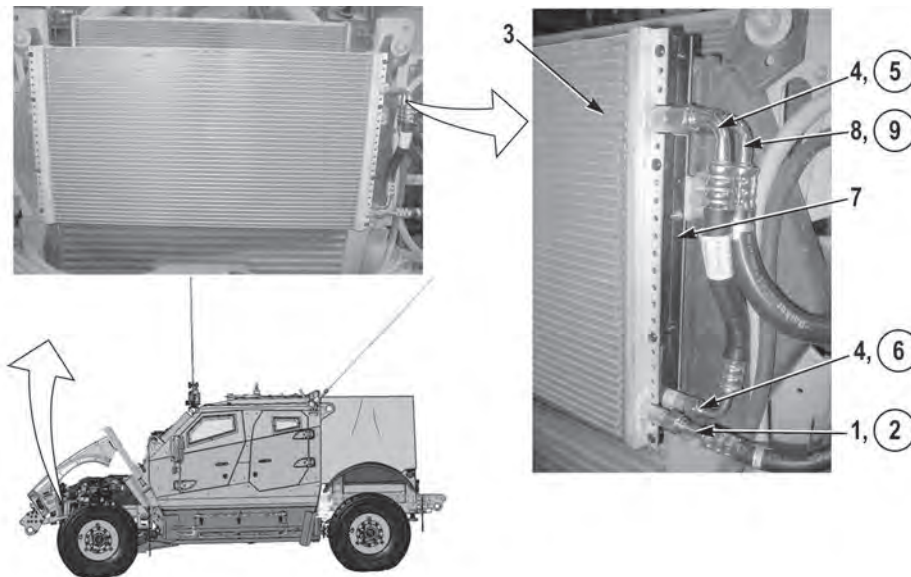
INSTALLATION

1. Install four new U-nuts (12) on charge air cooler (11).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound to four screws (10).
3. With the aid of an assistant, install two condensers (3 and 7) on four U-nuts (12) and charge air cooler (11) with four screws (10). Tighten screws (10) to 108 lb-in (12 N•m).



CAUTION

Do not lubricate A/C system O-rings. O-ring material is only compatible with air conditioning type lubricants. Failure to comply may result damage to equipment.

NOTE

- A/C hoses are shipped with O-rings installed. Use caution when handling, or O-ring loss may occur.
- Check that O-ring is present before making connections or refrigerant loss will occur.
- Install cable ties as required.

4. Install new O-ring (9) and hose (8) on rear condenser (7).
5. Install new O-ring (6) and hose (4) on rear condenser (7).
6. Install new O-ring (2) and hose (1) on front condenser (3).
7. Install new O-ring (5) and hose (4) on front condenser (3).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply primer, Dow Corning 1204, and sealing compound, Dow Corning 3140, to three hoses (1, 4, and 8).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR CONDITIONER LEAK DETECTION

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Driver side radiator baffles removed (If Equipped)
 (WP 0181)
 System refrigerant charged (WP 0024)

Tools and Special Tools

Tool Kit, Refrigeration Service Ordinance
 UV Detection Set

Materials/Parts

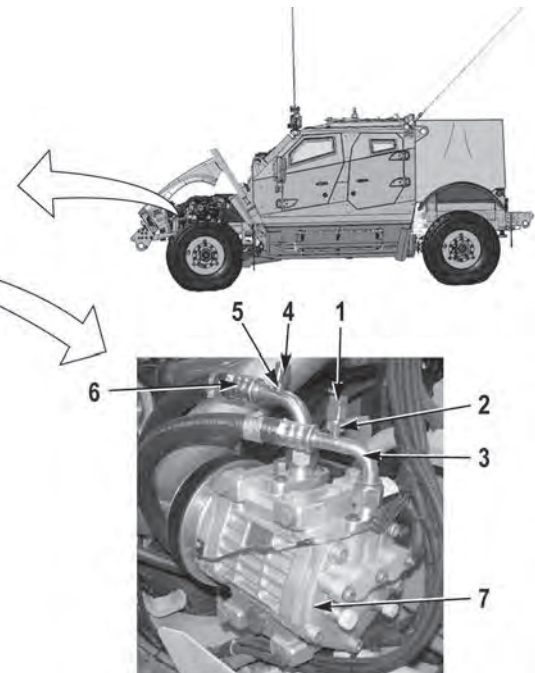
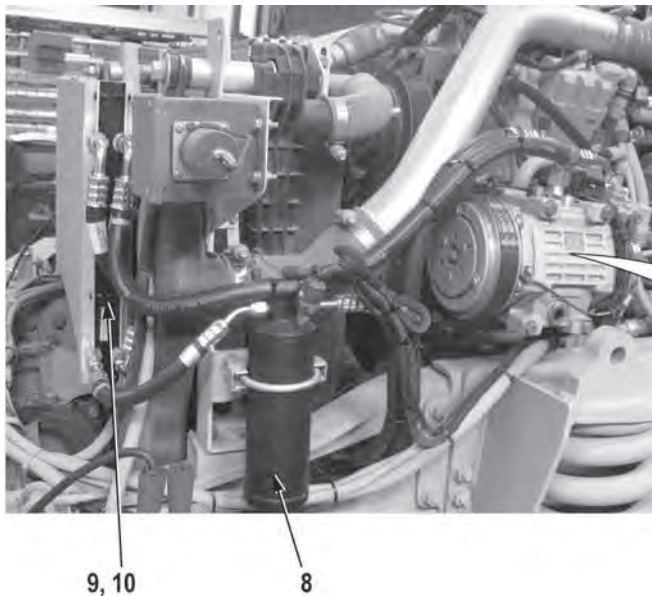
None

Personnel Required

AC Mechanic

Follow-On Maintenance

Install driver side radiator baffles (If Equipped)
 (WP 0181)
 Close hood and secure
 Remove and stow wheel chocks

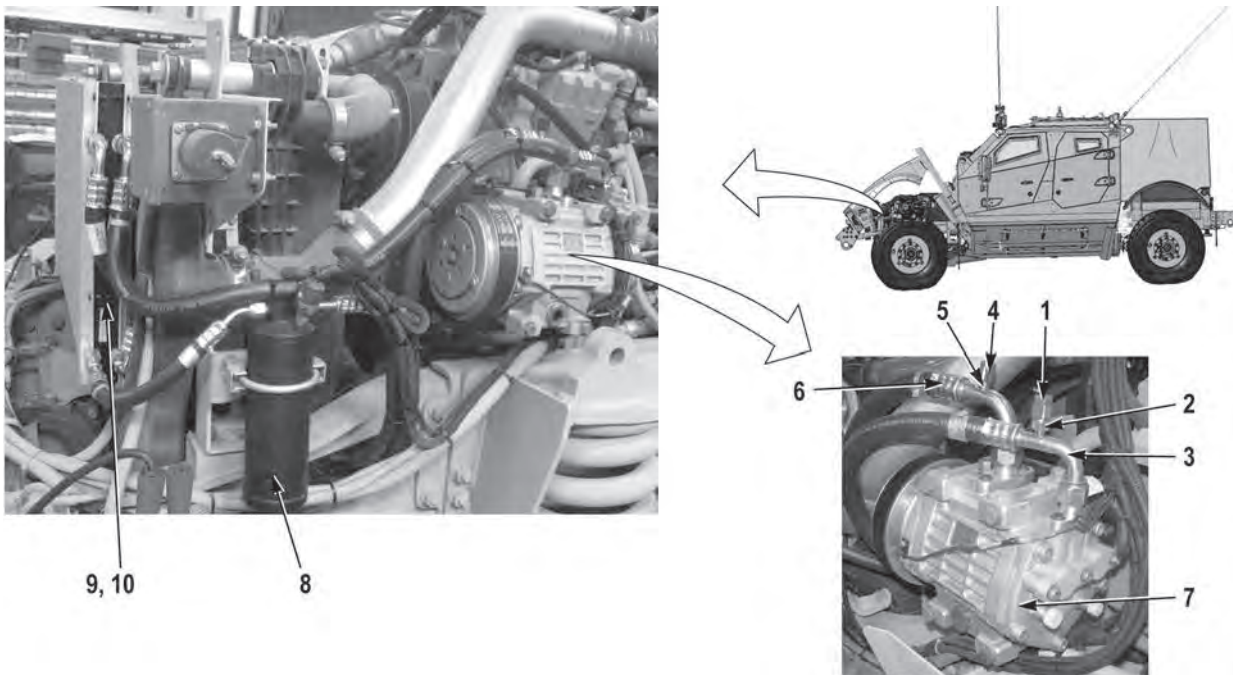
TEST FOR LEAKS**WARNING**

Refrigerant R-134a air conditioning systems should not be pressured-tested or leak-tested with compressed air. Combustible mixtures of air and R-134a may form. Failure to comply may result in injury or death to personnel.

NOTE

Newer vehicle configurations have service valve in different location on compressor.

1. Remove cap (1) from service valve (2) on hose (3).
2. Remove cap (4) from service valve (5) on hose (6).



NOTE

A/C system contains fluorescent tracer dye. Under system pressure fluorescent dye escapes at any leak point and can be detected with the UV leak detection light. The escaped dye glows a bright yellow-green when exposed to the UV light.

3. Use UV leak detection light to search for leaks around service valves (2 and 5), compressor (7), receiver/dryer (8), and front and rear condensers (9 and 10).
4. Repair leak(s) as required, service valves (WP 0024), compressor (WP 0019), receiver/dryer (WP 0023), front and rear condensers (WP 0021).
5. Charge HVAC system to proper charge.
6. Perform Steps (3) and (4).
7. Install cap (4) on service valve (5) on hose (6).
8. Install cap (1) on service valve (2) on hose (3).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR CONDITIONER RECEIVER/DRYER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secure
 Batteries disconnected (M1240, M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 System refrigerant evacuated (WP 0024)

Tools and Special Tools

Pan, Drain
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

O-ring (Item 5)
 O-ring (Item 7)
 O-ring (Item 9)
 O-ring (Item 12)
 Cap and Plug Set

Materials/Parts (continued)

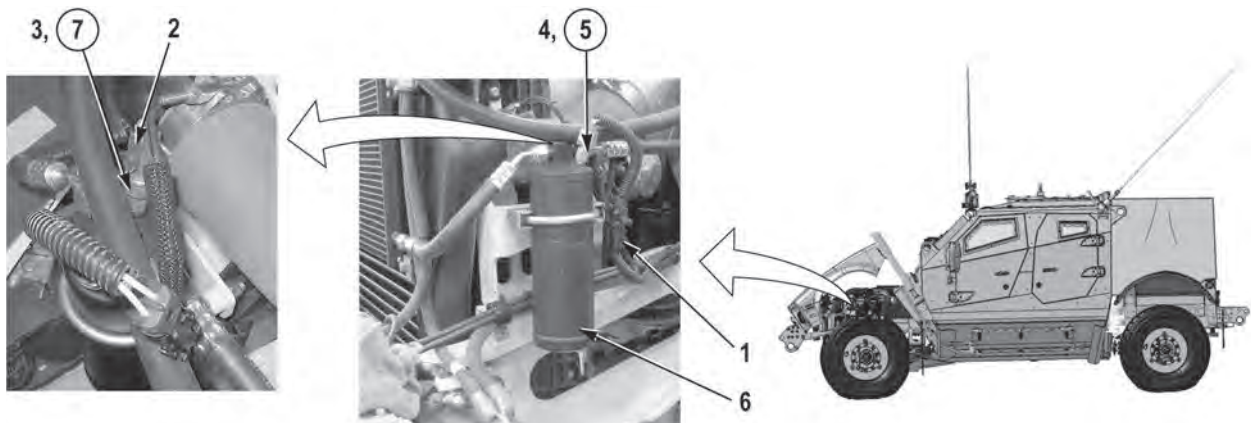
Compound, Corrosion Preventive, Ultra Tef-Gel
 05SA2
 Compound, Sealing, Flowable Silicone Primer,
 Dow Corning 1204
 Compound, Sealing, Flowable Silicone Sealant,
 Dow Corning 3140
 Lubricant, Connector, Nyogel 760G
 Tags, Identification
 Ties, cable

Personnel Required

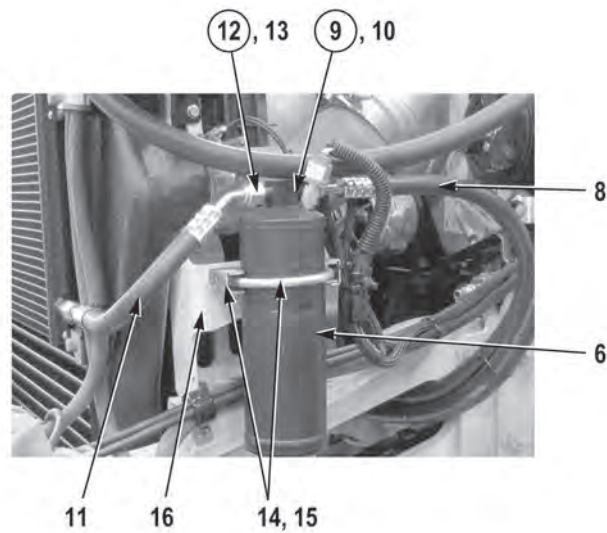
AC Mechanic

Follow-On Maintenance

Charge system refrigerant (WP 0024)
 Connect batteries (M1240, M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Remove cable ties as required.
 - Tag and mark wire connections prior to removal to ensure proper installation.
1. Disconnect connector (1).
 2. Disconnect connector (2) from binary switch (3).
 3. Remove high-pressure switch (4) and O-ring (5) from receiver/dryer (6). Discard O-ring (5).
 4. Remove binary switch (3) and O-ring (7) from receiver/dryer (6). Discard O-ring (7).



NOTE

- Tag and mark hoses prior to removal to ensure proper installation.
- Cap and plug hoses upon removal.

5. Remove hose (8) and O-ring (9) from receiver/dryer inlet port (10). Discard O-ring (9).
6. Remove hose (11) and O-ring (12) from receiver/dryer outlet port (13). Discard O-ring (12).

NOTE

Note position of receiver/dryer prior to removal to ensure proper installation.

7. Remove two nuts (14), clamp (15), and receiver/dryer (6) from mounting bracket (16).

END OF TASK

INSTALLATION**WARNING**

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

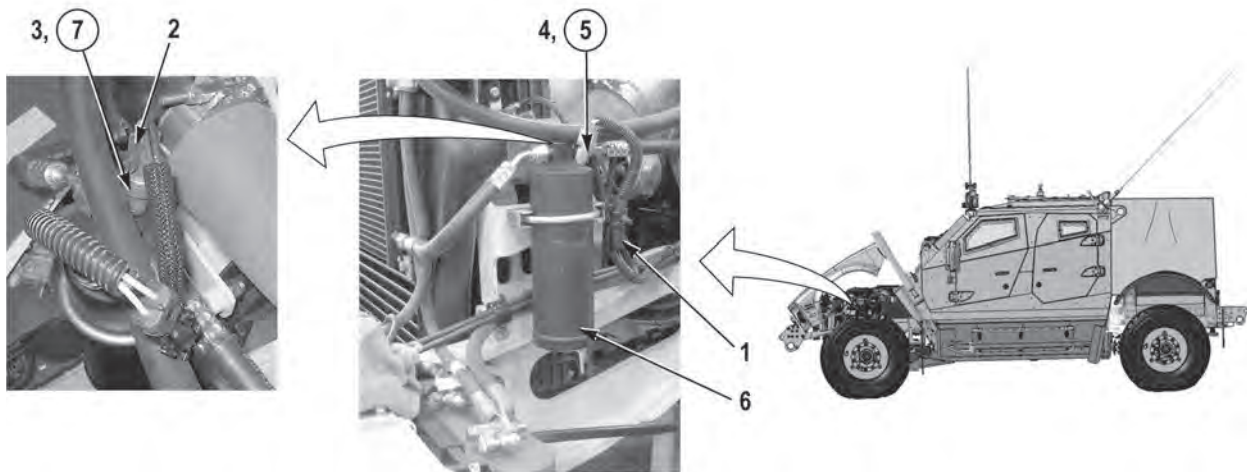
CAUTION

- When tightening A/C hoses and fittings, always use a backup wrench. Failure to comply may result in damage to equipment.
 - Do not lubricate A/C system O-rings. O-ring material is only compatible with air conditioning type lubricants. Failure to comply may result damage to equipment.
 - Do not overtighten nuts (14). Failure to comply may result in damage to receiver/dryer, loss of refrigerant, and damage to equipment.
1. Apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to threads of clamp (15).
 2. Install receiver/dryer (6) to mounting bracket (16) with clamp (15) and two nuts (14).

NOTE

Install receiver/dryer as noted prior to removal.

3. Position receiver/dryer (6) so top of receiver/dryer is 0.5 in. (13 mm) above clamp (15) and rotate receiver/dryer (6) so outlet port (13) is facing the driver's seat.
4. Tighten two nuts (14) to 10 lb-ft (14 N•m).
5. Install new O-ring (12) and hose (11) on receiver/dryer outlet port (13).
6. Install new O-ring (9) and hose (8) on receiver/dryer inlet port (10).



7. Install new O-ring (7) and binary switch (3) on receiver/dryer (6).
8. Install new O-ring (5) and high-pressure switch (4) on receiver/dryer (6).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

9. Apply connector lubricant to two connectors (2 and 1).

NOTE

Install cable ties as required.

10. Connect connector (2) to binary switch (3).
11. Connect connector (1).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

12. Apply primer, Dow Corning 1204, and sealing compound, Dow Corning 3140, to fittings of two hoses (11 and 8).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR CONDITIONER REFRIGERANT R-134A RECOVERY/EVACUATION AND RECHARGING

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured

Tools and Special Tools

Reclaimer, Refrigerant
Tool Kit, Refrigeration Service Ordnance

Materials/Parts

Dye, Leak Detection
Refrigeration Oil, Type P.A.G.

Personnel Required

Maintainer (HVAC Certified)

Follow-On Maintenance

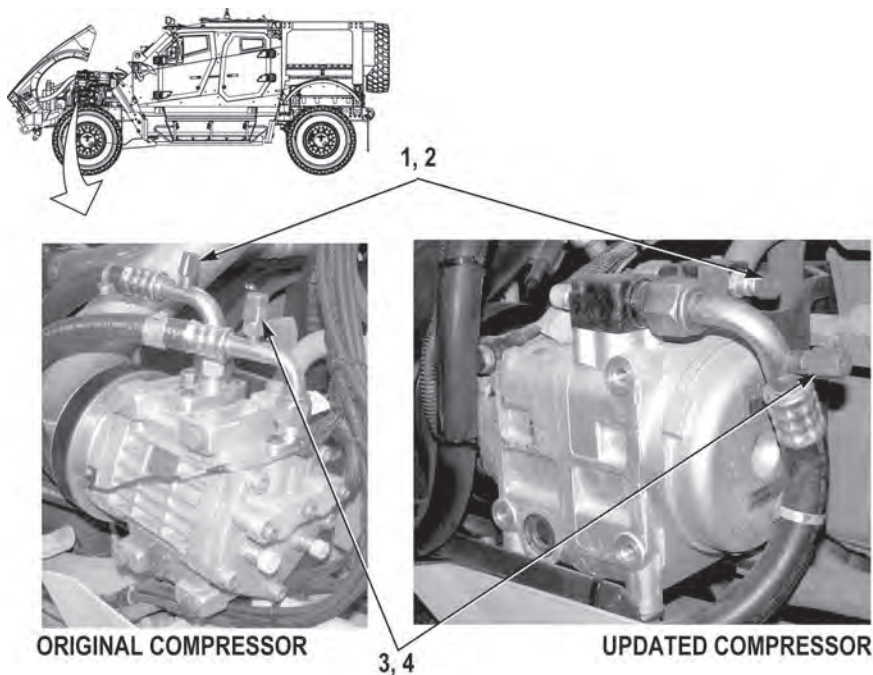
Close hood and secure
Check operation of air conditioning system
Remove and stow wheel chocks

RECOVERY**NOTE**

- The M-ATV is equipped with one of two air conditioner compressors. Both are shown in this work package.

Environmental Protection Agency (EPA) regulations specify that:

- Provisions are made to certify all air conditioning service, installation, and repair personnel.
1. Start engine and run at high idle until normal operating temperature 170 to 190°F (77 to 88 C) is reached.
 2. Shut off engine.



WARNING

- Use care to prevent refrigerant from touching skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissues. Failure to comply may result in injury or death to personnel.
- Do not attempt to pressure or leak test refrigerant R-134A air conditioning systems with compressed air. Combustible mixtures or air and R-134A may form, resulting in a fire or explosion. Failure to comply may result in injury or death to personnel.
- Wear proper eye protection and nonleather gloves when servicing air conditioner. Failure to comply may result in injury or death to personnel.

3. Remove cap (1) from high pressure side service valve (2).
4. Remove cap (3) from low pressure side service valve (4).

NOTE

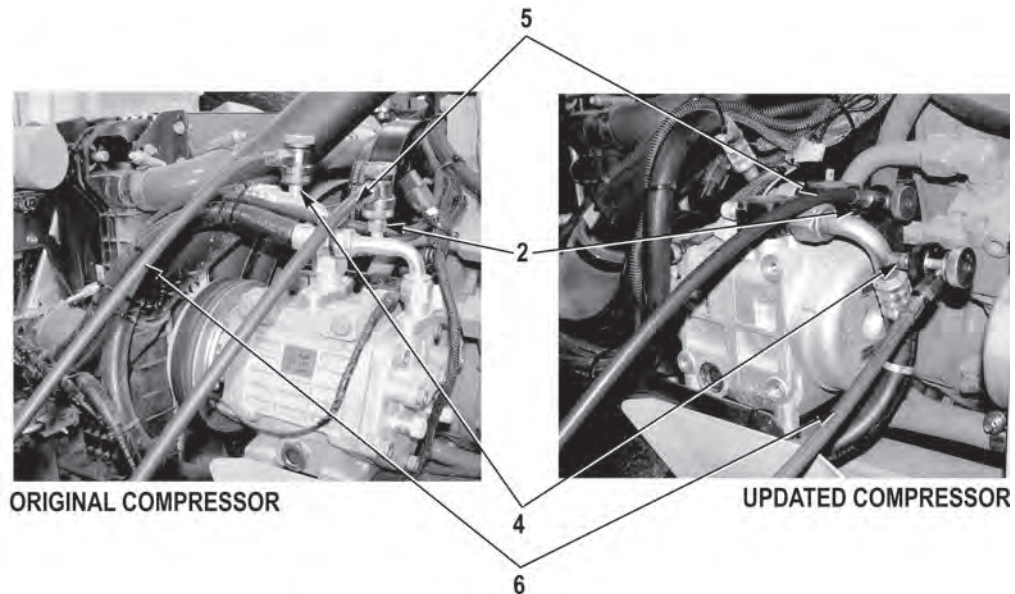
- Review recovery machine's operator's manual for proper operation.
 - Note amount of oil/dye mixture recovered for recharging.
5. Recover system refrigerant.
 6. Install cap (3) on low pressure side service valve (4).
 7. Install cap (1) on high pressure side service valve (2).

END OF TASK

CHARGING**WARNING**

- Use care to prevent refrigerant from touching skin or eyes. Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissues. Failure to comply may result in injury or death to personnel.
- Do not attempt to pressure or leak test refrigerant R-134A air conditioning systems with compressed air. Combustible mixtures of air and R-134A may form, resulting in a fire or explosion. Failure to comply may result in injury or death to personnel.
- Wear proper eye protection and nonleather gloves when servicing air conditioner. Failure to comply may result in injury or death to personnel.

1. Remove cap (1) from high pressure side service valve (2).
2. Remove cap (3) from low pressure side service valve (4).



3. Connect service hose (5) to high pressure side service valve (2).
4. Connect service hose (6) to low pressure side service valve (4).

NOTE

- System must be in a 27 to 30 in./HG vacuum status before charging.
 - Any change in pressure indicates a leak in A/C system.
5. Vacuum system until system reaches 27 to 30 in./HG.
 6. Let system sit for 30 minutes. Observe for loss of vacuum for possible leak.

CAUTION

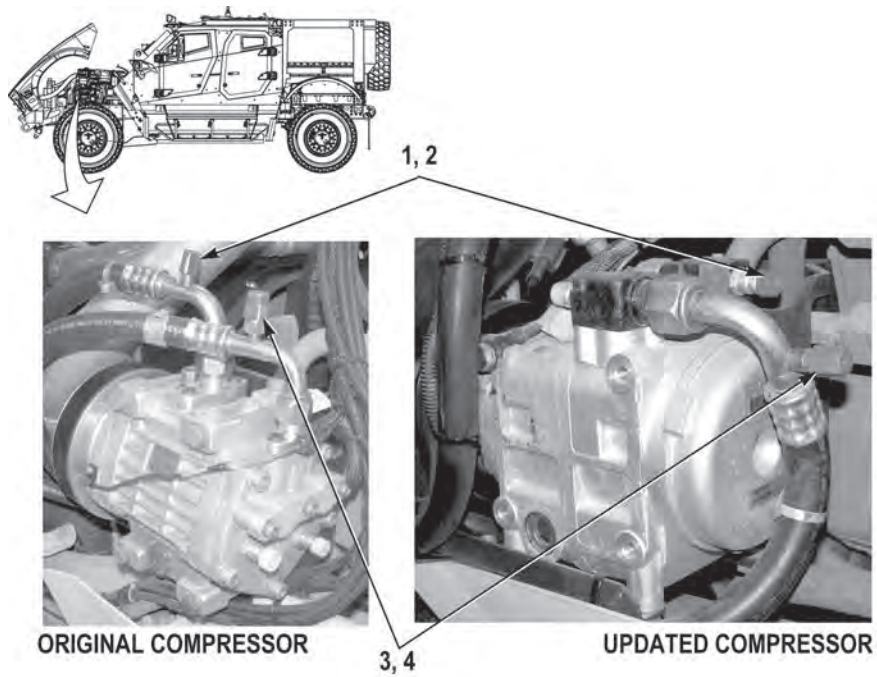
- **Do not overcharge system. The system is fully charged with 3.5 lbs (1.59 kg) of refrigerant. Failure to comply may result in damage to equipment.**
- **Do not operate vehicle system with the panel high-side valve in open position. Failure to comply may result in damage to equipment.**

NOTE

- Add oil/dye mixture as noted in recovery.
 - Use Table 1 to monitor pressure.
 - A slow charge condition may occur due to pressure equalization between service station and vehicle system.
 - Total system charge is 3.5 lbs (1.59 kg).
7. Charge system with R-134a refrigerant in accordance with Table 1. If system cannot obtain or hold 27 to 30 in./HG, perform leak test (WP 0022).

Table 1. Proper System Pressure Levels at Measured Temperatures.

°F	°C	HFC-134a (psi)	°F	°C	HFC-134a (psi)
-60	-51.1	21.8	55	12.8	51.1
-55	-48.3	20.4	60	15.6	57.3
-50	-45.6	18.7	65	18.3	63.9
-45	-42.8	16.9	70	21.1	70.9
-40	-40.0	14.8	75	23.8	78.4
-35	-37.2	12.5	80	26.7	88.4
-30	-34.4	9.8	85	29.4	94.9
-25	-31.7	6.9	90	32.2	103.9
-20	-28.9	3.7	95	35.0	113.5
-15	-26.1	0.0	100	37.8	123.6
-10	-23.3	1.9	105	40.6	134.3
-5	-20.6	4.1	110	43.3	145.3
0	-17.8	6.5	115	46.1	157.6
5	-15.0	9.0	120	48.9	170.3
10	-12.2	12	125	51.7	183.6
15	-9.4	15	130	54.4	197.6
20	-6.7	18.4	135	57.2	212.4
25	-3.9	22.1	140	60.0	227.9
30	-1.1	26.1	145	62.8	244.3
35	1.7	30.4	150	65.6	261.4
40	4.4	35.0	155	68.3	279.5
45	7.2	45.0	160	71.1	298.4
50	10.0	45.3	165	73.9	318.3



8. Remove service hoses.
9. Install cap (3) on low pressure side service valve (4).
10. Install cap (1) on high pressure side service valve (2).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

ANTENNA PLATFORM REPLACEMENT (M1240/M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Tire carrier removed (M1240) (WP 0041)
 Tire carrier removed (M1240A1) (WP 0042)
 Batteries disconnected (WP 0186)
 Coupler box removed (WP 0026)
 Rear fire suppression cylinders and brackets removed (AFES Linear Wire Detection) (WP 0068)

Tools and Special Tools

Jackstand (6)
 Lifting Device
 Strap, Nylon, 60 in. (4)
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (36) (Item 2, 7, 12, 16, 20, 25, 132, 143, and 147)
 Lockwasher (154) (Item 29, 37, 43, 49, 114, 120, 126, 137, 151, 157, 163, 169, 175, 180, 185, 190, 196, 201, 206, 211, 217, 222, 227, 232, 237, 242, 247, 252, 257, 262, 267, 272, 278, and 283)

Materials/Parts (continued)

Locknut (2) (Item 58 and 64)
 Clamp (Item 71)
 Locknut (16) (Item 74, 77, 94, 98, and 110)
 Locknut (4) (Item 79)
 Locknut (4) (Item 86 and 102)
 Locknut (4) (Item 90 and 106)
 Compound, Antiseize
 Sealant, RTV Silicone
 Tags, Identification

Personnel Required

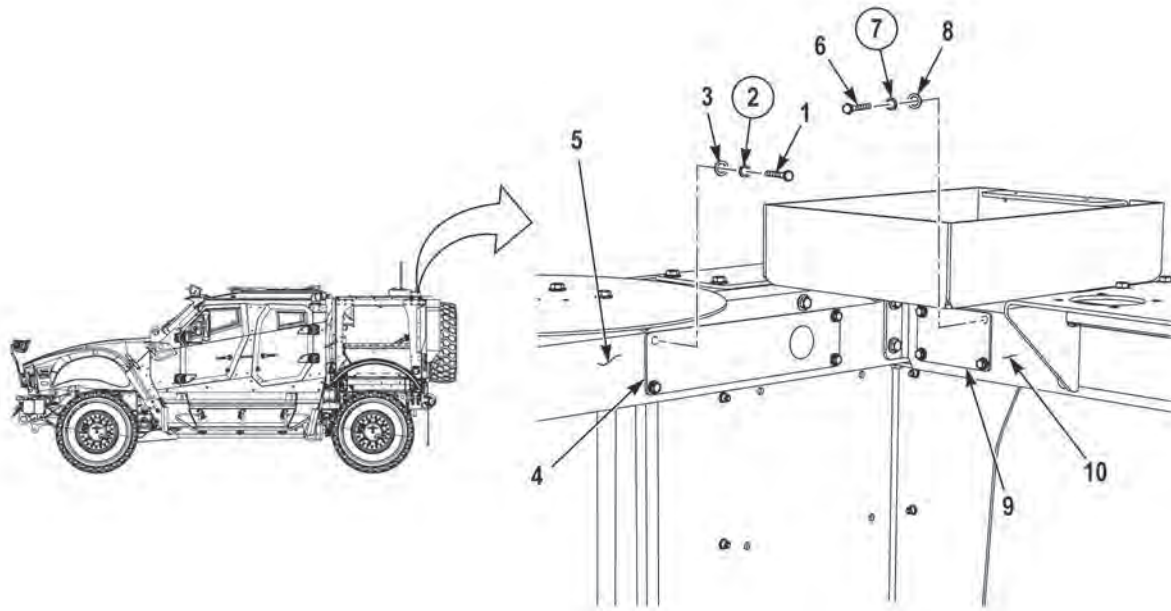
Two

Follow-On Maintenance

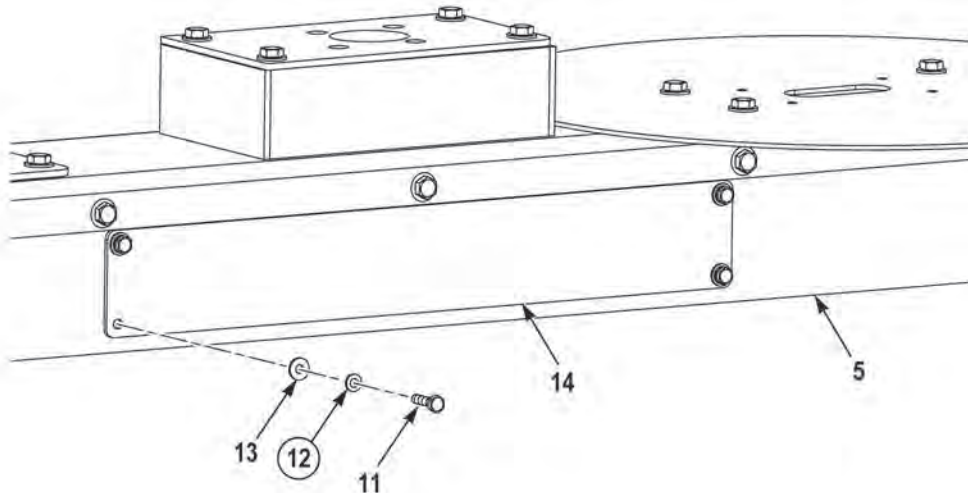
Install rear fire suppression cylinders and brackets (AFES Linear Wire Detection) (WP 0068)
 Install coupler box (WP 0026)
 Connect batteries (WP 0186)
 Install tire carrier (M1240) (WP 0041)
 Install tire carrier (M1240A1) (WP 0042)
 Remove and stow wheel chocks

REMOVAL**NOTE**

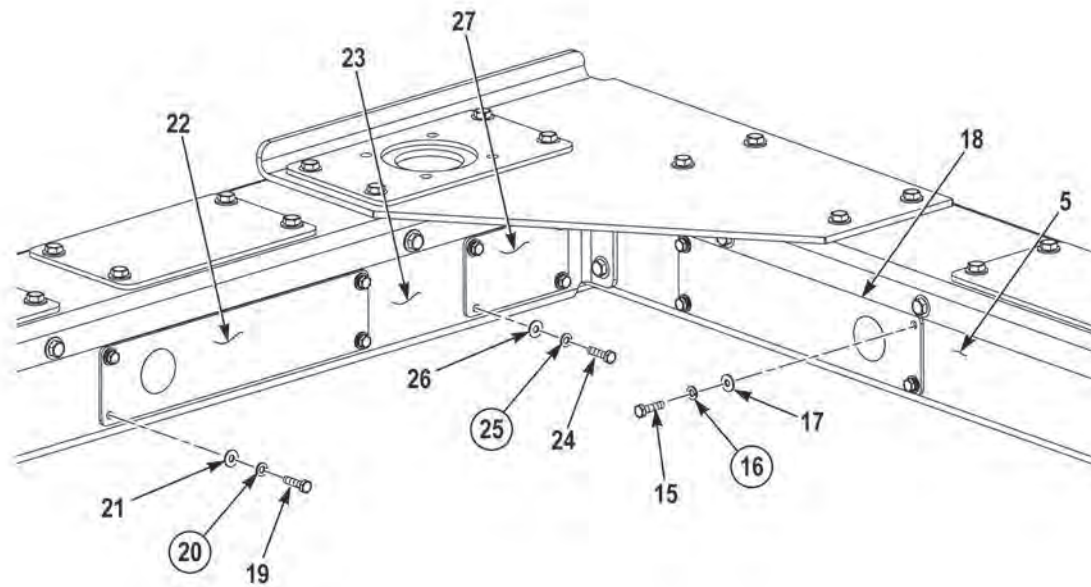
- Note position of hardware prior to removal to ensure proper installation.
- Note position of brackets, cover plates, and antenna mounting plates prior to removal to ensure proper installation.
- Configuration of antenna platform may differ depending on Government Furnished Equipment (GFE) components installed.
- Remove GFE components as required.
- If threaded inserts are damaged, replace in accordance with (WP 0291).



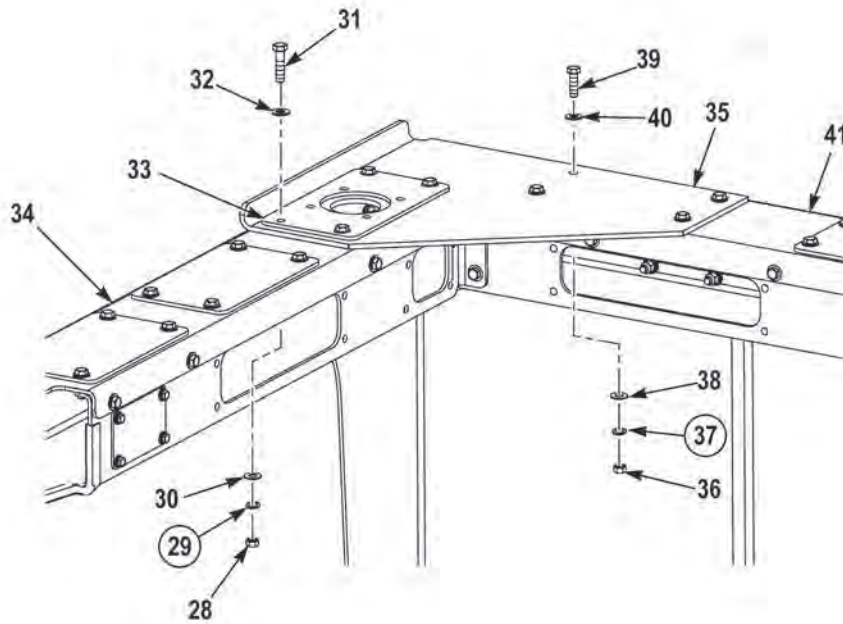
1. Remove four screws (1), lockwashers (2), washers (3), and access cover plate (4) from rear antenna support (5). Discard lockwashers (2).
2. Remove four screws (6), lockwashers (7), washers (8), and access cover plate (9) from driver side antenna support (10). Discard lockwashers (7).



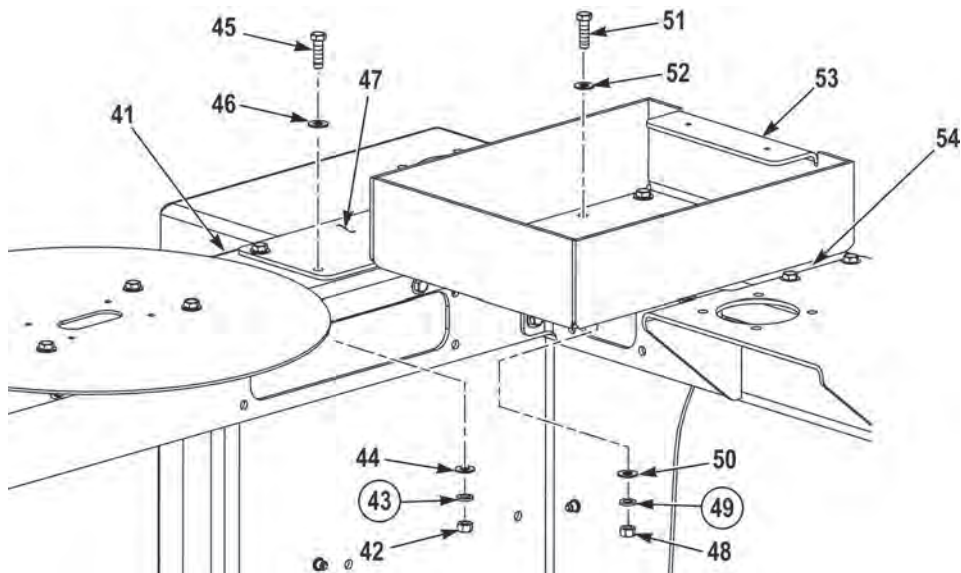
3. Remove four screws (11), lockwashers (12), washers (13), and access cover plate (14) from rear antenna support (5). Discard lockwashers (12).



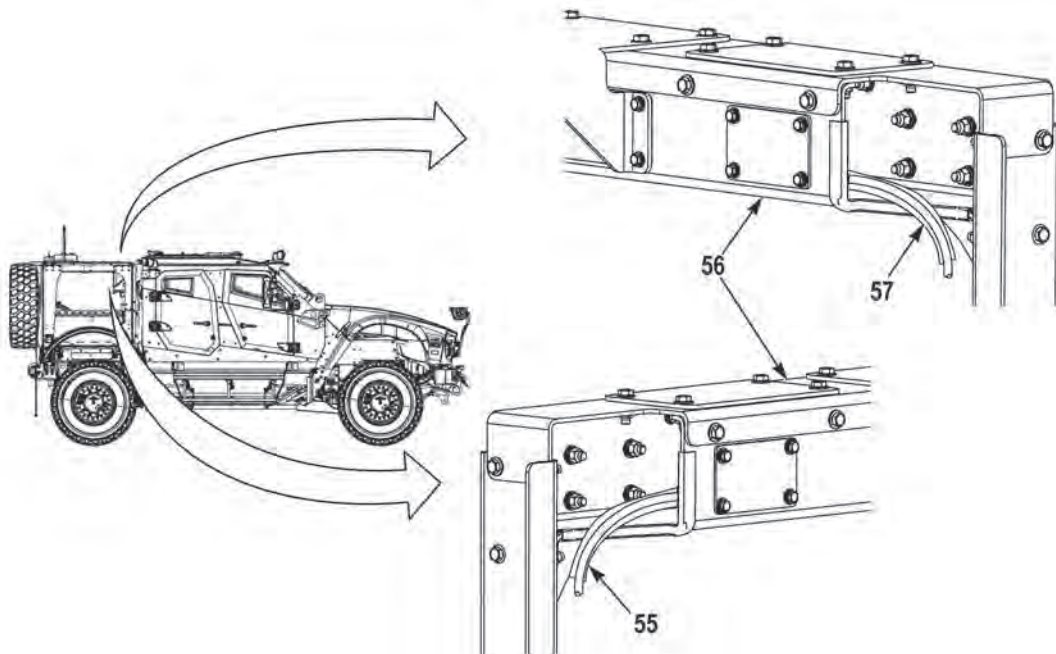
4. Remove four screws (15), lockwashers (16), washers (17), and access cover plate (18) from rear antenna support (5). Discard lockwashers (16).
5. Remove four screws (19), lockwashers (20), washers (21), and access cover plate (22) from passenger side antenna support (23). Discard lockwashers (20).
6. Remove four screws (24), lockwashers (25), washers (26), and access cover plate (27) from passenger side antenna support (23). Discard lockwashers (25).



7. Remove four nuts (28), lockwashers (29), washers (30), screws (31), washers (32), and antenna mounting plate (33) from passenger side antenna mounting panel (34) and antenna mounting bracket (35). Discard lockwashers (29).
8. Remove four nuts (36), lockwashers (37), washers (38), screws (39), washers (40), and antenna mounting bracket (35) from rear antenna mounting panel (41). Discard lockwashers (37).



9. Remove four nuts (42), lockwashers (43), washers (44), screws (45), washers (46), and top access cover (47) from rear antenna mounting panel (41). Discard lockwashers (43).
10. Remove four nuts (48), lockwashers (49), washers (50), screws (51), washers (52), and antenna box (53) from driver side antenna mounting panel (54). Discard lockwashers (49).

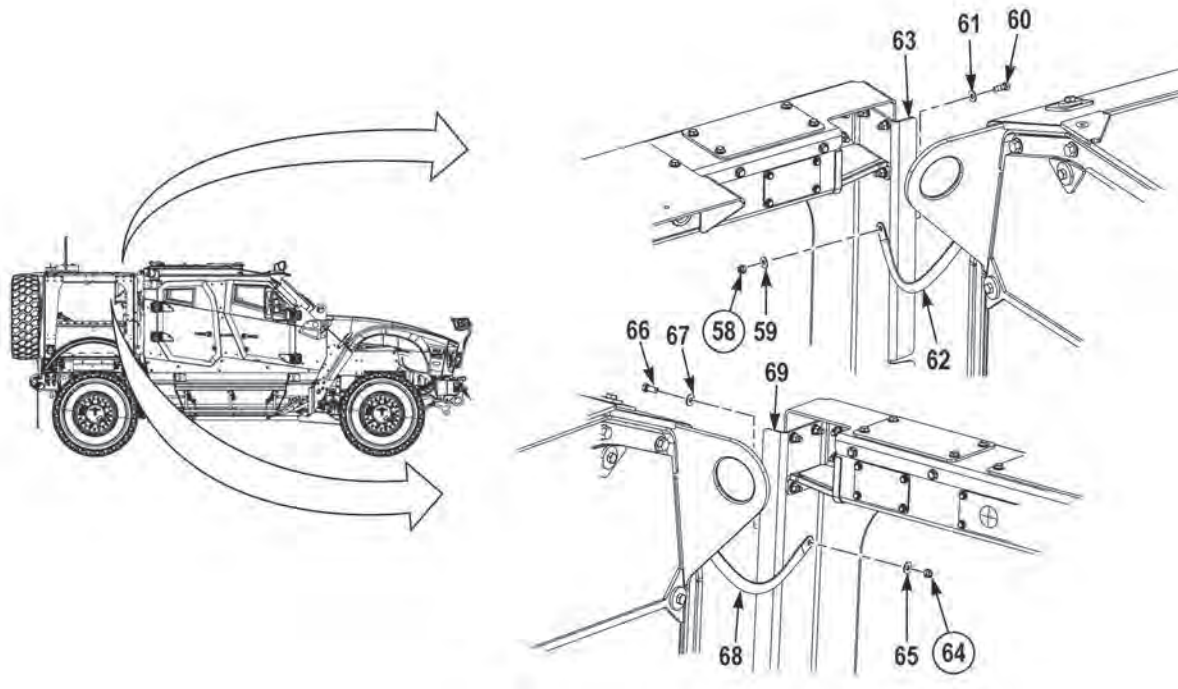


CAUTION

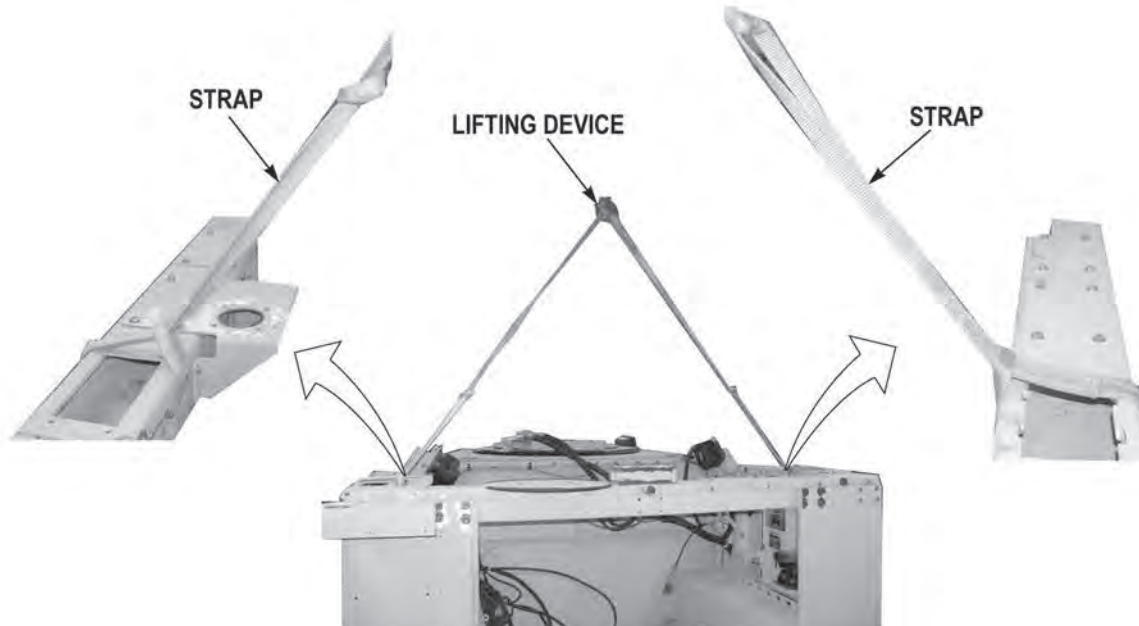
Ensure all GFE is disconnected prior to removal of GFE wire bundles. Failure to comply may result in damage to equipment.

NOTE

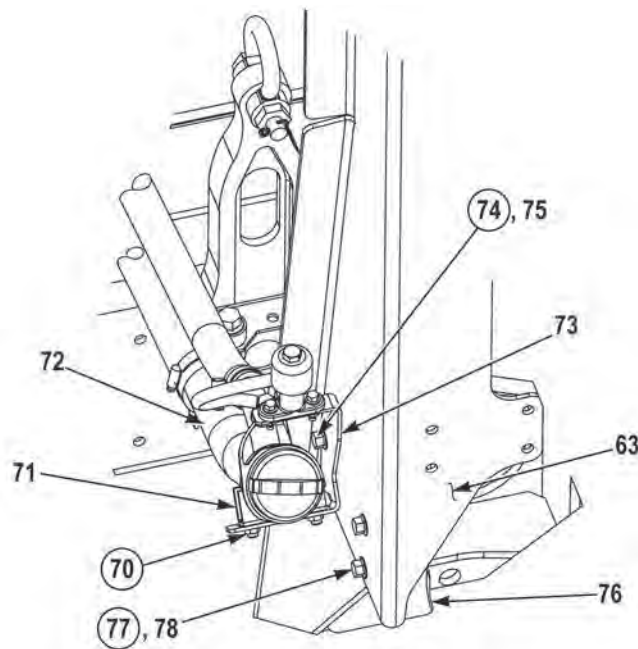
- Tag and mark connectors and GFE components prior to removal to ensure proper installation.
 - Note routing of GFE wire bundles prior to removal to ensure proper installation.
 - Disconnect GFE components as required.
11. Remove passenger side GFE wire bundle (55) from antenna platform (56).
 12. Remove driver side GFE wire bundle (57) from antenna platform (56).



13. Remove locknut (58), washer (59), screw (60), washer (61), and ground strap (62) from driver side front panel (63). Discard locknut (58).
14. Remove locknut (64), washer (65), screw (66), washer (67), and ground strap (68) from passenger side front panel (69). Discard locknut (64).



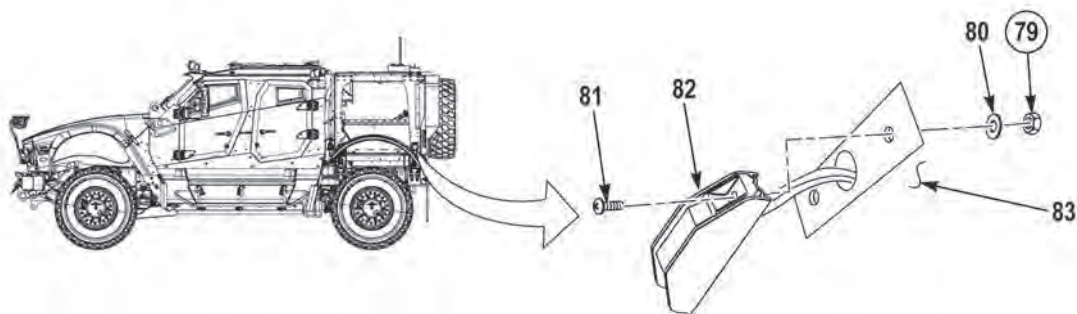
15. Attach a lifting device and four straps to support weight of antenna platform.



NOTE

Locknuts and clamp are purchased as an assembly.

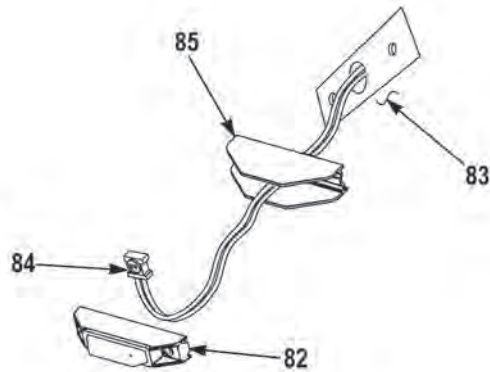
16. Remove two locknuts (70), clamp (71), and fuel filler hose (72) from bracket (73). Discard clamp (71) and locknuts (70).
17. Remove two locknuts (74), screws (75), and bracket (73) from bracket (76) and driver side front panel (63). Discard locknuts (74).
18. Remove two locknuts (77) and screws (78) from bracket (76) and driver side front panel (63). Discard locknuts (77).



NOTE

Driver side and passenger side marker lights are removed the same way. Driver side shown.

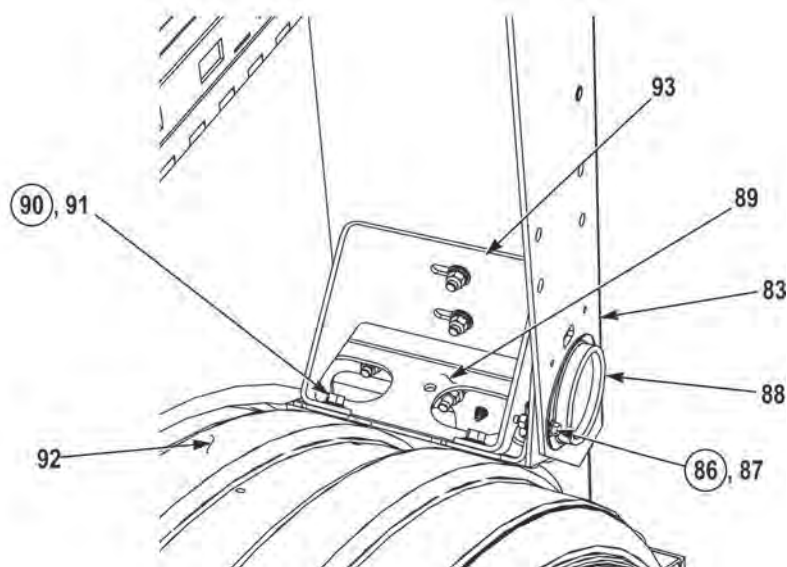
19. Remove two locknuts (79), washers (80), screws (81), and marker light assembly (82) from driver side rear panel (83). Discard locknuts (79).



NOTE

- Tag and mark connector prior to removal to ensure proper installation.
- Note position of connector prior to removal to ensure proper installation.

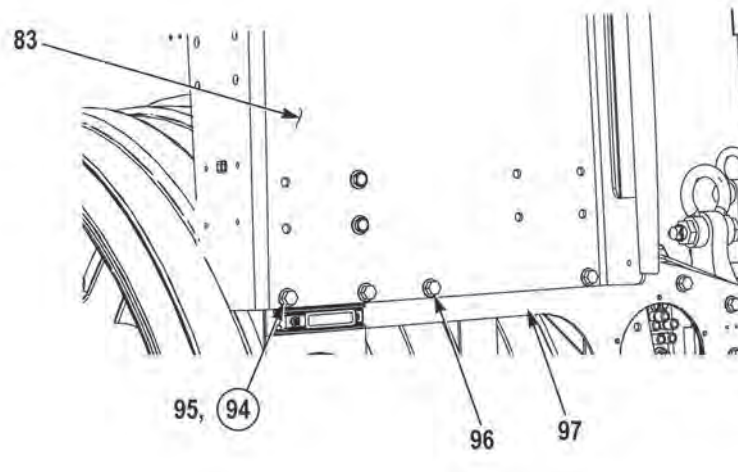
20. Disconnect connector (84) from marker light assembly (82).
21. Remove marker light shield (85) from driver side rear panel (83).
22. Repeat Steps (19) through (21) for passenger side marker light.



NOTE

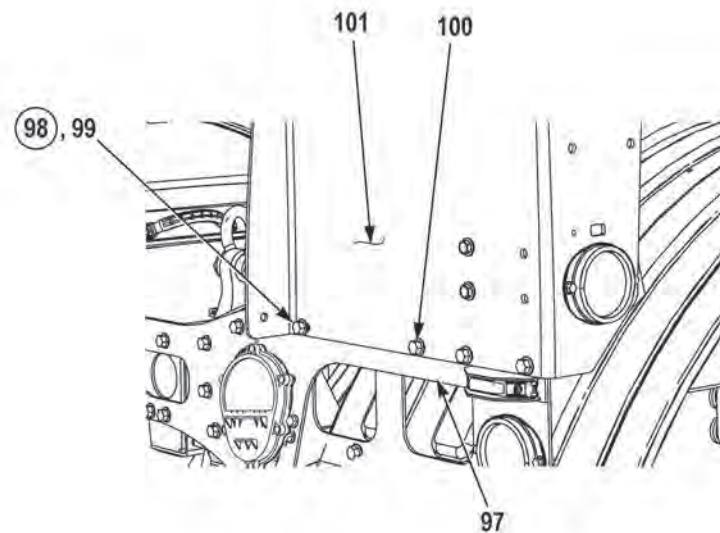
Note position of reflector prior to removal to ensure proper installation.

23. Remove two locknuts (86), screws (87), and reflector (88) from bracket (89) and driver side rear panel (83). Discard locknuts (86).
24. Remove two locknuts (90) and screws (91) from fender (92), bracket (89), and bracket (93). Discard locknuts (90).

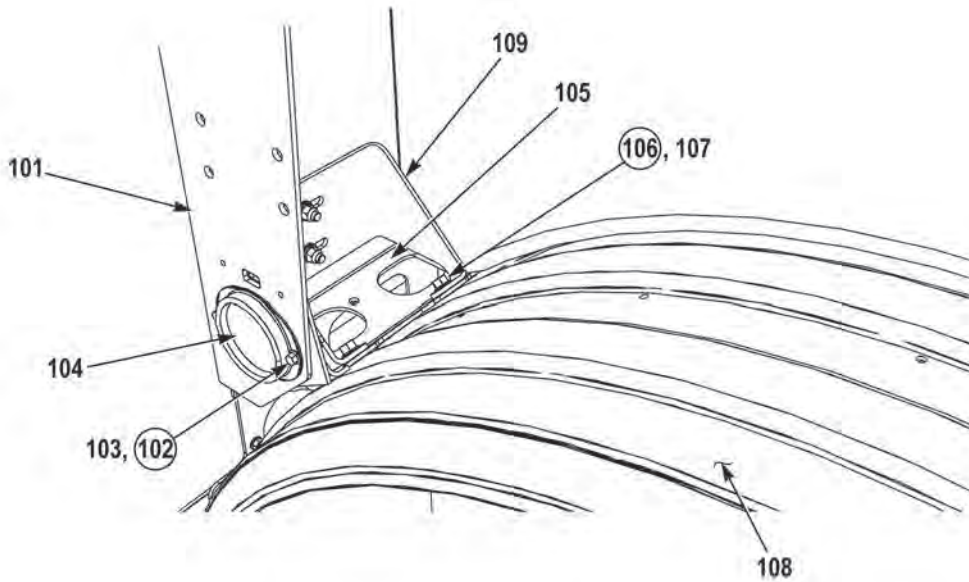
**NOTE**

Note position and remove cushion clips as required.

25. Remove four locknuts (94), three screws (95), and screw (96) from bracket (97) and driver side rear panel (83). Discard locknuts (94).



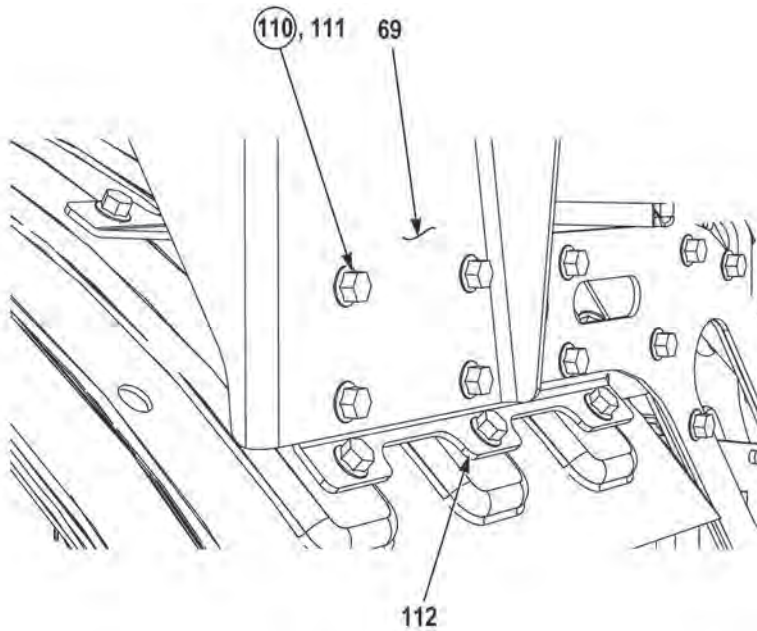
26. Remove four locknuts (98), three screws (99), and screw (100) from bracket (97) and passenger side rear panel (101). Discard locknuts (98).



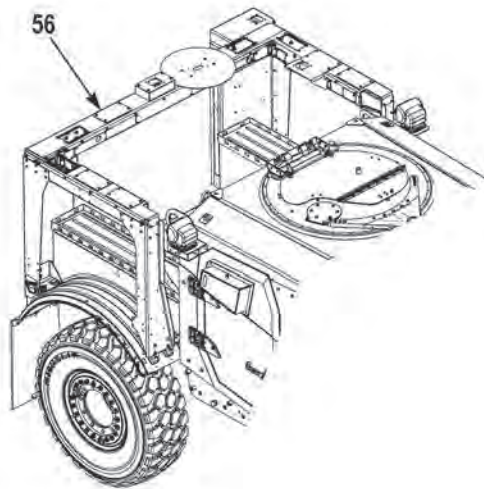
NOTE

Note position of reflector prior to removal to ensure proper installation.

27. Remove two locknuts (102), screws (103), and reflector (104) from bracket (105) and passenger side rear panel (101). Discard locknuts (102).
28. Remove two locknuts (106) and screws (107) from fender (108), bracket (105), and bracket (109). Discard locknuts (106).



29. Remove four locknuts (110) and screws (111) from bracket (112) and passenger side front panel (69). Discard locknuts (110).



WARNING

Antenna platform weighs 200 lbs (91 kg). Do not attempt to lift or move antenna platform without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

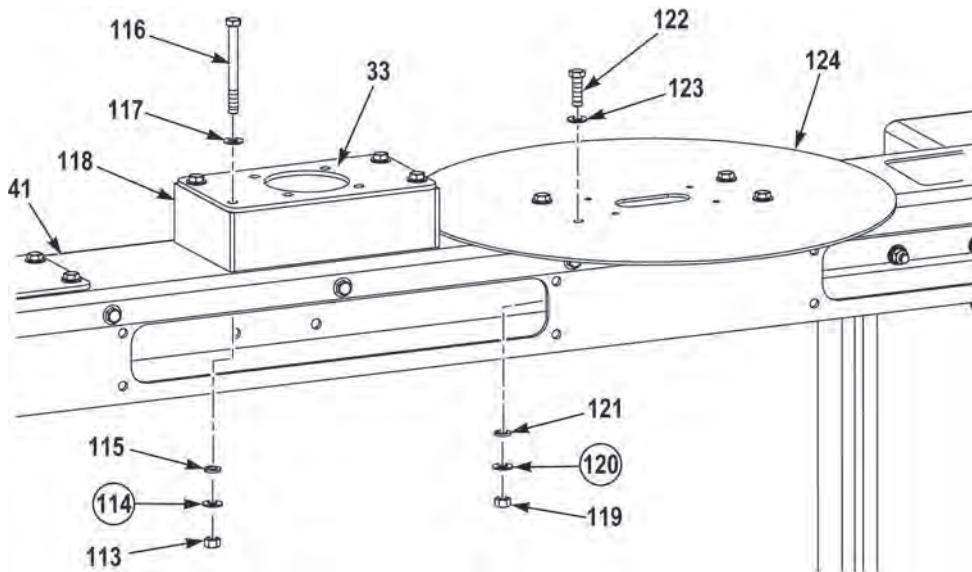
Ensure all GFE cables, wire harnesses, fire suppression lines, and connectors are away from antenna platform. Remove antenna platform slowly from vehicle. Failure to comply may result in damage to equipment.

NOTE

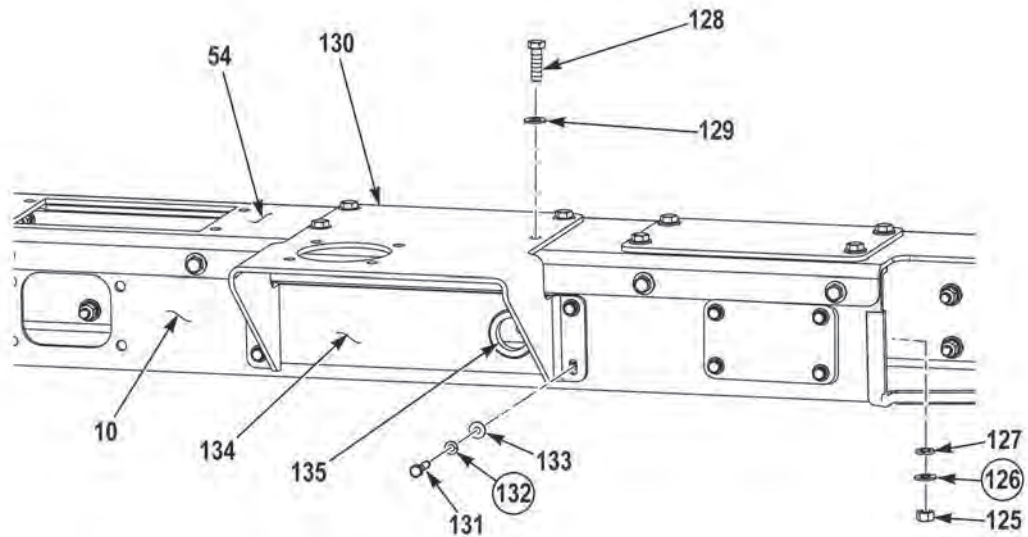
Note position of antenna rack prior to removal to ensure proper installation.

30. With the aid of an assistant and lifting device, remove antenna platform (56) from vehicle and position antenna platform (56) on a firm, level surface.

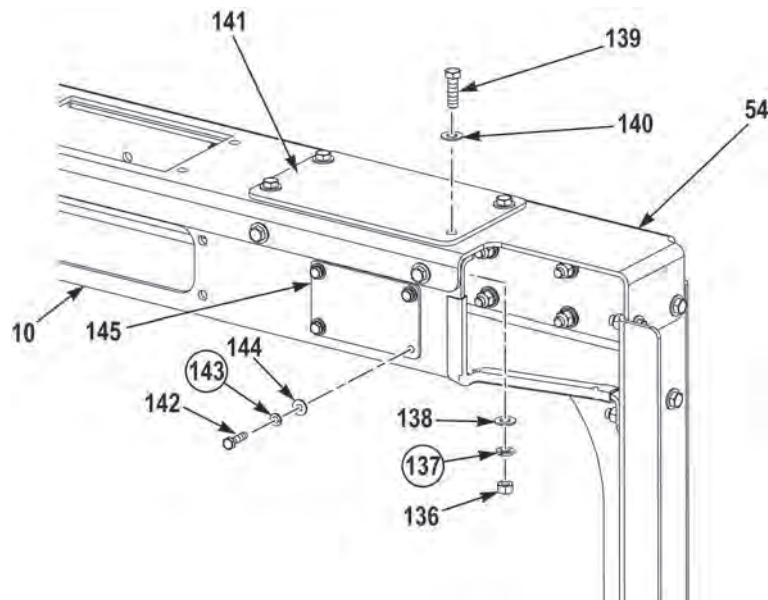
DISASSEMBLY

**NOTE**

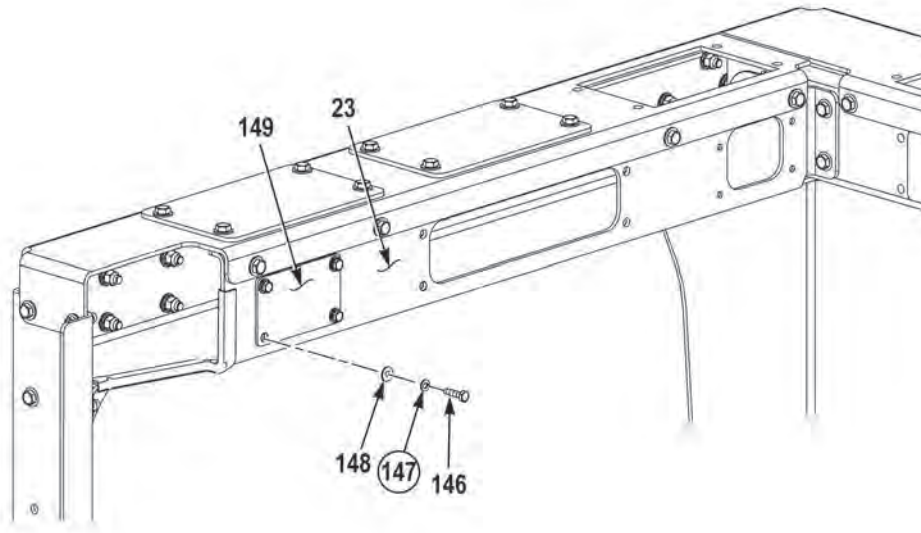
- Note position and placement of quickedge protectors prior to removal to ensure proper installation.
 - Remove quickedge protectors as required.
 - Note position of hardware prior to removal to ensure proper installation.
 - Note position of brackets cover plates, and antenna mounting plates prior to removal to ensure proper installation.
1. Remove four nuts (113), lockwashers (114), washers (115), screws (116), washers (117), antenna mounting plate (33), and antenna riser box (118) from rear antenna mounting panel (41). Discard lockwashers (114).
 2. Remove four nuts (119), lockwashers (120), washers (121), screws (122), washers (123), and x-wing antenna mount plate (124) from rear antenna mounting panel (41). Discard lockwashers (120).



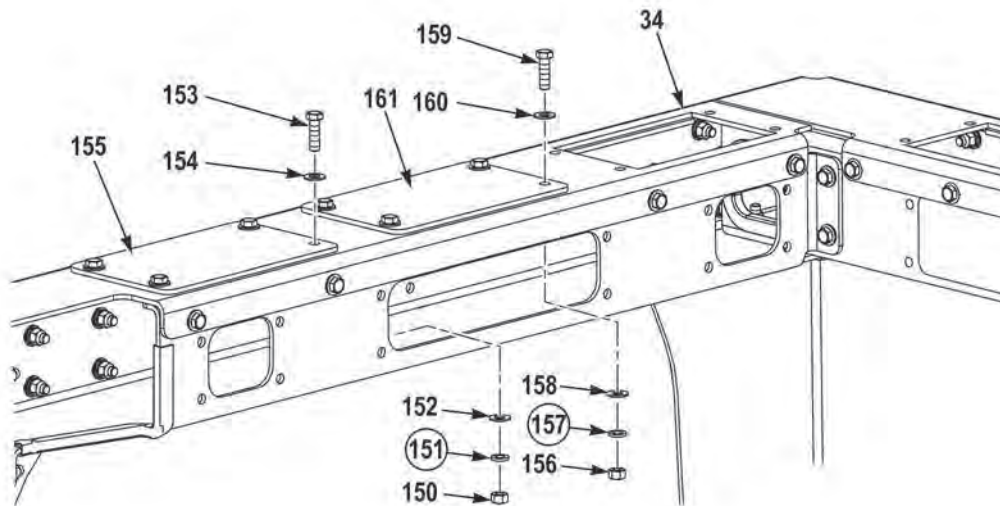
3. Remove four nuts (125), lockwashers (126), washers (127), screws (128), and washer (129) from driver side antenna mounting panel (54) and antenna mount bracket (130). Discard lockwashers (126).
4. Remove four screws (131), lockwashers (132), washers (133), antenna mount bracket (130), and antenna access cover plate (134) from driver side antenna support (10). Discard lockwashers (132).
5. Remove grommet (135) from access cover plate (134).



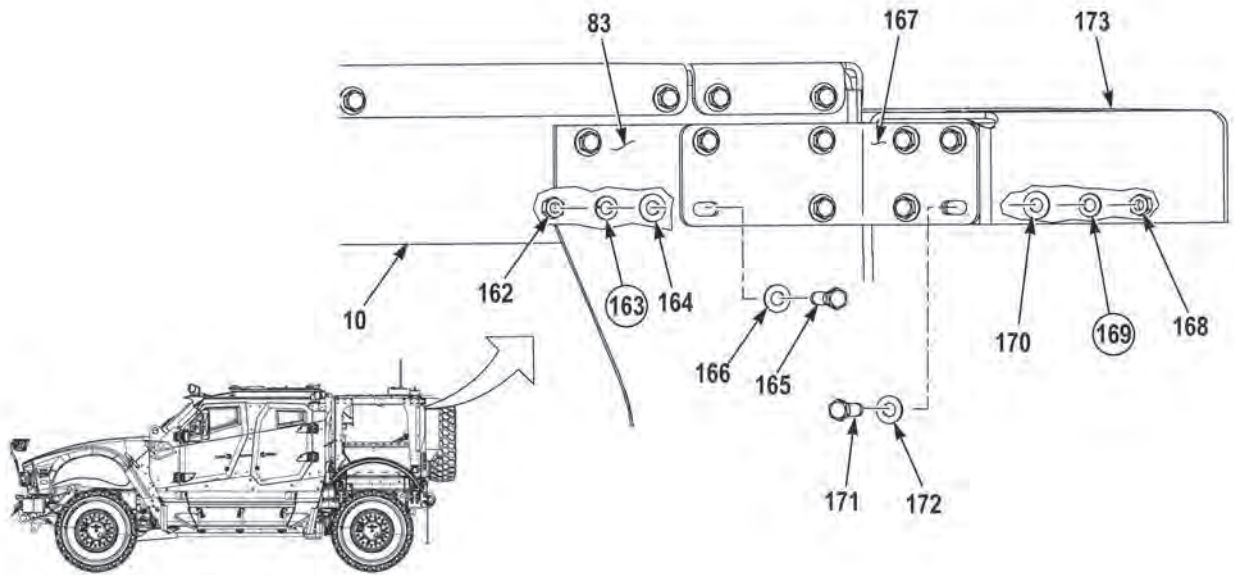
6. Remove four nuts (136), lockwashers (137), washers (138), screws (139), washers (140), and top access cover (141) from driver side antenna mounting panel (54). Discard lockwashers (137).
7. Remove four screws (142), lockwashers (143), washers (144), and access cover plate (145) from driver side antenna support (10). Discard lockwashers (143).



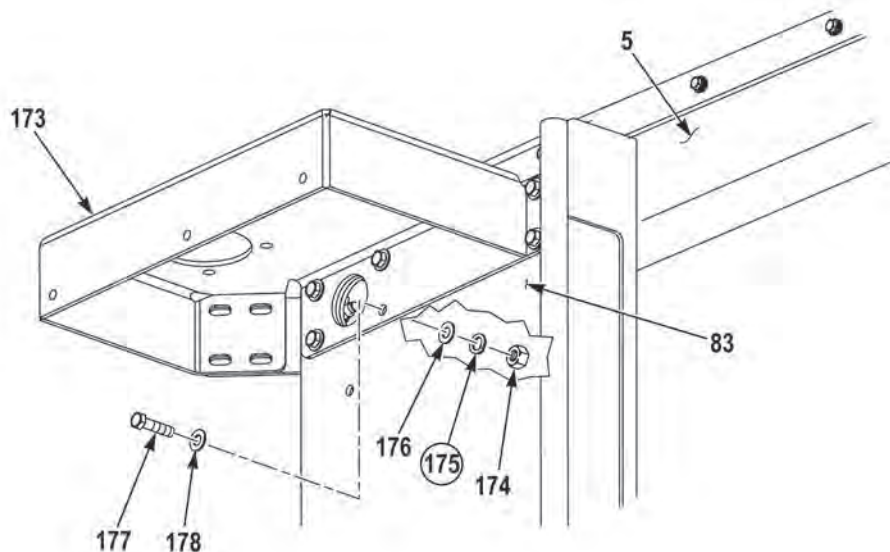
8. Remove four screws (146), lockwashers (147), washers (148), and access cover plate (149) from passenger side antenna support (23). Discard lockwashers (147).



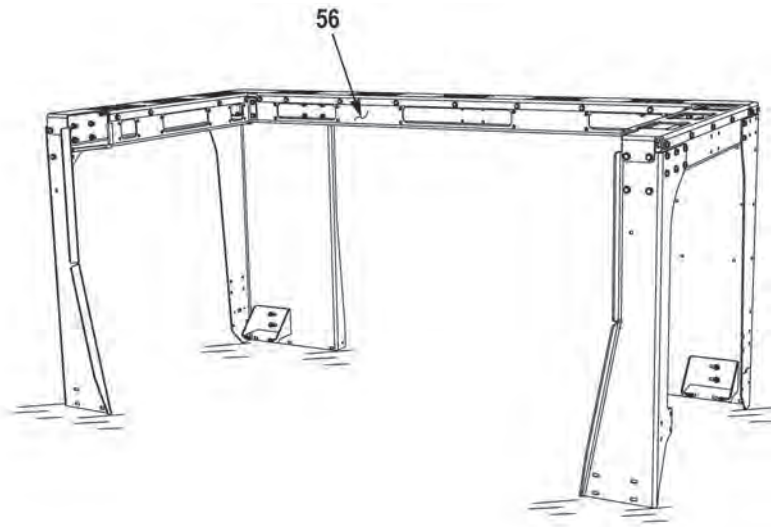
9. Remove four nuts (150), lockwashers (151), washers (152), screws (153), washers (154), and top access cover (155) from passenger side antenna mounting panel (34). Discard lockwashers (151).
10. Remove four nuts (156), lockwashers (157), washers (158), screws (159), washers (160), and top access cover (161) from passenger side antenna mounting panel (34). Discard lockwashers (157).



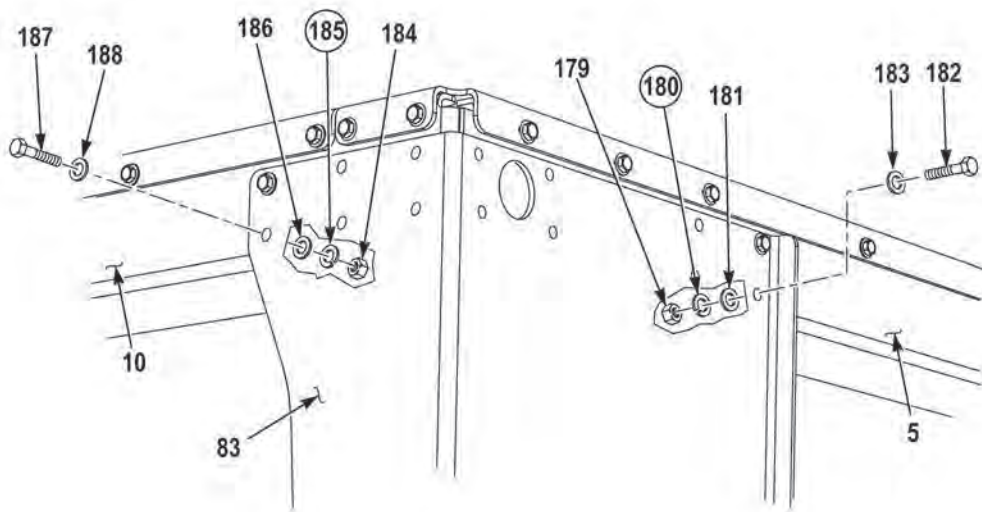
11. Remove four nuts (162), lockwashers (163), washers (164), screws (165), and washers (166) from driver side antenna support (10), driver side rear panel (83), and coupler box cover bracket (167). Discard lockwashers (163).
12. Remove four nuts (168), lockwashers (169), washers (170), screws (171), washers (172), and coupler box cover bracket (167) from coupler box cover (173). Discard lockwashers (169).



13. Remove six nuts (174), lockwashers (175), washers (176), screws (177), washers (178), and coupler box cover (173) from rear antenna support (5) and driver side rear panel (83). Discard lockwashers (175).



14. Attach a lifting device to support weight of antenna platform (56).



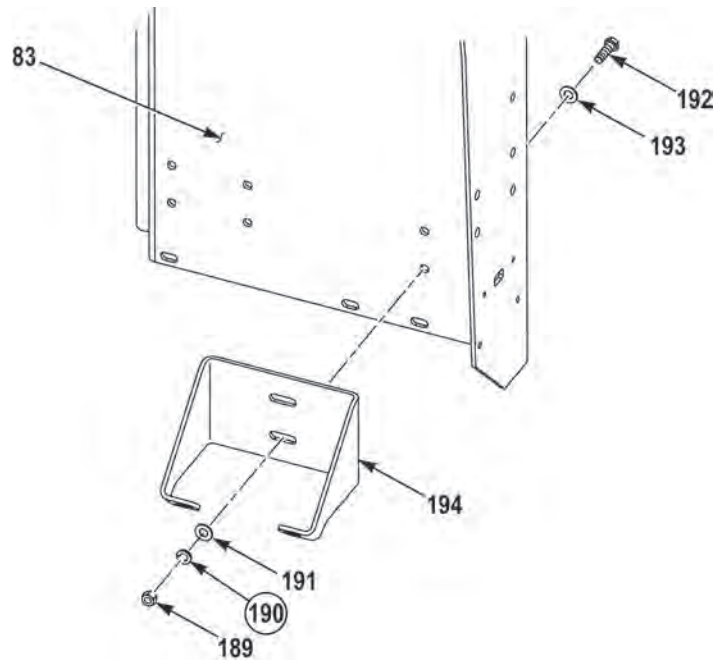
WARNING

Antenna platform weighs 200 lbs (91 kg). Do not attempt to lift or move antenna platform without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

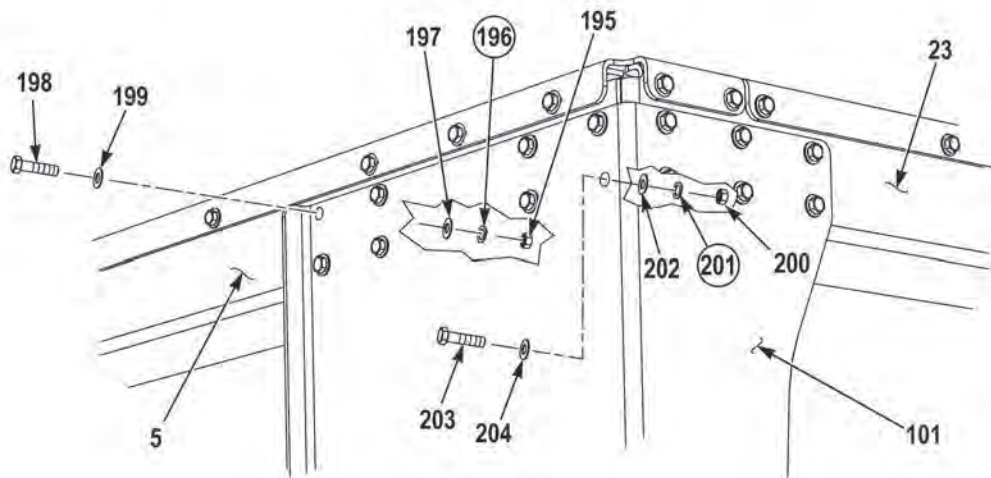
NOTE

The aid of an assistant may be required during panel removal to aid in stability.

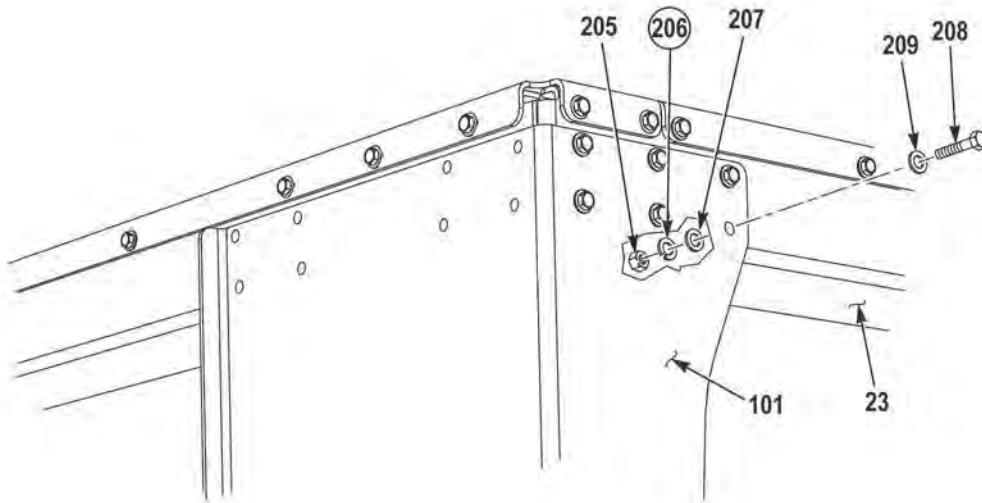
15. Remove two nuts (179), lockwashers (180), washers (181), screws (182), and washers (183) from rear antenna support (5) and driver side rear panel (83). Discard lockwashers (180).
16. Remove two nuts (184), lockwashers (185), washers (186), screws (187), washers (188), and driver side rear panel (83) from driver side antenna support (10). Discard lockwashers (185).



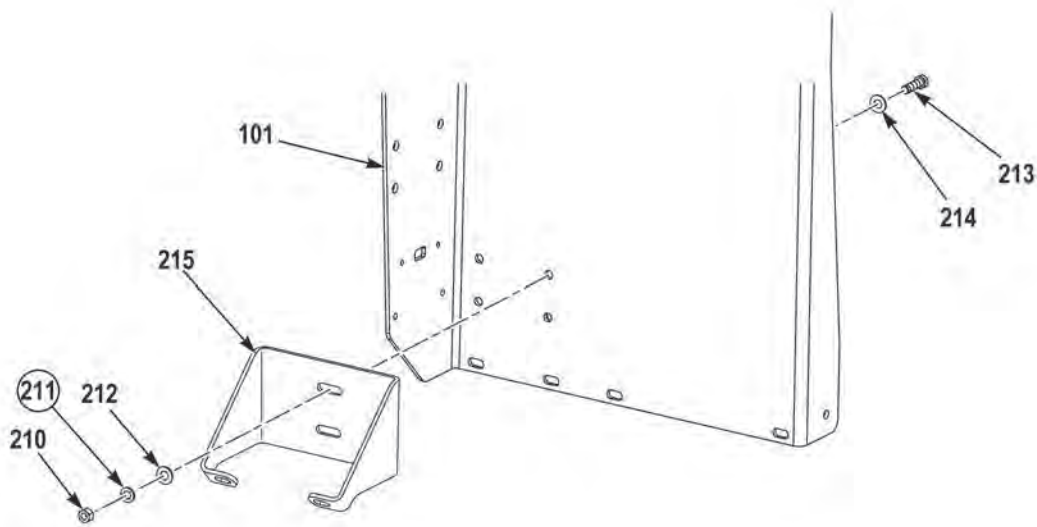
17. Remove two nuts (189), lockwashers (190), washers (191), screws (192), washers (193), and bracket (194) from driver side rear panel (83). Discard lockwashers (190).



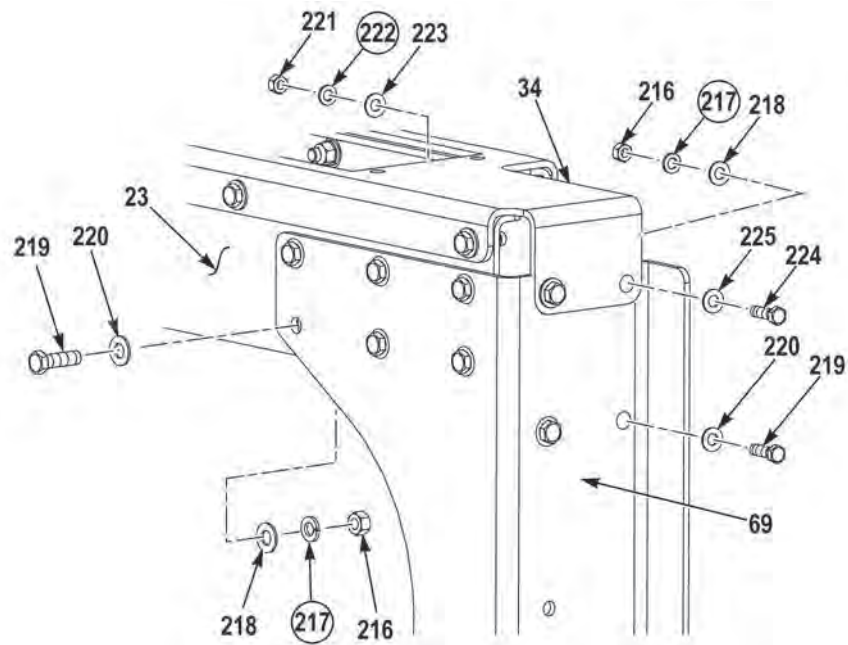
18. Remove six nuts (195), lockwashers (196), washers (197), screws (198), and washers (199) from rear antenna support (5) and passenger side rear panel (101). Discard lockwashers (196).
19. Remove two nuts (200), lockwashers (201), washers (202), screws (203), and washers (204) from passenger side antenna support (23), rear antenna support (5), and passenger side rear panel (101). Discard lockwashers (201).



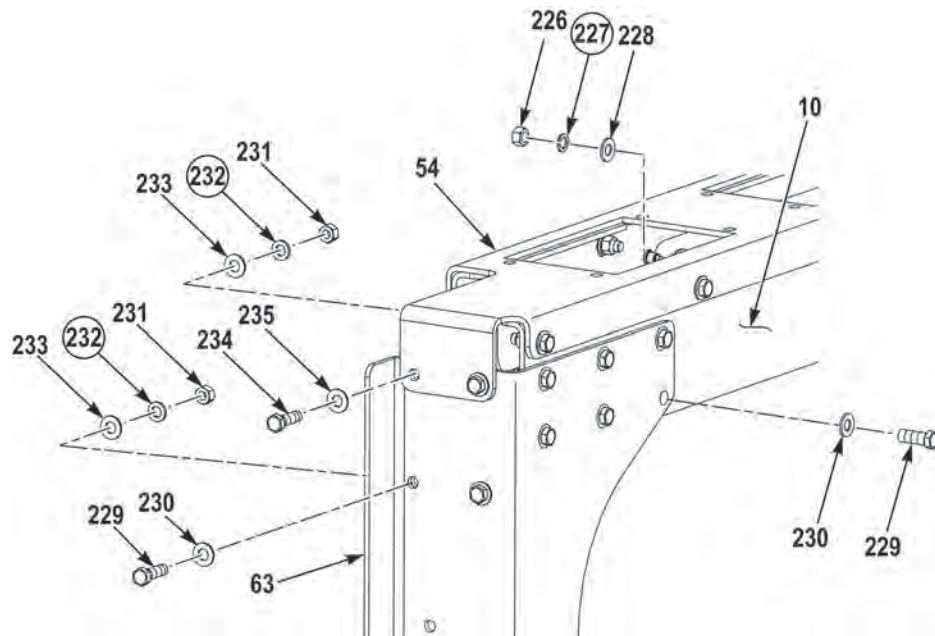
20. Remove six nuts (205), lockwashers (206), washers (207), screws (208), washers (209), and passenger side rear panel (101) from passenger side antenna support (23). Discard lockwashers (206).



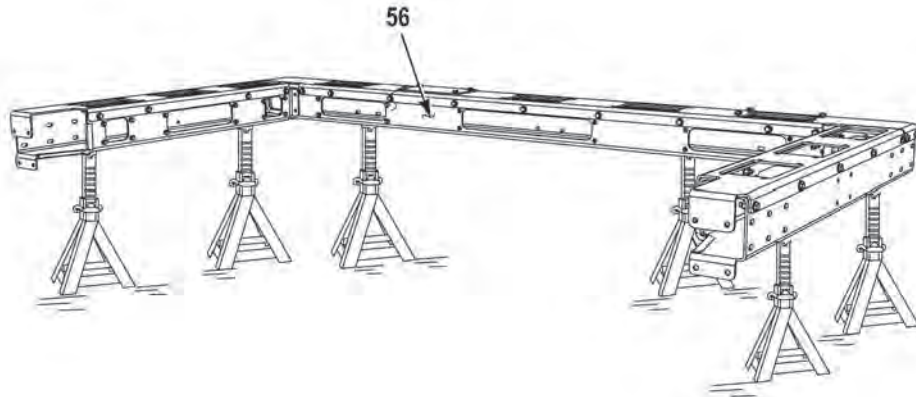
21. Remove two nuts (210), lockwashers (211), washers (212), screws (213), washers (214), and bracket (215) from passenger side rear panel (101). Discard lockwashers (211).



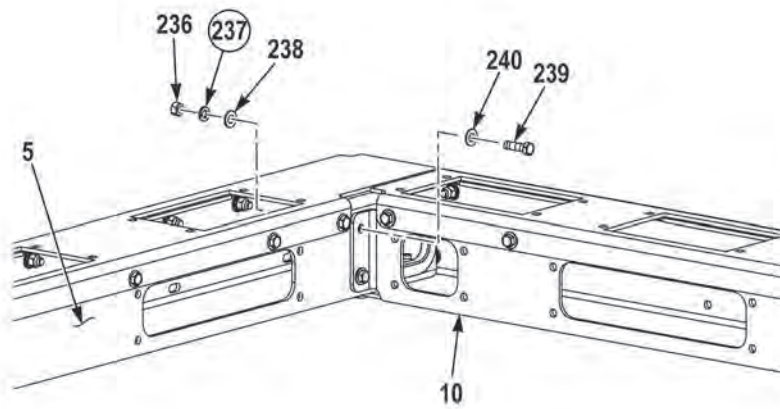
22. Remove eight nuts (216), lockwashers (217), washers (218), screws (219), and washers (220) from passenger side antenna support (23) and passenger side front panel (69). Discard lockwashers (217).
23. Remove two nuts (221), lockwashers (222), washers (223), screws (224), washers (225), and passenger side front panel (69) from passenger side antenna mounting panel (34). Discard lockwashers (222).



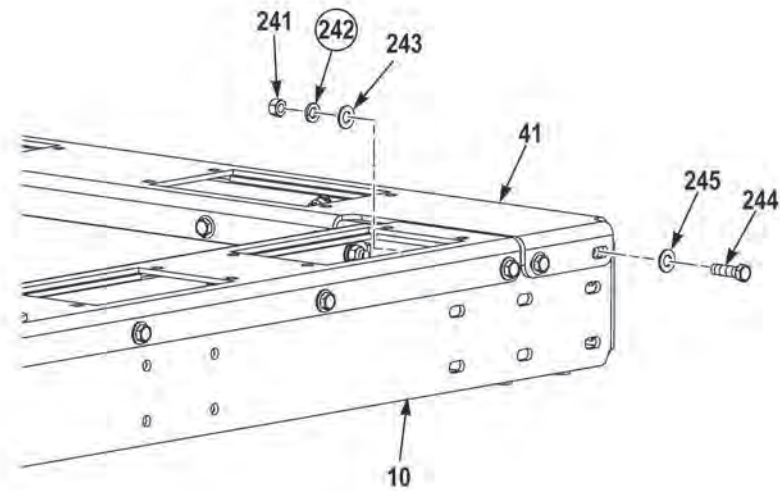
24. Remove eight nuts (226), lockwashers (227), washers (228), screws (229), and washers (230) from driver side antenna support (10) and driver side front panel (63). Discard lockwashers (227).
25. Remove two nuts (231), lockwashers (232), washers (233), screws (234), washers (235), and driver side front panel (63) from driver side antenna mounting panel (54). Discard lockwashers (232).



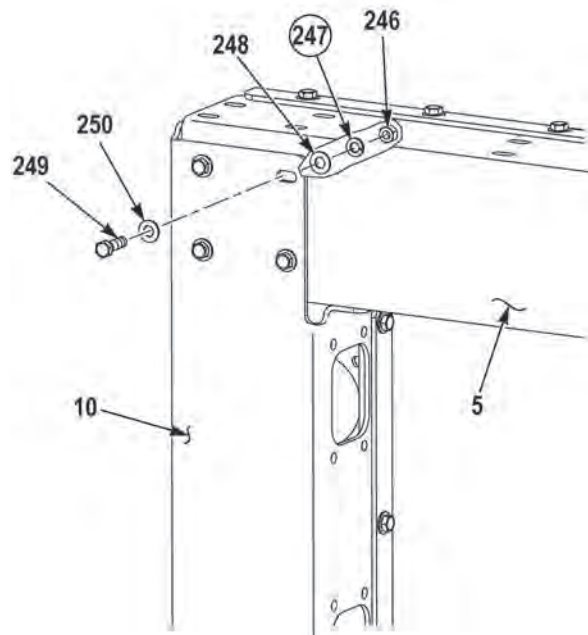
26. With the aid of an assistant and lifting device position antenna platform (56) on six jackstands.



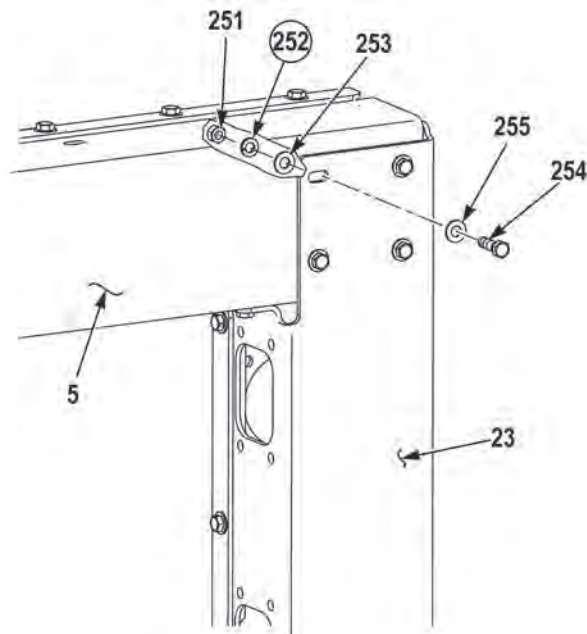
27. Remove two nuts (236), lockwashers (237), washers (238), screws (239), and washers (240) from rear antenna support (5) and driver side antenna support (10). Discard lockwashers (237).



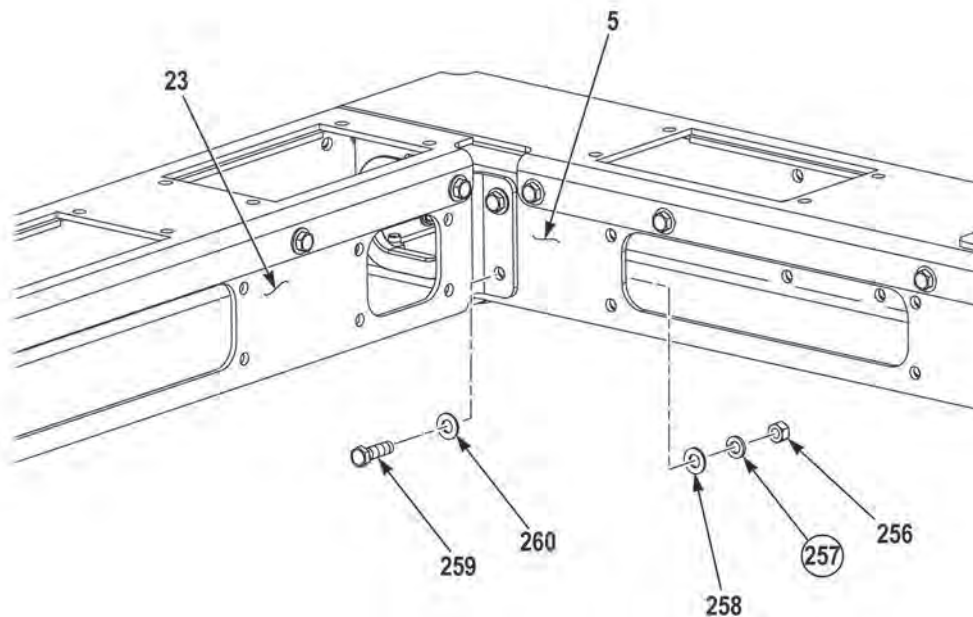
28. Remove two nuts (241), lockwashers (242), washers (243), screws (244), and washers (245) from driver side antenna support (10) and rear antenna mounting panel (41). Discard lockwashers (242).



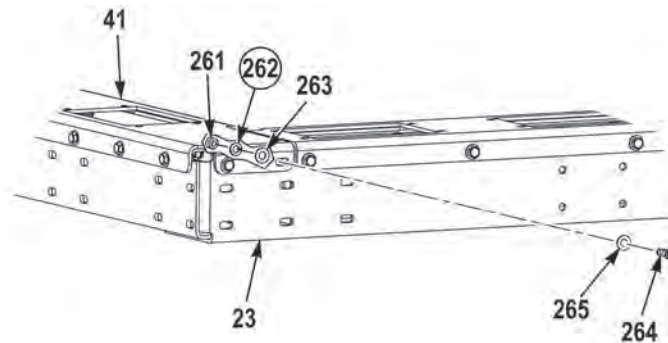
29. With the aid of an assistant, remove four nuts (246), lockwashers (247), washers (248), screws (249), washers (250), and driver side antenna support (10) from rear antenna support (5). Discard lockwashers (247).



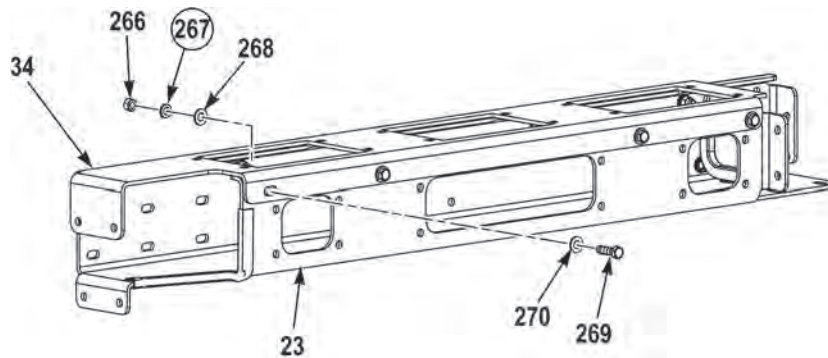
30. With the aid of an assistant, remove four nuts (251), lockwashers (252), washers (253), screws (254), and washers (255) from rear antenna support (5) and passenger side antenna support (23). Discard lockwashers (252).



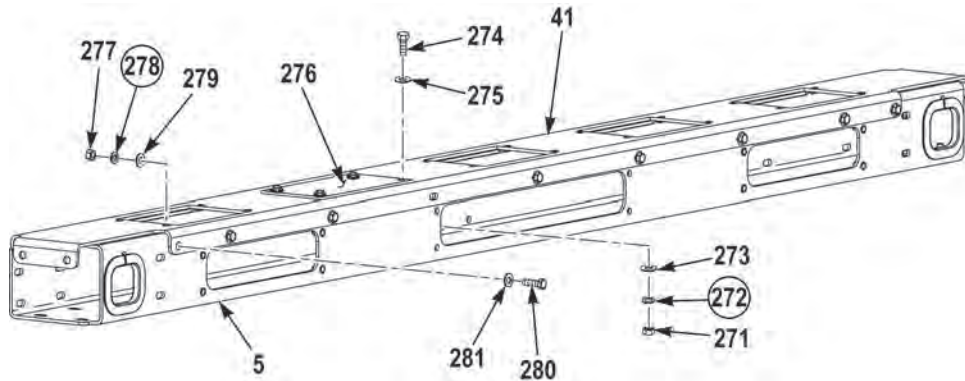
31. Remove two nuts (256), lockwashers (257), washers (258), screws (259), and washers (260) from rear antenna support (5) and passenger side antenna support (23). Discard lockwashers (257).



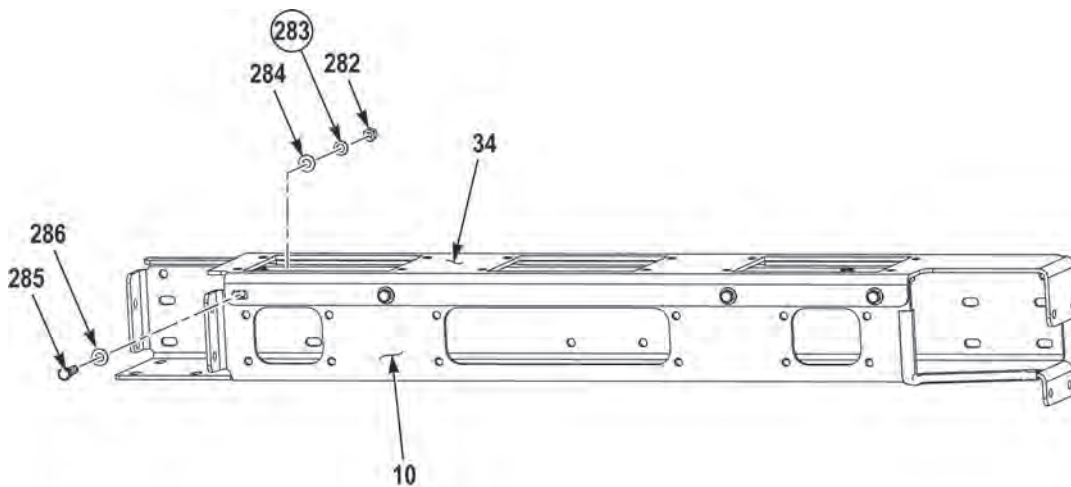
32. Remove two nuts (261), lockwashers (262), washers (263), screws (264), washers (265), and passenger side antenna support (23) from rear antenna mounting panel (41). Discard lockwashers (262).



33. Remove nine nuts (266), lockwashers (267), washers (268), screws (269), washers (270), and passenger side antenna mounting panel (34) from passenger side antenna support (23). Discard lockwashers (267).



34. Remove four nuts (271), lockwashers (272), washers (273), screws (274), and washers (275), and top access cover (276) from rear antenna mounting panel (41). Discard lockwashers (272).
35. Remove 20 nuts (277), lockwashers (278), washers (279), screws (280), washers (281), and rear antenna mounting panel (41) from rear antenna support (5). Discard lockwashers (278).



36. Remove nine nuts (282), lockwashers (283), washers (284), screws (285), washers (286), and passenger side antenna mounting panel (34) from driver side antenna support (10). Discard lockwashers (283).

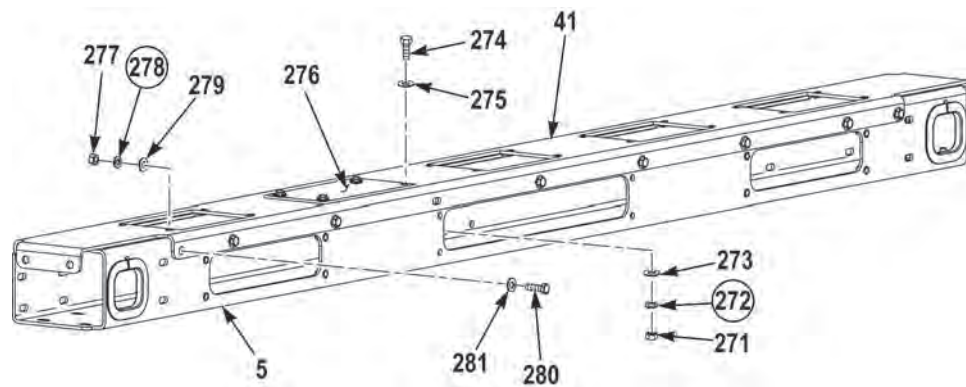
END OF TASK

ASSEMBLY**WARNING**

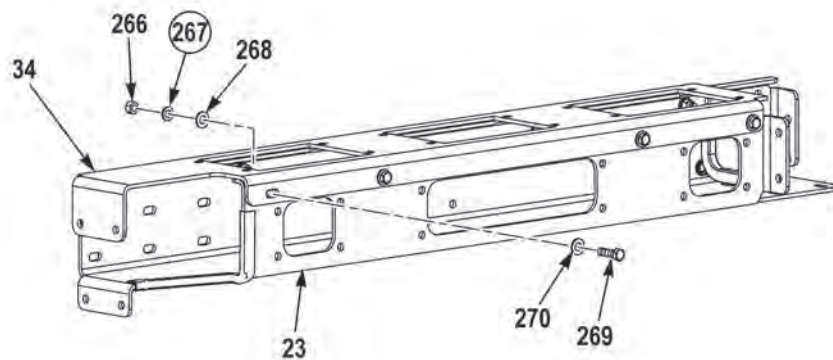
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

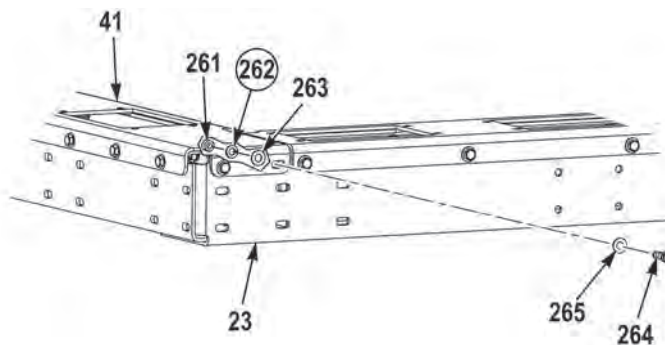
- Apply antiseize compound to all unpainted surfaces prior to assembly.
 - Install brackets, cover plates, and antenna mounting plates as noted prior to removal.
 - Install hardware as noted prior to removal.
 - Install quickedge as noted prior to removal.
 - If threaded inserts need to be installed, install in accordance with (WP 0291).
 - Reference SAE grade No. 2 for stainless steel hardware torquing.
1. Install driver side antenna mounting panel (10) on passenger side antenna support (23) with nine washers (286), screw (285), washers (284), new lockwashers (283), and nuts (282). Do not tighten nuts.



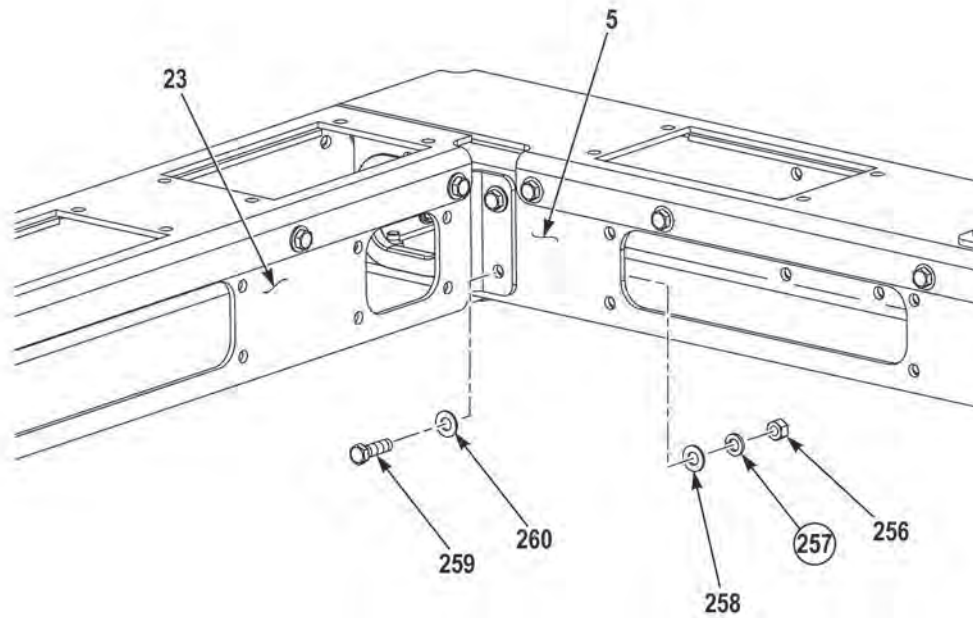
2. Install rear antenna mounting panel (41) on rear antenna support (5) with 20 washers (281), screws (280), washers (279), new lockwashers (278), and nuts (277). Do not tighten nuts.
3. Install top access cover (276) on rear antenna mounting panel (41) with four washers (275), screws (274), washers (273), new lockwashers (272), and nuts (271).



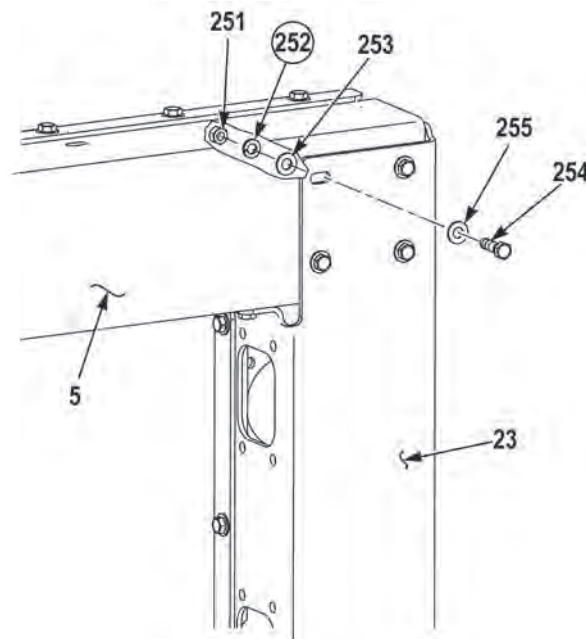
4. Install passenger side antenna mounting panel (34) on passenger side antenna support (23) with nine washers (270), screws (269), washers (268), new lockwashers (267), and nuts (266). Do not tighten nuts.



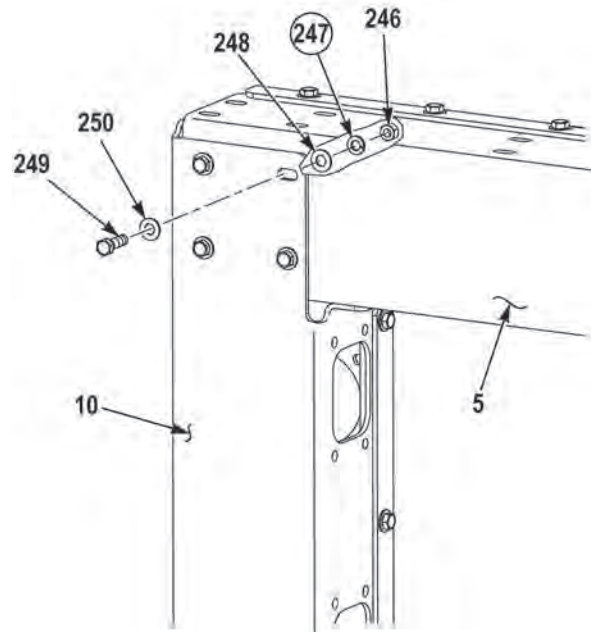
5. With the aid of an assistant, install passenger side antenna support (23) on rear antenna mounting panel (41) with two washers (265), screws (264), washers (263), new lockwashers (262), and nuts (261). Do not tighten nuts.



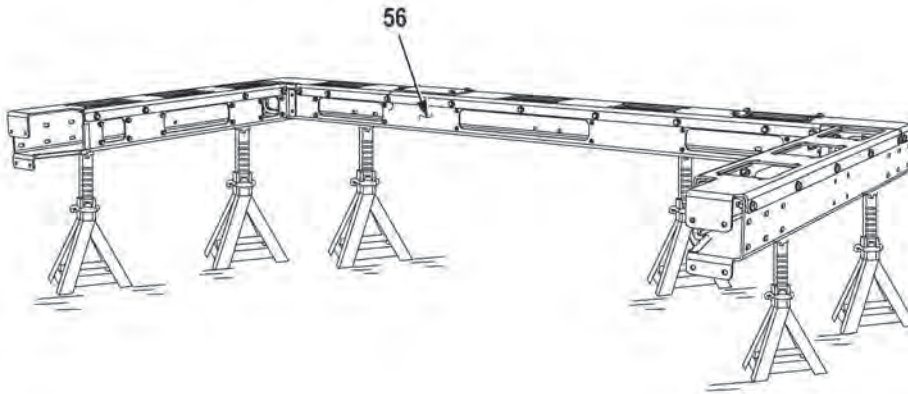
6. Install passenger side antenna support (23) on rear antenna support (5) with two washers (260), screws (259), washers (258), new lockwashers (257), and nuts (256). Do not tighten nuts.



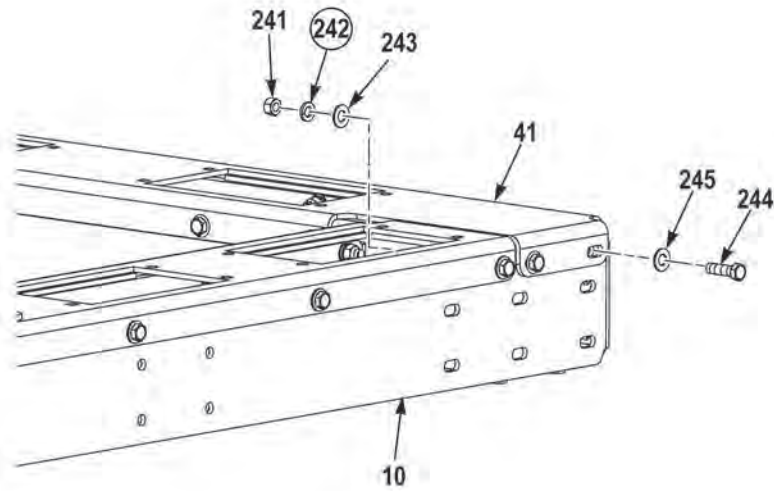
7. Install passenger side antenna support (23) on rear antenna support (5) with two washers (255), screws (254), washers (253), new lockwashers (252), and nuts (251). Do not tighten nuts.



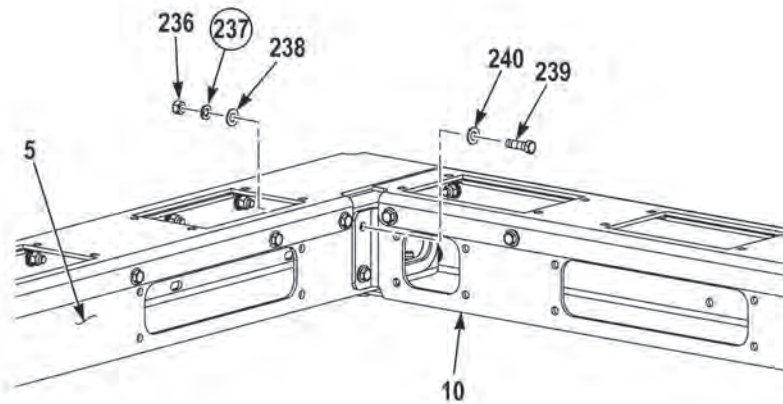
- Secure driver side antenna support (10) on rear antenna support (5) with two washers (250), screws (249), washers (248), new lockwashers (247), and nuts (246). Do not tighten nuts.



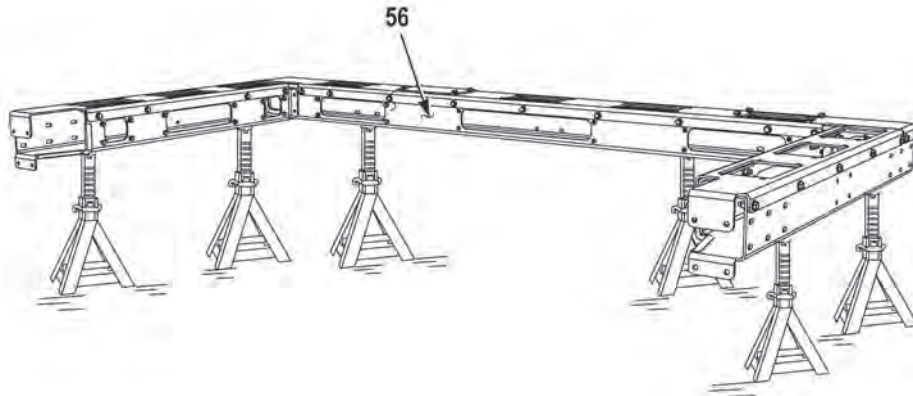
- With the aid of an assistant and a lifting device, position antenna platform (56) on six jackstands.



10. With the aid of an assistant, secure driver side antenna support (10) on rear antenna mounting panel (41) with four washers (245), screws (244), washers (243), new lockwashers (242), and nuts (241). Do not tighten nuts.



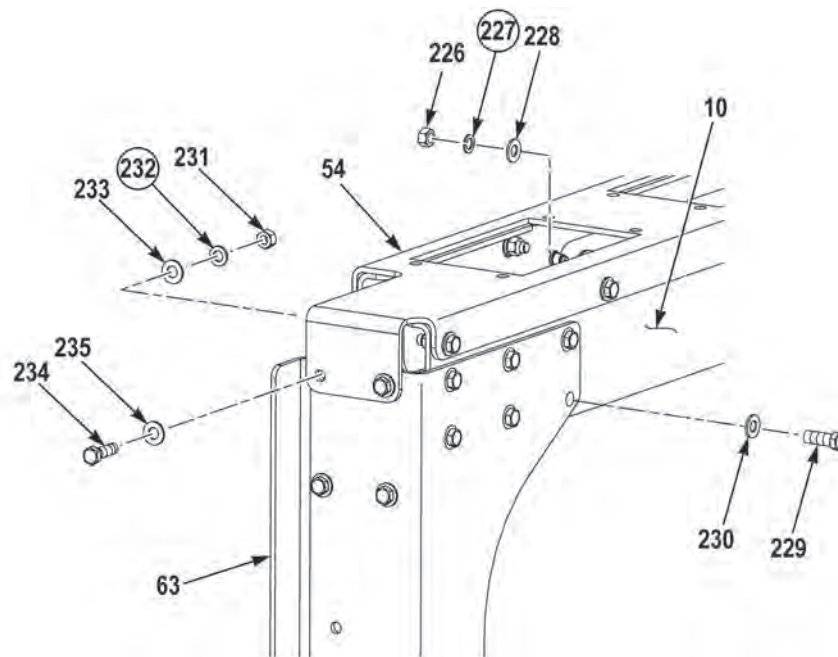
11. With the aid of an assistant, install driver side antenna support (10) on rear antenna support (5) with two washers (240), screws (239), washers (238), new lockwashers (237), and nuts (236). Do not tighten nuts.



NOTE

Lift antenna platform to height as noted prior to removal to vertical panels.

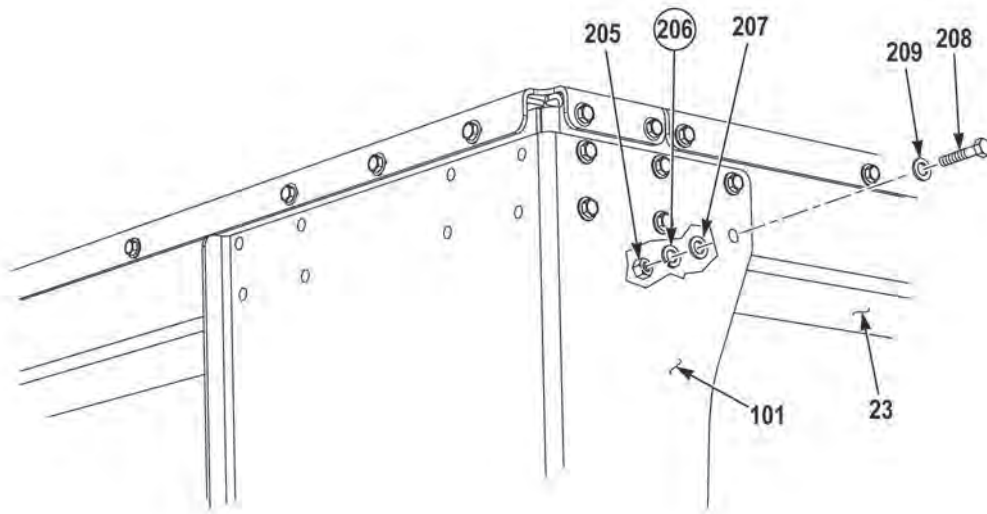
12. With the aid of an assistant and a lifting device, lift antenna platform (56).



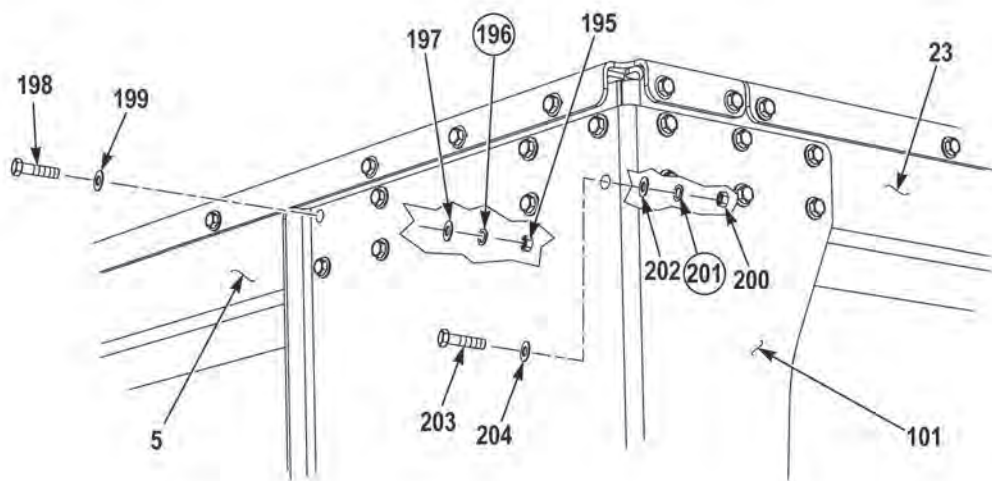
NOTE

An aid of an assistant maybe required during panel installation to aid in stability.

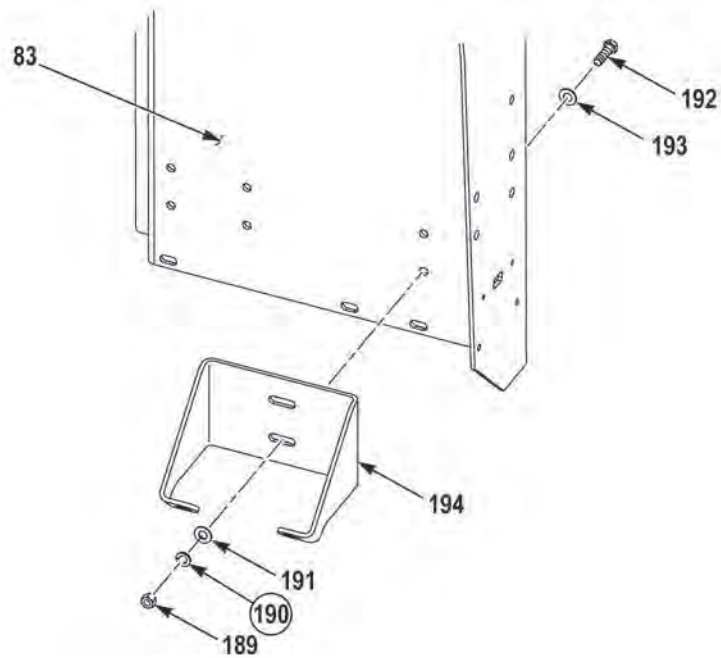
13. Install driver side front panel (63) on driver side antenna mounting panel (54) with two washers (235), screws (234), washers (233), new lockwashers (232), and nuts (231). Do not tighten nuts.
14. Install driver side front panel (63) on driver side antenna support (10) with eight washers (230), screws (229), washers (228), new lockwashers (227), and nuts (226). Do not tighten nuts.



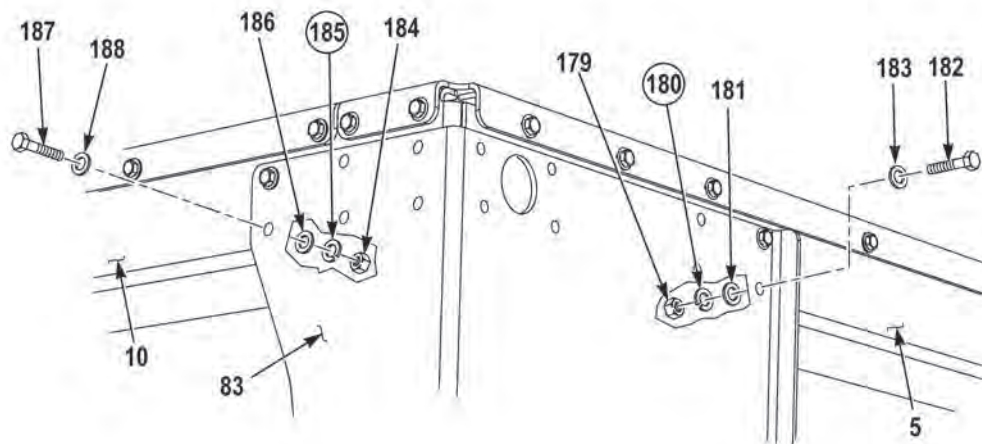
18. With the aid of an assistant, install passenger side rear panel (101) on passenger side antenna support (23) with six washers (209), screws (208), washers (207), new lockwashers (206), and nuts (205). Do not tighten nuts.



19. Install passenger side rear panel (101) on rear antenna support (5) and passenger side antenna support (23) with two washers (204), screws (203), washers (202), new lockwashers (201), and nuts (200). Do not tighten nuts.
20. Secure passenger side rear panel (101) on rear antenna support (5) with six washers (199), screws (198), washers (197), new lockwashers (196), and nuts (195). Do not tighten nuts.



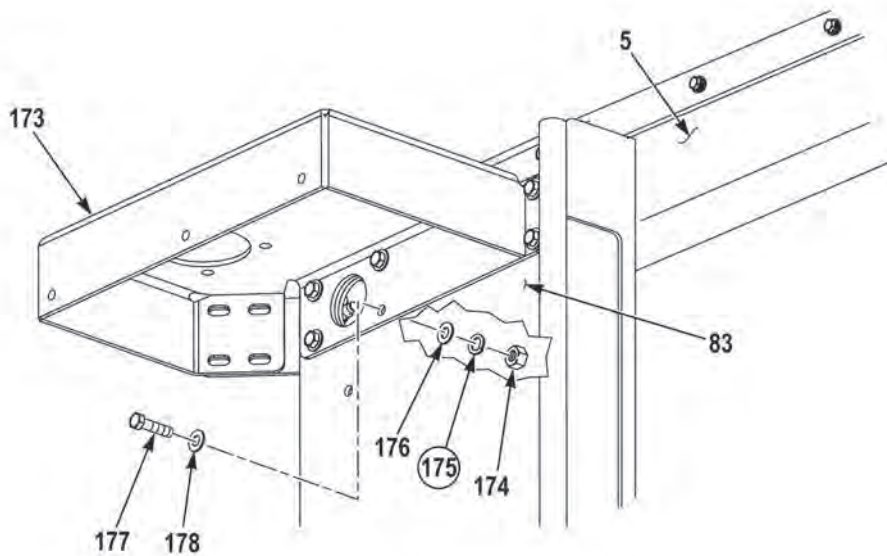
21. Install bracket (194) on driver side rear panel (83) with two washers (193), screws (192), washers (191), new lockwashers (190), and nuts (189). Do not tighten nuts.



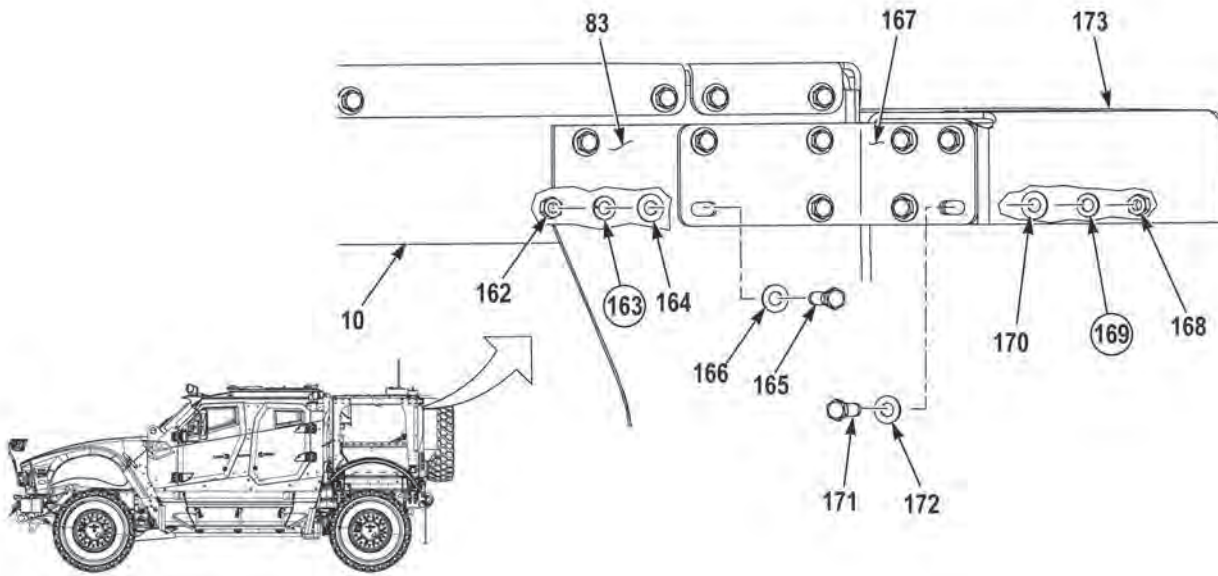
NOTE

An aid or an assistant may be required during panel installation to aid in stability.

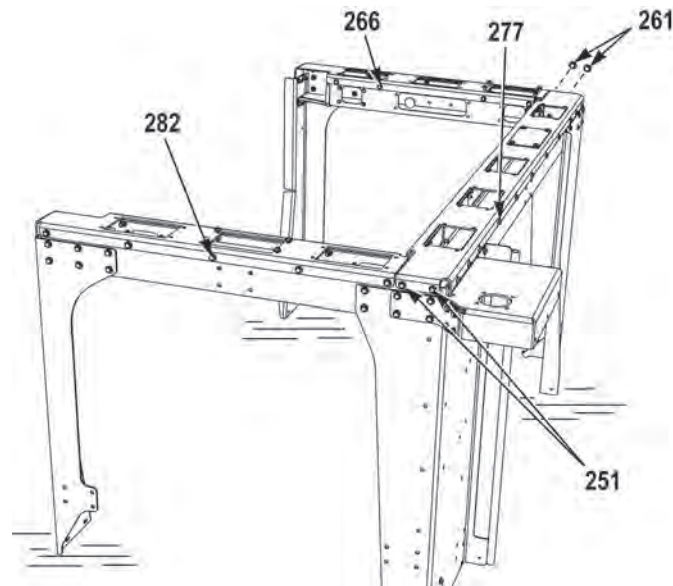
22. Install driver side rear panel (83) on driver side antenna support (10) with two washers (188), screws (187), washers (186), new lockwashers (185), and nuts (184). Do not tighten nuts.
23. Install driver side rear panel (83) on rear antenna support (5) with two washers (183), screws (182), washers (181), new lockwashers (180), and nuts (179). Do not tighten nuts.



24. Instal coupler box cover (173) on driver side rear panel (83) and rear antenna support (5) with six washers (178), screws (177), washers (176), new lockwashers (175), and nuts (174). Do not tighten nuts.



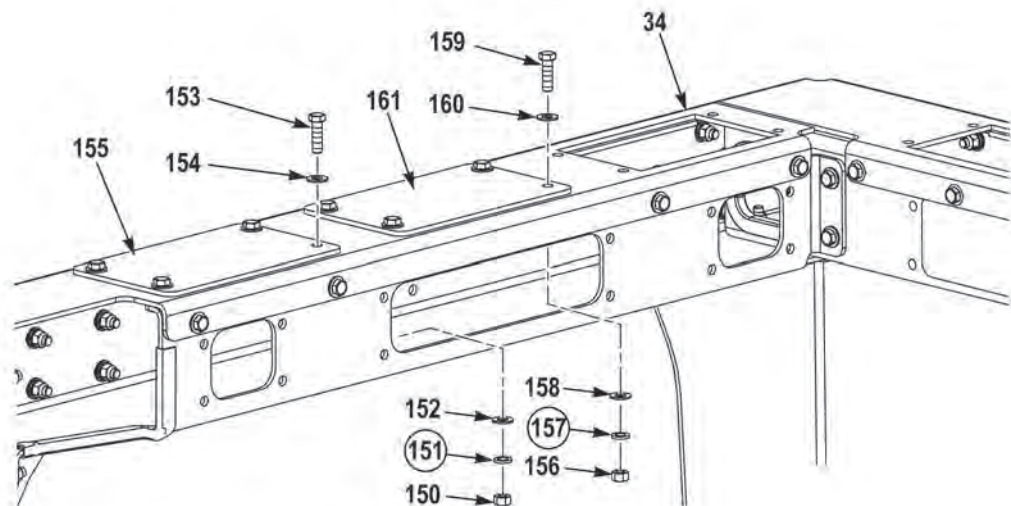
25. Install coupler box cover bracket (167) on coupler box cover (173) with four washers (172), screws (171), washers (170), new lockwashers (169), and nuts (168). Do not tighten nuts.
26. Instal coupler box cover bracket (167) on driver side rear panel (83) and driver side antenna support (10) with four washers (166), screws (165), washers (164), new lockwashers (163), and nuts (162). Do not tighten nuts.



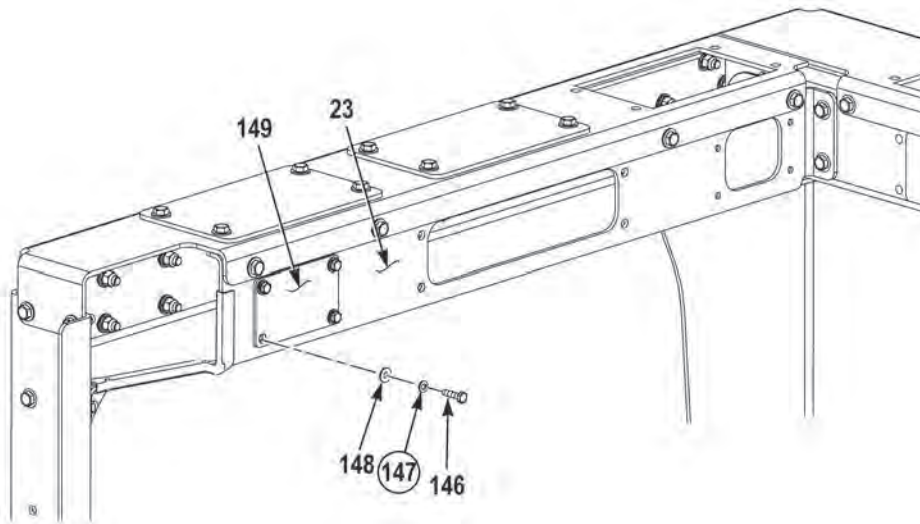
NOTE

Tighten only nuts that fasten antenna mounting panels to antenna supports.

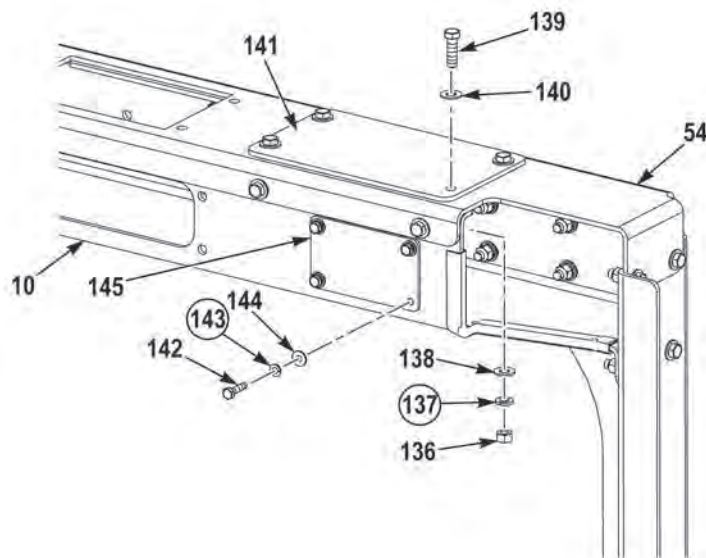
27. Tighten nine nuts (282).
28. Tighten 20 nuts (277), two nuts (261), and two nuts (251).
29. Tighten nine nuts (266).



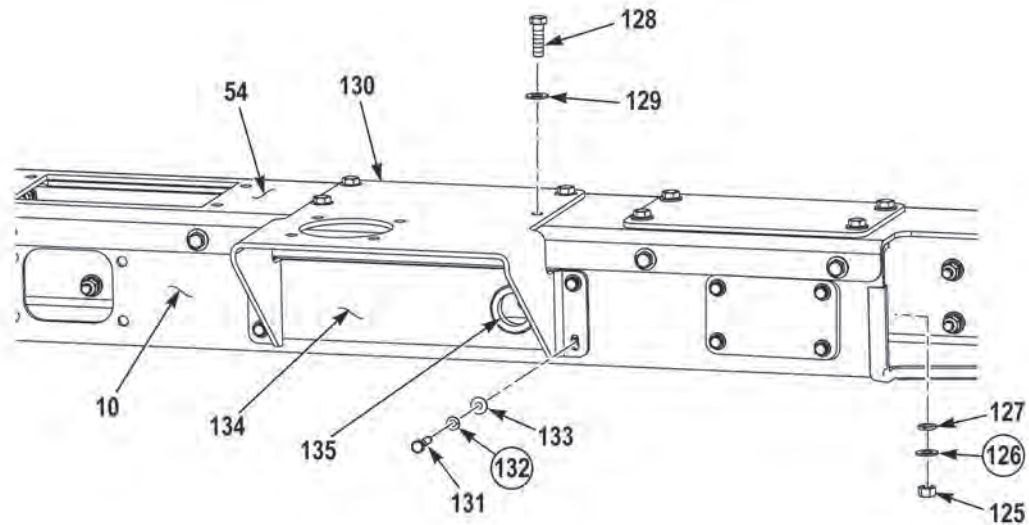
30. Install top access cover (161) on passenger side antenna mounting panel (34) with four washers (160), screws (159), washers (158), new lockwashers (157), and nuts (156).
31. Install access cover (155) on passenger side antenna mounting panel (34) with four washers (154), screws (153), washers (152), new lockwashers (151), and nuts (150).



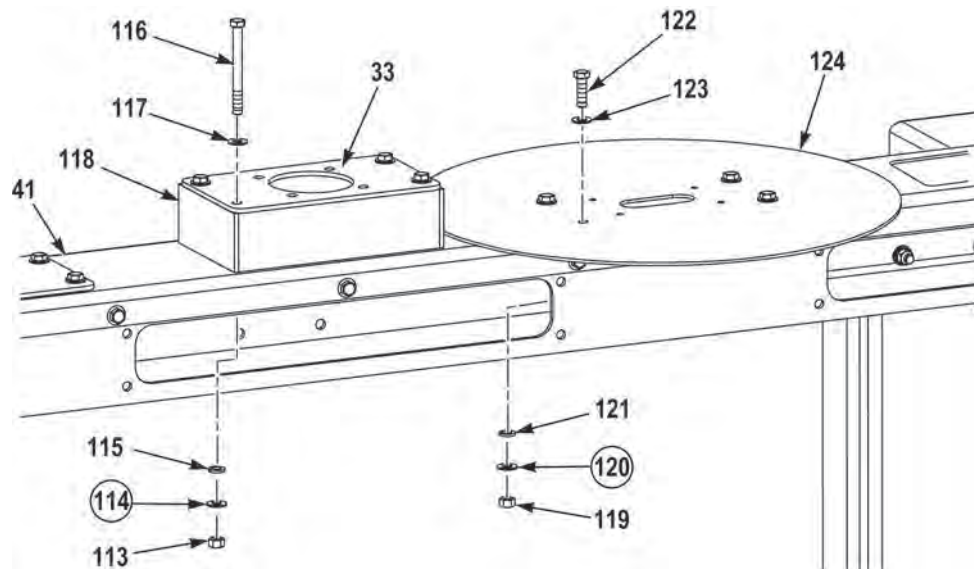
32. Install access cover plate (149) on passenger side antenna support (23) with four washers (148), new lockwashers (147), and screws (146).



33. Install access cover plate (145) on driver side antenna support (10) with four washers (144), new lockwashers (143), and screws (142).
34. Install top access cover (141) on driver side antenna mounting panel (54) with four washers (140), screws (139), washers (138), new lockwashers (137), and nuts (136).

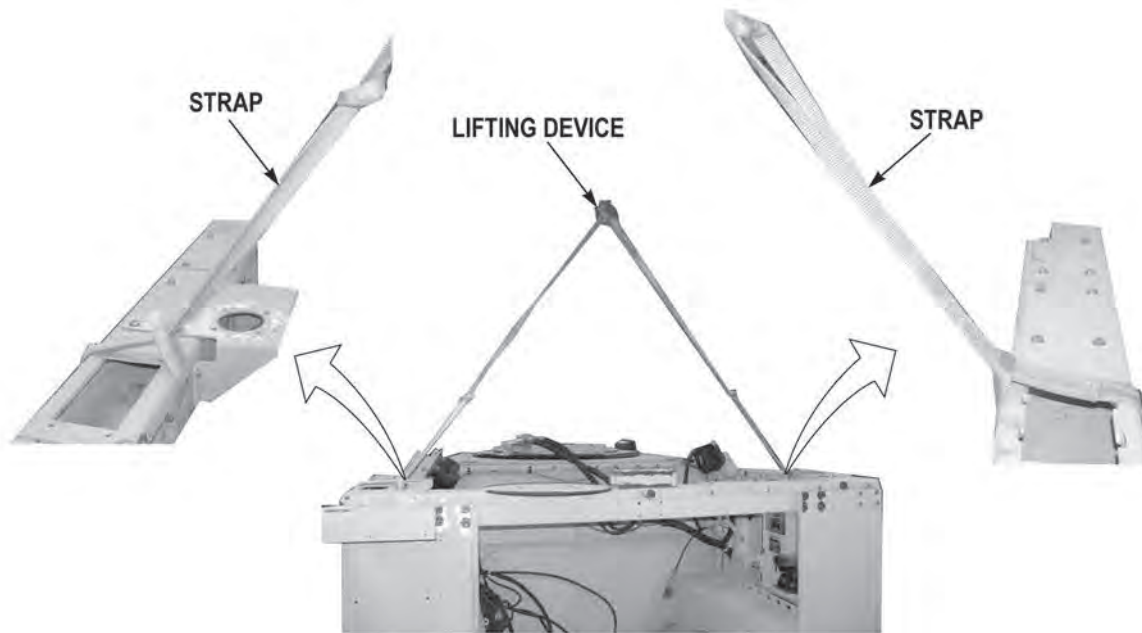


35. Install grommet (135) on access cover plate (134).
36. Install access cover plate (134) and antenna mount bracket (130) on driver side antenna support (10) with four washers (133), new lockwashers (132), and screws (131). Do not tighten screws.
37. Install antenna mount bracket (130) on driver side antenna mounting panel (54) with four washers (129), screws (128), washers (127), new lockwashers (126), and nuts (125).
38. Tighten four screws (131).



39. Install x-wing antenna mount plate (124) on rear antenna mounting panel (41) with four washers (123), screws (122), washers (121), new lockwashers (120), and nuts (119).
40. Install antenna riser box (118) and antenna mounting plate (33) on rear antenna mounting panel (41) with four washers (117), screws (116), washers (115), new lockwashers (114), and nuts (113).

END OF TASK

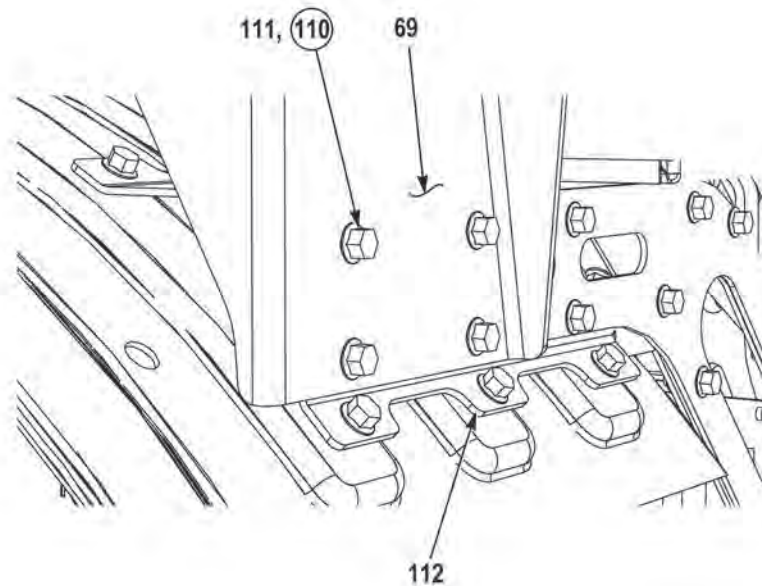
INSTALLATION**WARNING**

Antenna platform weighs 200 lbs (91 kg). Do not attempt to lift or move antenna platform without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

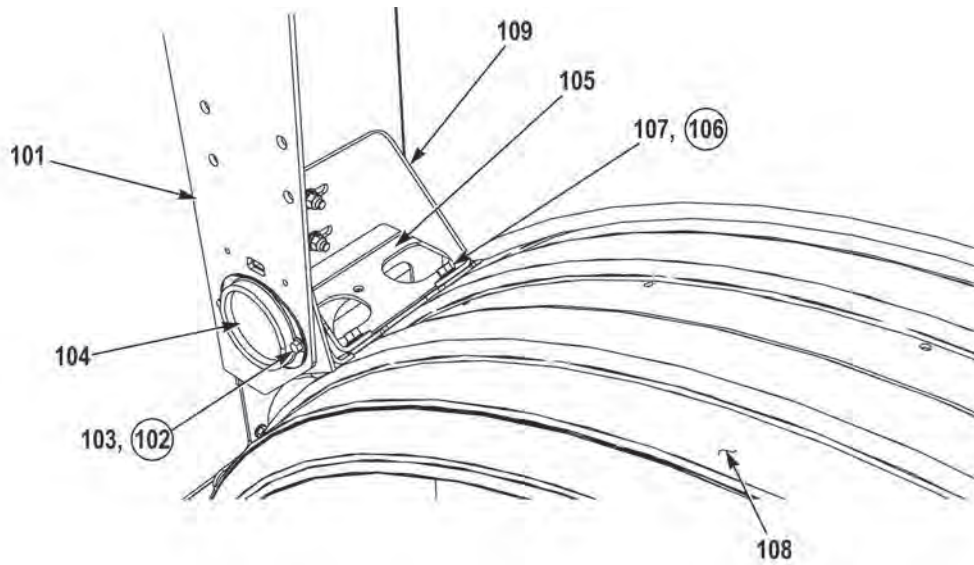
Position antenna platform as noted prior to removal.

1. With the aid of an assistant, a lifting device, and four straps position antenna platform on vehicle.



NOTE

- Install hardware as noted prior to removal.
 - Install brackets, cover plates, and antenna mounting plates as noted prior to removal.
 - Configuration of antenna platform may differ depending on GFE components installed.
 - Install cushion clips as required.
2. Install passenger side front panel (69) on bracket (112) with four screws (111) and new locknuts (110). Do not tighten locknuts.

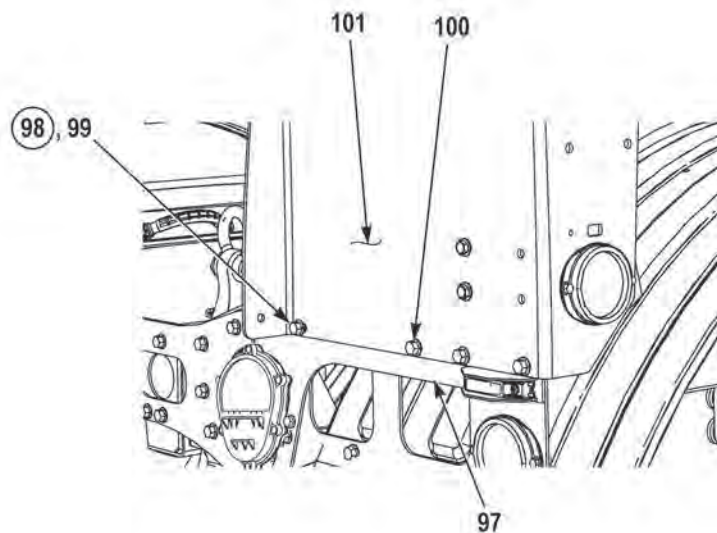


3. Install bracket (109) on bracket (105) and fender (108) with two screws (107) and new locknuts (106).

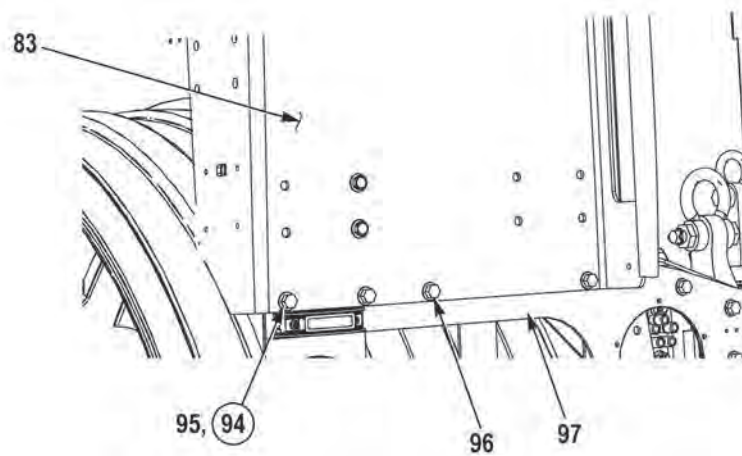
NOTE

Install reflector as noted prior to removal.

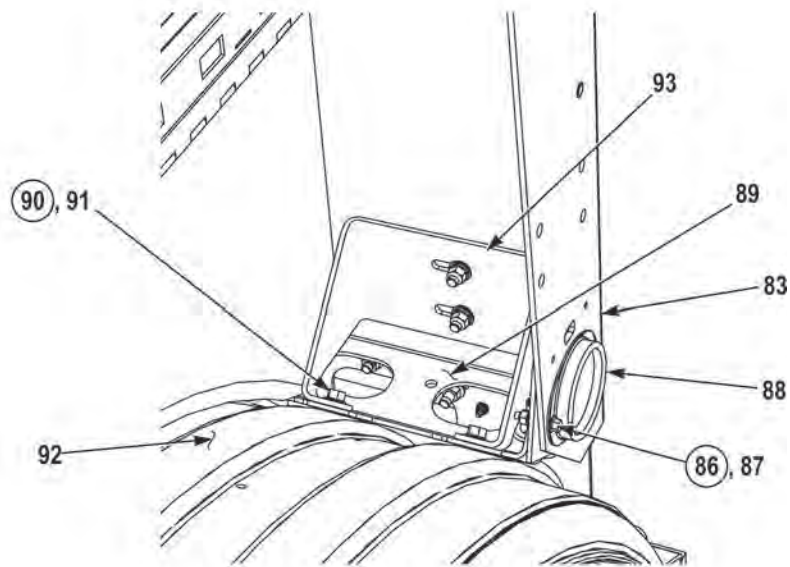
4. Install reflector (104) on passenger side rear panel (101) and bracket (105) with two screws (103) and new locknuts (102).



5. Install passenger side rear panel (101) on bracket (97) with screw (100), three screws (99), and four new locknuts (98). Do not tighten locknuts.



6. Install driver side rear panel (83) on bracket (97) with screw (96), three screws (95), and four new locknuts (94). Do not tighten locknuts.

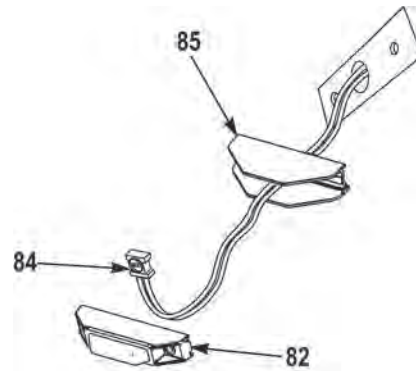


7. Install bracket (93) on bracket (89) and fender (92) with two screws (91) and new locknuts (90).

NOTE

Install reflector as noted prior to removal.

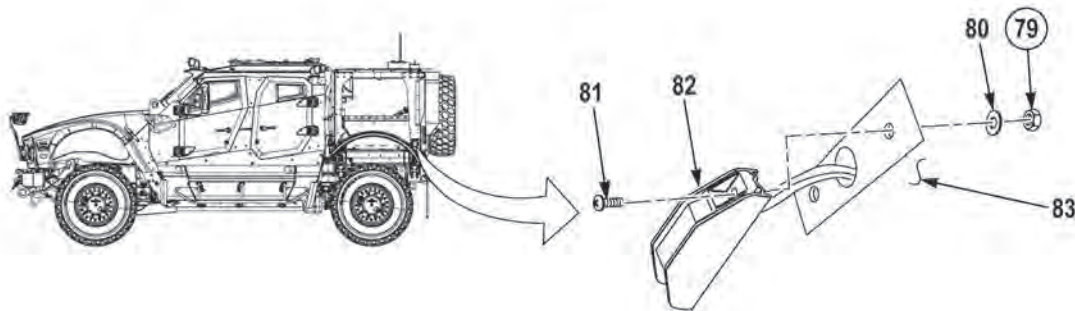
8. Install reflector (88) on driver side rear panel (83) and bracket (89) with two screws (87) and new locknuts (86).



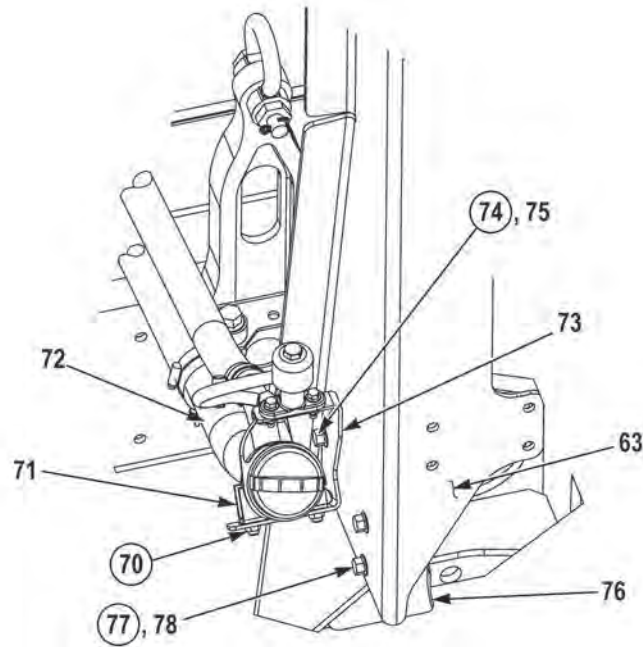
NOTE

- Connect connector as noted prior to removal.
- All marker lights are installed the same way. Driver side shown.

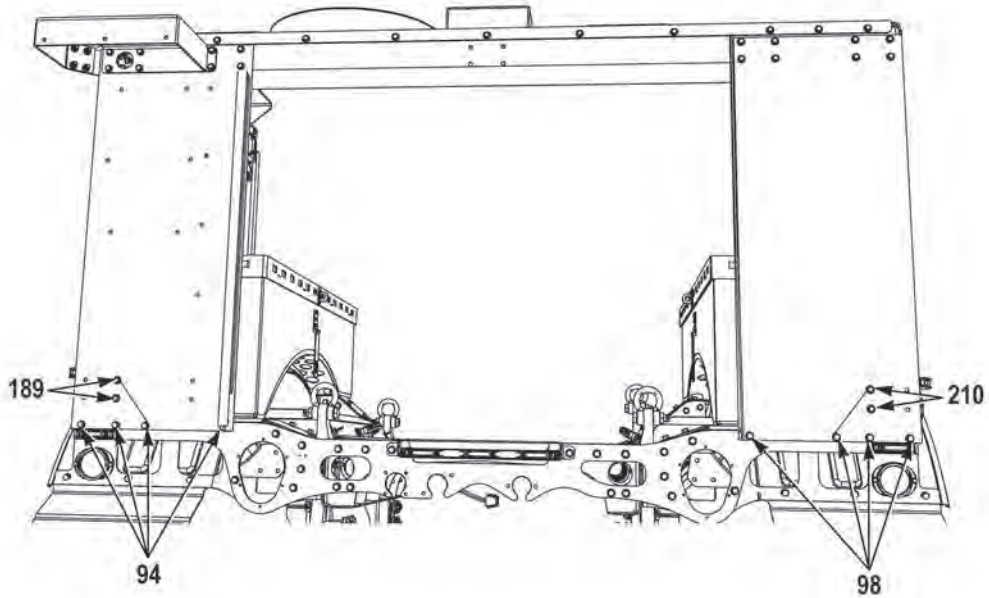
9. Insert connector (84) through marker light shield (85) and connect connector (84) on marker light assembly (82).



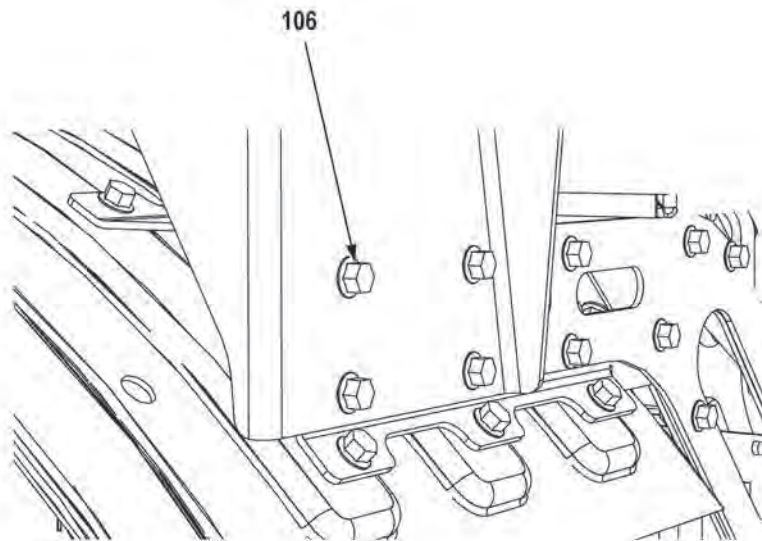
10. Install marker light assembly (82) on driver side rear panel (83) with two screws (81), washers (80), and new locknuts (79).
11. Repeat Steps (9) and (10) for passenger side marker light assembly.



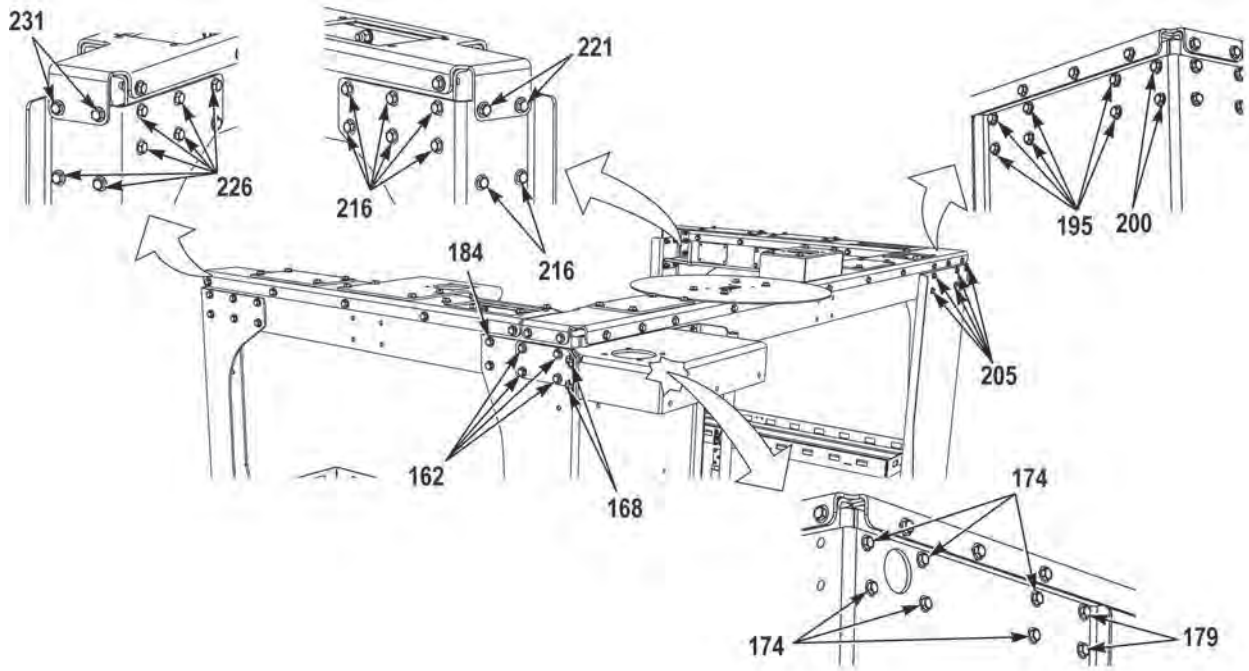
12. Install driver side front panel (63) on bracket (76) with two screws (78) and new locknuts (77). Do not tighten locknuts.
13. Install bracket (73) on driver side front panel (63) and bracket (76) with two screws (75) and new locknuts (74).
14. Install fuel filler hose (72) on bracket (73) with clamp (71) and two new locknuts (70).
15. Remove four straps and lifting device from vehicle.
16. Tighten two locknuts (77).



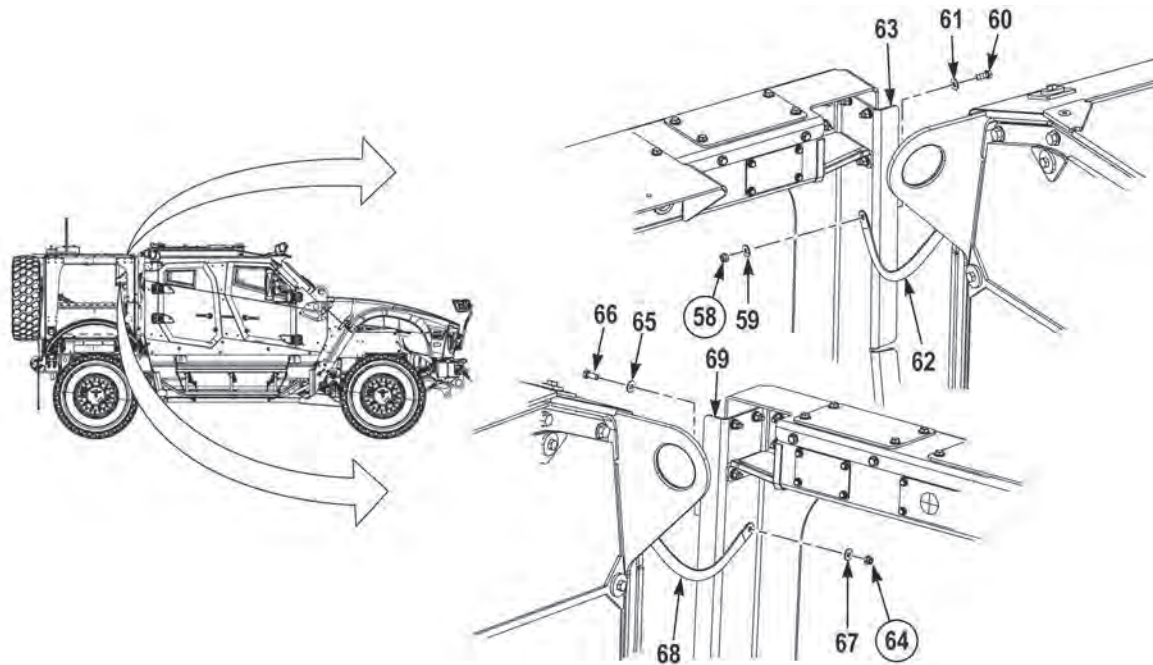
17. Tighten four locknuts (94) and two nuts (189).
18. Tighten four locknuts (98) and two nuts (210).



19. Tighten four locknuts (106).



20. Tighten eight nuts (226) and two nuts (231).
21. Tighten four nuts (162), four nuts (168), six nuts (174), two nuts (179), and two nuts (184).
22. Tighten six nuts (195), two nuts (200), and six nuts (205).
23. Tighten eight nuts (216) and two nuts (221).



NOTE

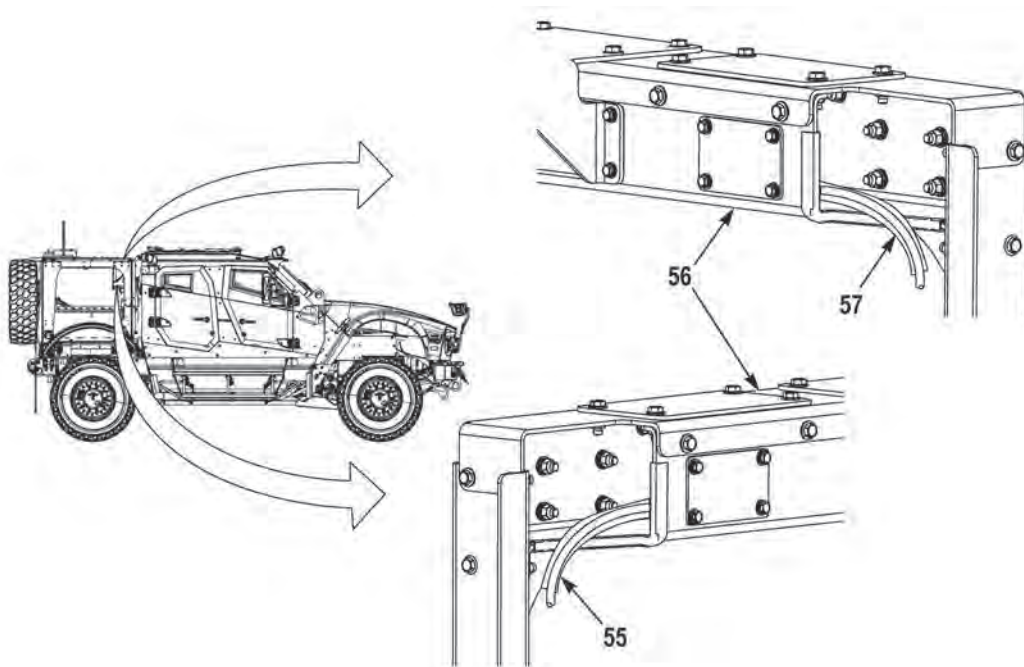
Ensure mating surfaces of front panel and ground strap, are clean bare metal prior to installation.

24. Install ground strap (68) on passenger side front panel (69) with washer (67), screw (66), washer (65), and new locknut (64).
25. Install ground strap (62) on driver side front panel (63) with washer (61), screw (60), washer (59), and new locknut (58).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

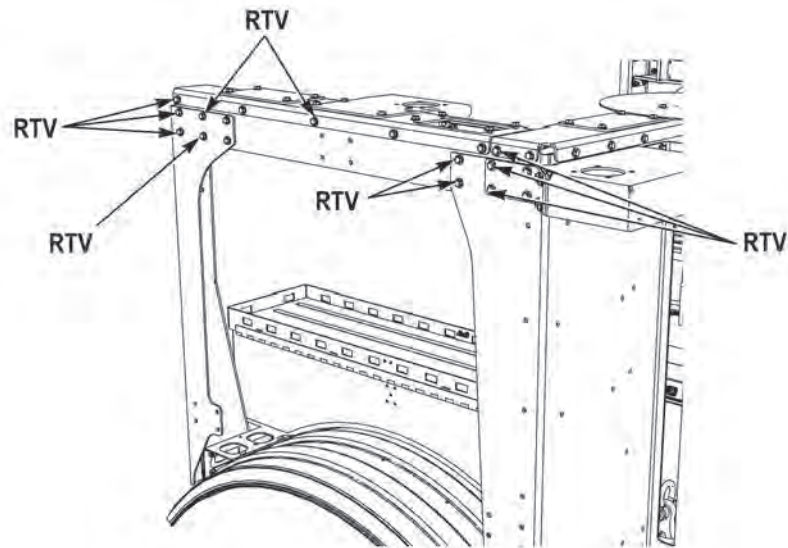
26. Apply adhesive, RTV to two screws (60 and 66) and locknuts (58 and 64).

**NOTE**

- Route GFE wire bundles as noted prior to removal.
- Connect GFE components as required.

27. Route driver side GFE wire bundle (57) through antenna platform (56).

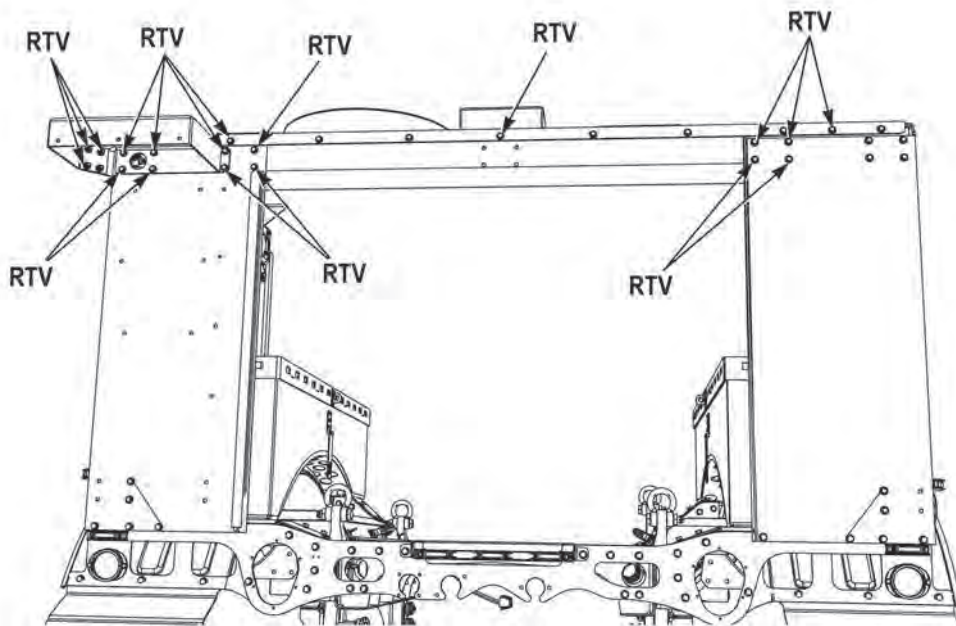
28. Route passenger side GFE wire bundle (55) through antenna platform (56).



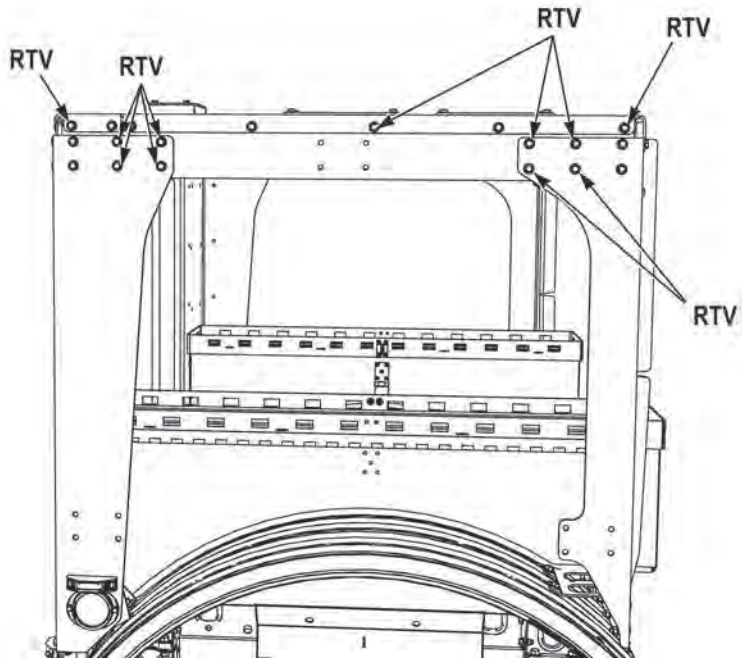
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

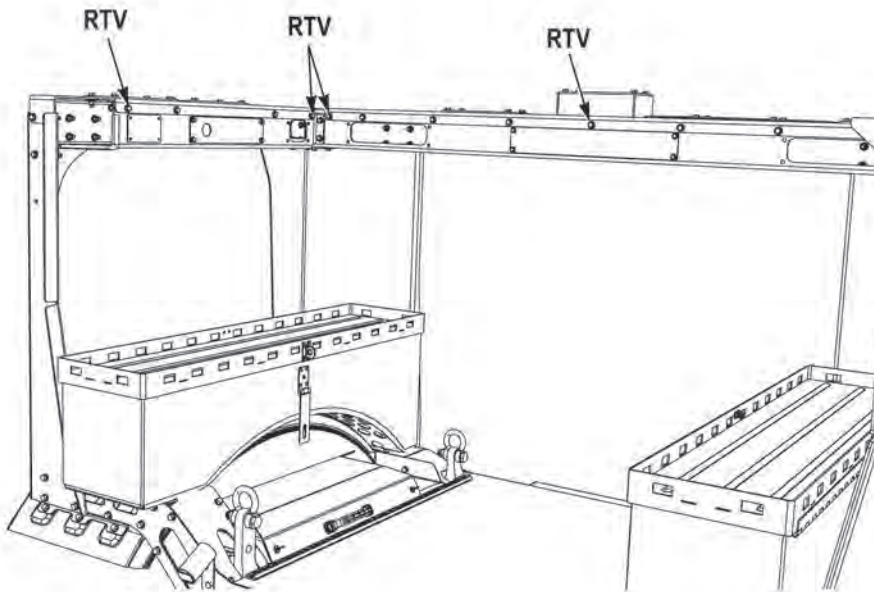
29. Apply adhesive, RTV to screwheads and nuts at 11 positions.



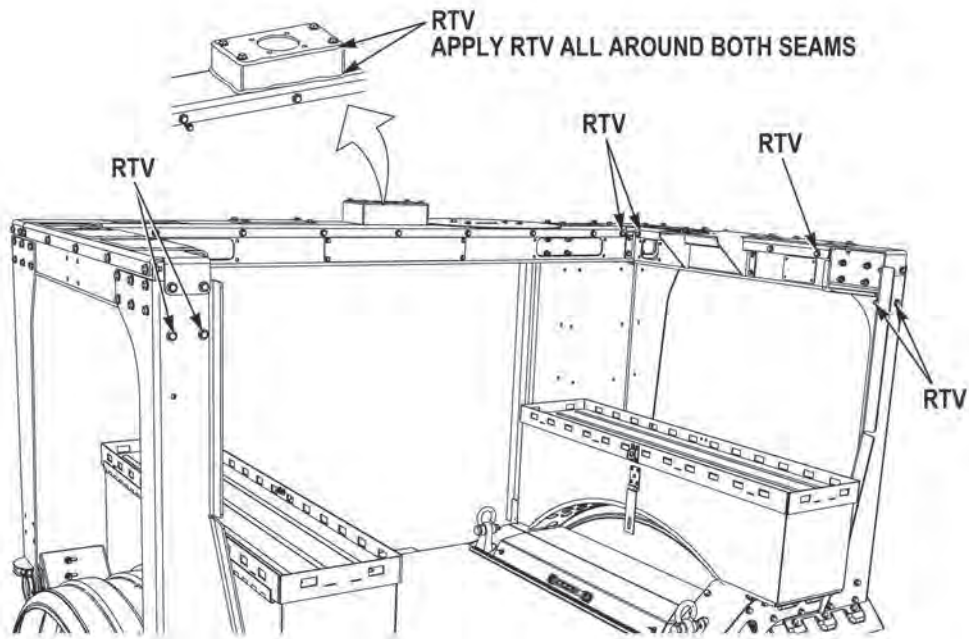
30. Apply adhesive, RTV to screwheads and nuts at 18 positions.



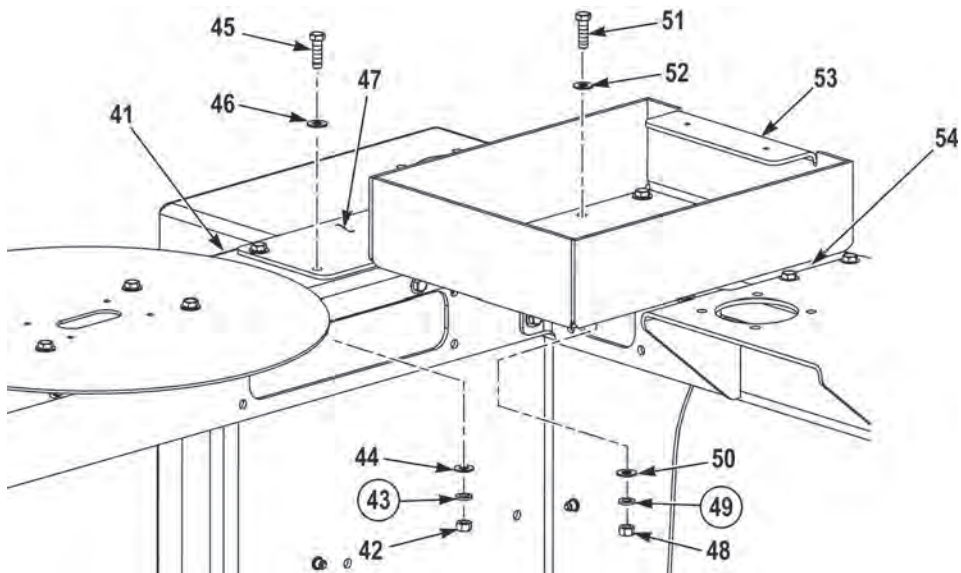
31. Apply adhesive, RTV to screwheads and nuts at 11 positions.



32. Apply adhesive, RTV to screwheads and nuts at four positions.

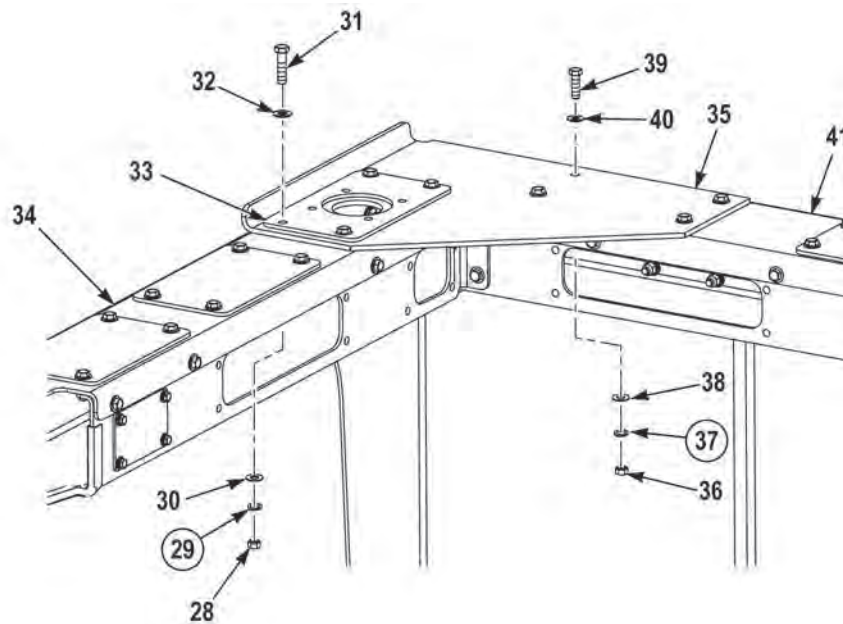


33. Apply adhesive, RTV to screwheads and nuts at nine positions.

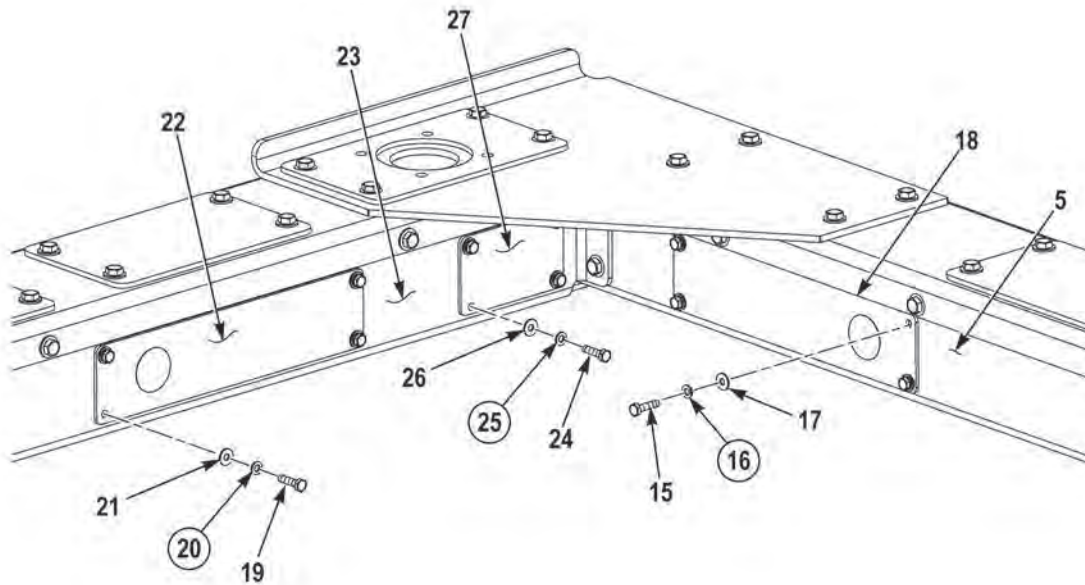


34. Install antenna box (53) on driver side antenna mounting panel (54) with four washers (52), screws (51), washers (50), new lockwashers (49), and nuts (48).

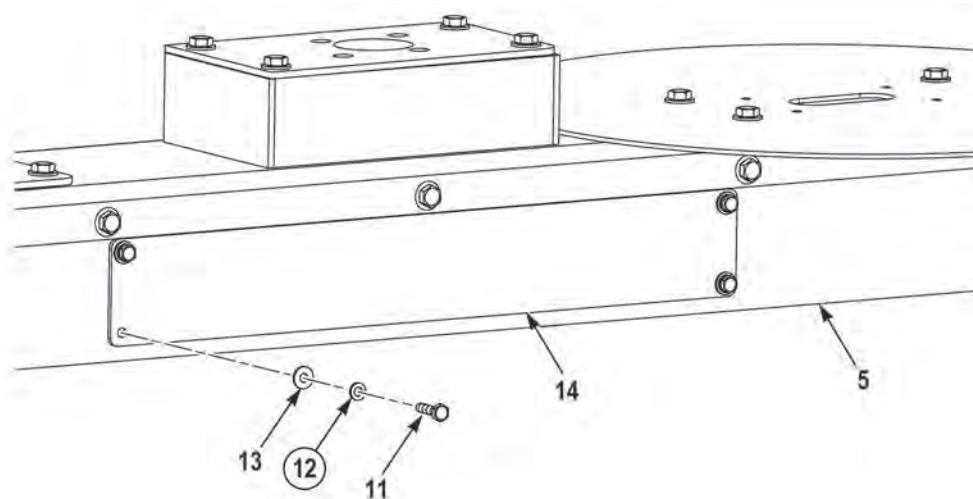
35. Install top access cover (47) on rear antenna mounting panel (41) with four washers (46), screws (45), washers (44), new lockwashers (43), and nuts (42).



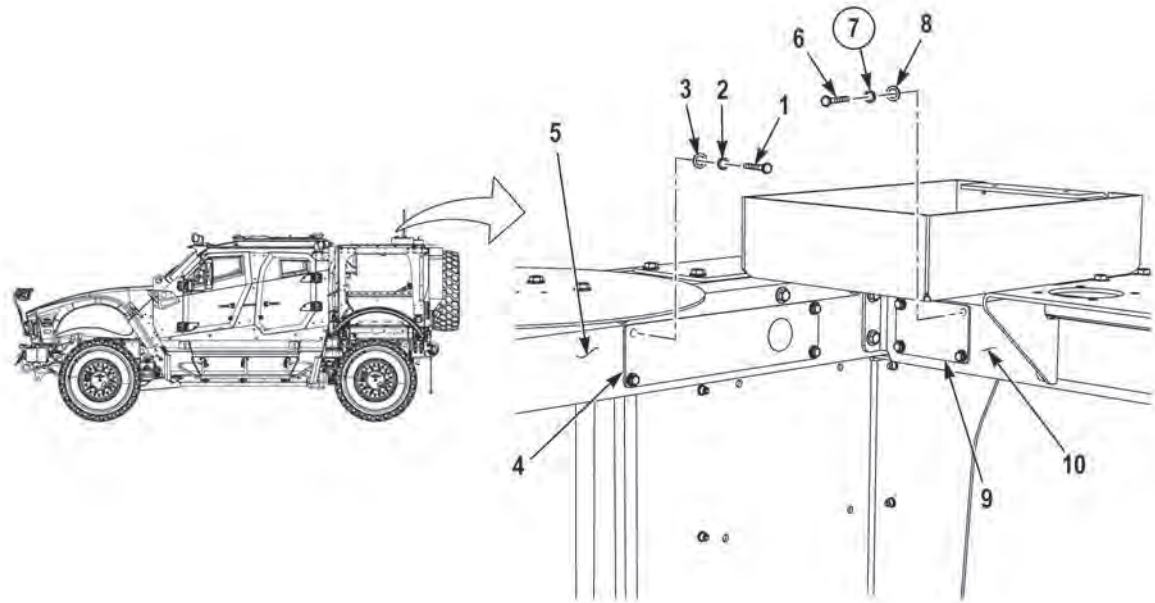
36. Install antenna mounting bracket (35) on rear antenna mounting panel (41) with four washers (40), screws (39), washers (38), new lockwashers (37), and nuts (36). Do not tighten nuts (36).
37. Install antenna mounting plate (33) on antenna mounting bracket (35) and passenger side antenna mounting panel (34) with four washers (32), screws (31), washers (30), new lockwashers (29), and nuts (28). Tighten four nuts (36).



38. Install access cover plate (27) on passenger side antenna support (23) with four washers (26), new lockwashers (25), and screws (24).
39. Install access cover plate (22) on passenger side antenna support (23) with four washers (21), new lockwashers (20), and screws (19).
40. Install access cover plate (18) on rear antenna support (5) with four washers (17), new lockwashers (16), and screws (15).



41. Install access cover plate (14) on rear antenna support (5) with four washers (13), new lockwashers (12), and screws (11).



42. Install access cover plate (9) on driver side antenna support (10) with four washers (8), new lockwashers (7), and screws (6).
43. Install access cover plate (4) on rear antenna support (5) with four washers (3), new lockwashers (2), and screws (1).
44. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

COUPLER BOX REPLACEMENT (M1240/M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Personnel Required

Two

Follow-On Maintenance

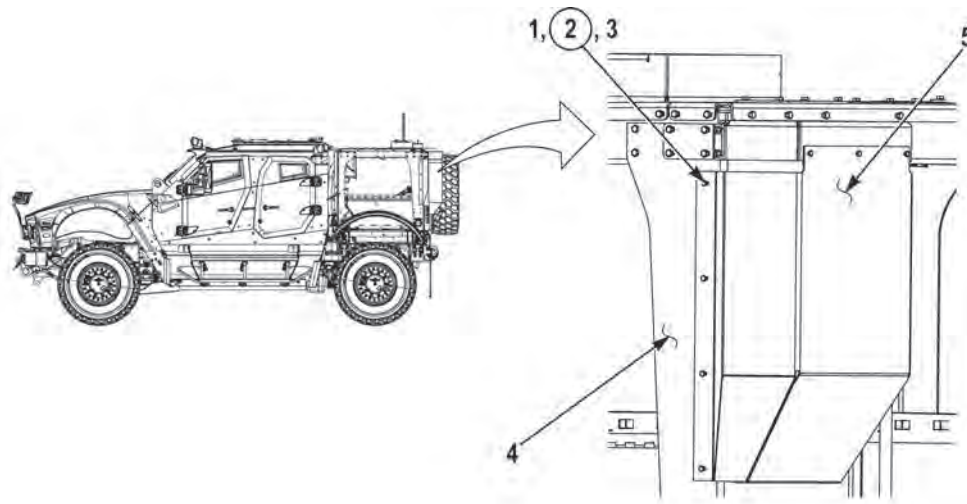
Remove and stow wheel chocks

Tools and Special Tools

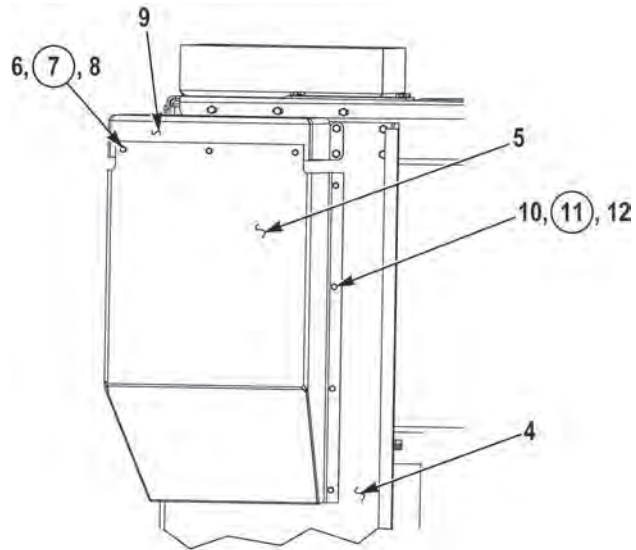
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (11) (Item 2, 7, and 11)

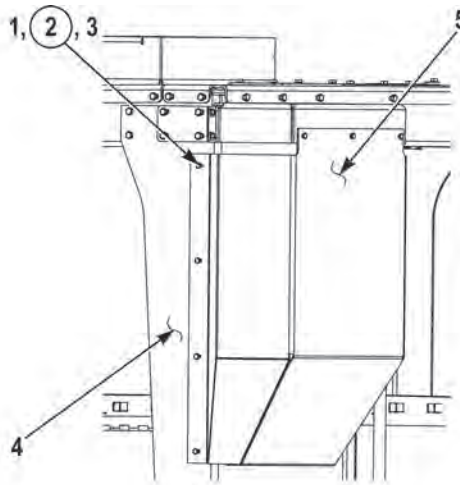
REMOVAL

1. Remove four screws (1), lockwashers (2), and washers (3) from antenna platform (4) and coupler box (5). Discard lockwashers (2).



2. Remove three screws (6), lockwashers (7), and washers (8) from coupler box cover (9) and coupler box (5). Discard lockwashers (7).
3. With the aid of an assistant, remove four screws (10), lockwashers (11), washers (12), and coupler box (5) from antenna platform (4). Discard lockwashers (11).

END OF TASK

INSTALLATION

1. With the aid of an assistant, install coupler box (5) on antenna platform (4) with four washers (12), new lockwashers (11), and screws (10).
2. Secure coupler box (5) on coupler box cover (9) with three washers (8), new lockwashers (7), and screws (6).
3. Secure coupler box (5) to antenna platform (4) with four washers (3), new lockwashers (2), and screws (1).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CREW VEHICLE RECEIVER/JAMMER (CVRJ) BOX REPLACEMENT (M1240/M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (WP 0186)

Personnel Required

Two

Follow-On Maintenance

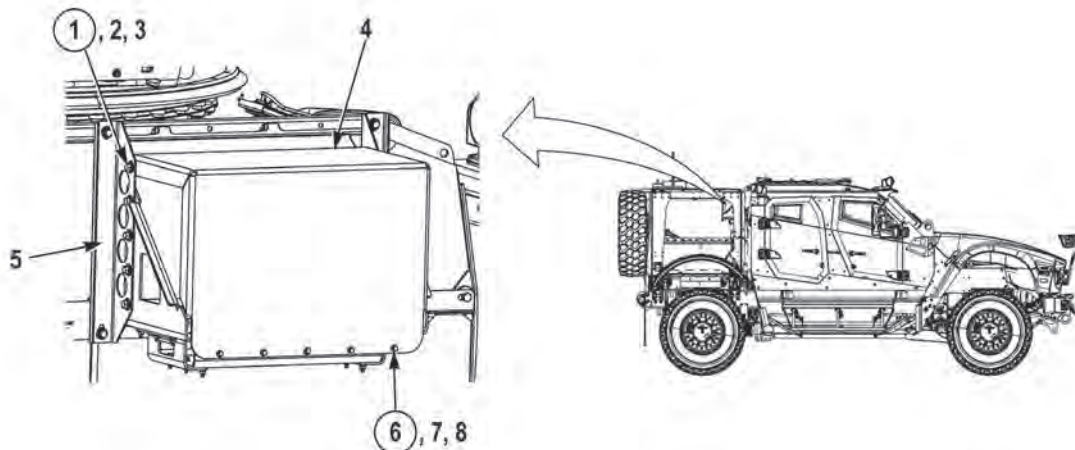
Connect batteries (WP 0186)
Remove and stow wheel chocks

Tools and Special Tools

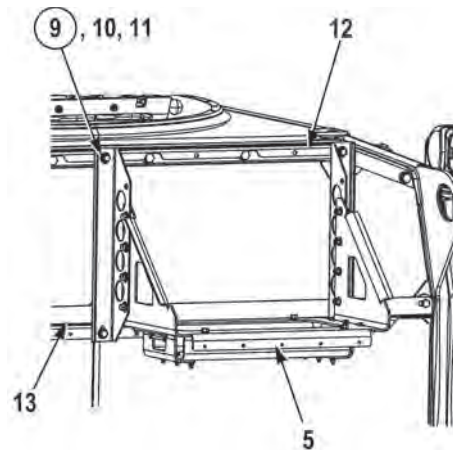
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (16) (Item 1, 9, 19, and 22)
Locknut (17) (Item 6 and 14)
Tags, Identification

REMOVAL

1. Remove two locknuts (1), screws (2), and washers (3) from CVRJ box shield (4) and CVRJ shelf (5). Discard locknuts (1).
2. Remove five locknuts (6), screws (7), washers (8), and CVRJ box shield (4) from CVRJ shelf (5). Discard locknuts (6).

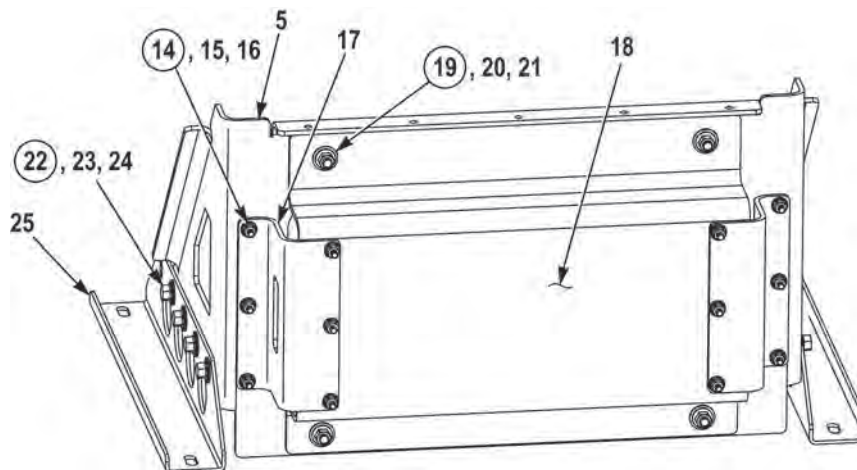


WARNING

Depending on GFE on CVRJ box shelf, weight may vary. A lifting device may be required to aid in removal. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark GFE components and connectors prior to removal to ensure proper installation.
 - Note position and remove GFE wire bundle from CVRJ shelf.
3. With the aid of an assistant, remove four locknuts (9), screws (10), washers (11), and CVRJ shelf (5) from bracket (12) and bracket (13). Discard locknuts (9).



NOTE

Perform Steps (4) through (6) if disassembling CVRJ shelf components.

4. Remove 12 locknuts (14), washers (15), screws (16), and two side support brackets (17) from CVRJ shelf (5) and bottom bracket (18). Discard locknuts (14).

5. Remove two locknuts (19), washers (20), screws (21), and bottom bracket (18) from CVRJ shelf (5). Discard locknuts (19).
6. Remove eight locknuts (22), screws (23), washers (24), and two brackets (25) from CVRJ shelf (5). Discard locknuts (22).

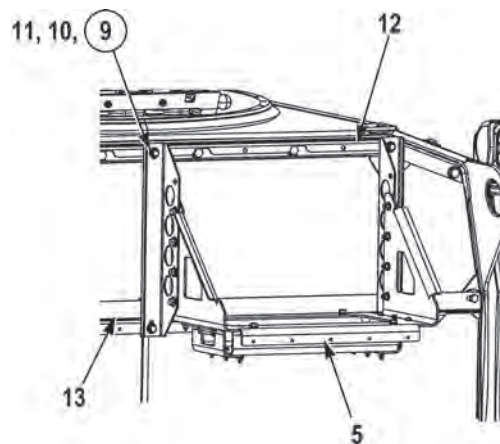
END OF TASK

INSTALLATION

NOTE

Perform Steps (1) through (3) if CVRJ shelf components were disassembled.

1. Install two brackets (25) on CVRJ shelf (5) with eight washers (24), screws (23), and new locknuts (22).
2. Install bottom bracket (18) on CVRJ shelf (5) with two screws (21), washers (20), and new locknuts (19).
3. Install two side support brackets (17) on bottom bracket (18) and CVRJ shelf (5) with 12 screws (16), washers (15), and new locknuts (14).



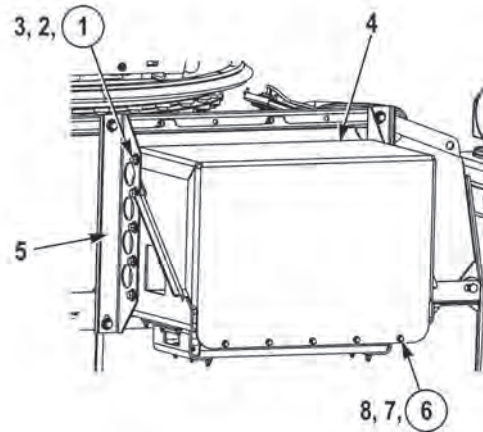
WARNING

Depending on GFE on CVRJ box shelf, weight may vary. A lifting device may be required to aid in installation. Failure to comply may result in injury or death to personnel.

NOTE

Position GFE wire bundle as noted prior to removal.

4. With the aid of an assistant, install CVRJ shelf (5) on bracket (13) and bracket (12) with four washers (11), screws (10), and new locknuts (9).



5. Install CVRJ box shield (4) on CVRJ shelf (5) with five washers (8), screws (7), and new locknuts (6).
6. Secure CVRJ box shield (4) to CVRJ shelf (5) with two washers (3), screws (2), and new locknuts (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DRIVER SIDE SPLASH GUARD REPLACEMENT (AFES NITROGEN DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Front fire suppression cylinders removed
 (WP 0067)
 Front sensor line removed (WP 0072)

Tools and Special Tools

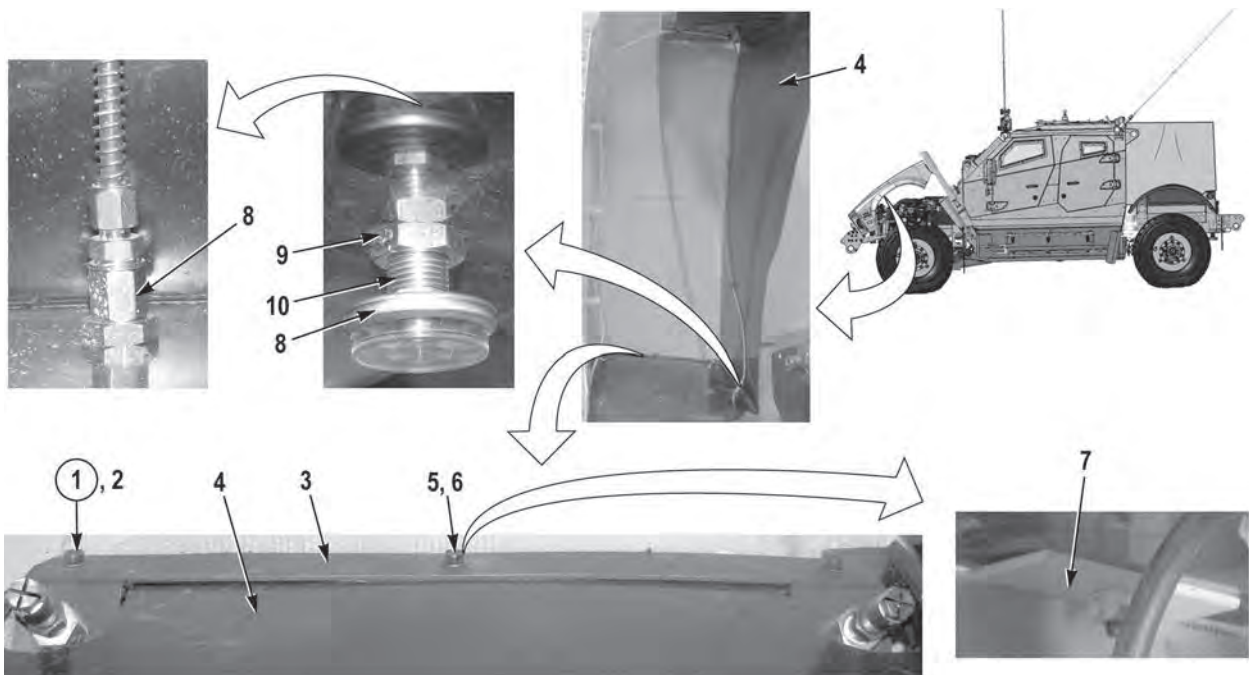
Tool Kit, General Mechanic's: Automotive

Materials/Parts

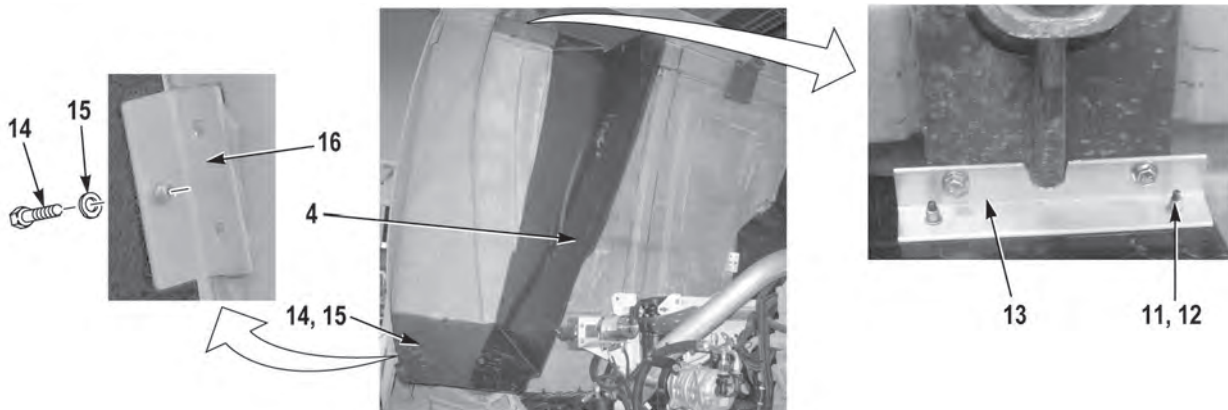
Locknut (2) (Item 1)
 Locknut (Item 17)
 Locknut (4) (Item 21)
 Locknut (4) (Item 26)

Follow-On Maintenance

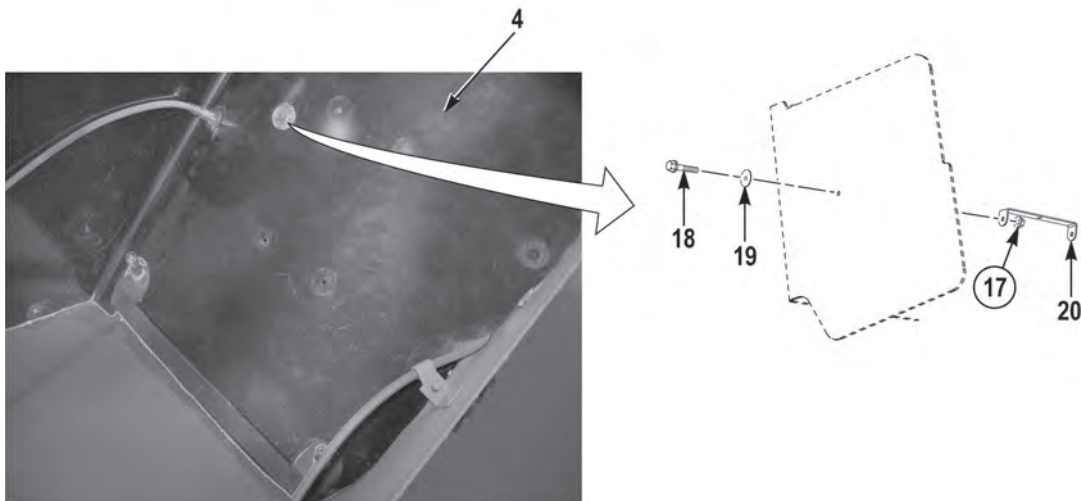
Install front sensor line (WP 0072)
 Install front fire suppression cylinders (WP 0067)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL

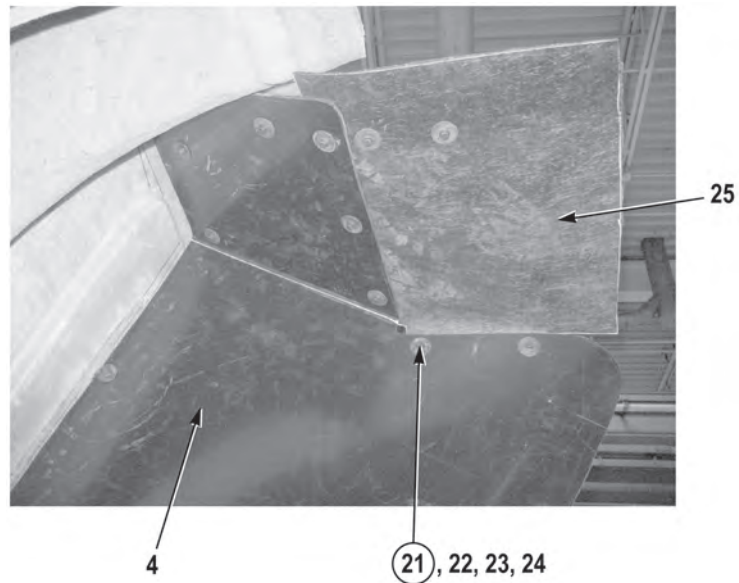
1. Remove two locknuts (1) and screws (2) from nozzle discharge assembly (3) and splash guard (4). Discard locknuts (1).
2. Remove screw (5), washer (6), and nozzle discharge assembly (3) from splash guard (4) and mounting bracket (7).
3. Remove pressure gauge (8) and nut (9) from fitting (10).
4. Remove fitting (10) from splash guard (4).



5. Remove three screws (11) and washers (12) from splash guard (4) and bracket (13).
6. Remove two screws (14) and washers (15) from splash guard (4) and two mounting brackets (16).



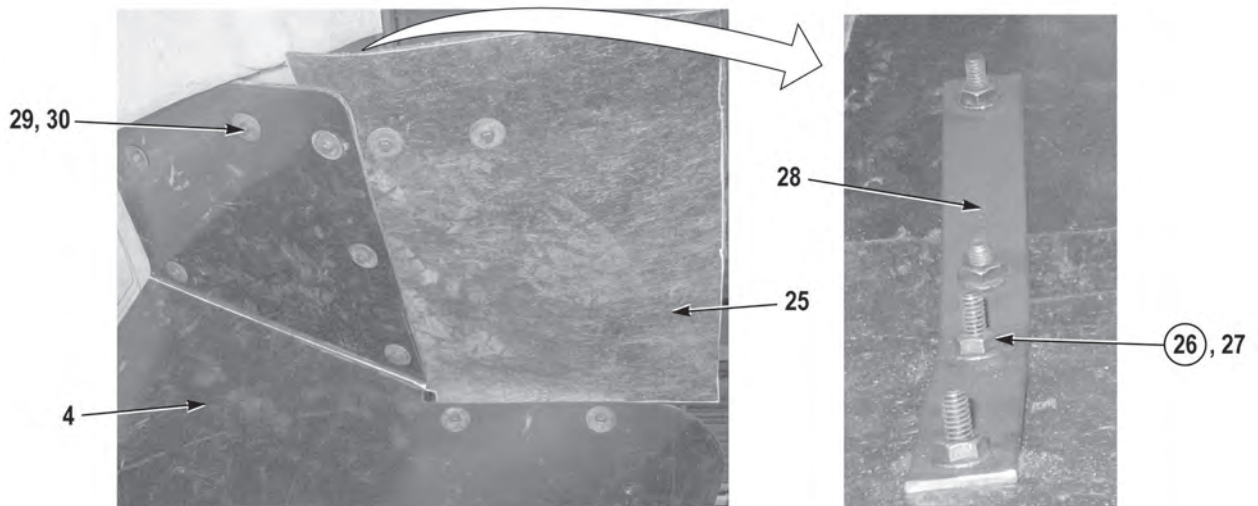
7. Remove locknut (17), screw (18), washer (19), and splash guard (4) from bracket (20) and vehicle. Discard locknut (17).



NOTE

Note position of splash guard prior to removal to ensure proper installation.

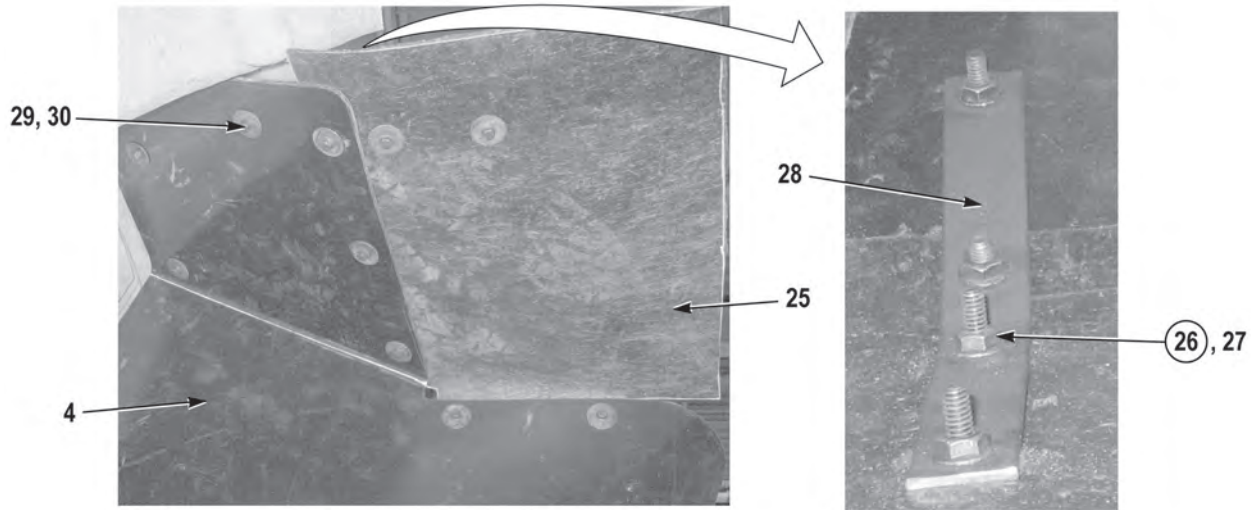
8. Remove four locknuts (21), washers (22), screws (23), and washers (24) from two splash guards (4 and 25). Discard locknuts (21).



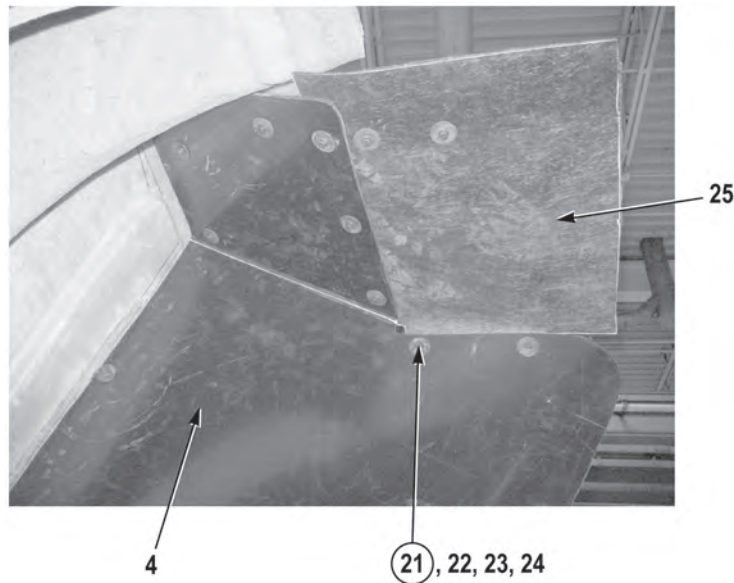
9. Remove four locknuts (26), washers (27), bracket (28), four screws (29), washers (30), and splash guard (25) from splash guard (4). Discard locknuts (26).

END OF TASK

INSTALLATION



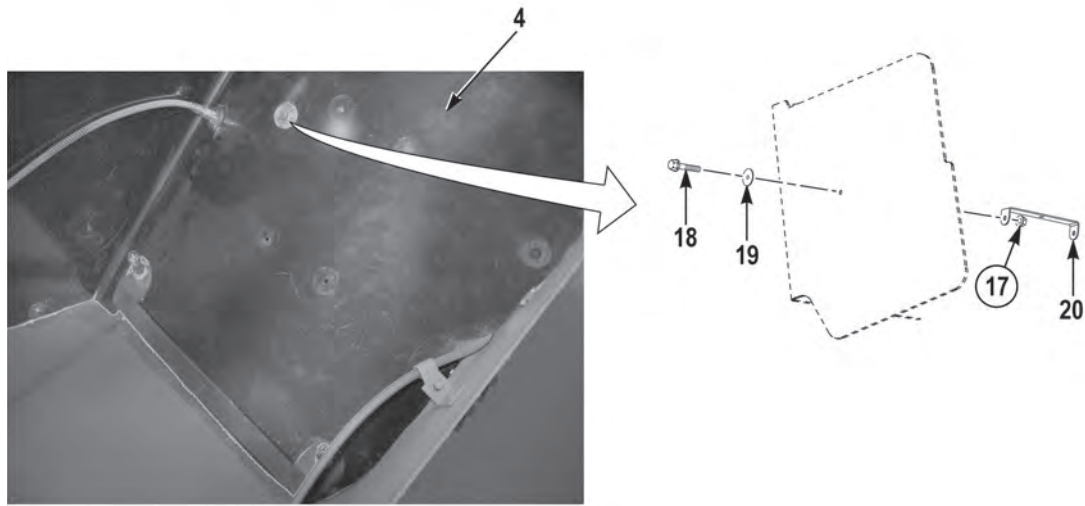
1. Install splash guard (25) on splash guard (4) with four washers (30), screws (29), bracket (28), four washers (27), and new locknuts (26).



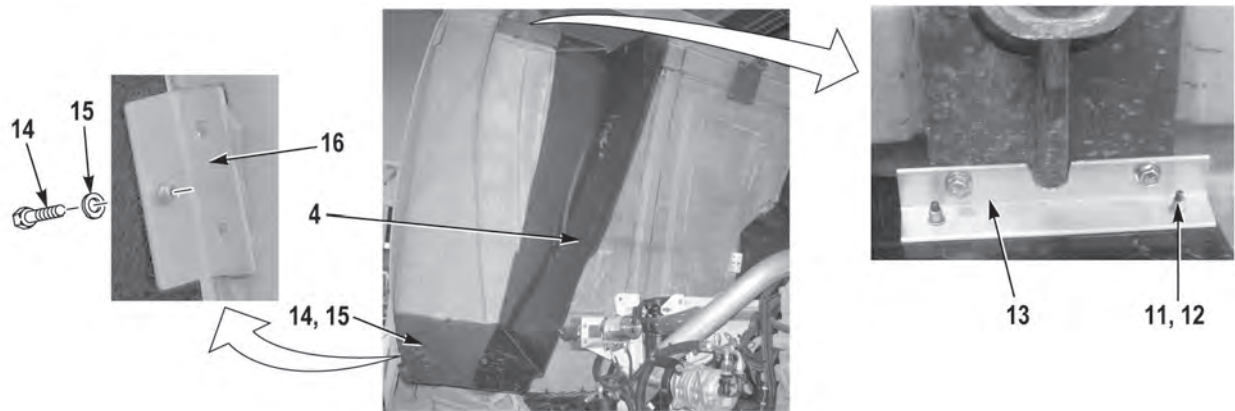
NOTE

Install splash guard as noted prior to removal.

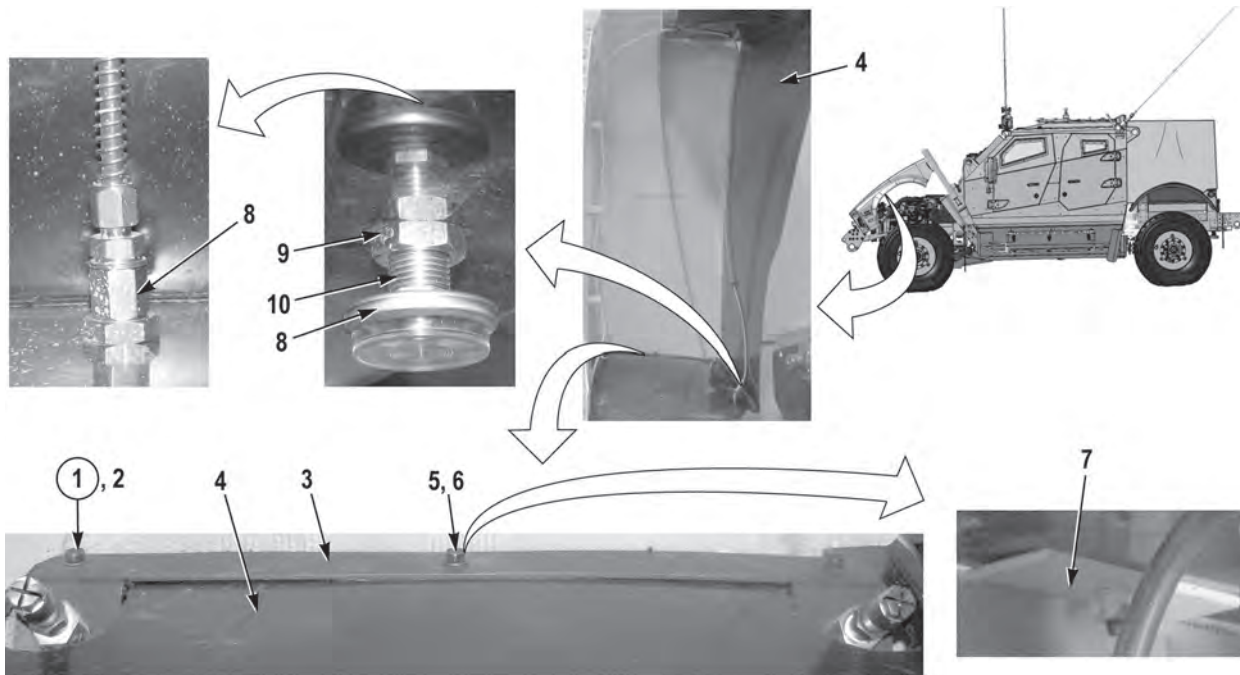
2. Secure splash guard (4) on splash guard (25) with four washers (24), screws (23), washers (22), and new locknuts (21).



3. Install splash guard (4) on bracket (20) with washer (19), screw (18), and new locknut (17).



4. Install splash guard (4) on two mounting brackets (16) with two washers (15) and screws (14).
5. Secure splash guard (4) on bracket (13) with three washers (12) and screws (11).



6. Install fitting (10) on splash guard (4) with nut (9).
7. Install pressure gauge (8) on fitting (10).
8. Install nozzle discharge assembly (3) on splash guard (4) and mounting bracket (7) with washer (6) and screw (5).
9. Secure nozzle discharge assembly (3) on splash guard (4) with two screws (2) and new locknuts (1).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DRIVER SIDE SPLASH GUARD REPLACEMENT (AFES LINEAR WIRE DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Front splash guard fire suppression cylinder removed (WP 0068)
 Hood removed (M1240, M1240A1) (WP 0157)
 Hood removed (M1245) (WP 0156)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

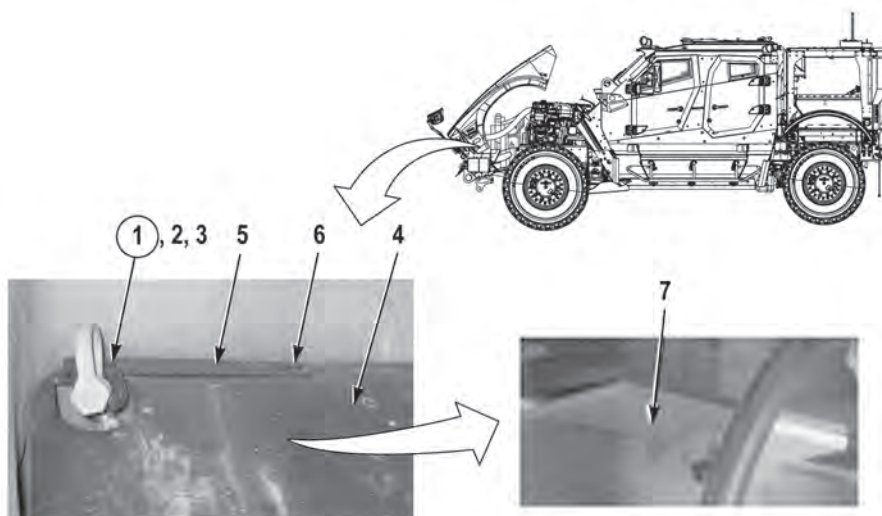
Locknut (Item 1)
 Locknut (Item 14)

Material/Parts (continued)

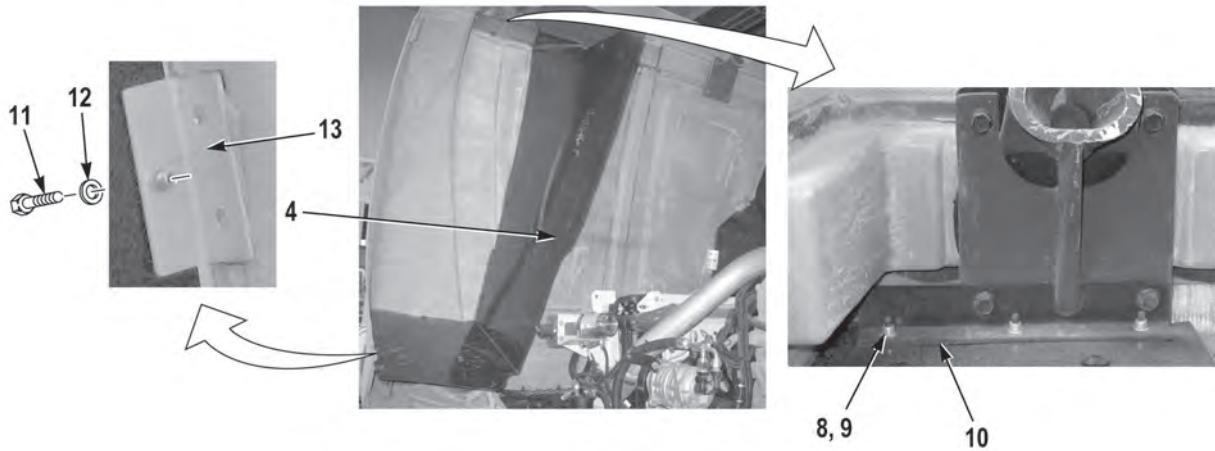
Locknut (Item 18)
 Locknut (5) (Item 28)
 Locknut (4) (Item 34)
 Locknut (4) (Item 39)

Follow-On Maintenance

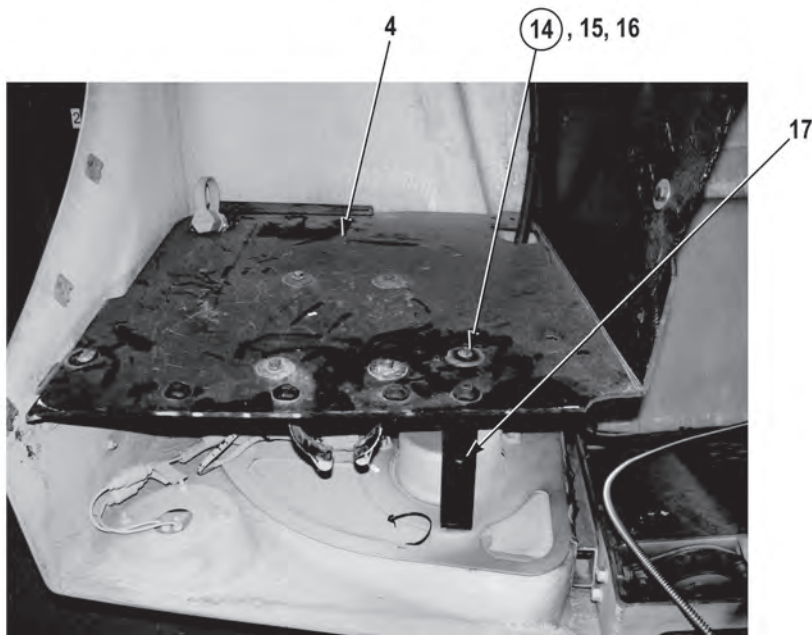
Install hood (M1245) (WP 0156)
 Install hood (M1240, M1240A1) (WP 0157)
 Install front splash guard fire suppression cylinder (WP 0068)
 Remove and stow wheel chocks

REMOVAL

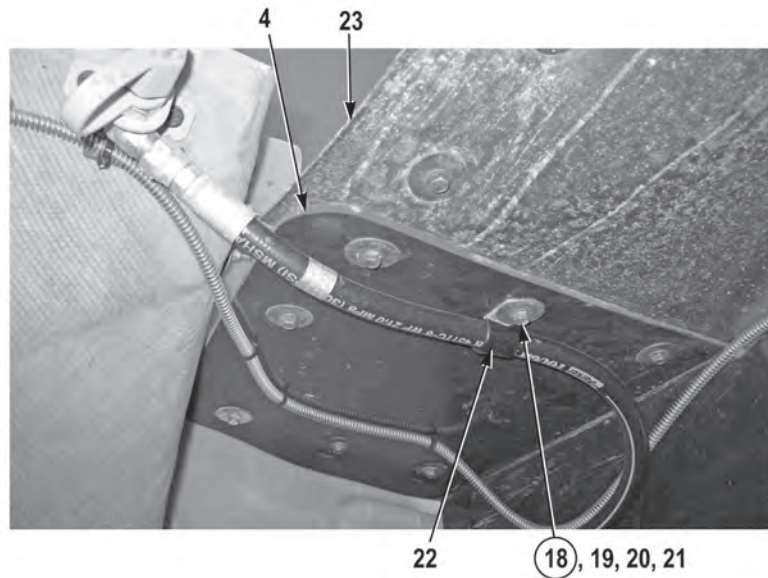
1. Remove all cable ties on splashguard that secure engine and undercarriage sensor lines (WP 0073).
2. Remove locknut (1), screw (2), and washer (3) from splash guard (4) and nozzle discharge assembly (5). Discard locknut (1).
3. Remove screw (6) and nozzle discharge assembly (5) from mounting bracket (7) and splash guard (4).



4. Remove three screws (8) and washers (9) from bracket (10) and splash guard (4).
5. Remove screw (11) and washer (12) from mounting bracket (13) and splash guard (4).



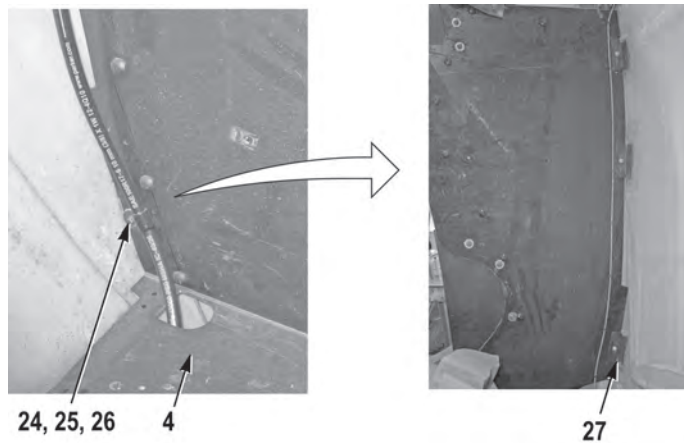
6. Remove locknut (14), screw (15), and washer (16) from bracket (17) and splash guard (4). Discard locknut (14).



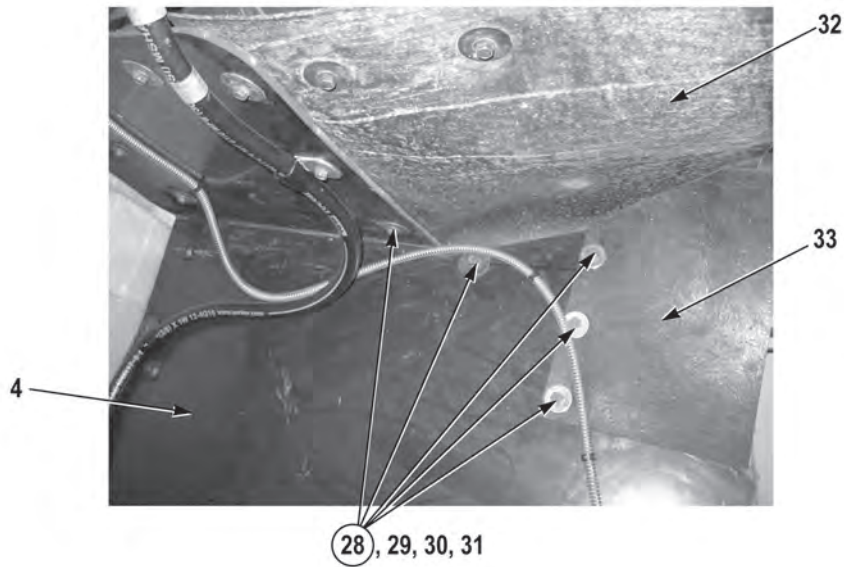
NOTE

Note position of cushion clip prior to removal to ensure proper installation.

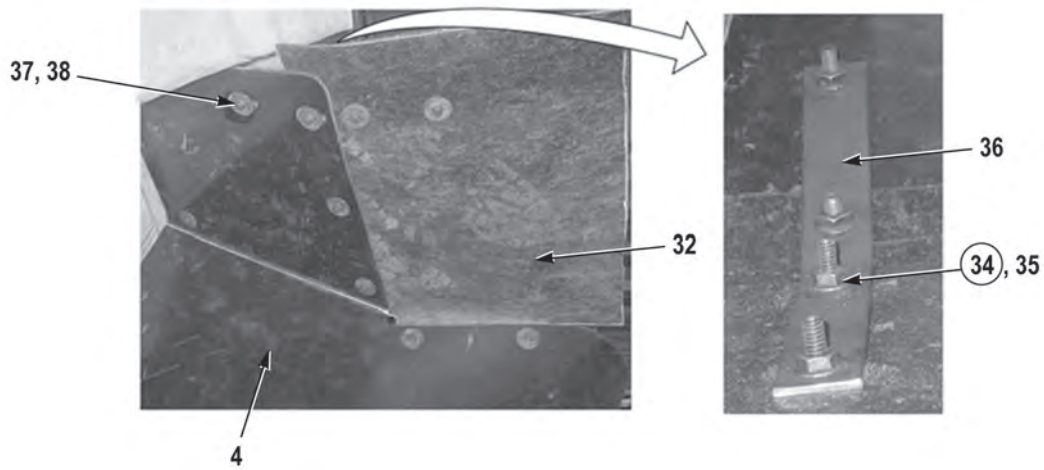
- Remove locknut (18), washer (19), screw (20), washer (21), and cushion clip (22) from flap (23) and splash guard (4). Discard locknut (18).



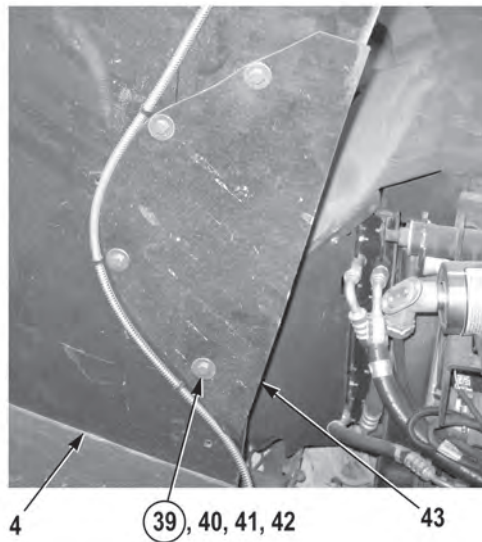
- Remove three screws (24), washers (25), cushion clips (26), and splash guard (4) from three mounting brackets (27) and vehicle.



9. Remove five locknuts (28), washers (29), screws (30), washers (31), and flap (33) from flap (32) and splash guard (4). Discard locknuts (28).



10. Remove four locknuts (34), washers (35), bracket (36), four screws (37), washers (38), and flap (32) from splash guard (4). Discard locknuts (34).

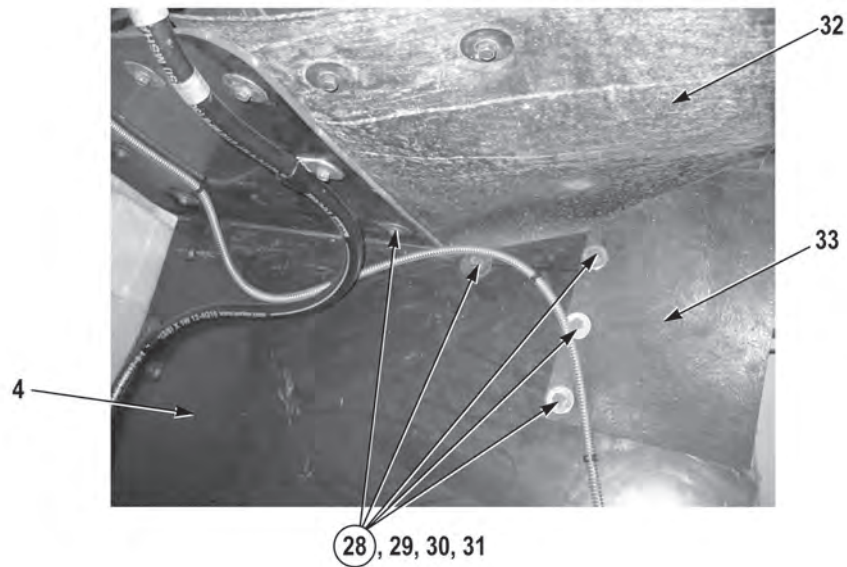


11. Remove four locknuts (39), washers (40), screws (41), washers (42), and flap (43) from splash guard (4). Discard locknuts (39).

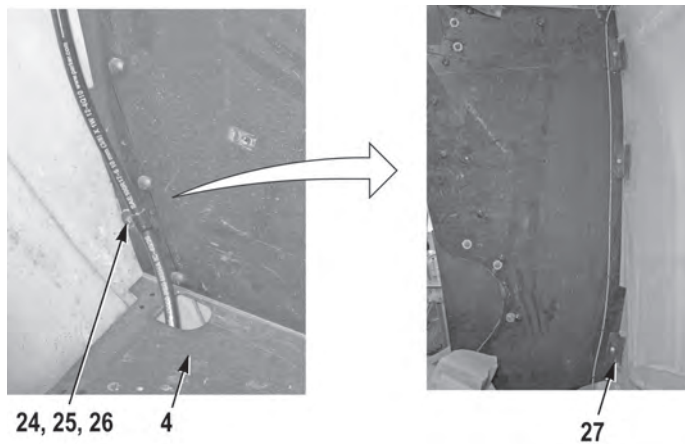
END OF TASK

INSTALLATION

1. Install flap (43) on splash guard (4) with four washers (40), screws (41), washers (40), and new locknuts (39).
2. Install flap (32) on splash guard (4) with four washers (38), screws (37), bracket (36), four washers (35), and new locknuts (34).



3. Install flap (33) on flap (32) and splash guard (4) with five washers (31), screws (30), washers (29), and new locknuts (28).



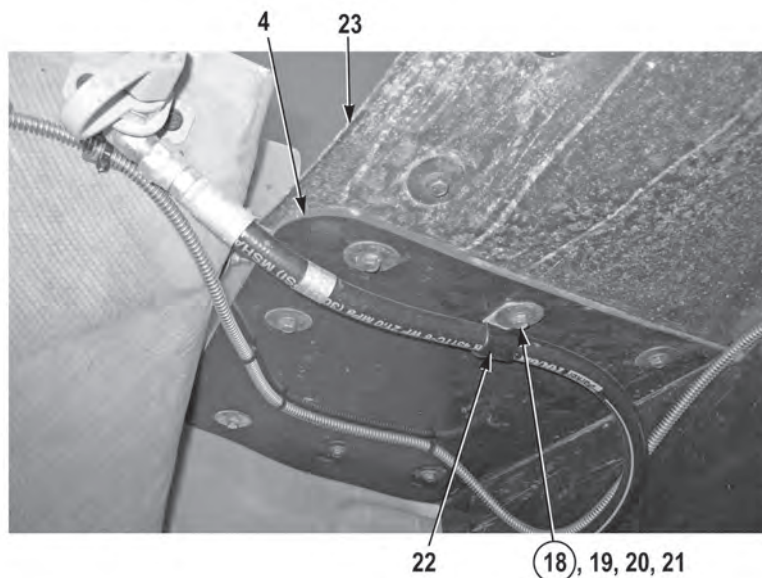
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

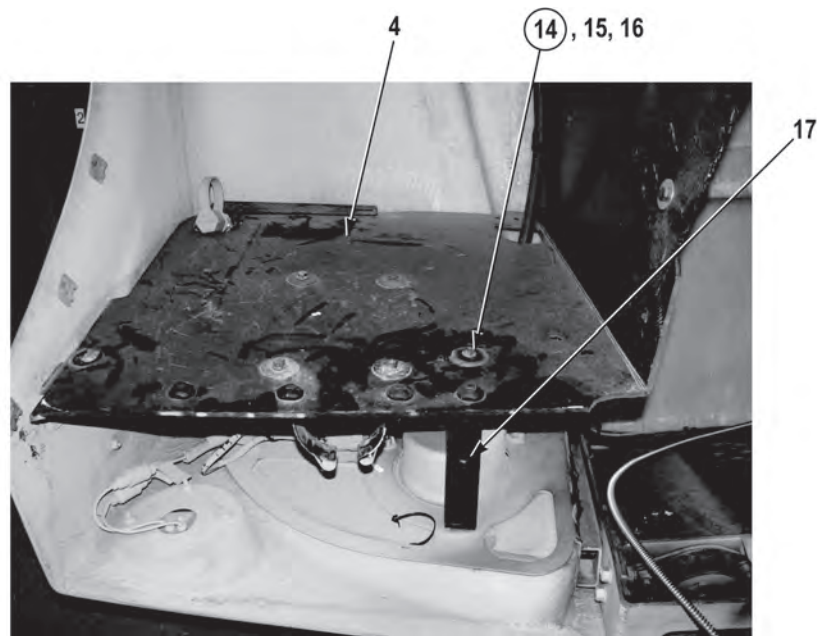
NOTE

Install cushion clips as noted prior to removal.

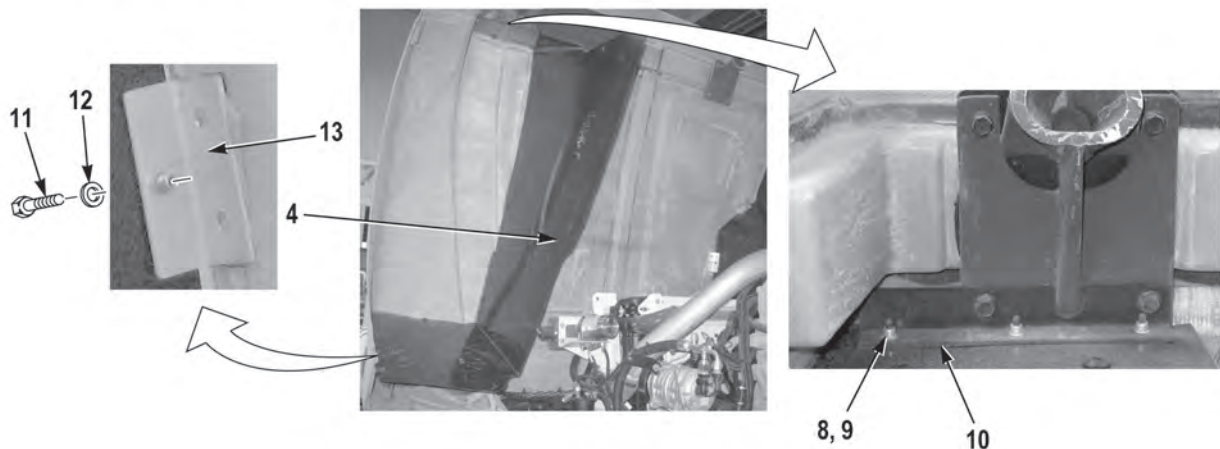
4. Apply sealing compound, Loctite 242, to threads of three screws (24) and install splash guard (4) and three cushion clips (26) on three mounting brackets (27) with three washers (25) and screws (24).



5. Install cushion clip (22) on flap (23) and splash guard (4) with washer (21), screw (20), washer (19), and new locknut (18).



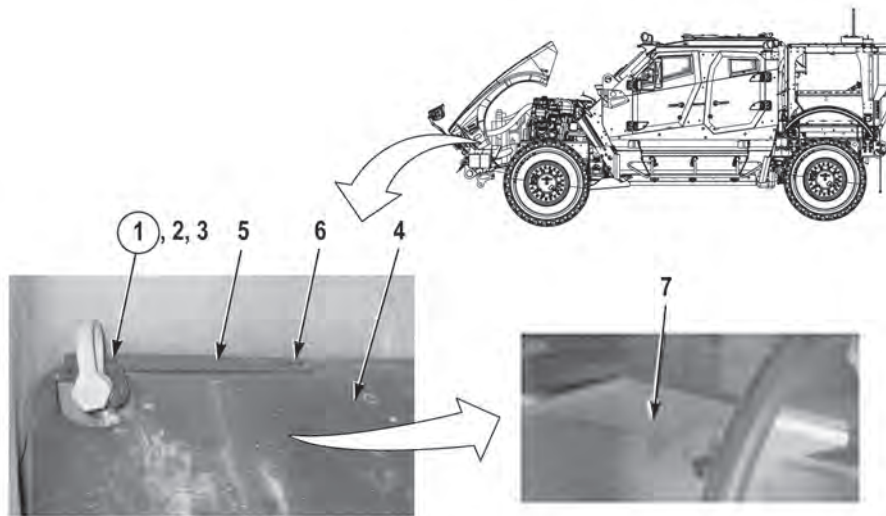
6. Install splash guard (4) on bracket (17) with washer (16), screw (15), and new locknut (14).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply sealing compound, Loctite 242, to threads of screw (11) and install splash guard (4) on mounting bracket (13) with washer (12) and screw (11).
8. Install splash guard (4) on bracket (10) with three washers (9) and screws (8).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

9. Apply sealing compound, Loctite 242, to threads of screw (6) and install nozzle discharge assembly (5) on mounting bracket (7) and splash guard (4) with screw (6).
10. Secure nozzle discharge assembly (5) to splash guard (4) with washer (3), screw (2), and new locknut (1).
11. Install all cable ties on splashguard that secure undercarriage and engine sensor lines (WP 0073).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FRONT MUD FLAP REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240, M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

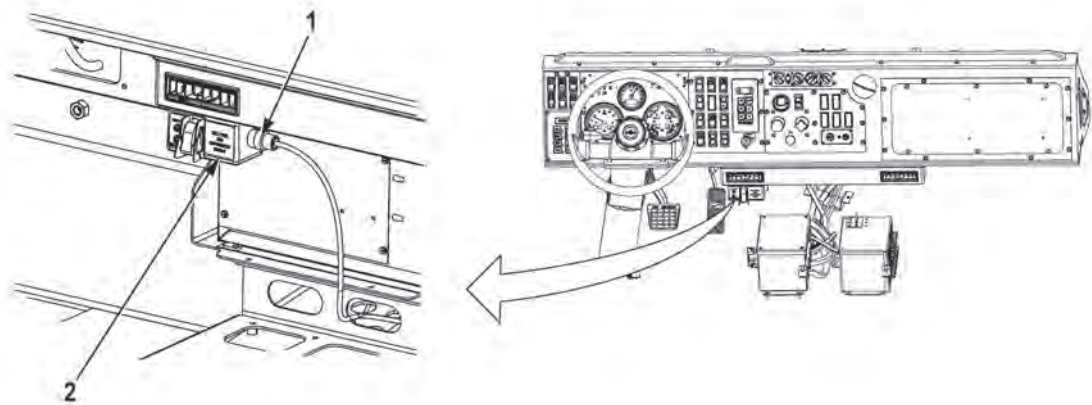
Tool Kit, General Mechanic's: Automotive

Materials/Parts

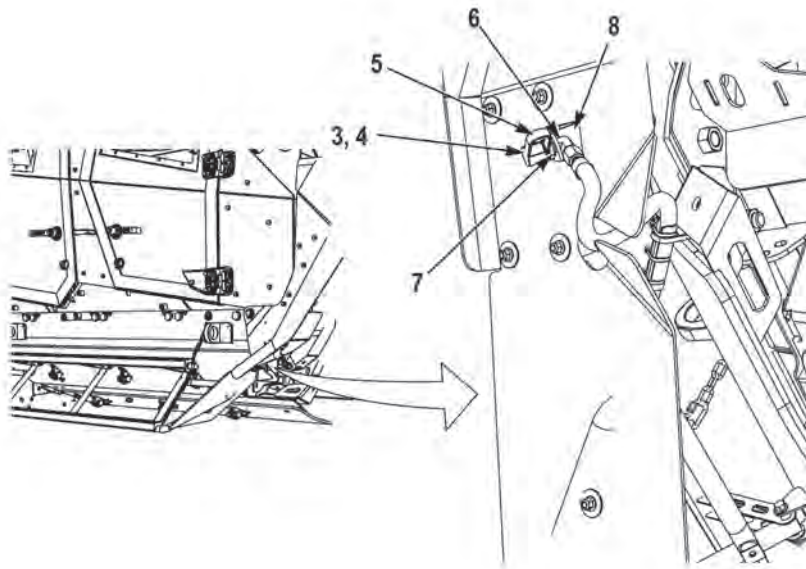
Locknut (Item 11)
Locknut (6) (Item 15)
Locknut (5) (Item 19)
Compound Sealing, Loctite 242
Ties, Cable

Follow-On Maintenance

Connect batteries (M1240, M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL

1. Disconnect connector (1) from undercarriage controller (2).

**NOTE**

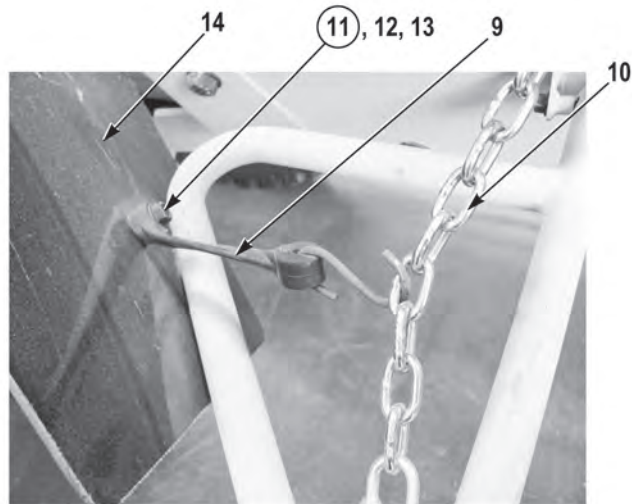
Driver and passenger side mud flaps are removed the same way. Passenger side shown.

2. Remove dust cap (3) from nozzle (4).

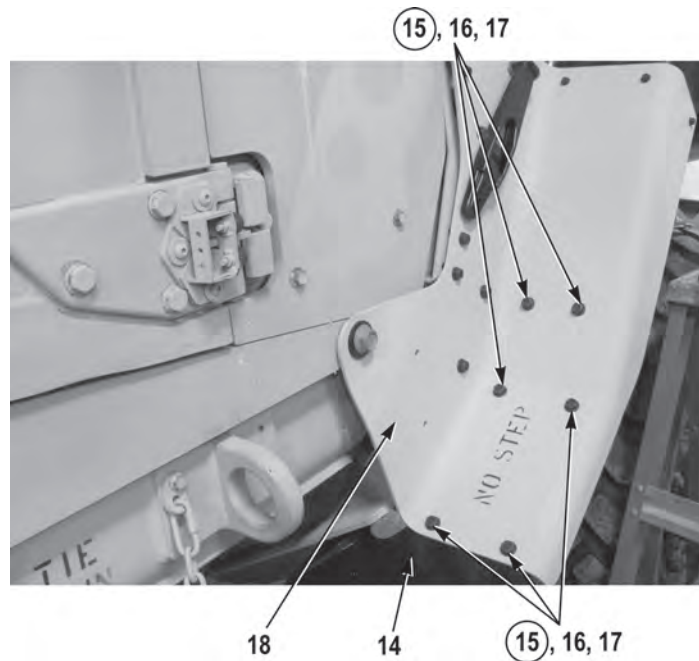
NOTE

- Note position of fitting prior to removal to ensure proper installation.
- Remove cable ties as required.

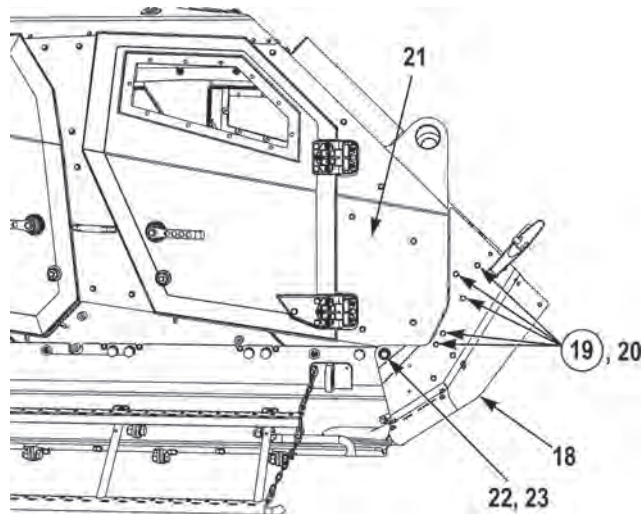
3. Remove nozzle (4) and lanyard (5) from fitting (6).
4. Remove nut (7) and fitting (6) from bracket (8).



5. Disconnect mud flap tiedown strap (9) from capsule step lower support chain (10).
6. Remove locknut (11), washer (12), screw (13), and mud flap tie down strap (9) from mud flap (14). Discard locknut (11).



7. Remove six locknuts (15), washers (16), screws (17), and mud flap (14) from quarter-fender (18). Discard locknuts (15).



NOTE

- Perform Steps (8) and (9) if removing front quarter-fender.
- Driver and passenger side quarter-fenders are removed the same way. Passenger side shown.

8. Remove five locknuts (19) and screws (20) from capsule (21) and quarter-fender (18). Discard locknuts (19).

9. Remove screw (22), washer (23), and quarter-fender (18) from capsule (21).

END OF TASK

INSTALLATION

WARNING

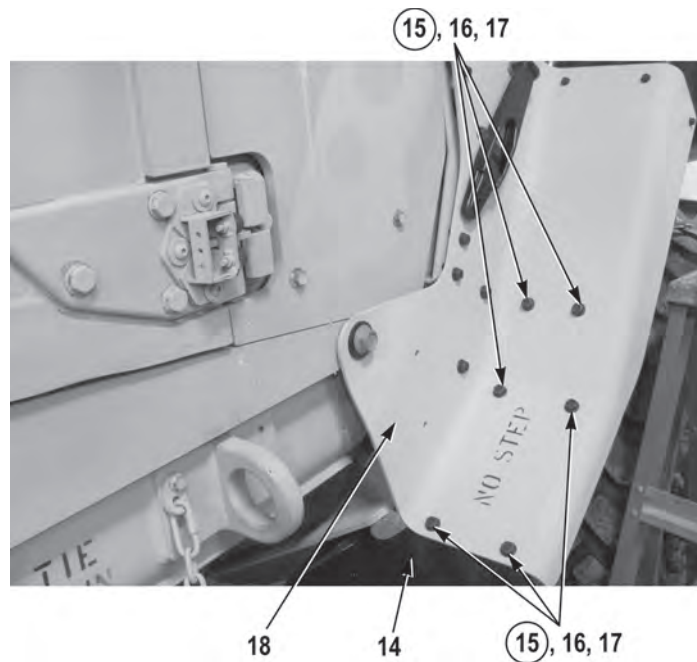
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Perform Steps (1) and (2) if quarter-fenders were removed.
- Driver and passenger side quarter-fenders are installed the same way. Passenger side shown.

1. Apply sealing compound, Loctite 242, to threads of screw (22) and install quarter-fender (18) on capsule (21) with washer (23) and screw (22).

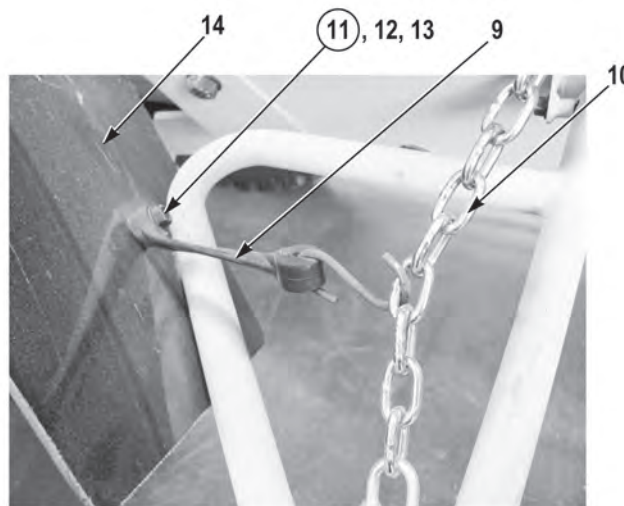
2. Secure quarter-fender (18) to capsule (21) with five screws (20) and new locknuts (19).



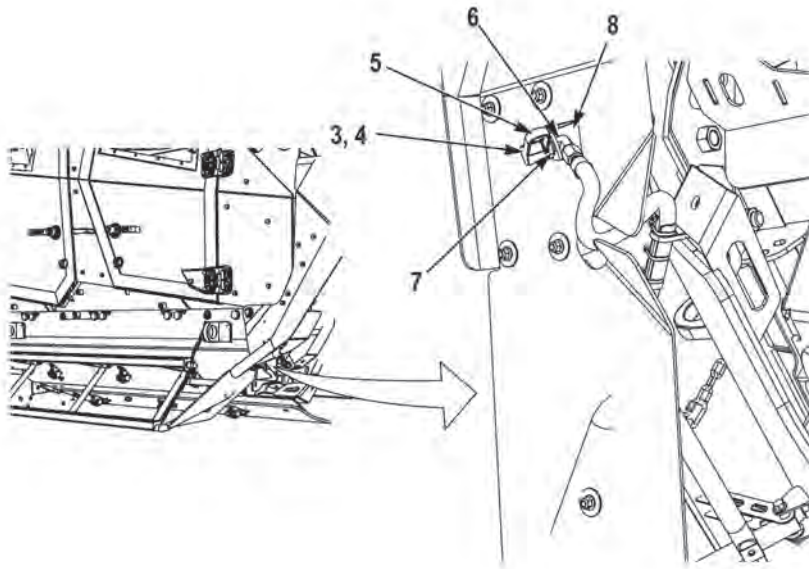
NOTE

Driver and passenger side mud flaps are installed the same way. Passenger side shown.

3. Install mud flap (14) on quarter-fender (18) with six screws (17), washers (16), and new locknuts (15).



4. Install mud flap tiedown strap (9) on mud flap (14) with washer (12), screw (13), and new locknut (11). Tighten locknut 3/4 to 1 turn after locknut and screw head make contact with material.
5. Connect mud flap tiedown strap (9) to capsule step lower support chain (10).



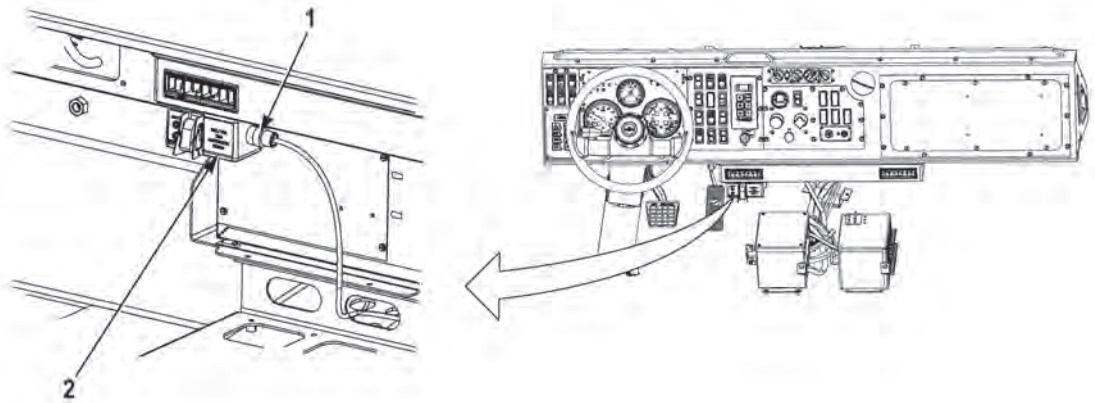
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fitting as noted prior to removal.

6. Apply sealing compound, Loctite 242, to the threads of fitting (6) and install fitting (6) on bracket (8) with nut (7).
7. Install lanyard (5) and nozzle (4) on fitting (6).
8. Install dust cap (3) on nozzle (4).



9. Connect connector (1) to undercarriage controller (2).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HVAC REPLACEMENT (FRONT)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air conditioning system refrigerant recovered
 (WP 0024)
 Cooling system drained (reservoir equipped)
 (WP 0176)
 Cooling system drained (surge tank equipped)
 (WP 0177)
 Dash removed (WP 0151)

Tools and Special Tools

Tool Kit, Refrigeration Service Ordinance
 Wrench, Torque, 75 ft-lb
 Wrench, Torque, 300 in-lb

Materials/Parts

O-ring (Item 12)
 O-ring (Item 13)

Materials/Parts (continued)

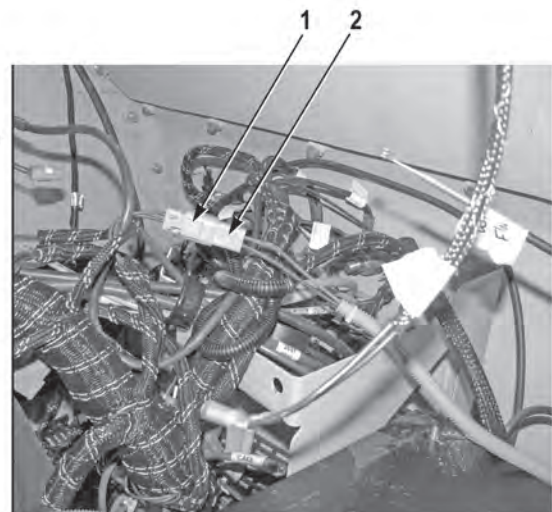
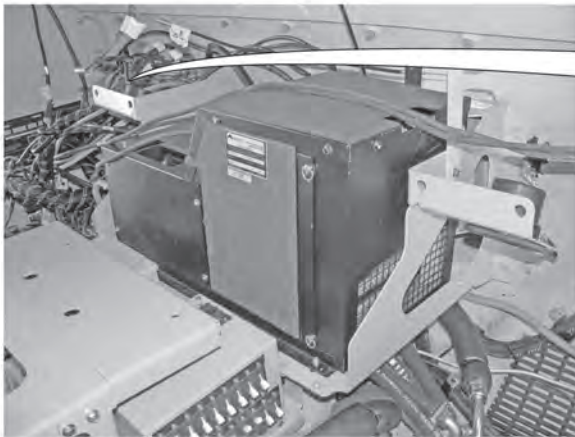
O-ring (Item 29)
 O-ring (Item 30)
 Cap and Plug Set
 Refrigerant Oil, PAG
 Tags, Identification

Personnel Required

Two

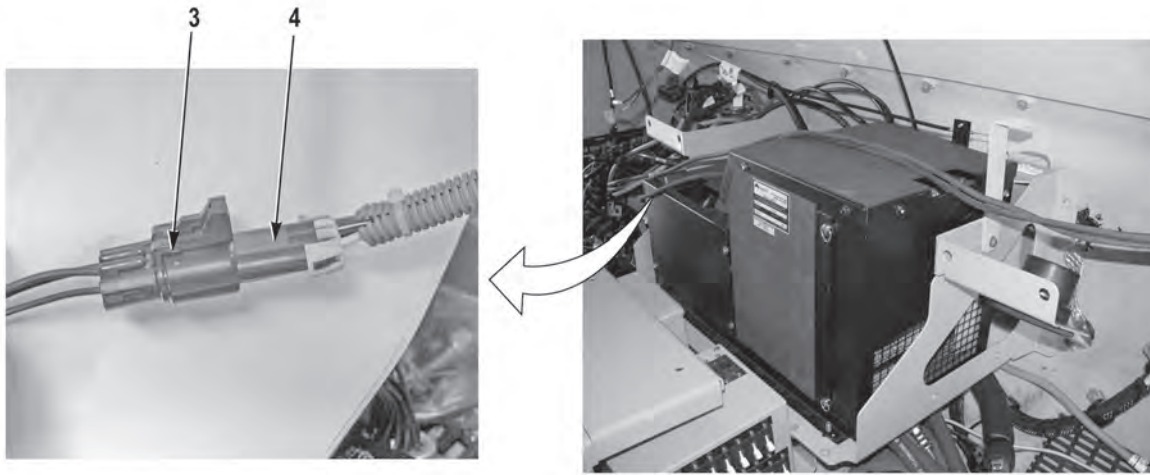
Follow-On Maintenance

Install dash (WP 0151)
 Fill cooling system (reservoir equipped)
 (WP 0176)
 Fill cooling system (surge tank equipped)
 (WP 0177)
 Remove and stow wheel chocks

REPLACEMENT
**NOTE**

Tag and mark connectors prior to removal to ensure proper installation.

1. Disconnect connector (1) from HVAC assembly connector (2).



2. Disconnect connector (3) from HVAC assembly connector (4).

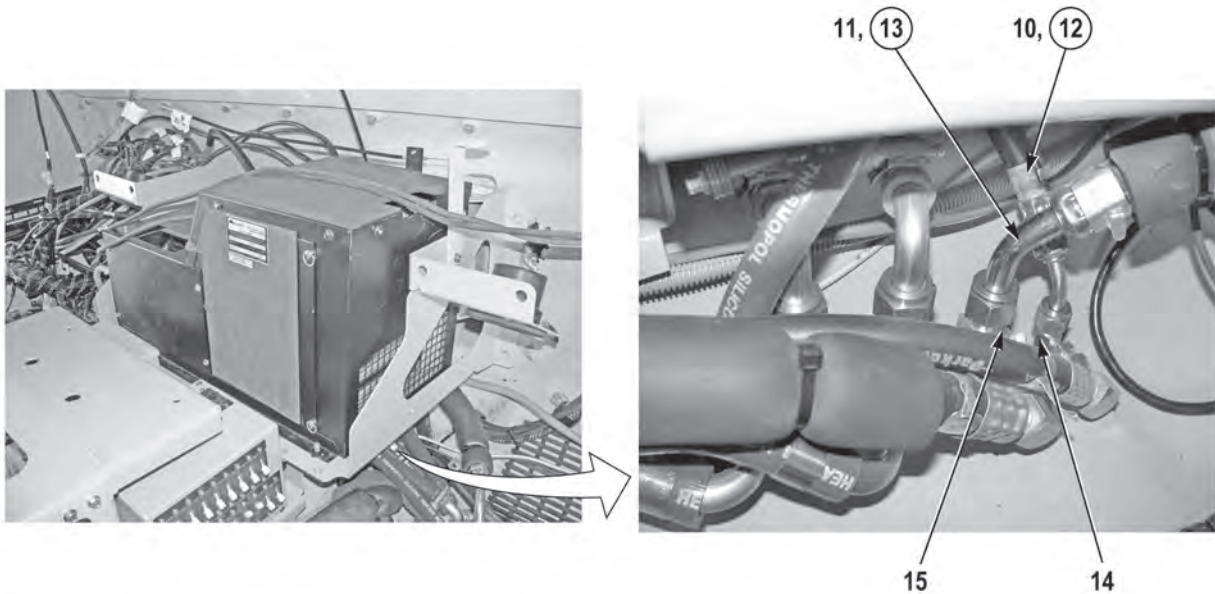


3. Disconnect connector (5) from HVAC assembly connector (6).

CAUTION

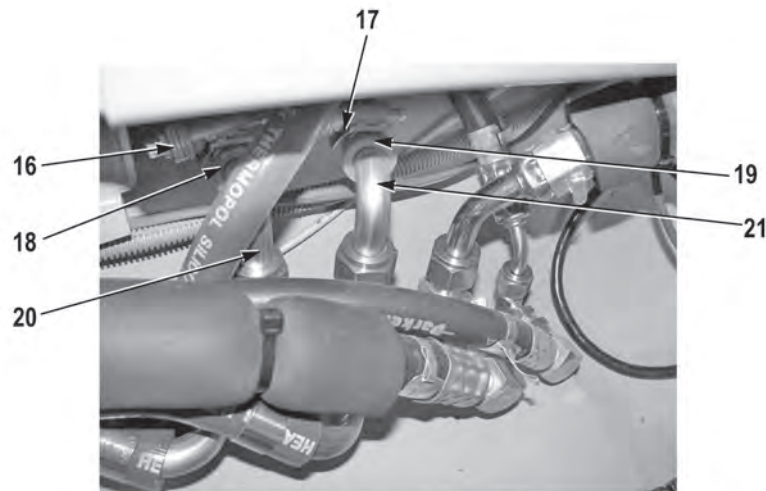
Blower motor cover should be reinstalled prior to HVAC assembly removal to prevent damage to HVAC internal wiring harness and /or components. Failure to comply may result in damage to equipment.

4. Reinstall blower motor cover (7) on HVAC assembly (8) with one screw (9).

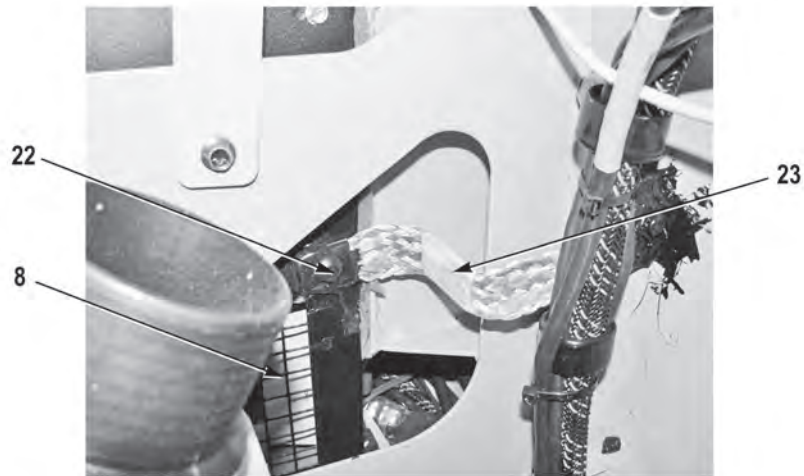


NOTE

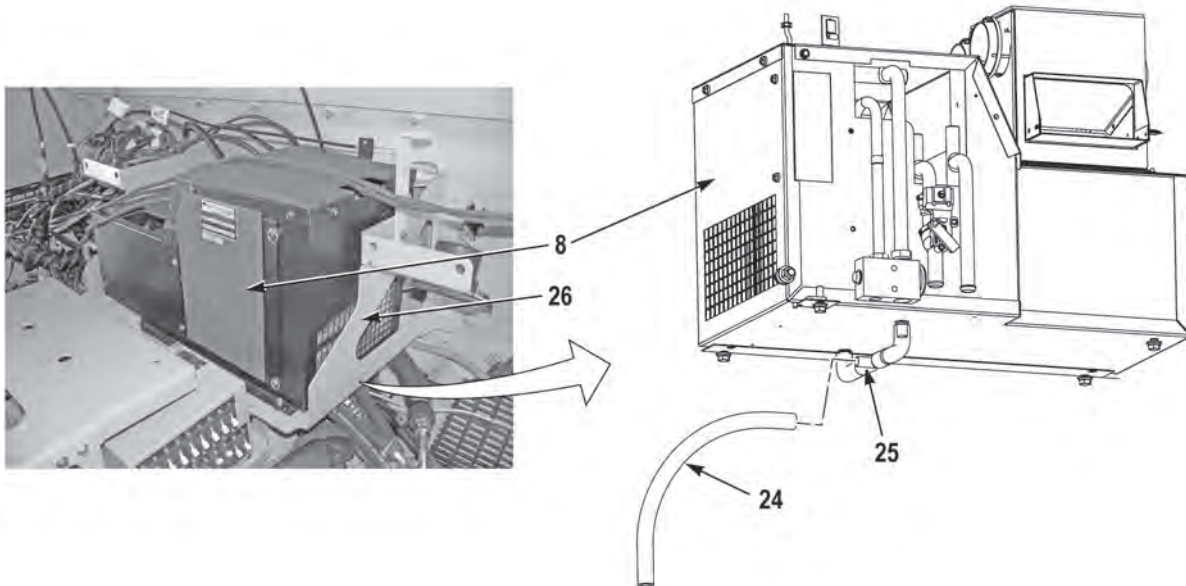
- Tag and mark hoses and fittings prior to removal to ensure proper installation.
 - Cap and plug hoses and fittings upon removal.
5. Remove two air conditioner hoses (10 and 11) and O-rings (12 and 13) from fittings (14 and 15). Discard O-rings (12 and 13).



6. Loosen two heater hose clamps (16 and 17).
7. Remove two heater hoses (18 and 19) from fittings (20 and 21).



8. Remove screw (22) and ground strap (23) from HVAC assembly (8).



9. Remove drain hose (24) from tee fitting (25).

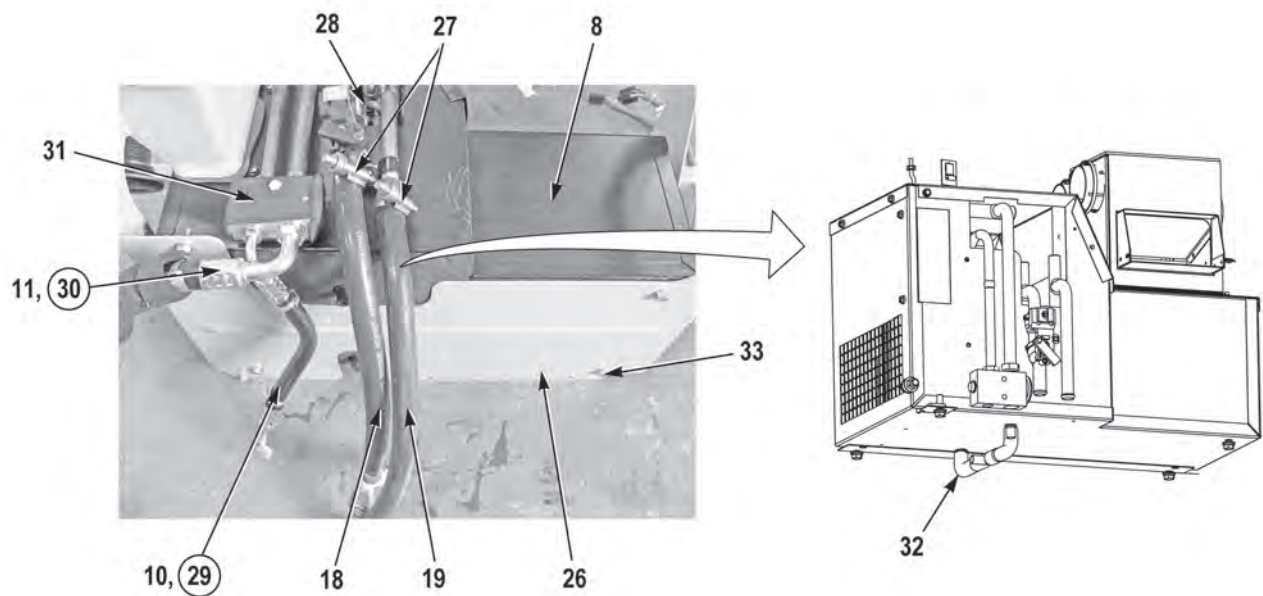
WARNING

HVAC assembly and HVAC tray weighs 60 lbs (27.2 kg). Do not move or lift HVAC assembly and HVAC tray without the aid of an assistant. Failure to comply may result in injury or death to personnel.

CAUTION

Ensure all wires and cables are clear of HVAC removal path. Failure to comply may result in damage to equipment.

10. With the aid of an assistant, remove HVAC assembly (8) and HVAC tray (26) from vehicle.

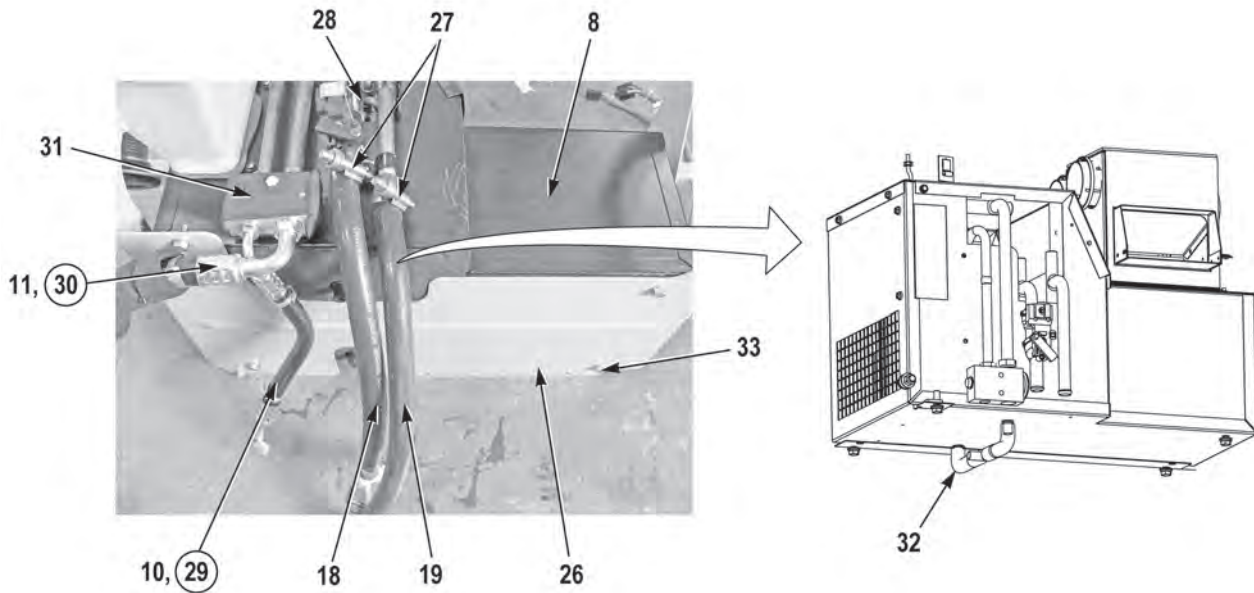
**NOTE**

Note position and orientation of hoses prior to removal to ensure proper installation.

11. Remove hoses (18 and 19) and two clamps (27) from heater core (28).
12. Remove two air conditioner hoses (10 and 11) and O-rings (29 and 30) from expansion valve (31). Discard O-rings (29 and 30).
13. Remove drain hose assembly (32) from bottom of HVAC assembly (8).
14. Remove four screws (33) and HVAC tray (26) from HVAC assembly (8).

END OF TASK

INSTALLATION



1. Install HVAC assembly (8) on HVAC tray (26) with four screws (33).

NOTE

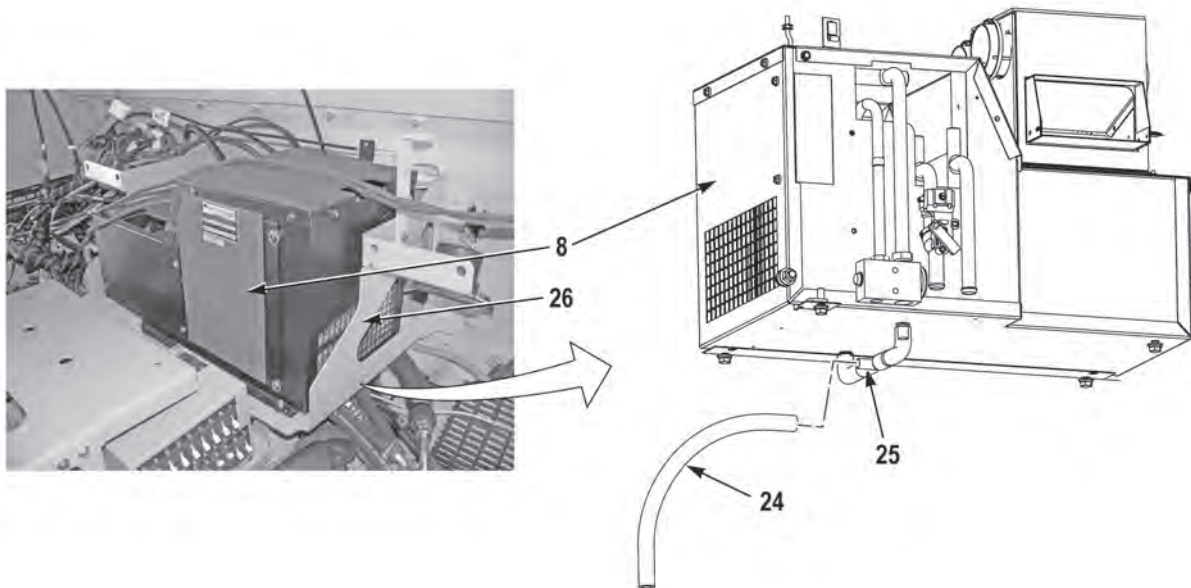
Install hoses as noted prior to removal.

2. Lightly lubricate two new O-rings (29 and 30) with PAG oil and install air conditioner hoses (10 and 11) and O-rings (29 and 30) on expansion valve (31). Tighten hose (10) to 12 lb-ft (16.3 N•m). Tighten hose (11) to 24 lb-ft (32.5 N•m).

CAUTION

Do not overtighten clamp on heater control valve. Failure to comply may result in damage to equipment.

3. Install two heater hoses (18 and 19) and clamps (27) on heater core (28). Tighten clamp (27) on metal line to 40 lb-in. (4.53 N•m).
4. Install drain hose assembly (32) on bottom of front HVAC (8).



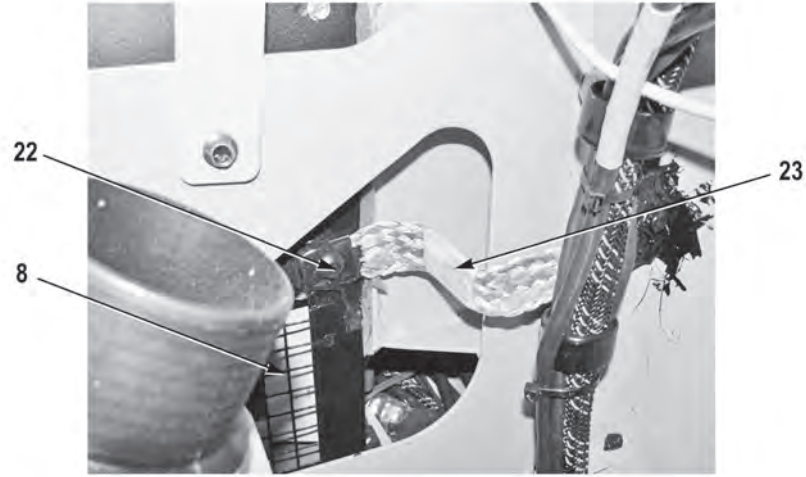
WARNING

HVAC assembly and HVAC tray weighs 60 lbs (27.2 kg). Do not move or lift HVAC assembly and HVAC tray without the aid of an assistant. Failure to comply may result in injury or death to personnel.

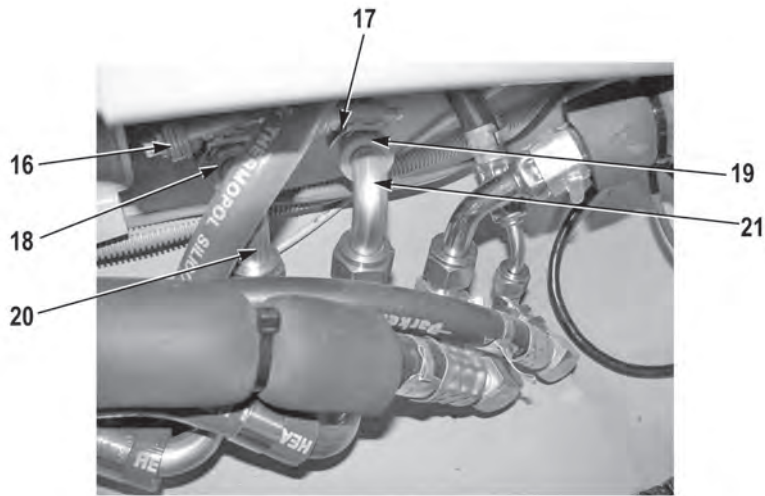
CAUTION

Ensure all wires and cables are clear of HVAC installation path. Failure to comply may result in damage to equipment.

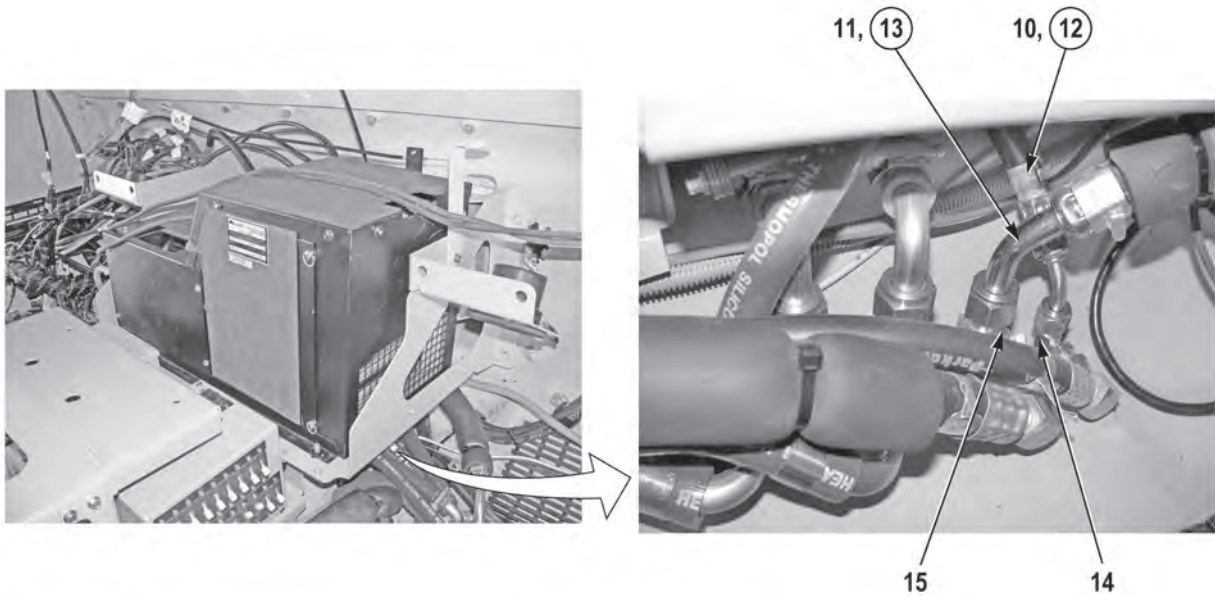
5. With the aid of an assistant, position HVAC tray (26) and HVAC assembly (8) in vehicle.
6. Install drain hose (24) on tee fitting (25).



7. Install ground strap (23) on HVAC assembly (8) with screw (22).



8. Install two heater hoses (18 and 19) and clamps (16 and 17) on fittings (20 and 21). Tighten clamps (16 and 17) to 40 lb-in (4.53 N•m).



9. Lightly lubricate two O-rings (12 and 13) with PAG oil and install hoses (10 and 11) and O-rings (12 and 13) on fittings (14 and 15). Tighten hose (10) to 12 lb-ft (16.3 N•m). Tighten hose (11) to 24 lb-ft (32.5 N•m).

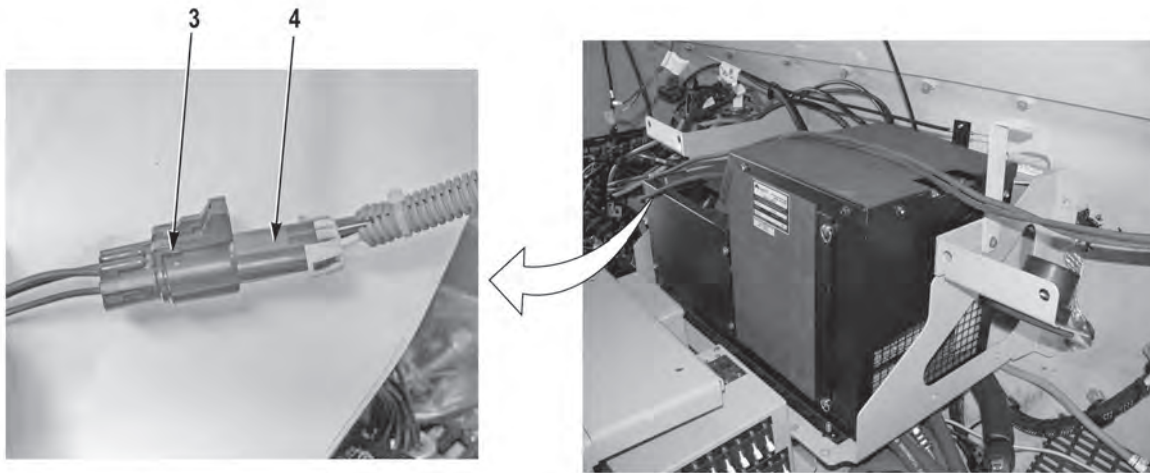
NOTE

Radiator should be filled and checked for leaks and air conditioner system vacuum leak checked before HVAC assembly is completely installed. Once HVAC assembly tray is mounted some hoses and fittings that were removed will not be easily accessed.

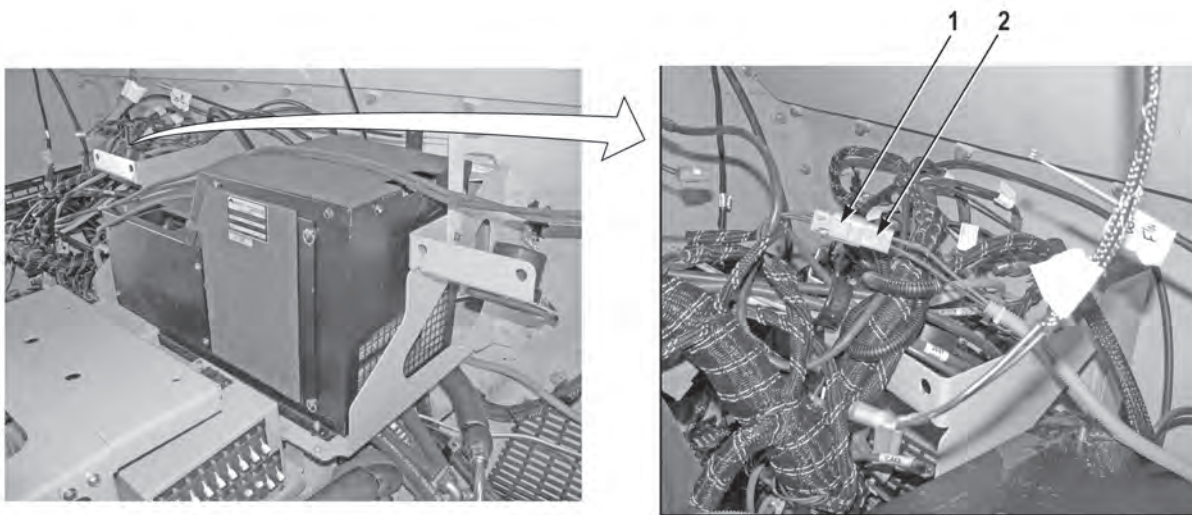
10. Fill radiator (reservoir equipped) (WP 0176) or surge tank equipped (WP 0177).
11. Vacuum leak check air conditioning system (WP 0024).



12. Remove screw (9) and blower motor cover (7) from HVAC assembly (8).
13. Connect connector (5) to HVAC assembly connector (6).



14. Connect connector (3) to HVAC connector (4).



15. Connect connector (1) to HVAC assembly connector (2).

16. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HVAC REPLACEMENT, REAR (M1240/M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
System refrigerant recovered (WP 0024)
Batteries disconnected (WP 0186)
Cooling system drained (reservoir equipped)
(WP 0176)
Cooling system drained (surge tank equipped)
(WP 0177)
Passenger side rear seat raised (M1240A1)
Passenger side rear seat removed (M1240/
M1245) (WP 0162)

Tools and Special Tools

Tool Kit, Refrigeration Service Ordinance
Wrench, Torque, 300 in-lb
Wrench, Torque, 75 ft-lb

Materials/Parts

Lockwasher (Item 6)
Lockwasher (Item 13)
O-ring (Item 44)

Materials/Parts (continued)

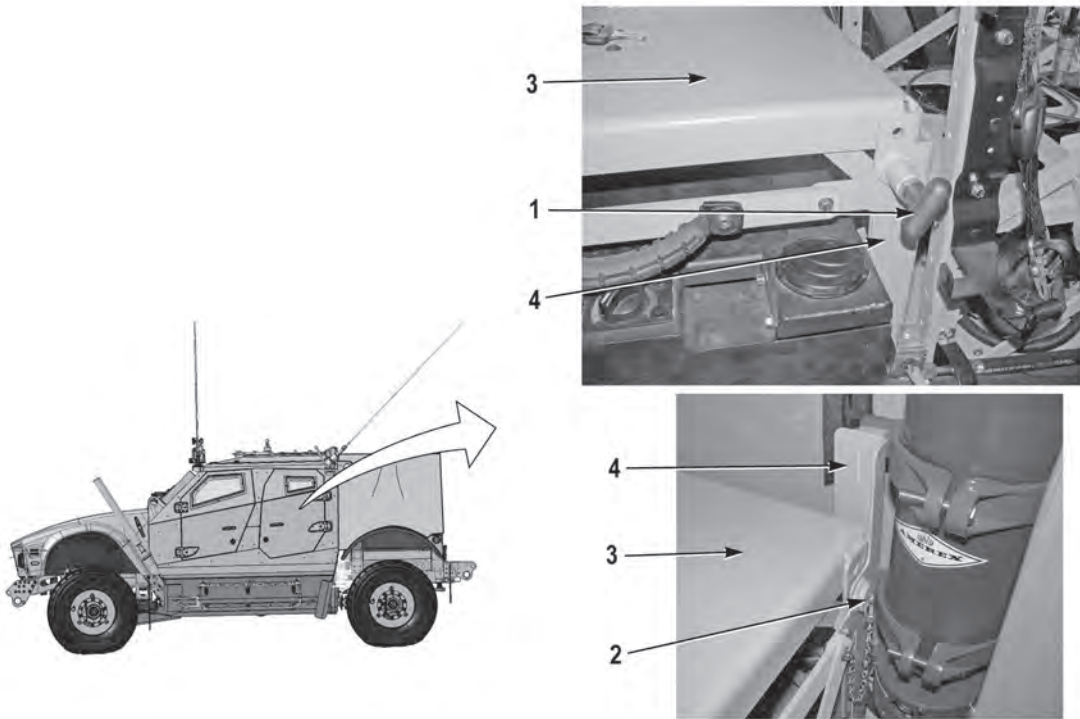
O-ring (Item 47)
Lockwasher (Item 52)
Fasteners, Pushpin (4) (Item 58)
Cap and Plug Set
Refrigerant Oil, PAG
Tags, Identification
Ties, Cable

Personnel Required

Two

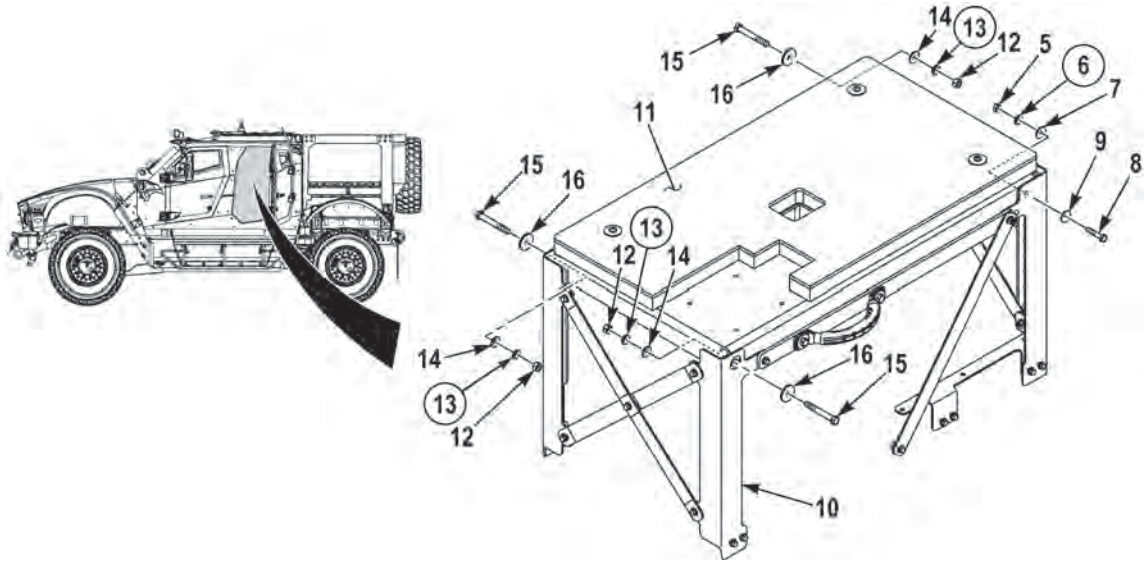
Follow-On Maintenance

Install passenger side rear seat (M1240/M1245)
(WP 0162)
Connect batteries (WP 0186)
Recharge refrigerant system (WP 0024)
Fill cooling system (reservoir equipped)
(WP 0176)
Fill cooling system (surge tank equipped)
(WP 0177)
Remove and stow wheel chocks

REMOVAL**NOTE**

- Perform Step (1) for M1240.
- Gunner's platform will fall when pins are removed.

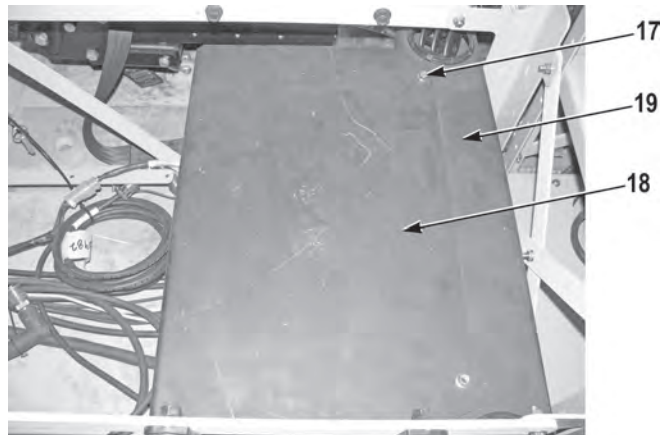
1. Remove three T-pins (1), pin (2), and gunner's platform (3) from platform stands (4).



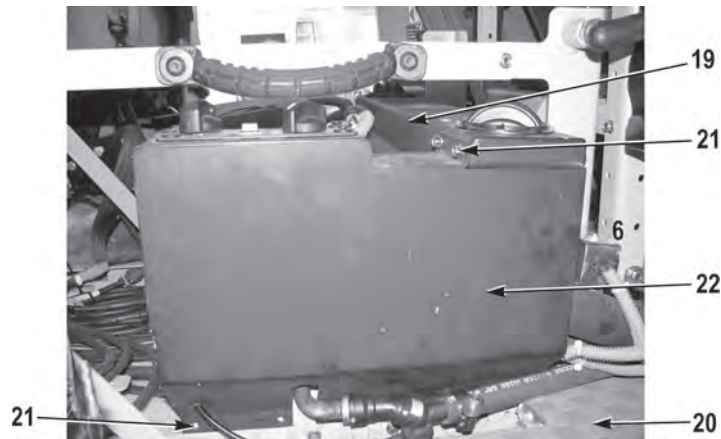
NOTE

Perform Steps (2) and (3) for M1240A1.

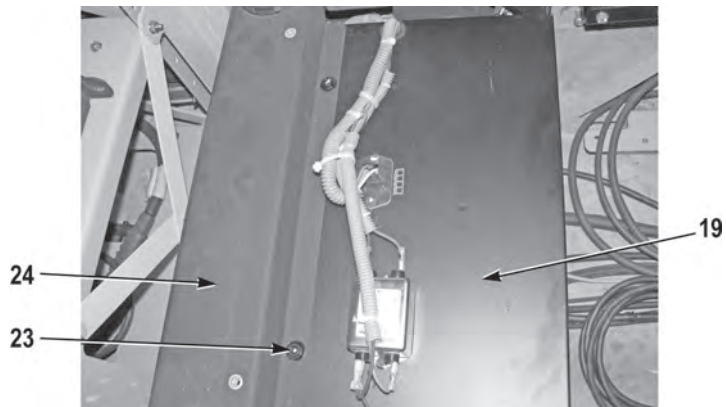
2. Remove nut (5), lockwasher (6), washer (7), screw (8), and washer (9) from platform stand (10) and gunner platform (11). Discard lockwasher.
3. Remove three nuts (12), lockwashers (13), washers (14), screws (15), washers (16), and gunner platform (11) from platform stand (10). Discard lockwashers.



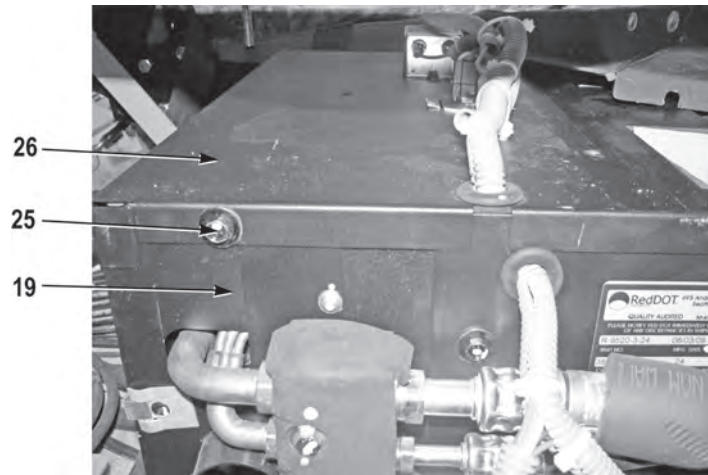
4. Remove four screws (17) and cover (18) from rear HVAC (19).



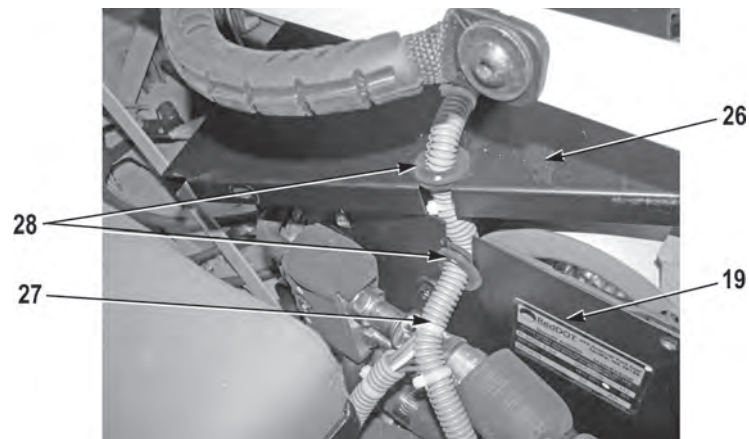
5. Remove passenger side rear floor mat (20) from vehicle.
6. Remove six screws (21) and control panel (22) from rear HVAC (19).



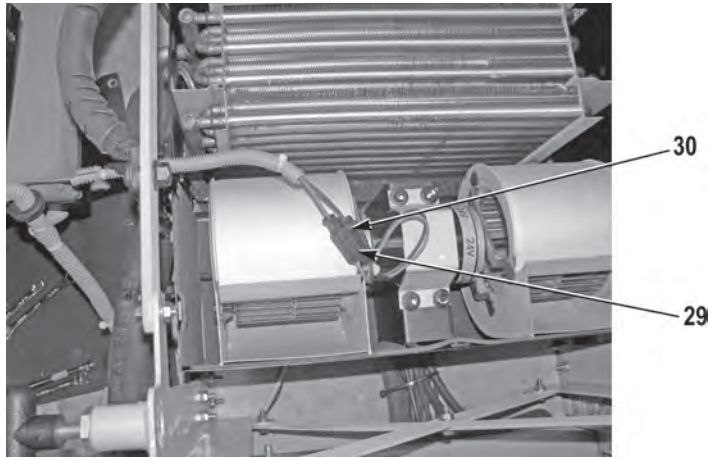
7. Remove five screws (23) and top plenum (24) from rear HVAC (19).



8. Remove screw (25) and HVAC cover (26) from rear HVAC (19).



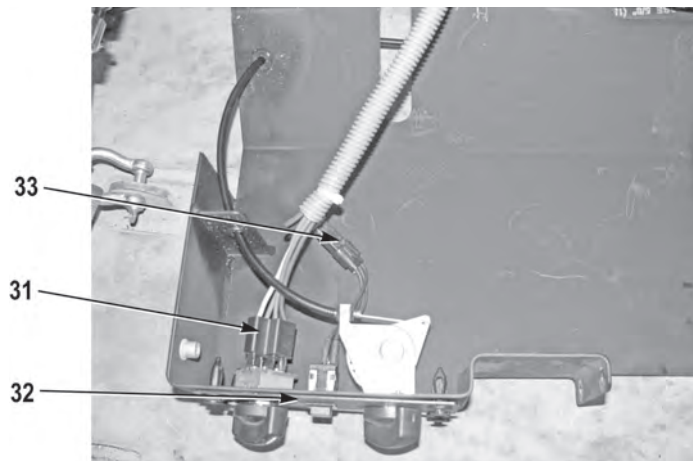
9. Remove HVAC harness (27) and two grommets (28) from HVAC cover (26) and rear HVAC (19).



NOTE

Tag and mark connectors prior to removal to ensure proper installation.

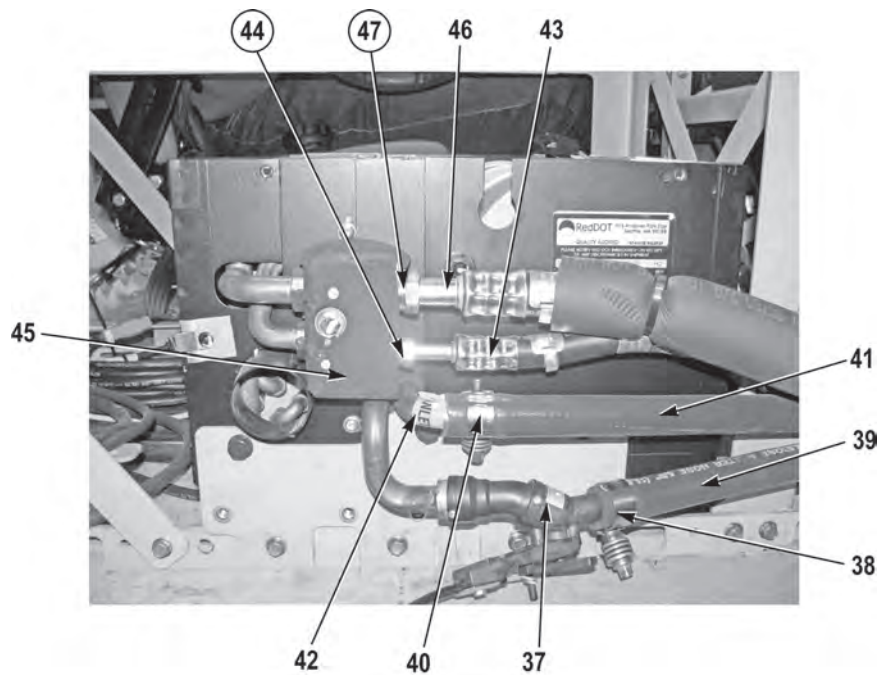
10. Disconnect two connectors (29 and 30).



11. Disconnect connector (31) from HVAC control board (32).
12. Disconnect connector (33).



13. Remove screw (34), plate (35), and cable (36) from heater control valve (37).



NOTE

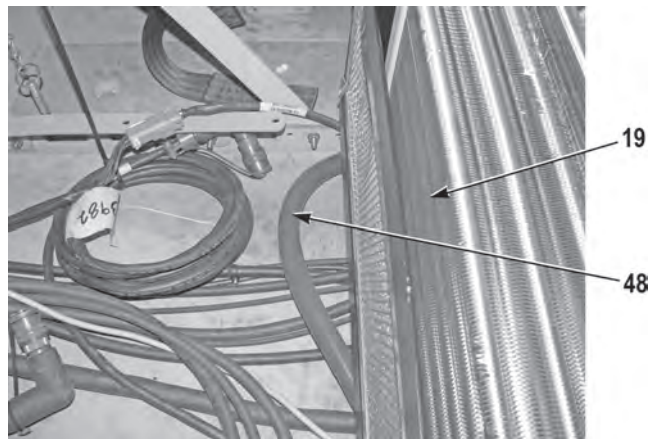
- Tag and mark hoses prior to removal to ensure proper installation.
- Cap and plug hoses and fittings upon removal.

14. Loosen clamp (38) and remove hose (39) and clamp (38) from heater control valve (37).

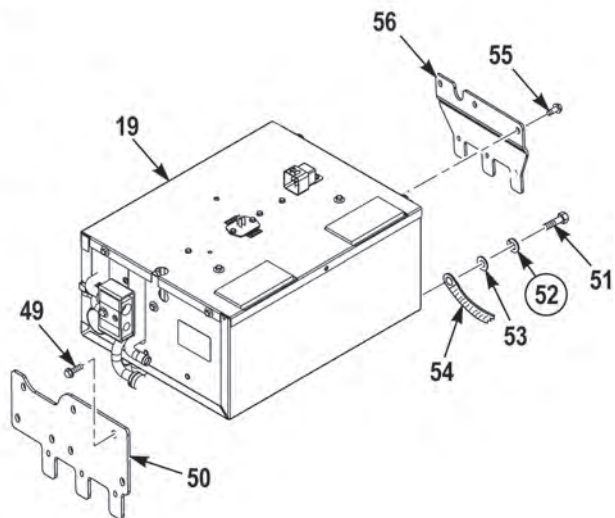
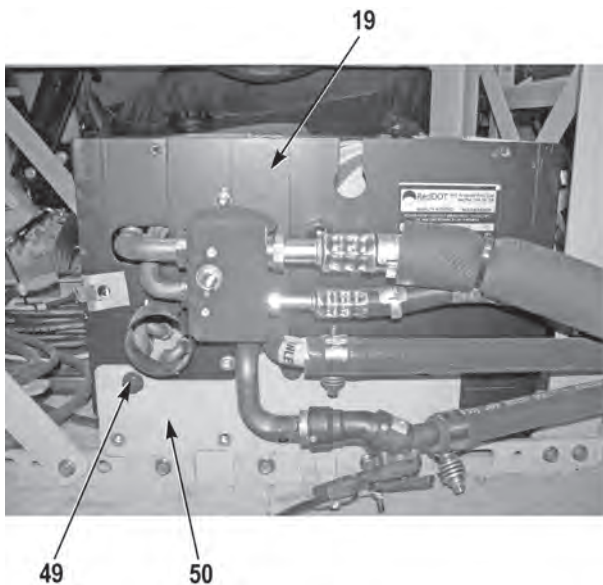
15. Loosen clamp (40) and remove hose (41) and clamp (40) from heater core (42).

16. Remove hose (43) and O-ring (44) from expansion valve (45). Discard O-ring (44).

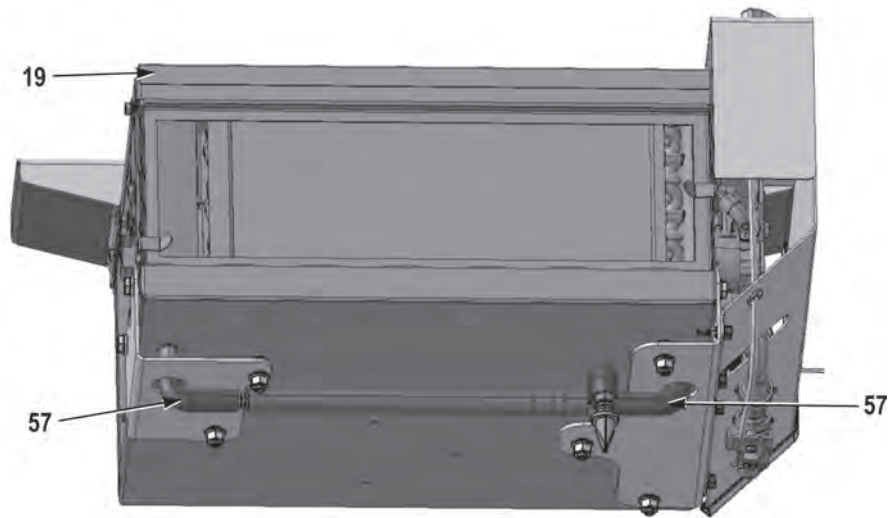
17. Remove hose (46) and O-ring (47) from expansion valve (45). Discard O-ring (47).



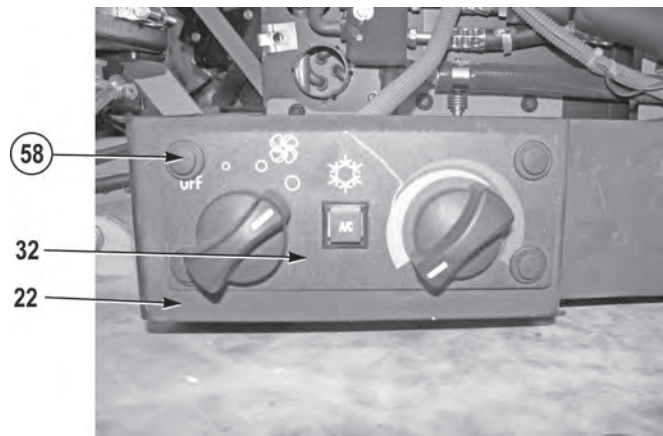
18. Remove drain hose (48) from rear HVAC (19).



19. Remove three screws (49) from passenger side support bracket (50) and rear HVAC (19).
20. Remove screw (51), lockwasher (52), washer (53), and ground strap (54) from rear HVAC (19). Discard lockwasher (52).
21. With the aid of an assistant, remove three screws (55) and rear HVAC (19) from driver side support bracket (56) and vehicle.



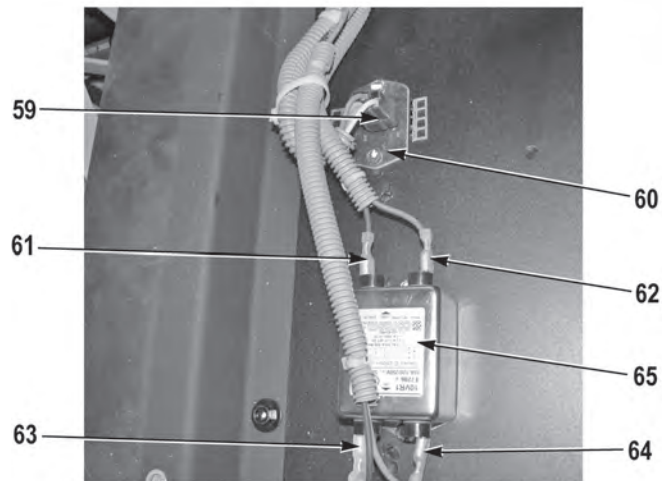
22. Remove two hoses (57) from rear HVAC (19).



NOTE

Perform Step (23) if HVAC control board needs to be removed.

23. Remove four pushpin fasteners (58) and HVAC control board (32) from control panel (22). Discard pushpin fasteners (58).



NOTE

Perform Steps (24) and (25) if HVAC wire harness needs to be removed.

24. Disconnect connector (59) from blower motor resistor (60).
25. Disconnect four wires (61, 62, 63, and 64) from blower motor control (65).

END OF TASK

INSTALLATION

NOTE

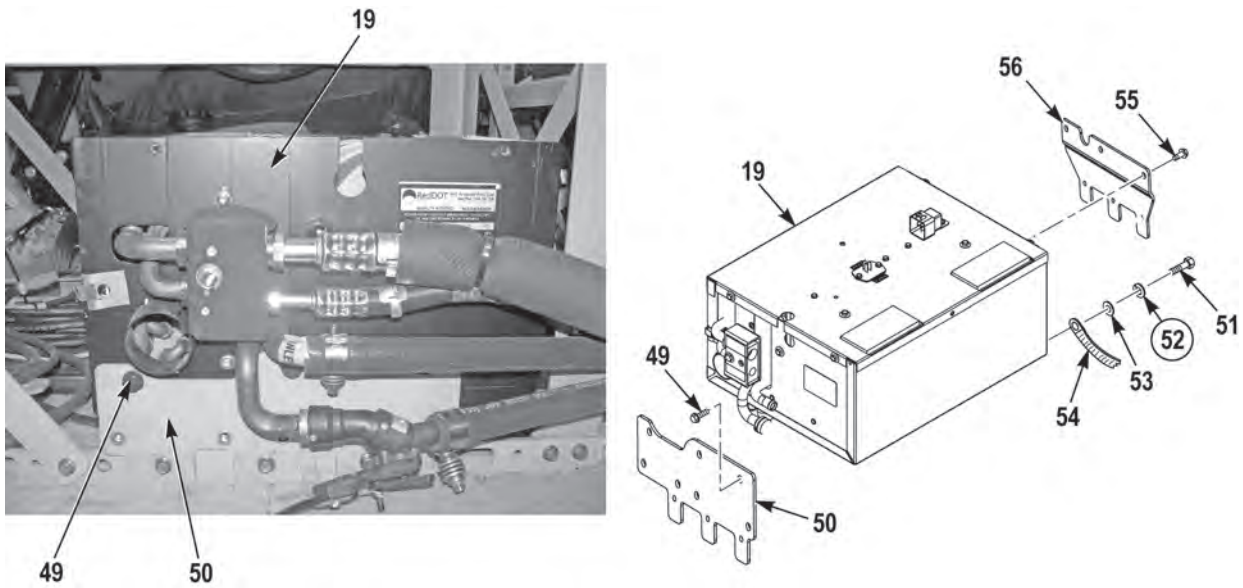
Perform Steps (1) and (2) if HVAC wire harness was removed.

1. Connect four wires (61, 62, 63, and 64) to blower motor control (65).
2. Connect connector (59) to blower motor resistor (60).

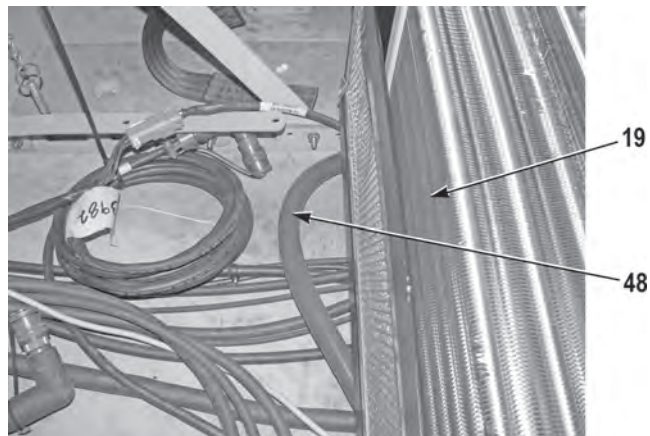
NOTE

Perform Step (3) if HVAC control board was removed.

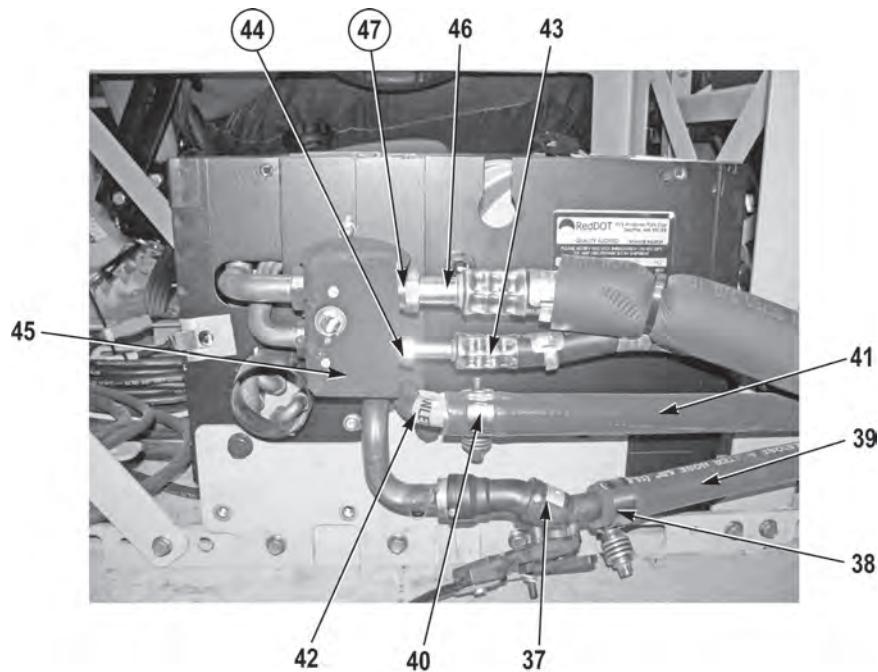
3. Install HVAC control board (32) on control panel (22) with four new pushpin fasteners (58).
4. Install two hoses (57) on rear HVAC (19).



5. With the aid of an assistant, position rear HVAC (19) in vehicle.
6. Secure rear HVAC (19) to driver side support bracket (56) with three screws (55).
7. Install ground strap (52) on rear HVAC (19) with washer (53), new lockwasher (52), and screw (51).
8. Secure rear HVAC (19) to passenger side support bracket (50) with three screws (49).



9. Install drain hose (48) on rear HVAC (19).

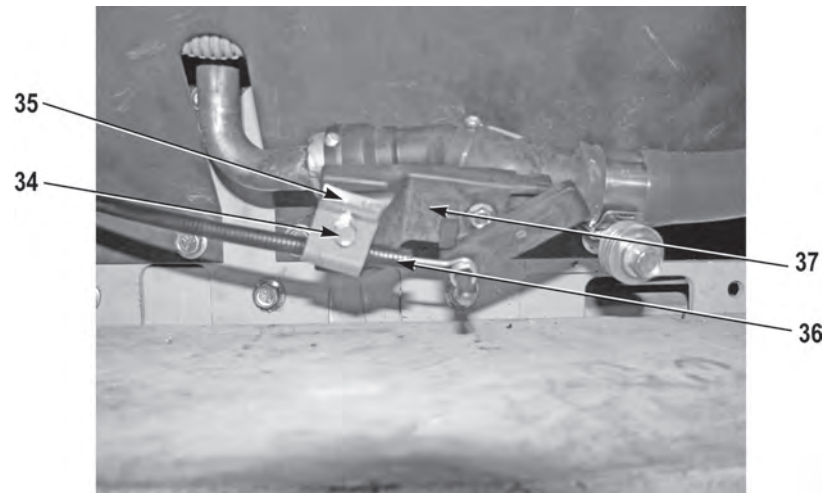


10. Apply PAG oil to new O-ring (47) and install hose (46) and O-ring (47) on expansion valve (45). Tighten hose (46) to 24 lb-ft (32.5 N•m).
11. Apply PAG oil to new O-ring (44) and install hose (43) and O-ring (44) on expansion valve (45). Tighten hose (43) to 12 lb-ft (16.3 N•m)
12. Install hose (44) and clamp (40) on heater core (42). Tighten clamp (40) to 40 lb-in (4.53 N•m).

CAUTION

Do not overtighten clamp on heater control valve. Failure to comply may result in damage to equipment.

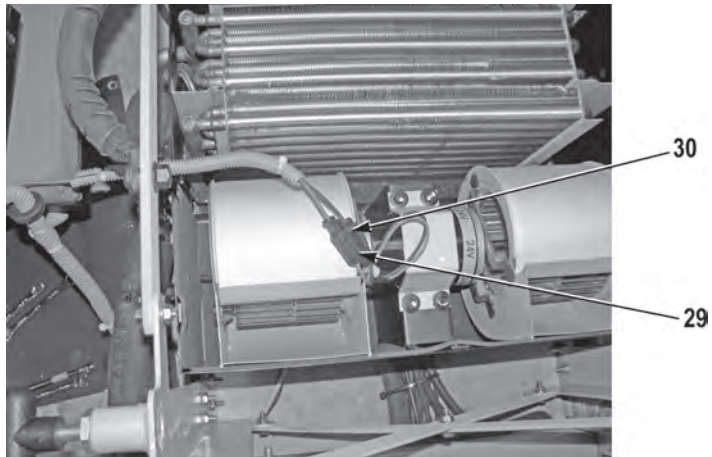
13. Install hose (39) and clamp (38) on heater control valve (37).



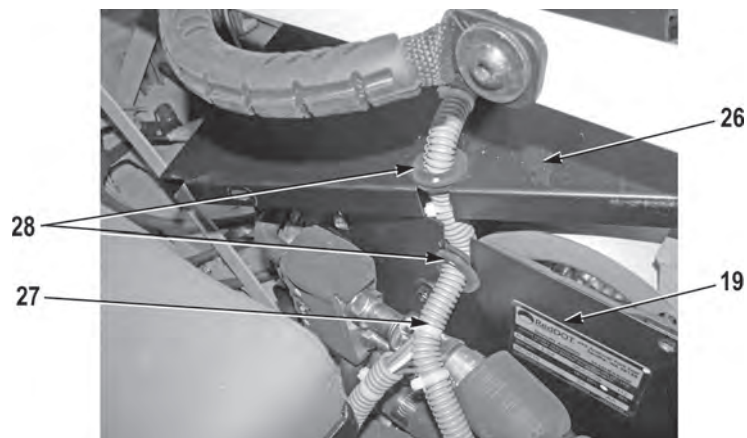
14. Install cable (36) on heater control valve (37) with plate (35) and screw (34).



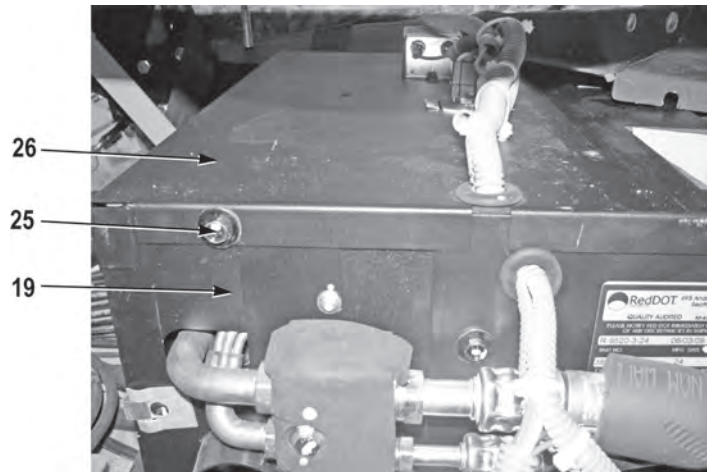
15. Connect connector (33).
16. Connect connector (31) to HVAC control board (32).



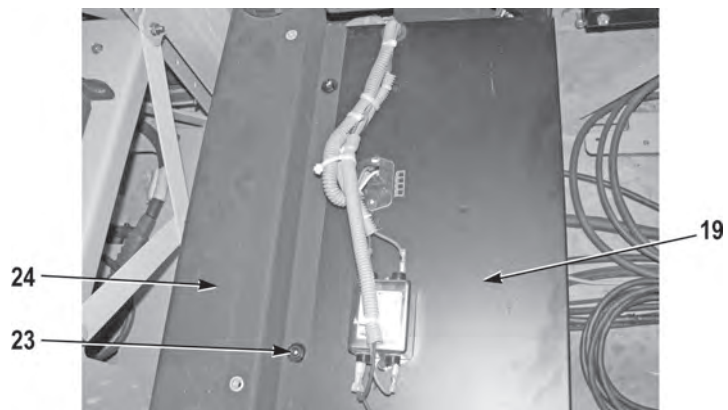
17. Connect two connectors (29 and 30).



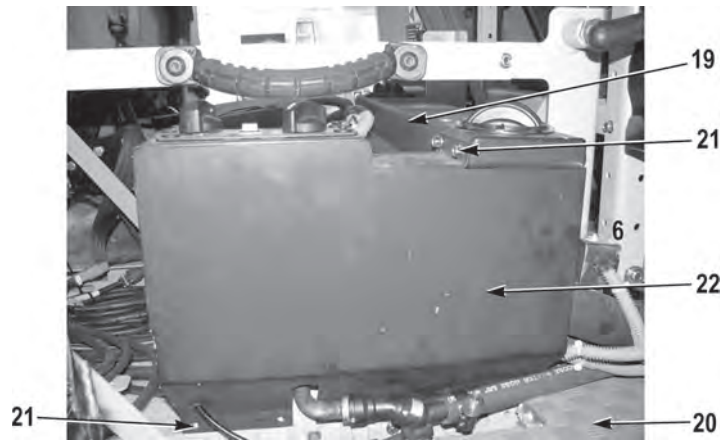
18. Install HVAC harness (27) on rear HVAC (19) and HVAC cover (26) with two grommets (28).



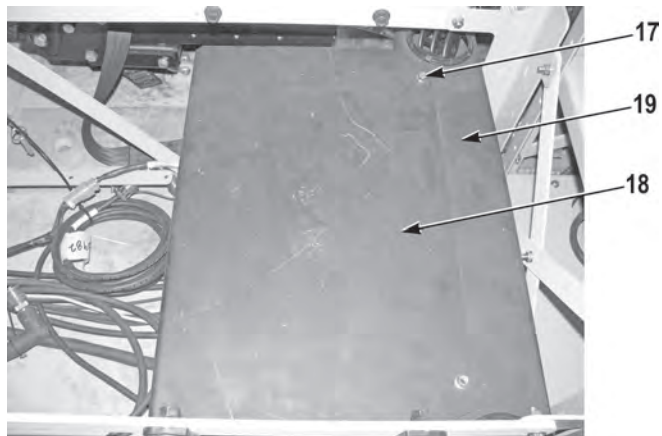
19. Install HVAC cover (26) on rear HVAC (19) with screw (25).



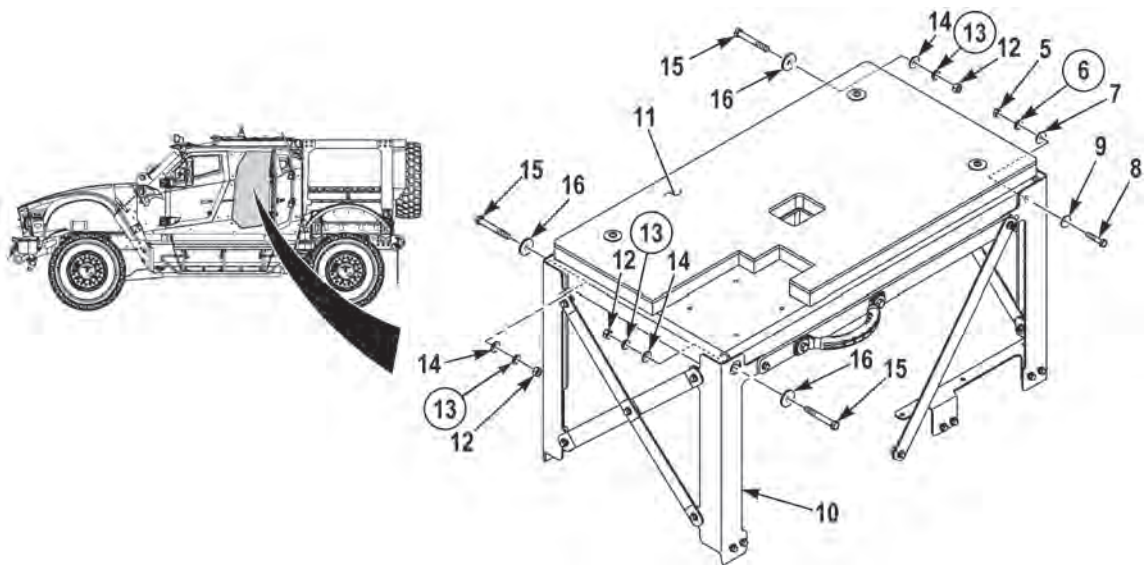
20. Install top plenum (24) on rear HVAC (19) with five screws (23).



21. Install control panel (22) on rear HVAC (19) with six screws (9).
22. Install passenger side rear floor mat (20) in vehicle.



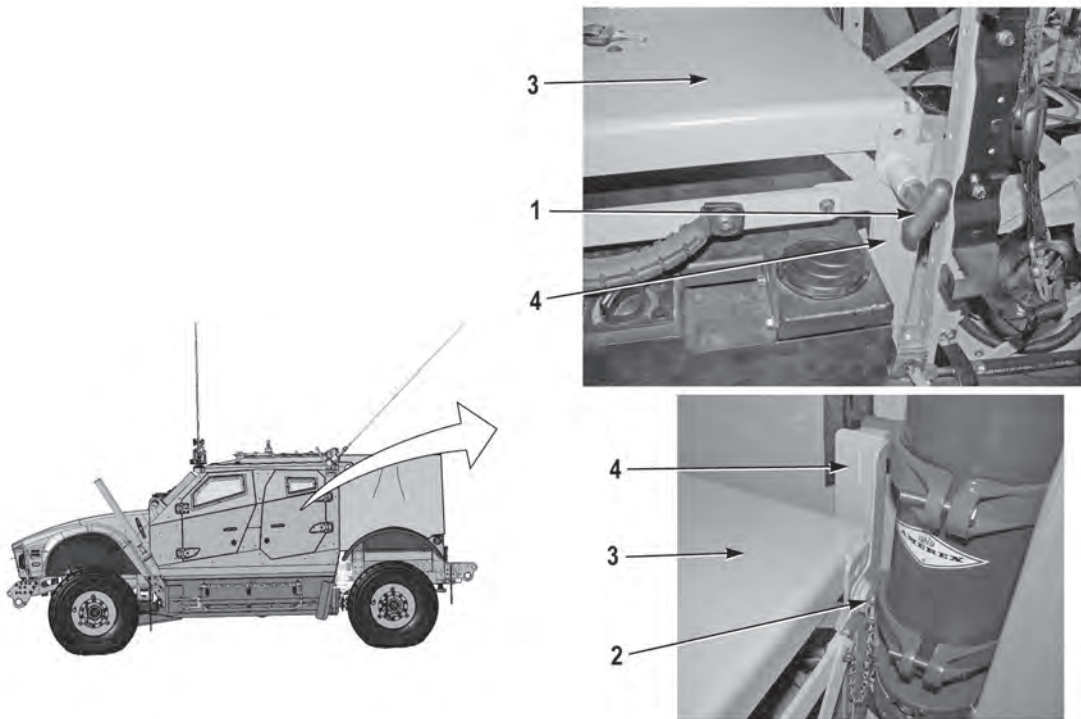
23. Install cover (18) on rear HVAC (19) with four screws (17).



NOTE

Perform Steps (24) and (25) for M1240A1.

24. Install gunner platform (16) on platform stand (10) with three washers (16), screws (15), washers (14), new lockwashers (13), and nuts (12).
25. Secure gunner platform (11) on platform stand (10) with washer (9), screw (8), washer (7), new lockwasher (6), and nut (5).

**NOTE**

Perform Step (26) for M1240.

26. Install gunner's platform (3) on four gunner stands (4) with pin (2) and three T-pins (1).
27. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

LOWER PLENUM REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Fire suppression system chassis switch removed
(WP 0062)

Materials/Parts

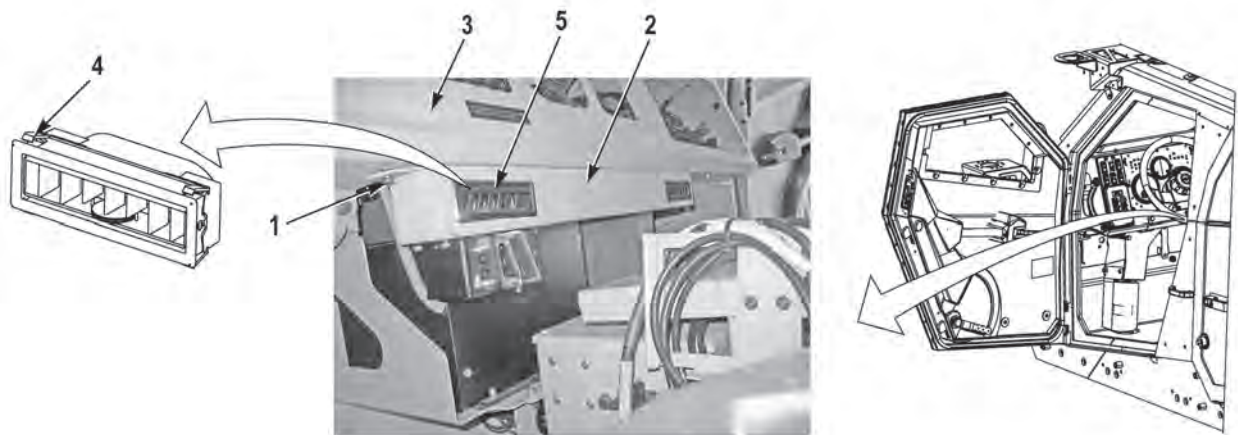
None

Follow-On Maintenance

Install fire suppression system chassis switch
(WP 0062)
Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL

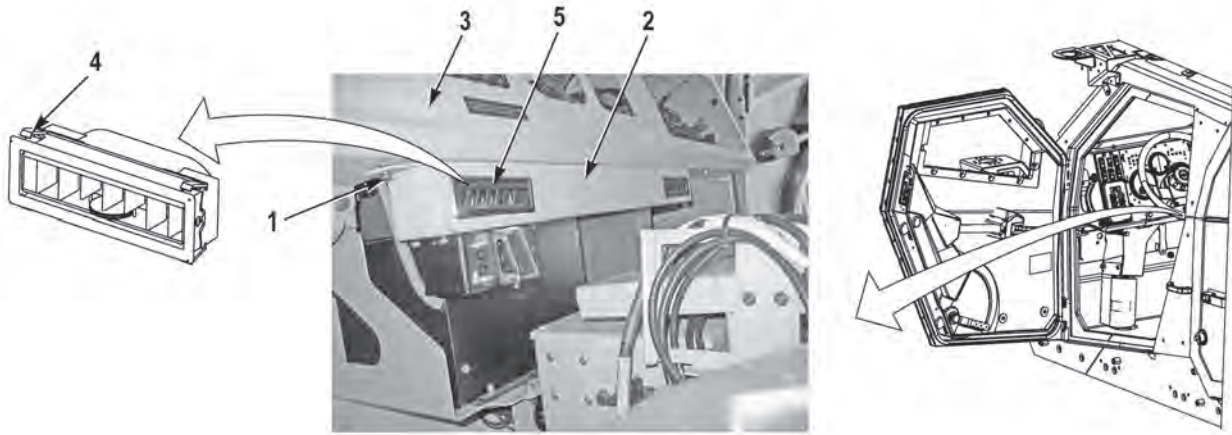
1. Remove two screws (1) and lower plenum (2) from dash assembly (3).

NOTE

Perform Step (2) if vents are being replaced.

2. Push clips (4) down and remove two vents (5) from lower plenum (2).

END OF TASK

INSTALLATION**NOTE**

Perform Step (1) if vents were removed.

1. Install two vents (5) on plenum (2) until secured by clips (4).
2. Install lower plenum (2) on dash assembly (3) with two screws (1).
3. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

PASSENGER SIDE SPLASH GUARD REPLACEMENT (AFES NITROGEN DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Front sensor line removed (WP 0072)
 Front fire suppression cylinder removed (WP 0067)

Tools and Special Tools

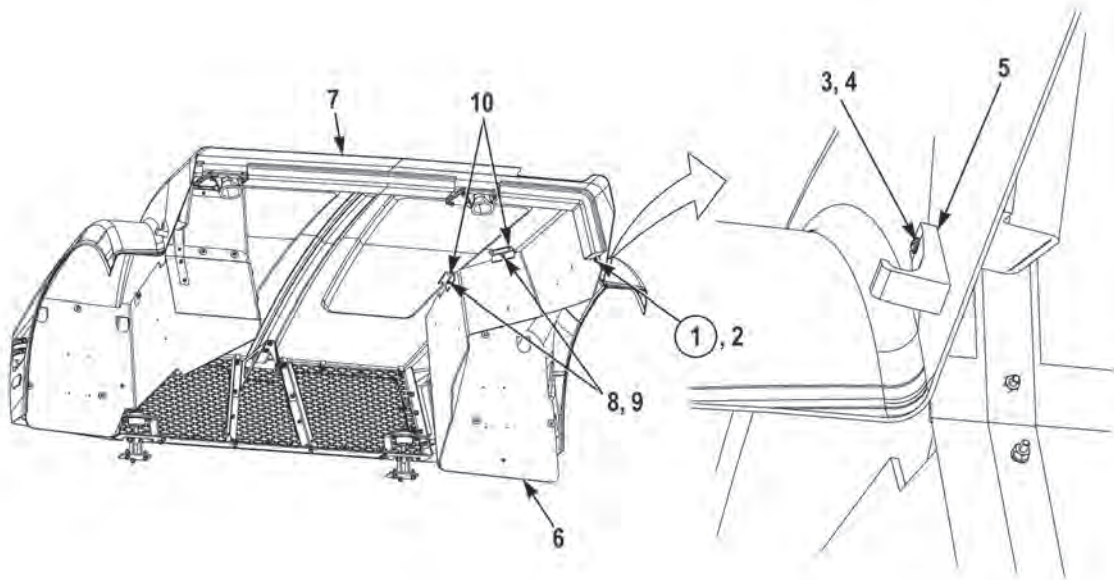
Tool Kit, General Mechanic's: Automotive

Materials/Parts

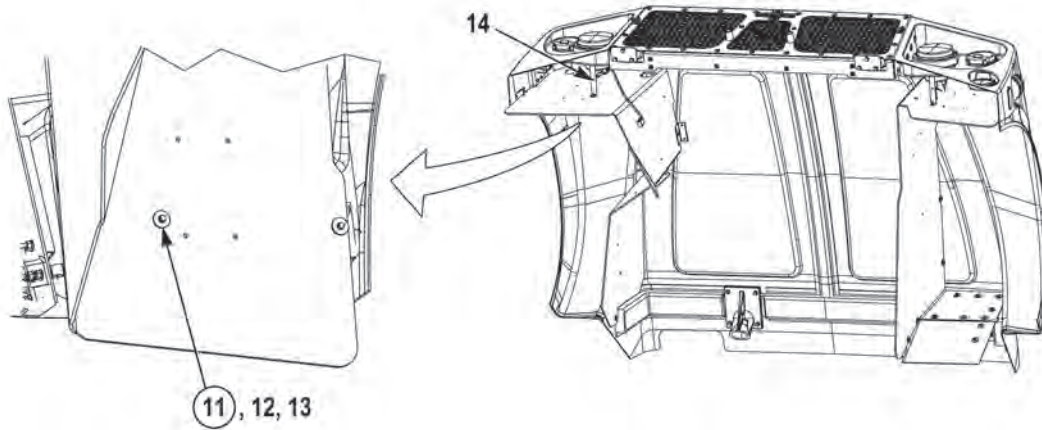
Locknut (2) (Item 1)
 Locknut (Item 11)
 Locknut (2) (Item 18)
 Compound, Sealing, Loctite 242

Follow-On Maintenance

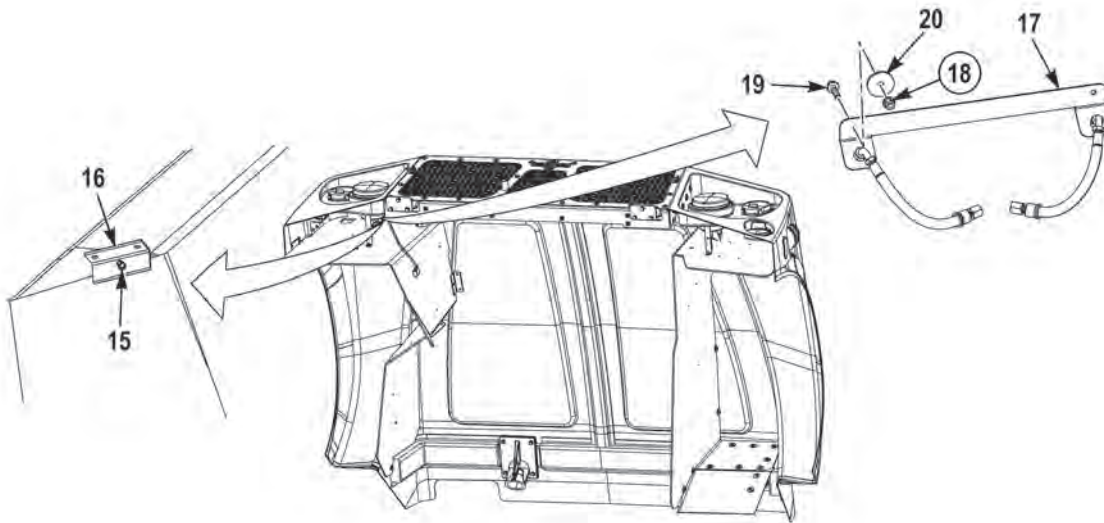
Install front fire suppression cylinder (WP 0067)
 Install front sensor line (WP 0072)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL

1. Remove two locknuts (1), washers (2), screws (3), washers (4), and hood latch (5) from splash guard (6) and hood (7). Discard locknuts (1).
2. Remove two screws (8) and washers (9) from splash guard (6) and two mounting brackets (10).



3. Remove locknut (11), screw (12), and washer (13) from splash guard (6) and bracket (14). Discard locknut (11).



4. Remove screw (15) and splash guard (6) from mounting bracket (16) and nozzle discharge assembly (17).
5. Remove two locknuts (18), screws (19), washers (20), and nozzle discharge assembly (17) from splash guard (6). Discard locknuts (18).

END OF TASK

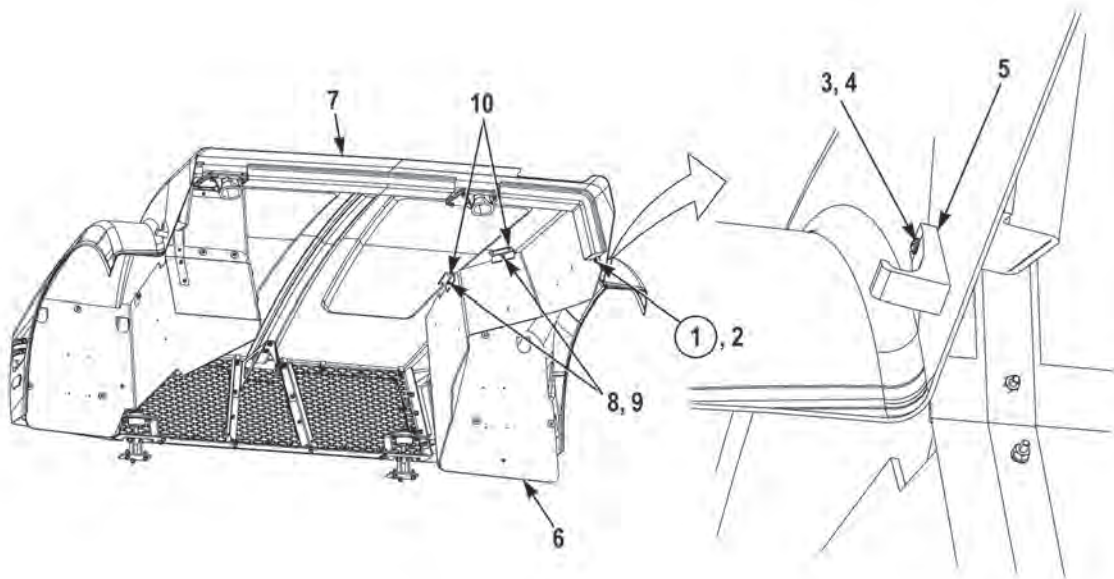
INSTALLATION

1. Install nozzle discharge assembly (17) on splash guard (6) with two washers (20), screws (19), and new locknuts (18).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 242, to threads of screw (15) and two screws (8).
3. Secure nozzle discharge assembly (17) on mounting bracket (16) and splash guard (6) with screw (15).
4. Install splash guard (6) on bracket (14) with washer (13), screw (12), and new locknut (11).



5. Install two washers (9) and screws (8) on two mounting brackets (10) and splash guard (6).
6. Install hood latch (5) on hood (7) and splash guard (6) with two washers (4), screws (3), washers (2), and new locknuts (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

PASSENGER SIDE SPLASH GUARD REPLACEMENT (AFES LINEAR WIRE DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Front splash guard fire suppression cylinder removed (WP 0068)
 Hood removed (WP 0157)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

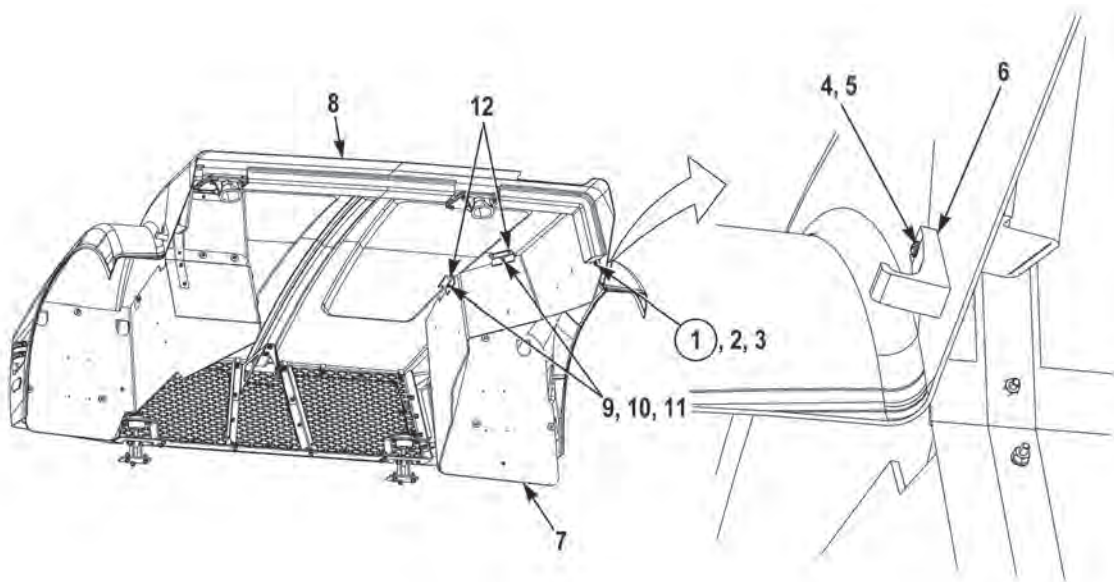
Locknut (2) (Item 1)
 Locknut (Item 13)

Materials/Parts (continued)

Locknut (Item 17)
 Locknut (Item 28)
 Compound, Sealing, Loctite 242

Follow-On Maintenance

Install hood (WP 0157)
 Install front splash guard fire suppression cylinder (WP 0068)
 Remove and stow wheel chocks

REMOVAL

1. Remove all cable ties on splash guard that secure engine and undercarriage sensor lines (WP 0073).
2. Remove two locknuts (1), washers (2), washers (3), screws (4), washers (5), and hood latch (6) from splash guard (7) and hood (8). Discard locknuts (1).

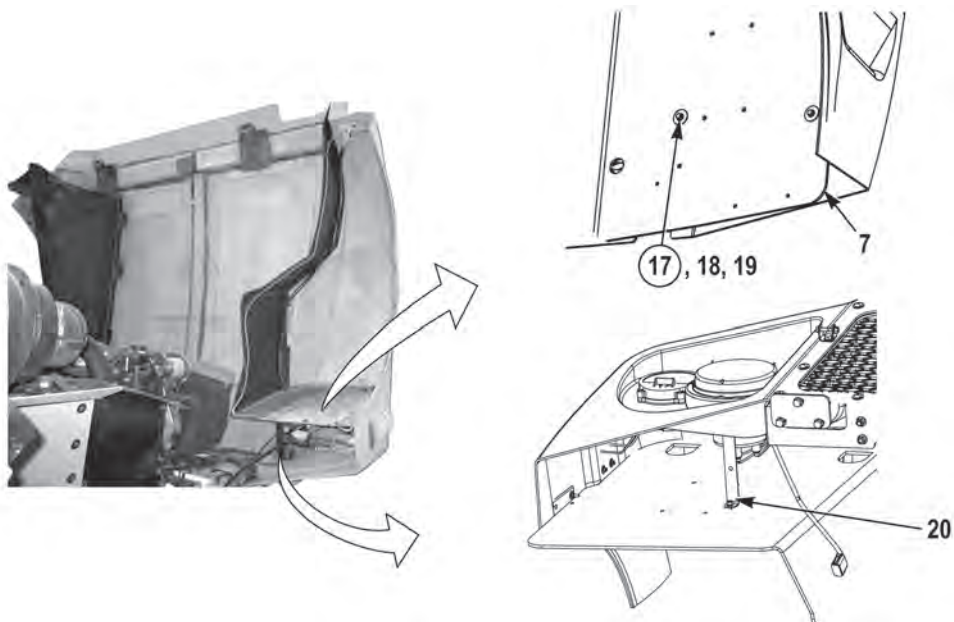
NOTE

Note position of cushion clips prior to removal to ensure proper installation.

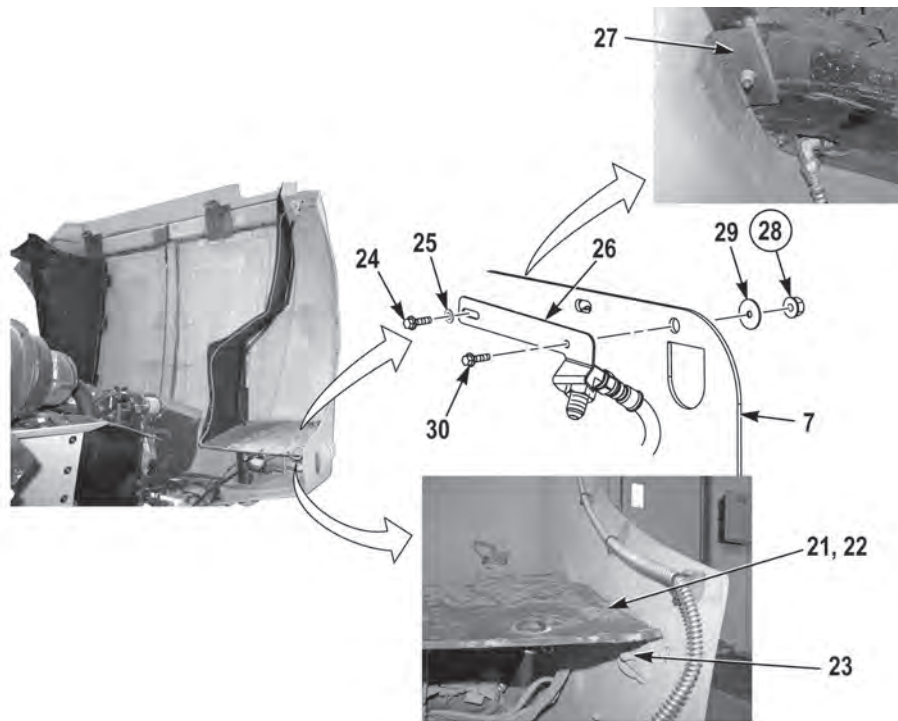
3. Remove two screws (9), washers (10), and cushion clips (11) from two mounting brackets (12) and splash guard (7).



4. Remove locknut (13), screw (14), washer (15), and cushion clip (16) from splash guard (7). Discard locknut (13).



5. Remove locknut (17), washer (18), and screw (19) from splash guard (7) and bracket (20). Discard locknut (17).



6. Remove screw (21) and washer (22) from splash guard (7) and mounting bracket (23).
7. Remove screw (24), washer (25), and splash guard (7), from nozzle discharge assembly (26) and mounting bracket (27).
8. Remove locknut (28), washer (29), screw (30), and nozzle discharge assembly (26) from splash guard (7). Discard locknut (28).

END OF TASK

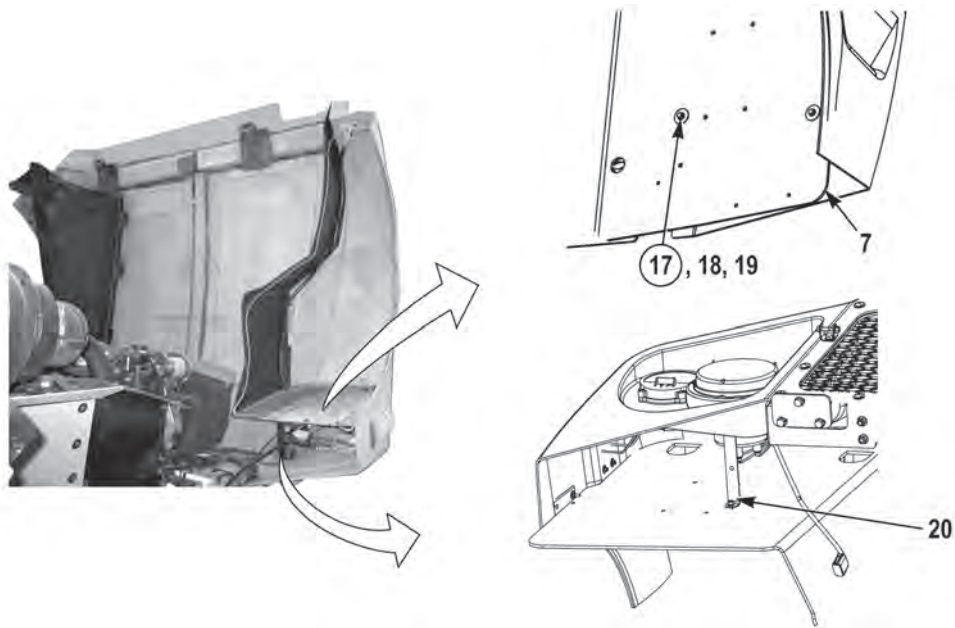
INSTALLATION

1. Install nozzle discharge assembly (26) on splash guard (7) with screw (30), washer (29), and new locknut (28).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 242 to threads of screw (24).
3. Secure nozzle discharge assembly (26) and splash guard (7) on mounting bracket (27) with washer (25) screw (24).
4. Apply sealing compound, Loctite 242, to threads of screw (21) and secure splash guard (7) on mounting bracket (23) with washer (22) and screw (21).



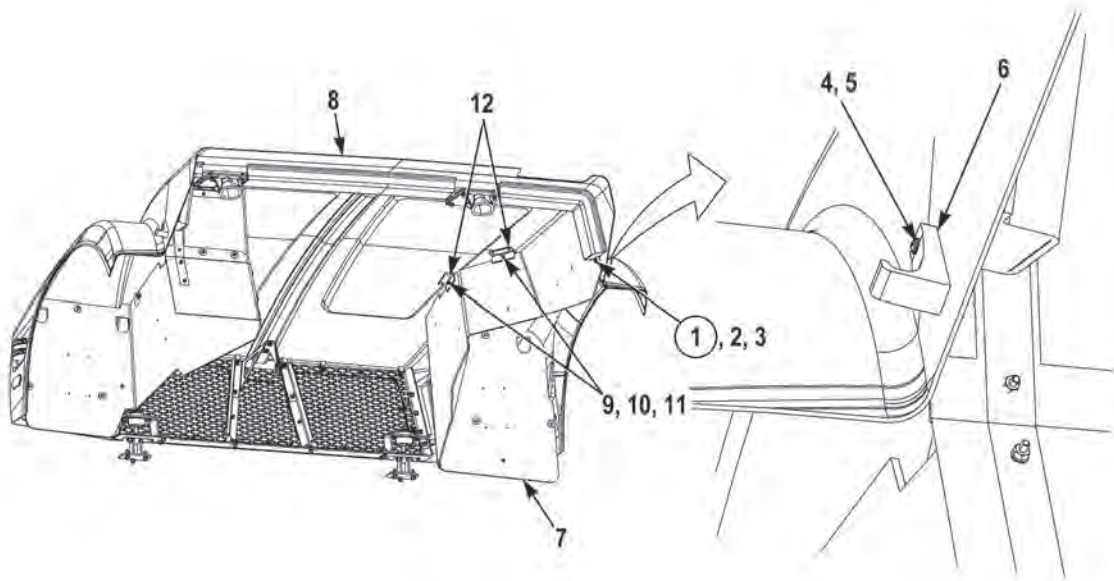
5. Install splash guard (7) on bracket (20) with screw (19), washer (18), and new locknut (17).



NOTE

Install cushion clips as noted prior to removal.

6. Install cushion clip (16) on splash guard (7) with washer (15), screw (14), and new locknut (13).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply sealing compound, Loctite 242 to threads of two screws (9) and install cushion clips (11), washers (10), and screws (9) on mounting brackets (12) and splash guard (7).
8. Install hood latch (6) on hood (8) and splash guard (7) with two washers (5), screws (4), washers (3), washers (2), and new locknuts (1).
9. Install all cable ties on splash guard that secure undercarriage and engine sensor lines (WP 0073).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

REAR AIR CONDITIONER REPLACEMENT (M1245)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 System Refrigerant Recovered (WP 0024)
 Batteries Disconnected (WP 0187)

Tools and Special Tools

Cap and Plug Set
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

O-rings (2)
 Fasteners, Pushpin (6) (Item 1)
 Locknuts (4) (Item 12)

Materials/Parts (continued)

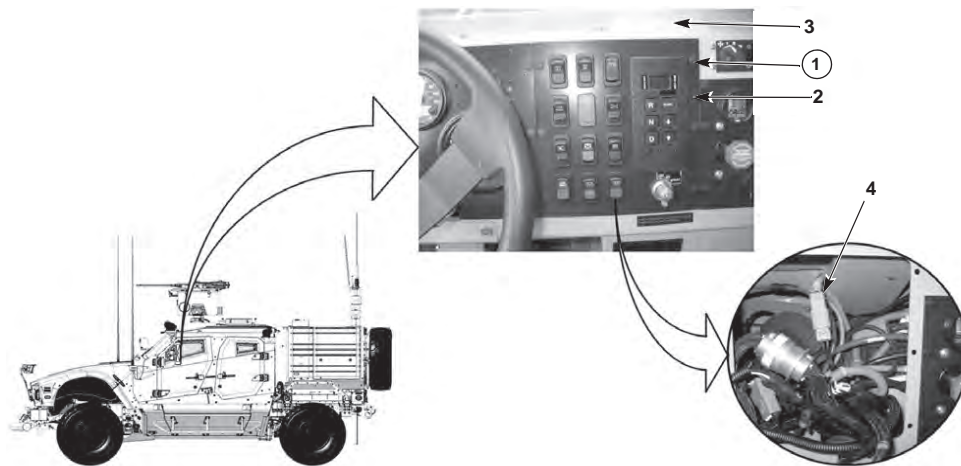
Cap and Plug Set
 Refrigerant Oil, PAG
 Tags, Identification
 Ties, Cable

Personnel Required

Two

Follow-On Maintenance

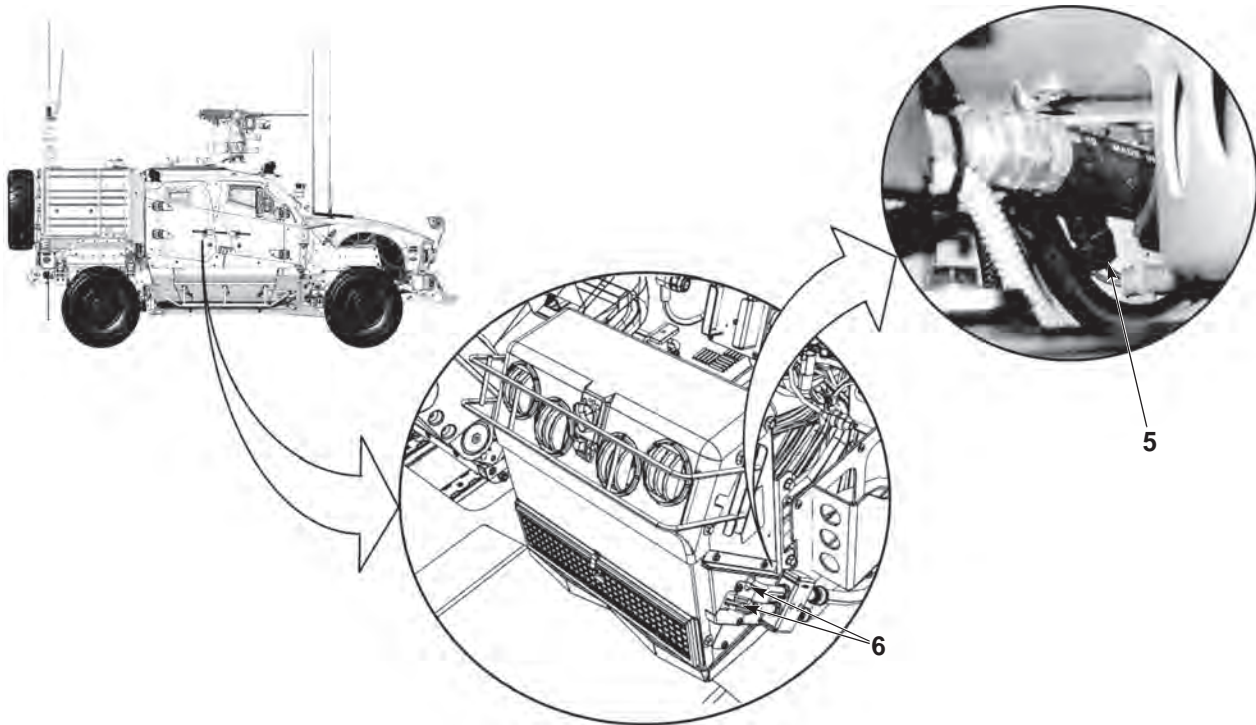
Connect Batteries (WP 0187)
 Recharge Refrigerant System (WP 0024)
 Remove and Stow Wheel Chocks

REMOVAL

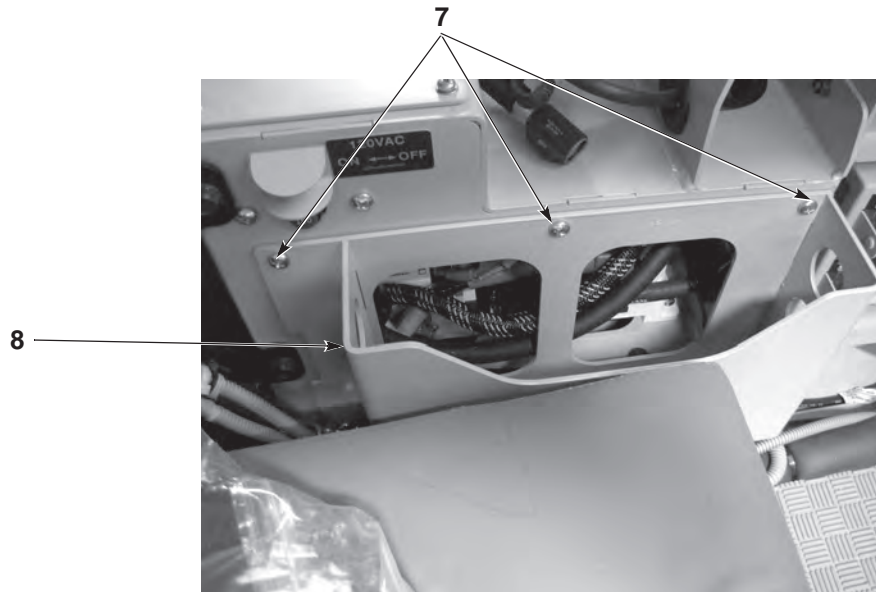
1. Remove six pushpin fasteners (1) from transmission dash panel (2) and move away from dash (3). Discard pushpin fasteners (1).
2. Tag and disconnect rear air conditioner switch connector (4).

NOTE

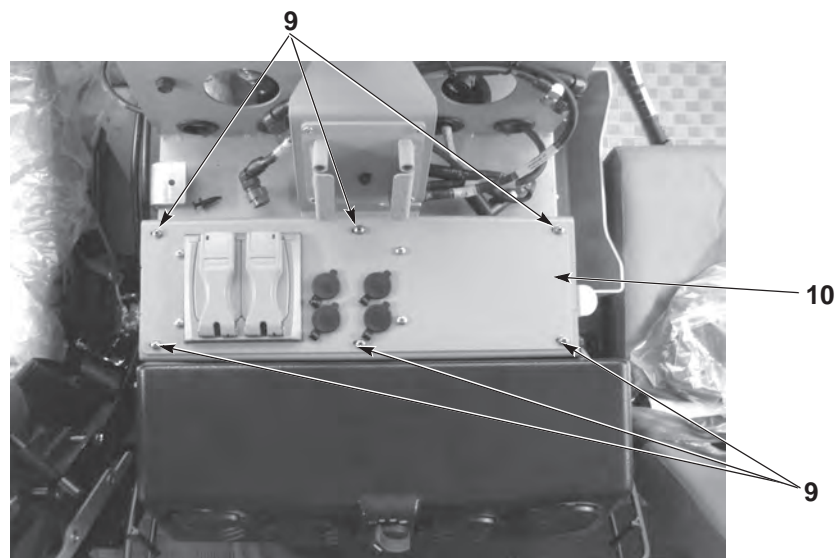
- Note harness routing prior to removal.
 - For easier installation, attach guide wire to the air conditioner power harness prior to removal.
3. Remove air conditioner power harness from dash (3).

REMOVAL – CONTINUED

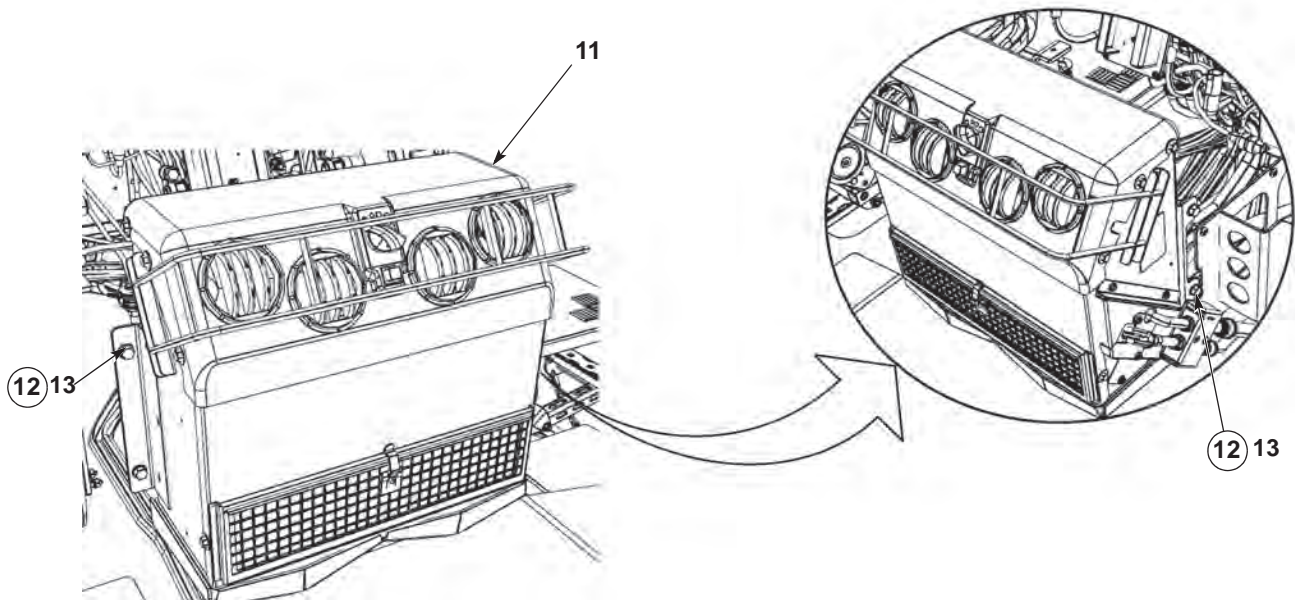
4. Disconnect rear air conditioner electrical connector (5).
5. Tag, disconnect, and cap rear air conditioner lines (6). Discard O-rings.

REMOVAL – CONTINUED

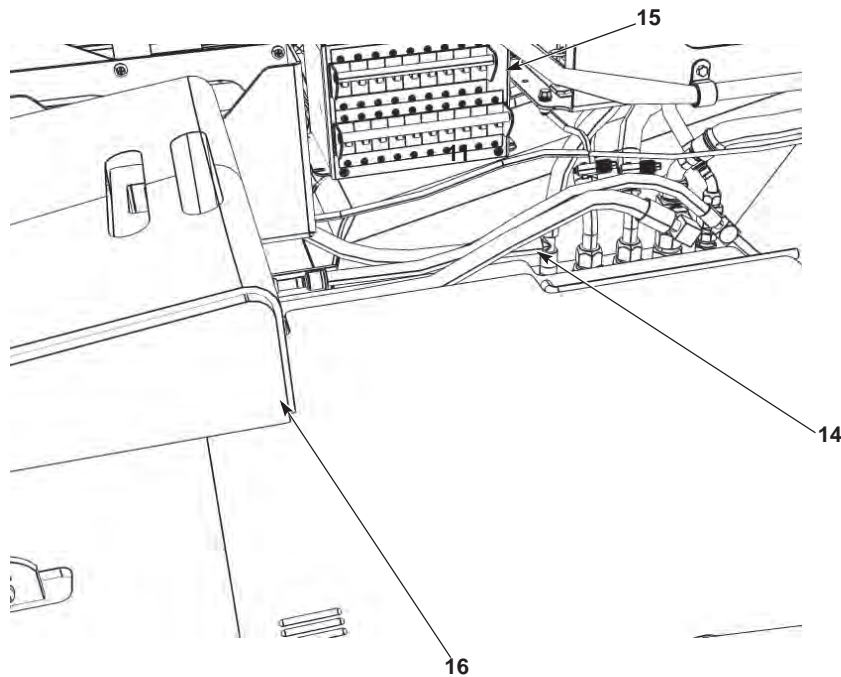
6. Remove six screws (7) from the back of the storage bracket (8).



7. Remove six screws (8) from the 120V outlet cover (10) to access the top rear A/C locknuts.

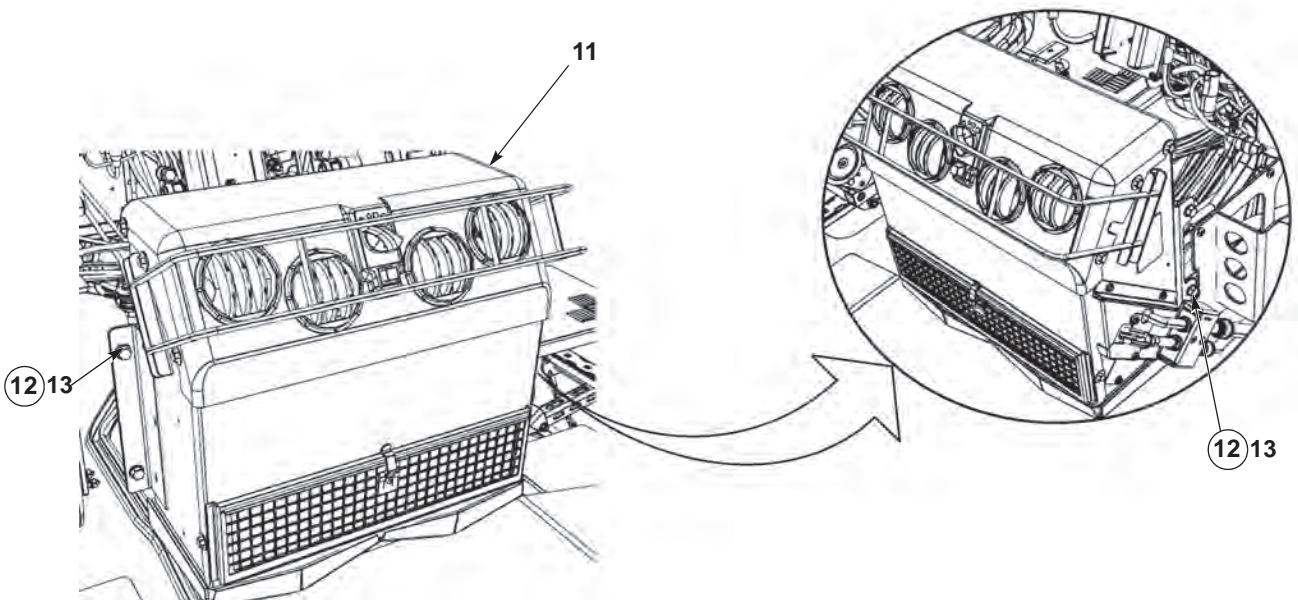
REMOVAL – CONTINUED

8. Remove four screws (13) and four locknuts (12) from rear air conditioner (11). Discard locknuts.

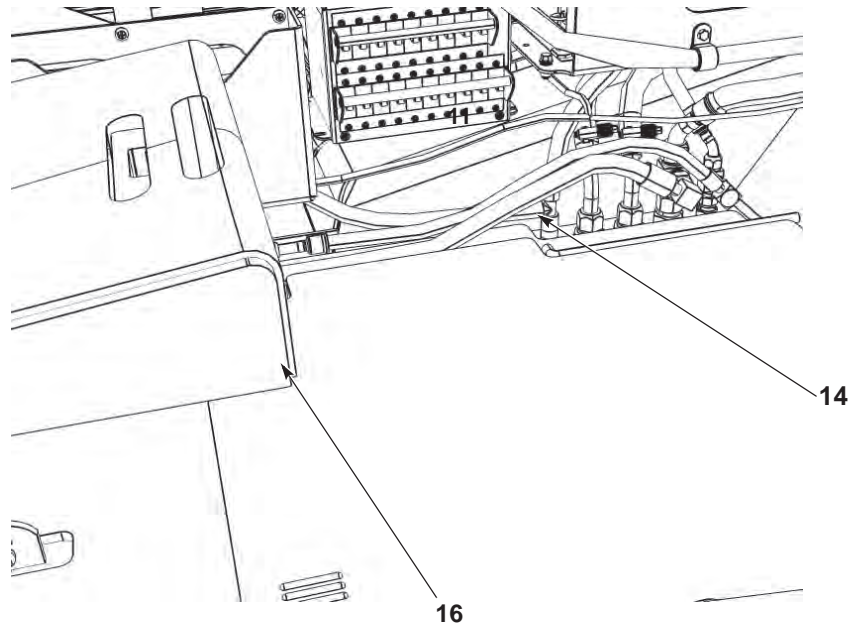


9. Remove the drain hose from T-fitting (14) under the PDU box (15), located on the passenger side just in front of the passenger seat (16).
10. Remove rear A/C.

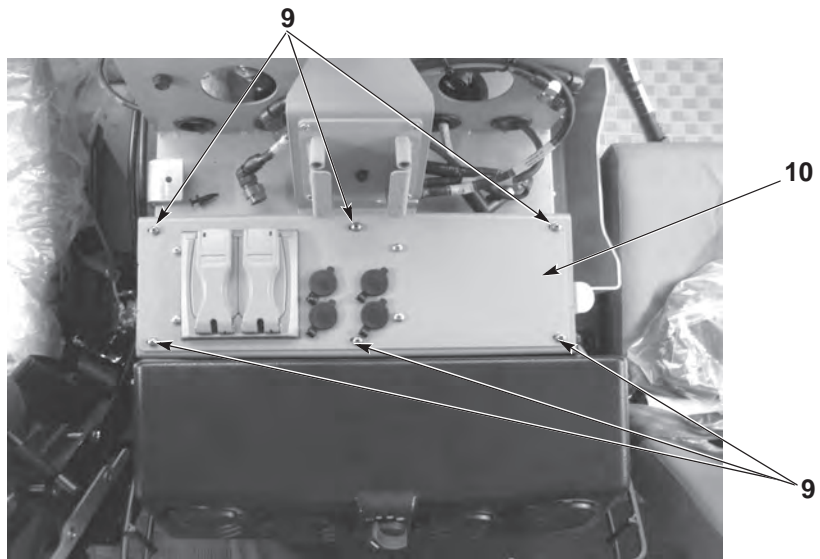
END OF TASK

INSTALLATION

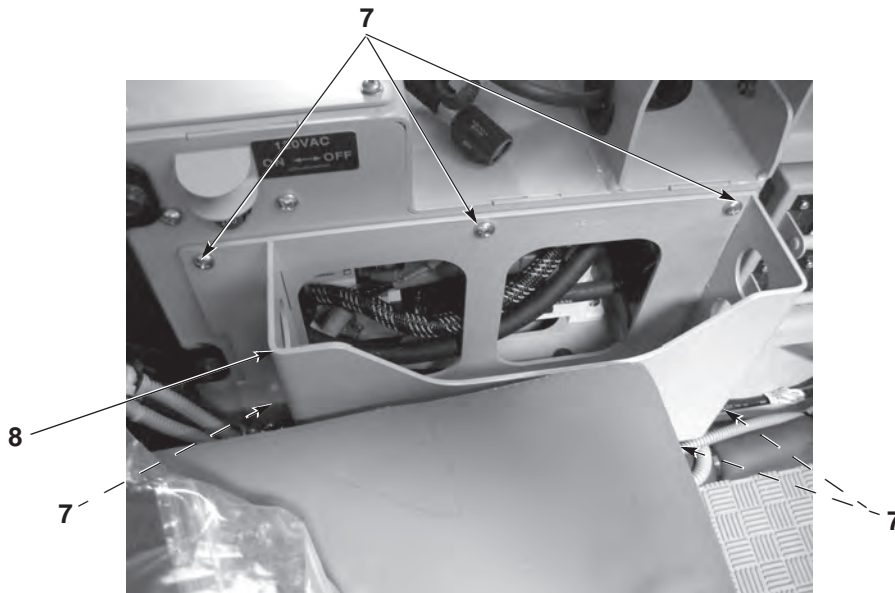
1. Position rear air conditioner (11) into the capsule, and install four screws (13) and four new locknuts (12).



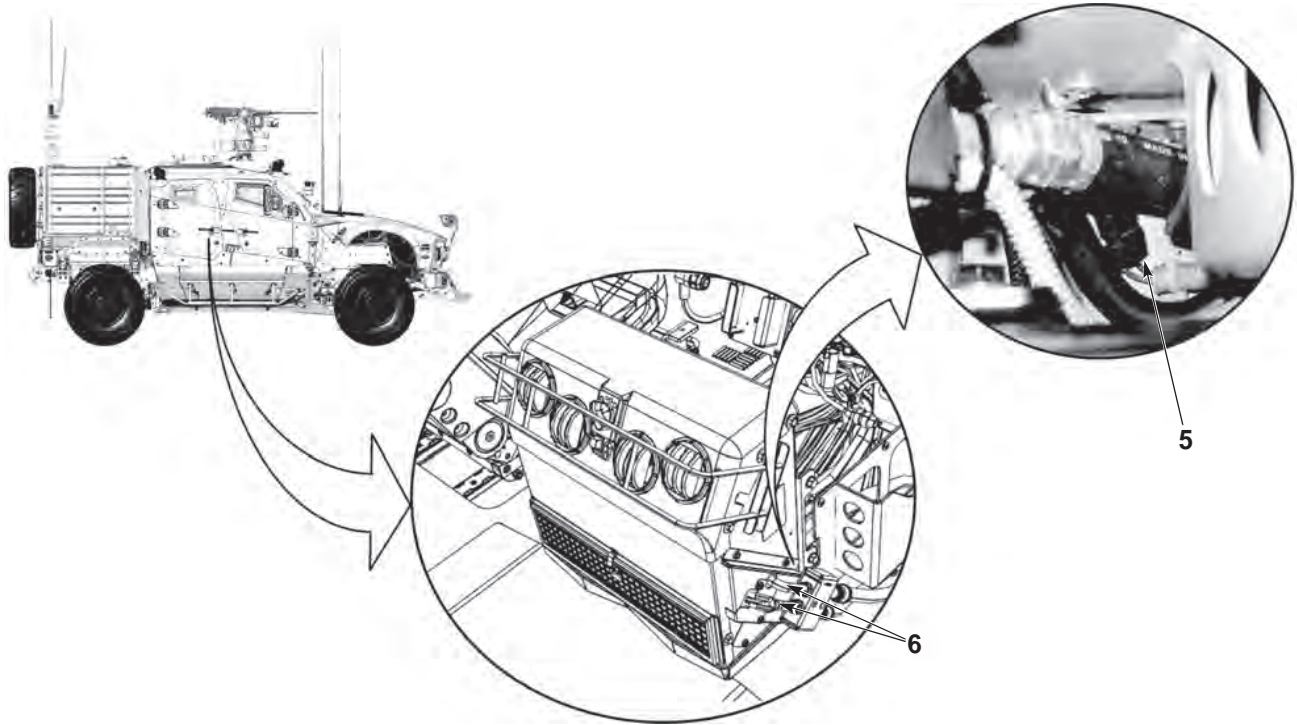
2. Feed drain hose along the passenger side, next to the passenger seat (16), and connect to the T-fitting (14).

INSTALLATION – CONTINUED

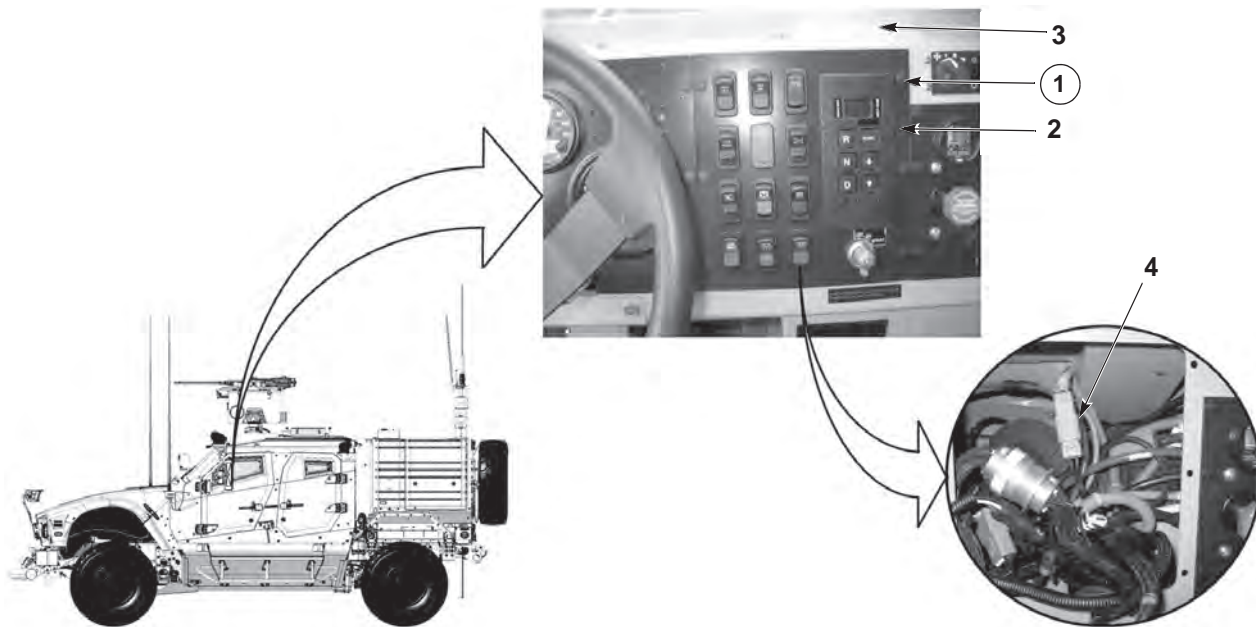
3. Install 120V outlet cover (10) and six screws (8).



4. Install storage bracket (8) and six screws (7) to the back of the storage bracket (8).

INSTALLATION – CONTINUED

5. Install new O-rings and connect the rear air conditioner lines (6).
6. Connect rear air conditioner electrical connector (5).

INSTALLATION – CONTINUED**NOTE**

If a guide wire was attached as noted in removal, feed line to A/C electrical connector.

7. Route air conditioner power harness to dash as noted.
8. Connect rear air conditioner switch connector (4).
9. Position transmission dash panel (2) into dash (3).
10. Install six new pushpin fasteners (1).
11. Perform all Follow-On Maintenance Tasks.

END OF TASK

END OF WORK PACKAGE

REAR FENDER EXTENSION REPLACEMENT (MUD PROTECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Materials/Parts

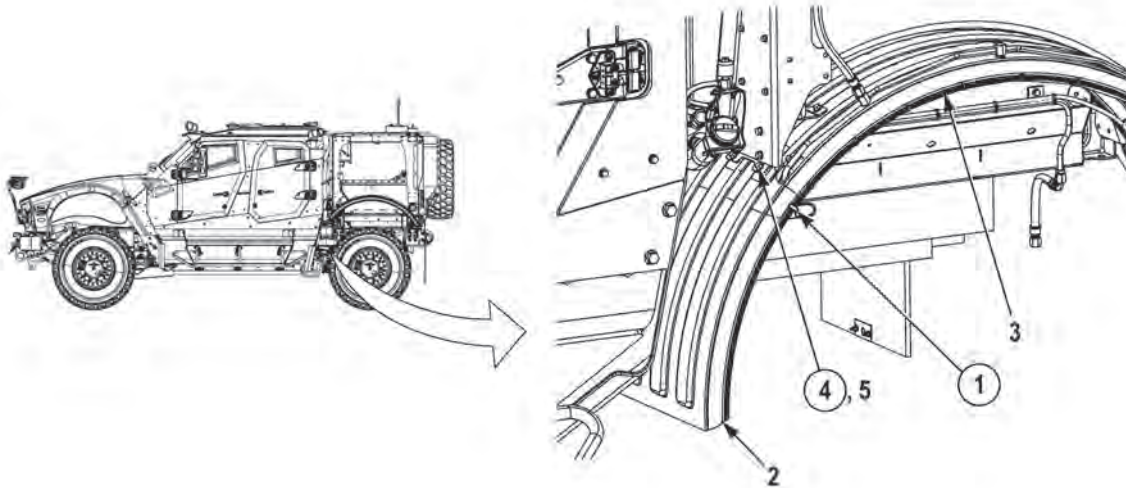
Locknut (3) (Item 4)
 Ties, Cable

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

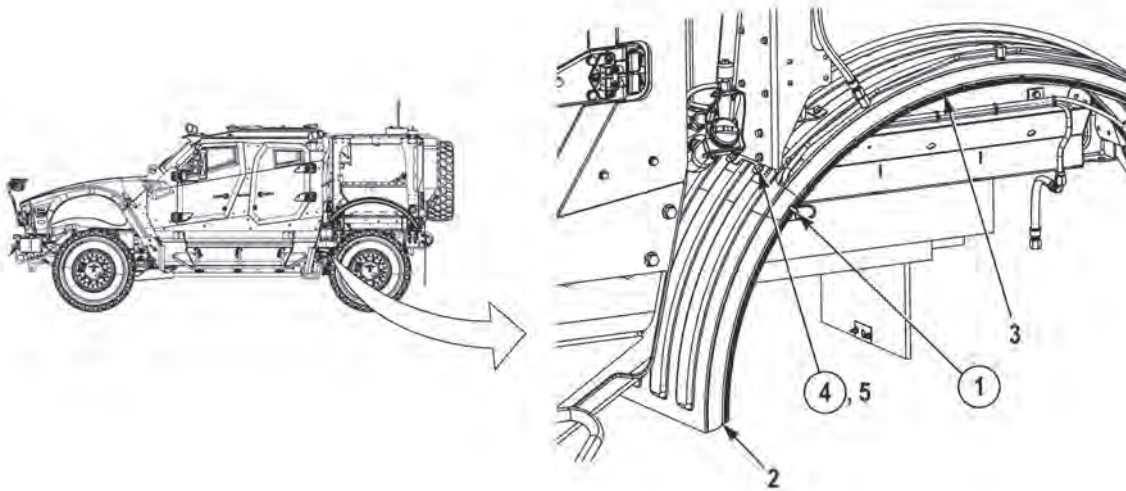
Remove and stow wheel chocks

REMOVAL**NOTE**

Driver side and passenger side rear fender extensions are removed the same way. Driver side shown.

1. Remove cable tie (1) from rear fender extension (2) and rear fender (3).
2. Remove three locknuts (4), screws (5), and rear fender extension (2) from fender (3). Discard locknuts (4).

END OF TASK

INSTALLATION**NOTE**

Driver side and passenger side rear fender extensions are installed the same way. Driver side shown.

1. Install rear fender extension (2) on fender (3) with three screws (5) and new locknuts (4).
2. Install cable tie (1) on rear fender extension (2) and rear fender (3).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

SPARE TIRE UNSTOW/STOW (FOR 395/85R20 SPARE TIRE CARRIER)

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Materials/Parts

None

Personnel Required

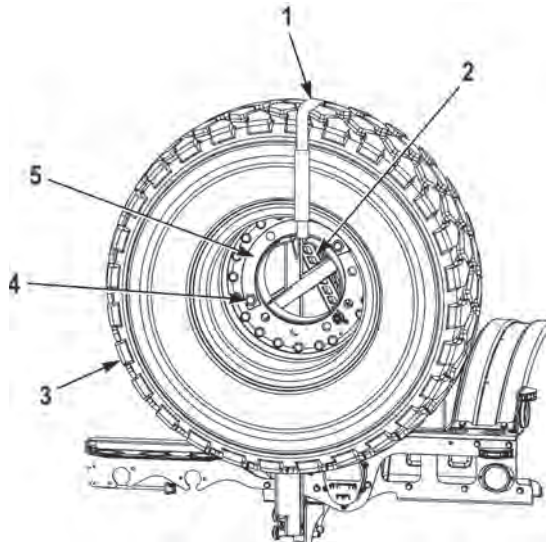
Three

Tools and Special Tools

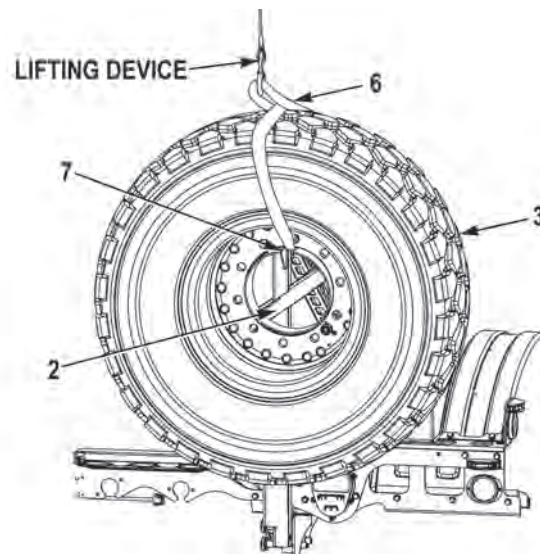
Lifting Device, Minimum Capacity 500 lbs
(227 kg)
Strap, Choker (From BII, TM 9-2355-335-10)
Tool Kit, General Mechanic's: Automotive
Wrench, Torque 250 ft-lb

Follow-On Maintenance

Remove and stow wheel chocks

UNSTOW

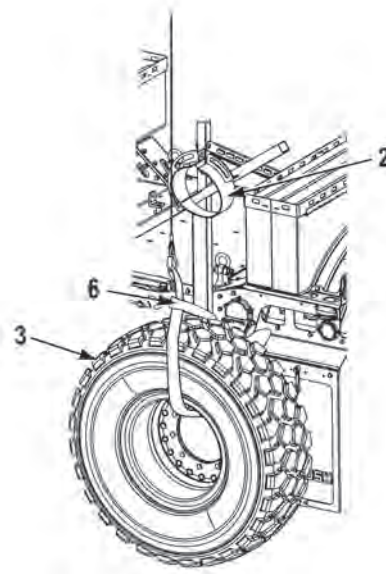
1. Remove tie-down strap (1) from tire carrier (2) and spare tire (3).
2. Remove three nuts (4) and studded bracket (5) from tire carrier (2) and spare tire (3).



NOTE

Tire carrier has a slot to allow choker strap to be wrapped around spare tire and allows spare tire to be removed from tire carrier without interference.

3. Attach choker strap (6) by wrapping around spare tire (3) and through choker strap slot (7) in tire carrier (2).
4. Attach lifting device to choker strap (6).



WARNING

Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

Caution must be used when removing spare tire from tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

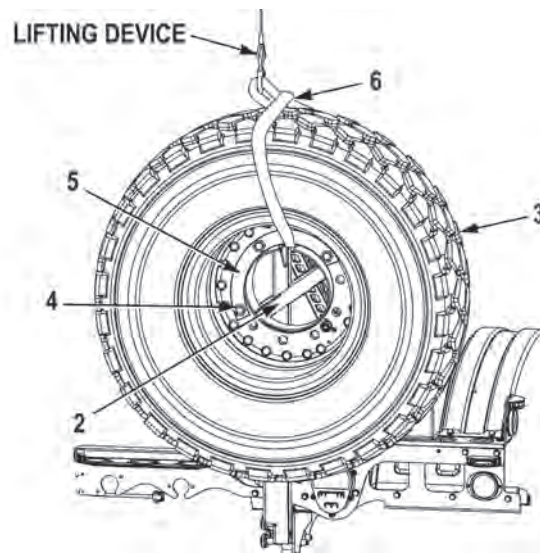
NOTE

Note position of CTIS and air valves prior to removal to ensure proper installation.

5. With the aid of two assistants and lifting device, remove spare tire (3) from tire carrier (2).
6. Remove lifting device and choker strap (6) from spare tire (3).

STOW

1. Attach choker strap (6) by wrapping around spare tire (3) .
2. Attach lifting device to choker strap (6).



WARNING

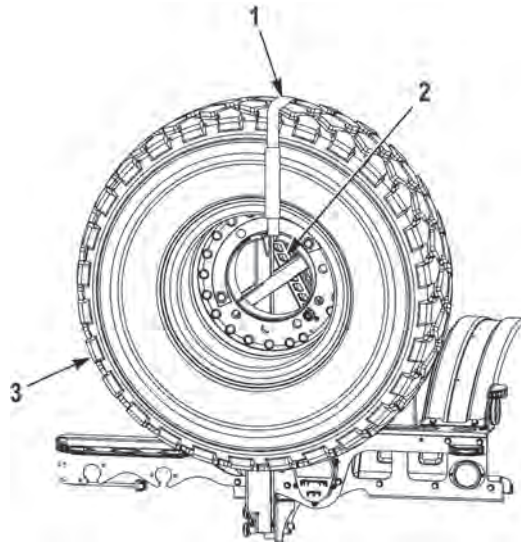
Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

Caution must be used when installing spare tire on tire carrier. Air valve on spare tire is inserted through top driver side slot of tire carrier. Failure to comply may result in damage to equipment.

NOTE

- Tire carrier has a slot to allow choker strap to be wrapped around spare tire and allows spare tire to be installed on tire carrier without interference.
 - Install spare tire as noted prior to removal.
3. With the aid of two assistants and lifting device, install spare tire (3) on tire carrier (2).
 4. Install studded bracket (5) on spare tire (3) and tire carrier (2) with three nuts (4). Tighten nuts to 250 lb-ft (339 N.m)
 5. Remove lifting device and choker strap (6) from spare tire (3).



6. Install tie-down strap (1) on spare tire (3) and tire carrier (2).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPARE TIRE UNSTOW/STOW (FOR UPGRADED SPARE TIRE CARRIER)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

Handle, Sliding Tee, 3/4 in. Drive (from BII, TM-9-2355-335-10)
 Lifting Device, Minimum Capacity 700 lbs (317.8 kg)
 Lug Nut Wrench Extension 8 in. 3/4 in. Drive (from BII, TM-9-2355-335-10)
 Socket, Lug Nut 33 mm, Impact 3/4 in. Drive (from BII, TM-9-2355-335-10)

Tools and Special Tools (Continued)

Strap, Nylon, 60 in. (From BII, TM 9-2355-335-10)
 Strap, Nylon, 70 in. (From BII, TM 9-2355-335-10)
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque 250 ft-lb

Materials/Parts

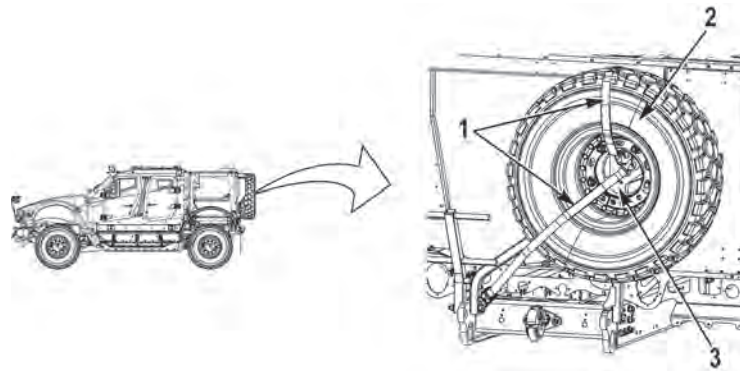
None

Personnel Required

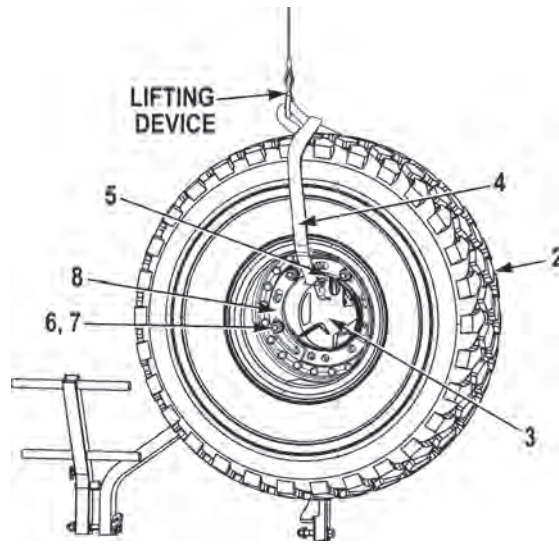
Three

Follow-On Maintenance

Remove and stow wheel chocks

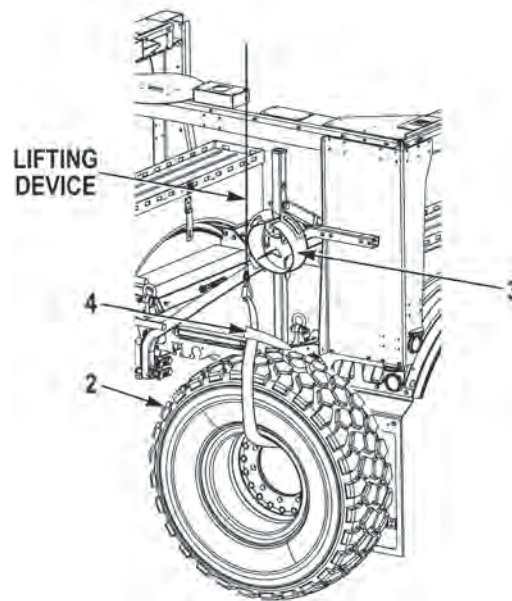
UNSTOW 395/85R20 TIRE**NOTE**

- Note position and location of safety straps prior to removal to ensure proper installation.
 - Winch maybe installed on tire carrier and hook maybe attached to safety strap.
1. Remove two safety straps (1) from 395/85R20 tire (2) and tire carrier (3).



NOTE

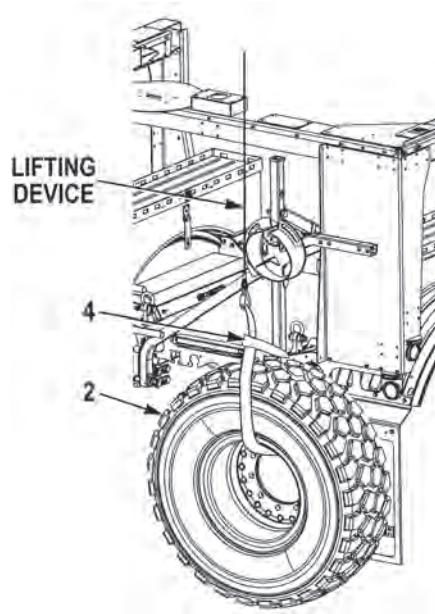
- Tire carrier has a slot to allow choker strap to be wrapped around spare tire and allows spare tire to be removed from tire carrier without interference.
 - Use 60 in. choker strap to lift 395/85R20 tire.
2. Attach 60 in. choker strap (4) by wrapping around 395/85R20 tire (2) and through choker strap slot (5) in tire carrier (3).
 3. Attach lifting device to choker strap (4).
 4. Remove three nuts (6), screws (7), and spacer (8) from 395/85R20 tire (2) and tire carrier (3).

**WARNING**

395/85R20 tire weighs 380 lbs (172.3 kg). Do not lift or move 395/85R20 tire without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

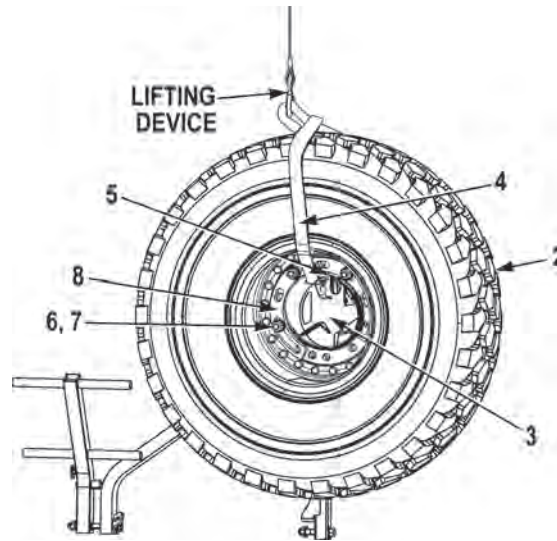
5. With the aid of two assistants and lifting device, remove 395/85R20 tire (2) from tire carrier (3).
6. Remove lifting device from 60 in. choker strap (4) and remove 60 in. choker strap (4) from 395/85R20 tire (2).

END OF TASK

STOW 395/85R29 TIRE**NOTE**

Use 60 in. choker strap to lift 395/85R20 tire.

1. Attach 60 in. choker strap (4) to 395/85R20 tire (2).
2. Attach lifting device to 60 in. choker strap (4).



WARNING

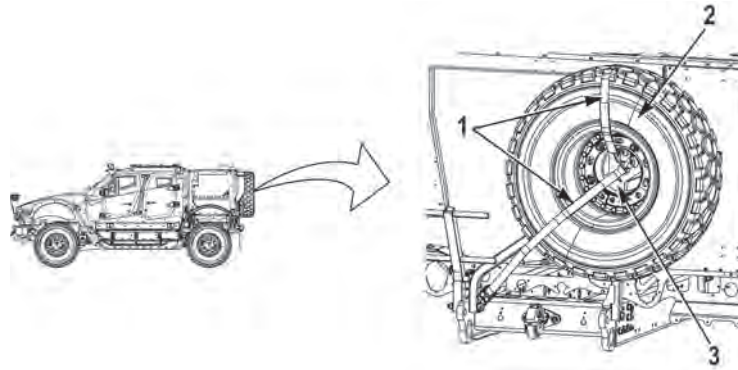
395/85R20 tire weighs 380 lbs (172.5 kg). Do not lift or move 395/85R20 tire without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

Care must be used when installing 395/85R20 tire on tire carrier. Air valve on 395/85R20 tire is inserted through top driver side slot of tire carrier. Ensure spacer is aligned properly to avoid damage to CTIS valve. Failure to comply may result in damage to equipment.

NOTE

- Tire carrier has a slot to allow 395/85R20 tire to be installed on tire carrier without interference.
 - Ensure choker strap is aligned with slot in tire carrier while installing 395/85R20 tire.
3. With the aid of two assistants and lifting device, position 395/85R20 tire (2) on tire carrier (3).
 4. Install spacer (8) and secure 395/85R20 tire (2) on tire carrier (3) with three screws (7) and nuts (6). Tighten nuts to 250 lb-ft (339 N•m).
 5. Remove lifting device from 60 in. choker strap (4) and remove 60 in. choker strap (4) from 395/85R20 tire (2) and choker strap slot (5) in tire carrier (3).

**NOTE**

Install safety straps as noted prior to removal.

6. Install two safety straps (1) on tire carrier (3) and 395/85R20 tire (2).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPARE TIRE UNSTOW/STOW (M1245)

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Tools and Special Tools

Lifting Device
Strap, Choker (In BII)
Tool Kit, General Mechanic's: Automotive
Wrench, Torque 250 ft-lb

Materials/Parts

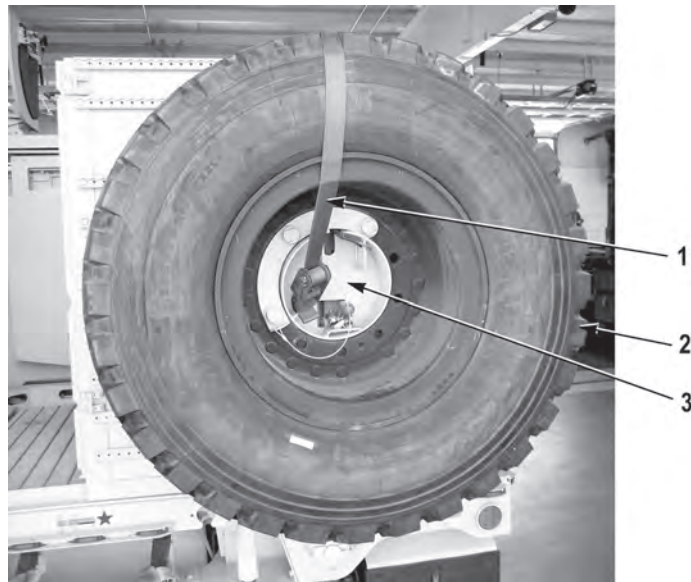
None

Personnel Required

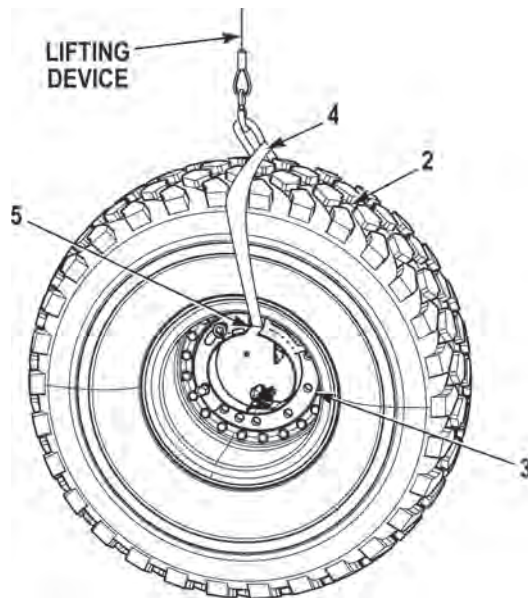
Three

Follow-On Maintenance

Remove and stow wheel chocks

UNSTOW TIRE

1. Remove safety strap (1) from spare tire (2) and tire carrier (3).



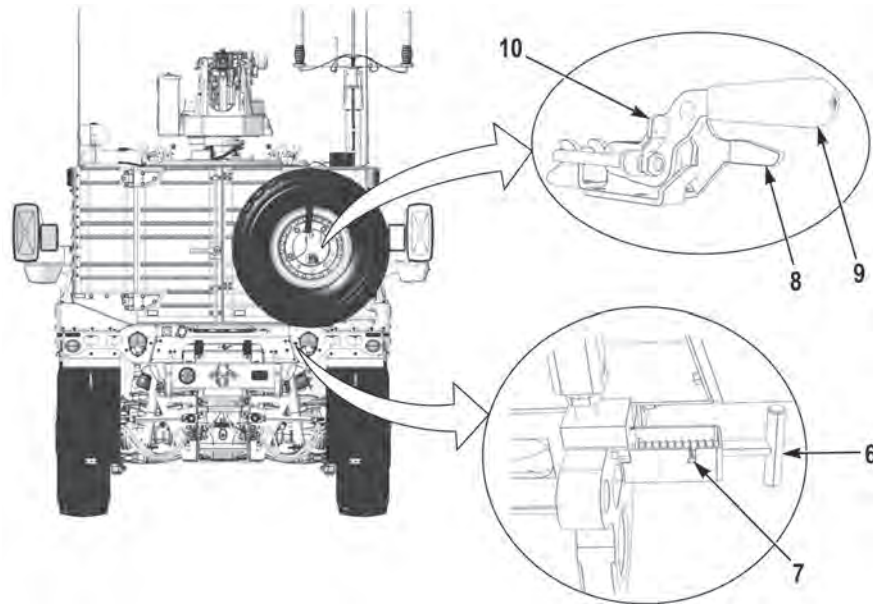
WARNING

Spare tire weighs 380 lbs (172.3 kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

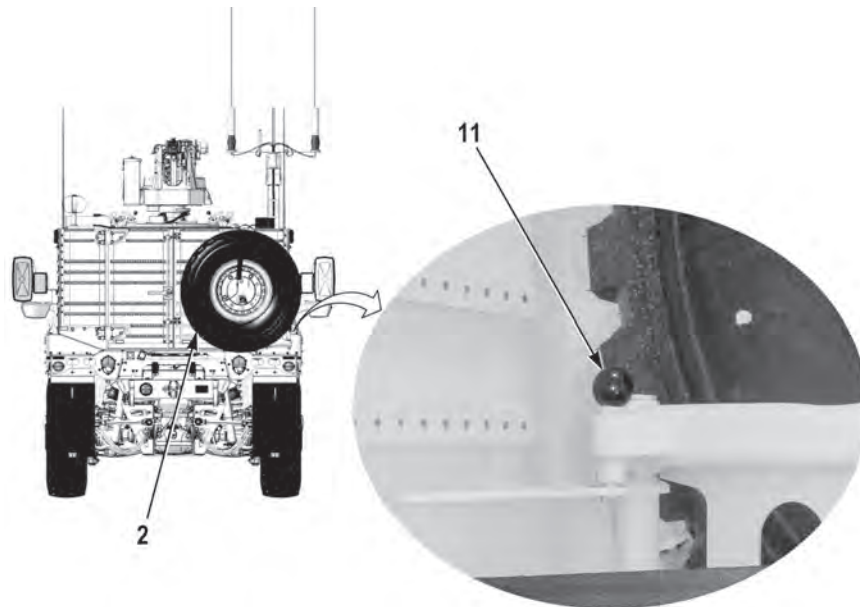
Tire carrier has a slot to allow choker strap to be wrapped around spare tire and allows spare tire to be removed from tire carrier assembly without interference.

2. Attach choker strap (4) by wrapping around spare tire (2) and through choker strap slot (5) in tire carrier (3).
3. Attach lifting device to choker strap (4).



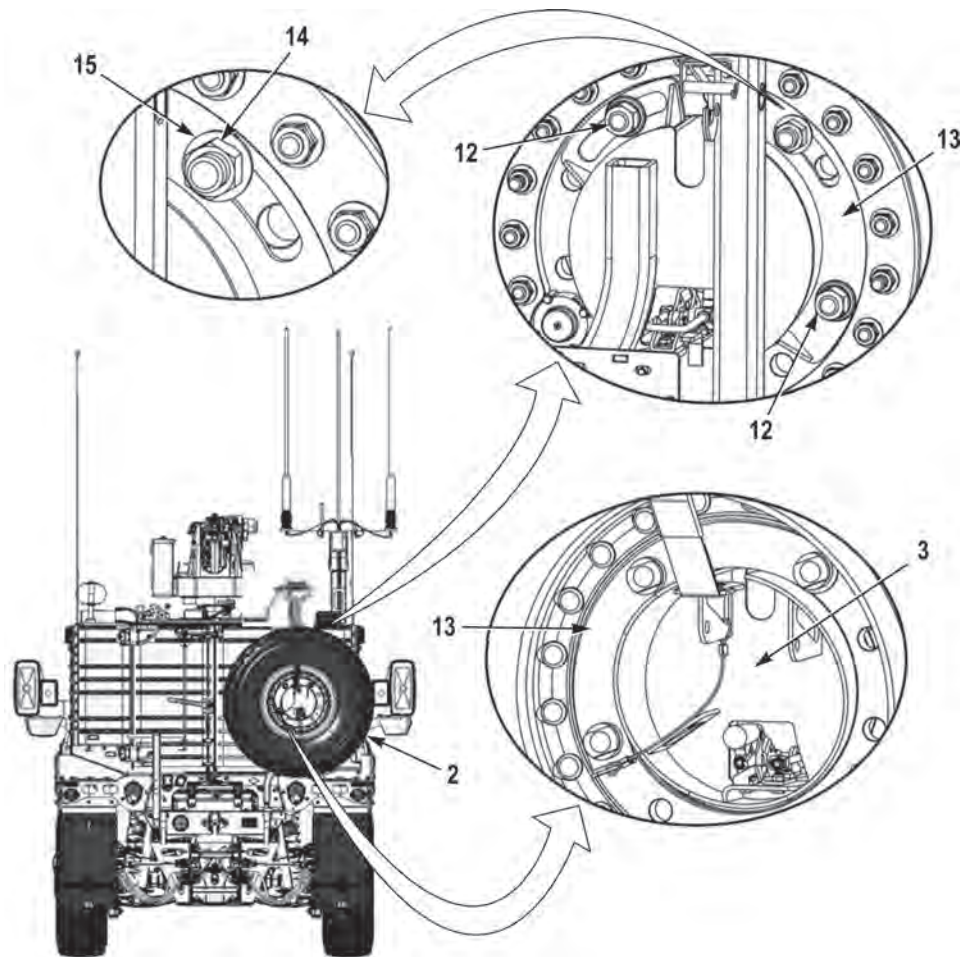
WARNING

- **Keep cargo deck rear doors closed and locked at all times during spare tire stow/unstow operation. Failure to comply may result in injury to personnel.**
 - **Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.**
4. Pull the locking "T" handle (6), and turn counterclockwise into the locking groove (7).
 5. Squeeze the locking latch (8), and lift lever (9) upward, pull the thumb tab (10) back.

**WARNING**

Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

6. Carefully swing spare tire (2) away from vehicle, until safety latch (11) engages.

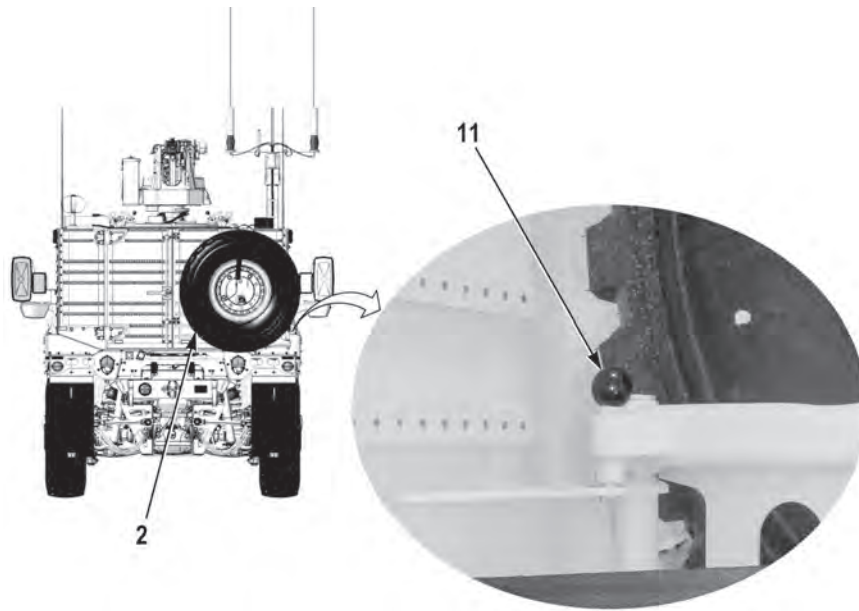


WARNING

Keep out from under spare tire when lowering and raising spare tire. Spare tire can slip or fall. Failure to comply may result in injury or death to personnel.

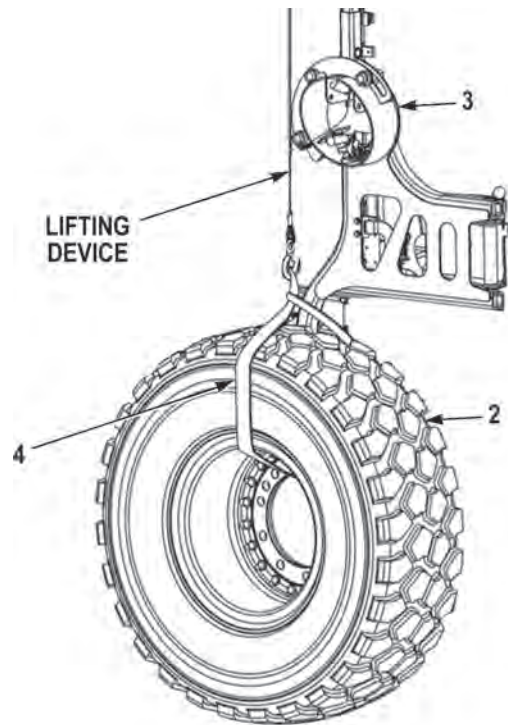
NOTE

- Note position of CTIS and air valves on spare tire prior to removal to ensure proper installation.
 - Nuts securing spare tire to spare tire carrier assembly are two different lengths. Note position of nut, washer, and stud prior to removal of spare tire.
7. Remove two nuts (12) from bracket (13) and spare tire (2).
 8. Remove nut (14) and washer (15) from bracket (13) and spare tire (2).
 9. Remove bracket (13) from spare tire (2) and tire carrier (3).

**WARNING**

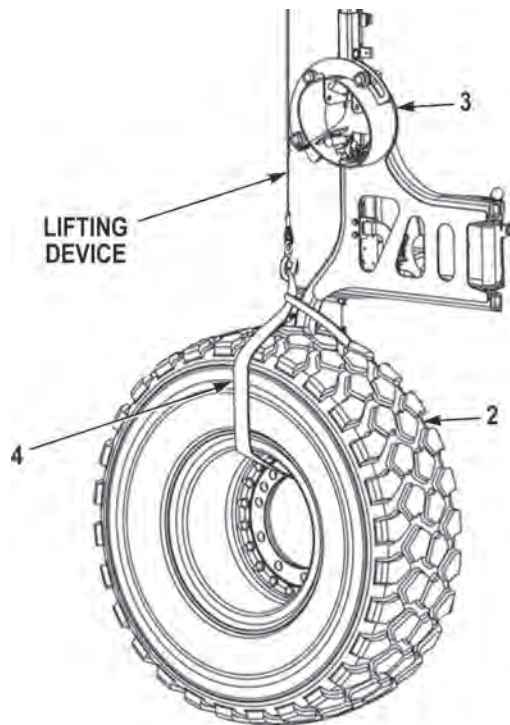
Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

10. Pull up on the safety latch (11), and carefully swing spare tire (2) back into the stowed position.



11. With the aid of two assistants and lifting device, slowly raise spare tire (2) while pushing spare tire (2) away from tire carrier (3) and lower spare tire (2) to ground.
12. Remove lifting device from choker strap (4) and remove choker strap (4) from spare tire (2).

END OF TASK

STOW TIRE**WARNING**

Spare tire weighs 380 lbs (172.3 kg). Do not attempt to lift or move spare tire without the aid of two assistants and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

Ensure CTIS is facing the vehicle and the choker strap in the 12 o'clock position when stowing spare tire.

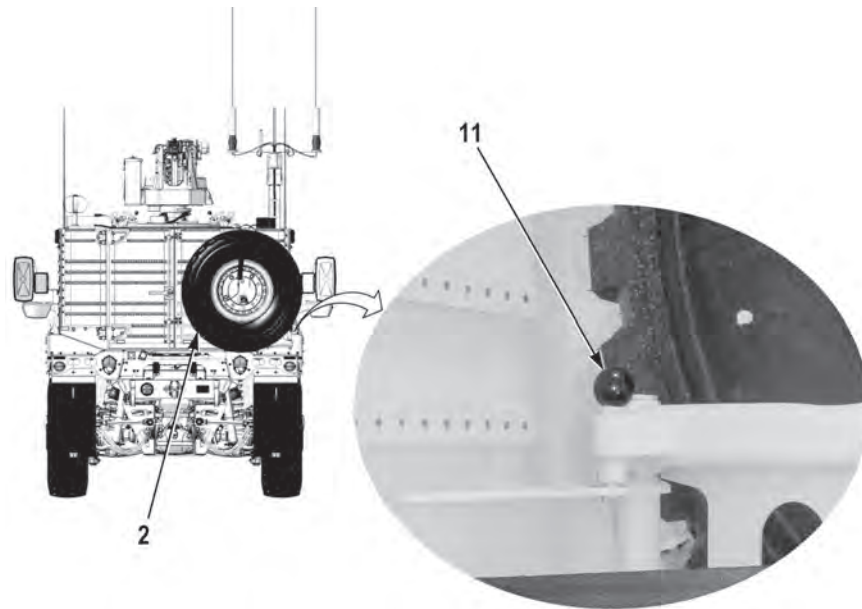
1. Position spare tire (2) below tire carrier (3).
2. Attach choker strap (4) by wrapping around spare tire (2).
3. Attach lifting device to choker strap (4).

WARNING

Keep out from under spare tire while lowering and raising spare tire. Spare tire can slip or fall. Failure to comply may result in injury or death to personnel.

NOTE

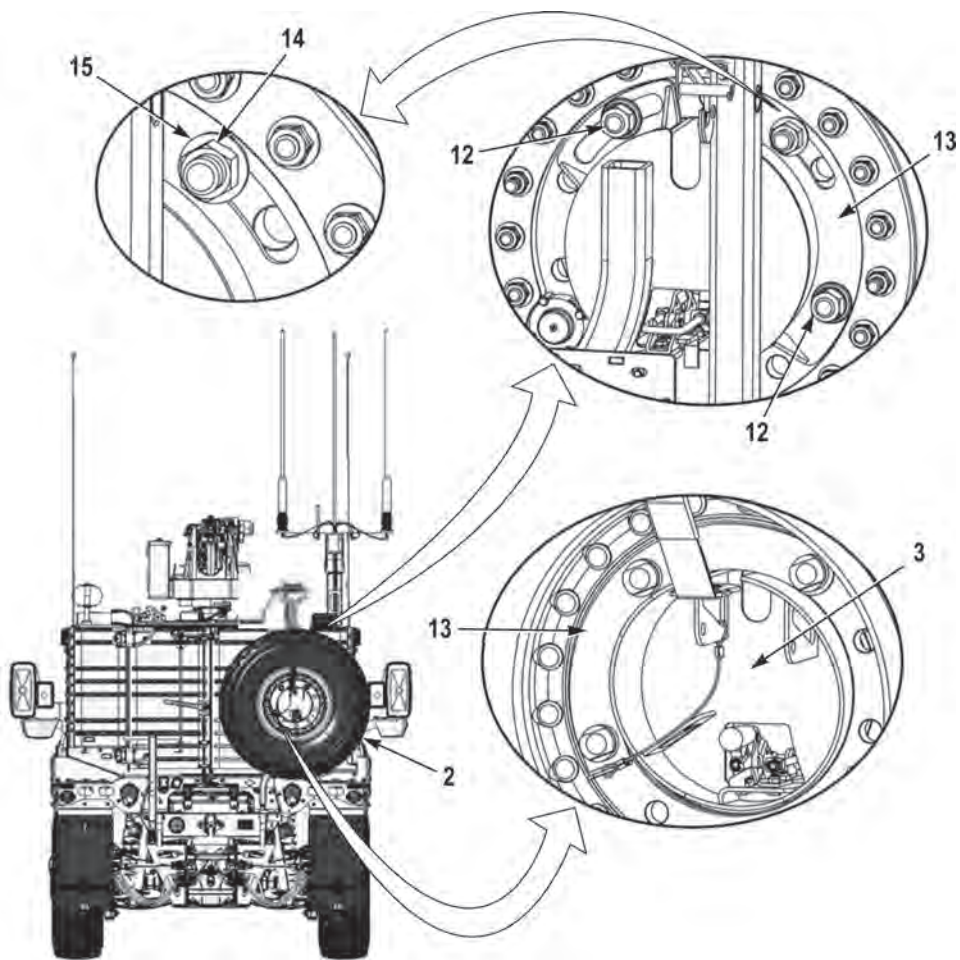
- Tire carrier has a slot to allow choker strap to remain installed on spare tire while spare tire is installed on tire carrier.
 - Ensure CTIS air valves are positioned as noted during removal.
4. With the aid of two assistants and lifting device, position spare tire (2) on tire carrier (3).



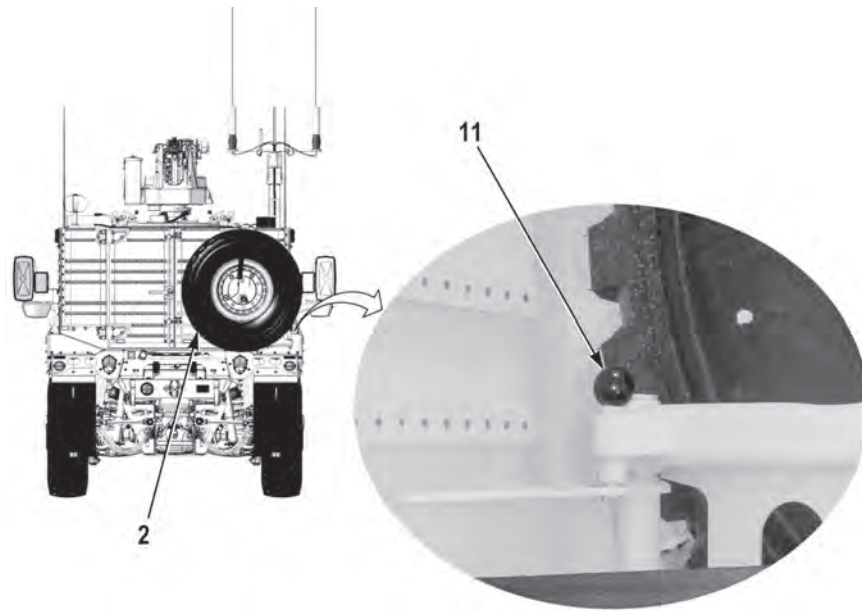
WARNING

Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

5. Carefully swing spare tire (2) away from the vehicle, until the safety latch (11) engages.

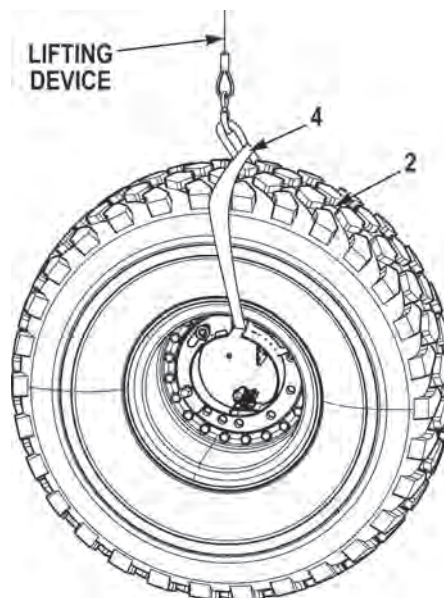


6. Install bracket (13) on the spare tire (2) and tire carrier (3) with washer (15) and nut (14). Tighten nut to 250 lb-ft (339 N•m).
7. Secure bracket (13) on spare tire (2) and tire carrier (3) with two nuts (12). Tighten nuts to 250 lb-ft (339 N•m).

**WARNING**

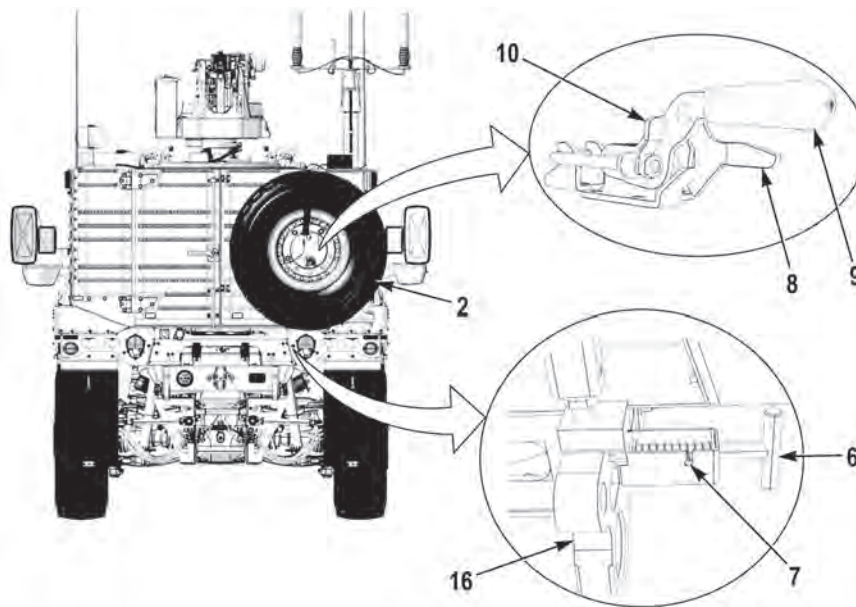
Keep hands away from pinch point area of the assembly when swinging spare tire assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

8. Pull up on the safety latch (11), and carefully swing spare tire (2) back into the stowed position.

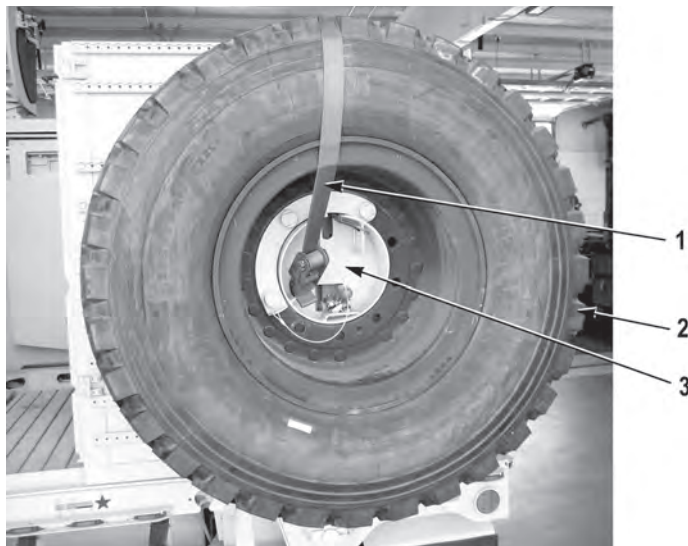
**NOTE**

Ensure wheel assembly is firmly seated on the spare tire assembly before removing the choker strap.

9. Remove lifting device from choker strap (4) and remove choker strap (4) from spare tire (2).



10. Align holes in lower portion of spare tire (2) and frame (16).
11. Turn the "T" handle (6) clockwise from the locking groove (7) allowing pin to spring into place, locking the lower portion to the frame (16).
12. Verify that the "T" handle (6) is secured and locked into position.
13. Push the thumb tab (10) downward.
14. Pull downward on lever (9) until the locking latch (8) engages.



15. Install safety strap (1) on tire carrier (3) and spare tire (2).

END OF TASK

END OF WORK PACKAGE

TIRE CARRIER REPLACEMENT (FOR 395/85R20 SPARE TIRE CARRIER)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Spare tire removed (TM 9-2355-335-10)

Tools and Special Tools

Bar, Breaker
Socket, Standard 1-1/8 in.
Tool Kit, General Mechanic's: Automotive
Wrench, Combination 1-1/8 in.

Materials/Parts

Locknut (Item 3)
Locknut (Item 7)

Materials/Parts (Continued)

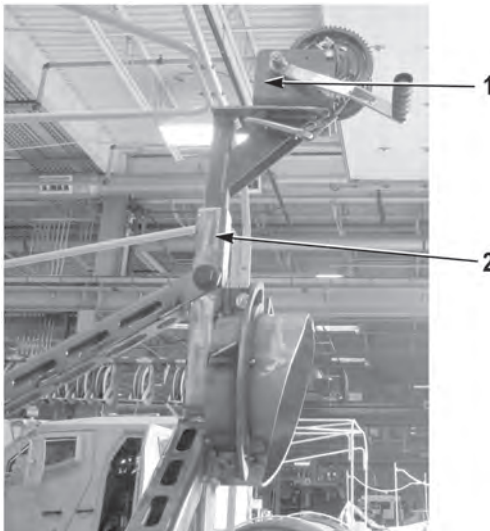
Locknut (Item 11)
Locknut (Item 16)
Locknut (2) (Item 19)
Locknut (Item 22)

Personnel Required

Two

Follow-On Maintenance

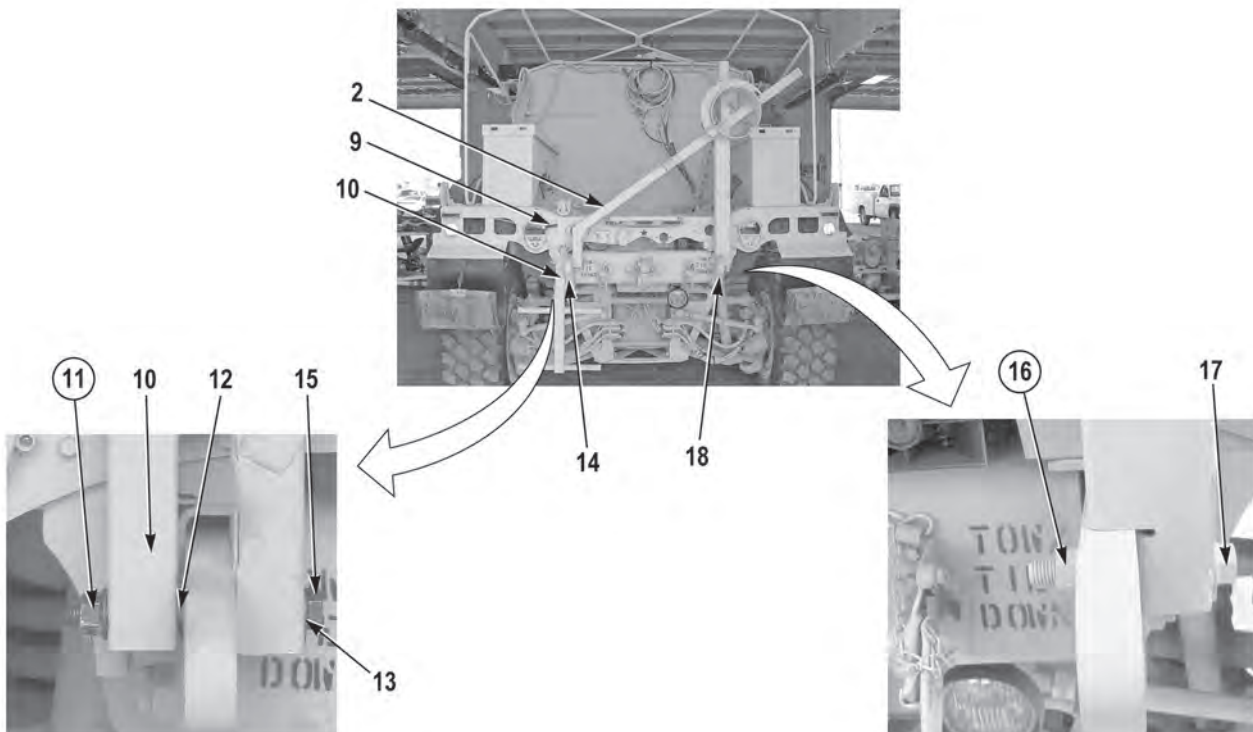
Install spare tire (TM 9-2355-335-10)
Remove and stow wheel chocks

REMOVAL

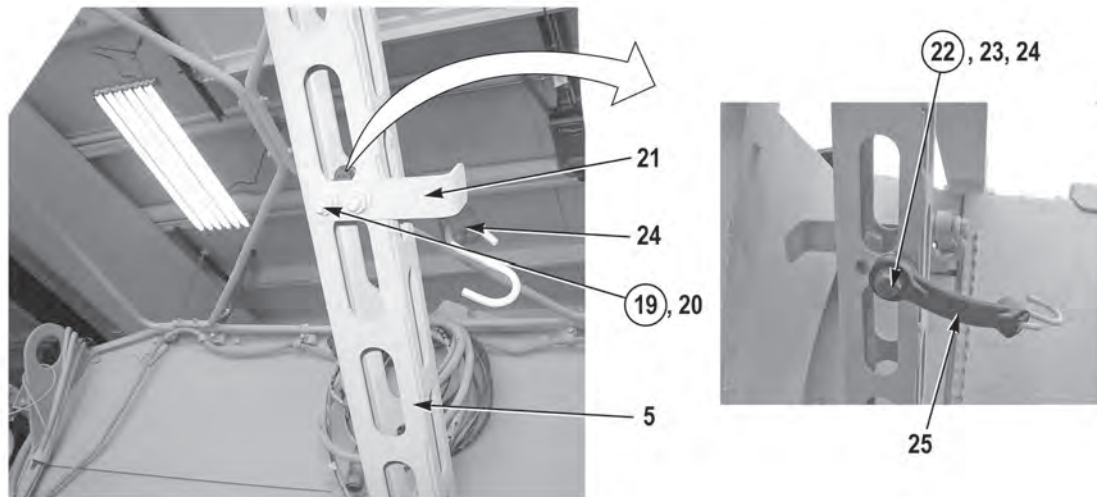
1. Remove winch assembly (1) from tire carrier assembly (2).



2. Remove locknut (3), screw (4), and support arm (5) from tie down bracket (6). Discard locknut (3).
3. Remove locknut (7), screw (8), and support arm (5) from tire carrier assembly (2) and vehicle. Discard locknut (7).



4. Remove strap (9) from cargo access step (10).
5. Remove locknut (11), cargo access step (10), and spacer (12) from frame rail (14). Discard locknut (11).
6. With the aid of an assistant, remove locknut (16), screw (17), screw (15), washer (13), and tire carrier (2) frame rail (14) and frame rail (18). Discard locknut (16).

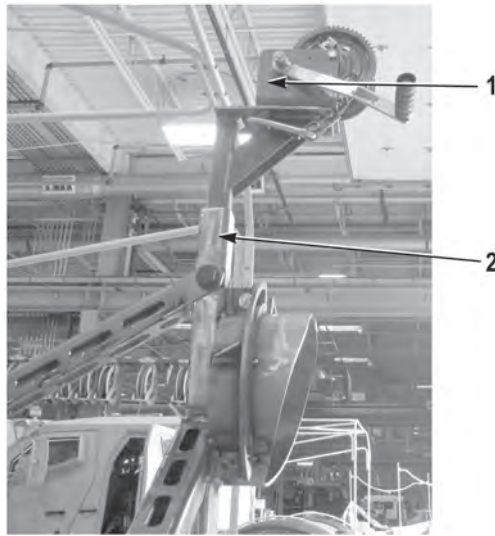


7. Remove two locknuts (19), screws (20), and bracket (21) from support arm (5). Discard locknuts (19).
8. Remove locknut (22), screw (23), washer (24), and strap (25) from support arm (5). Discard locknut (22).

END OF TASK

INSTALLATION

1. Install strap (25) on support arm (5) with washer (24), screw (23), and new locknut (22).
2. Install bracket (21) on support arm (5) with two screws (20) and new locknuts (19).
3. With the aid of an assistant, install tire carrier assembly (2) on frame rail (18) and frame rail (14) with washer (13), screw (15), screw (17), and new locknut (16).
4. Install spacer (12) and cargo access step (10) on screw (15) and frame rail (14) with new locknut (11).
5. Place cargo access step (10) in upward position and install strap (9) on cargo access step (10).
6. Install support arm (5) on tire carrier assembly (2) and vehicle with screw (8) and new locknut (7).
7. Secure support arm (5) on tie down bracket (6) with screw (4) and new locknut (3).



8. Install winch assembly (1) on tire carrier assembly (2).
9. Install spare tire.
10. Stow winch assembly (1) in proper storage area.
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

TIRE CARRIER REPLACEMENT (FOR UPGRADED SPARE TIRE CARRIER)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Spare tire removed

Tools and Special Tools

Bar, Breaker, 3/4 in.
Socket, Standard, 1 1/8 in., 3/4 in. Dr.
Tool Kit, General Mechanic's: Automotive
Wrench, Combination 1 1/8 in.

Materials/Parts

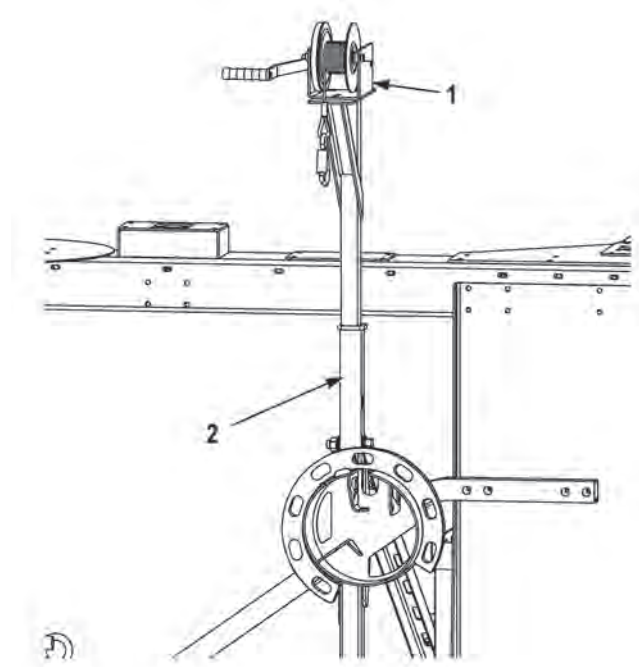
Locknut (4) (Item 3)
Locknut (2) (Item 7)

Materials/Parts (continued)

Locknut (Item 10)
Locknut (Item 17)
Locknut (4) (Item 20)
Locknut (2) (Item 24)
Locknut (2) (Item 31 and 34)

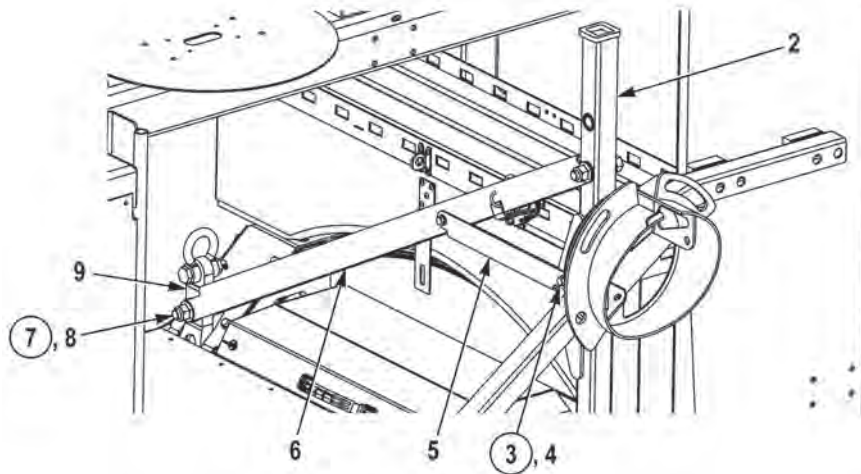
Follow-On Maintenance

Install spare tire
Remove and stow wheel chocks

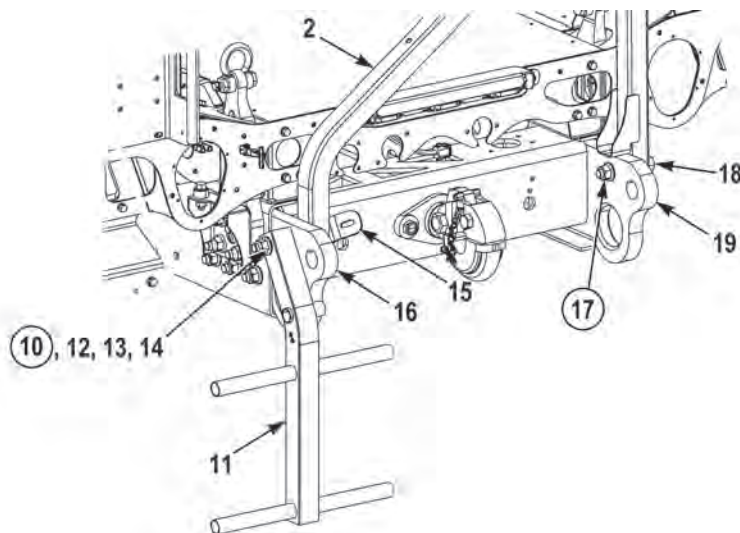
REMOVAL**NOTE**

Ensure crow bar mounted on tire carrier is removed prior to tire carrier removal.

1. Remove winch assembly (1) from spare tire support (2).



2. Remove four locknuts (3), screws (4), and support (5) from support brace (6) and spare tire support (2). Discard locknuts (3).
3. Remove two locknuts (7), screws (8), and support brace (6) from tie down bracket (9) and spare tire support (2). Discard locknuts (7).



NOTE

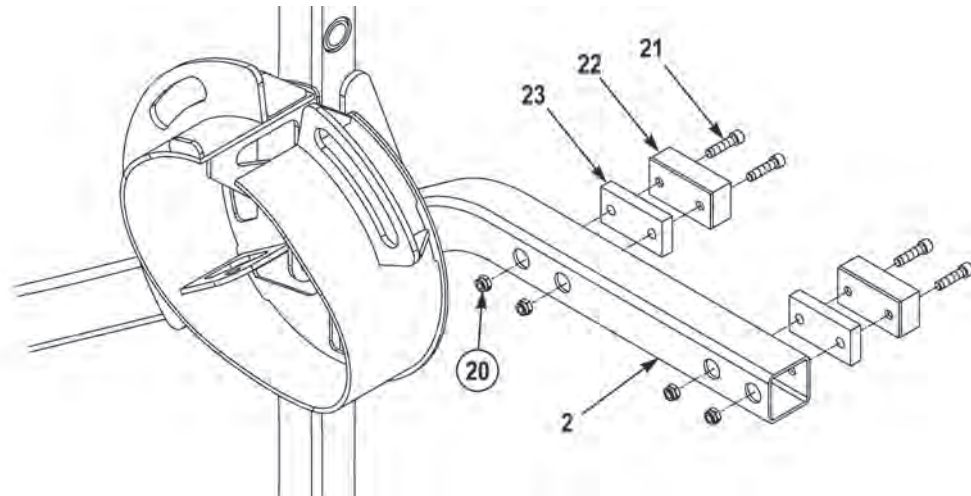
Note position of mounting hardware and strap bracket prior to removal to ensure proper installation.

4. Remove locknut (10), cargo deck step (11), spacer (12), screw (13), washer (14), and strap bracket (15) from driver side frame extension (16) and spare tire support (2). Discard locknut (10).

NOTE

An aid of assistant may be required to aid in removal of spare tire support.

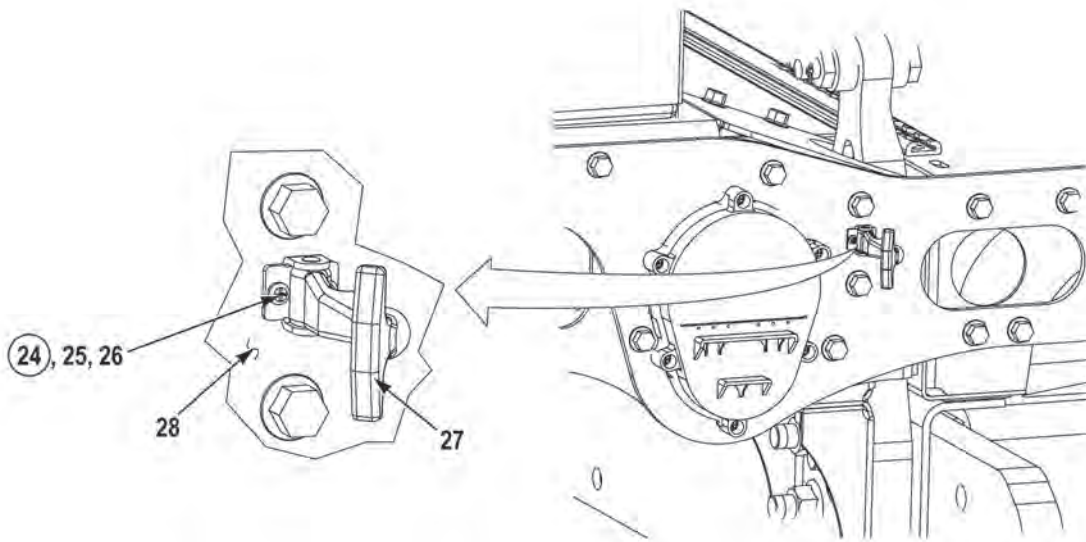
5. Remove locknut (17), screw (18), and spare tire support (2) from passenger side frame extension (19) and vehicle.



NOTE

Perform Step (6) if rubber isolators need to be removed.

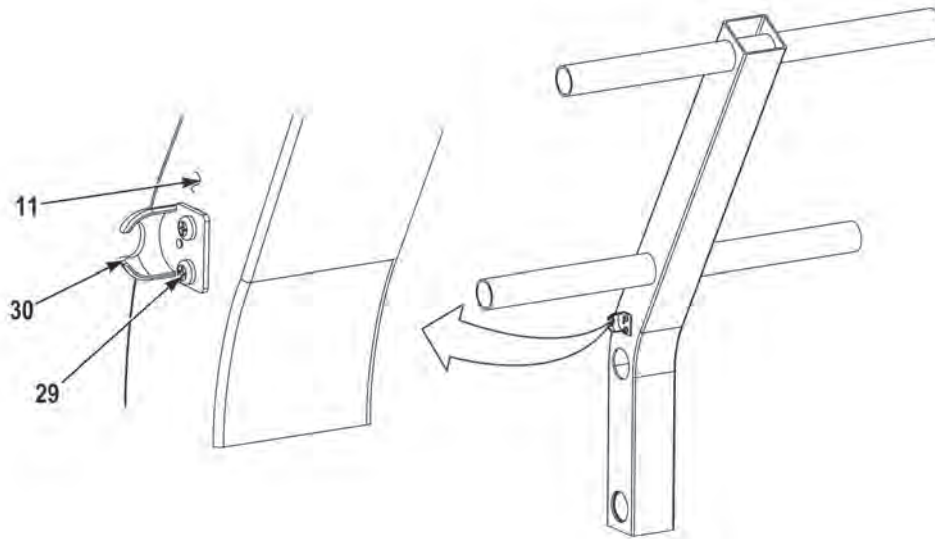
6. Remove four locknuts (20), screws (21), two rubber isolators (22), and spacers (23) from spare tire support (2). Discard locknuts (20).



NOTE

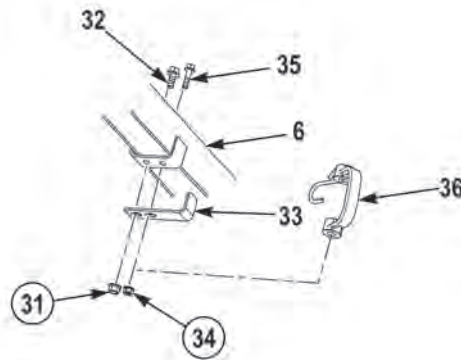
Perform Steps (7) and (8) if rubber latch assembly needs to be removed.

7. Remove two locknuts (24), washers (25), screws (26), and rubber latch (27) from cargo deck (28). Discard locknuts (24).

**NOTE**

Note position of rubber latch bracket prior to removal to ensure proper installation.

8. Remove two screws (29) and rubber latch bracket (30) from cargo deck step (11).

**NOTE**

Perform Steps (9) and (10) if upper crow bar mounting bracket needs to be removed.

9. Remove locknut (31) and screw (32) from upper crow bar mounting bracket (33) and support brace (6). Discard locknut (31).
10. Remove locknut (34), screw (35), rubber strap (36), and upper crow bar mounting bracket (33) from support brace (6). Discard locknut (34).

END OF TASK

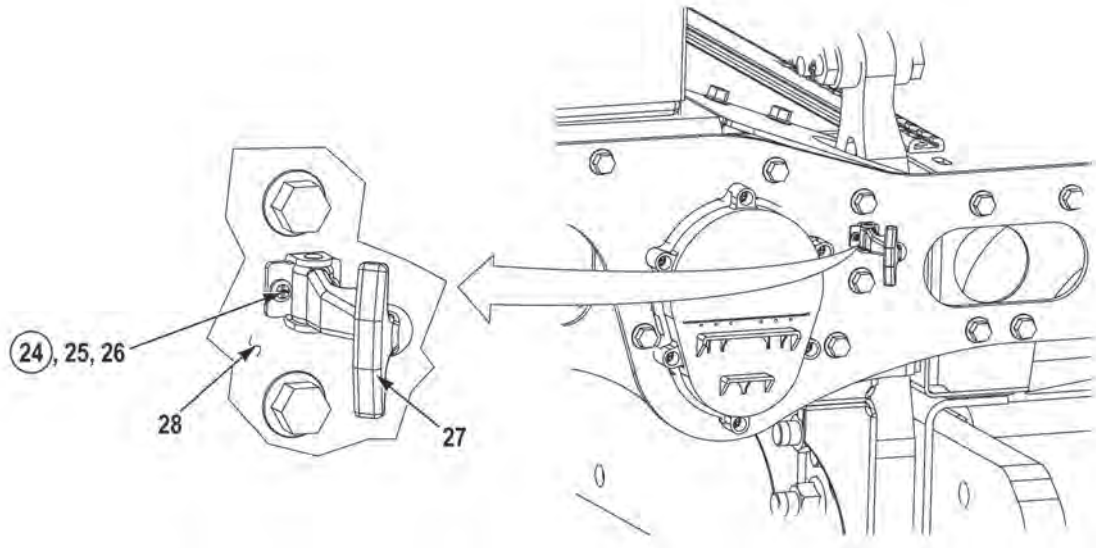
INSTALLATION**NOTE**

Perform Steps (1) and (2) if upper crow bar mounting bracket was removed.

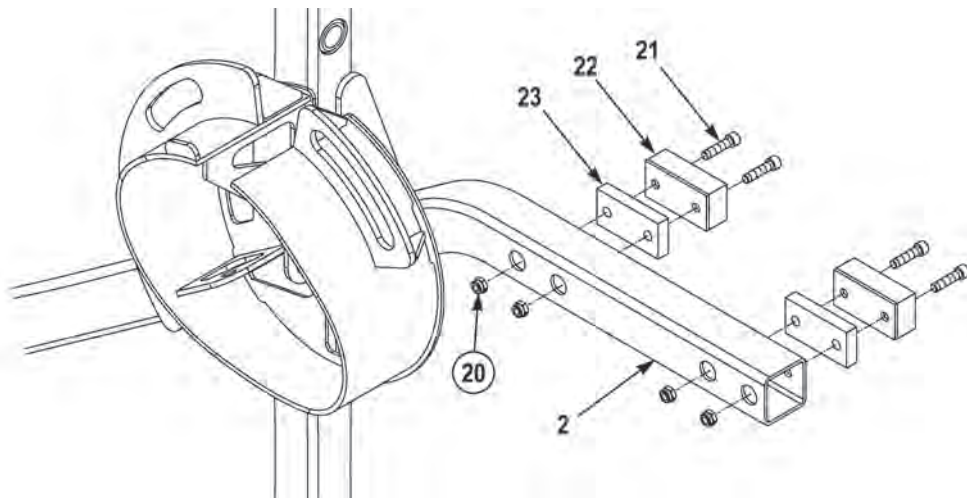
1. Install rubber strap (36) and upper crow bar mounting bracket (33) on support brace (6) with screw (35) and new locknut (34).
2. Secure upper crow bar mounting bracket (33) on support brace (6) with screw (32) and new locknut (31).

NOTE

- Perform Steps (3) and (4) if rubber latch assembly was removed.
 - Install rubber latch bracket as noted prior to removal.
3. Install rubber latch bracket (30) on cargo deck step (11) with two screws (29).

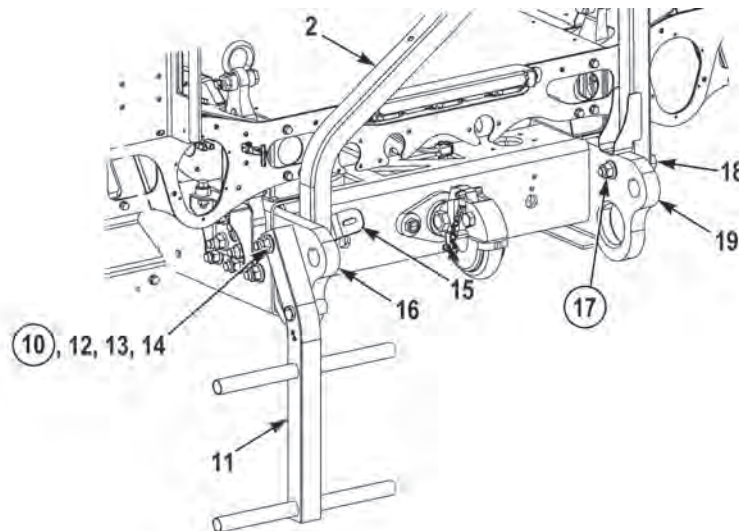


4. Install rubber latch (27) on cargo deck (28) with two screws (26), washers (25), and new locknuts (24).

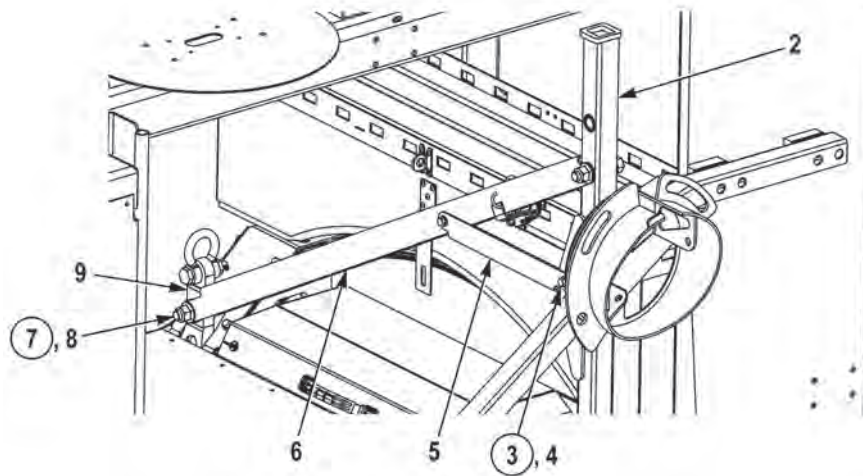
**NOTE**

Perform Step (5) if rubber isolators were removed.

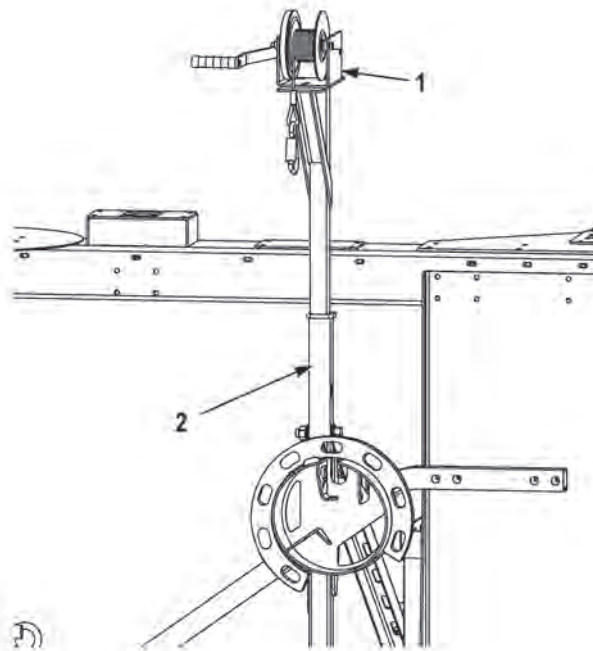
5. Install two spacers (23) and rubber isolators (22) on spare tire support (2) with four screws (21) and new locknuts (20).

**NOTE**

- Install hardware and strap bracket as noted prior to removal.
 - An aid of an assistant may be required to aid installation of spare tire support.
6. Position spare tire support (2) on vehicle and install spare tire support (2) on passenger side frame extension (19) with screw (18) and new locknut (17).
 7. Install strap bracket (15), spare tire support (2), spacer (12), and cargo deck step (11) on driver side frame extension (16) with washer (14), screw (13), and new locknut (10).



8. Install support brace (6) on tie down bracket (9) and spare tire support (2) with two screws (8) and new locknuts (7).
9. Install support (5) on spare tire support (2) and support brace (6) with four screws (4) and new locknuts (3).



10. Install winch assembly (1) on spare tire support (2).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

TIRE CARRIER REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 Spare Tire Removed (TM 9-2355-335-10)
 Rear cargo door removed (WP 0248)

Tools and Special Tools

Grease, Automotive and Artillery (GAA)
 (MIL-G-10924)
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 1)
 C-clip (1) (Item 6)
 Locknut (1) (Item 7)

Materials/Parts (Continued)

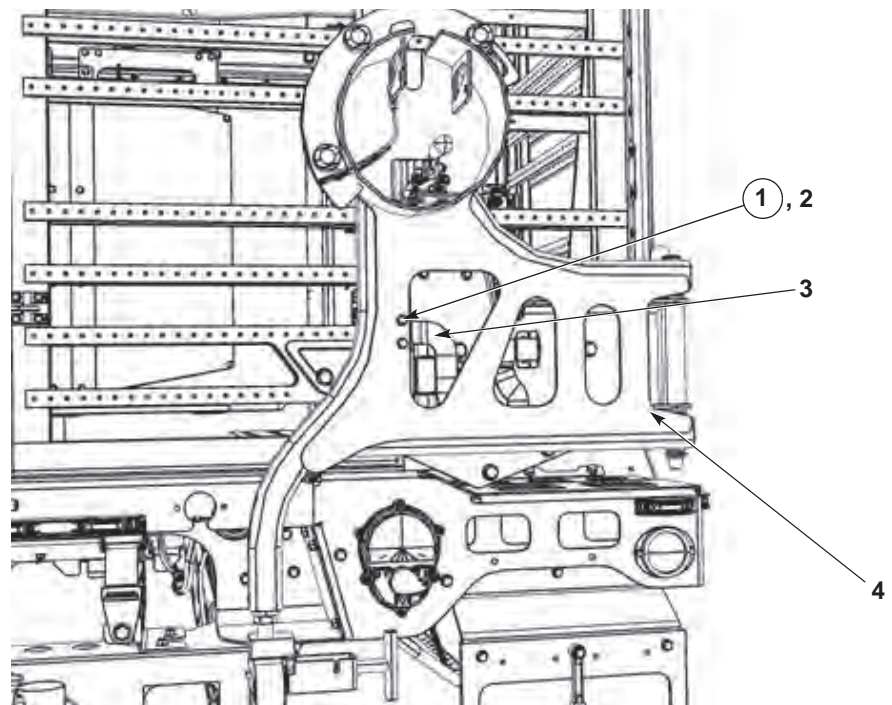
Locknut (3) (Item 11)
 Locknut (3) (Item 13)
 Lockwasher (4) (Item 16)
 Locknut (3) (Item 18)

Personnel Required

Two

Follow-On Maintenance

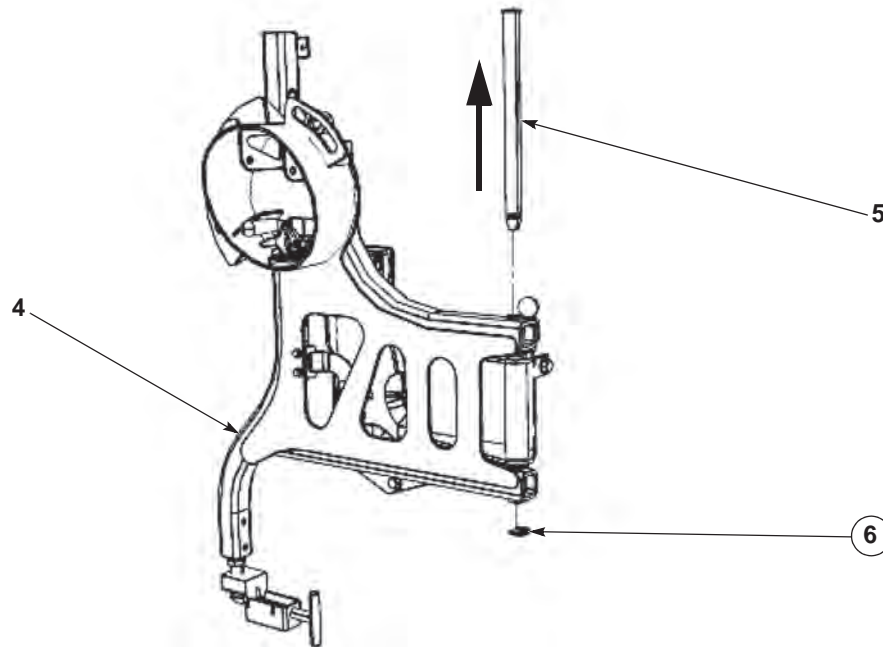
Install Rear Cargo Door (WP 0248)
 Install Spare tire (TM 9-2355-335-10)
 Remove and Stow Wheel Chocks

REMOVAL**WARNING**

Keep hands away from pinch point areas of the tire carrier assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

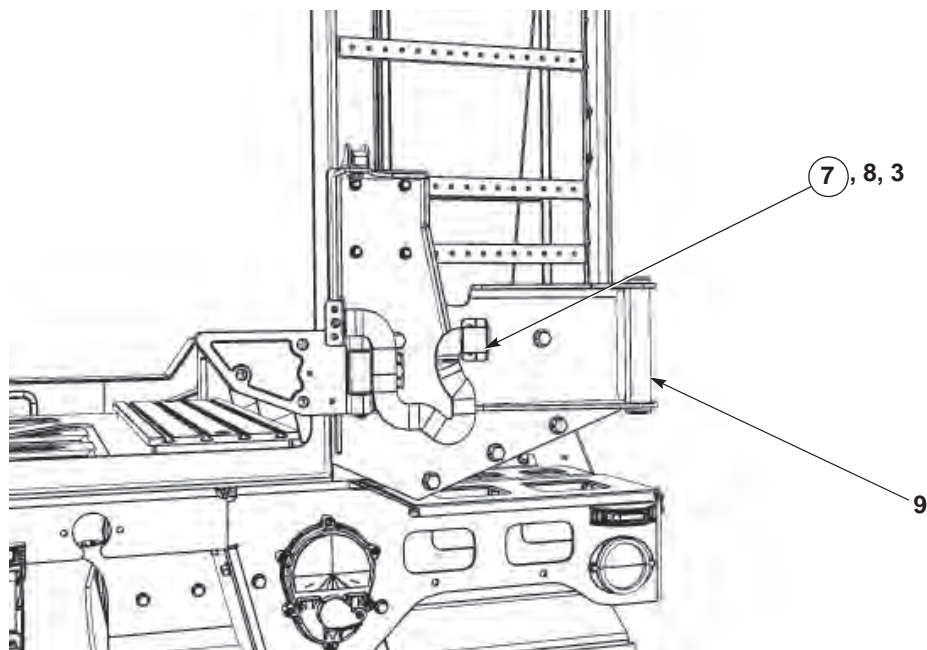
1. Remove two locknuts (1), and two screws (2), disconnecting the strap (3) from tire assembly outer frame support (4). Discard locknuts (1).

REMOVAL – CONTINUED

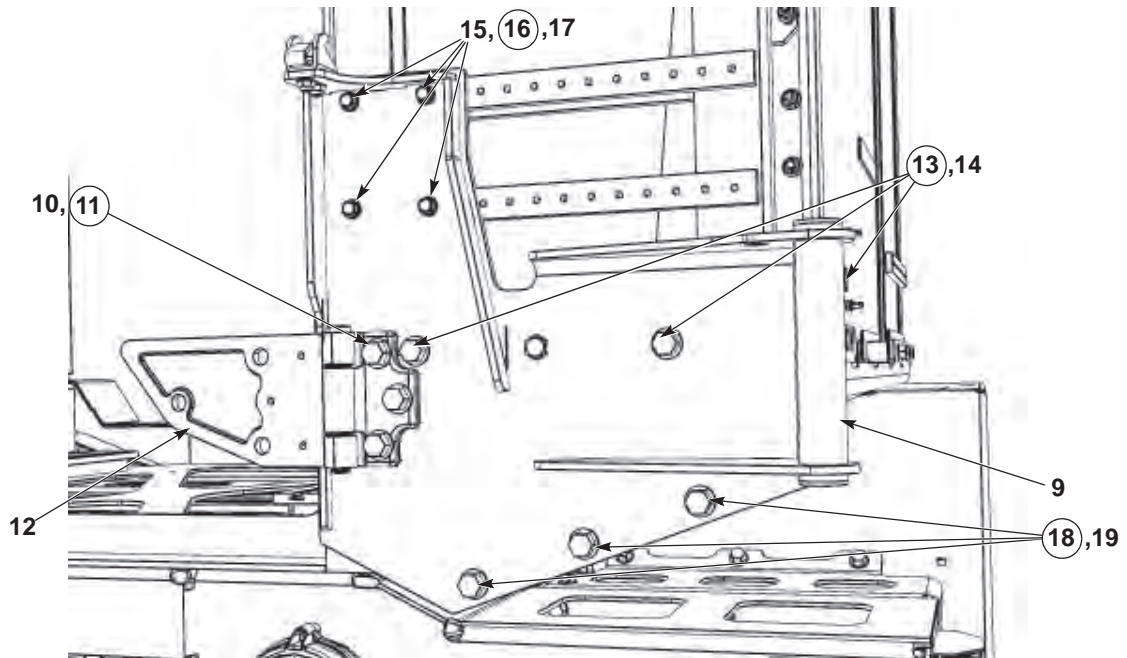
**NOTE**

Perform step 2 only if replacing a part of carrier assembly.

2. Remove the C-clip (6), and drive the pivot pin (5) upward to remove. Discard C-clip (6).
3. With the aid of an assistant, remove the tire assembly outer frame support (4).



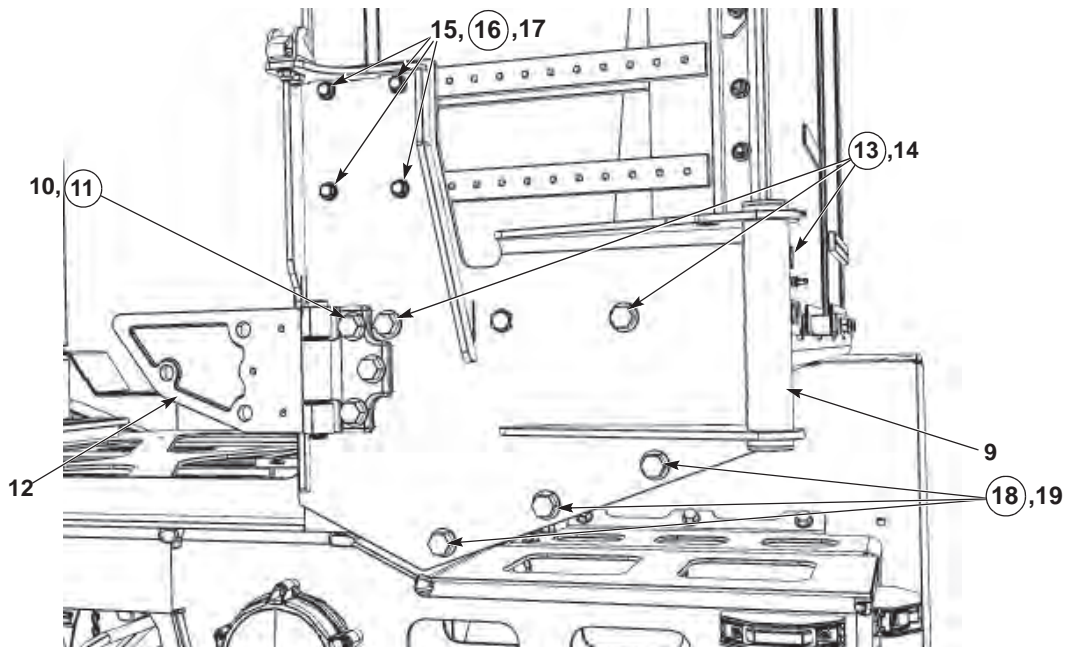
4. Remove locknut (7), screw (8) and strap (3) from tire assembly inner frame support (9). Discard locknut (7).

REMOVAL – CONTINUED

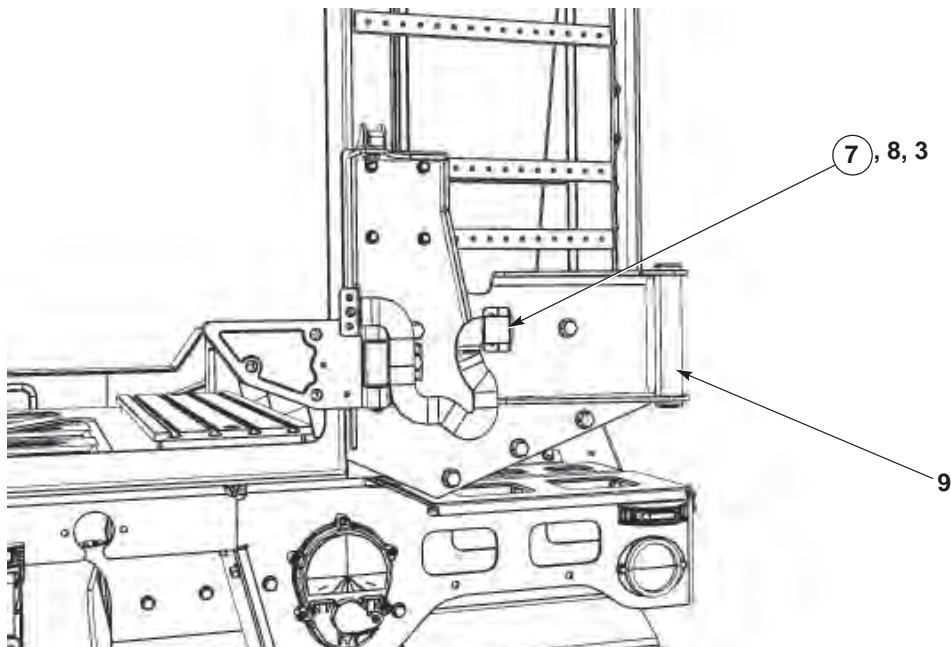
5. Remove three locknuts (11), three screws (10), and remove cargo door hinge (12). Discard locknuts (11).
6. Remove three locknuts (13), three screws (14), from the tire assembly inner frame support (9). Discard locknuts (13).
7. Remove four screws (15), four lockwashers (16), and four washers (17). Discard lockwashers (16).
8. Remove three locknuts (18), three screws (19) and with the aid of an assistant, remove the tire assembly inner frame support (9). Discard locknuts (18).

END OF TASK

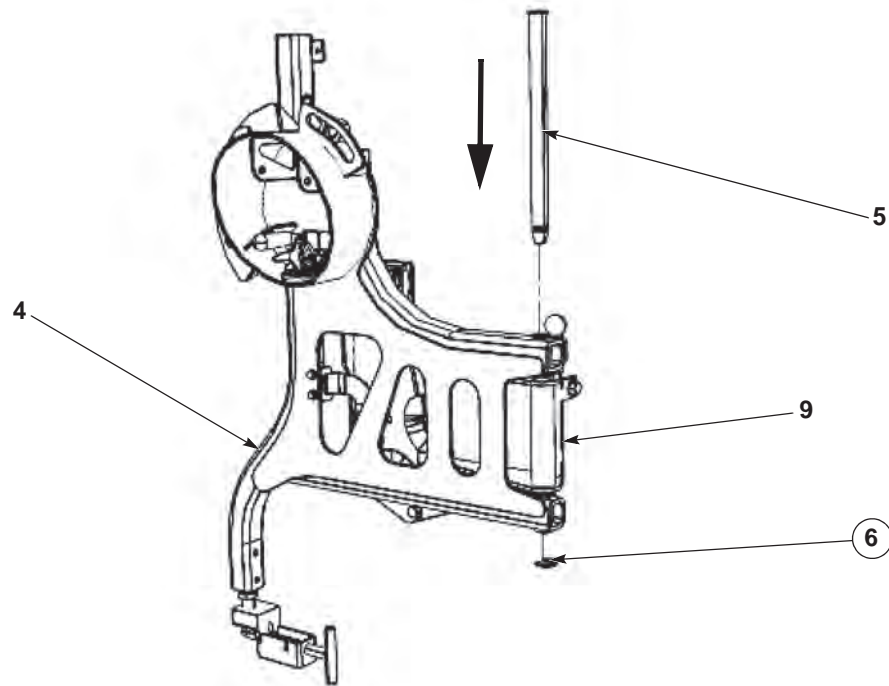
INSTALLATION



1. With the aid of an assistant, attach the tire assembly inner frame support (9) to the vehicle, install screws (19), and new locknuts (18).
2. Install four washers (17), four new locknuts (16), and four screws (15).
3. Install three screws (14) and three new locknuts (13) to the tire assembly inner frame support (9).
4. Attach the cargo door hinge (12), and secure the hinge with three screws (10) and three new locknuts (11).



5. Attach strap (3) to the tire assembly inner frame support (9), and install screw (8) and new locknut (7).

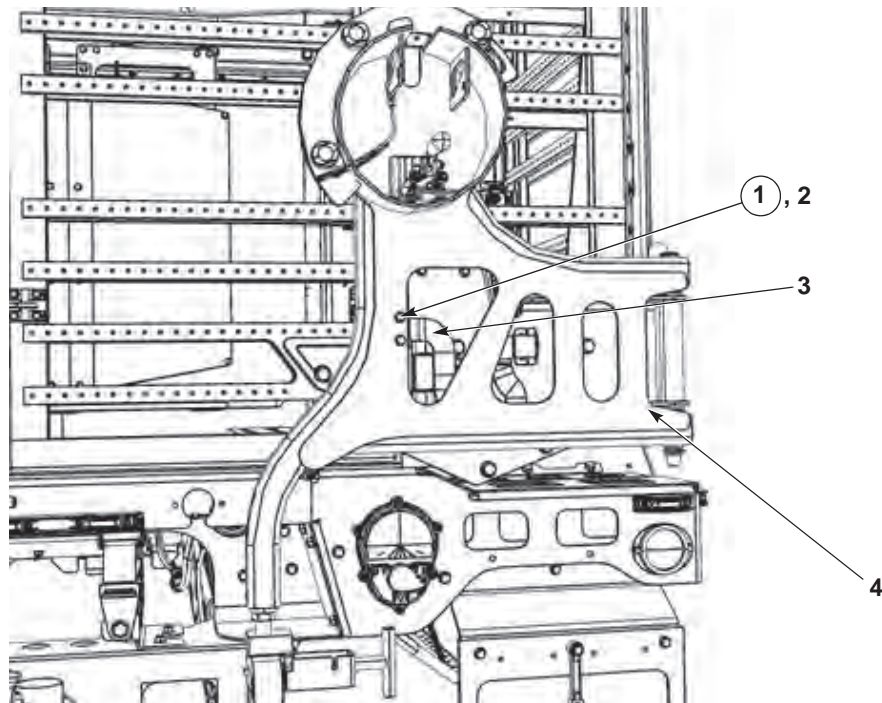
INSTALLATION – CONTINUED

6. With the aid of an assistant, attach the tire assembly outer frame support (4) to the tire assembly inner frame support (9).

NOTE

Apply a light coat of lubrication (GAA) on pivot pin and inner cylinder before inserting pin.

7. Insert the pivot pin (5) and drive downward, joining both the inner and outer frame supports (4 and 9). Secure the pivot pin (5) with new C-clip (6).

INSTALLATION – CONTINUED**WARNING**

Keep hands away from pinch point areas of the tire carrier assembly. Hands and fingers could get crushed. Failure to comply may result in injury to personnel.

8. Install two screws (2) and two new locknuts (1), securing strap (3) to tire assembly outer frame support (4).
9. Perform all Follow-On maintenance Tasks.

END OF TASK

END OF WORK PACKAGE

WINDSHIELD WIPER ARM REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Tools and Special Tools

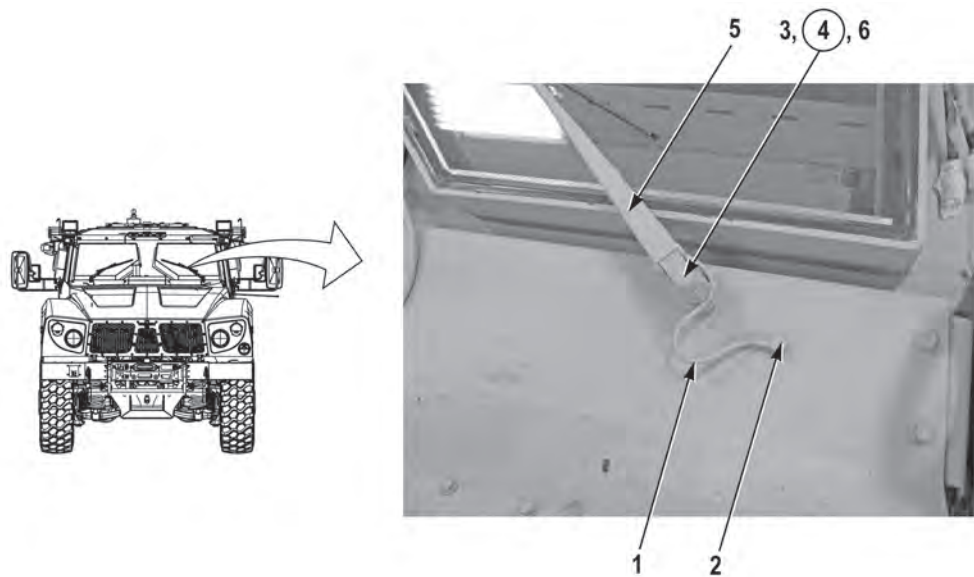
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (Item 4)
Locknut (Item 7)

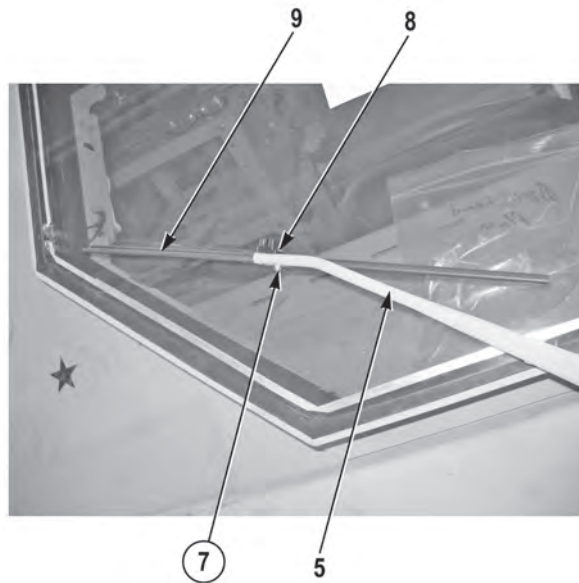
Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

Note position of hose prior to removal to ensure proper installation.

1. Remove hose (1) from fitting (2).
2. Remove nut (3), lockwasher (4), and windshield wiper arm (5) from stud (6). Discard lockwasher (4).

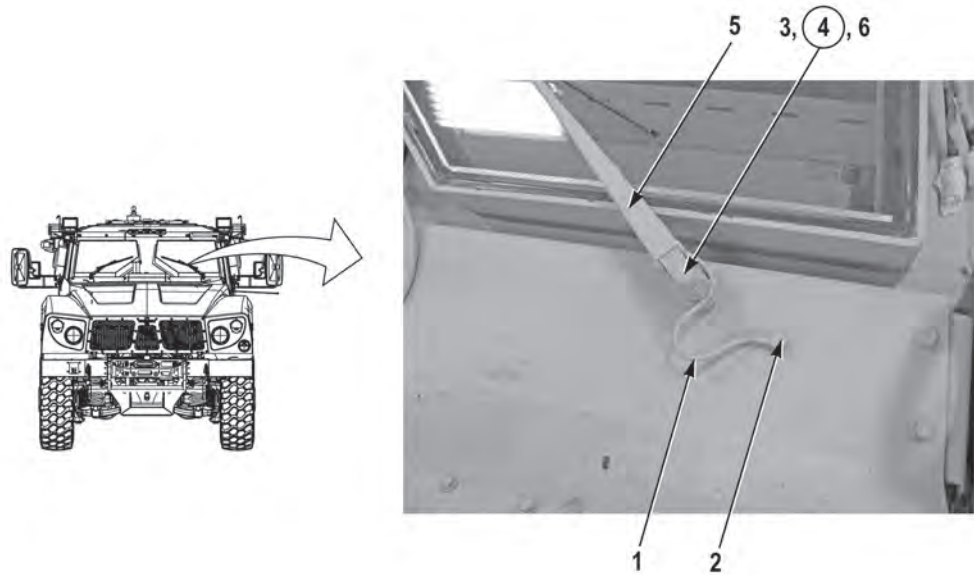


3. Remove locknut (7), screw (8), and wiper blade (9) from windshield wiper arm (5). Discard locknut (7).

END OF TASK

INSTALLATION

1. Install windshield wiper blade (9) on windshield wiper arm (5) with screw (8) and new locknut (7).



2. Install windshield wiper arm (5) on stud (6) with new lockwasher (4) and nut (3).

NOTE

Install hose as noted prior to removal.

3. Install hose (1) on fitting (2).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

WINDSHIELD WIPER MOTOR REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 Air cleaner assembly removed (WP 0257)
 Horn removed

Tools and Special Tools

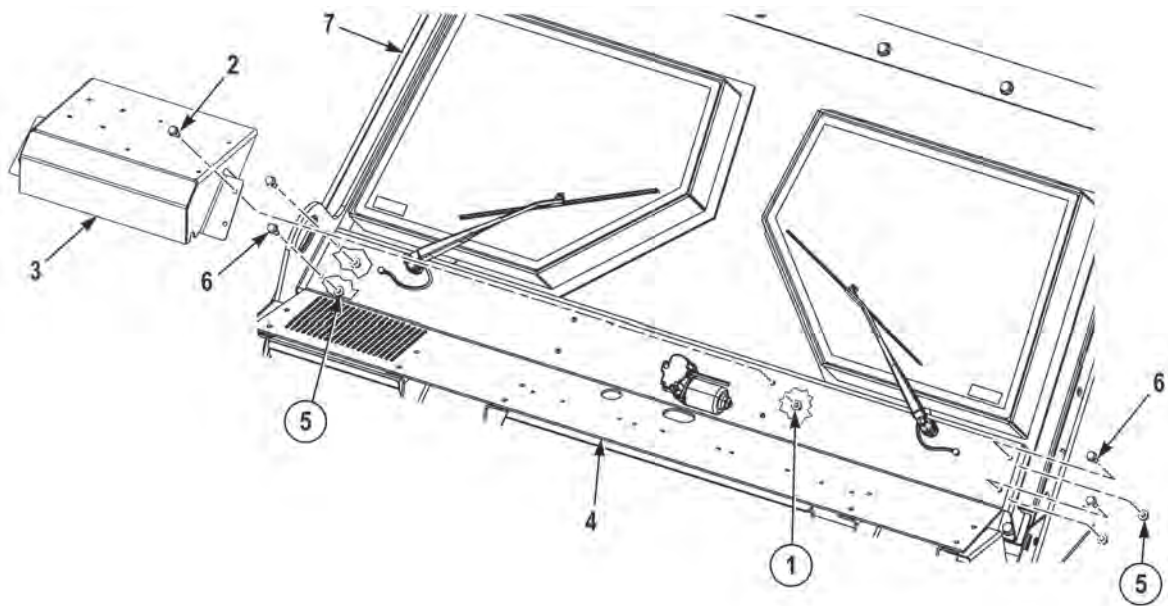
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (4) (Item 1)
 Locknut (4) (Item 5)
 Locknut (6) (Item 8)

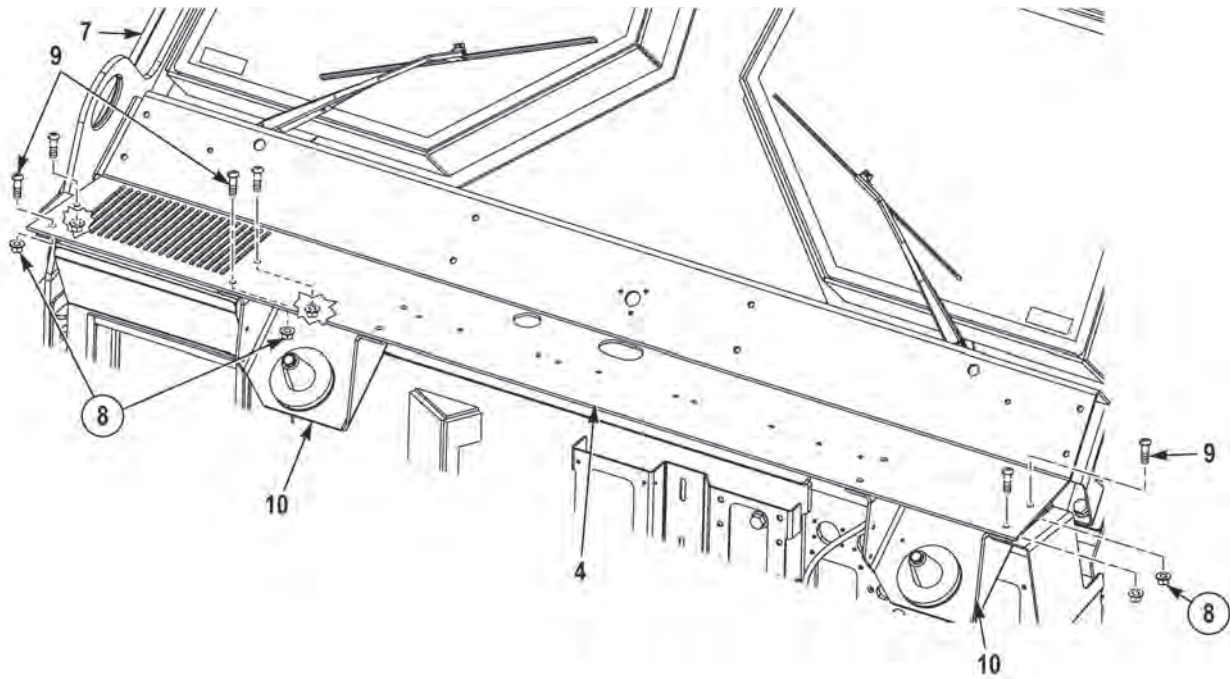
Follow-On Maintenance

Install horn
 Install air cleaner assembly (WP 0257)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

REMOVAL**NOTE**

Note position of screws prior to removal to ensure proper installation.

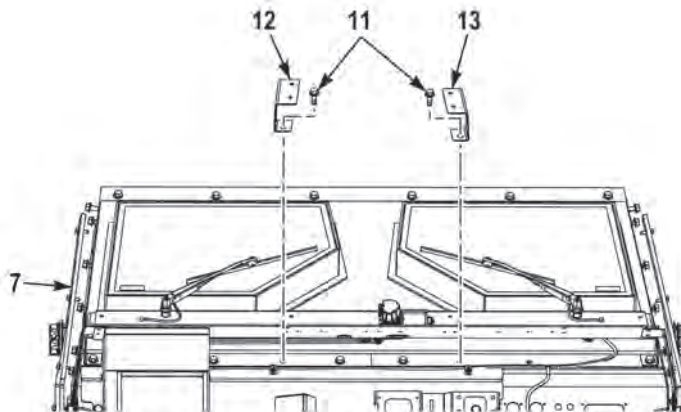
1. Remove four locknuts (1), screws (2), and cover (3) from hood support bracket (4). Discard locknuts (1).
2. Remove four locknuts (5) and screws (6) from hood support bracket (4) and capsule (7). Discard locknuts (5).



CAUTION

Only remove hood support bracket far enough away from capsule for access of remaining hardware. Failure to comply may result in damage to equipment.

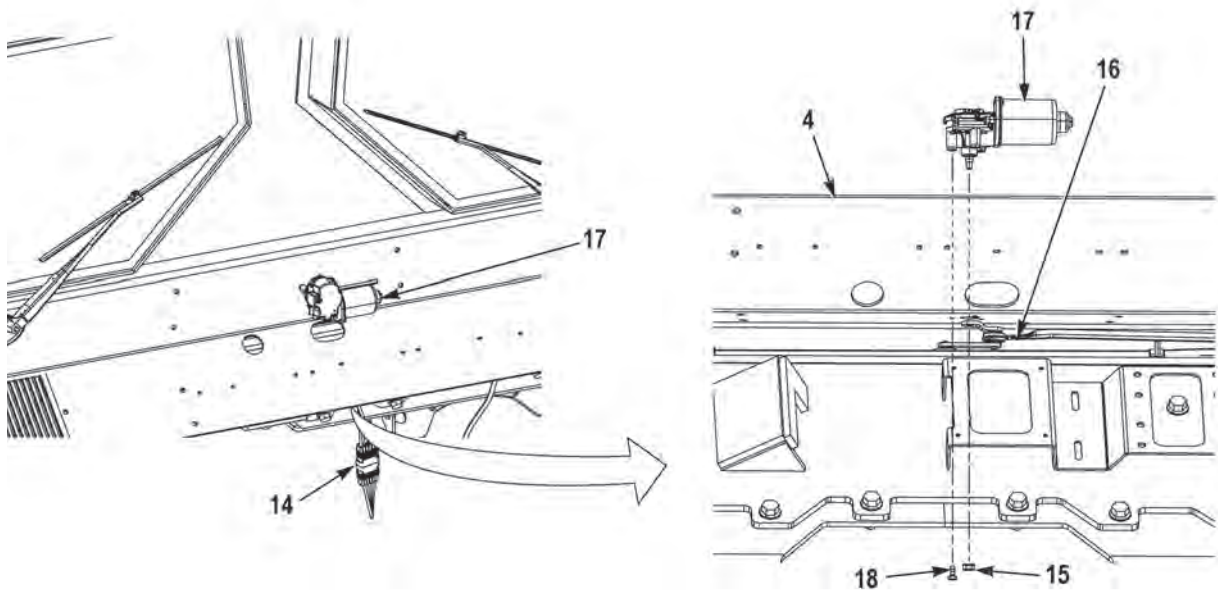
3. Remove six locknuts (8), screws (9), and hood support bracket (4) from capsule (7) and two brackets (10). Discard locknuts (8).



NOTE

Note position of brackets prior to removal to ensure proper installation.

4. Remove two screws (11), bracket (12), and bracket (13) from capsule (7).



5. Disconnect connector (14).
6. Remove nut (15) from windshield wiper arm (16) and windshield wiper motor (17).
7. Remove three screws (18) and windshield wiper motor (17) from hood support bracket (4).

END OF TASK

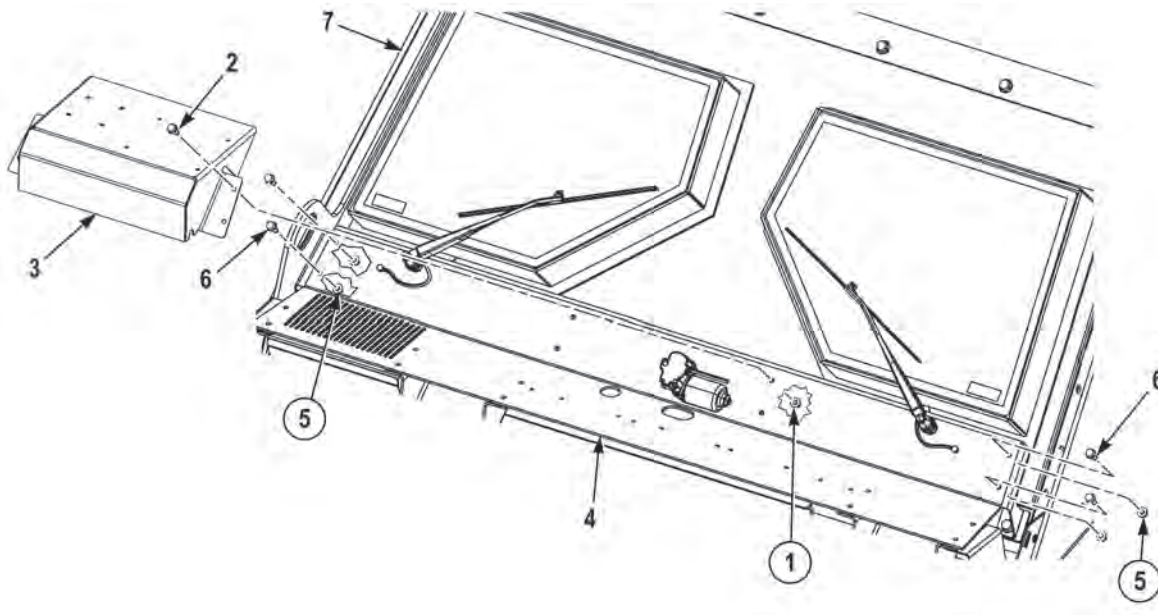
INSTALLATION

1. Install windshield wiper motor (17) on hood support bracket (4) with three screws (18).
2. Install nut (15) on windshield wiper motor (17) and windshield wiper arm (16).
3. Connect connector (14).

NOTE

Install brackets as noted prior to removal.

4. Install bracket (13) and bracket (12) on capsule (7) with two screws (11). Do not tighten screws (11).
5. Install hood support bracket (4) on two brackets (10) and capsule (7) with six screws (9) and new locknuts (8). Do not tighten screws (9).



6. Install four screws (6) and new locknuts (5) on hood support bracket (4) and capsule (7). Do not tighten screws (6).
7. Tighten screws (11), (9), and (6).

NOTE

Install screws as noted prior to removal.

8. Install cover (3) on hood support bracket (4) with four screws (2) and new locknuts (1).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

BELLY DEFLECTOR CROSSMEMBER WELDMENT REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Passenger side belly deflector panel removed (M1240/M1245) (WP 0052)
 Passenger side belly deflector panel removed (M1240A1) (WP 0056)
 Driver side belly deflector panel removed (M1240/M1245) (WP 0049)
 Driver side belly deflector panel removed (M1240A1) (WP 0056)
 Front axle propeller shaft removed (WP 0090)

Tools and Special Tools

Lifting Device, Minimum Capacity 200 lbs (91 kg)
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

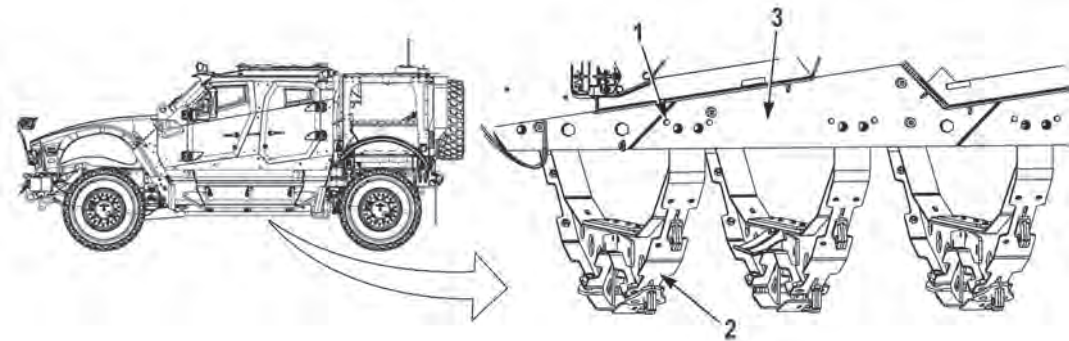
Install front axle propeller shaft (WP 0090)
 Install driver side belly deflector panel (M1240/M1245) (WP 0049)
 Install driver side belly deflector panel (M1240A1) (WP 0056)
 Install passenger side belly deflector panel (M1240/M1245) (WP 0052)
 Install passenger side belly deflector panel (M1240A1) (WP 0056)
 Remove and stow wheel chocks

REMOVAL**WARNING**

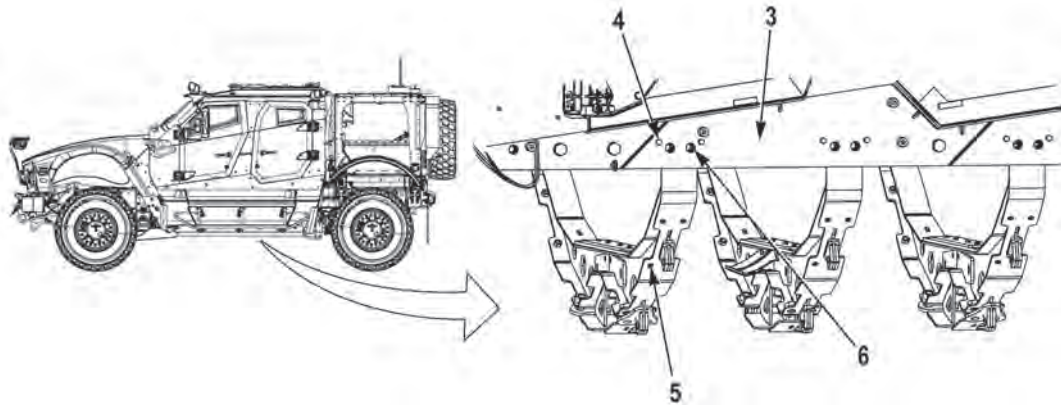
Crossmember weighs 113 lbs (51 kg). Do not attempt to lift or move crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- All crossmembers are removed the same way except where noted. Front crossmember shown.
- Perform Step (1) for M1240/M1245.
- Perform Steps (2) and (3) for M1240A1.



1. With the aid of an assistant and lifting device, remove four screws (1) and crossmember (2) from capsule (3).



NOTE

- Front crossmember has two screws securing crossmember to capsule on vehicle equipped with underbody improvement panels.
 - Perform Step (2) if removing front crossmember.
2. Remove two screws (4) from crossmember (5) and capsule (3).
 3. With the aid of an assistant and a lifting device, remove four setscrews (6) and crossmember (5) from capsule (3).

END OF TASK

INSTALLATION

WARNING

Crossmember weighs 113 lbs (51 kg). Do not attempt to lift or move crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- All crossmembers are installed the same way except where noted. Front crossmember shown.
 - Perform Steps (1) through (3) for M1240A1.
 - Perform Steps (4) and (5) for M1240/M1245.
 - Front crossmember has two screws securing crossmember to capsule.
1. With the aid of an assistant and a lifting device, install crossmember (5) on capsule (3) with four setscrews (6).

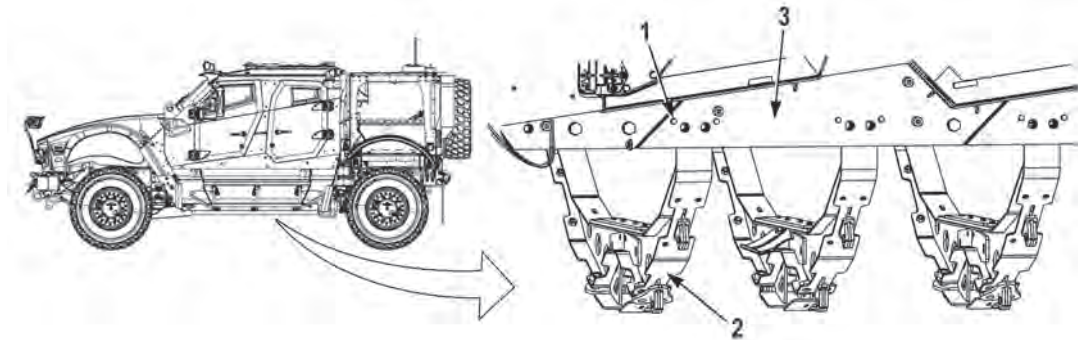
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Perform Steps (2) and (3) if front crossmember was removed.

2. Apply sealing compound, Loctite 242, to the threads of two screws (4).
3. With the aid of an assistant and a lifting device, secure crossmember (5) on capsule (3) with two screws (4).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to threads of four screws (1).

WARNING

Crossmember weighs 113 lbs (51 kg). Do not attempt to lift or move crossmember without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

5. With the aid of an assistant and lifting device, install crossmember (2) on capsule (3) with four screws (1).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CAPSULE ARMOR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Antenna removed
Spotlight bracket removed (WP 0167)
B-Pillar handle removed (if equipped) (WP 0140)
Front mud flap removed (if equipped) (WP 0030)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (Item 5)
Locknut (Item 10)

Materials/Parts (continued)

Compound, Sealing, Loctite 242
Ties, Cable

Personnel Required

Two

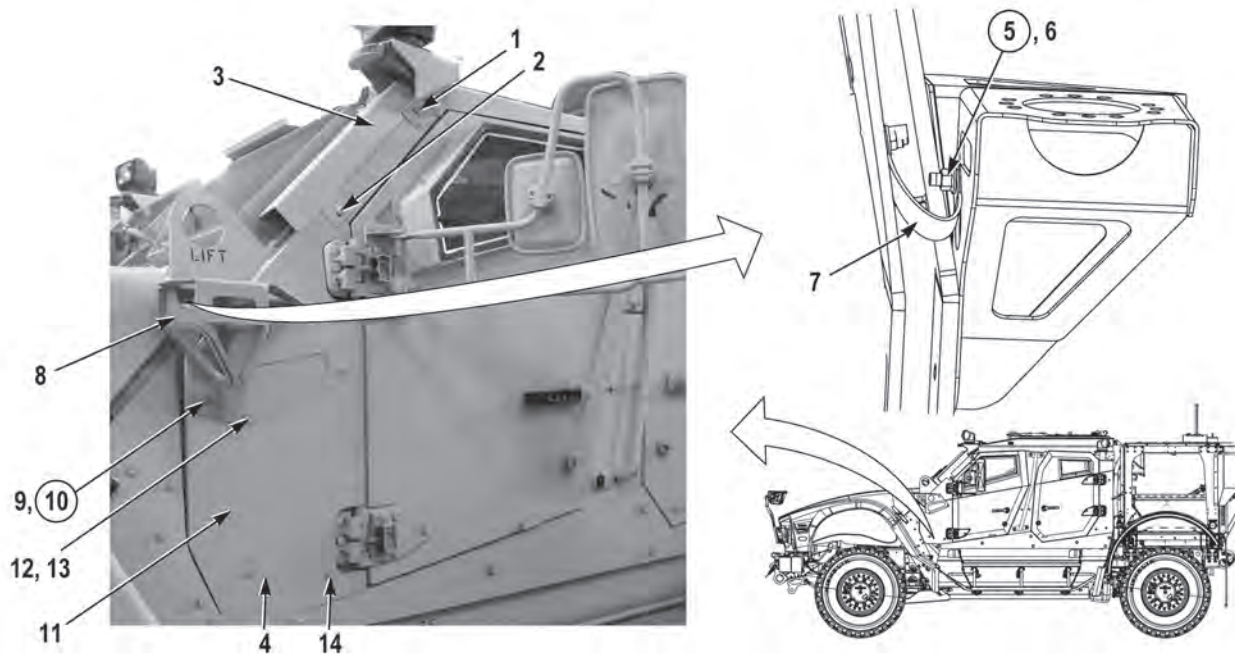
Follow-On Maintenance

Install front mud flap (if equipped) (WP 0030)
Install B-Pillar handle (if equipped) (WP 0140)
Install spotlight bracket (WP 0167)
Install antenna
Remove and stow wheel chocks

REMOVAL**NOTE**

Driver side and passenger side capsule side deflector panel are removed the same way.
Driver side shown.

- Perform Steps (1) through (5) to remove front capsule side deflector panel.
- Perform Step (6) to remove center capsule side deflector panel.
- Perform Steps (7) and (8) to remove rear capsule side deflector panel.
- Perform Step (9) to remove lower capsule side deflector panel on vehicles equipped with improved mud flaps.
- Perform Step (10) to remove lower capsule side deflector panel on vehicles not equipped with improved mud flaps.

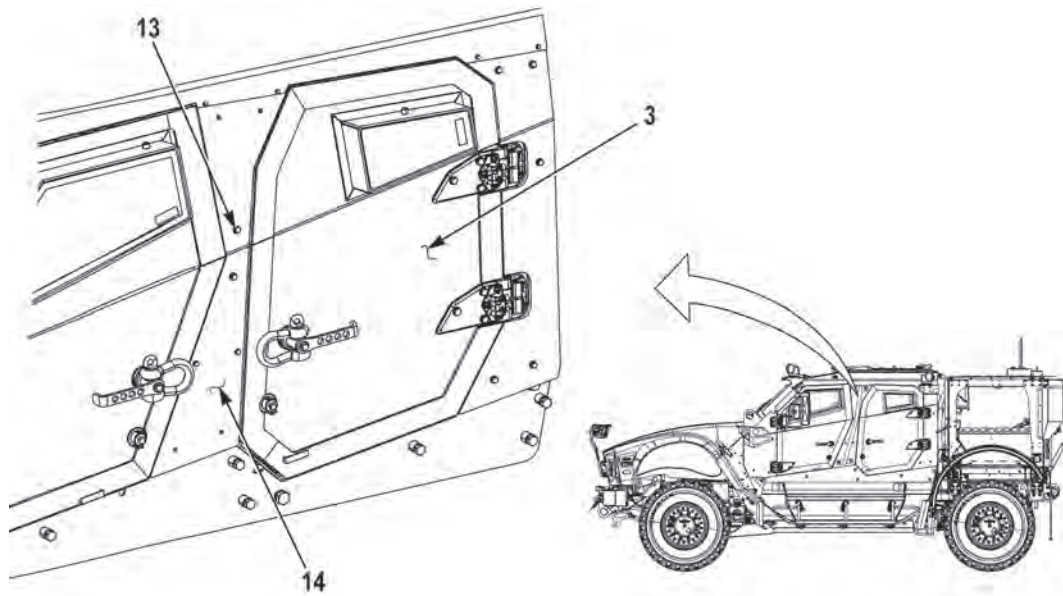


1. Remove two screws (1), (2), and raceway cover (3) from capsule (4).

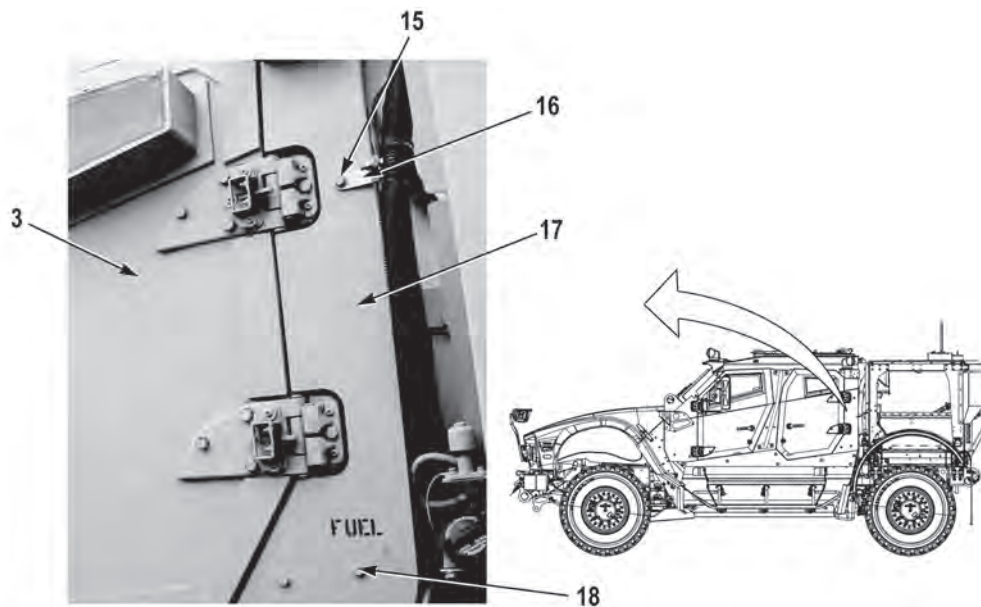
NOTE

Perform Step (2) if removing driver side front capsule side deflector panel.

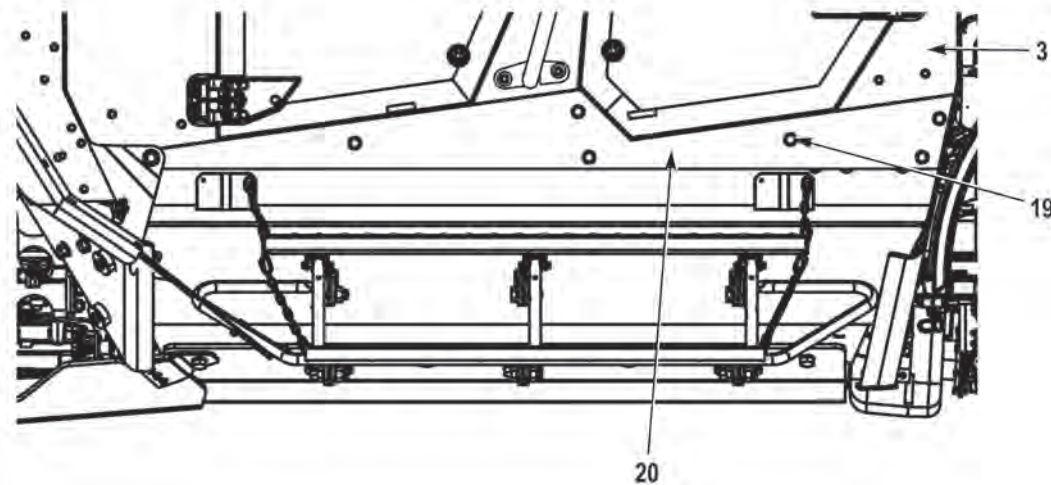
2. Remove locknut (5), screw (6) and ground strap (7) from antenna bracket (8). Discard locknut (5).
3. Remove screw (9) and locknut (10) from front capsule side deflector panel (11) and antenna bracket (8). Discard locknut (10).
4. Remove three screws (12), cushion clip (13), and antenna bracket (8) from capsule (4).
5. With the aid of an assistant, remove two screws (14) and front capsule side deflector panel (11) from capsule (4).



6. With the aid of an assistant, remove two screws (13) and center capsule side deflector panel (14) from capsule (3).



7. Remove screw (15) and bracket (16) from rear capsule side deflector panel (17) and capsule (3).
8. With the aid of an assistant, remove two screws (18) and rear capsule side deflector panel (17) from capsule (3).



9. Remove six screws (19) and lower capsule side deflector panel (20) from capsule (3).
10. Remove seven screws (19) and lower capsule side deflector panel (20) from capsule (3).

END OF TASK

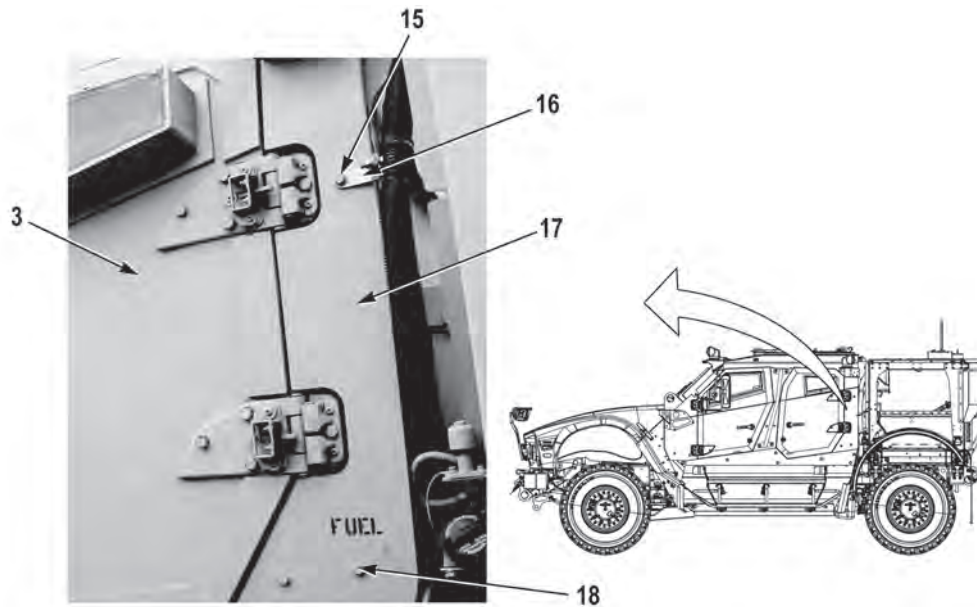
INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

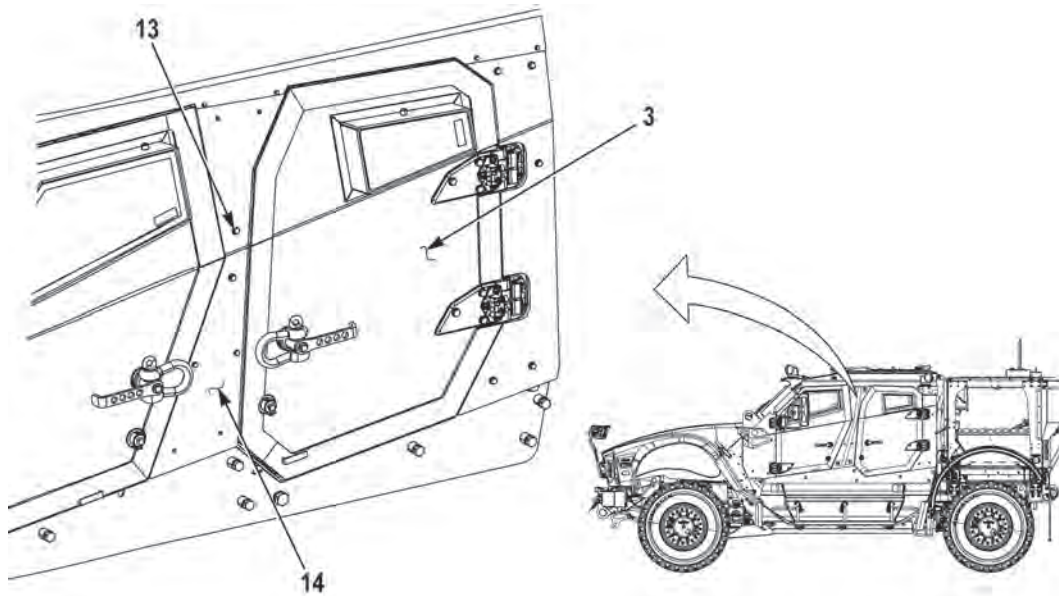
- Driver side and passenger side capsule side deflector panel are installed the same way. Driver side shown.
 - Perform Steps (1) and (2) to install lower capsule side deflector panel on vehicles not equipped with improved mud flaps.
 - Perform Steps (3) and (4) on vehicles equipped with improved mud flaps.
 - Perform Steps (5) through (7) to install rear capsule side deflector panel.
 - Perform Step (8) and (9) to install center capsule side deflector panel.
 - Perform Steps (10) through (16) to install front capsule side deflector panel.
1. Apply sealing compound, Loctite 242, to threads of seven screws (19).
 2. With the aid of an assistant, install lower capsule side deflector panel (20) on capsule (3) with seven screws (19).
 3. Apply sealing compound, Loctite 242, to threads of six screws (19).
 4. With the aid of an assistant, install lower capsule side deflector panel (20) on capsule (3) with six screws (19).



WARNING

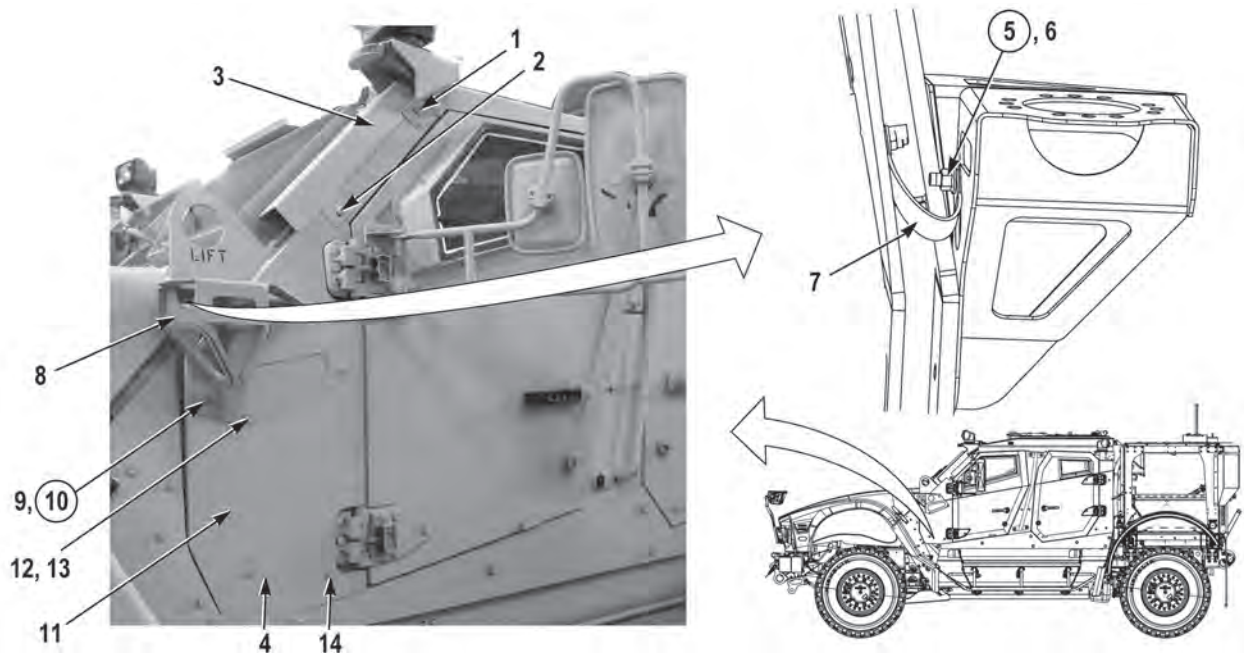
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

5. Apply sealing compound, Loctite 242, to threads of three screws (15 and 18).
6. With the aid of an assistant, install rear capsule side deflector panel (17) on capsule with two screws (18).
7. Install bracket (16) on capsule (3) and rear capsule side deflector panel (17) with screw (15).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply sealing compound, Loctite 242, to threads of two screws (13).
9. With the aid of an assistant, install center capsule side deflector panel (14) on capsule (3) with two screws (13).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

10. Apply sealing compound, Loctite 242, to threads of seven screws (1, 2, 12, and 14).
11. With the aid of an assistant, install front capsule side deflector panel (11) on capsule (4) with two screws (14).
12. Install antenna bracket (8) and cushion clip (13) on capsule (4) with three screws (12).
13. Secure antenna bracket (8) on and capsule (4) with screw (9) and new locknut (10).

NOTE

- Perform Steps (14) and (15) if installing driver side front capsule side deflector panel.
 - Ensure mating surface of antenna bracket and ground strap is clean bare metal prior to installation.
14. Install ground strap (7) on driver side antenna bracket (8) with screw (6) and new locknut (5).
 15. Apply sealant, RTV to screw (6), exposed metal, and locknut (5).
 16. Install raceway cover (3) on capsule (4) with two screws (1) and (2).
 17. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CENTER BELLY DEFLECTOR PANEL REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Muffler removed (WP 0241)
Engine belly deflector panel removed (WP 0050)

Tools and Special Tools

Lifting Device
Socket, 36 mm
Tool Kit, General Mechanic's: Automotive
Transmission Jack
Wrench, 36 mm

Materials/Parts

Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

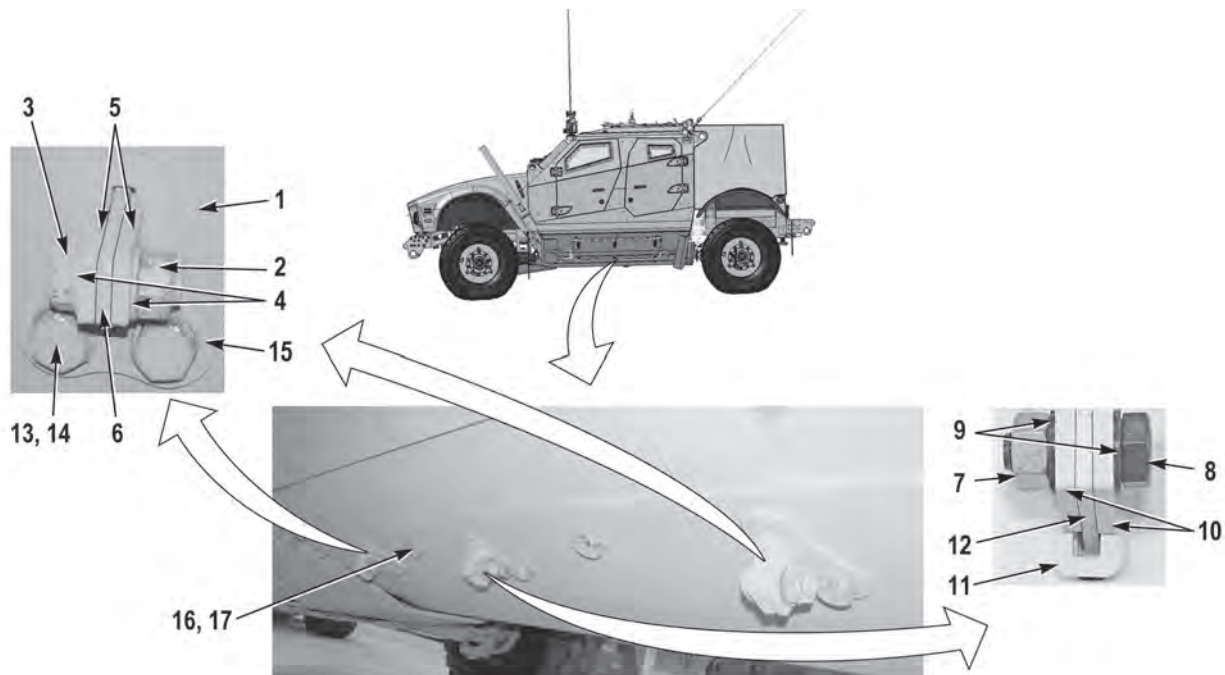
Install engine belly deflector panel (WP 0050)
Install muffler (WP 0241)
Remove and stow wheel chocks

REMOVAL**WARNING**

Center belly deflector weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- The front and rear wedge sets on the passenger side of the center belly deflector are removed with the muffler.
- Both sides of the center belly deflector are removed the same way. Driver side shown.
- Note position of mounting hardware prior to removal to ensure proper installation.



1. Position transmission jack under center belly deflector panel (1) to support the weight of center belly deflector panel (1).
2. Remove two nuts (2), screws (3), four washers (4), and four wedges (5) from front and rear armor mounting brackets (6).
3. Remove nut (7), screw (8), two washers (9), wedges (10), and spacer (11) from center armor mounting bracket (12) and center belly deflector panel (1).
4. Repeat Step (3) for passenger side.
5. Remove four screws (13), washers (14), and two spacer plates (15) from front and rear mounting brackets (6) and center belly deflector panel (1).
6. Repeat Step (5) for passenger side.

WARNING

Center belly deflector weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

7. Remove ten screws (16) and washers (17) from center belly deflector panel (1).
8. With the aid of an assistant and transmission jack, remove center belly deflector panel (1) from vehicle.

END OF TASK

INSTALLATION**WARNING**

Center belly deflector weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Both sides of the center belly deflector are installed the same way. Driver side shown.
 - Install mounting hardware as noted prior to removal.
1. With the aid of an assistant, lifting device, and transmission jack, position center belly deflector panel (1) on vehicle.
 2. Install three screws (8 and 3) and nuts (7 and 2) through armor mounting brackets (12 and 6). Do not tighten nuts (7 and 2).

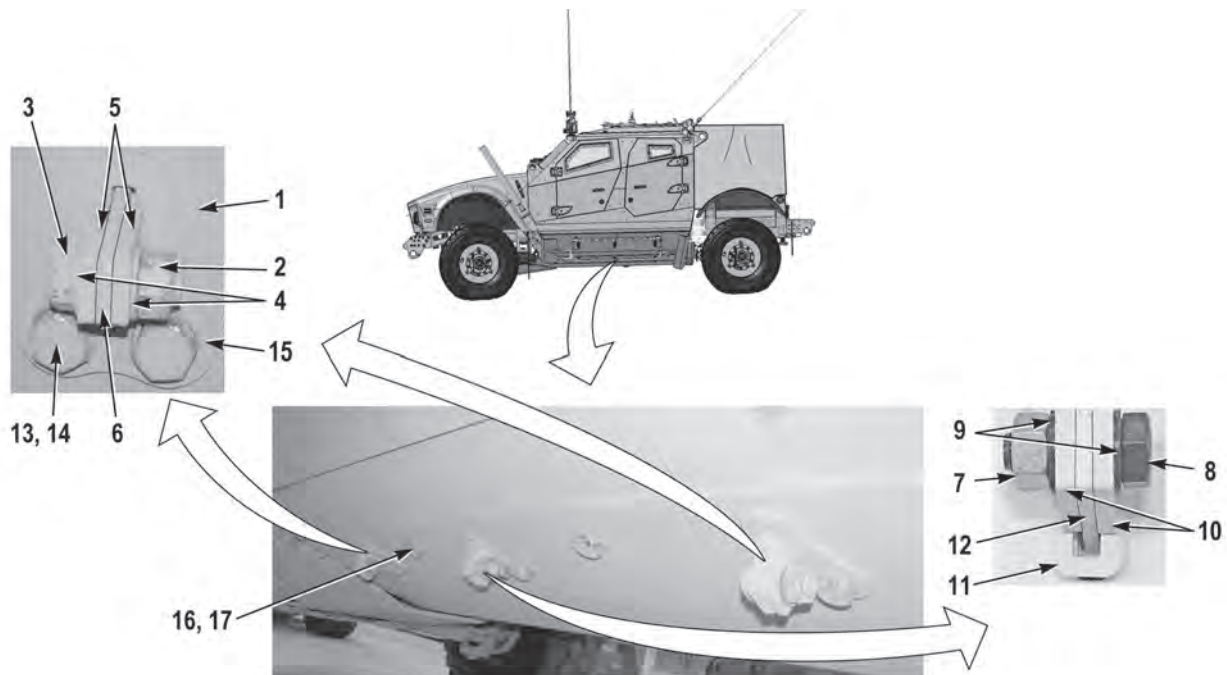
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Do not tighten any screws until all screws have been started with at least three threads engaged to aid in screw alignment.

3. Apply sealing compound, Loctite 242, to threads of ten screws (16) and secure center belly deflector panel (1) on vehicle with ten washers (17) and screws (16). Do not tighten screws (16).
4. Remove three nuts (7 and 2) and screws (8 and 3) from armor mounting brackets (12 and 6).
5. Apply sealing compound, Loctite 242, to threads of 12 screws (13, 8, and 3).
6. Install two spacer plates (15) on front and rear armor mounting brackets (6) and center belly deflector panel (1) with four washers (14) and screws (13). Do not tighten screws (13).
7. Repeat Step (8) for passenger side.
8. Install spacer (11) and two wedges (10) on center mounting bracket (12) with screw (8), two washers (9), and nut (7). Do not tighten nut (7).
9. Repeat Step (6) for passenger side.



NOTE

The front and rear passenger side wedge sets are installed with the muffler.

10. Install four wedges (5) on front and rear driver side armor mounting brackets (6) with four washers (4), two screws (3), and nuts (2).
11. Tighten 14 screws (16 and 13) and four nuts (7 and 2).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DRIVER SIDE BELLY DEFLECTOR PANEL REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Driver side lower capsule side deflector panel removed (WP 0047)
Driver side capsule steps removed (WP 0142)
Front driver side wheel well deflector panel removed (WP 0059)
Rear driver side wheel well deflector panel removed (WP 0059)
Center belly deflector panel removed (WP 0048)

Tools and Special Tools

Lifting Device
Socket, 36 mm
Tool Kit, General Mechanic's: Automotive
Transmission Jack
Wrench, 36 mm

Materials/Parts

Compound, Sealing, Loctite 242

Personnel Required

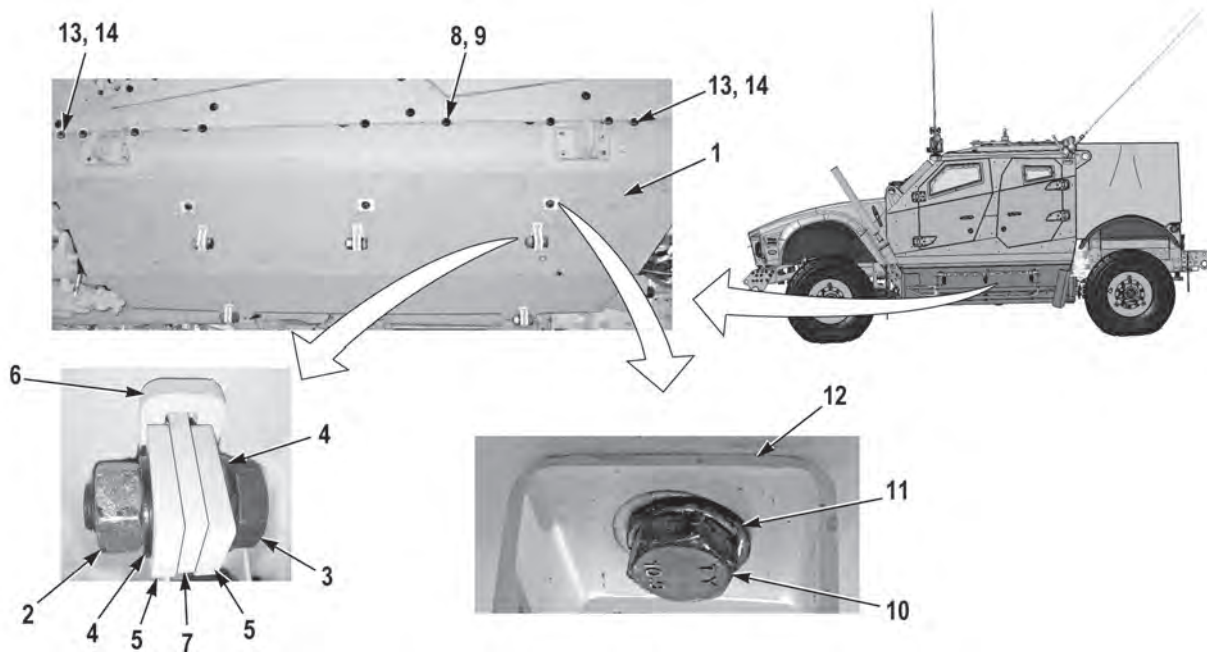
Two

Follow-On Maintenance

Install center belly deflector panel (WP 0048)
Install rear driver side wheel well deflector panel (WP 0059)
Install front driver side wheel well deflector panel (WP 0059)
Install driver side capsule steps (WP 0142)
Install driver side lower capsule side deflector panel (WP 0047)
Remove and stow wheel chocks

REMOVAL**WARNING**

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.



1. Position transmission jack under driver side belly deflector panel (1) to support weight of driver side belly deflector panel (1).

NOTE

Note position of mounting hardware prior to removal to ensure proper installation.

2. Remove three nuts (2), screws (3), six washers (4), wedges (5), and three spacers (6) from armor mounting brackets (7).

NOTE

Front and rear screws are shorter than center screws. Note position of screws prior to removal to ensure proper installation.

3. Remove 11 screws (8) and washers (9) from driver side belly deflector panel (1).

NOTE

Note position of brackets prior to removal to ensure proper installation.

4. Remove three screws (10), washers (11), and brackets (12) from driver side belly deflector panel (1).
5. With the aid of an assistant and lifting device, support weight of driver side belly deflector panel (1).
6. Remove two screws (13) and washers (14) from driver side belly deflector panel (1).
7. With the aid of an assistant and lifting device, remove driver side belly deflector panel (1) from vehicle.

END OF TASK

INSTALLATION**WARNING**

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

1. With the aid of an assistant, lifting device, and transmission jack, position driver side belly deflector panel (1) on vehicle.

NOTE

Install mounting hardware as noted prior to removal.

2. Install three screws (3) through armor mounting bracket (7).
3. Install three nuts (2) on screws (3). Do not tighten nuts (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to threads of two screws (13) and three screws (10).

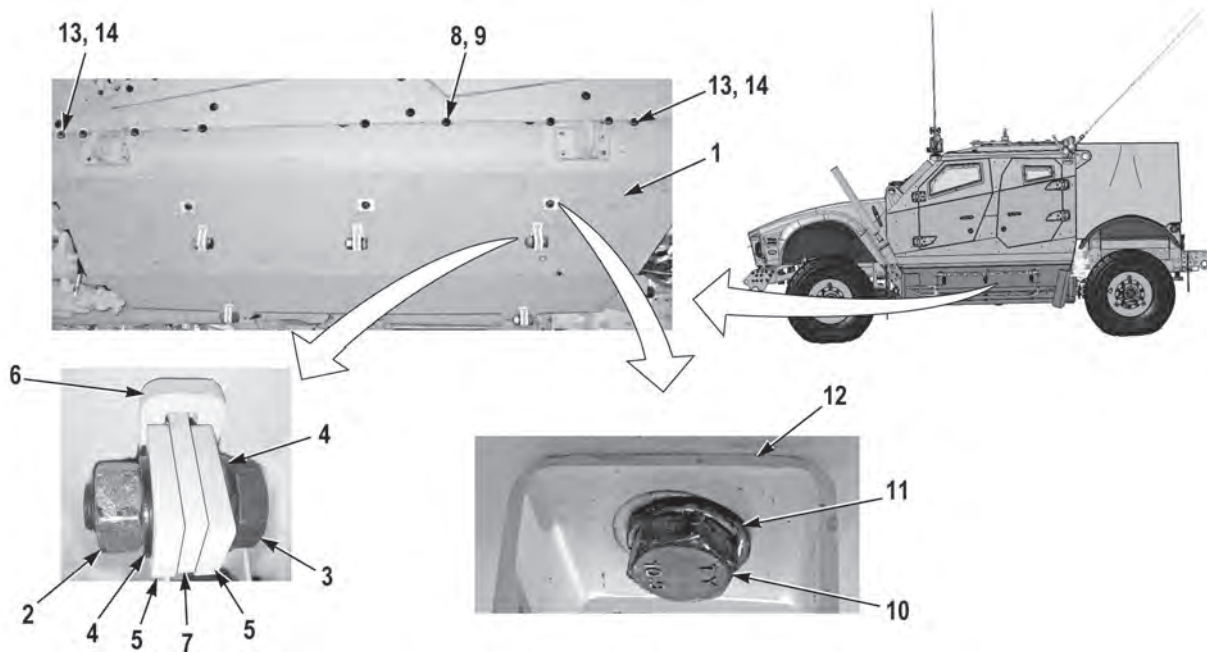
NOTE

- Do not tighten any screws until all screws have been started with at least three threads engaged to aid in screw alignment.
 - Install front and rear screws as noted prior to removal.
5. Secure driver side deflector panel (1) to vehicle with two washers (14) and screws (13).

NOTE

Install brackets as noted prior to removal.

6. Install three brackets (12) on driver side belly deflector panel (1) with washers (11) and screws (10).
7. Apply sealing compound, Loctite 242, to threads of 11 screws (8).
8. Install 11 washers (9) and screws (8) on driver side belly deflector panel (1).
9. Remove three screws (3) and nuts (2) from armor mounting bracket (7).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

10. Apply sealing compound, Loctite 242, to threads of three screws (3).
11. Install three spacers (6), six wedges (5), and washers (4) on armor mounting brackets (7) with three screws (3) and nuts (2).
12. Tighten 19 screws (13, 10, 8, and 3).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

ENGINE BELLY DEFLECTOR PANEL REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Underbody improvement panel removed
 (M1240A1) (WP 0056)

Tools and Special Tools

Extension 3/4" Dr. 4" Long
 Handle, Sliding-T, 3/4" Dr.
 Handle, Ratchet, 3/4" Dr.
 Jack, Transmission
 Socket, 3/4" Dr., 6 pt, 36 mm
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

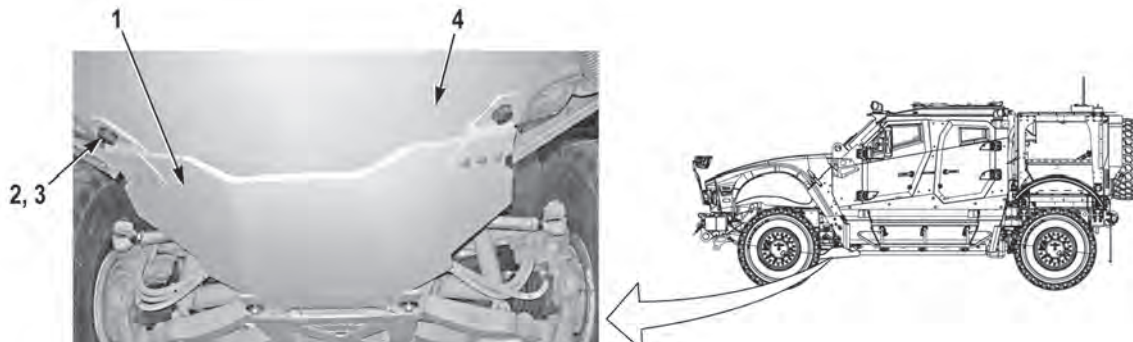
Locknut (2) (Item 8)
 Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

Install underbody improvement panel (M1240A1)
 (WP 0056)
 Remove and stow wheel chocks

REMOVAL**WARNING**

Engine belly deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move engine belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

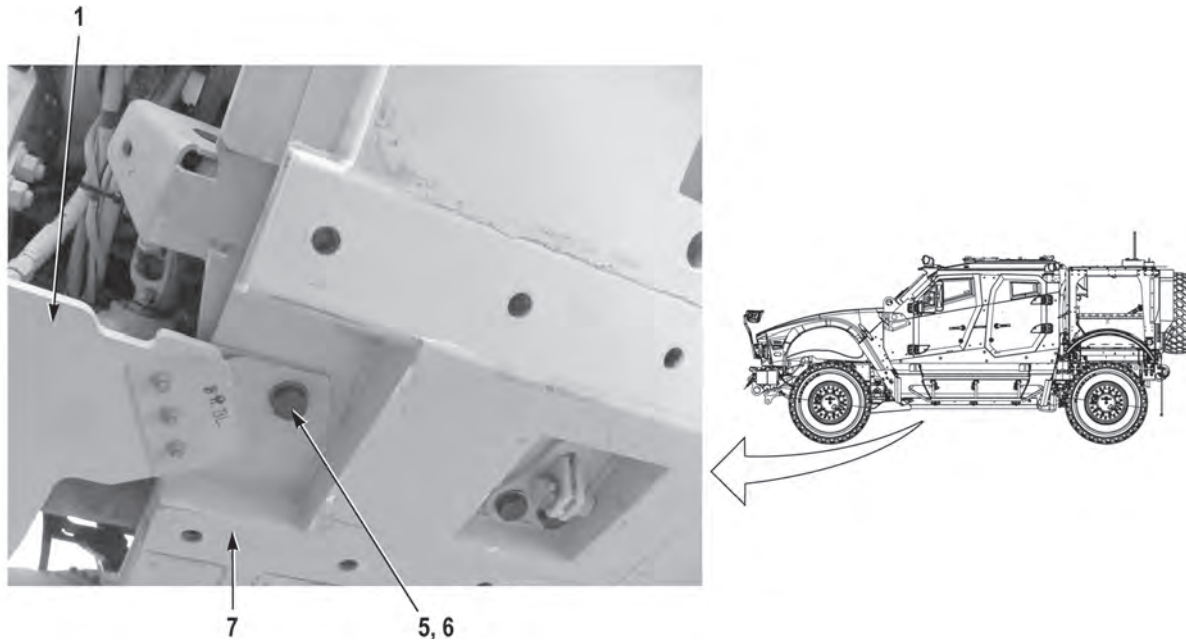
NOTE

Note position of engine belly deflector panel on vehicle prior to removal to ensure proper installation.

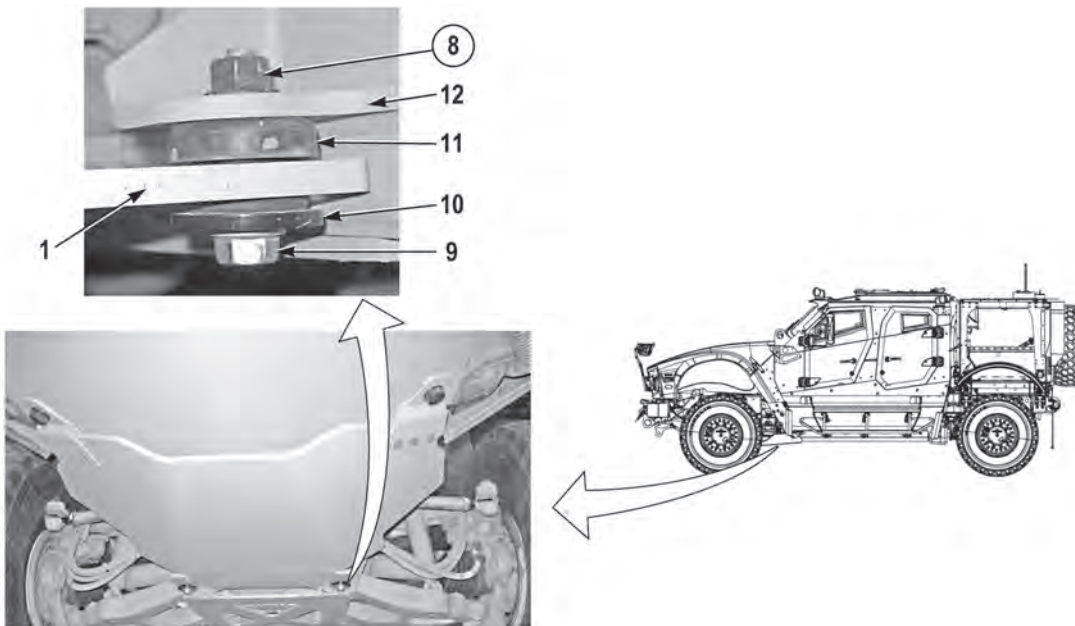
1. Position transmission jack under engine belly deflector panel (1) to support weight of engine belly deflector panel (1).

NOTE

- Perform Step (2) for M1240/M1245.
 - Perform Step (3) for M1240A1.
2. Remove two screws (2) and washers (3) from center belly deflector panel (4) and engine belly deflector panel (1).



3. Remove two screws (5) and washers (6) from ladder panel (7) and engine belly deflector panel (1).



NOTE

Note position of cushions prior to removal to ensure proper installation.

4. Remove two locknuts (8), screws (9), washers (10), and cushions (11) from engine belly deflector panel (1) and two brackets (12). Discard locknuts (8).
5. With the aid of an assistant and transmission jack, remove engine belly deflector panel (1) from vehicle.

END OF TASK

INSTALLATION**WARNING**

Engine belly deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move engine belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

1. Position transmission jack under engine belly deflector panel (1) to support weight of engine belly deflector panel (1).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

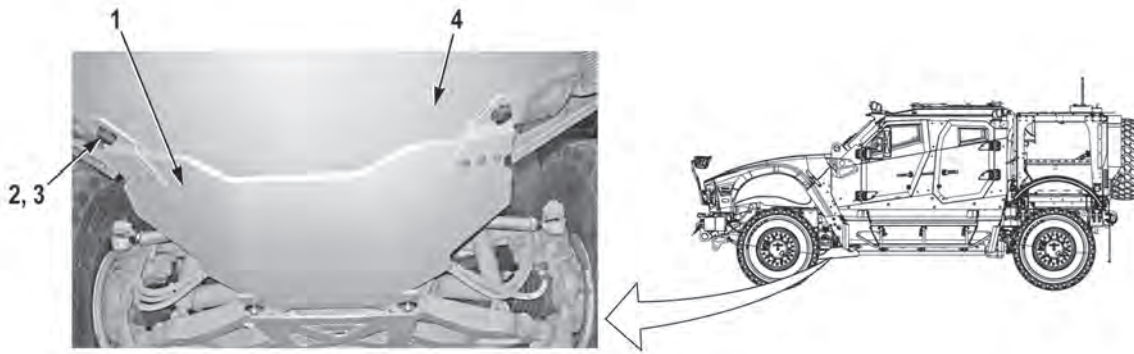
2. Apply sealing compound, Loctite 242, to threads of two screws (9).

NOTE

- Install cushions as noted prior to removal.
 - Install engine belly deflector panel as noted prior to removal.
3. With the aid of an assistant and transmission jack, install engine belly deflector panel (1) on two brackets (12) with cushions (11), washers (10), screws (9), and new locknuts (8).

NOTE

- Perform Step (4) for M1240A1.
 - Perform Step (5) for Models M1240/M1245.
4. Install engine belly deflector panel (1) on ladder panel (7) with two washers (6) and screws (5).



5. Install engine belly deflector panel (1) on center belly deflector panel (4) with two washers (3) and screws (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

LITTER DOOR DYNEEMA PANEL REPLACEMENT (M1245)

Preconditions

Park vehicle
Engine OFF
Wheels Chocked
Litter Door Removed (WP 0245)

Personnel Required

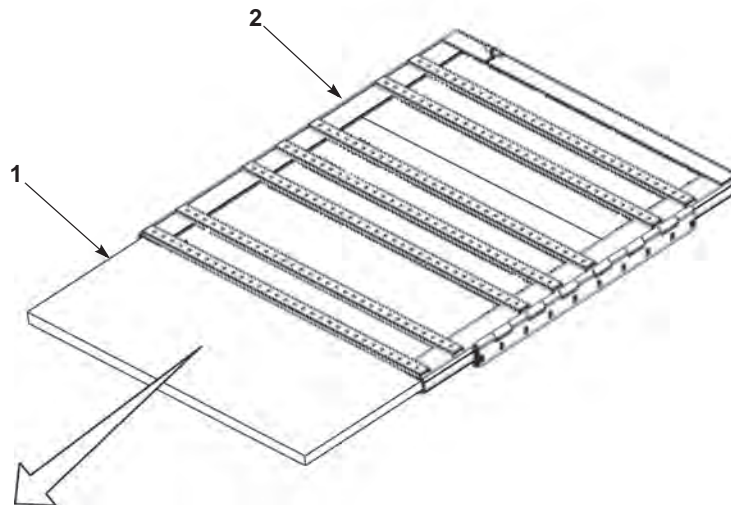
Two

Follow-On Maintenance

Install Litter Door (WP 0245)
Remove and Stow Wheel Chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL**WARNING**

Litter door and dyneema panel assembly weigh 142 lbs (65 kg). Do not move or lift litter door or dyneema panel without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

CAUTION

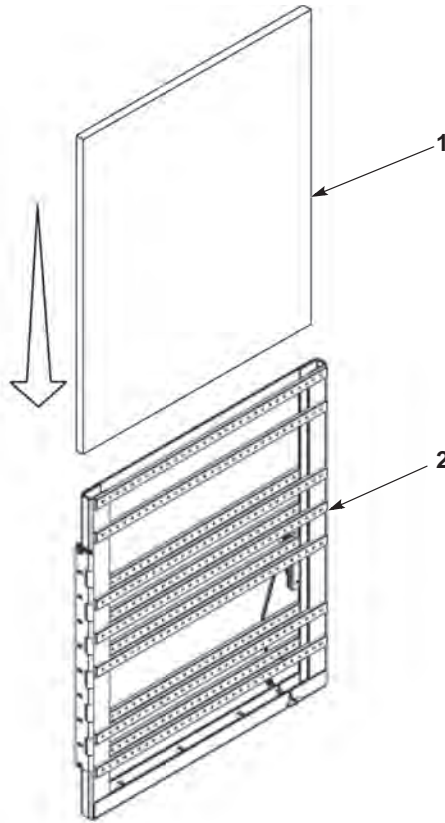
Litter door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

NOTE

- Dyneema panel will slide from litter door freely.
- Driver side and passenger side litter door dyneema panels are removed the same way.

1. Slide dyneema panel (1) out of litter door (2).

END OF TASK

INSTALLATION**WARNING**

Litter door and dyneema panel assembly weigh 142 lbs (65 kg). Do not move or lift litter door or dyneema panel without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

NOTE

- Dyneema panel will slide into litter door freely.
- If dyneema panel does not slide freely, apply force to panel using a dead blow hammer.
- Driver side and passenger side litter door dyneema panels are installed the same way.

1. With the aid of an assistant, insert dyneema panel (1) into litter door (2).
2. Perform all Follow-On Maintenance Tasks.

END OF TASK**END OF WORK PACKAGE**

PASSENGER SIDE BELLY DEFLECTOR PANEL REPLACEMENT (M1240/M1245)

Preconditions

- Park vehicle
- Engine OFF
- Wheels chocked
- Passenger side lower capsule side deflector panel removed (WP 0047)
- Passenger side capsule steps removed (WP 0142)
- Front passenger side wheel well deflector panel removed (WP 0059)
- Rear passenger side wheel well deflector panel removed (WP 0059)
- Center belly deflector panel removed (WP 0048)

Tools and Special Tools

- Lifting Device
- Socket, 36 mm
- Tool Kit, General Mechanic's: Automotive
- Transmission Jack
- Wrench, 36 mm

Materials/Parts

- Compound, Sealing, Loctite 242

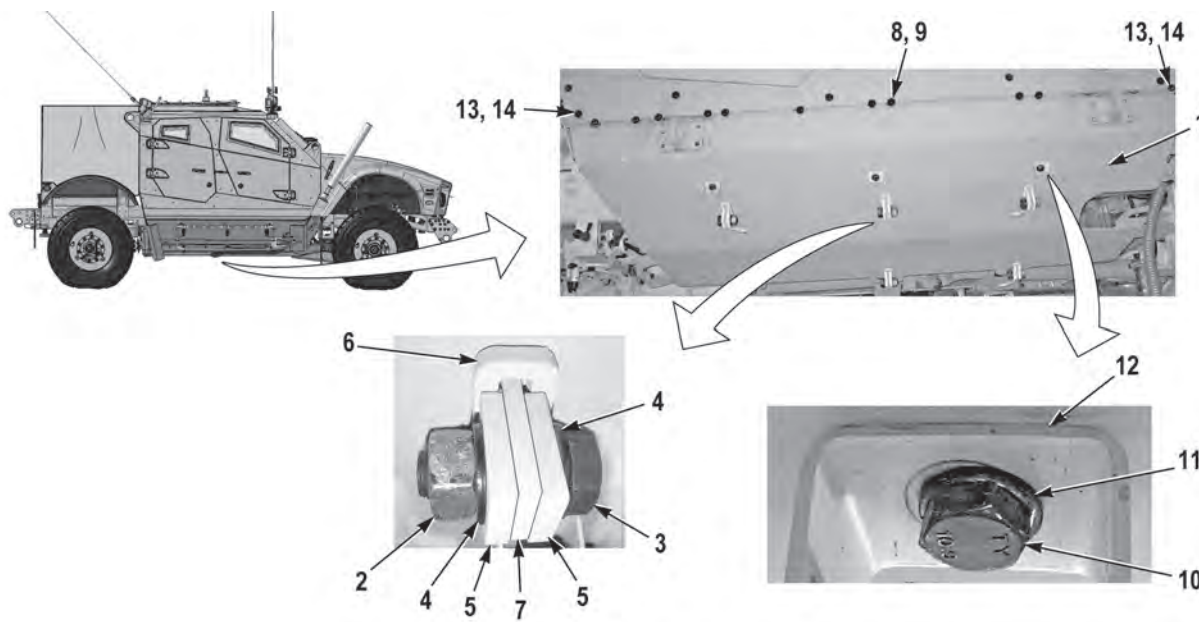
Personnel Required

- Two

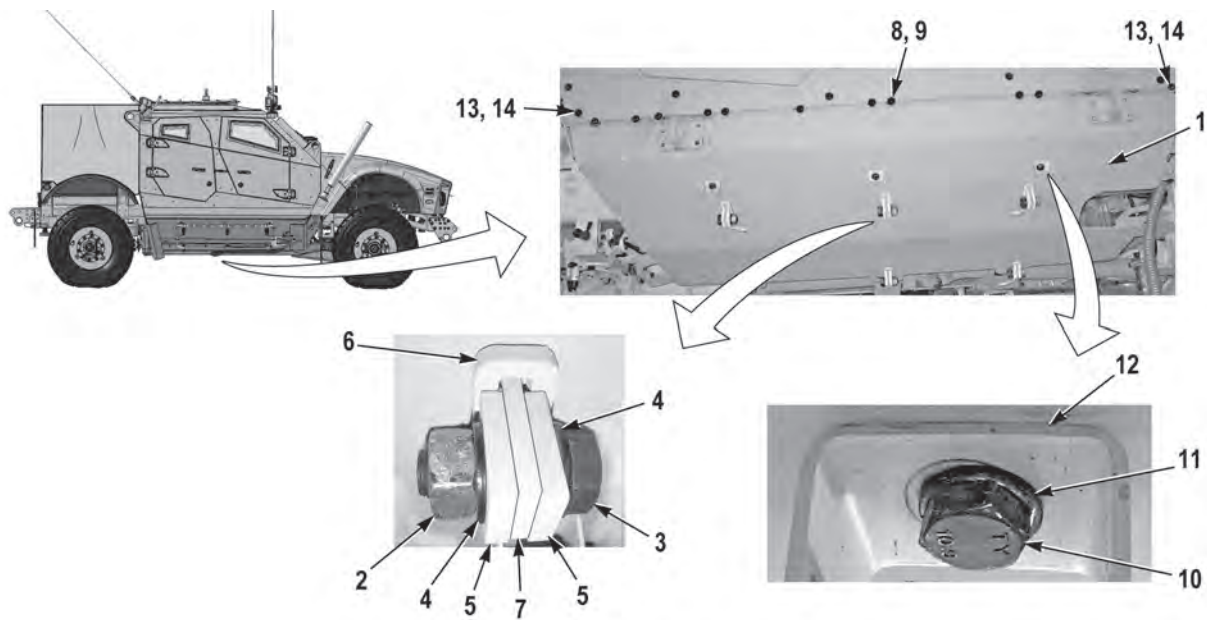
Follow-On Maintenance

- Install center belly deflector panel (WP 0048)
- Install rear passenger side wheel well deflector panel (WP 0059)
- Install front passenger side wheel well deflector panel (WP 0059)
- Install passenger side capsule steps (WP 0142)
- Install passenger side lower capsule side deflector panel (WP 0047)
- Remove and stow wheel chocks

REMOVAL



1. Position transmission jack under passenger side belly deflector panel (1) to support weight of passenger side belly deflector panel (1).



WARNING

Passenger side belly deflector panel weighs 353 lbs (160 kg). Do not attempt to lift or move passenger side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Note position of mounting hardware prior to removal to ensure proper installation.
- Two wedge assemblies have been removed with the muffler.

2. Remove nut (2) screw (3), two washers (4), wedges (5), and spacer (6) from armor mounting bracket (7).

NOTE

Front and rear screws are shorter than center screws. Note position of screws prior to removal to ensure proper installation.

3. Remove 14 screws (8) and washers (9) from passenger side belly deflector panel (1).
4. With the aid of an assistant and lifting device, support passenger side belly deflector panel (1).
5. Remove three screws (10), washers (11), and brackets (12) from passenger side belly deflector panel (1).
6. Remove two screws (13) and washers (14) from passenger side belly deflector panel (1).
7. With the aid of an assistant and lifting device, remove belly deflector panel (1) from vehicle.

END OF TASK

INSTALLATION**WARNING**

Passenger side belly deflector panel weighs 353 lbs (160 kg). Do not attempt to lift or move passenger side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

1. With the aid of an assistant, lifting device, and transmission jack, position passenger side belly deflector panel (1) on vehicle.
2. Install screw (3) and nut (2) through armor mounting bracket (7). Do not tighten nut (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

3. Apply sealing compound, Loctite 242, to threads of two screws (13) and three screws (10).

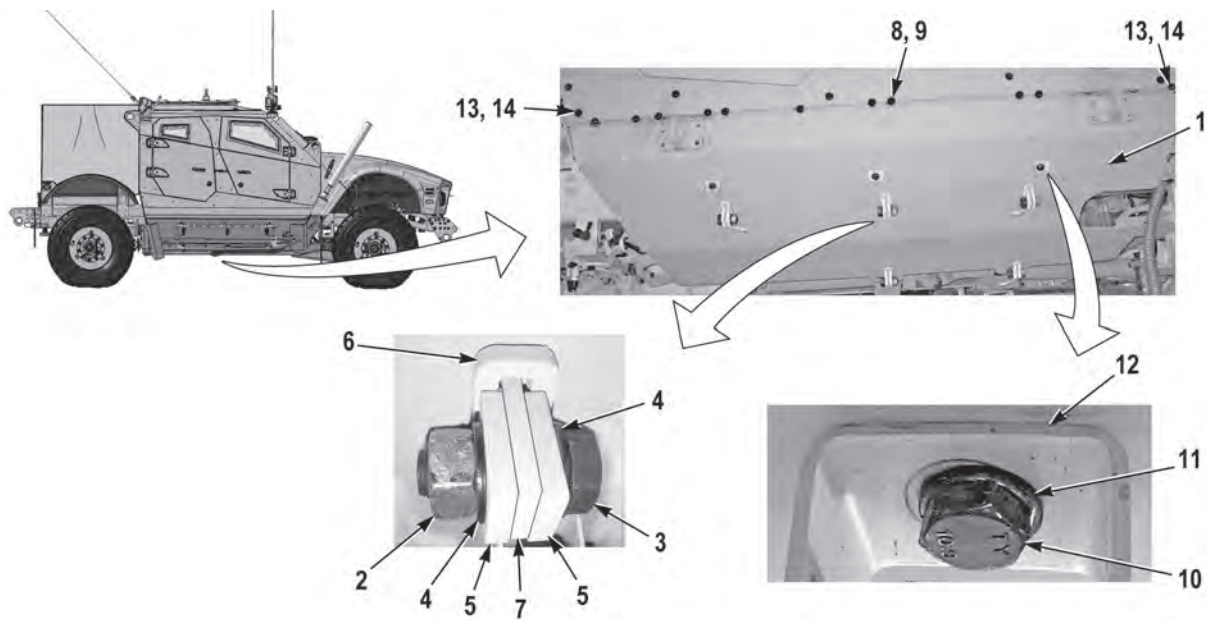
NOTE

- Do not tighten any screws until all screws have been started with at least three threads engaged to aid in screw alignment.
 - Install front and rear screws as noted prior to removal.
4. Secure passenger side deflector panel (1) to vehicle with two washers (14) and screws (13).
 5. Install three brackets (12), washers (11), and screws (10). Do not tighten screws (10).

NOTE

Only the center wedge assembly will be installed. The front and rear wedge assemblies will be installed with the muffler.

6. Apply sealing compound, Loctite 242, to threads of 11 screws (8).
7. Install 11 washers (9) and screws (8). Do not tighten screws (8).
8. Remove nut (2) and screw (3) from armor mounting bracket (7).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

9. Apply sealing compound, Loctite 242, to threads of screw (3).

NOTE

- Install mounting hardware as noted prior to removal.
 - Two wedge assemblies will be installed with muffler.
10. Install spacer (6), two wedges (5), and washers (4) on armor mounting bracket (7) with screw (3) and nut (2).
11. Tighten screws (13, 10, and 8) and nut (2).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

REAR CARGO DOOR DYNEEMA PANEL REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 Rear Cargo Door Removed (WP 0248)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

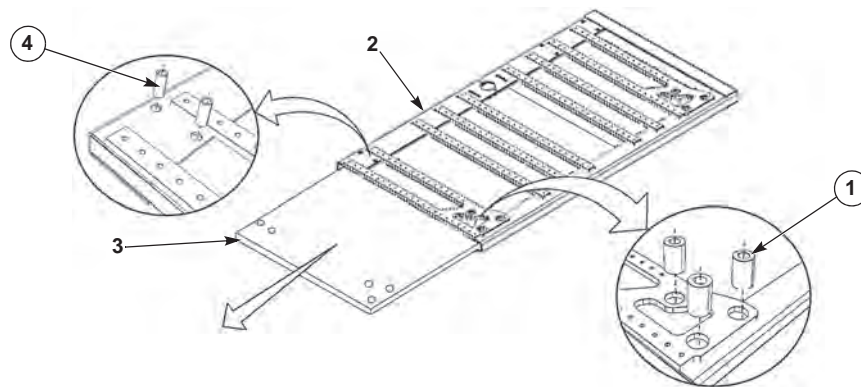
Bushing (6) (Item 1)
 Bushing (8) (Item 4)

Personnel Required

Two

Follow-On Maintenance

Install Rear Cargo Door (WP 0248)
 Remove and Stow Wheel Chocks

REMOVAL**WARNING**

Panel assemblies for the rear cargo door weigh 90 lbs (41 kg). Do not move or lift rear door or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

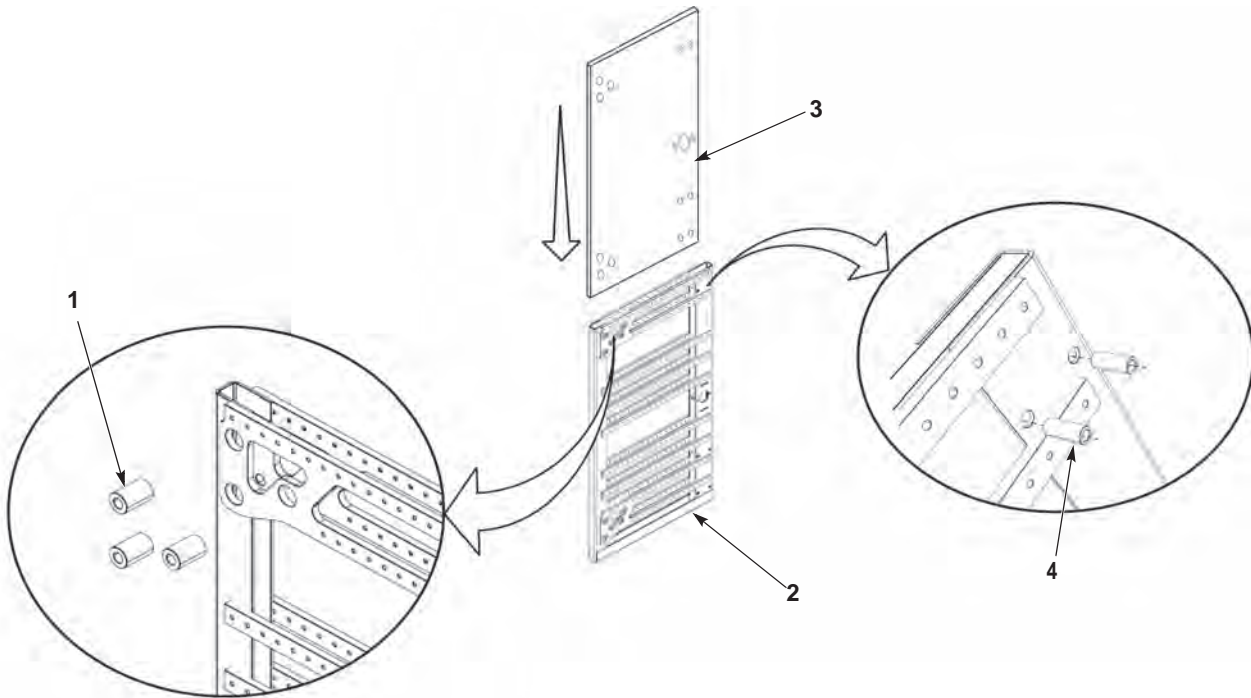
CAUTION

Rear cargo door must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

NOTE

- Dyneema panel will slide from rear cargo freely.
 - Driver side and passenger side dyneema panels are removed the same way.
 - Driver side door shown.
1. Remove six bushings (1) from rear cargo door (2), and dyneema panel (3). Discard bushings (1).
 2. Remove eight bushings (4) from rear cargo door (2), and dyneema panel (3). Discard bushings (4).
 3. Slide dyneema panel (3) out of rear cargo door (2).

END OF TASK

INSTALLATION**WARNING**

Panel assemblies for the rear cargo door weigh 90 lbs (41 kg). Do not move or lift rear door or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

NOTE

- Dyneema panel will slide into rear cargo door freely.
- If dyneema panel does not slide freely, apply force to panel using a dead blow hammer.
- Driver side and passenger side dyneema panels are installed the same way.
- Driver side door shown.

1. With the aid of an assistant, insert dyneema panel (3) into rear cargo door (2).
2. Install six new bushings (1) through the rear cargo door (2) and dyneema panel (3).
3. Install eight new bushings (4) through the rear cargo door (2) and dyneema panel (3).
4. Perform all Follow-On Maintenance Tasks.

END OF TASK**END OF WORK PACKAGE**

REAR WALL DYNEEMA PANEL REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 Cargo Deck Rear Wall Removed (WP 0247)

Personnel Required

Two

Follow-On Maintenance

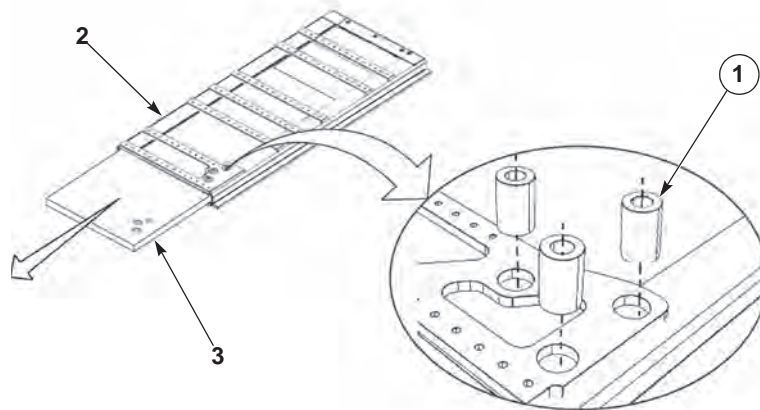
Install Cargo Deck Rear Wall (WP 0247)
 Remove and Stow Wheel Chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Bushing (3) (Item 1)

REMOVAL**WARNING**

Rear wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift rear wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

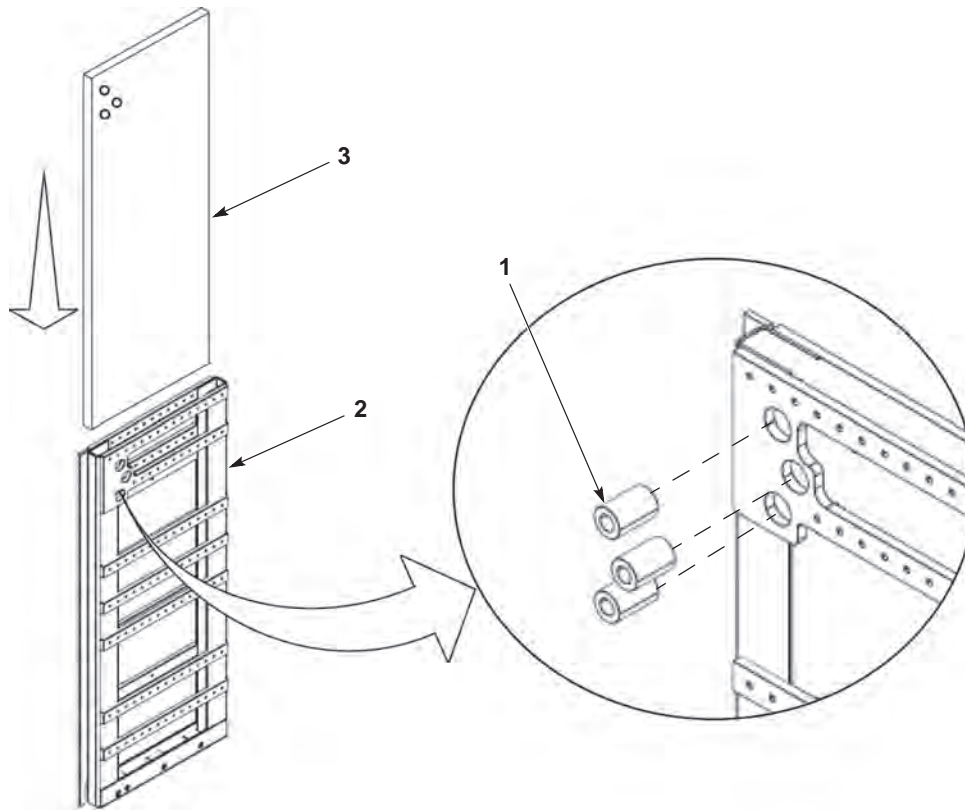
CAUTION

Rear wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

NOTE

- Dyneema panel will slide from rear wall freely.
 - Driver side and passenger side dyneema panels are removed the same way.
1. Remove three bushings (1) from rear wall (2), and dyneema panel (3). Discard bushings (1).
 2. Slide dyneema panel (3) out of rear wall (2).

END OF TASK

INSTALLATION**WARNING**

Rear wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift rear wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

NOTE

- Dyneema panel will slide into rear wall freely.
- If dyneema panel does not slide freely, apply force to panel using a dead blow hammer.
- Driver side and passenger side dyneema panels are installed the same way.

1. With the aid of an assistant, insert dyneema panel (3) into rear wall (2).
2. Install three new bushings (1) through rear wall (2) and dyneema panel (3).
3. Perform all Follow-On Maintenance Tasks.

END OF TASK**END OF WORK PACKAGE**

SIDE WALL DYNEEMA PANEL REPLACEMENT (M1245)

Preconditions

Park Vehicle
Engine OFF
Wheels Chocked
Cargo Deck Side Wall Removed (WP 0249)

Personnel Required

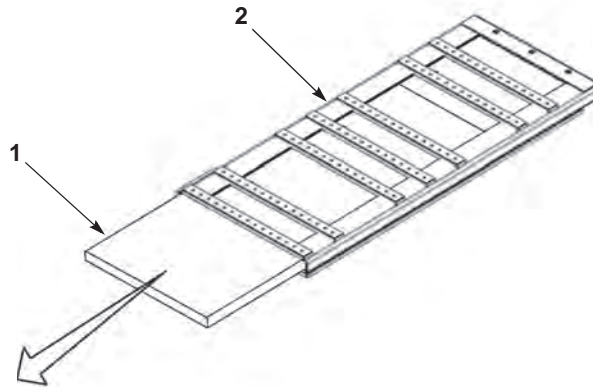
Two

Follow-On Maintenance

Install Cargo Deck Side Wall (WP 0249)
Remove and Stow Wheel Chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL**WARNING**

Cargo deck side wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift side wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

CAUTION

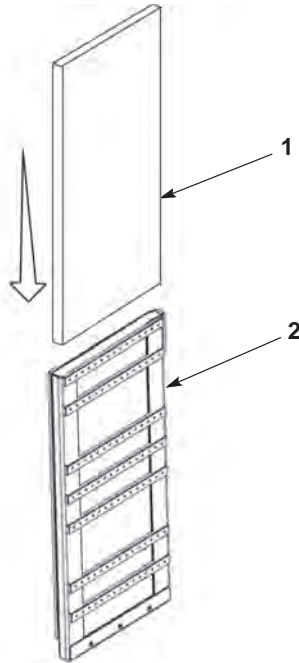
Cargo deck side wall panel must be placed on a soft, flat surface before removing dyneema panel. Failure to comply may result in damage to equipment.

NOTE

- Dyneema panel will slide from cargo deck side wall freely.
- Driver side and passenger side dyneema panels are removed the same way.

1. Slide dyneema panel (1) out of cargo deck side wall (2).

END OF TASK

INSTALLATION**WARNING**

Cargo deck side wall and dyneema panels weigh 90 lbs (41 kg). Do not move or lift side wall or dyneema panel without the aid of an assistant. Failure to comply may result in injury to personnel.

NOTE

- Dyneema panel will slide into cargo deck side wall freely.
- If dyneema panel does not slide freely, apply force to panel using a dead blow hammer.
- Driver side and passenger side dyneema panels are installed the same way.

1. With the aid of an assistant, insert dyneema panel (1) into cargo deck side wall (2).
2. Perform all Follow-On Maintenance Tasks.

END OF TASK**END OF WORK PACKAGE**

UNDERBODY IMPROVEMENT AND BELLY DEFLECTOR ARMOR PANELS REPLACEMENT (M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Front capsule side deflector panels removed
(WP 0047)
Lower capsule side deflector panels removed
(WP 0047)
Rear capsule side deflector panel removed
(WP 0047)
Passenger side engine panel removed
(M1240A1) (WP 0258)
Front wheel well deflector panels removed
(WP 0057)
Rear wheel well deflector panels removed
(WP 0058)
Capsule steps removed (WP 0143)

Tools and Special Tools

Adapter, Torque Wrench (Crowfoot) 36 mm
Adapter Kit, Transmission Jack
Extension, 3/4 in. Dr. 4 in. Long
Handle, Sliding-T, 3/4 in. Dr.
Handle, Ratchet, 3/4 in. Dr.
Jack, Transmission
Jackstand (2)
Screwdriver Attachment, HEX, 1/2 Dr. 12 mm
Metric HEX Bit
Setscrew, Plain Cup, M24-3.0 x 50 mm
DIN 916 (12)
Socket, Deep Well, 12 mm

Tools and Special Tools (Continued)

Socket, Impact Socket, 3/4" Dr, 6 PT, 36 mm
Tool Kit, General Mechanic's: Automotive
Wrench, Combination, 36 mm (2)
Wrench, Torque, 75 ft-lb
Wrench, Torque, Click, Ratcheting, 3/4" Drive,
600 ft-lb

Materials/Parts

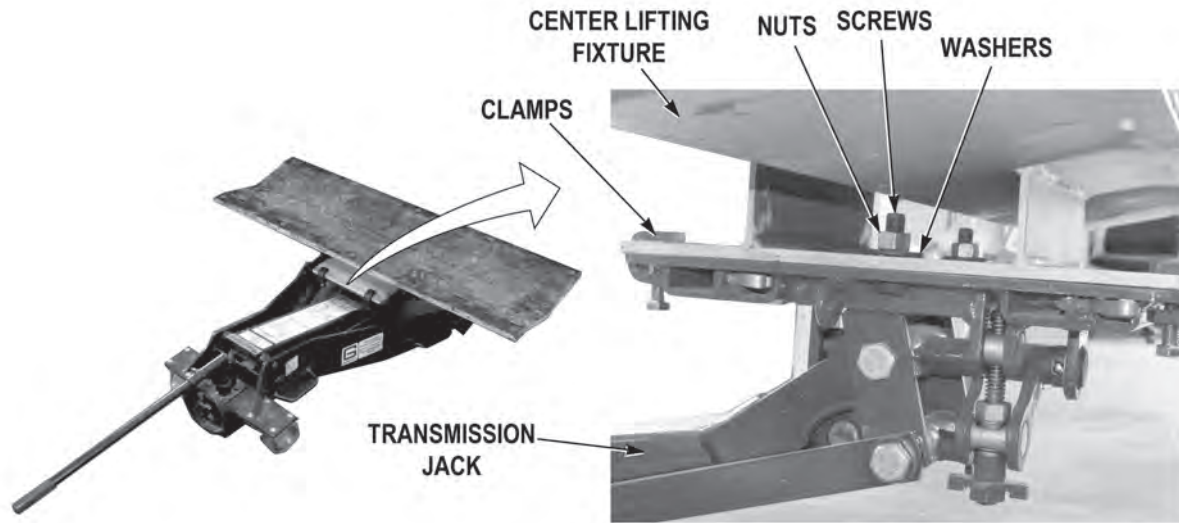
Locknut (6) (Item 5)
Locknut (6) (Item 16)
Compound, Sealing, Loctite 242

Personnel Required

Three

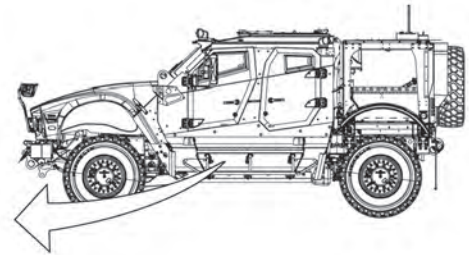
Follow-On Maintenance

Install capsule steps (WP 0143)
Install rear wheel well deflector panels (WP 0058)
Install front wheel well deflector panels
(WP 0057)
Install passenger side engine panel (M1240A1)
(WP 0258)
Install rear capsule side deflector panel
(WP 0047)
Install lower capsule side deflector panel
(WP 0047)
Install front capsule side deflector panels
(WP 0047)
Remove and stow wheel chocks

UNDERBODY IMPROVEMENT PANEL REMOVAL**WARNING**

Center lifting fixture weighs 100 lbs (45 Kg). Do not attempt to lift or move center lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

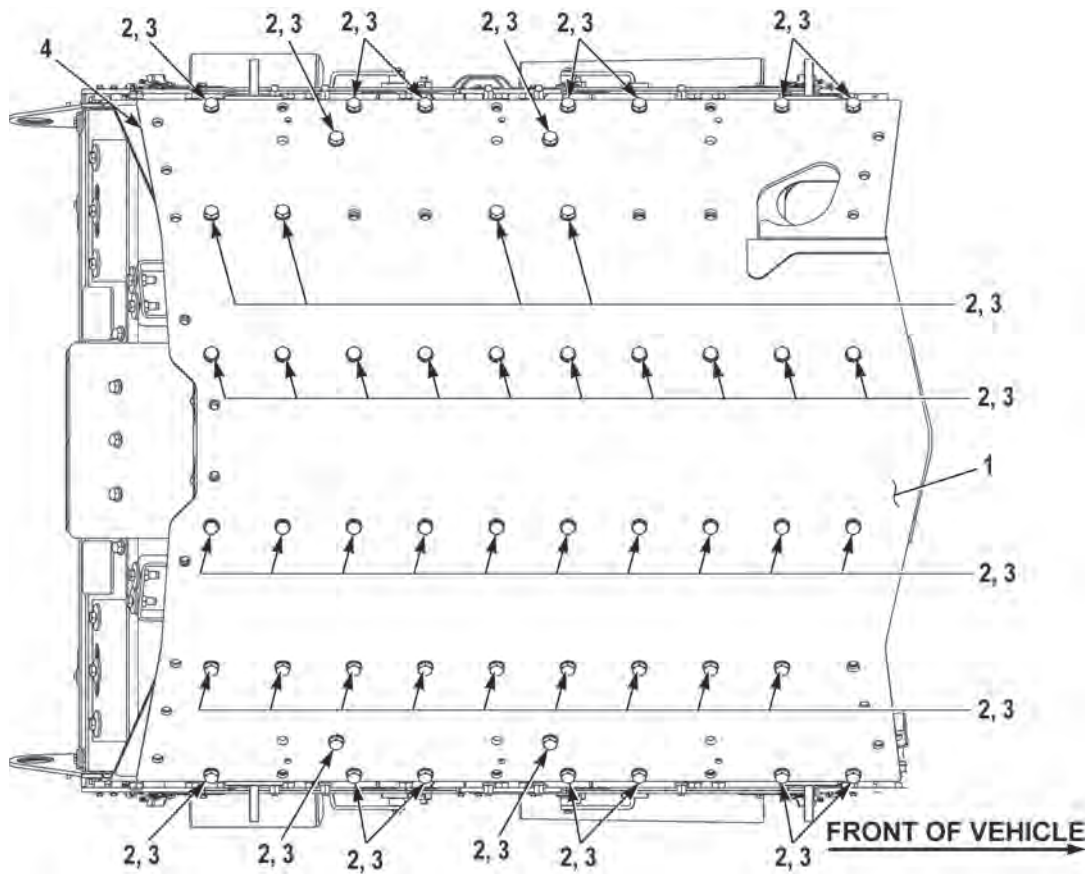
1. Install center lifting fixture on transmission jack with two screws, washers, and nuts. Tighten securely.
2. Secure center lifting fixture on transmission jack with four clamps.



NOTE

A tape measure may be utilized to aid in centering adapter on underbody improvement panel.

3. Center transmission jack and adapter under underbody improvement panel (1) to support the weight of underbody improvement panel (1).

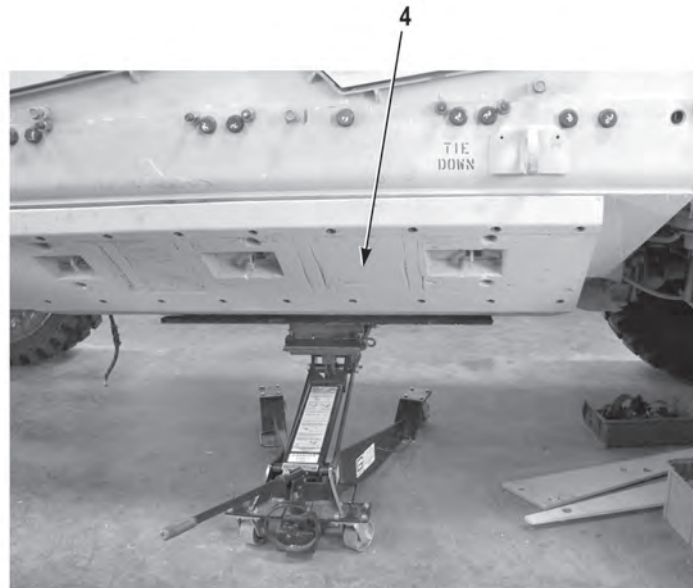


WARNING

Underbody improvement panel weighs 1,000 lbs (454 kg). Do not attempt to lift or move center deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

4. With the aid of two assistants, transmission jack, and adapter, remove 51 screws (2), washers (3), and underbody improvement panel (1) from ladder panel (4).

END OF TASK

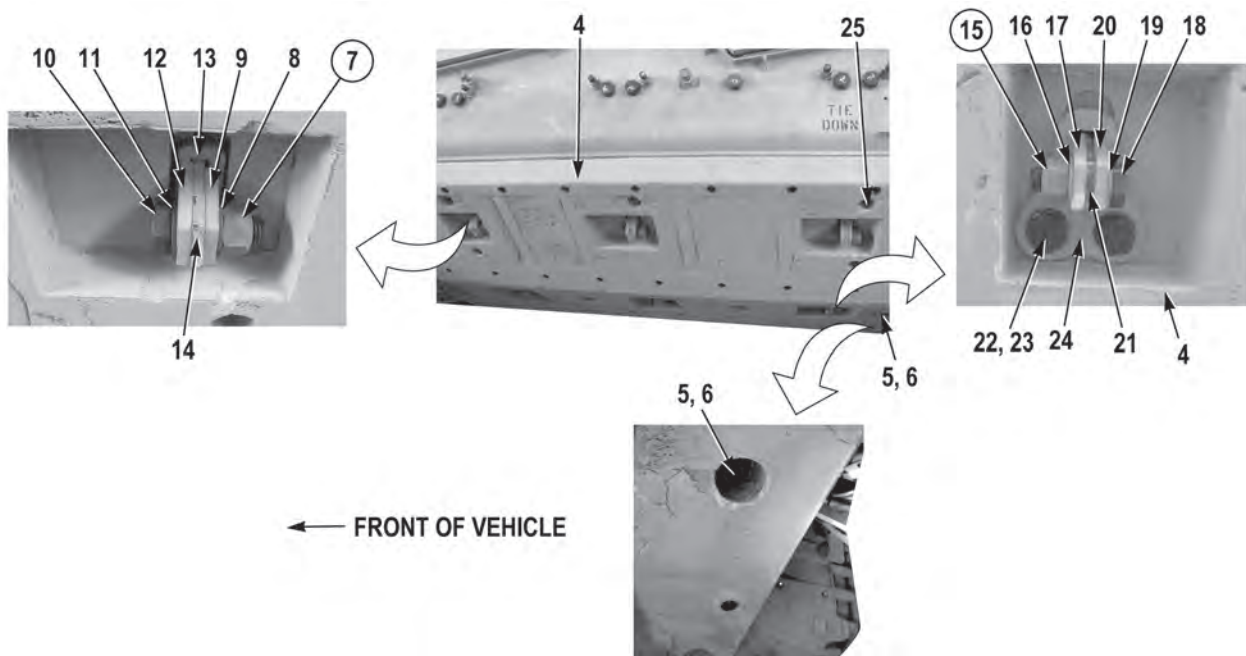
LADDER PANEL REMOVAL

1. Remove engine belly deflector panel (WP 0050).

CAUTION

Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while removing from vehicle. Failure to comply may result in damage to equipment.

2. Position transmission jack and adapter under ladder panel (4) to support the weight of ladder panel (4).



WARNING

Place a jackstand on each side of lifting device centered on ladder panel in case of transmission jack failure. Failure to comply may result in injury or death to personnel.

NOTE

- Driver side and passenger side ladder panel mounting hardware is removed the same way. Driver side shown.
- Note position of mounting hardware prior to removal to ensure proper installation.

3. Remove two screws (5) and washers (6) from ladder panel (4).
4. Remove six locknuts (7), washers (8), wedges (9), screws (10), washers (11), wedges (12), and spacers (13) from six armor mounting brackets (14) and ladder panel (4). Discard locknuts (7).
5. Remove six locknuts (15), washers (16), wedges (17), screws (18), washers (19), and wedges (20) from six armor mounting brackets (21) and ladder panel (4). Discard locknuts (15).

NOTE

Remove lower screws prior to removing upper screws.

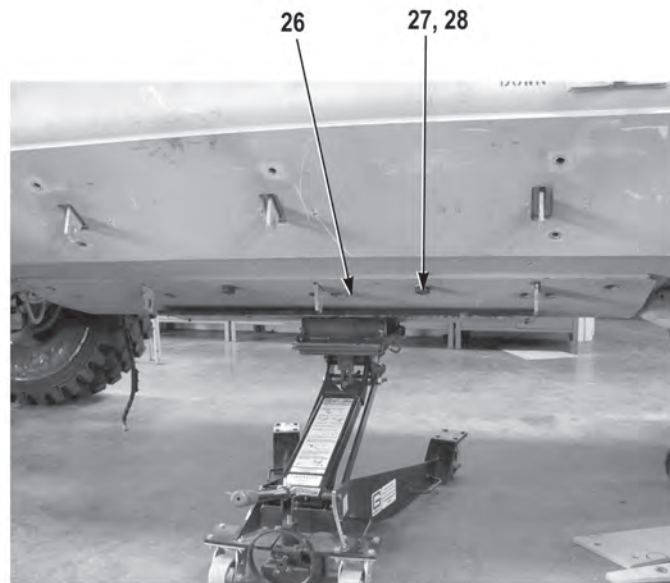
6. Remove 12 screws (22), washers (23), and spacer plates (24) from ladder panel (4) and six mounting brackets (21).
7. Remove ten screws (25) from ladder panel (4).

WARNING

Ladder panel weighs approximately 800 lbs (363 kg). Do not attempt to lift or move ladder panel without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

8. With the aid of an assistant, transmission jack, and adapter, remove ladder panel (4) from vehicle.

END OF TASK

CENTER BELLY DEFLECTOR PANEL REMOVAL

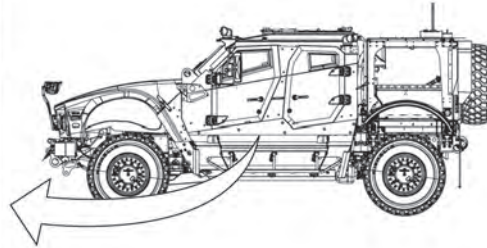
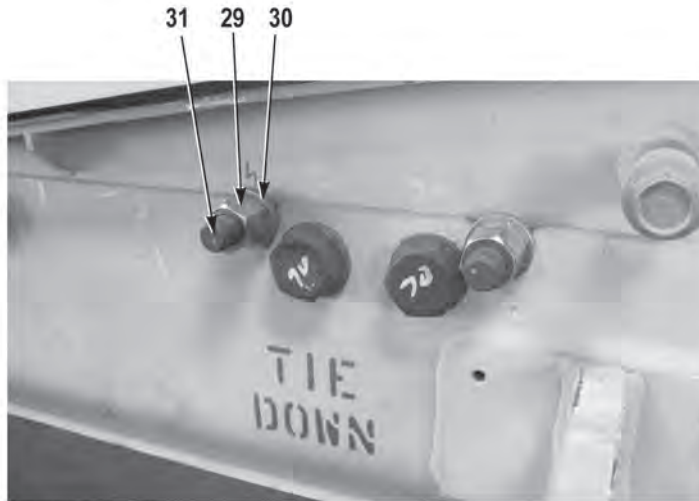
1. Position transmission jack and adapter under center belly deflector panel (26) to support the weight of center belly deflector panel (26).

WARNING

Center belly deflector panel weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

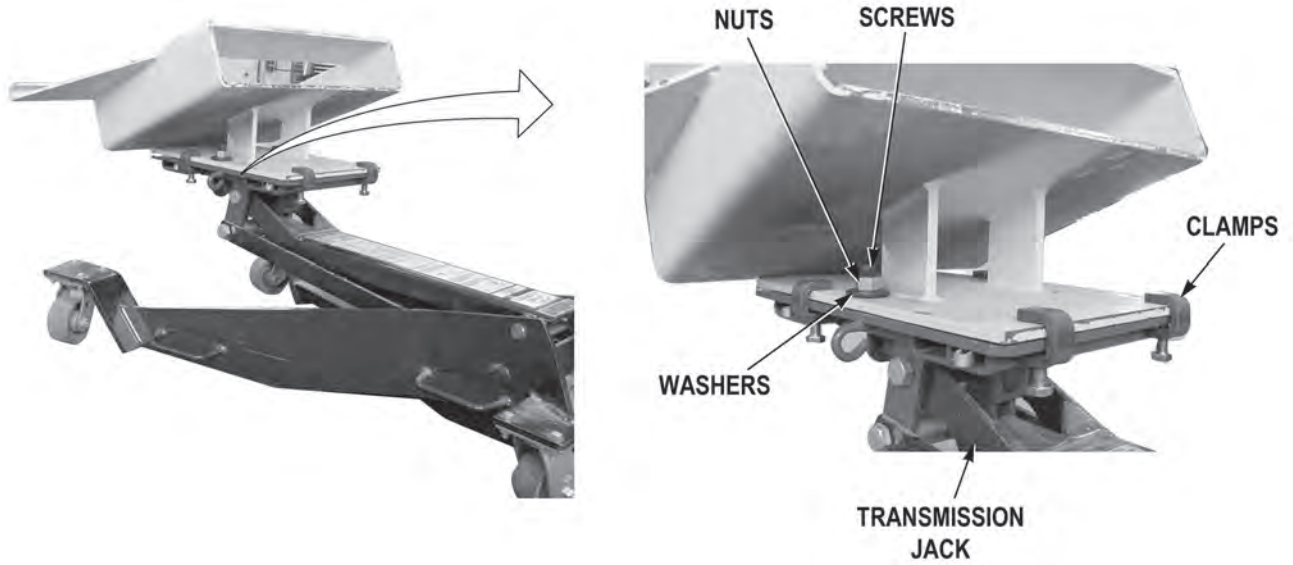
2. With the aid of an assistant, transmission jack, and adapter, remove four screws (27), washers (28), and center belly deflector panel (26) from vehicle.

END OF TASK

DRIVER SIDE AND PASSENGER SIDE BELLY DEFLECTOR PANEL REMOVAL**CAUTION**

Tension rods are loosened and not removed in Step (1). Failure to comply may result in damage to equipment.

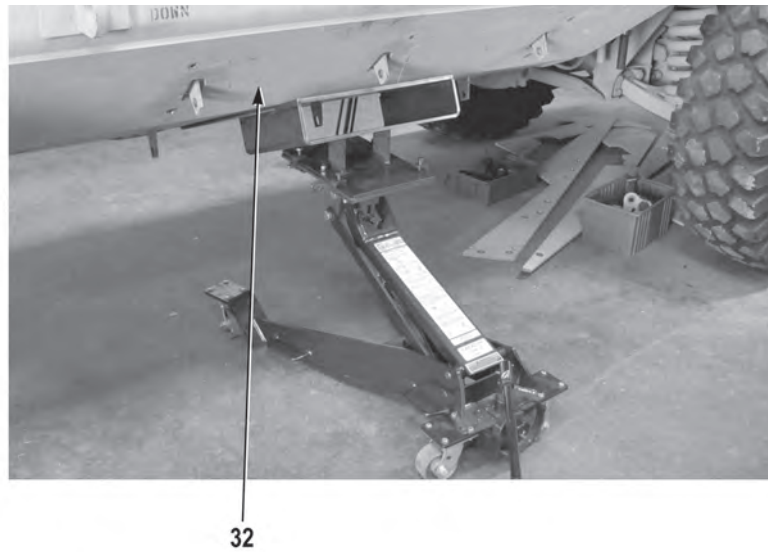
1. With the aid of an assistant, loosen five nuts (29), washers (30), and tension rods (31).



WARNING

Side lifting fixture weighs 95 lbs (43 Kg). Do not attempt to lift or move side lifting fixture without the aid of an assistant and a lifting device. Failure to comply may result in injury of death to personnel.

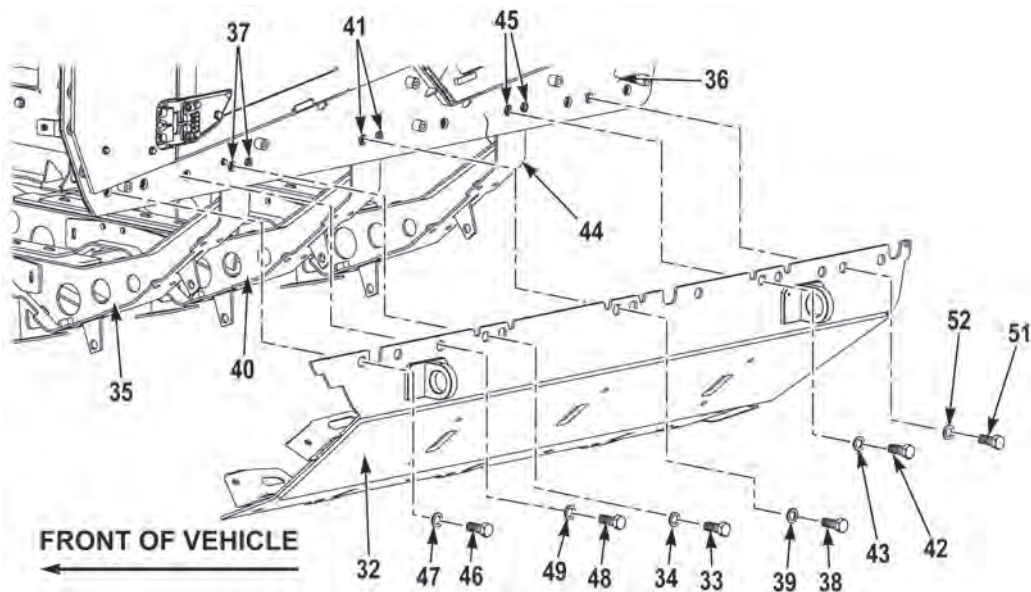
2. Install side lifting fixture on transmission jack with two screws, washers, and nuts.
3. Secure side lifting fixture on transmissions jack with four clamps.



NOTE

- Driver side and passenger side belly deflector panels are removed the same way. Driver side shown.
- Cross members are supported by shared mounting hardware with side belly deflector panels. Setscrews are installed to support crossmembers during side belly deflector removal.

4. Position transmission jack and adapter under driver side belly deflector panel (32) to support the weight of driver side belly deflector (32).



NOTE

Note position of mounting hardware prior to removal to ensure proper installation.

5. Remove screw (33) and washer (34) from crossmember (35) and driver side belly deflector panel (32).

CAUTION

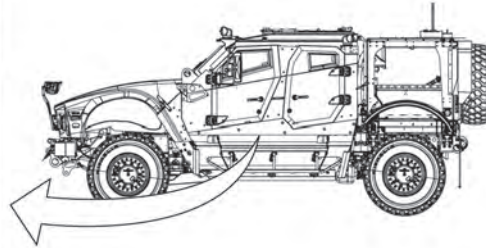
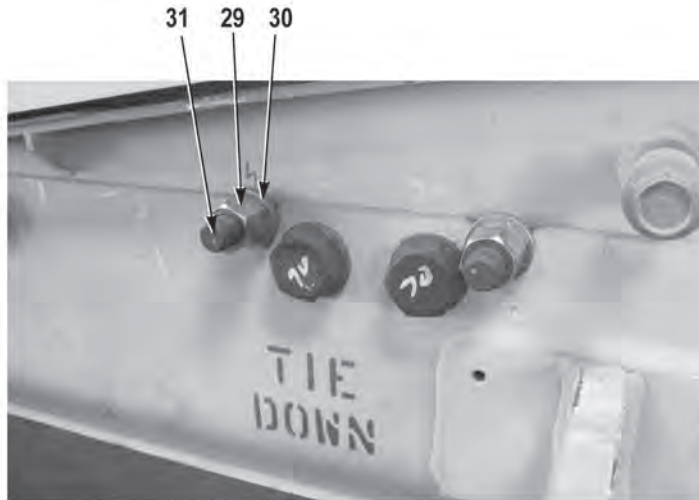
Ensure setscrews are recessed no further than past side belly deflector panel or crossmember will not be held in place and may come off with panel. Failure to comply may result in damage to equipment.

6. Secure crossmember (35) on capsule (36) with setscrew (37).
7. Repeat Steps (5) and (6) for remaining screw (33) and setscrew (37) on crossmember (35).
8. Remove screw (38) and washer (39) from crossmember (40) and driver side belly deflector panel (32).
9. Secure crossmember (40) on capsule (36) with setscrew (41).
10. Repeat Steps (8) and (9) for remaining screw (38) and setscrew (41).
11. Remove screw (42) and washer (43) from crossmember (44) and driver side deflector panel (32).
12. Secure crossmember (44) on capsule (36) with setscrew (45).
13. Repeat Steps (11) and (12) for remaining screw (42) and setscrew (45).
14. Install washer (47) and screw (46) on driver side deflector panel (32) and capsule (36).
15. Install three washers (49) and screws (48) on driver side belly deflector (32) and capsule (36).

WARNING

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

16. With the aid of an assistant, transmission jack, and adapter, remove two screws (51), washers (52), and driver side belly deflector panel (32) from capsule (36).
17. Repeat Steps (4) through (13) for passenger side belly deflector panel.



CAUTION

Use caution when removing tension rods from vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

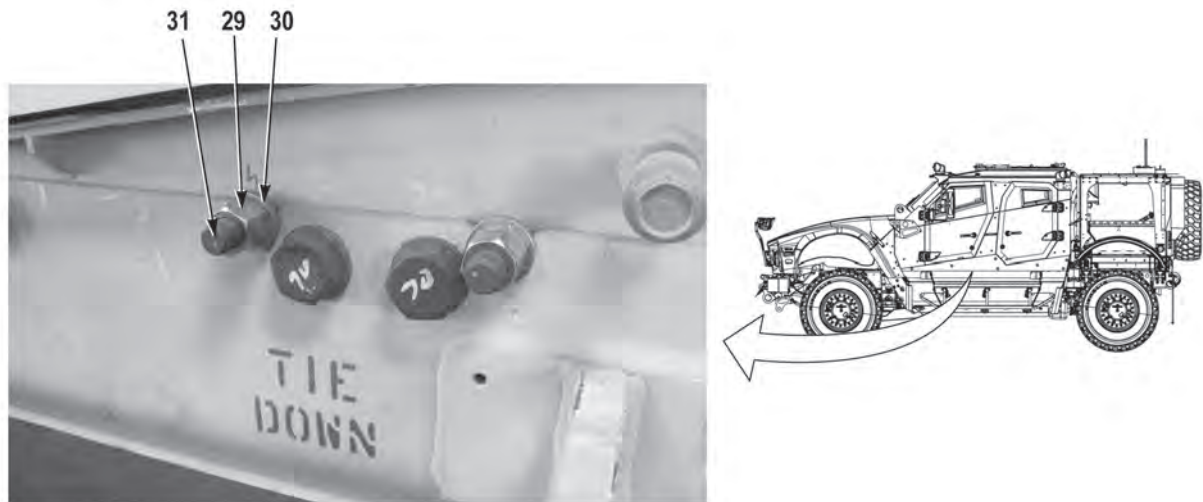
NOTE

- Tension rods have two nuts and washers. Only the driver side nuts and washers need to be removed.
- Tension rods are removed from passenger side of vehicle.
- Note position of mounting hardware prior to removal to ensure proper installation.

18. With the aid of an assistant, remove five nuts (29), washers (30), and tension rods (31) from vehicle.

END OF TASK

DRIVER SIDE AND PASSENGER SIDE BELLY DEFLECTOR PANEL INSTALLATION



WARNING

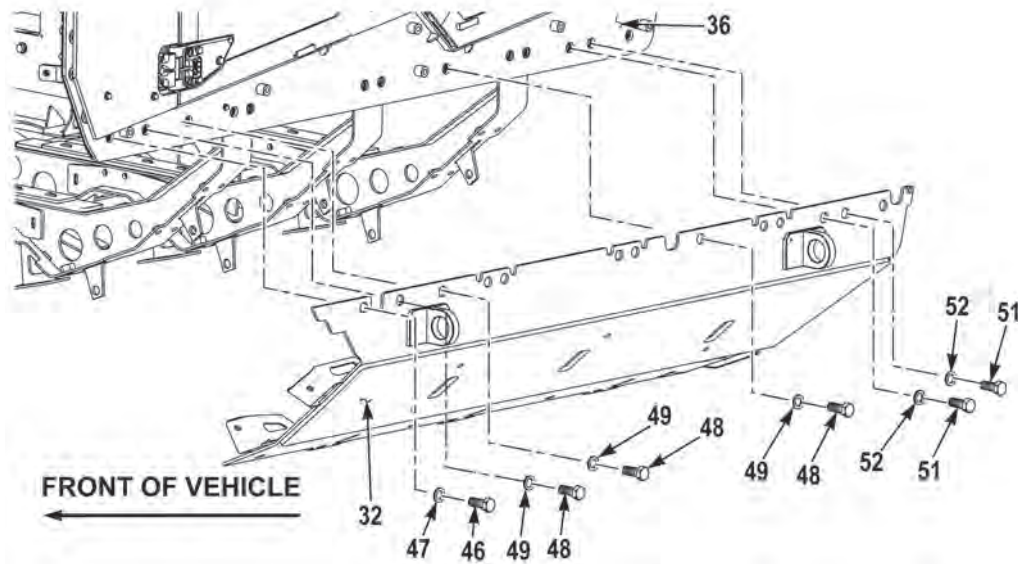
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

Use caution when inserting tension rods through vehicle. Ensure tension rods do not contact air lines, hydraulic hoses, or wire harnesses. Failure to comply may result in damage to equipment.

NOTE

- Tension rods are installed from passenger side of vehicle.
 - Install mounting hardware as noted prior to removal.
 - During installation of tension rods, ensure equal threads of tension rod are exposed on driver side and passenger side of vehicle.
 - Tension rods have nuts and washers on both sides. Only one nut and washer was removed during removal from vehicle.
1. Apply sealing compound, Loctite 242, to threads of five tension rods (31) and, with the aid of an assistant, install five tension rods (31) on vehicle with five washers (30) and nuts (29). Do not tighten nuts (29).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

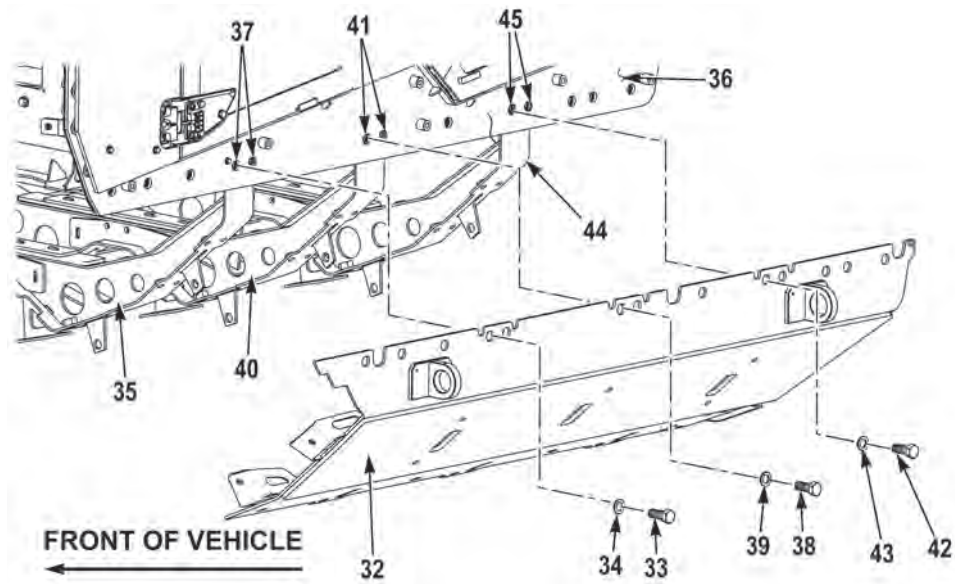
NOTE

- Driver side and passenger side belly deflector panels are installed the same way. Driver side shown.
 - Setscrews are removed and replaced with mounting hardware that is shared with side belly deflector panels upon installation of side belly deflector panels.
 - Install mounting hardware as noted prior to removal.
2. Apply sealing compound, Loctite 242, to threads of two screws (51).

WARNING

Driver side belly deflector panel weighs 364 lbs (165 kg). Do not attempt to lift or move driver side belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

3. With the aid of an assistant, transmission jack, and adapter, install driver side belly deflector panel (32) on capsule (36) with two washers (52) and screws (51). Do not tighten screws (51).
4. Apply sealing compound, Loctite 242, to threads of three screws (48) and secure driver side belly deflector panel (32) on capsule (36) with three washers (49) and screws (48). Do not tighten screws (48).
5. Apply sealing compound, Loctite 242, to threads of screw (46) and secure driver side belly deflector panel (32) on capsule (36) with washer (47) and screw (46). Do not tighten screw (46).



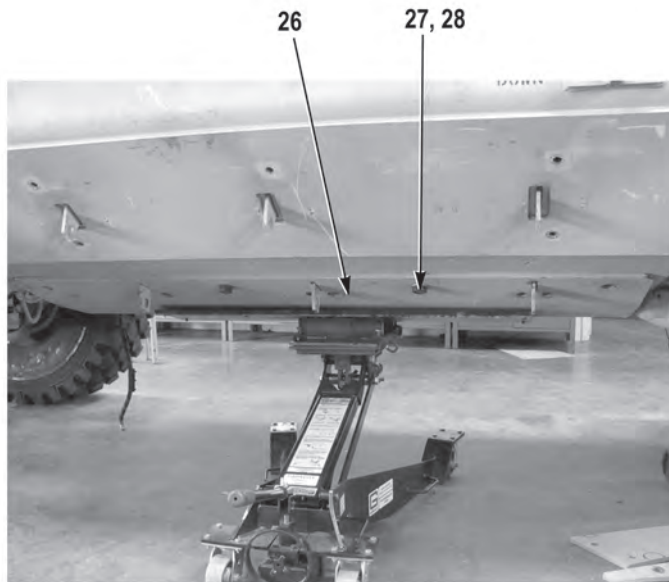
6. Remove setscrew (45) from crossmember (44) and capsule (36).

NOTE

A pry bar will be necessary to align screw holes when installing screws.

7. Apply sealing compound, Loctite 242, to threads of screw (42) and secure driver side belly deflector panel (32) on capsule (36) and crossmember (44) with washer (43) and screw (42). Do not tighten screw (42).
8. Repeat Steps (6) and (7) for remaining screw (42) and setscrew (45).
9. Remove setscrew (41) from crossmember (40) and capsule (36).
10. Apply sealing compound, Loctite 242, to threads of screw (38) and secure driver side belly deflector panel (32) on capsule (36) and crossmember (40) with washer (39) and screw (38). Do not tighten screw (38).
11. Repeat Steps (9) and (10) for remaining screw (38) and setscrew (41).
12. Remove setscrew (37) from crossmember (35) and capsule (36).
13. Apply sealing compound, Loctite 242, to threads of screw (33) and secure driver side belly deflector panel (32) on capsule (36) and crossmember (35) with washer (34) and screw (33). Do not tighten screw (33).
14. Repeat Steps (12) and (13) for remaining screw (33) and setscrew (37).
15. Repeat Steps (2) through (14) for passenger side belly deflector panel.

END OF TASK

CENTER BELLY DEFLECTOR PANEL INSTALLATION**WARNING**

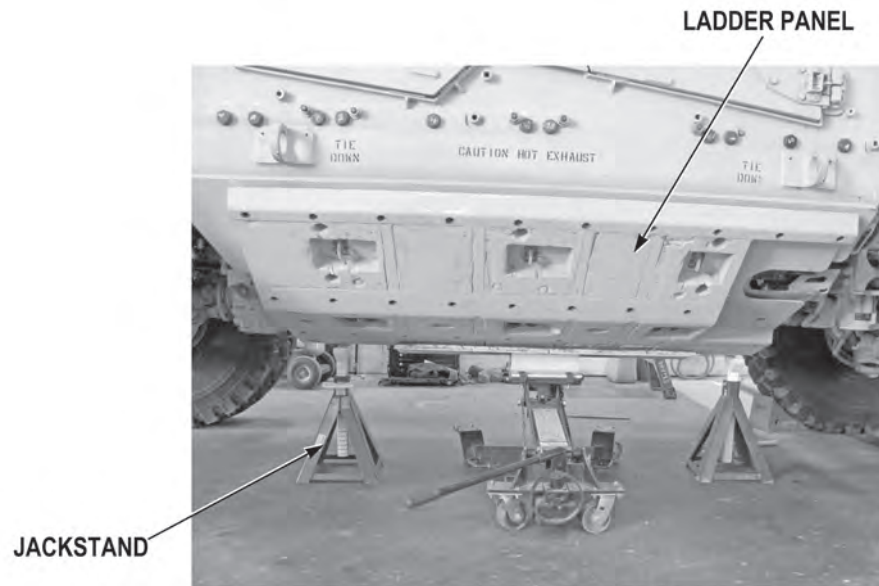
Center belly deflector panel weighs 420 lbs (191 kg). Do not attempt to lift or move center belly deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

Do not tighten mounting hardware until ladder panel is installed.

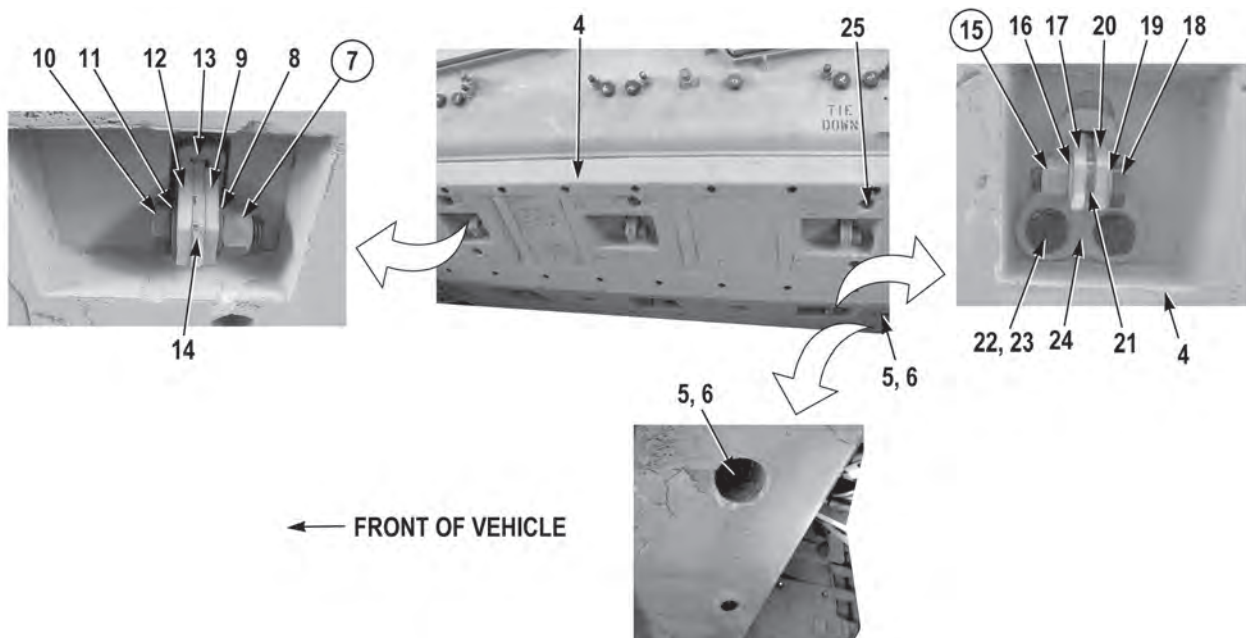
1. Apply sealing compound, Loctite 242, to threads of four screws (27).
2. With the aid of an assistant, transmission jack, and adapter, install center belly deflector panel (26) on vehicle with four washers (28) and screws (27). Do not tighten screws (27).

END OF TASK

LADDER PANEL INSTALLATION**WARNING**

Place a jackstand on each side of lifting device centered on ladder panel in case of transmission jack failure. Failure to comply may result in injury or death to personnel.

1. Install two jackstands under ladder panel as shown.



WARNING

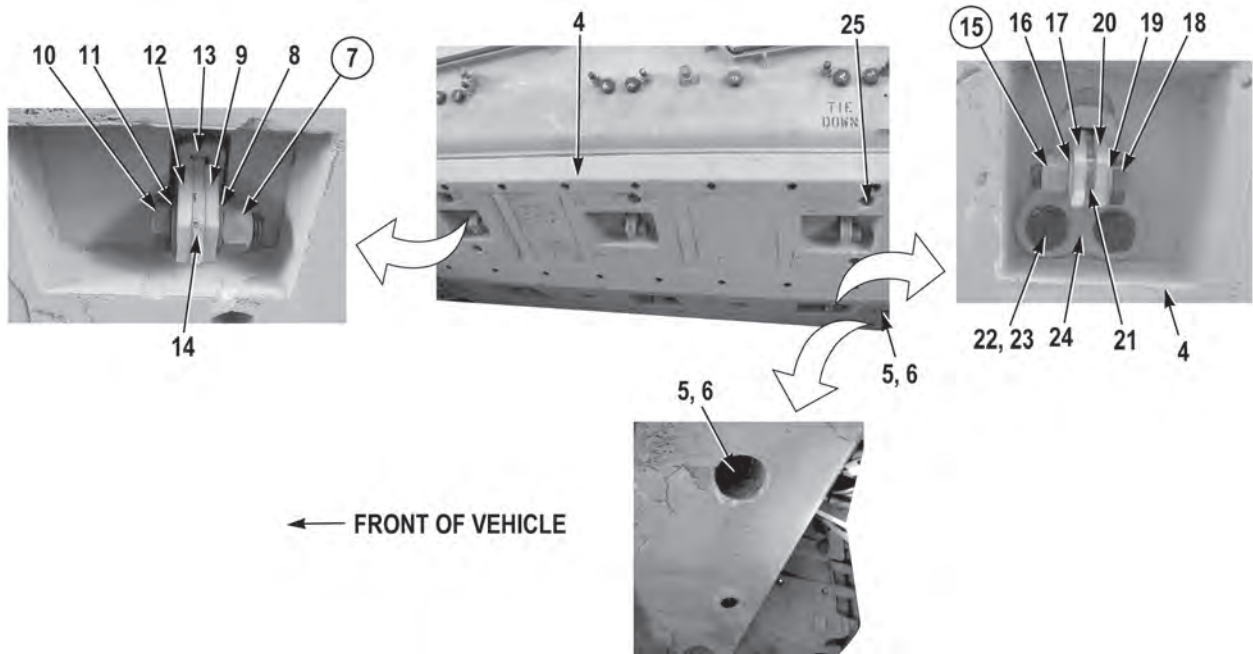
- Ladder panel weighs approximately 800 lbs (363 kg). Do not attempt to lift or move ladder panel without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.
- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

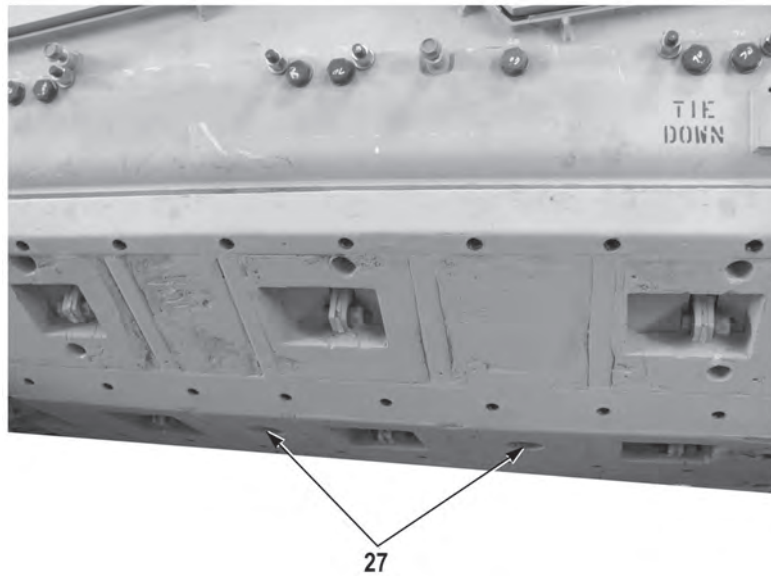
Ladder structure panel utilizes foam inserts on underside. Ensure panel is supported in a way which protects the foam inserts while lifting into place on vehicle. Failure to comply may result in damage to equipment.

NOTE

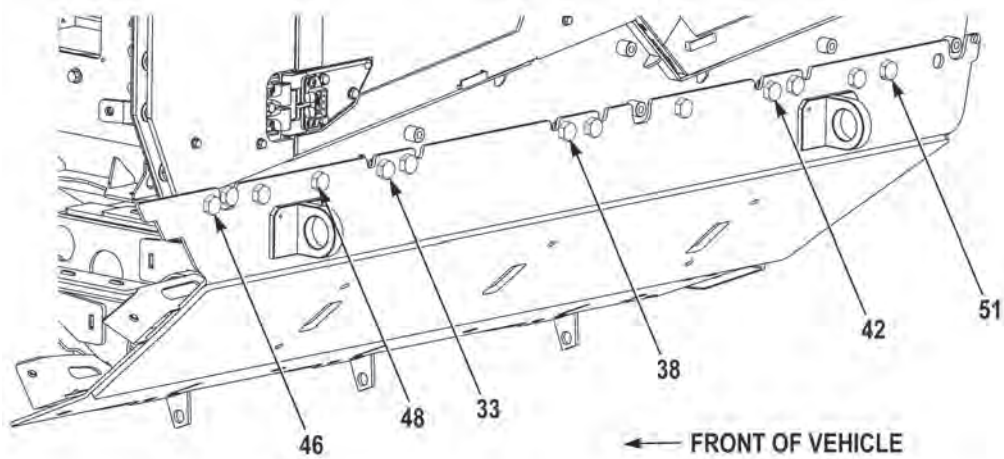
- Install mounting hardware as noted prior to removal.
 - Do not tighten mounting hardware on ladder panel until all mounting hardware has been started by at least three threads engaged to aid in alignment of mounting hardware.
 - A pry bar may be used to aid assistance of installation of ladder panel.
2. Apply sealing compound, Loctite 242, to threads of 12 screws (22) and with the aid of an assistant, transmission jack, and adapter install ladder panel (4) on six armor mounting brackets (21) with six spacer plates (24), 12 washers (25), and screws (22). Do not tighten screws (22).
 3. Secure ladder panel (4) on six armor mounting brackets (21) with six wedges (20), washers (19), screws (18), wedges (17), washers (16), and locknuts (15). Do not tighten locknuts (15).
 4. Install two washers (6) and screws (5) on ladder panel (4).



5. Install ten screws (25) on ladder panel (4).
6. Install ladder panel (4) on six armor mounting brackets (14) with six spacers (13), wedges (12), washers (11), screws (10), wedges (9), washers (8), and locknuts (7). Do not tighten locknuts (7).
7. Tighten 12 screws (22) to 570 lb-ft (773 N•m).
8. Tighten six locknuts (15) to 270 lb-ft (366 N•m).
9. Tighten two screws (5) to 570 lb-ft (773 N•m).
10. Tighten ten screws (25) to 70 lb-ft (52 N•m).
11. Tighten six locknuts (7) to 270 lb-ft (366 N•m).

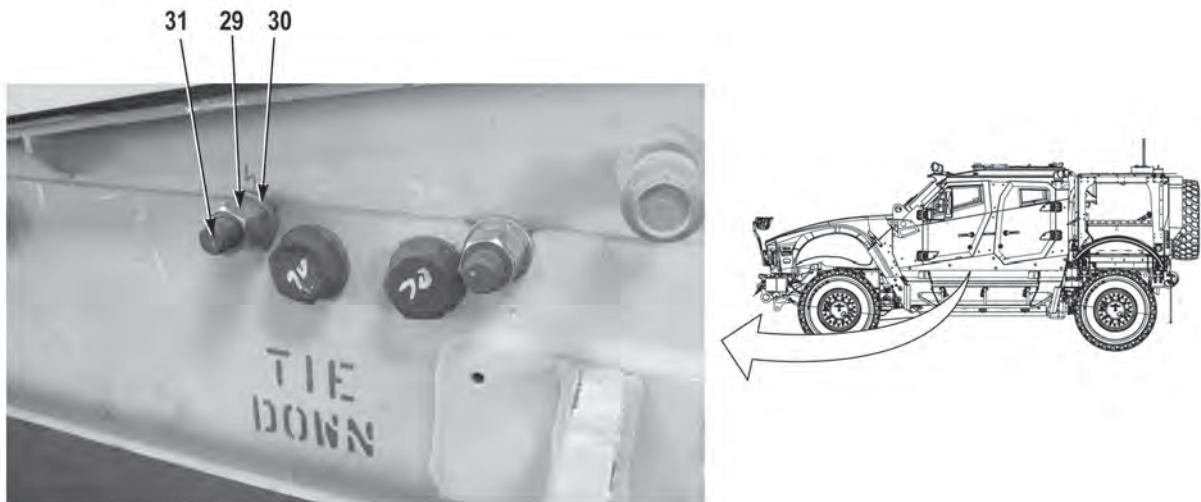


12. Tighten four screws (27) 570 lb-ft (773 N•m).
13. Remove transmission jack and two jackstands from vehicle.
14. Install engine belly deflector (WP 0050).



15. Tighten two screws (51) to 570 lb-ft (773 N•m).
16. Tighten three screws (48) to 570 lb-ft (773 N•m).
17. Tighten screw (46) to 570 lb-ft (773 N•m).
18. Tighten two screws (42) to 570 lb-ft (773 N•m).
19. Tighten two screws (38) to 570 lb-ft (773 N•m).

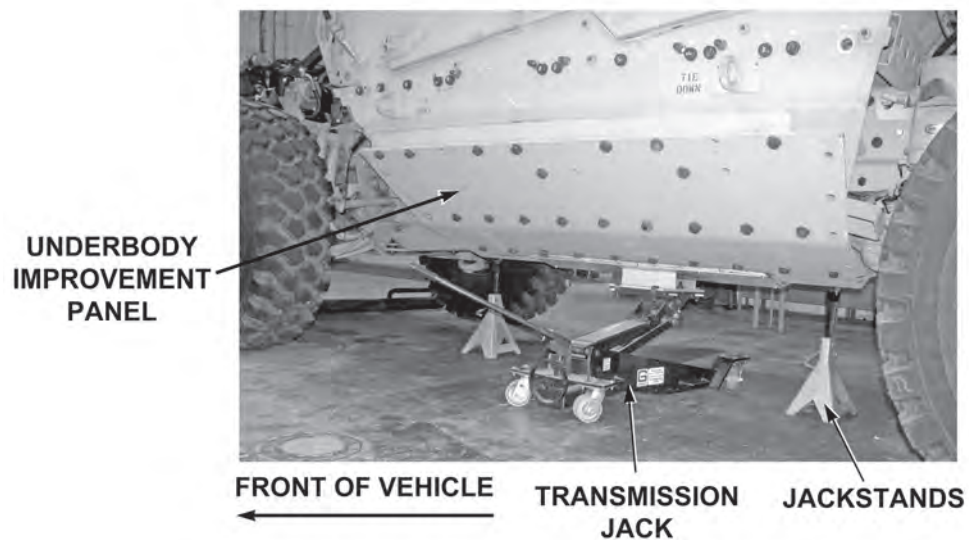
20. Tighten two screws (33) to 570 lb-ft (773 N•m).
21. Repeat Steps (15) through (20) for passenger side.



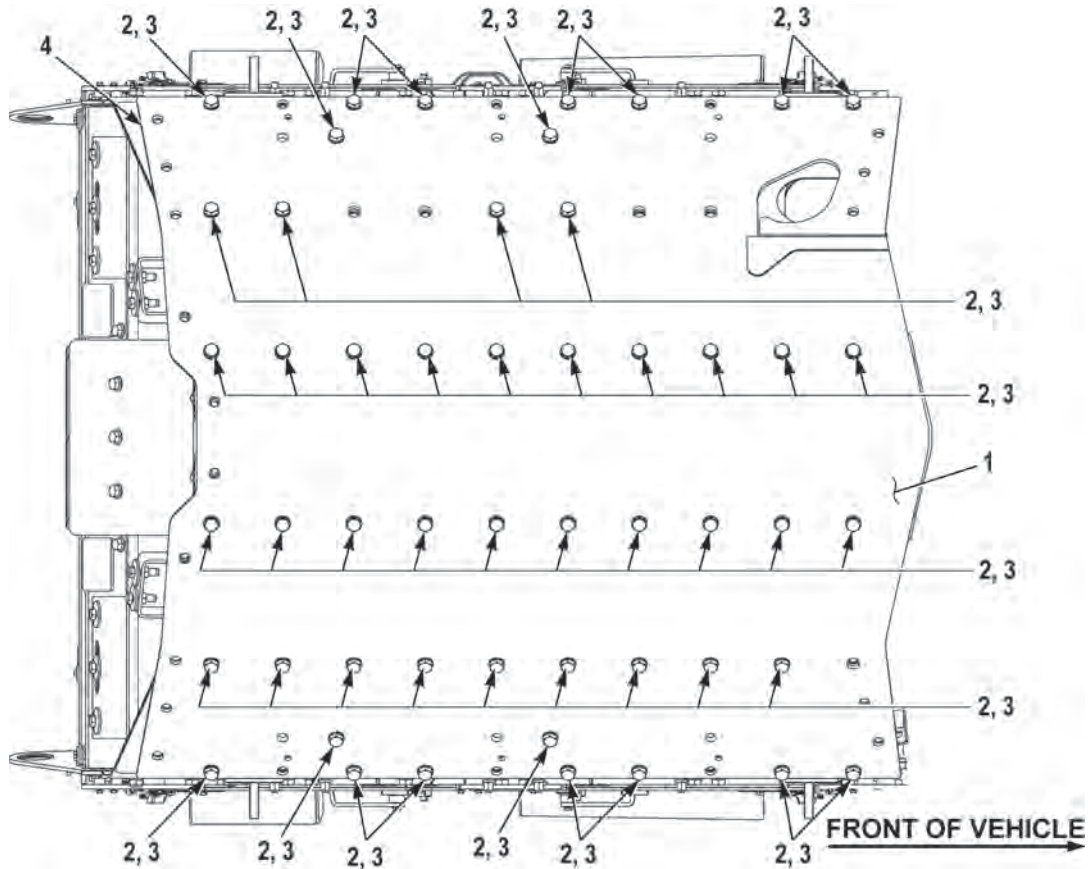
22. With the aid of an assistant, tighten ten nuts (29) to 70 lb-ft (95 N•m).

END OF TASK

UNDERBODY IMPROVEMENT PANEL INSTALLATION



1. Install two jackstands under, underbody improvement panel as shown.

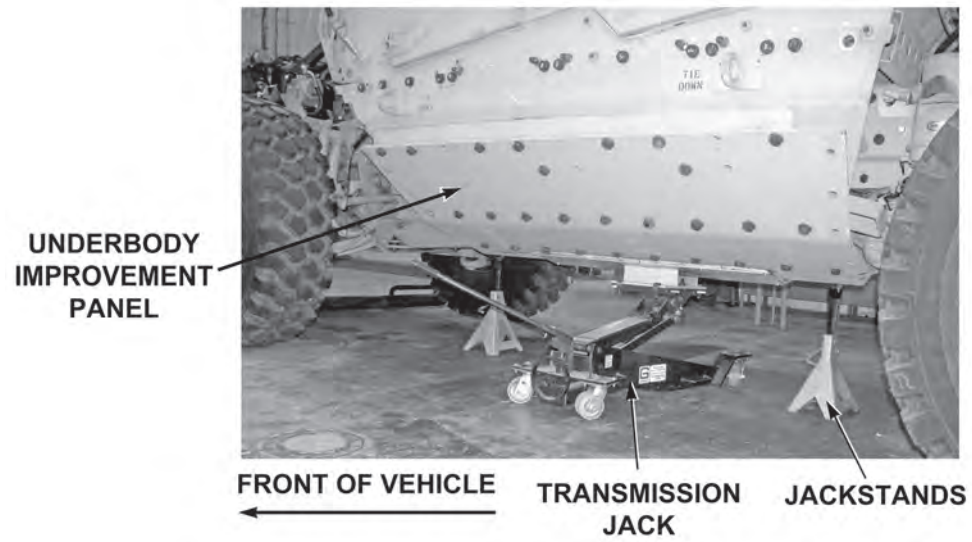


WARNING

Underbody improvement panel weighs 1,000 lbs (454 kg). Do not attempt to lift or move center deflector panel without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Install mounting hardware as noted prior to removal.
 - Screws should be installed starting from the center moving outward on driver side and repeated for the passenger side.
 - Do not tighten mounting hardware until all mounting hardware has been started by at least three threads engaged to aid in alignment of mounting hardware.
2. Apply sealing compound, Loctite 242, to threads of 51 screws (2).
 3. With the aid of an assistant, transmission jack, and adapter, install underbody improvement panel (1) on ladder panel (4) with 51 washers (3) and screws (2). Tighten 51 screws (2) to 570 lb-ft (773 N•m).



4. Remove two jackstands and transmission jack from underbody improvement panel and vehicle.
5. Perform all Follow-On Maintenance Tasks.

END OF TASK

END OF WORK PACKAGE

WHEEL WELL DEFLECTOR PANEL, FRONT, REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Passenger side engine panel removed
 (as required) (WP 0258)
 Front mud flap and quarter-panel removed
 (if equipped) (WP 0030)
 Front capsule side deflector panel removed
 (WP 0050)

Tools and Special Tools

Adapter, 3/4 in. to 1/2 in.
 Bar, Breaker, 3/4 in. Dr.
 Ratchet, 3/4 in. Dr.
 Socket, 30 mm, 3/4 in. Dr.
 Socket, 30 mm, 1/2 in. Dr.
 Socket, 36 mm, 3/4 in. Dr.
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

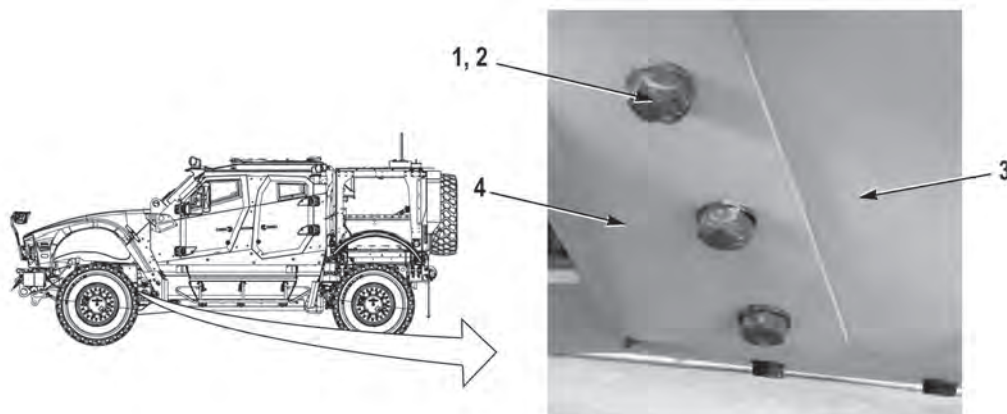
Compound, Sealing, Loctite 242

Personnel Required

Two

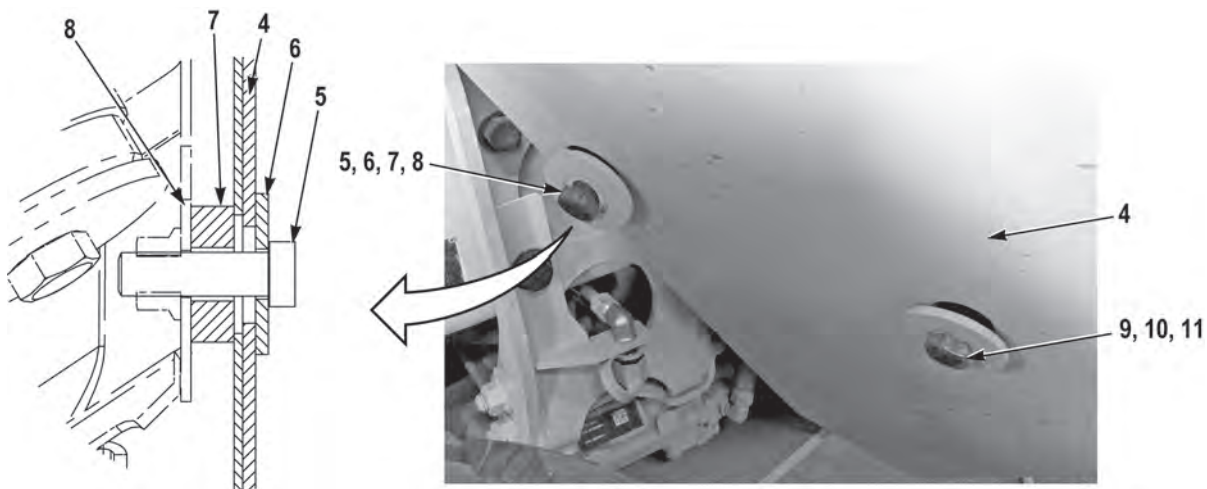
Follow-On Maintenance

Install front capsule side deflector panel
 (WP 0050)
 Install front mud flap and quarter-panel
 (if equipped) (WP 0030)
 Install passenger side engine panel (as required)
 (WP 0258)
 Remove and stow wheel chocks

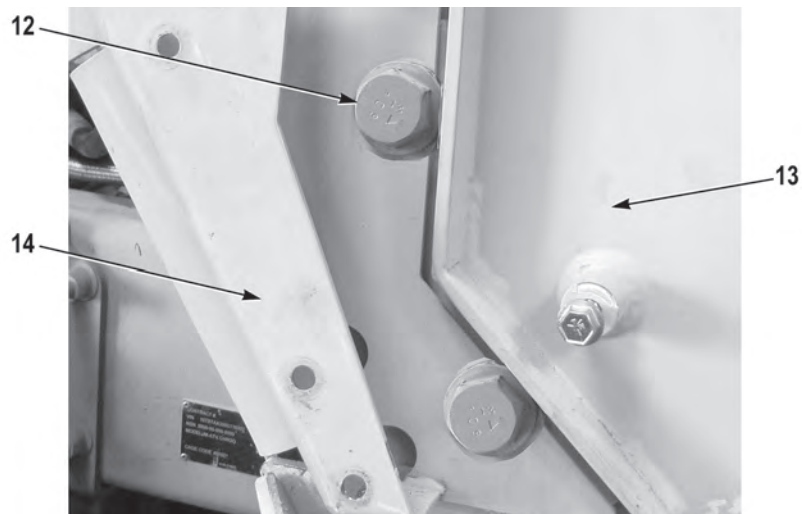
REMOVAL**NOTE**

Driver side and passenger side wheel well deflector panels are removed the same way except where noted. Driver side shown.

1. Remove three screws (1) and washers (2) from underbody improvement panel (3) and wheel well deflector panel (4).



2. Remove screw (5), washer (6), and isolator (7) from capsule mount bracket (8) and wheel well deflector panel (4).
3. Remove screw (9), washer (10), and isolator (11) from capsule mount bracket (8) and wheel well deflector panel (4).



WARNING

Wheel well deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

NOTE

Note length and location of hardware upon removal on driver side. Longer screw on driver side is located on top.

4. With the aid of an assistant, remove two screws (12) and wheel well deflector panel (4) from capsule (13) and bracket (14).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

Ensure longer bolt is installed in top position. Failure to comply may result in damage to equipment.

NOTE

- Driver side and passenger side wheel well deflector panels are installed the same way except where noted. Driver side shown.
 - Install hardware as noted prior to removal. Longer screw on driver side is located on top.
1. Apply sealing compound, Loctite 242, to threads of two screws (12), screw (9), and screw (5).

WARNING

Wheel well deflector panel weighs 60 lbs (27 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

NOTE

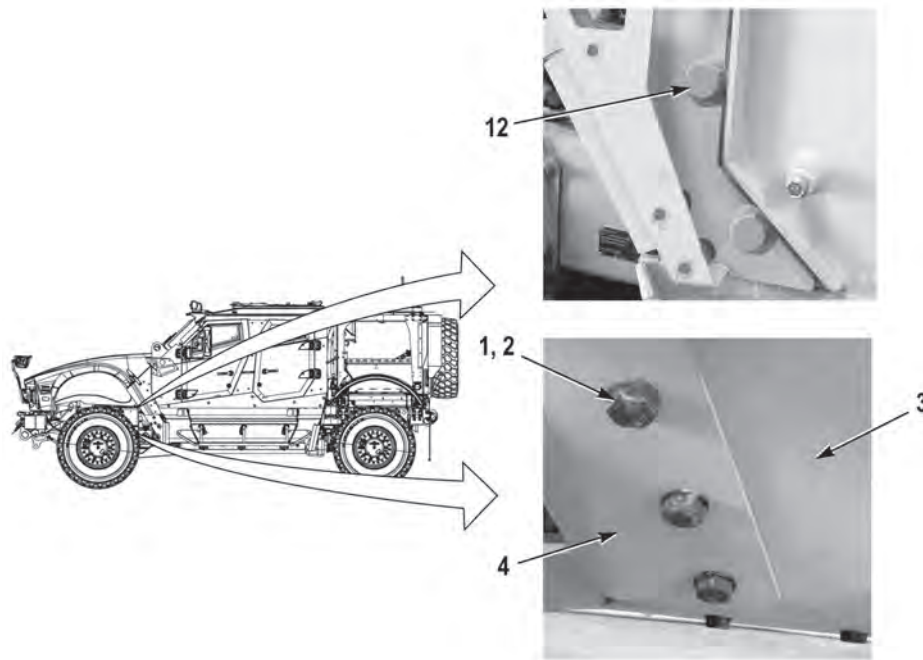
Wheel well deflector panel is installed between quarter-panel mounting bracket and capsule.

2. With the aid of an assistant, install wheel well deflector panel (4) on bracket (14) and capsule (13) with two screws (12). Do not tighten screws (12).

NOTE

Install portion of isolator without steel sleeve.

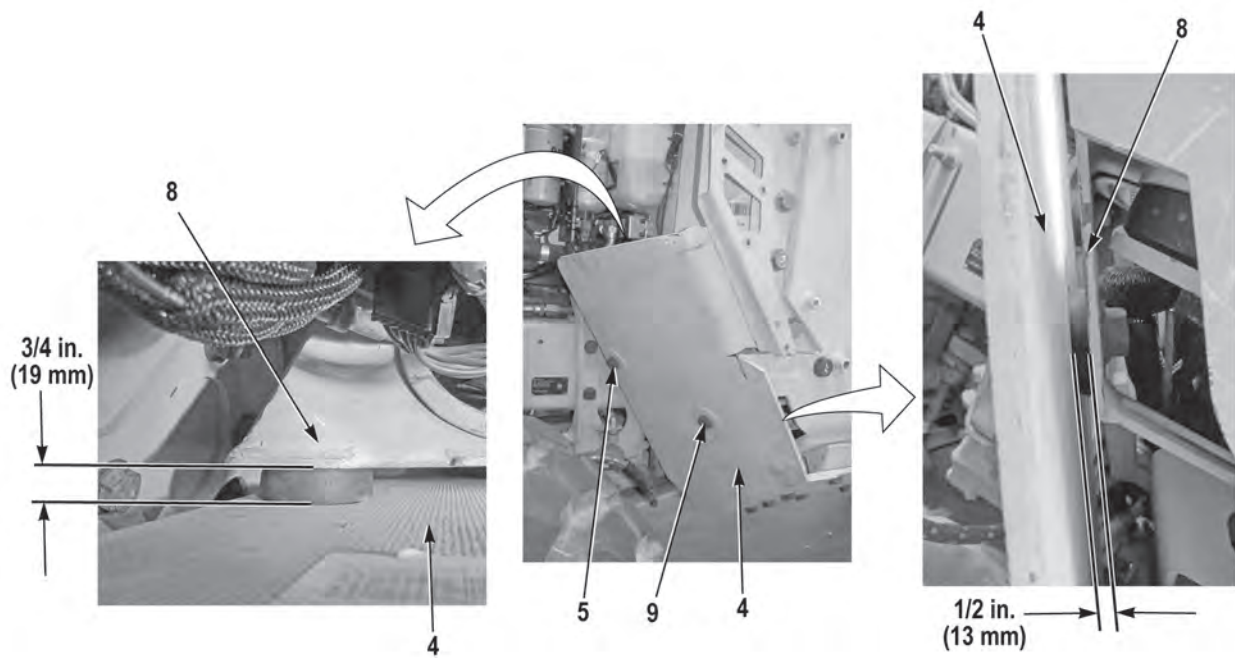
3. Install wheel well deflector panel (4) and isolator (11) on capsule mount bracket (8) with washer (10) and screw (9). Do not tighten screw (9).
4. Secure isolator (7) and wheel well deflector panel (4) on capsule mount bracket (8) with washer (6) and screw (5). Do not tighten screw (5).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

5. Apply sealing compound, Loctite 242 to threads of three screws (1).
6. Install wheel well deflector panel (4) on underbody improvement panel (3) with three washers (2) and screws (1). Do not tighten screws.
7. Tighten three screws (1) and two screws (12).



8. Tighten screw (5) until gap between wheel well deflector panel (4) and capsule mount bracket (8) is 3/4 in. (19 mm).
9. Tighten screw (9) until gap between wheel well deflector panel (4) and capsule mount bracket (8) is 1/2 in. (13 mm).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

WHEEL WELL DEFLECTOR PANEL, REAR, REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Muffler removed (passenger side only) (WP 0242)
 Air dryer filter removed (driver side only) (WP 0102)
 Lower capsule side deflector panel removed (WP 0047)
 Rear capsule side deflector panel removed (WP 0047)
 Rear fender extension removed (WP 0037)

Tools and Special Tools

Bar, Breaker, 3/4 in. Dr.
 Socket, 30 mm, 3/4 in. Dr.
 Socket, 36 mm, 3/4 in. Dr.
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

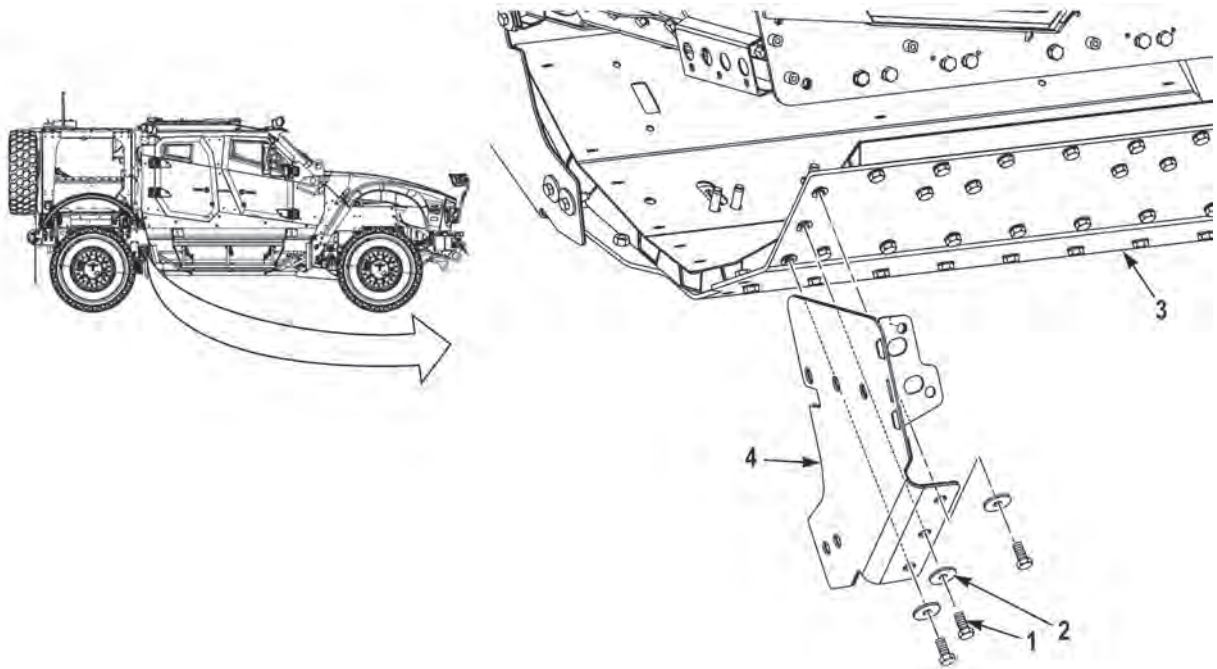
Compound, Sealing, Loctite 242

Personnel Required

Two

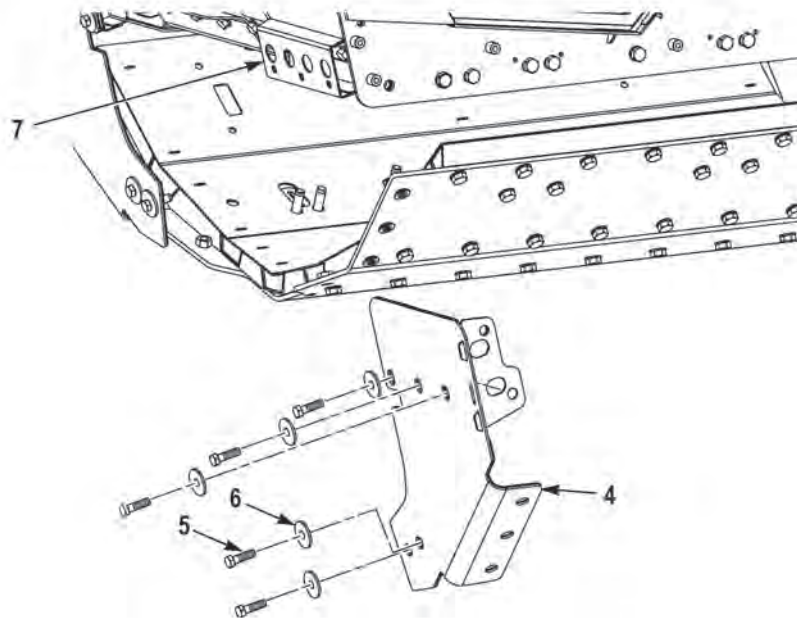
Follow-On Maintenance

Install rear fender extension (WP 0037)
 Install rear capsule side deflector panel (WP 0047)
 Install lower capsule side deflector panel (WP 0047)
 Install air dryer filter (driver side only) (WP 0102)
 Install muffler (passenger side only) (WP 0242)
 Remove and stow wheel chocks

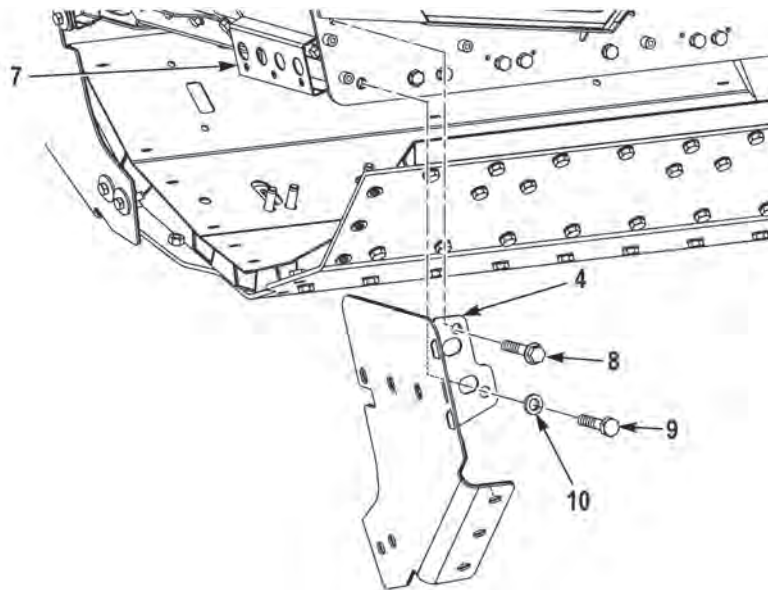
REMOVAL**NOTE**

Driver side and passenger side wheel well deflector panels are removed the same way. Passenger side shown.

1. Remove three screws (1) and washers (2) from underbody improvement panel (3) and wheel well deflector panel (4).



2. Remove five screws (5) and washers (6) from capsule (7) and wheel well deflector panel (4).



WARNING

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

3. With the aid of an assistant, remove screw (8), screw (9), washer (10), and wheel well deflector panel (4) from capsule (7).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

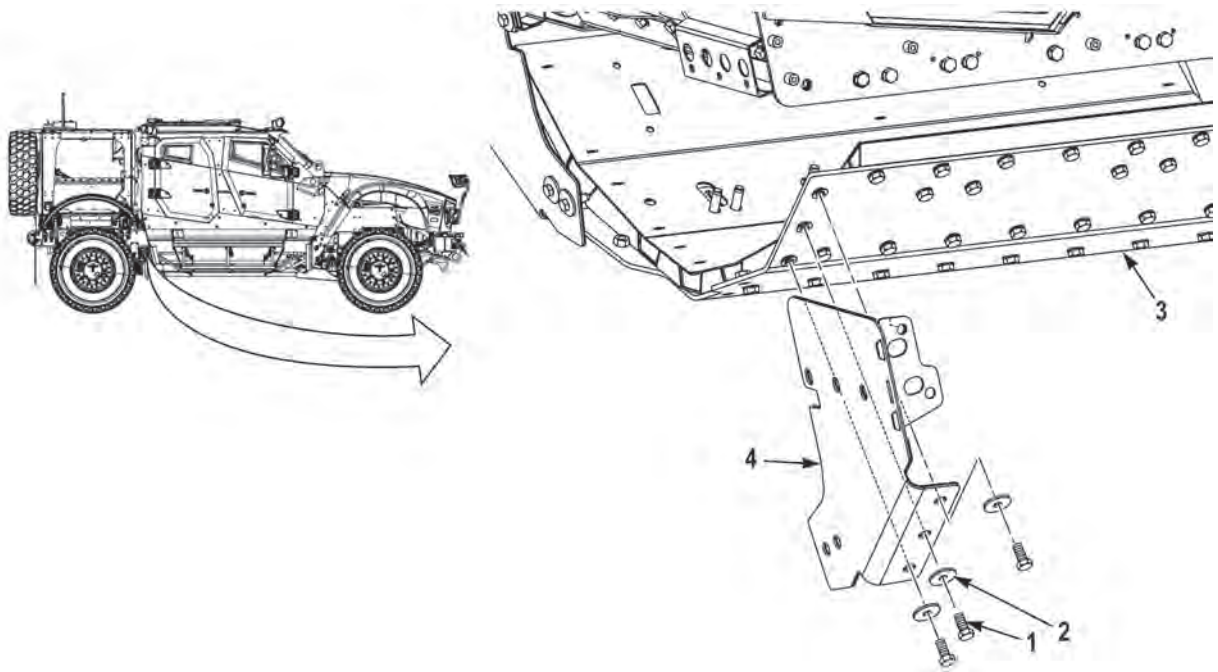
Driver side and passenger side wheel well deflector panels are installed the same way. Passenger side shown.

1. Apply sealing compound, Loctite 242, to threads of screw (9), screw (8), five screws (5), and three screws (1).

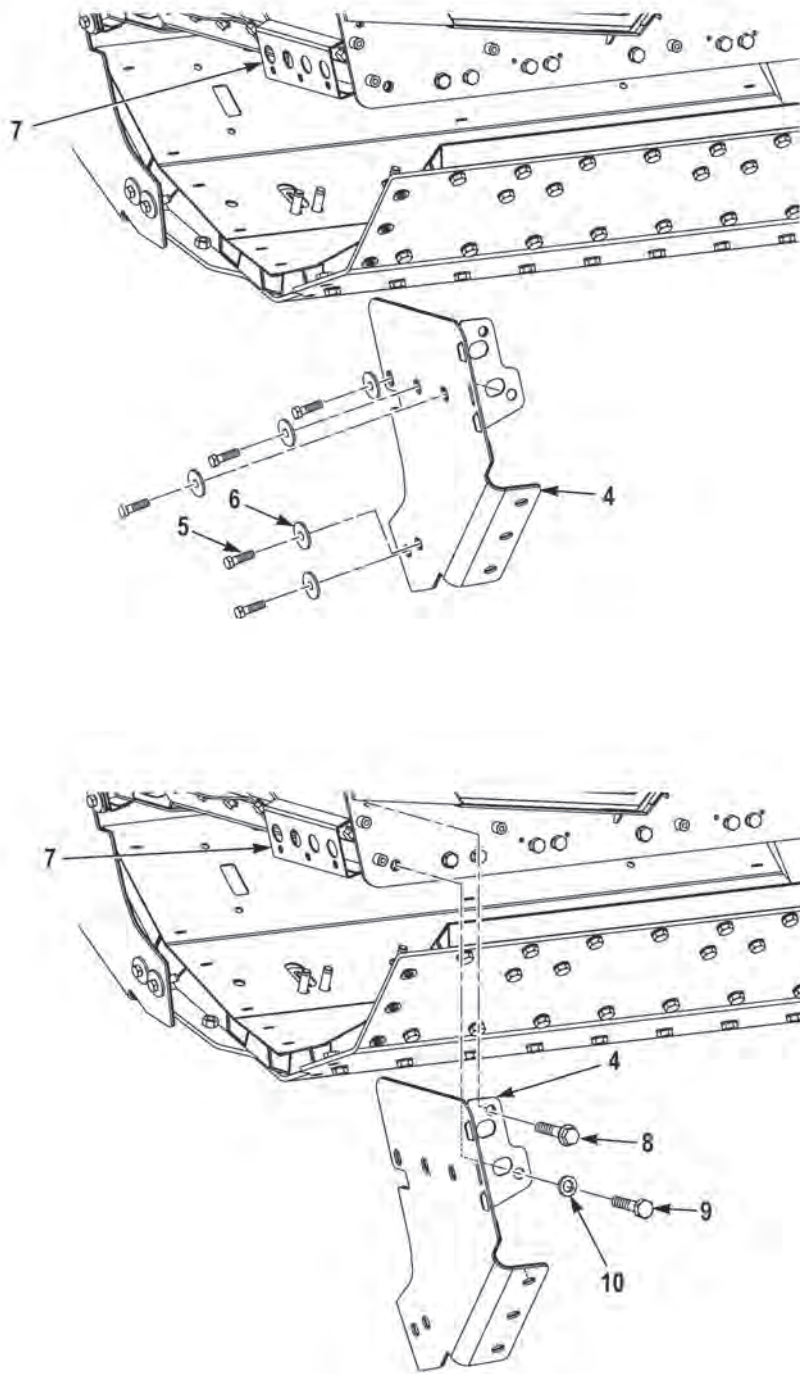
WARNING

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

2. With the aid of an assistant, install wheel well deflector panel (4) on capsule (7) with screw (9), washer (10), and screw (8). Do not tighten screw (8) and screw (9).
3. Secure wheel well deflector panel (4) on capsule (7) with five washers (6) and screws (5). Do not tighten screws (5).



4. Secure wheel well deflector panel (4) on underbody improvement panel (3) with three washers (2) and screws (1).



5. Tighten three screws (1), five screws (5), screw (8), and screw (9).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

WHEEL WELL DEFLECTOR PANEL REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
 Socket, 30 mm

Materials/Parts

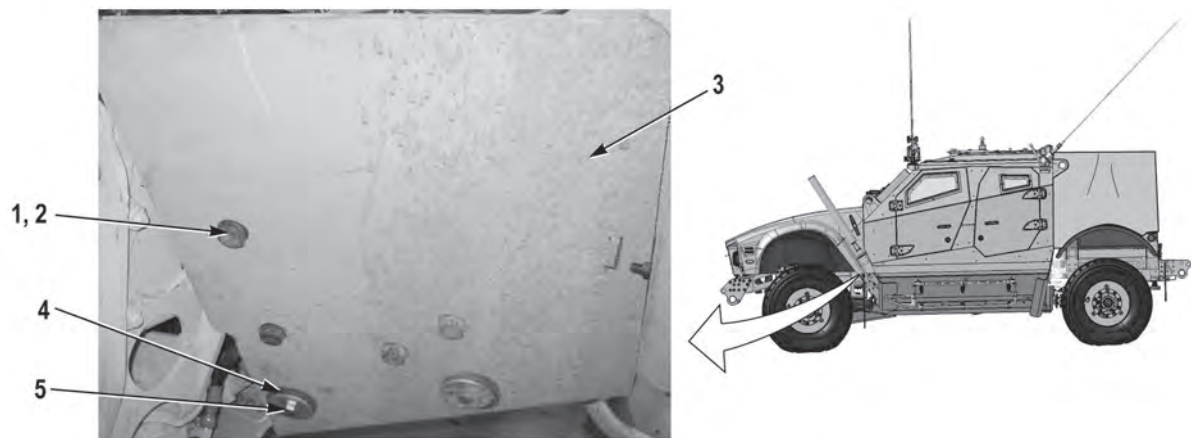
Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

Remove and stow wheel chocks

FRONT WHEEL WELL DEFLECTOR PANEL REMOVAL**WARNING**

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

NOTE

Front driver side wheel well deflector panel and front passenger side wheel well deflector panel are removed the same way. Front driver side wheel well deflector panel shown.

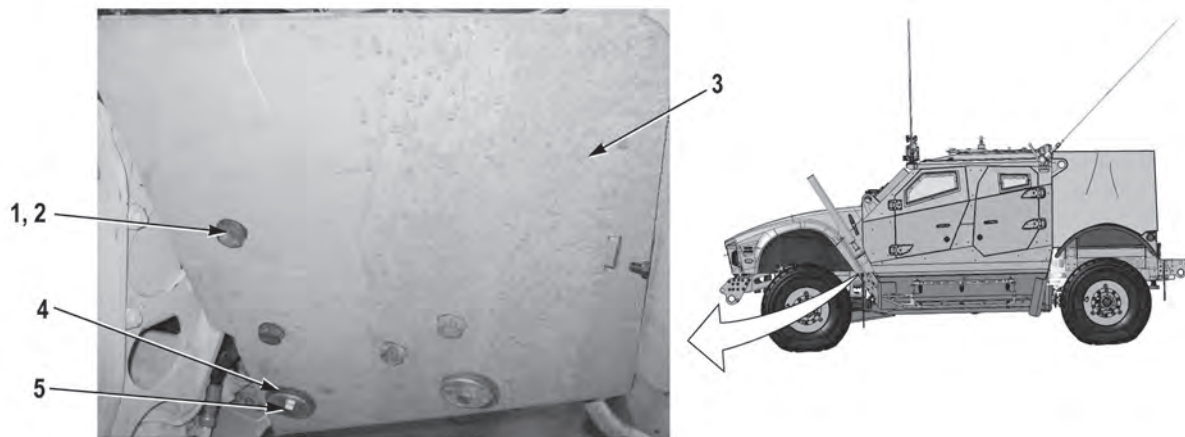
1. Remove three screws (1) and washers (2) from wheel well deflector (3).

NOTE

Loosen but do not remove screw in Step (2), screw will support panel until it is removed from vehicle.

2. Loosen screw (1).
3. Remove two screws (4) and washers (5) from wheel well deflector panel (3).
4. Remove screw (1), washer (2), and wheel well deflector panel (3) from vehicle.

END OF TASK

FRONT WHEEL WELL DEFLECTOR PANEL INSTALLATION**WARNING**

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

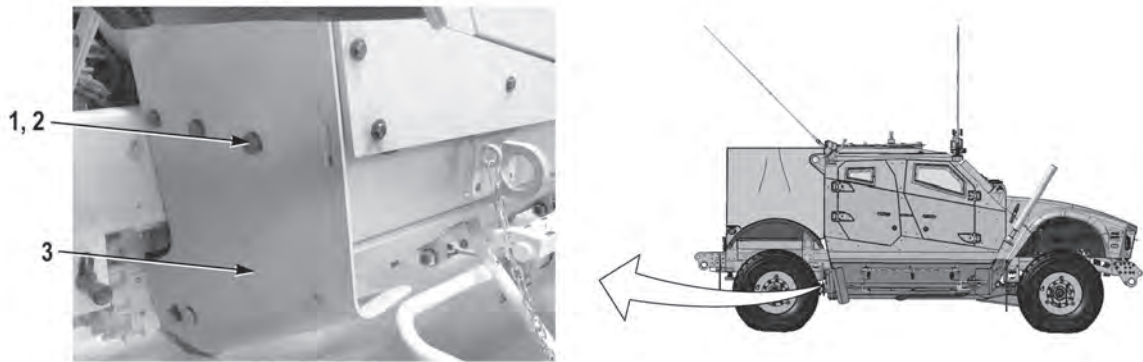
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Front driver side wheel well deflector panel and front passenger side wheel well deflector panel are installed the same way. Front passenger side wheel well deflector panel shown.

1. Apply sealing compound, Loctite 242 to threads of six screws (4 and 1).
2. Install wheel deflector panel (3) on vehicle with two washers (5) and screws (4).
3. Secure wheel deflector panel (3) to vehicle with four washers (2) and screws (1).

END OF TASK

REAR WHEEL WELL DEFLECTOR PANEL REMOVAL**WARNING**

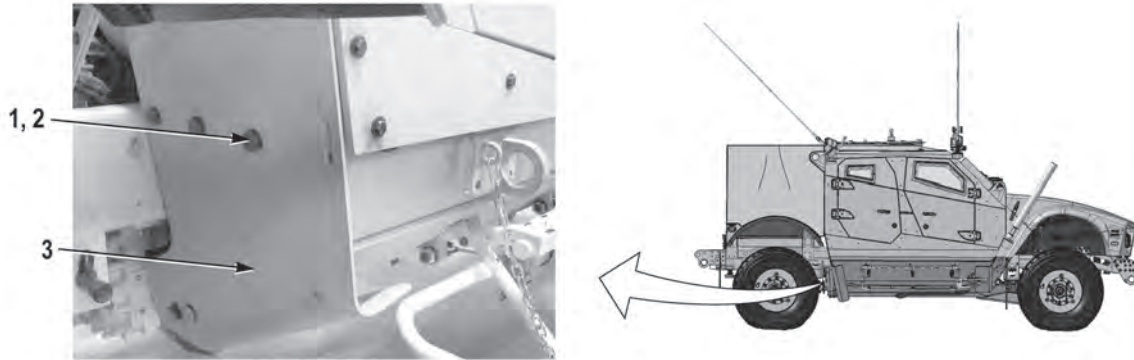
Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

NOTE

Rear driver side wheel well deflector panel and rear passenger side wheel well deflector panel are removed the same way. Rear passenger side wheel well deflector panel shown.

1. Remove five screws (1), washers (2) and wheel well deflector panel (3) from vehicle.

END OF TASK

REAR WHEEL WELL DEFLECTOR PANEL INSTALLATION**WARNING**

Wheel well deflector panel weighs 54 lbs (24.5 kg). Do not attempt to lift or move wheel well deflector panel without the aid of an assistant. Failure to comply may result in injury or death to personnel.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Rear driver side wheel well deflector panel and rear passenger side wheel well deflector panel are installed the same way. Rear passenger side wheel well deflector panel shown.

1. Apply Sealing compound, Loctite 242 to threads of five screws (1).
2. Install wheel well deflector panel (3) on vehicle with five screws (1) and washers (2).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

FIRE SUPPRESSION SYSTEM AEROSOL GENERATOR REPLACEMENT, ENGINE COMPARTMENT (FOUR GENERATOR AFES SYSTEM)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Batteries disconnected (WP 0186)

Tools and Special Tools

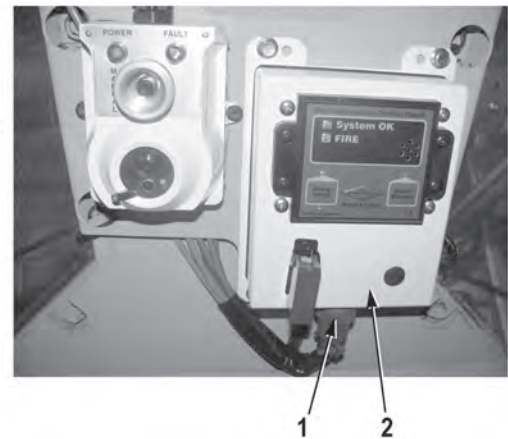
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 8)
 Locknut (1) (Item 12)
 Lubricant, Connector, Nyogel 760G
 Ties, Cable
 Tags, Identification

Follow-On Maintenance

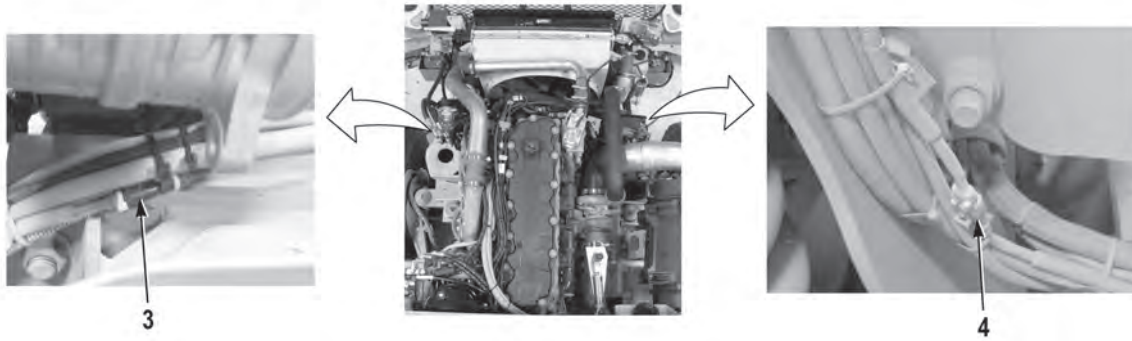
Connect batteries (WP 0186)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL**WARNING**

- **M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel.**
- **If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.**

NOTE

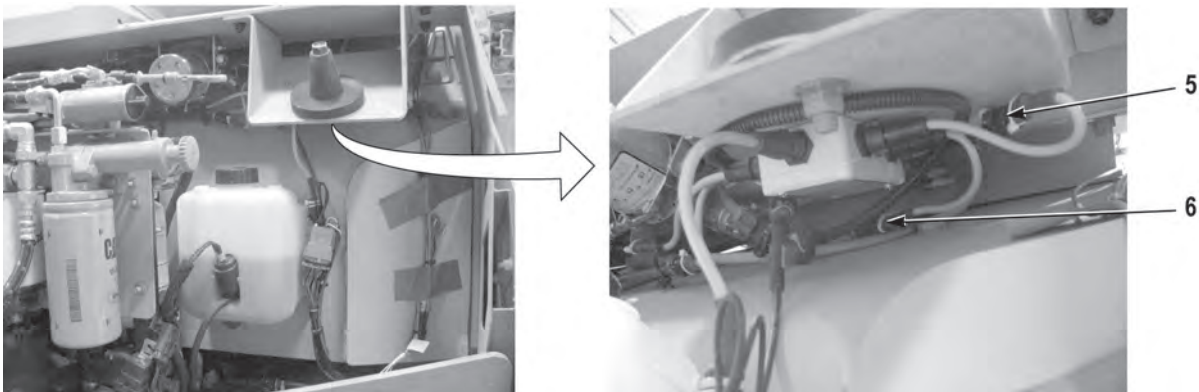
- Yellow cable ties identify connectors to aerosol generator.
 - Green cable ties identify connectors to sensors.
1. Disconnect connector (1) from fire suppression control panel (2).



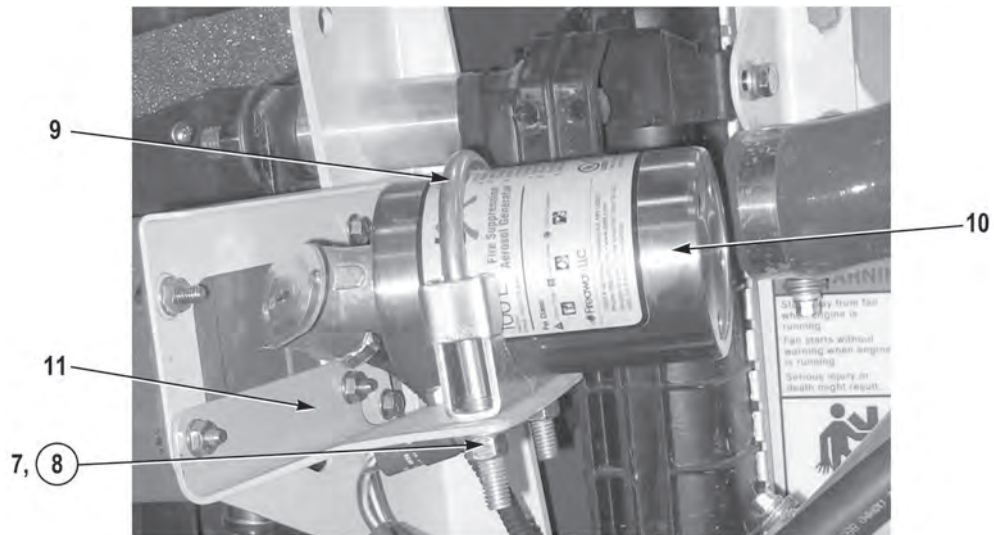
NOTE

- Remove cable ties as required.
- Tag and mark wire connectors prior to removal to ensure proper installation.

2. Disconnect two connectors (3 and 4).

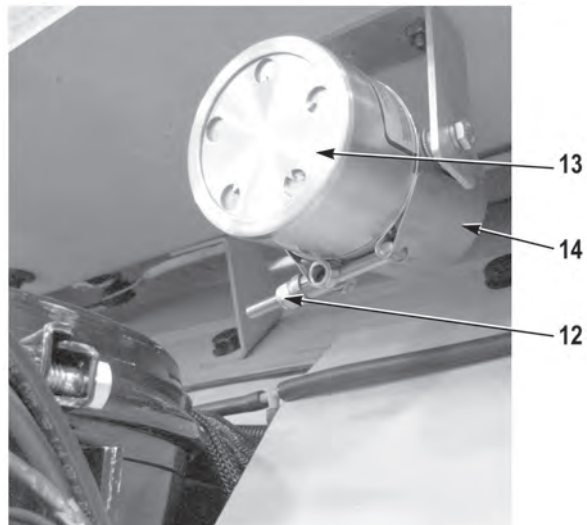


3. Disconnect two connectors (5 and 6).



NOTE

- Driver side and passenger side front fire suppression aerosol generators are removed the same way. Driver side shown.
 - Remove cushion clips and cable ties as required.
4. Remove two nuts (7), lockwashers (8), U-bolt (9), and aerosol generator (10) from bracket (11). Discard lockwashers (8).

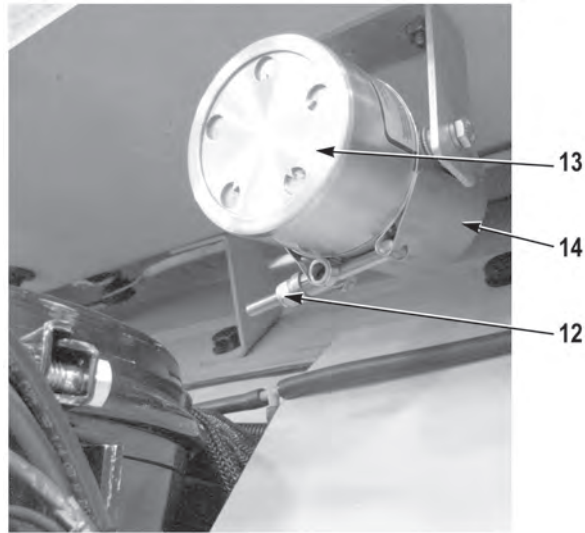


NOTE

- Driver side and passenger side rear fire suppression aerosol generators are removed the same way. Driver side shown.
5. Remove locknut (12) and aerosol generator (13) from bracket (14).

END OF TASK

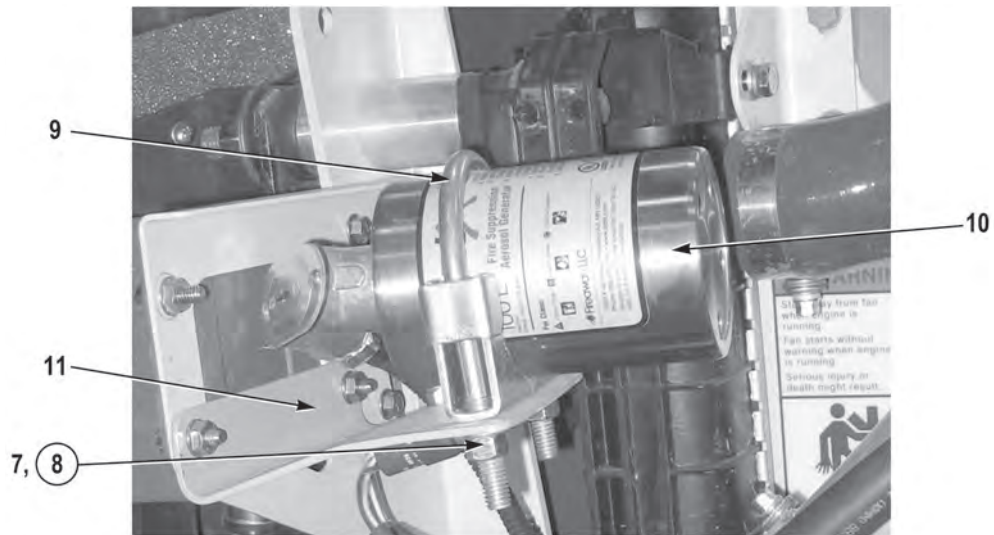
INSTALLATION



NOTE

Driver side and passenger side rear fire suppression aerosol generators are installed the same way. Driver side shown.

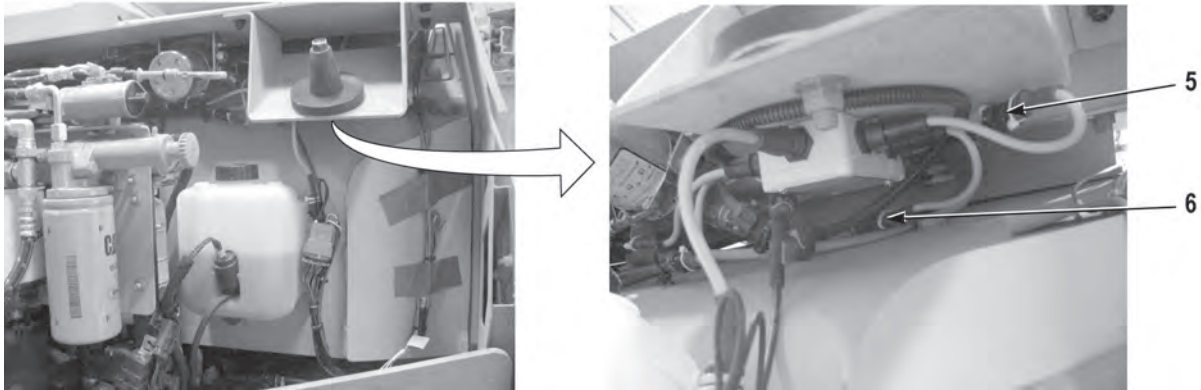
1. Install aerosol generator (13) on bracket (14) with new locknut (12).



NOTE

- Driver side and passenger side front fire suppression aerosol generators are installed the same way. Driver side shown.
- Install cushion clips and cable ties as required.

2. Install aerosol generator (10) on bracket (11) with U-bolt (9), two new lockwashers (8), and nuts (7).



WARNING

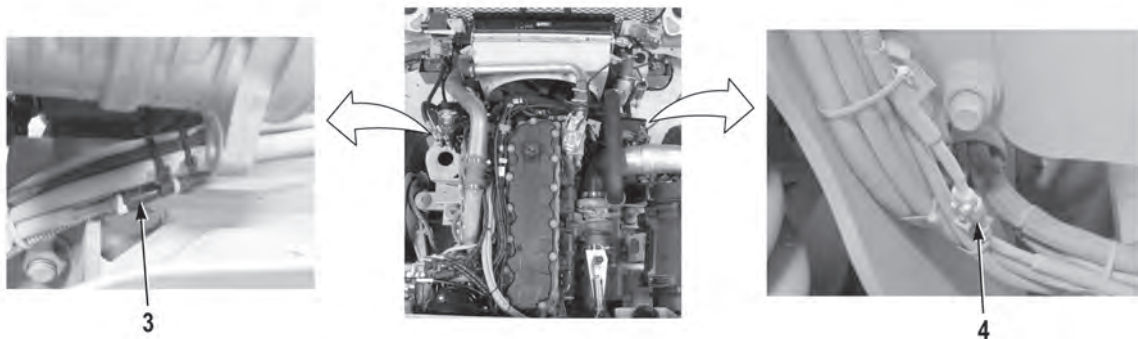
Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

3. Apply connector lubricant, Nyogel 760G, to four connectors (6, 5, 4, and 3).

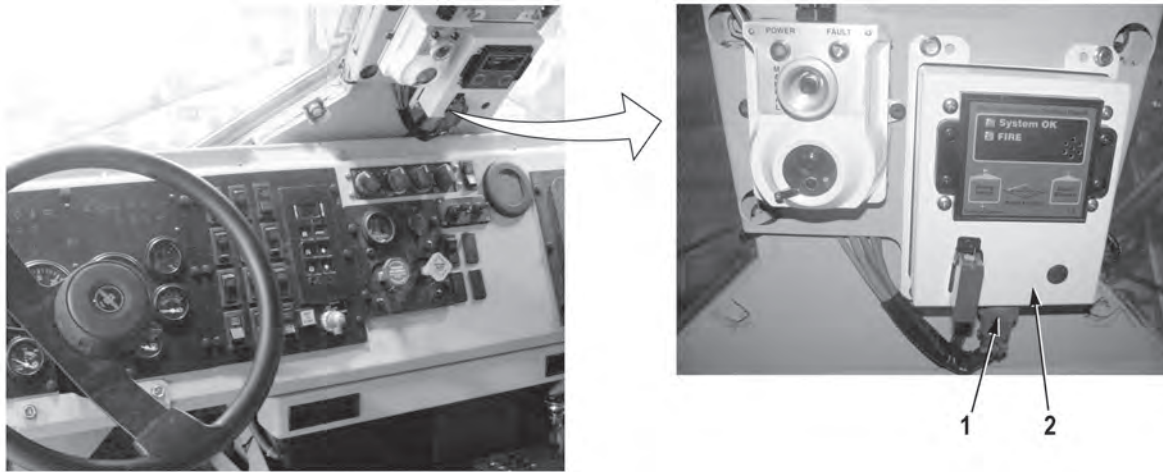
NOTE

Install cable ties as required.

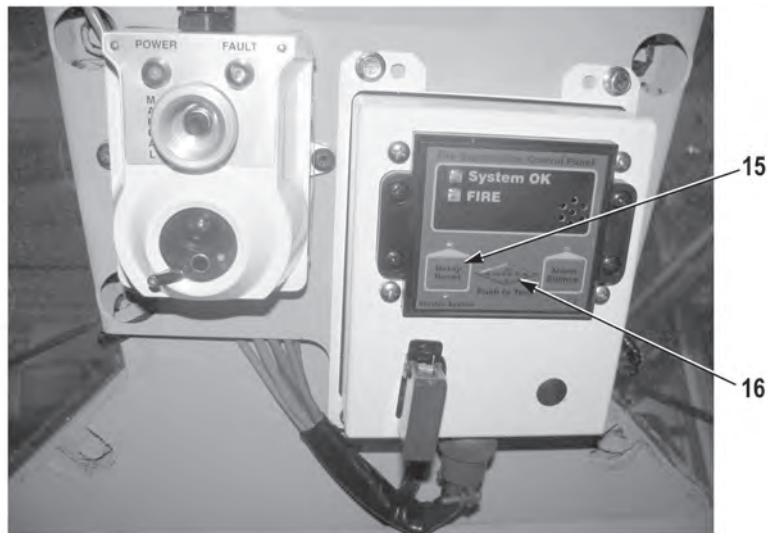
4. Connect two connectors (6 and 5).



5. Connect two connectors (4 and 3).



6. Apply connector lubricant, Nyogel 760G, to connector (1).
7. Connect connector (1) on fire suppression control panel (2).
8. Connect batteries (WP 0186).



9. Push fire suppression system button (15) to reset fire suppression relay.
10. Press and hold button (16) to test LEDs and audible alarm.
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM AEROSOL GENERATOR REPLACEMENT, ENGINE COMPARTMENT (FIVE GENERATOR AFES SYSTEM)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

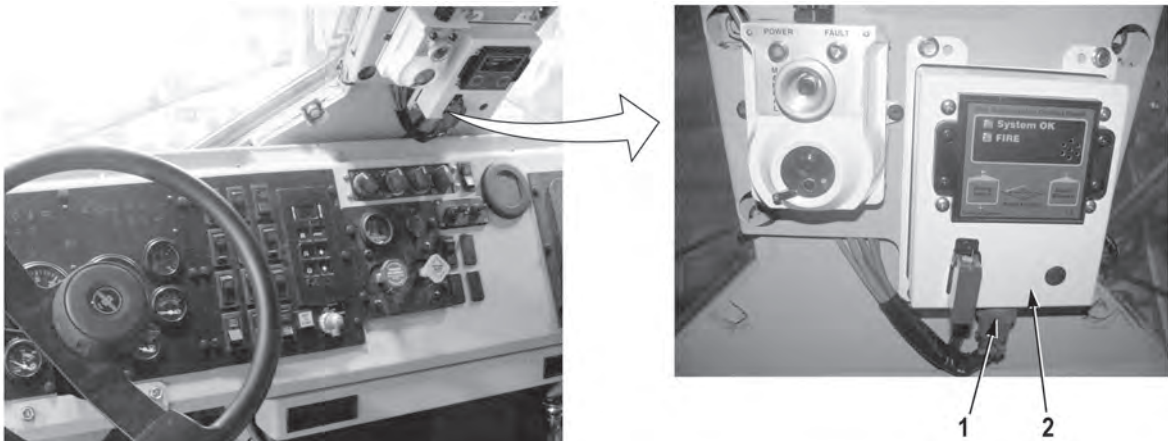
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 9)
 Locknut (Item 13)
 Lockwasher (2) (Item 17)
 Tags, Identification
 Ties, Cable

Follow-On Maintenance

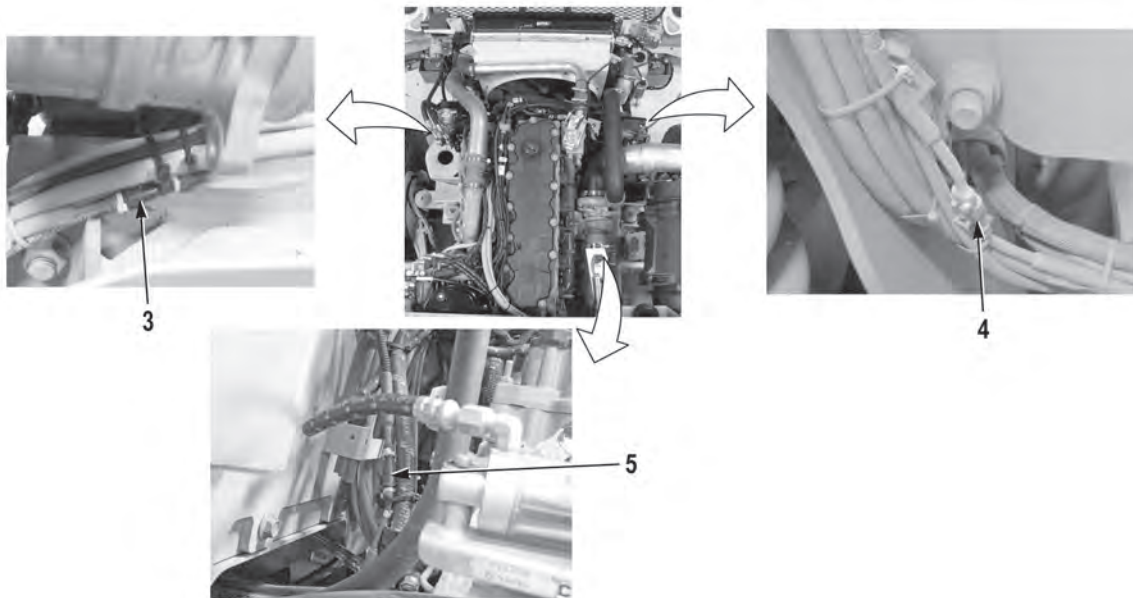
Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Close and secure hood
 Remove and stow wheel chocks

REMOVAL**WARNING**

- **M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel.**
- **If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.**

NOTE

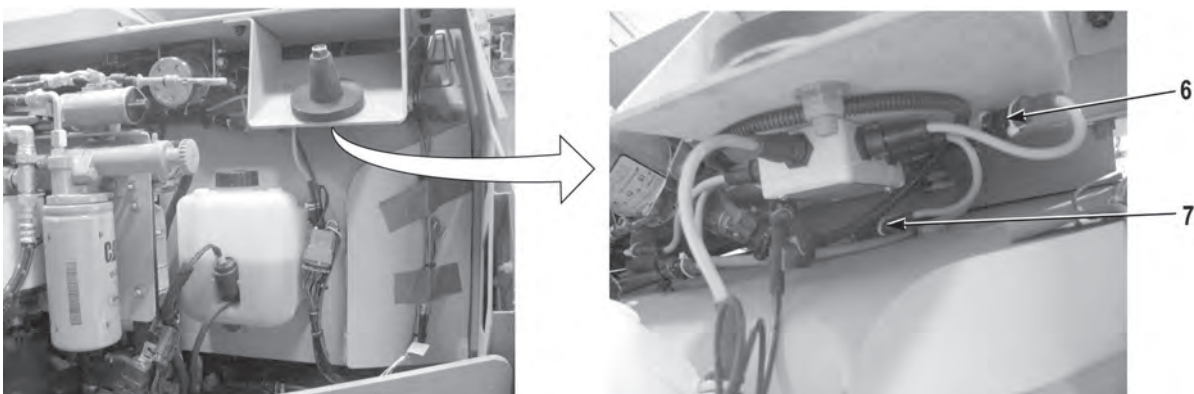
- Yellow cable ties identify connectors to aerosol generator.
 - Green cable ties identify connectors to sensors.
1. Disconnect connector (1) from fire suppression control panel (2).



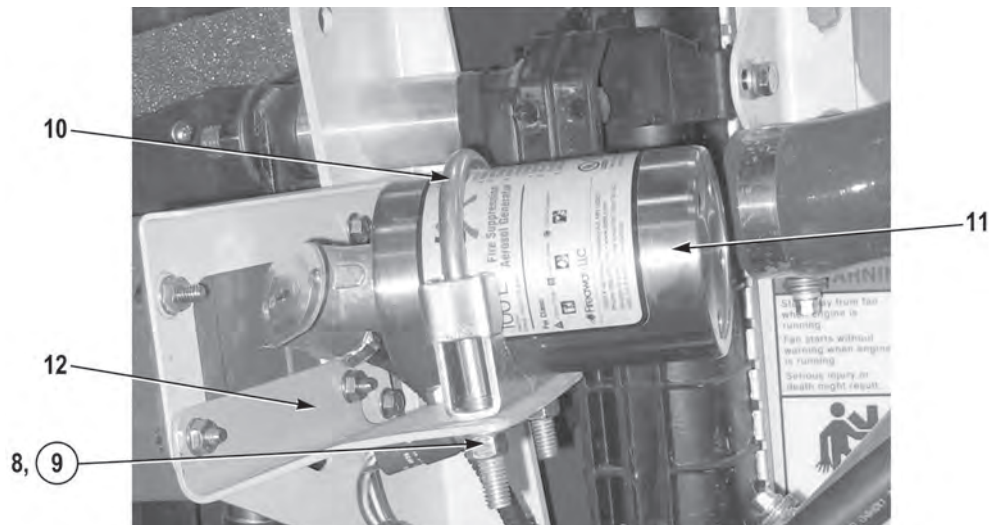
NOTE

- Remove cables ties as required.
- Tag and mark wire connectors prior to removal to ensure proper installation.

2. Disconnect connector (3).
3. Disconnect connector (4).
4. Disconnect connector (5).

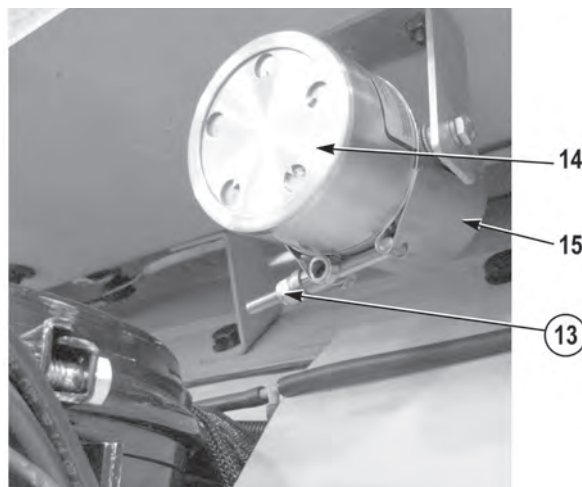


5. Disconnect connector (6).
6. Disconnect connector (7).



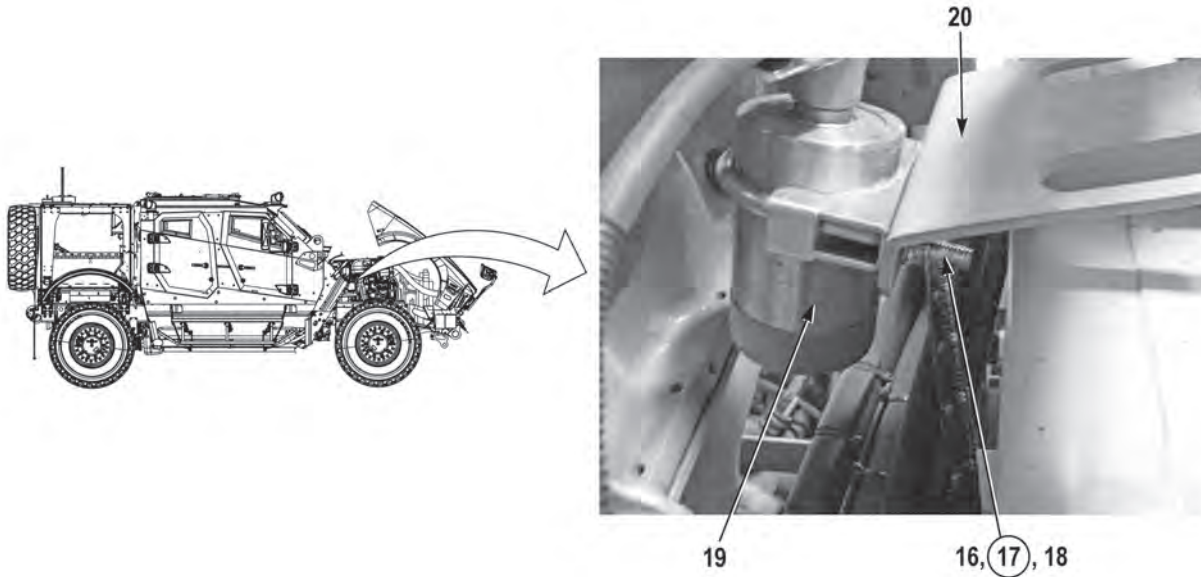
NOTE

- Driver side and passenger side front fire suppression aerosol generators are removed the same way. Driver side shown.
 - Remove cushion clips and cable ties as required.
 - Note position of aerosol generators prior to removal to ensure proper installation.
7. Remove two nuts (8), lockwashers (9), U-bolt (10), and aerosol generator (11) from bracket (12). Discard lockwashers (9).



NOTE

- Driver side and passenger side rear fire suppression aerosol generators are removed the same way. Driver side shown.
 - Note position of aerosol generators prior to removal to ensure proper installation.
8. Remove locknut (13) and aerosol generator (14) from bracket (15). Discard locknut (13).



NOTE

Note position of aerosol generator prior to removal to ensure proper installation.

9. Remove two nuts (16), lockwashers (17), U-bolt (18), and aerosol generator (19) from bracket (20). Discard lockwashers (17).

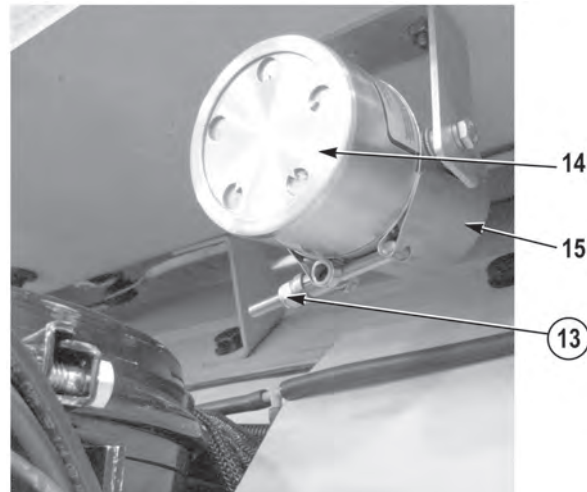
END OF TASK

INSTALLATION

NOTE

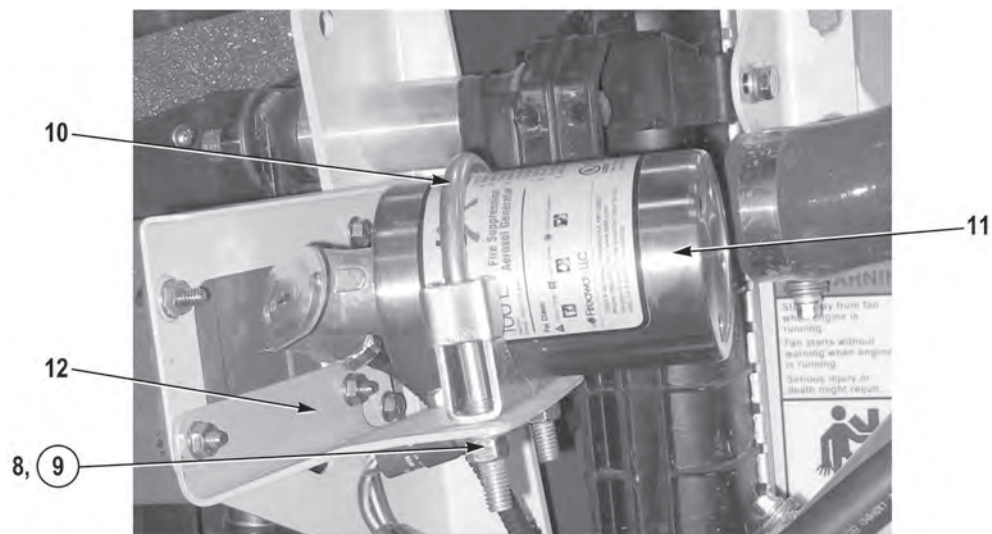
Install aerosol generator as noted prior to removal.

1. Install aerosol generator (19) on bracket (20) with U-bolt (18), two new lockwashers (17), and nuts (16).



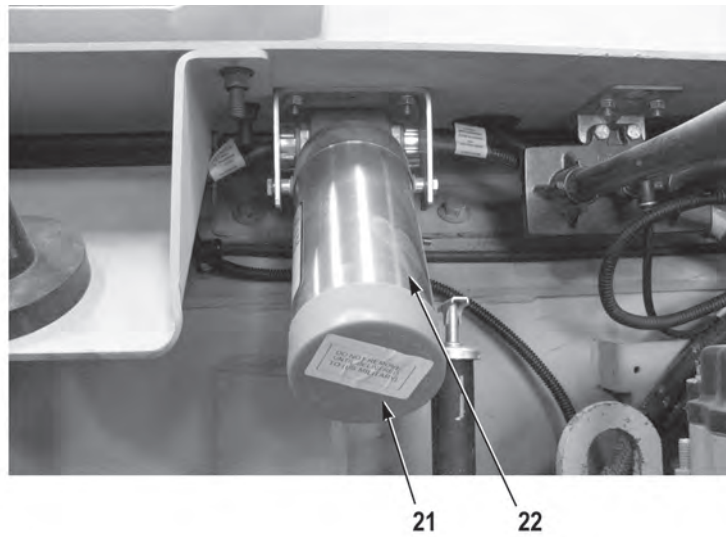
NOTE

- Driver side and passenger side rear fire suppression aerosol generators are installed the same way. Driver side shown.
 - Install aerosol generators as noted prior to removal.
2. Install aerosol generator (14) on bracket (15) with new locknut (13).



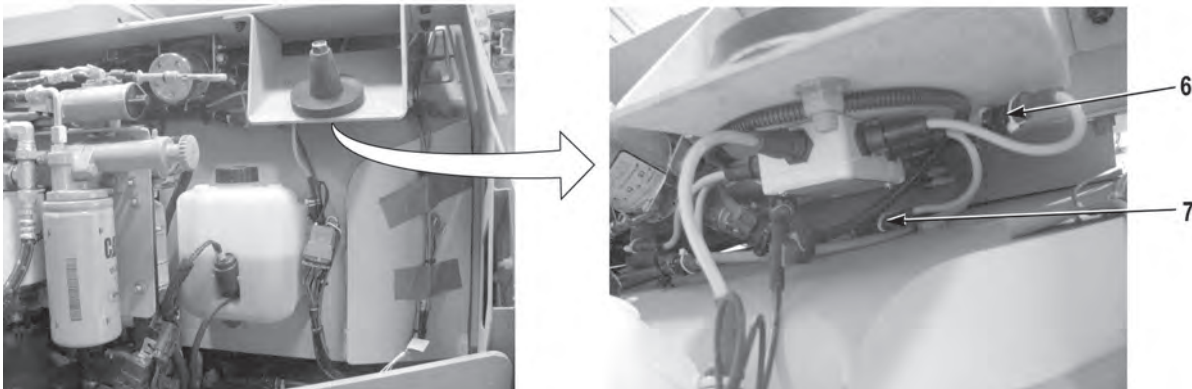
NOTE

- Driver side and passenger side front fire suppression aerosol generators are installed the same way. Driver side shown.
 - Install aerosol generators as noted prior to removal.
 - Install cushion clips and cables as required.
3. Install aerosol generator (11) on bracket (12) with U-bolt (10), two new lockwashers (9), and nuts (8).

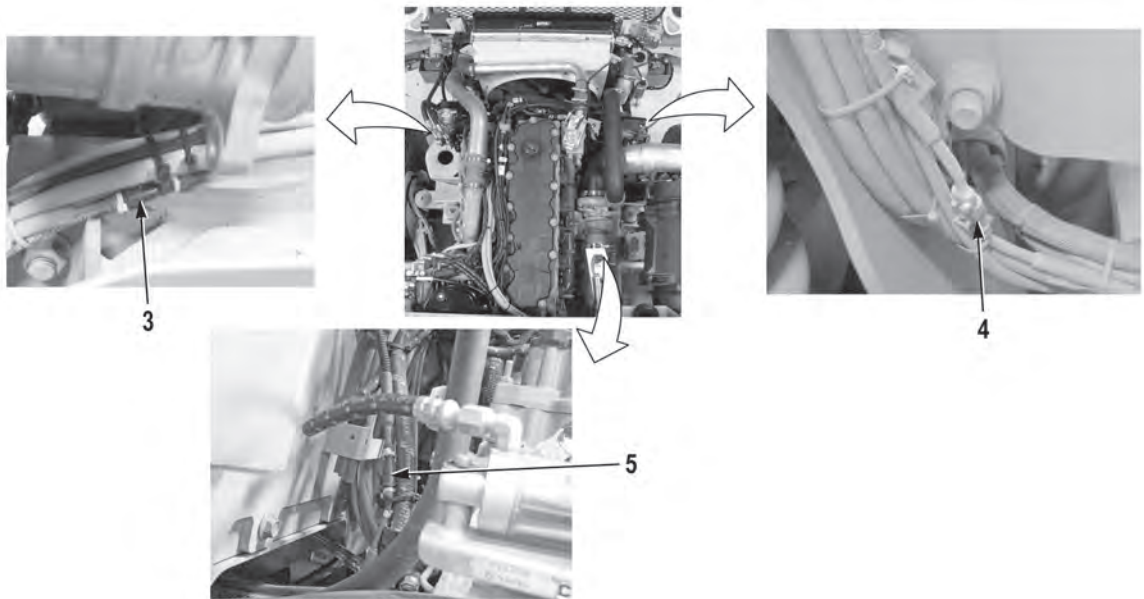
**WARNING**

Ensure blue caps are removed from aerosol generators after installation. If blue caps remain installed, aerosol generators may fail to discharge. Failure to comply may result in injury or death to personnel.

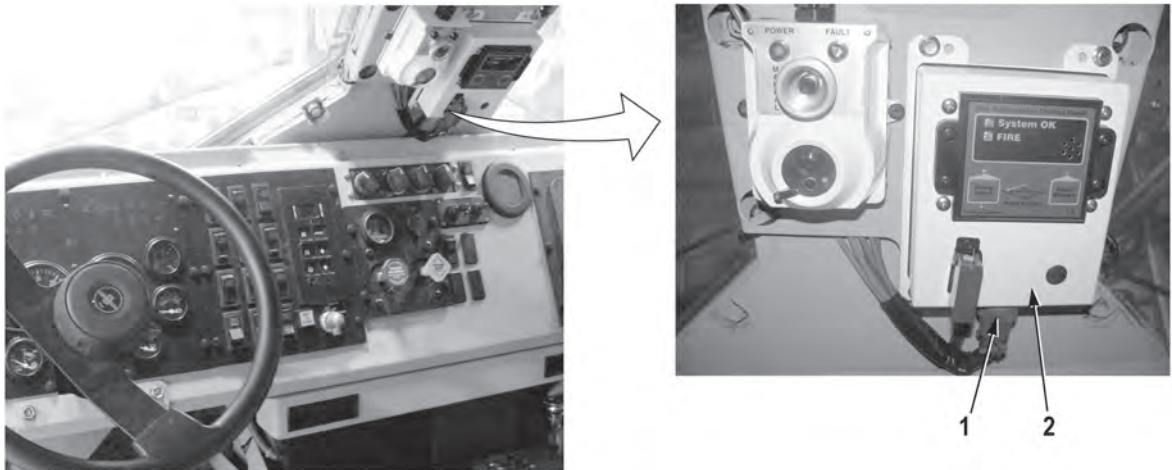
4. Remove all blue caps (21) from aerosol generators (22).



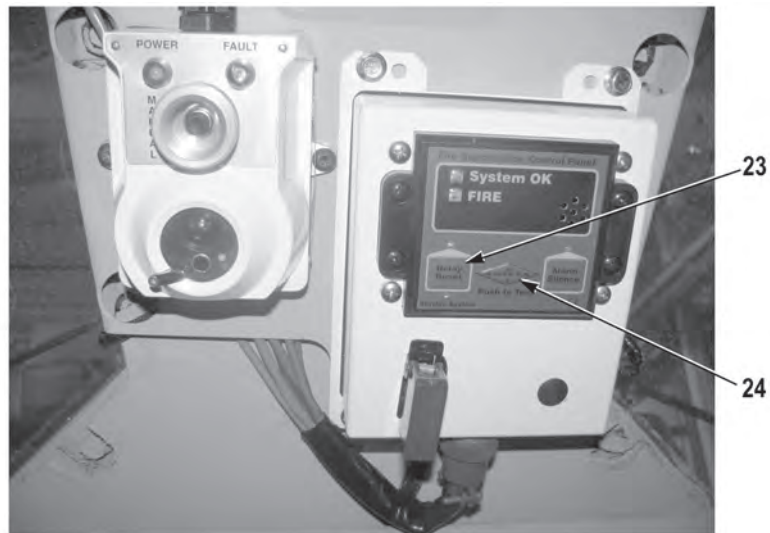
5. Connect connector (7).
6. Connect connector (6).



7. Connect connector (5).
8. Connect connector (4).
9. Connect connector (3).



10. Connect connector (1) to fire suppression control panel (2).
11. Perform fire suppression systems testing (WP 0075).
12. Connect batteries (M1240/M1240A1) (WP 0186) or (M1245) (WP 0187).



13. Push fire suppression system button (23) to reset fire suppression relay.
14. Press and hold button (24) to test LEDs audible alarm.
15. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CHASSIS, SWITCH REPLACEMENT

Preconditions

- Park vehicle
- Engine OFF
- Wheels chocked
- Batteries disconnected (M1240/M1240A1)
(WP 0186)
- Batteries disconnected (M1245) (WP 0187)

Materials/Parts

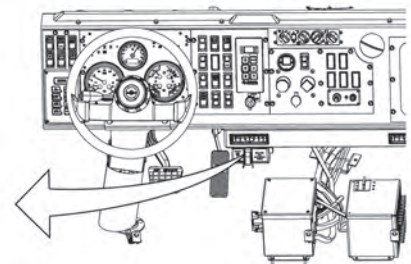
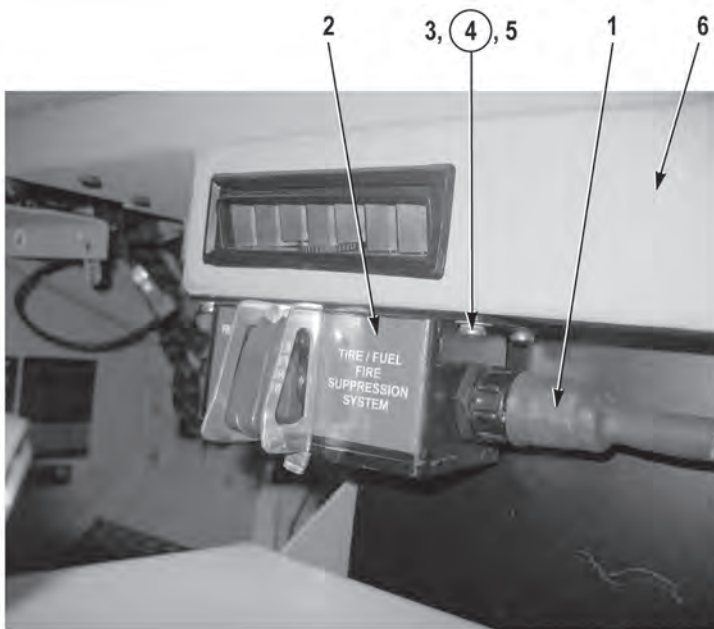
- Lockwasher (4) (Item 4)

Follow-On Maintenance

- Connect batteries (M1240/M1240A1) (WP 0186)
- Connect batteries (M1245) (WP 0187)
- Remove and stow wheel chocks

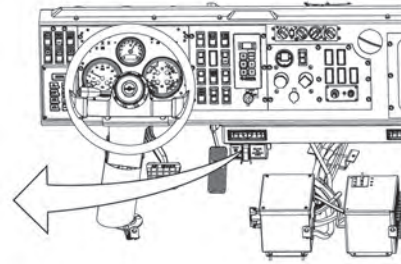
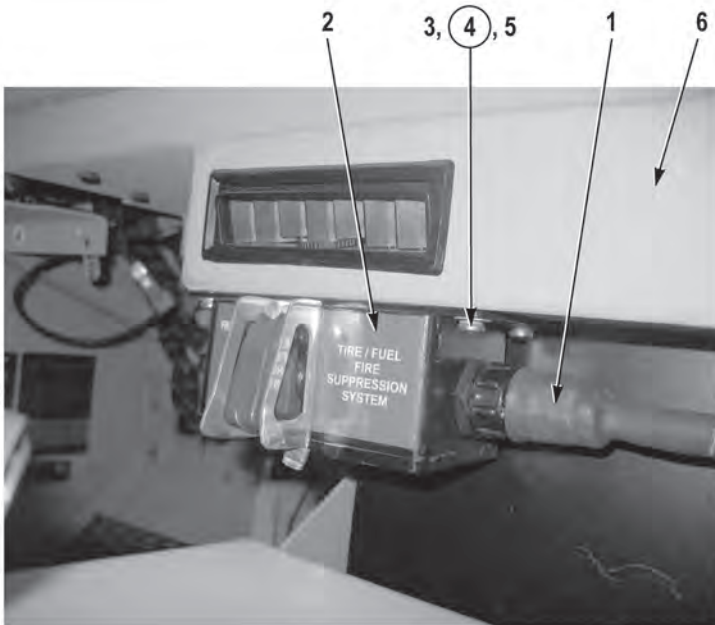
Tools and Special Tools

- Tool Kit, General Mechanic's: Automotive
-

REMOVAL

1. Disconnect connector (1) from switch (2).
2. Remove four screws (3), lockwashers (4), washers (5), and switch (2) from plenum (6). Discard lockwashers (4).

END OF TASK

INSTALLATION

1. Install switch (2) on plenum (6) with four washers (5), new lockwashers (4), and screws (3).
2. Connect connector (1) to switch (2).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

FIRE SUPPRESSION SYSTEM ACTUATION 4-WAY JUNCTION REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

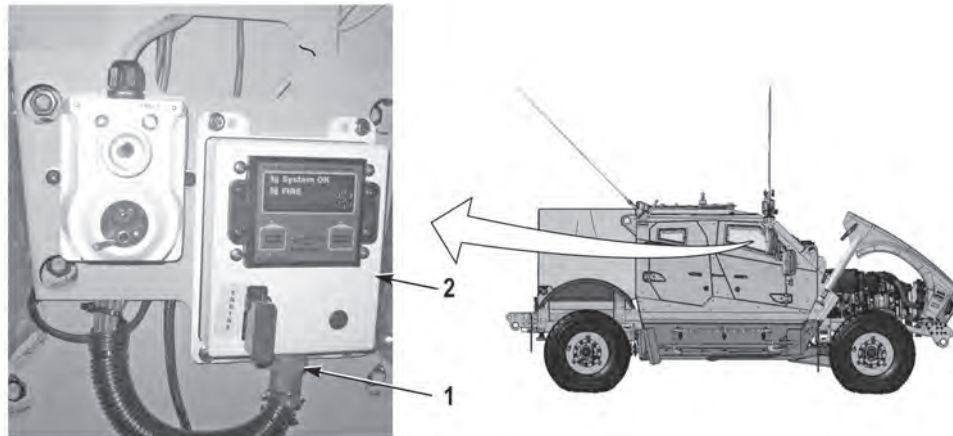
Tool Kit, General Mechanic's: Automotive

Materials/Parts

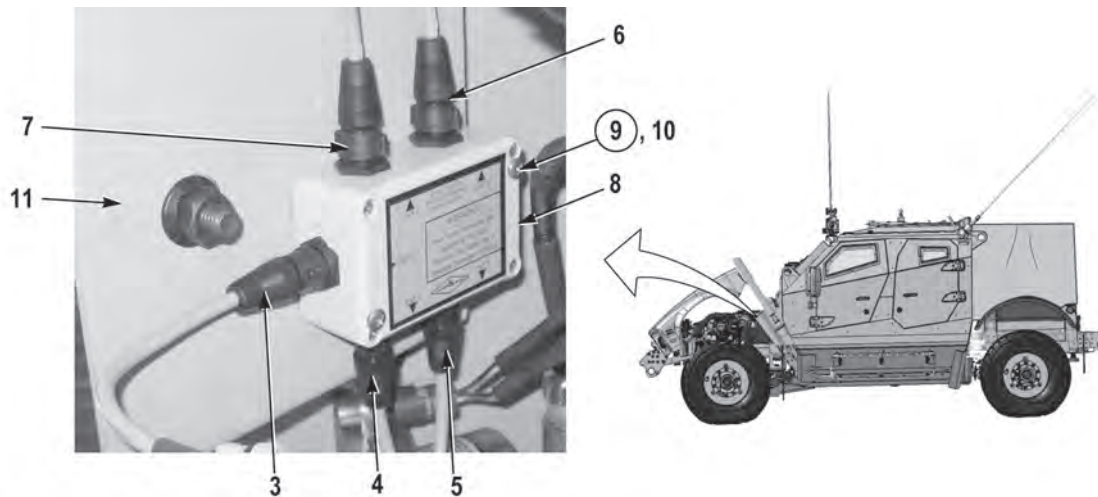
Locknut (2) (Item 9)
Lubricant, Connector, Nyogel 760G
Tags, Identification

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Close hood and secure
Remove and stow wheel chocks

REMOVAL

1. Disconnect connector (1) from fire suppression system control (2).

**NOTE**

Tag and mark wire connectors prior to removal to ensure proper installation.

2. Loosen and disconnect five connectors (3, 4, 5, 6, and 7) from actuation 4-way adapter (8).

NOTE

Note position of activation 4-way adapter prior to removal to ensure proper installation.

3. Remove two locknuts (9), screws (10), and activation 4-way adapter (8) from bracket (11). Discard locknuts (9).

END OF TASK**INSTALLATION****NOTE**

Install activation 4-way adapter as noted prior to removal.

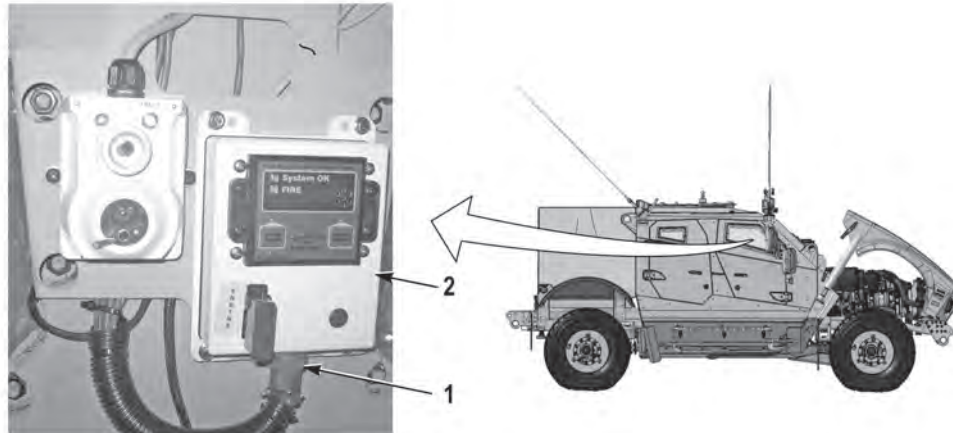
1. Install activation 4-way adapter (8) on bracket (11) with two screws (10) and new locknuts (9).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

- Use care when connecting connectors. Failure to comply may result in damage to equipment.
 - Ensure connectors are completely seated. Failure to comply may result in damage to equipment.
2. Apply connector lubricant, Nyogel 760G, to five connectors (7, 6, 5, 4, and 3).
 3. Connect and tighten five connectors (7, 6, 5, 4, and 3) to activation 4-way adapter (8).

**WARNING**

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply connector lubricant, Nyogel 760G, to connector (1).
5. Connect connector (1) to fire suppression system control (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CONTROL REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

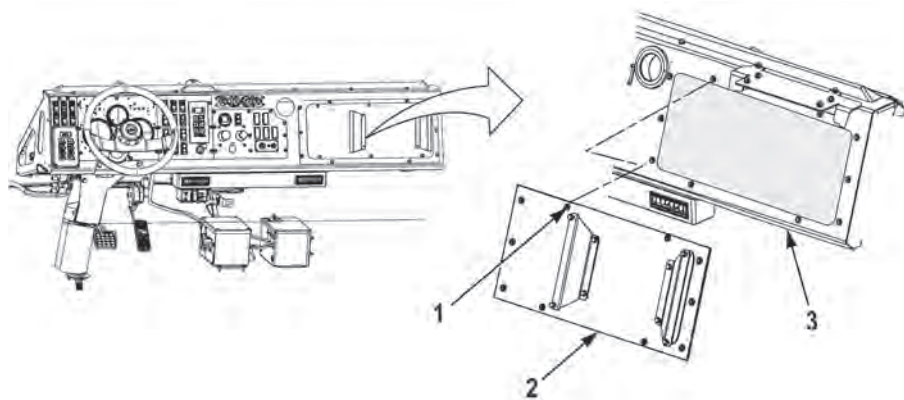
Tool Kit, General Mechanic's: Automotive

Materials/Parts

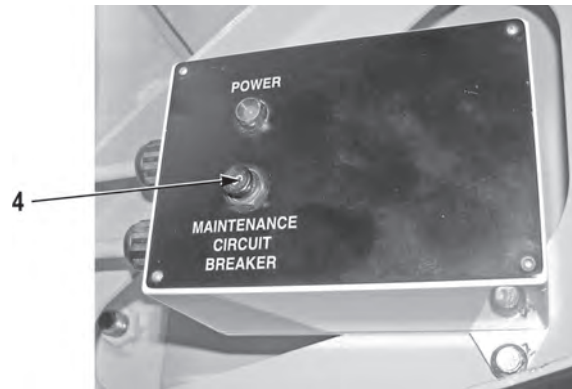
Lubricant, Connector, Nyogel 760G
Tags, Identification

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL

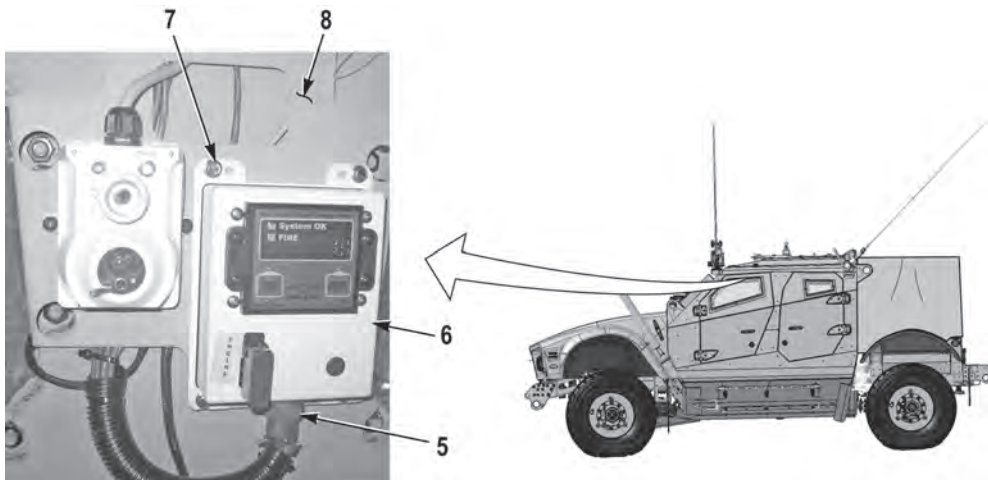
1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

2. Pull out circuit breaker (4).

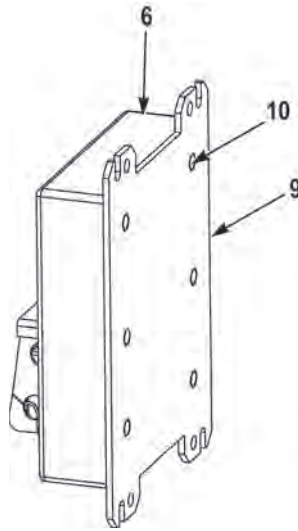


NOTE

Tag and mark wire connectors prior to removal to ensure proper installation.

3. Disconnect connector (5) from fire suppression system control (6).
4. Remove four screws (7) and fire suppression system control (6) from bracket (8).

END OF TASK

BATTERY INSPECTION**NOTE**

Rear cover may have a date sticker on it.

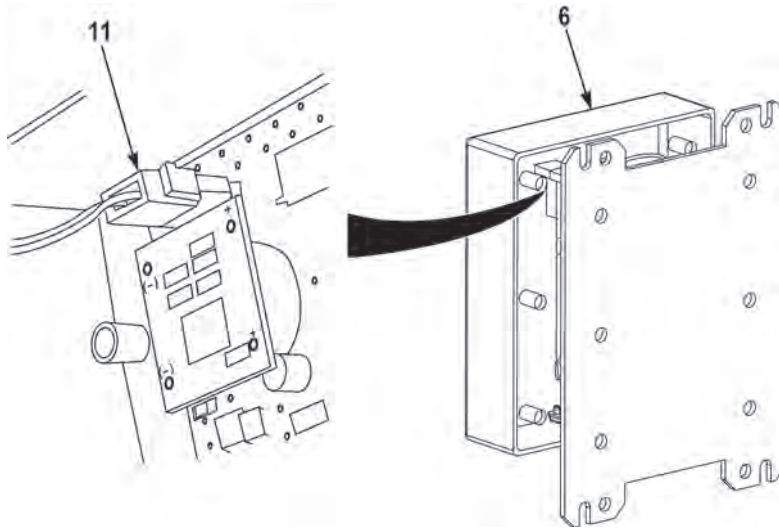
1. Inspect rear cover (9) for evidence of date sticker.

CAUTION

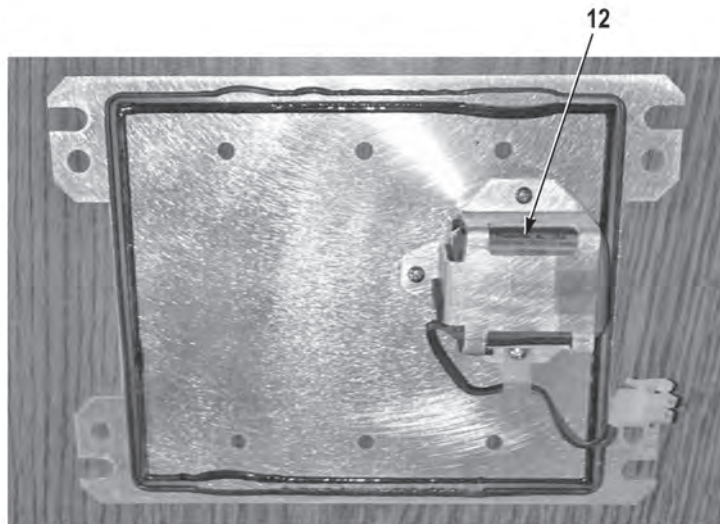
Do not open cover for farther than is required to disconnect connector. Failure to comply may result in damage to equipment.

NOTE

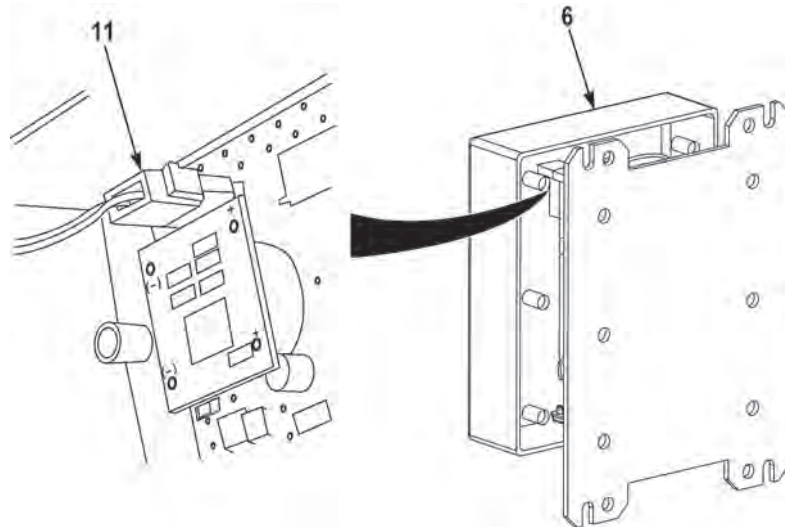
- Battery, cover, and seal come as an assembly.
 - Battery must be replaced after three years.
 - Perform Steps (2) through (6) if date sticker is not present or battery is over three years old.
2. Remove six screws (10) and rear cover (9) from fire suppression system control (6).



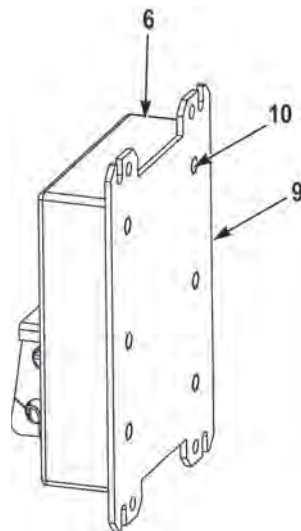
3. Disconnect connector (11) from fire suppression system control (6).



4. Inspect battery (12) for date and replace as required.



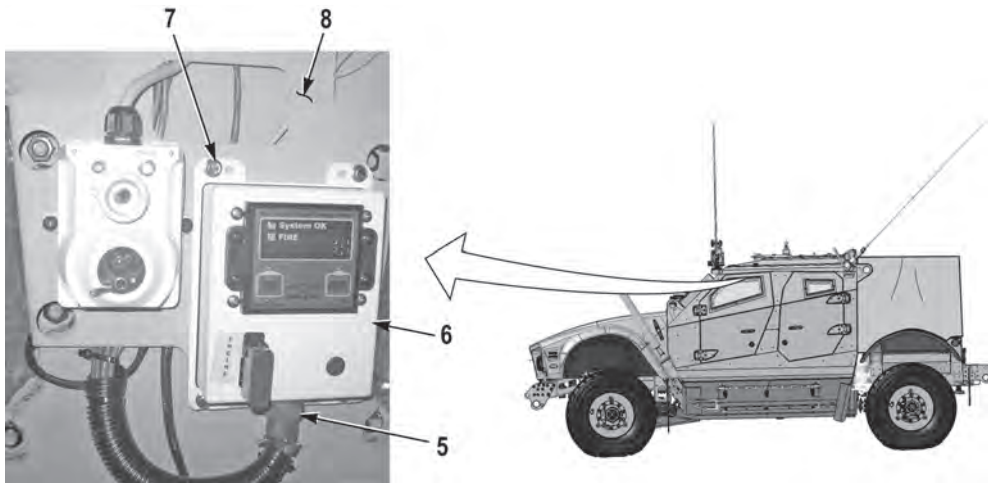
5. Connect connector (11) to fire suppression system control (6).



6. Install rear cover (9) on fire suppression system control (6) with six screws (10).

END OF TASK

INSTALLATION

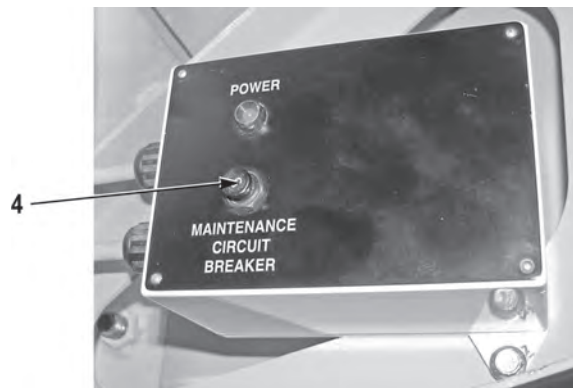


1. Install fire suppression system control (6) on bracket (8) with four screws (7).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

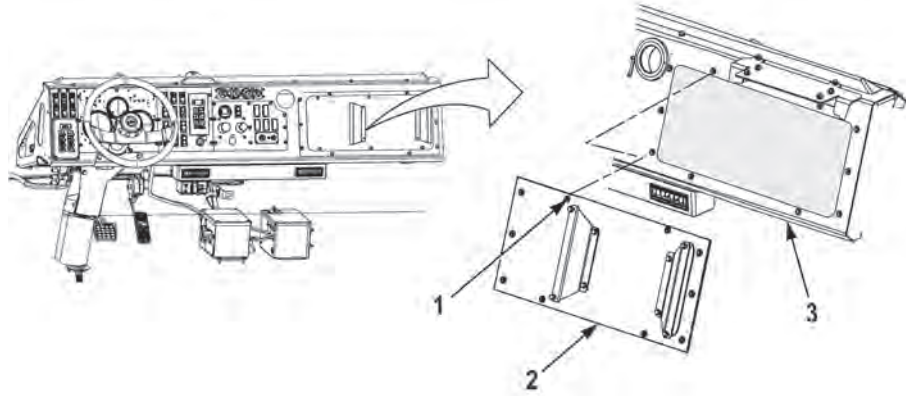
2. Apply connector lubricant, Nyogel 760G, to connector (5).
3. Connect connector (5) to fire suppression system control (6).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

4. Push and reset circuit breaker (4).



5. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CYLINDER REPLACEMENT, CAPSULE (PLATFORM MOUNT)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (WP 0186)

Materials/Parts

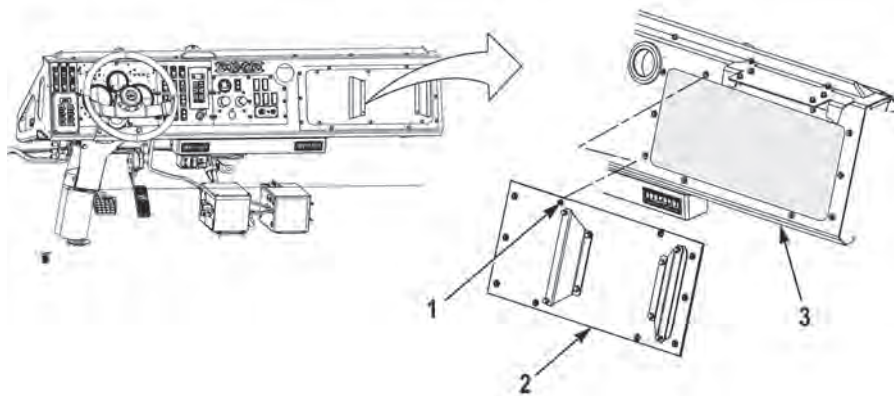
Locknut (2) (Item 9)

Follow-On Maintenance

Connect batteries (WP 0186)
Remove and stow wheel chocks

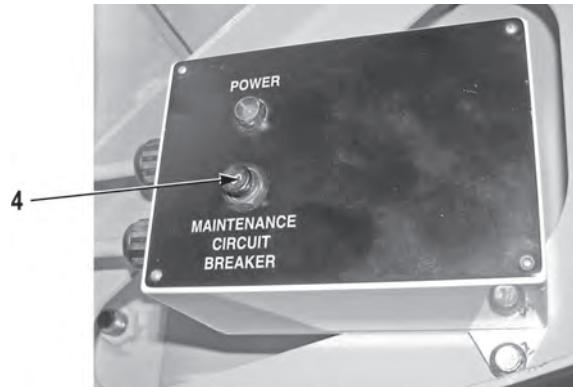
Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL**NOTE**

After discharge of the capsule fire suppression system, there will be a discharge disc from the cylinder blocking the nozzle/diffuser. This discharge disc must be removed to ensure proper operation of the capsule fire suppression system.

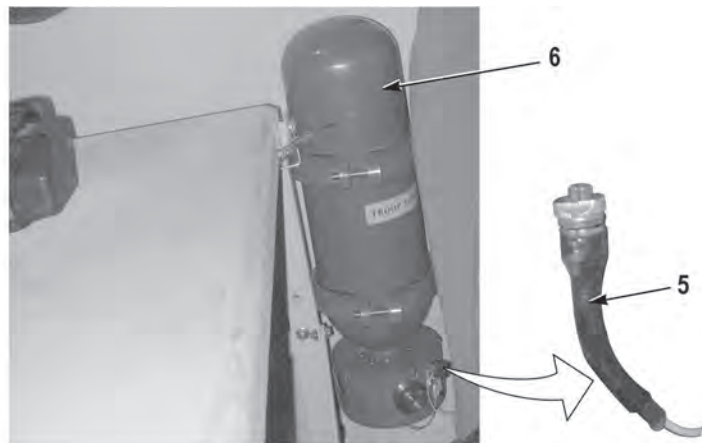
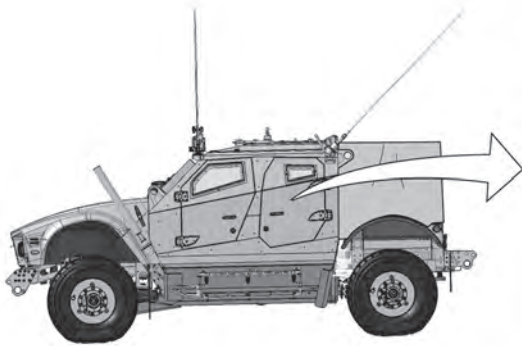
1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

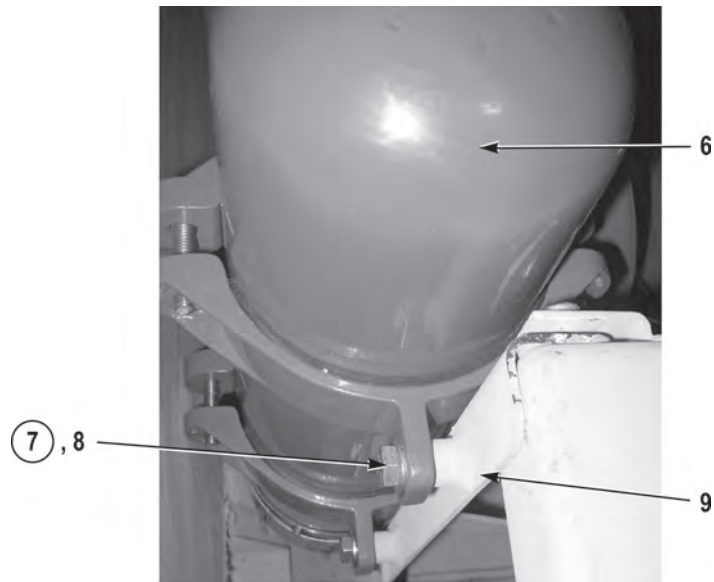
2. Pull out circuit breaker (4).



WARNING

Capsule interior fire suppression system activation rapidly releases highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinders. Failure to comply may result in injury to personnel.

3. Disconnect connector (5) from cylinder (6).



NOTE

Note position of cylinder prior to removal to ensure proper installation.

4. Remove two locknuts (7), screws (8), and cylinder (6) from gunner stand (9). Discard locknuts (7).

END OF TASK

INSTALLATION

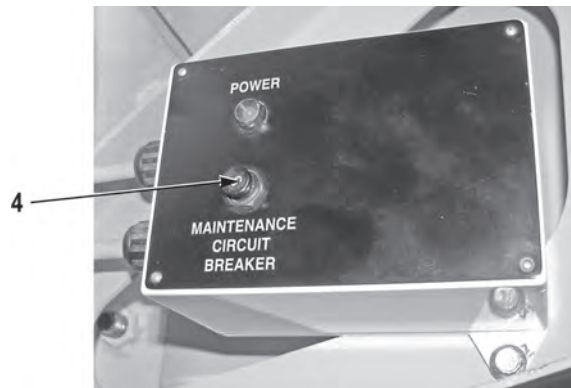
WARNING

Capsule interior fire suppression system activation rapidly releases highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinders. Failure to comply may result in injury to personnel.

NOTE

Install cylinder as noted prior to removal.

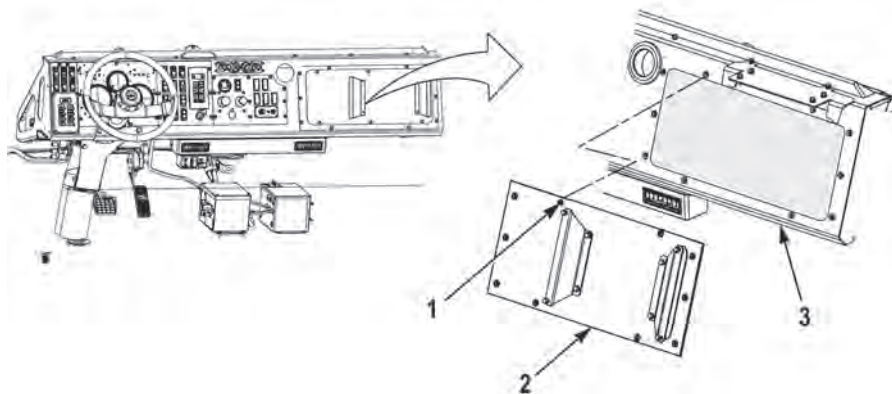
1. Install cylinder (6) on gunner stand (9) with two screws (8) and new locknuts (7).
2. Connect connector (5) to cylinder (6).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

3. Push and reset circuit breaker (4).



4. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CYLINDER REPLACEMENT, CAPSULE (WALL MOUNT)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)

Tools and Special Tools

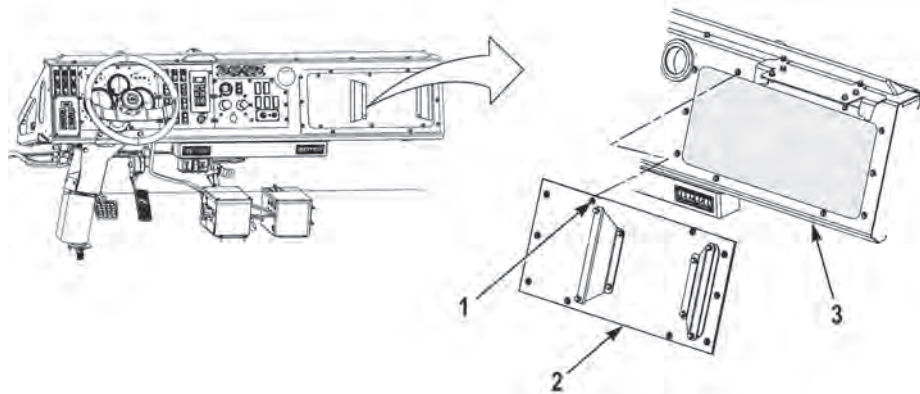
Scale, Weighing
Tool Kit, General Mechanic's: Automotive
Wrench, Adjustable, 0 to 3-5/8 Jaw

Materials/Parts

Fastener, Pushpin (2) (Item 17)
Compound, Sealing, Loctite 242
Fastener Tape, Hook and Pile

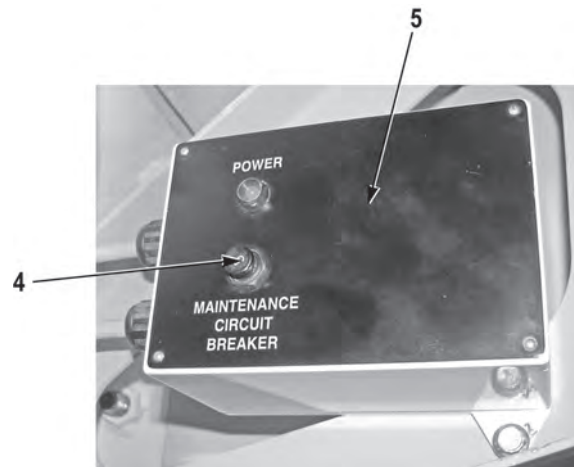
Follow-On Maintenance

Perform fire suppression systems testing
(WP 0075)
Connect batteries (M1240/M1240A1) (WP 0186)
Remove and stow wheel chocks

REMOVAL**NOTE**

After discharge of the capsule fire suppression system, there will be a discharge disc from the cylinder blocking the nozzle/diffuser. This discharge disc must be removed to ensure proper operation of the capsule fire suppression system.

1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).

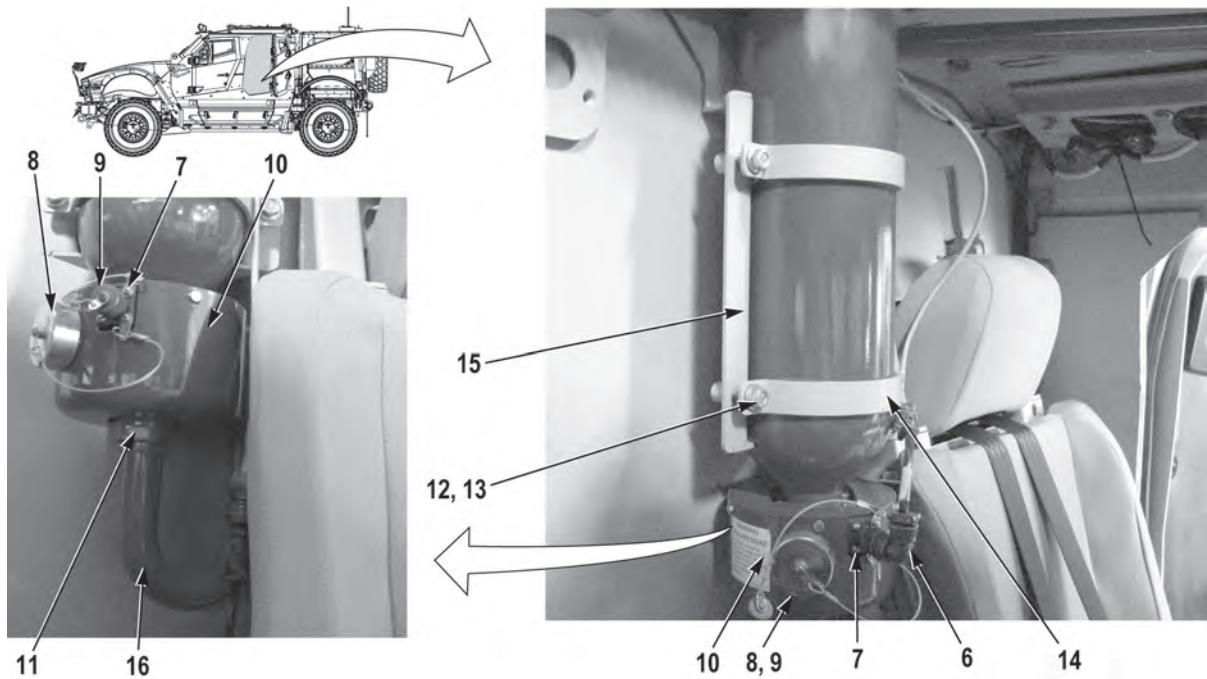


WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

NOTE

- Pull to open circuit breaker.
 - Push to close circuit breaker.
2. Open circuit breaker (4) on battery backup box (5).



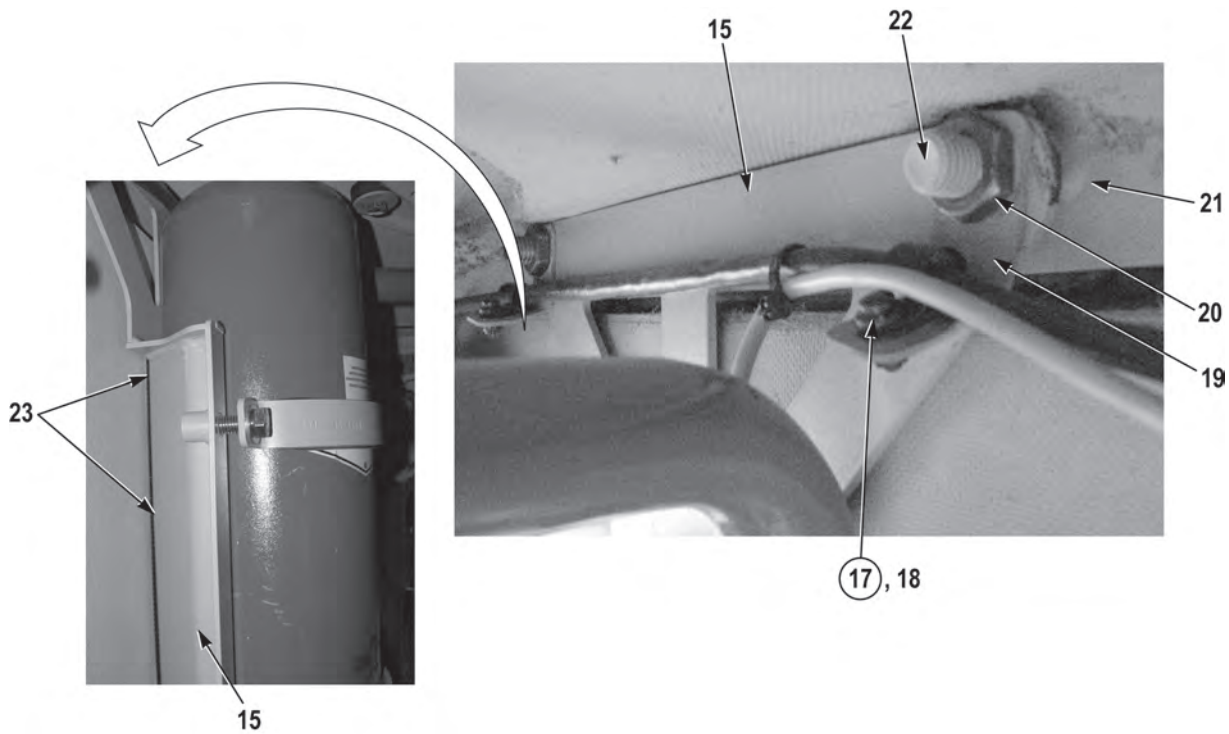
WARNING

Capsule interior fire suppression system activation rapidly releases highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinders. Failure to comply may result in injury to personnel.

NOTE

Note position of fire suppression cylinder assembly prior to removal to ensure proper installation.

3. Disconnect connector (6) from fire suppression cylinder assembly connector (7).
4. Remove large safety cap (8) and small safety cap (9) from fire suppression cylinder assembly (10).
5. Install small safety cap (9) on fire suppression cylinder assembly connector (7).
6. Install large safety cap (8) in its original position on fire suppression cylinder assembly (10).
7. Remove nut (11) from fire suppression cylinder assembly (10).
8. Remove four screws (12), washers (13), two brackets (14), and fire suppression cylinder assembly (10) from bracket (15) and tube (16).

**NOTE**

Perform Steps (9) and (10) if removing bracket.

9. Remove two pushpin fasteners (17) and cushion clips (18) from standoff brackets (19). Discard pushpin fasteners (17).

NOTE

Hook and pile fastener tape is used to secure cylinder bracket to capsule.

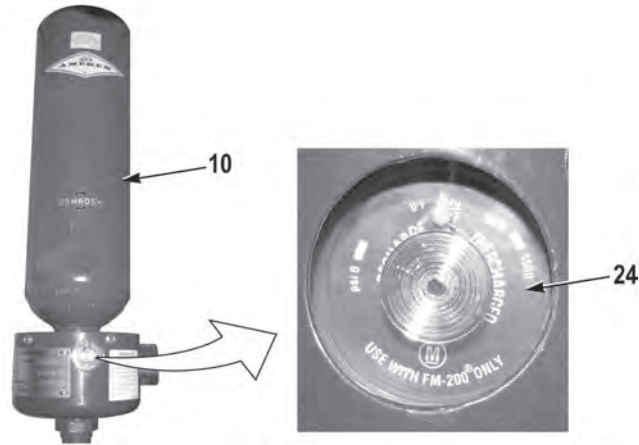
10. Remove two nuts (20), standoff brackets (19) and bracket (15) from capsule (21) and two screws (22).

NOTE

Note position of hook and fastener tape on bracket and capsule and remove as required.

11. Remove hook and pile fastener tape (23) from bracket (15) and capsule (21) as required.

END OF TASK

INSPECTION**NOTE**

Pressure gauge must be checked when ambient temperature is above 0°F (-17.8°C).

1. Check pressure gauge (24) on fire suppression cylinder assembly (10) to verify gauge indicator is in green range of gauge.

NOTE

- The scale used to weigh the cylinder must be capable of weighing to the nearest 0.01 kg, and must be properly calibrated.
 - Scale is part of refrigeration kit (SC 5180-90-CL-N18).
 - Ensure cylinder is free from dirt, debris, or anything that would impact weight of bottle prior to weighing.
2. Weigh fire suppression cylinder assembly (10) using electronic scale.
 3. Copy and utilize the MATV capsule fire suppression cylinder assembly inspection form, located on the next page, to determine if fire suppression cylinder assembly (10) meets minimum allowable weight.

Correction Factor Table	
Months Since Factory Fill	Correction Factor (Line B)
6-8	0.26
9-12	0.25
13-16	0.24
17-21	0.23
22-25	0.22
26-29	0.21
30-33	0.20
34-38	0.19
39-42	0.18
43-46	0.17
47-50	0.16
51-55	0.15
56-59	0.14
60-63	0.13
64-67	0.12
68-71	0.11

Date Inspected: _____
 Cylinder Serial Number (25): _____
 Scale Reading (with all Cylinder Attachments in Place): _____
 Date Filled (26): _____
 Number of Months Since Filled: _____

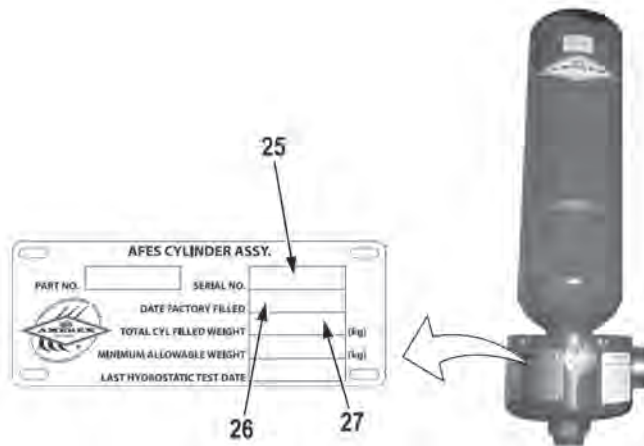
Minimum Allowable Weight Calculation

(To be compared to your Scale Reading, above)

- A) Weight (27): _____
- B) Correction Factor From Table: _____
- C) Minimum Allowable Weight (A + B): _____

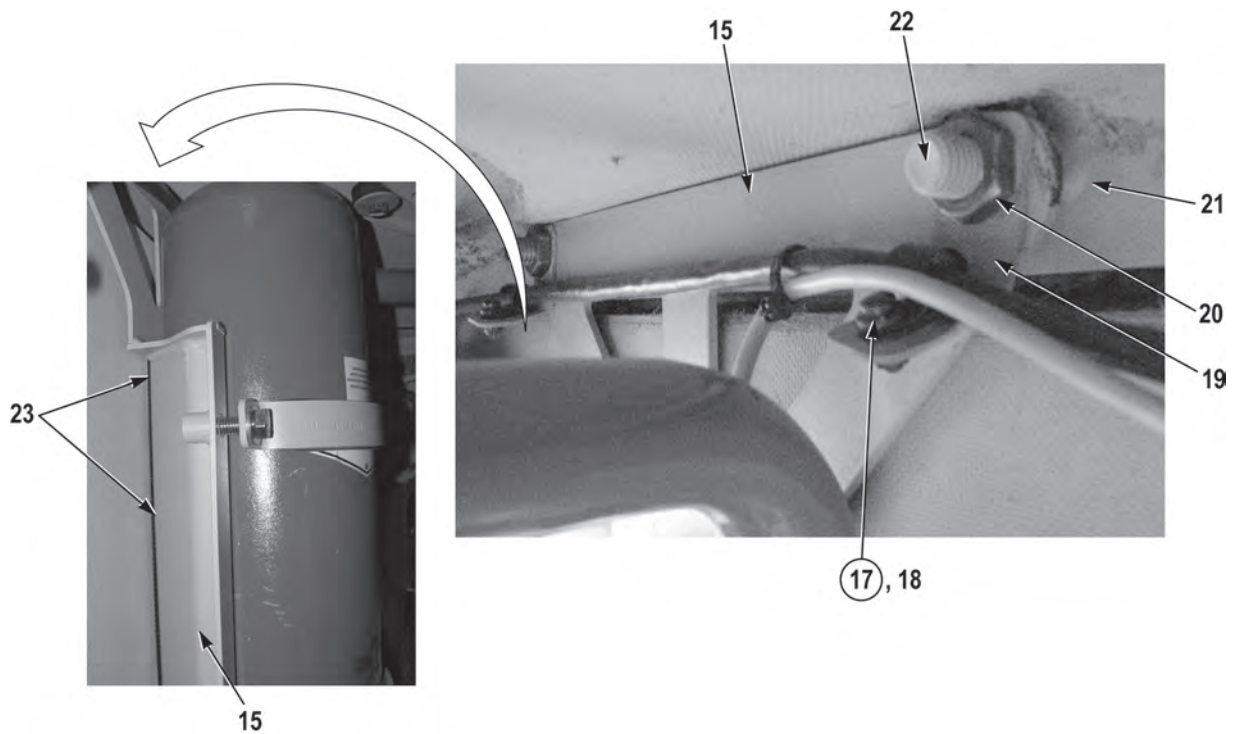
If your scale reading is less than "C", Cylinder must be replaced.

The correction factor is the weight added to the minimum allowable weight stamped on the nameplate to determine original factory fill weight minus the allowable loss for the number of months in service. This correction factor added to the nameplate weight is the minimum allowable weight based on the months the cylinder has been in service.



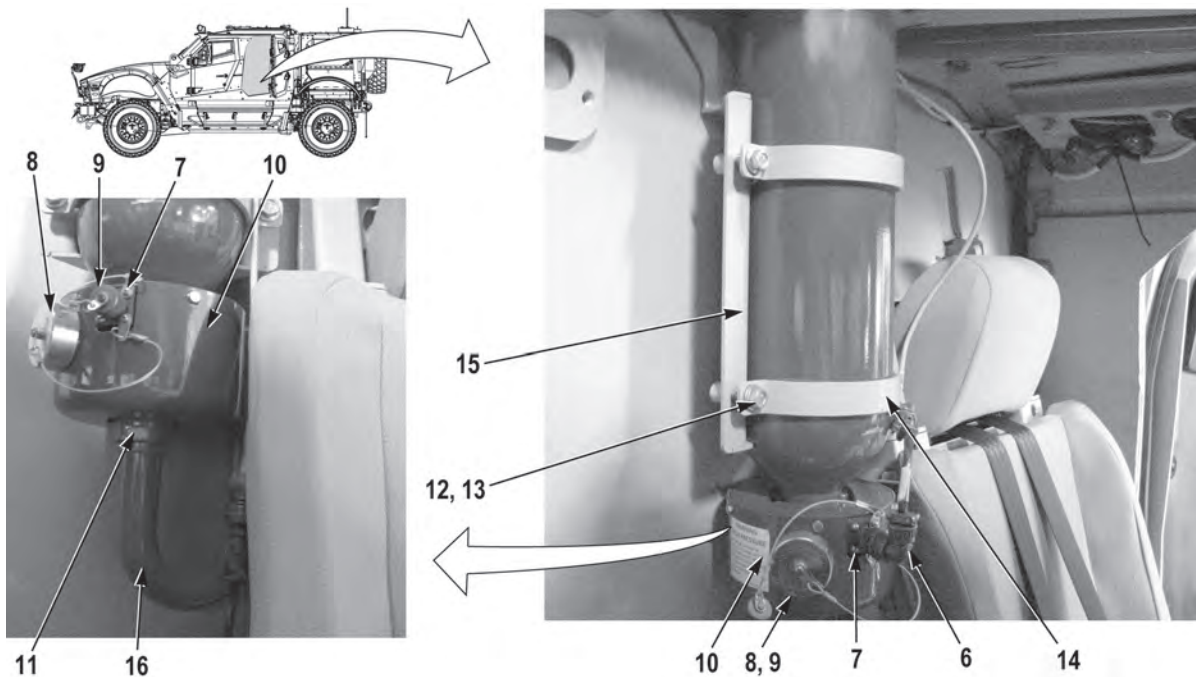
END OF TASK

INSTALLATION



NOTE

- Perform Step (1) if hook and pile fastener tape was removed.
 - Install hook and pile fastener tape in position noted during removal.
1. Install hook and pile fastener tape (23) on capsule (21) and bracket (15) as required.
 2. Install bracket (15) and two standoff brackets (19) on capsule (21) with two screws (22) and nuts (20).
 3. Install two cushion clips (18) on standoff brackets (19) with two new pushpin fasteners (17).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

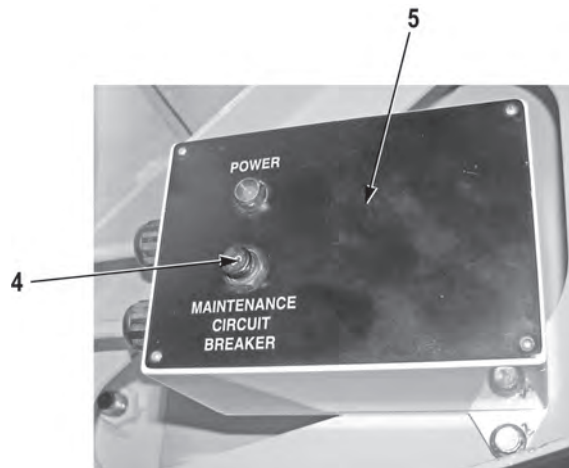
NOTE

- Install fire suppression cylinder assembly as noted prior to removal.
 - Tighten two brackets evenly and ensure they are centered.
4. Apply sealing compound, Loctite 242, to the threads of four screws (12) and position fire suppression cylinder assembly (10) on tube (16) and install fire suppression cylinder assembly (10) on bracket (15) with two brackets (14), four washers (13), and screws (12).
 5. Secure tube (16) on fire suppression cylinder assembly (7) with nut (11).
 6. Remove large safety cap (8) from fire suppression cylinder assembly (10).
 7. Remove small safety cap (9) from fire suppression cylinder assembly connector (7).
 8. Install small safety cap (9) and large safety cap (8) in stowed position on fire suppression cylinder assembly (10).

WARNING

Capsule interior fire suppression system activation rapidly release highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinder. Failure to comply may result in injury to personnel.

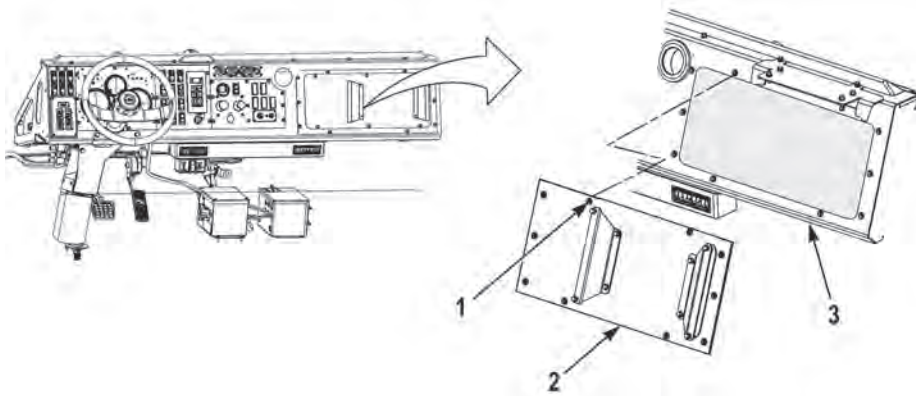
9. Connect connector (6) to fire suppression cylinder assembly connector (7).

**WARNING**

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

NOTE

- Pull to open circuit breaker.
 - Push to close circuit breaker.
10. Close circuit breaker (4) on battery backup box (5).



11. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).

12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CYLINDER REPLACEMENT, UNDERCARRIAGE (AFES NITROGEN DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Batteries disconnected (WP 0186)

Tools and Special Tools

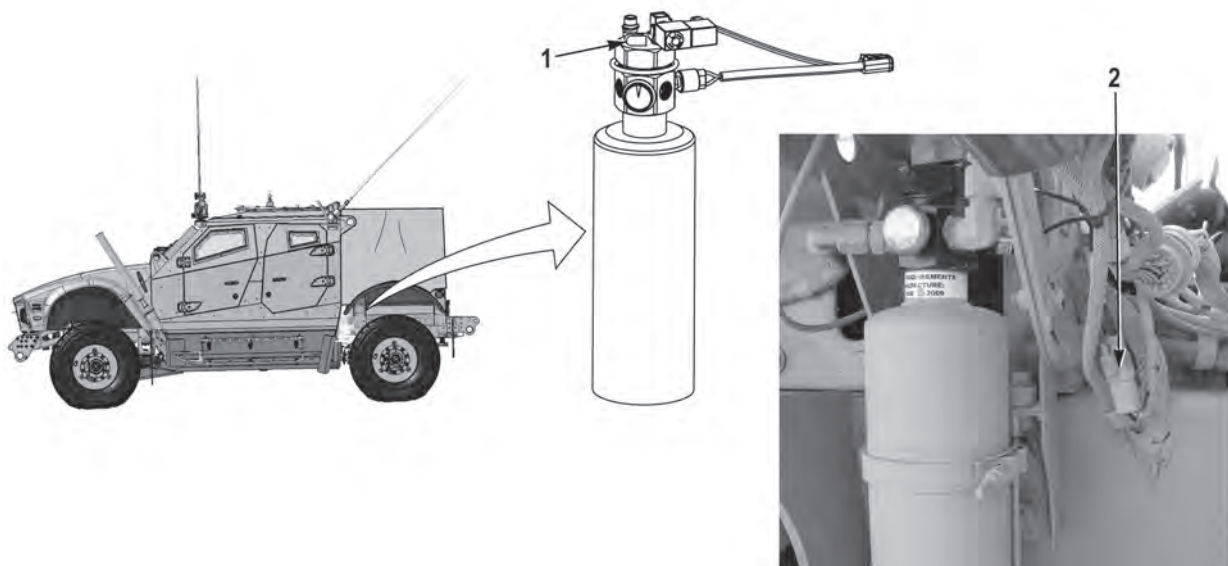
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 11)
 Locknut (2) (Item 14)
 Locknut (4) (Item 15)
 Lubricant, Connector, 760G

Follow-On Maintenance

Connect batteries (WP 0186)
 Close hood and secure
 Remove and stow wheel chocks

REAR FIRE SUPPRESSION CYLINDER REMOVAL**WARNING**

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

Driver side and passenger side fire suppression cylinders are removed the same way. Driver side shown.

1. Move valve (1) to OFF position.
2. Disconnect connector (2).

**NOTE**

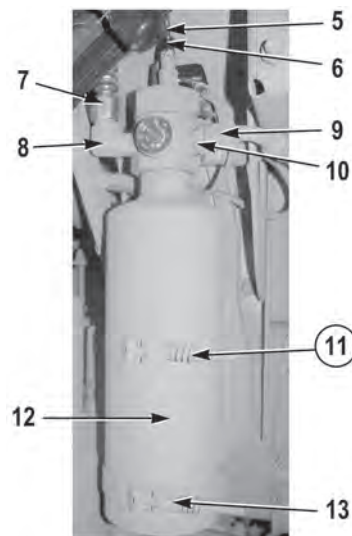
Pressure gauge is located on the passenger side.

3. Note reading on pressure gauge (3).

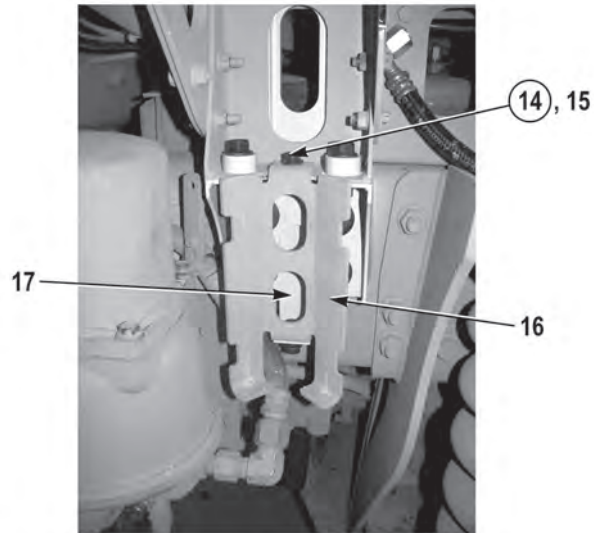
NOTE

If pressure is present in sensor lines perform Steps (4) and (5).

4. Remove pressure gauge (3) from sensor line fitting (4).
5. Drain pressure from sensor line fitting (4).



6. Remove sensor line (5) from fitting (6).
7. Remove hose (7) from fitting (8).
8. Remove hose (9) from fitting (10).
9. Remove two locknuts (11) and cylinder (12) from two clamps (13). Discard locknuts (11).



NOTE

Perform Step (10) if replacing bracket.

10. Remove two locknuts (14), screws (15), and bracket (16) from bracket (17). Discard locknuts (14).

END OF TASK

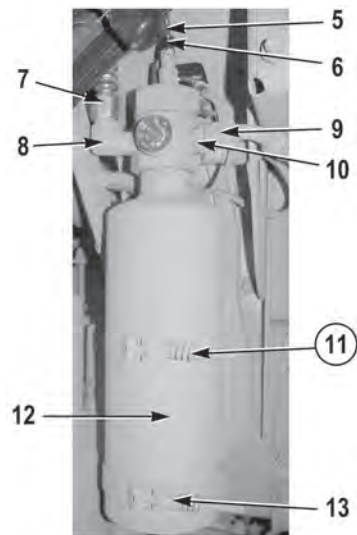
REAR FIRE SUPPRESSION CYLINDER INSTALLATION

WARNING

Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

- Driver side and passenger side fire suppression cylinders are installed the same way. Driver side shown.
 - Perform Step (1) if bracket was removed.
1. Install bracket (16) on bracket (17) with screws (15) and new locknuts (14).

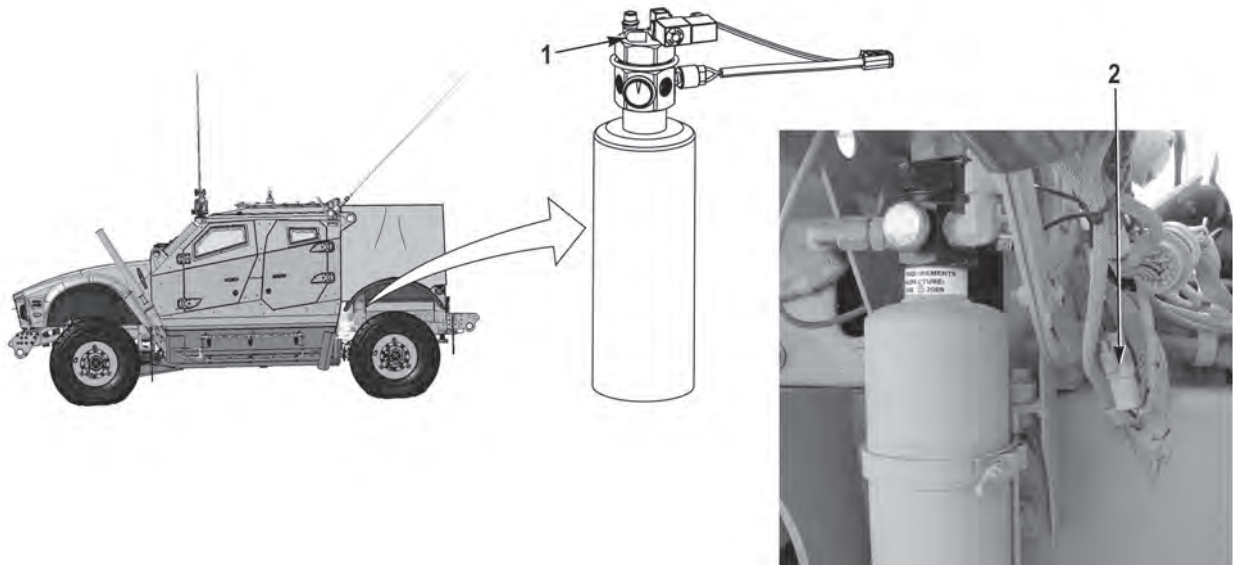


2. Install cylinder (12) on two clamps (13) with new locknuts (11).
3. Install hose (9) on fitting (10).
4. Install hose (7) on fitting (8).
5. Install sensor line (5) on fitting (6).



NOTE

- If pressure gauge was removed perform Step (6).
 - Pressure gauge is located on passenger side.
6. Install pressure gauge (3) on sensor line fitting (4).

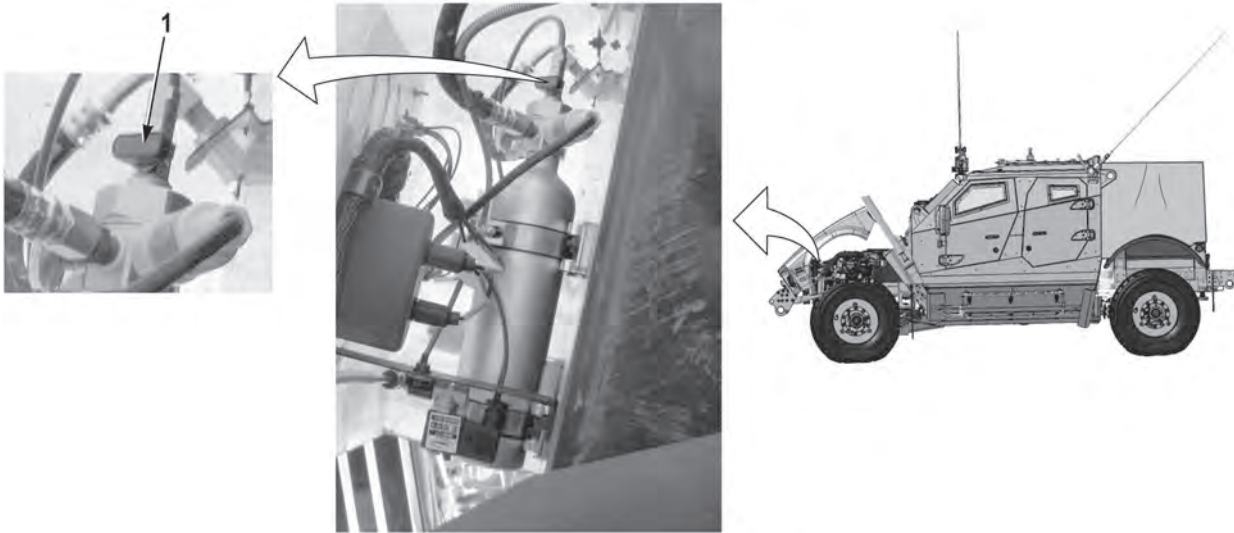


WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply connector lubricant, Nyogel 760G, to connector (2).
8. Connect connector (2).
9. Ensure valve (1) remains in OFF position.
10. Replace any damaged sensor lines and/or charge sensor line system with nitrogen (WP 0074).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

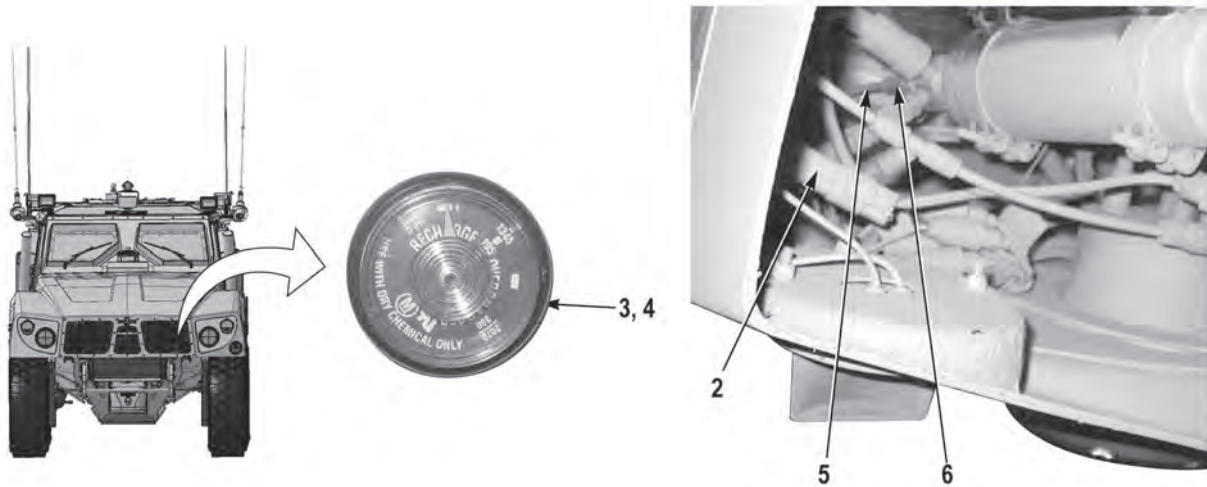
FRONT FIRE SUPPRESSION CYLINDER REMOVAL**WARNING**

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

Driver side and passenger side fire suppression cylinders are removed the same way. Driver side shown.

1. Move valve (1) to OFF position.



2. Disconnect connector (2).

NOTE

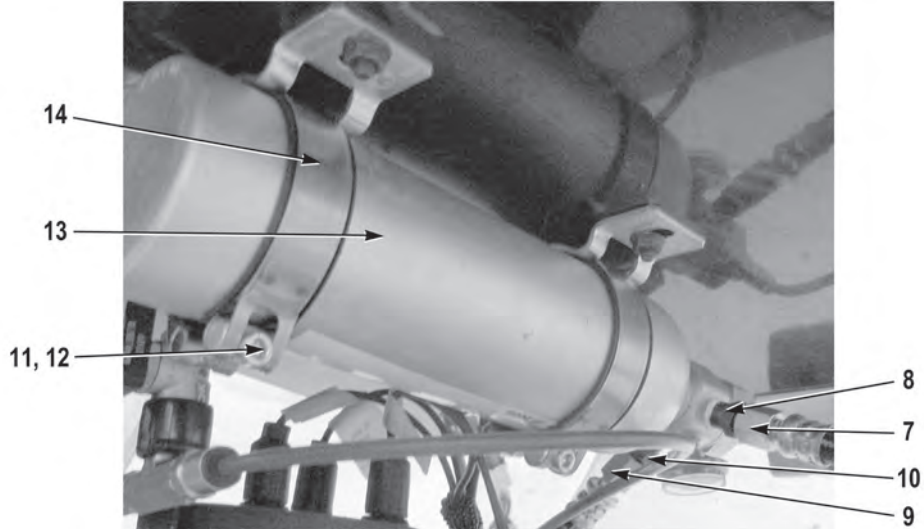
Pressure gauge is on driver side.

3. Note reading on pressure gauge (3).

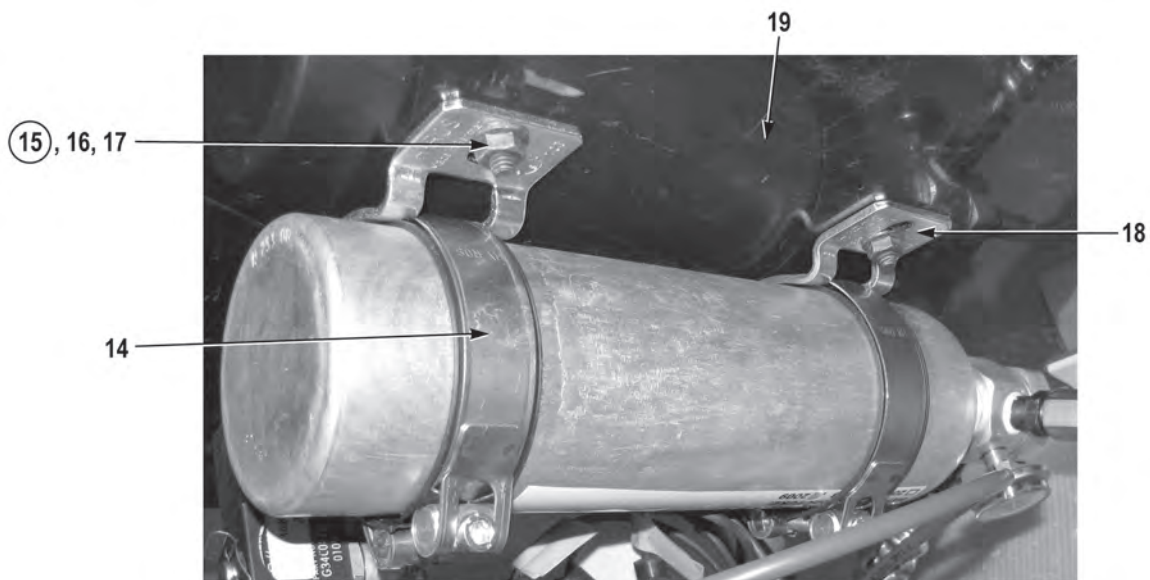
NOTE

If pressure is present in sensor lines perform Steps (4) and (5).

4. Remove pressure gauge (3) from sensor line fitting (4).
5. Drain pressure from sensor line fitting (4).
6. Remove sensor line (5) from fitting (6).



7. Remove hose (7) from fitting (8).
8. Remove hose (9) from fitting (10).
9. Remove two nuts (11), screws (12), and cylinder (13) from two clamps (14).



NOTE

Perform Step (10) if brackets need to be removed.

10. Remove four locknuts (15), screws (16), washers (17), two clamps (14), and two brackets (18) from splash guard (19). Discard locknuts (15).

END OF TASK

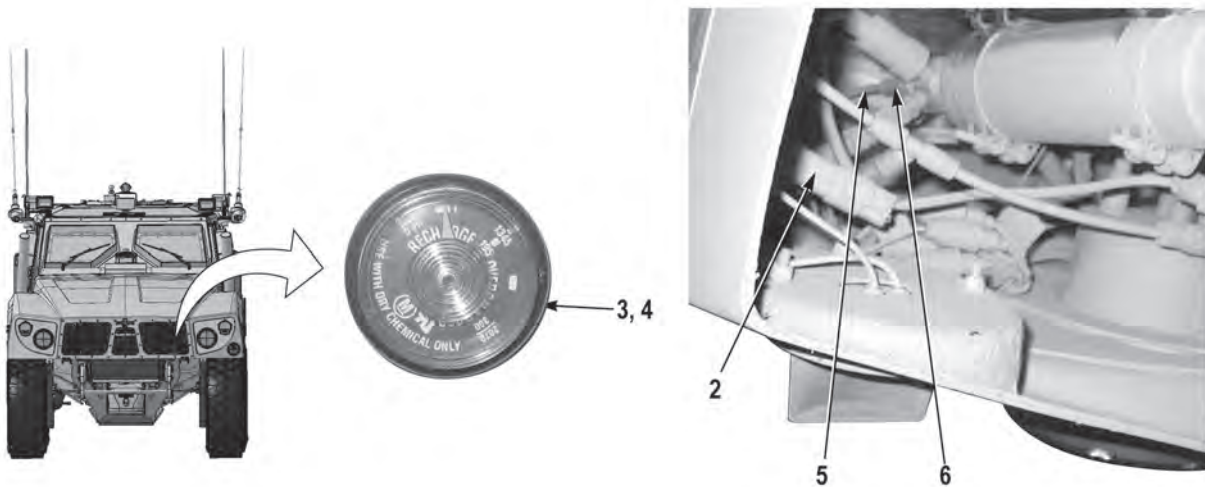
FRONT FIRE SUPPRESSION CYLINDER INSTALLATION

WARNING

Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

- Driver side and passenger side fire suppression cylinders are installed the same way. Driver side shown.
 - Perform Step (1) if brackets were removed.
1. Install two brackets (18) and clamps (14) on splash guard (19) with four washers (17), screws (16), and new locknuts (15).
 2. Install cylinder (13) on two clamps (14) with two screws (12) and nuts (11).
 3. Install hose (9) on fitting (10).
 4. Install hose (7) on fitting (8).



5. Install sensor line (5) on fitting (6).

NOTE

If pressure gauge was removed perform Step (6).

6. Install pressure gauge (3) on sensor line fitting (4).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

7. Apply connector lubricant, Nyogel 760G, to connector (2).
8. Connect connector (2).



9. Ensure valve (1) remains in the OFF position.
10. Replace any damaged sensor lines and/or charge sensor line system with nitrogen (WP 0074).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM CYLINDER REPLACEMENT, UNDERCARRIAGE (AFES LINEAR WIRE DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood raised and secured
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

Cap and Plug Set
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 0 to 300 in-lb

Materials/Parts

Locknut (4) (Item 10)
 Locknut (Item 13)
 Locknut (4) (Item 17)

Materials/Parts (Continued)

Locknut (4) (Item 28)
 Locknut (6) (Item 43)
 Locknut (2) (Item 46)
 Locknut (2) (Item 50)
 Tags, Identification
 Ties, Cable

Follow-On Maintenance

Perform fire suppression systems testing
 (WP 0075)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks
 Lower hood and secure

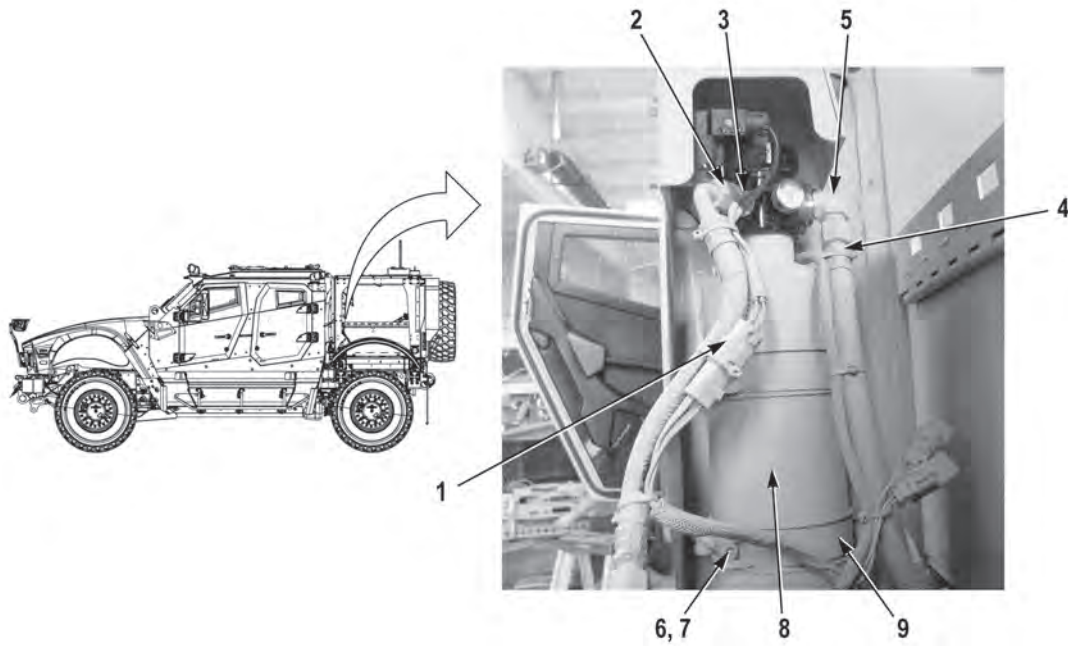
REAR FIRE SUPPRESSION CYLINDER REMOVAL

WARNING

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure batteries are disconnected. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

- Driver side and passenger side rear fire suppression cylinders, clamps, and covers are removed the same way. Driver side shown.
- Tag and mark connectors prior to removal to ensure proper installation.
- Remove cable ties as required.

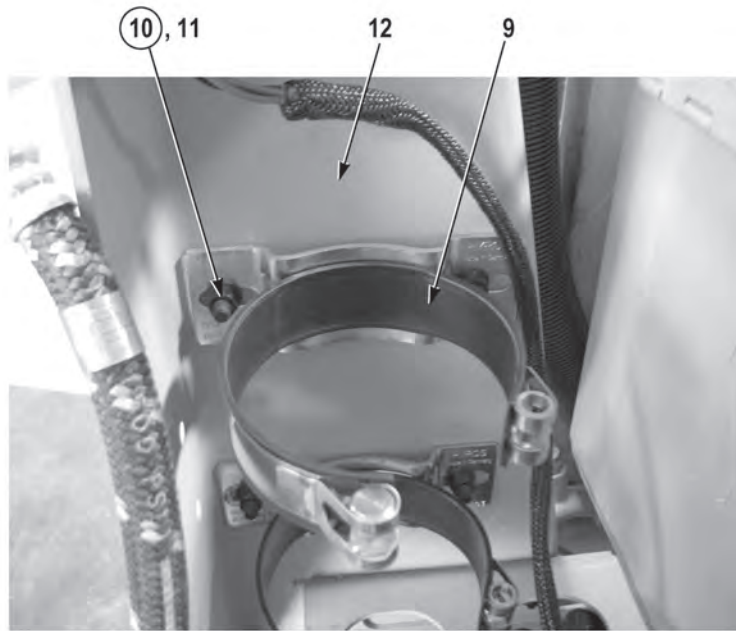


1. Disconnect connector (1).

NOTE

Cap and plug hoses and fittings upon removal.

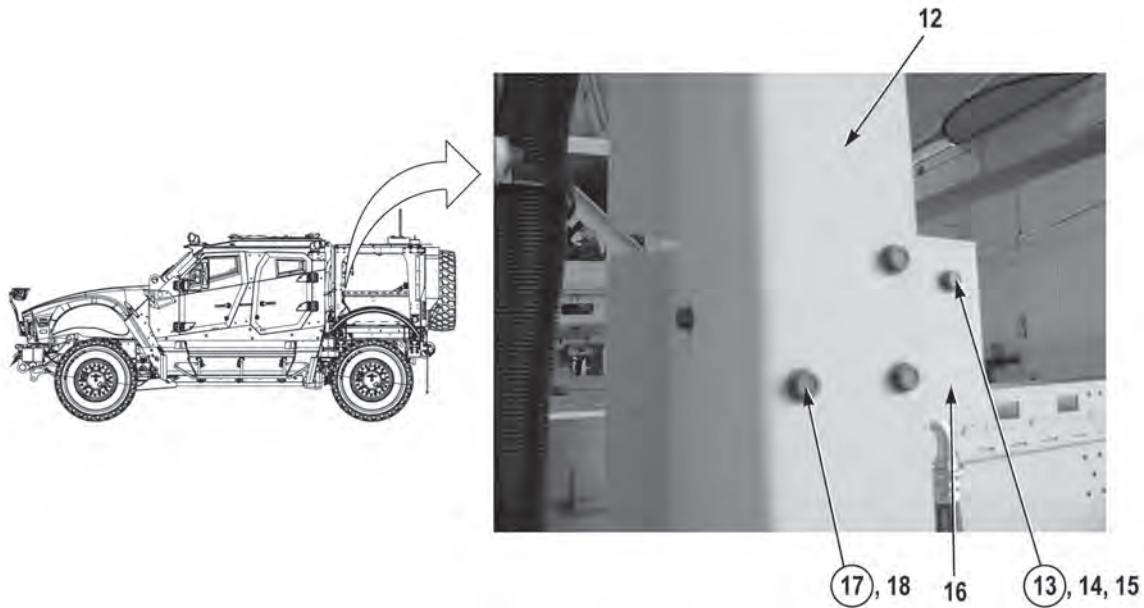
2. Remove hose (2) from fitting (3).
3. Remove hose (4) from fitting (5).
4. Remove two screws (6), nuts (7), and cylinder (8) from two brackets (9).



NOTE

Perform Step (5) if brackets need to be removed.

5. Remove four locknuts (10), screws (11), and two brackets (9) from antenna platform (12). Discard locknuts (10).



NOTE

Perform Steps (6) and (7) if cover needs to be removed.

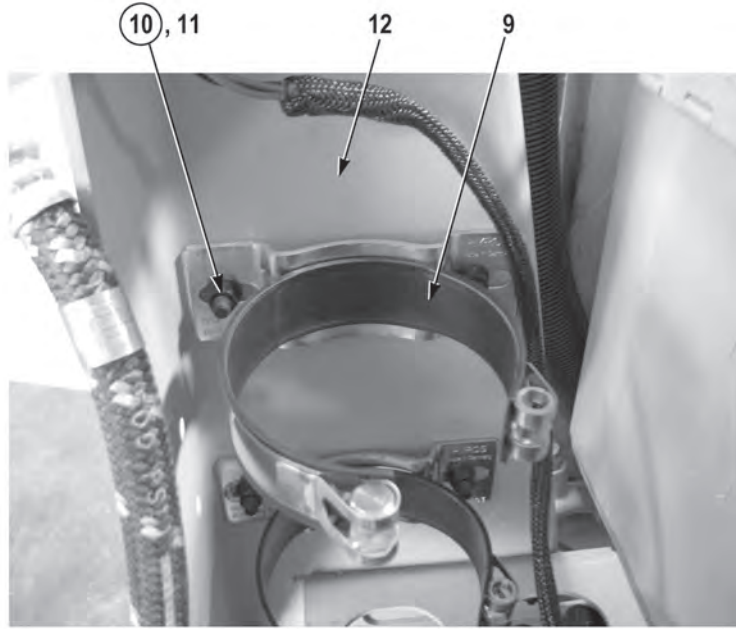
6. Remove locknut (13), screw (14), and connector (15) from cover (16). Discard locknut (13).
7. Remove four locknuts (17), screws (18), and cover (16) from antenna platform (12). Discard locknuts (17).

END OF TASK

REAR FIRE SUPPRESSION CYLINDER INSTALLATION

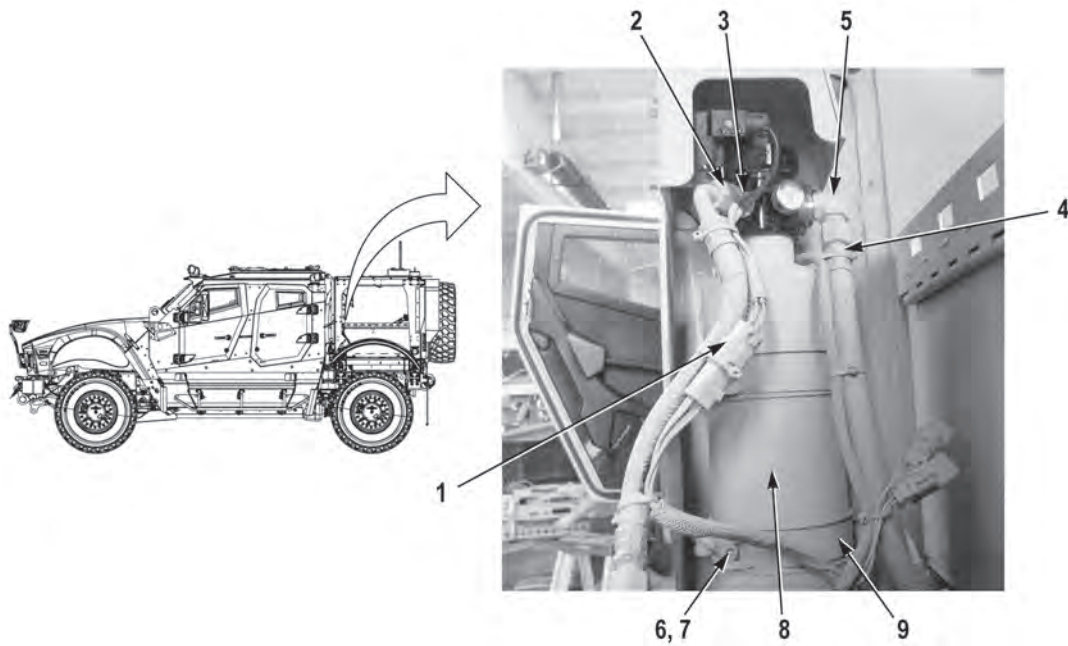
NOTE

- Driver side and passenger side rear fire suppression cylinders, clamps, and covers are installed the same way. Driver side shown.
 - Perform Steps (1) and (2) if cover was removed.
1. Install cover (16) on antenna platform (12) with four screws (18) and new locknuts (17).
 2. Install connector (15) on cover (16) with screw (14) and new locknut (13).

**NOTE**

Perform Step (3) if brackets were removed.

3. Install two brackets (9) on antenna platform (12) with four screws (11) and new locknuts (10). Tighten locknuts (10) to 151 lb-in (17 N•m).



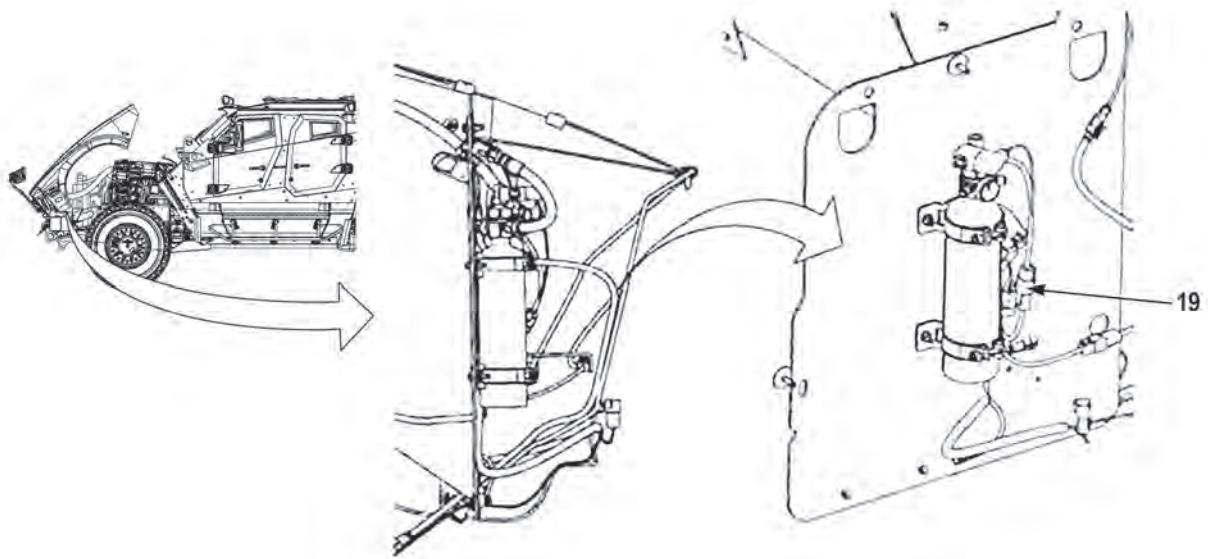
4. Install cylinder (8) on two brackets (9) with two nuts (7) and screws (6). Do not tighten nuts (7).
5. Install hose (4) on fitting (5).
6. Install hose (2) on fitting (3).

NOTE

Install cable ties as required.

7. Connect connector (1).
8. Tighten nuts (7).

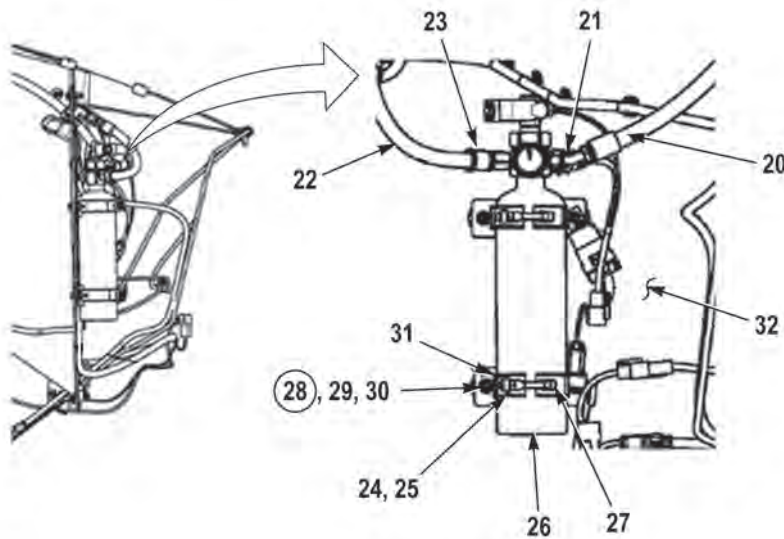
END OF TASK

FRONT SPLASH GUARD FIRE SUPPRESSION CYLINDER REMOVAL**WARNING**

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure batteries are disconnected. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

- Driver side and passenger side front splash guard fire suppression cylinders are removed the same way. Driver side shown.
 - Tag and mark connectors prior to removal to ensure proper installation.
1. Disconnect connector (19).

**NOTE**

Cap and plug hoses and fittings upon removal.

2. Remove hose (20) from fitting (21).
3. Remove hose (22) from fitting (23).
4. Remove two screws (24), nuts (25), and cylinder (26) from two clamps (27).

NOTE

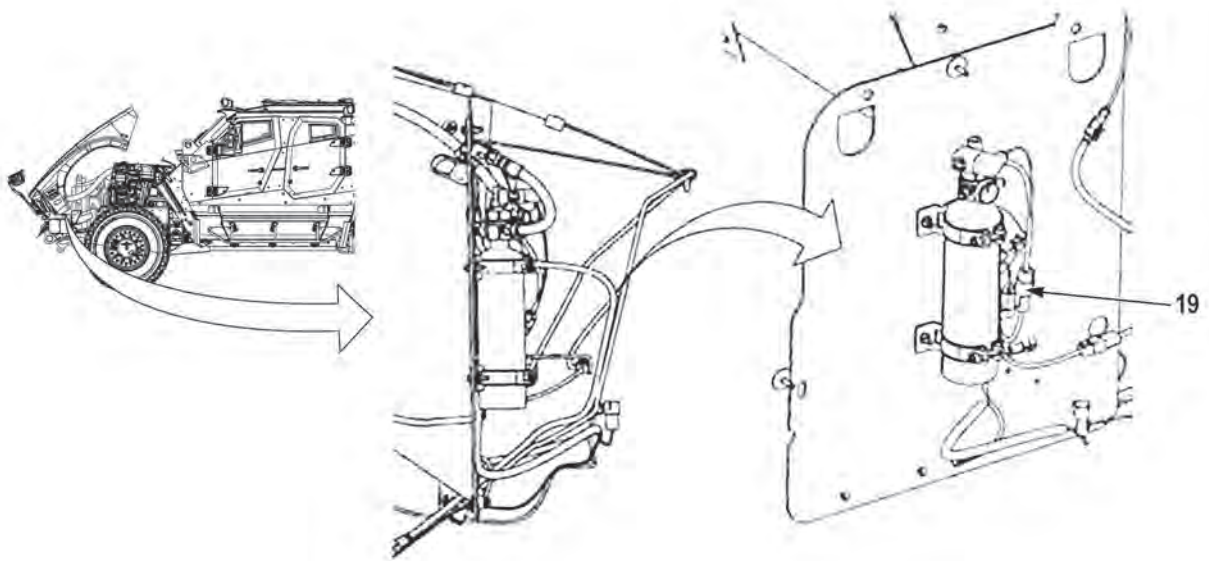
Perform Step (5) if removing clamps and brackets.

5. Remove four locknuts (28), screws (29), washers (30), two clamps (27), and brackets (31) from splash guard (32). Discard locknuts (28).

END OF TASK**INSTALLATION****NOTE**

- Driver side and passenger side front splash guard fire suppression cylinders are installed the same way. Driver side shown.
- Perform Step (1) if brackets were removed.

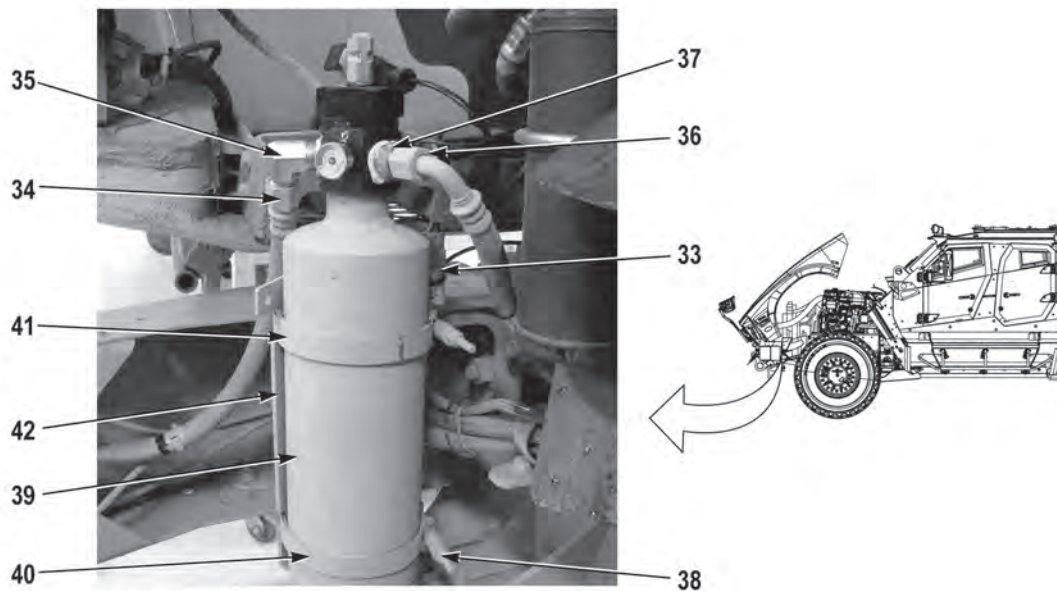
1. Install two brackets (31) and clamps (27) on splash guard (32) with four washers (30), screws (29), and new locknuts (28).
2. Install cylinder (26) on two clamps (27) with two nuts (25) and screws (24).
3. Install hose (22) on fitting (23).
4. Install hose (20) on fitting (21).



5. Connect connector (19).

END OF TASK

FRONT BUMPER FIRE SUPPRESSION CYLINDERS REMOVAL

**WARNING**

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure batteries are disconnected. Failure to comply may result in discharge of cylinder or injury to personnel.

NOTE

- Driver side and passenger side front bumper fire suppression cylinders are removed the same way. Driver side shown.
- Tag and mark connector prior to removal to ensure proper installation.

1. Disconnect connector (33).

NOTE

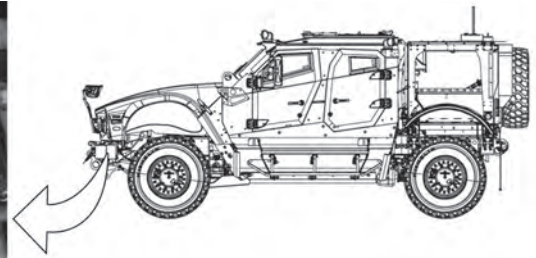
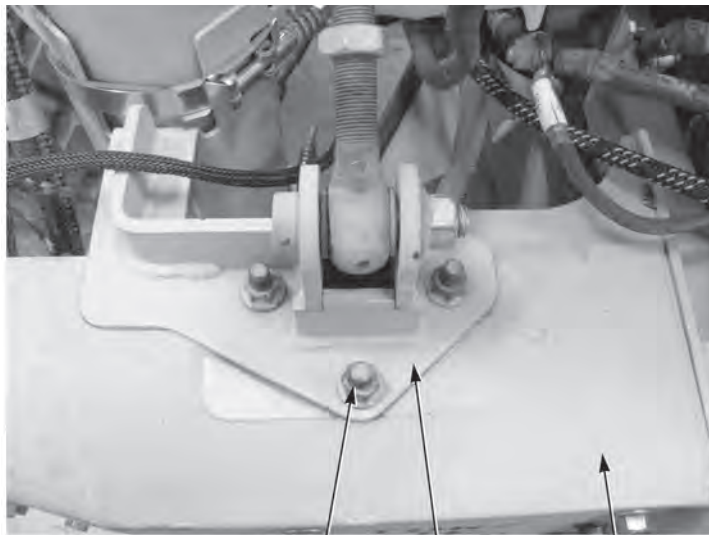
Cap and plug hoses and fittings upon removal.

2. Remove hose (34) from fitting (35).
3. Remove hose (36) from fitting (37).
4. Loosen two nuts (38) and remove cylinder (39) from clamp (40), clamp (41), and bracket (42).
5. Remove clamp (41) from bracket (42).

NOTE

Perform Steps (6) through (10) if clamp and brackets need to be removed.

6. Remove hood (WP 0157).



43, 44 42 45

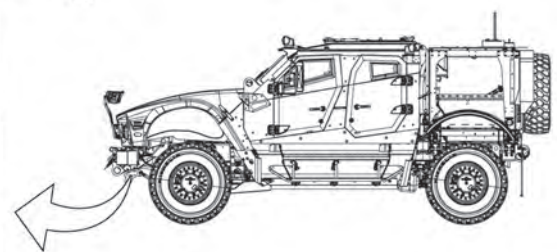
NOTE

Match mark hood brackets prior to removal to ensure proper installation.

7. Remove three locknuts (43) and screws (44) from bracket (42) and bumper (45). Discard locknuts (43).



40
42

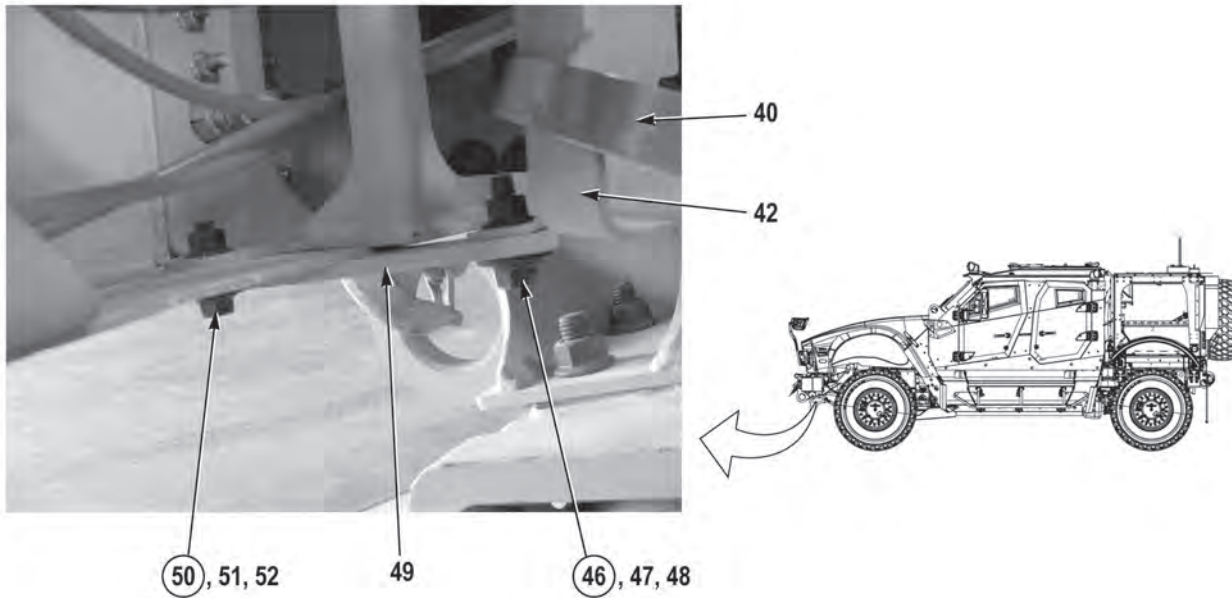


50, 51, 52 49 46, 47, 48

8. Remove locknut (46), screw (47), washer (48), and bracket (42) from bracket (49). Discard locknut (46).
9. Remove clamp (40) from bracket (42).
10. Remove locknut (50), screw (51), washer (52), and bracket (49) from bumper (45). Discard locknut (50).

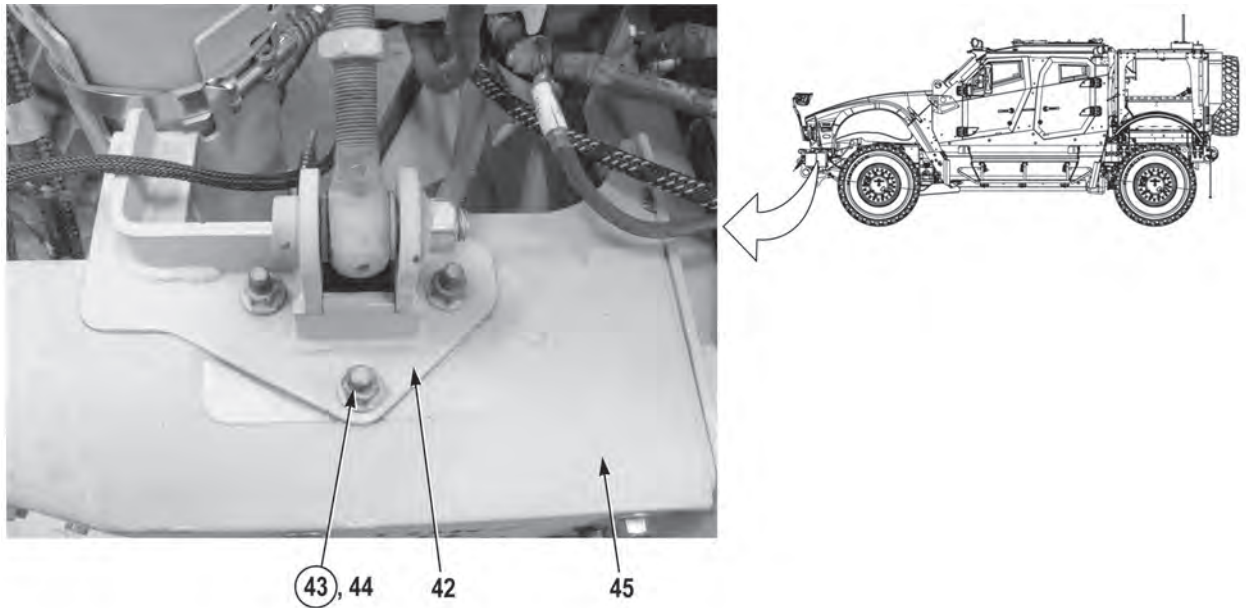
END OF TASK

FRONT BUMPER FIRE SUPPRESSION CYLINDERS INSTALLATION

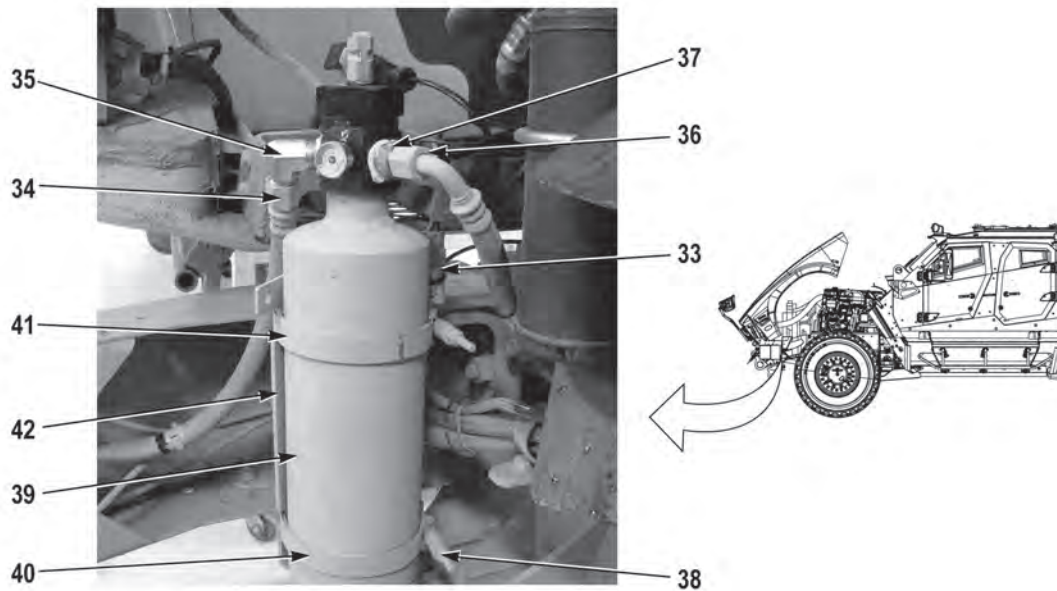


NOTE

- Driver side and passenger side front bumper fire suppression cylinders are installed the same way. Driver side shown.
 - Perform Steps (1) through (4) if clamp and brackets were removed.
1. Install bracket (49) on bumper (45) with washer (52), screw (51), and new locknut (50). Do not tighten locknut (50).
 2. Position clamp (40) on bracket (42).
 3. Install bracket (42) on bracket (49) with washer (48), screw (47), and new locknut (46). Do not tighten locknut (46).



4. Secure bracket (42) on bumper (45) with three screws (44) and new locknuts (43).
5. Tighten locknut (50) and locknut (46).



6. Position clamp (41) on bracket (42).
7. Install hood (WP 0157).
8. Install cylinder (39) on bracket (42) with clamp (41) and clamp (40).
9. Install hose (36) on fitting (37).
10. Install hose (34) on fitting (35).
11. Tighten two nuts (38) to 100 lb-in (11.3 N•m).
12. Connect connector (33).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM FRONT OPTICAL SENSOR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Materials/Parts

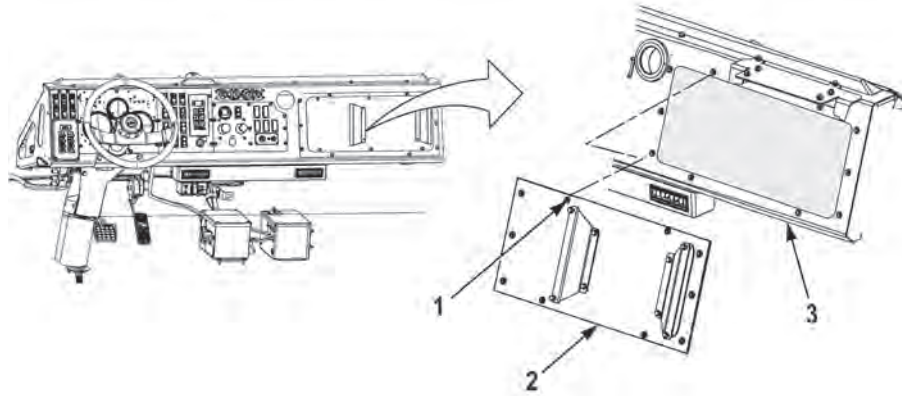
Tags, Identification

Follow-On Maintenance

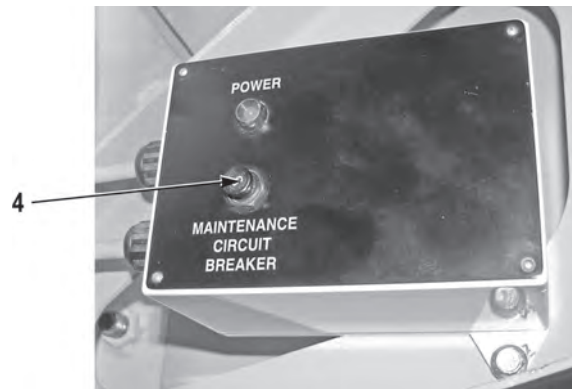
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL

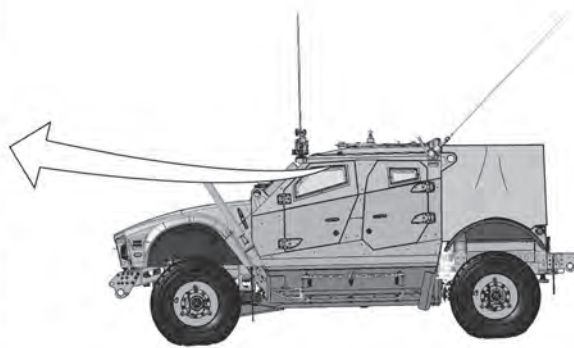
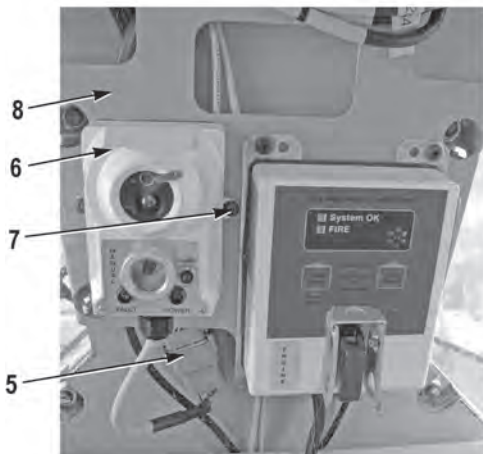
1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

2. Pull out circuit breaker (4).



NOTE

Tag and mark wire connectors prior to removal to ensure proper installation.

3. Disconnect connector (5) from front optical sensor (6).
4. Remove two screws (7) and front optical sensor (6) from bracket (8).

END OF TASK

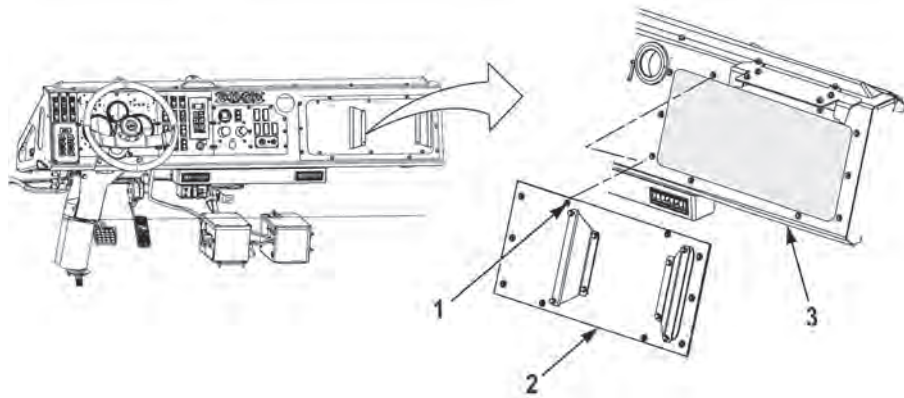
INSTALLATION

1. Install front optical sensor (6) on bracket (8) with two screws (7).
2. Connect connector (5) to front optical sensor (6).

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

3. Push and reset circuit breaker (4).



4. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

FIRE SUPPRESSION SYSTEM POWER SUPPLY REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

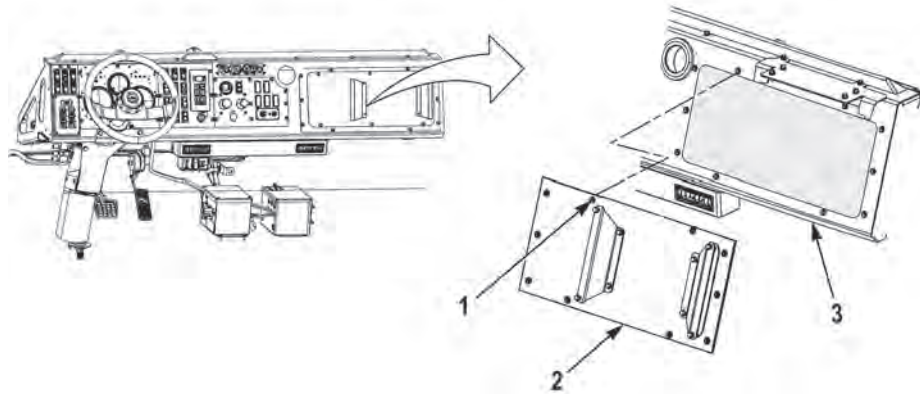
Tool Kit, General Mechanic's: Automotive

Materials/Parts

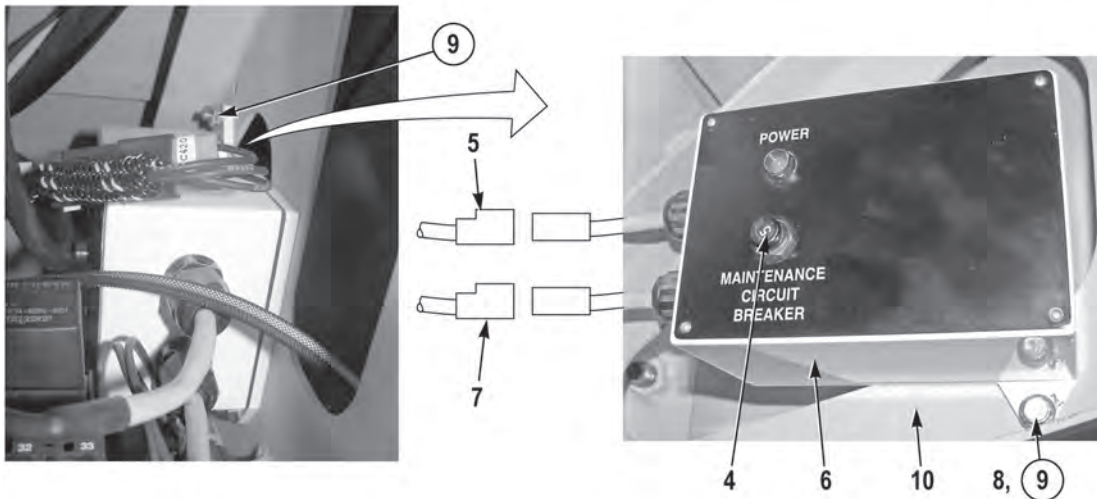
Locknut (2) (Item 9)
Lubricant, Connector, Nyogel 760G
Tags, Identification

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL

1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

2. Pull out circuit breaker (4).

NOTE

Tag and mark wire connectors prior to removal to ensure proper installation.

3. Disconnect connector (5) from fire suppression power supply (6).
4. Disconnect connector (7) from fire suppression power supply (6).
5. Remove two screws (8), locknuts (9), and fire suppression power supply (6) from bracket (10).

END OF TASK

INSTALLATION

1. Install fire suppression power supply (6) on bracket (10) with two screws (8) and new locknuts (9).

WARNING

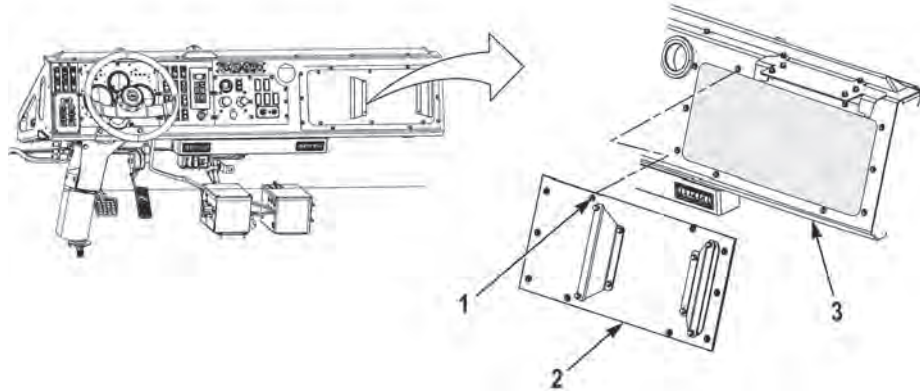
Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply connector lubricant, Nyogel 760G, to two connectors (7 and 5).
3. Connect connector (7) to fire suppression power supply (6).
4. Connect connector (5) to fire suppression power supply (6).

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

5. Push and reset circuit breaker (4).



6. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM REAR OPTICAL SENSOR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

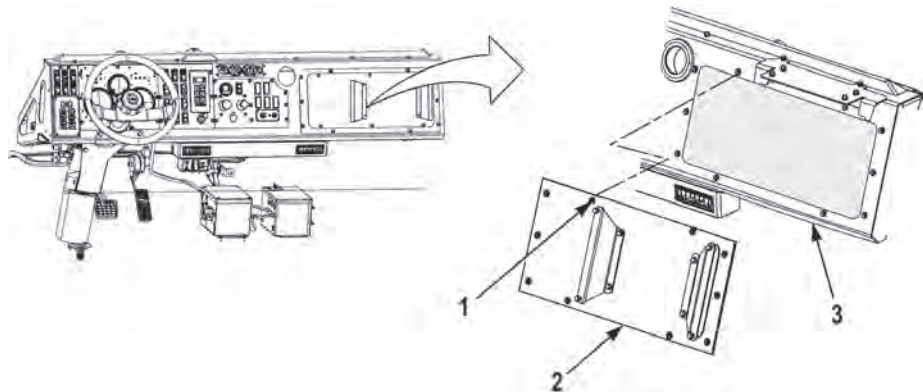
Tool Kit, General Mechanic's: Automotive

Materials/Parts

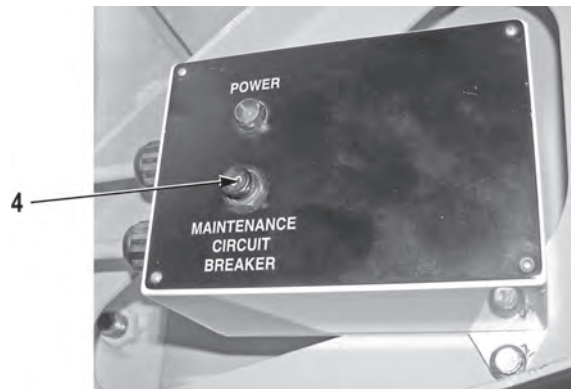
Locknut (2) (Item 10)
Tags, Identification

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL

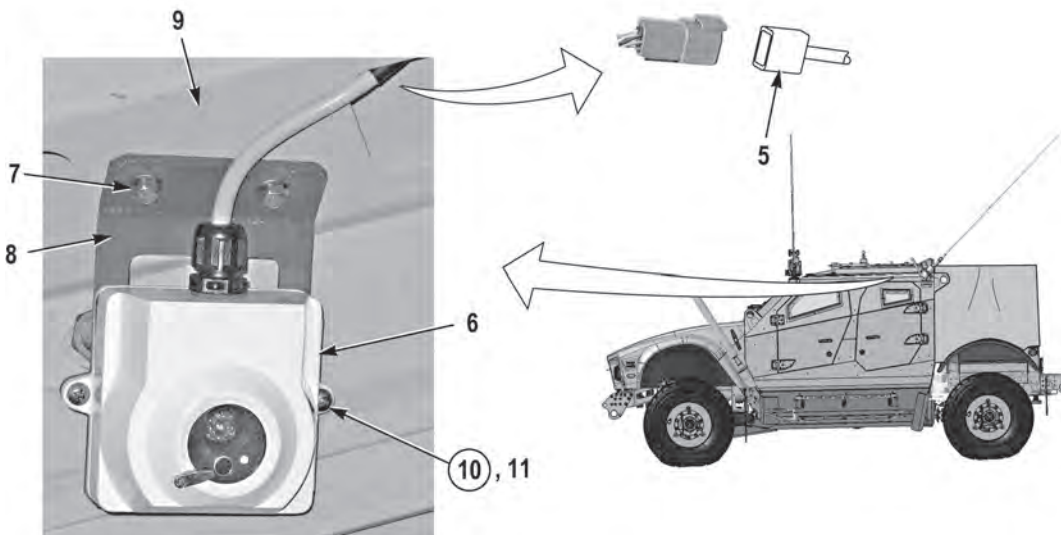
1. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

2. Pull out circuit breaker (4).



NOTE

Tag and mark wire connectors prior to removal to ensure proper installation.

3. Disconnect connector (5) from rear optical sensor (6).
4. Remove two screws (7) and rear optical sensor bracket (8) from bracket (9).
5. Remove two locknuts (10), screws (11), and rear optical sensor (6) from rear optical sensor bracket (8). Discard locknuts (10).

END OF TASK

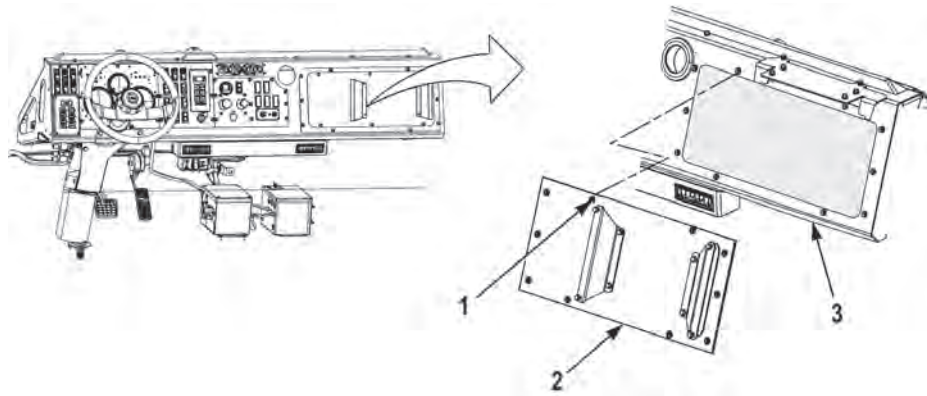
INSTALLATION

1. Install rear optical sensor (6) on rear optical sensor bracket (8) with two screws (11) and new locknuts (10).
2. Install rear optical sensor bracket (8) on bracket (9) with two screws (7).
3. Connect connector (5) to rear optical sensor (6).

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

4. Push and reset circuit breaker (4).



5. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

FIRE SUPPRESSION SYSTEM SENSOR LINE REPLACEMENT CHART, UNDERCARRIAGE (AFES NITROGEN DETECTION)

WARNING

Ensure fire suppression system cylinders are in the OFF position first, then relieve pressure in sensor line system prior to replacing any sensor lines, or accidental discharge may occur. Failure to comply may result in injury or death to personnel.

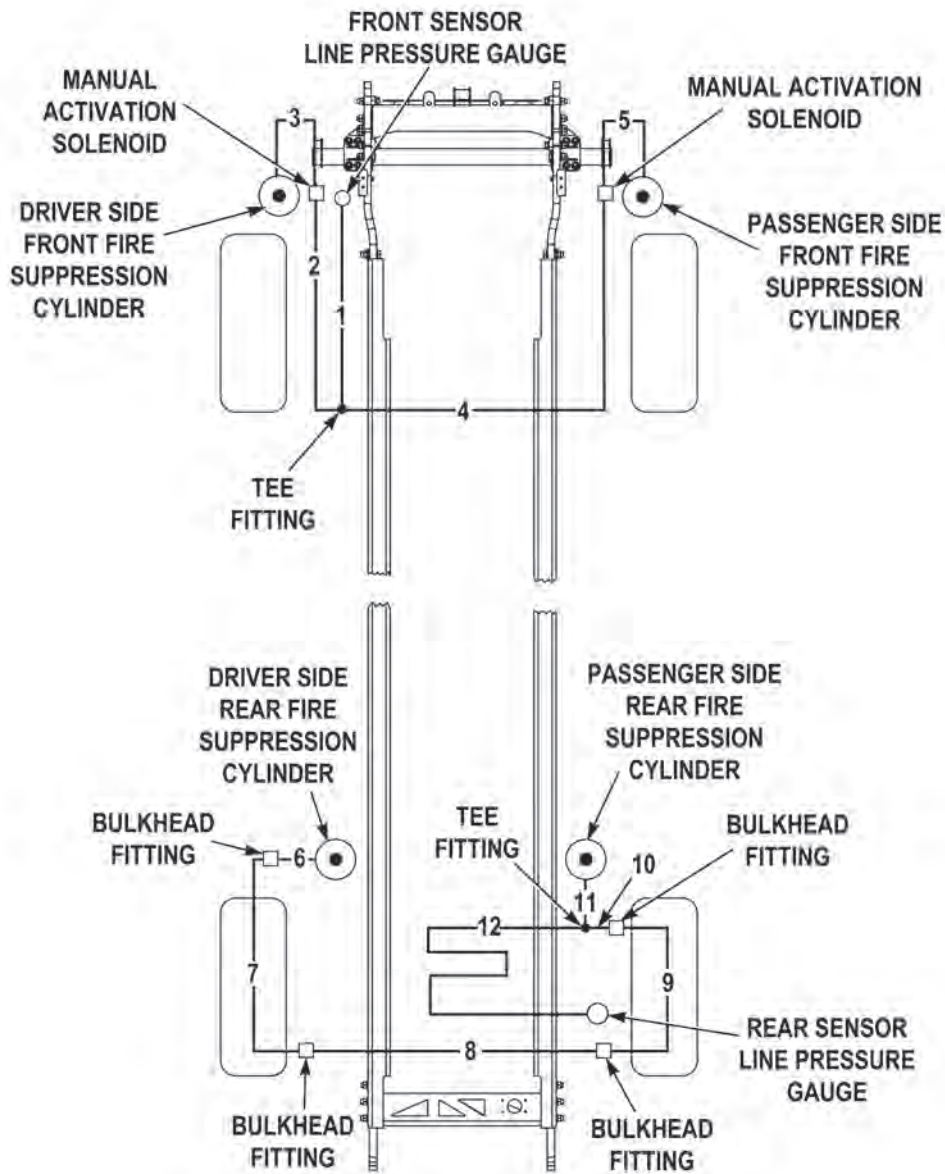


Table 1. Undercarriage Fire Suppression System Sensor Line Replacement Chart.

Item No.	From	To
1	Front Sensor Line Pressure Gauge	Tee Fitting
2	Tee Fitting	Driver Side Front Manual Activation Solenoid
3	Driver Side Front Manual Activation Solenoid	Driver Side Front Fire Suppression Cylinder
4	Tee Fitting	Passenger Side Front Manual Activation Solenoid
5	Passenger Side Front Manual Activation Solenoid	Passenger Side Front Fire Suppression Cylinder
6	Driver Side Rear Fire Suppression Cylinder	Bulkhead Fitting
7	Bulkhead Fitting	Bulkhead Fitting
8	Bulkhead Fitting	Bulkhead Fitting
9	Bulkhead Fitting	Bulkhead Fitting
10	Bulkhead Fitting	Tee Fitting
11	Tee Fitting	Passenger Side Rear Fire Suppression Cylinder
12	Tee Fitting	Rear Sensor Line Pressure Gauge

END OF TASK**END OF WORK PACKAGE**

FIRE SUPPRESSION SYSTEM SENSOR LINE REPLACEMENT CHART, UNDERCARRIAGE/ENGINE (AFES LINEAR WIRE DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

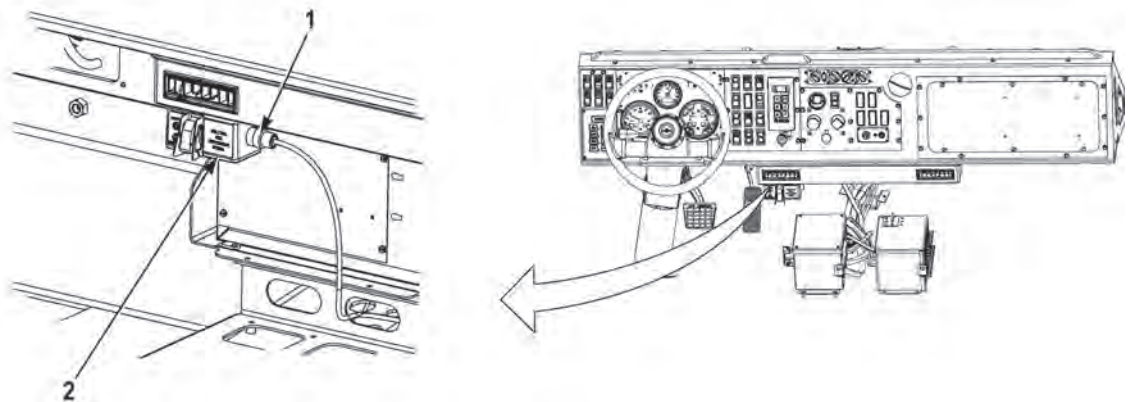
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Tags, Identification
 Ties, Cable
 Ties, Cable Buttonhead

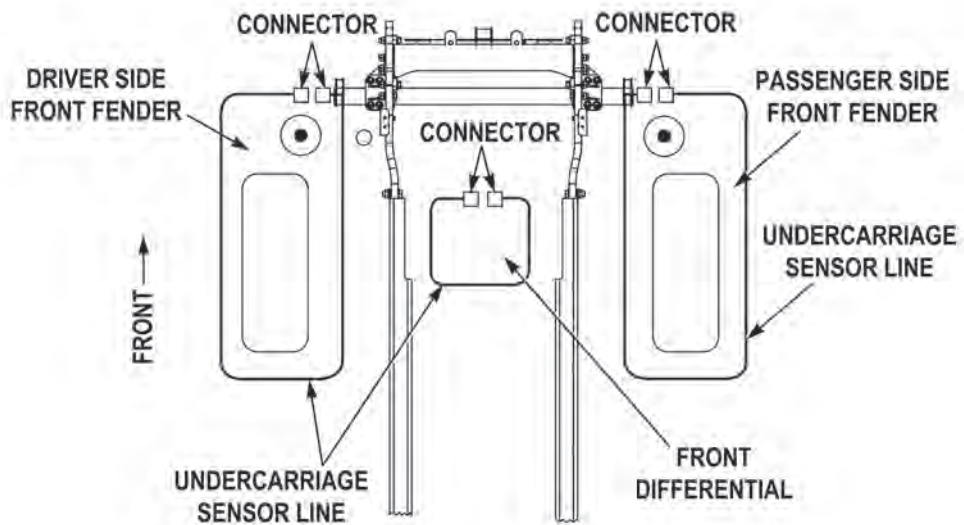
Follow-On Maintenance

Perform fire suppression systems testing
 (WP 0075)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks
 Close hood and secure

UNDERCARRIAGE SENSOR LINES**WARNING**

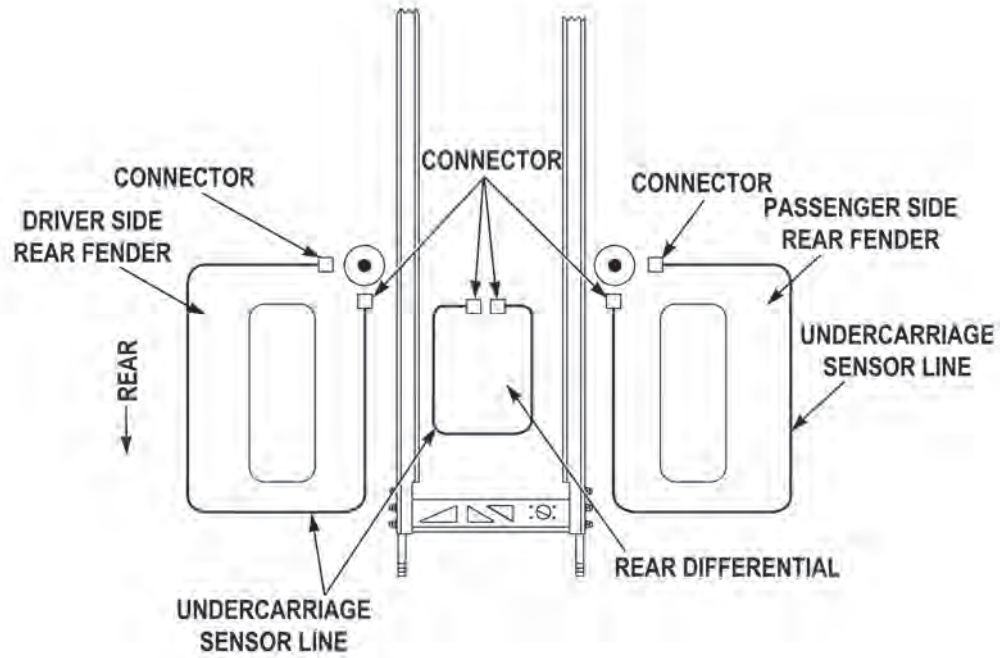
Ensure batteries and undercarriage controller connector are disconnected prior to replacing sensor lines. Failure to comply may result in injury or death to personnel.

1. Disconnect connector (1) from undercarriage controller (2).



NOTE

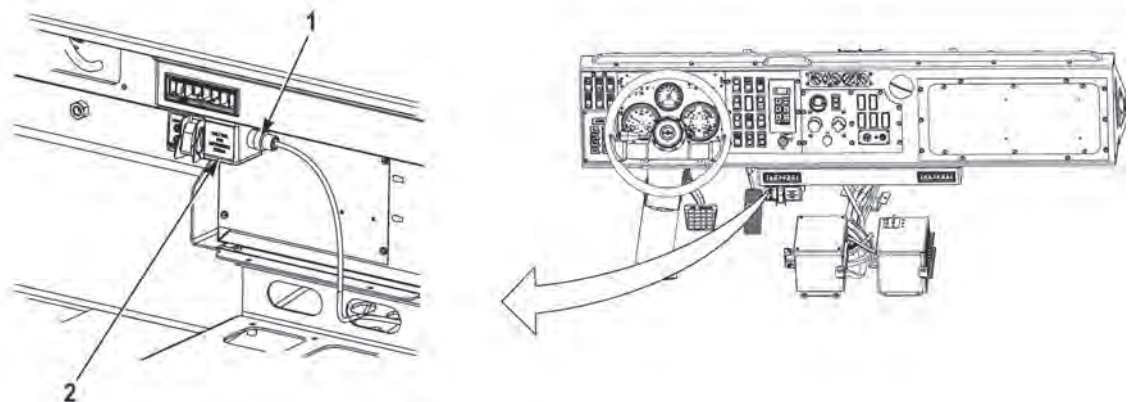
- Note routing of undercarriage sensor lines prior to removal to ensure proper installation.
 - Tag and mark sensor lines prior to removal to ensure proper installation.
 - Remove cable ties as required.
 - Note location of cushion clips and remove as required.
2. Remove undercarriage sensor line from fender.



NOTE

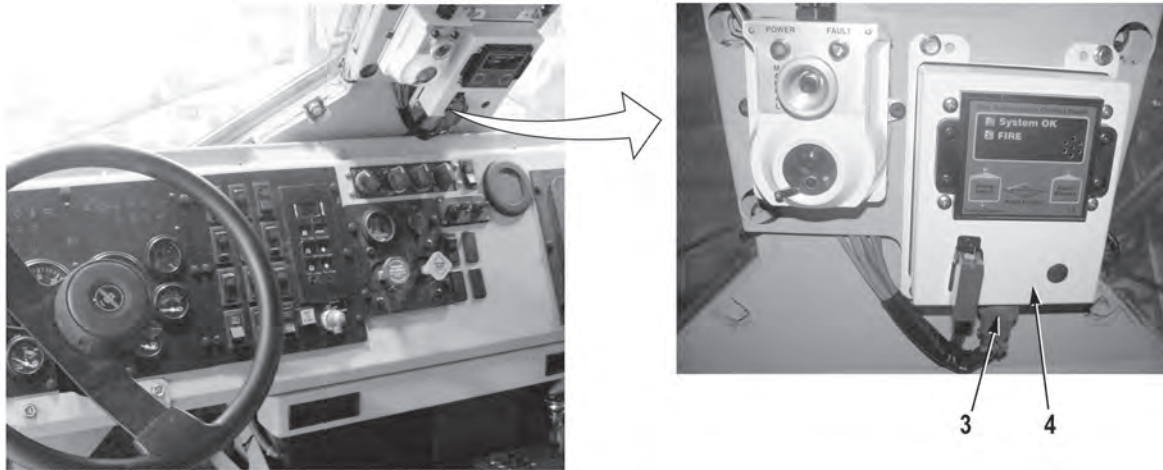
- Install cable ties as required.
- Install cushion clips in original locations as required.
- Route sensor lines as noted prior to removal.

3. Install undercarriage sensor line on fender.



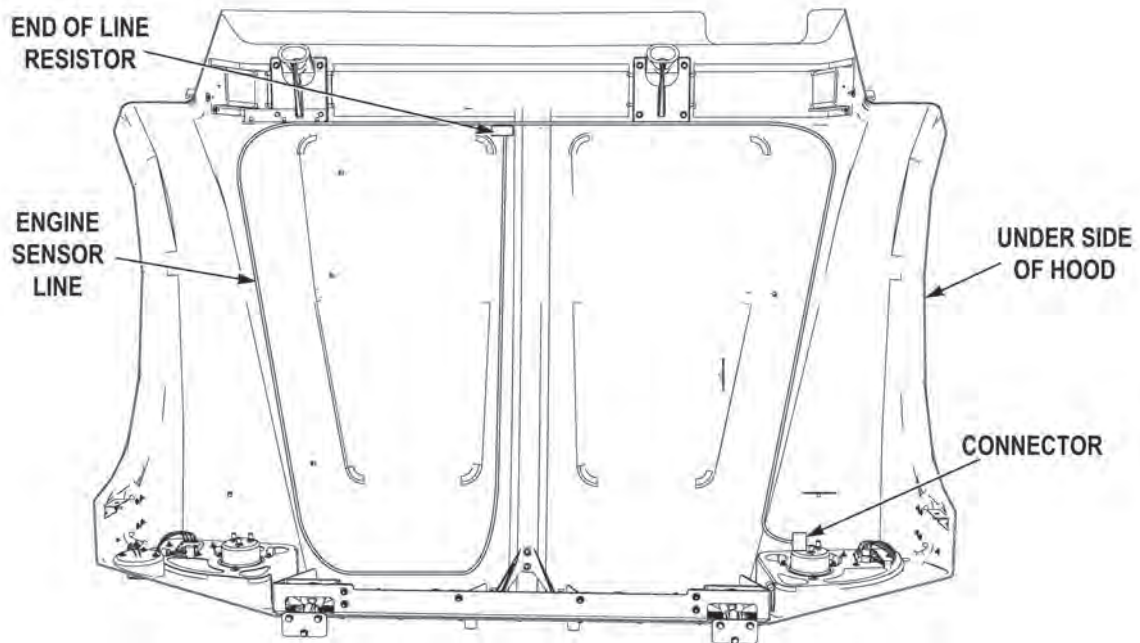
4. Connect connector (1) to undercarriage controller (2).

END OF TASK

ENGINE SENSOR LINES**WARNING**

- **M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel.**
- **If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.**

1. Disconnect connector (3) from fire suppression control panel (4).



NOTE

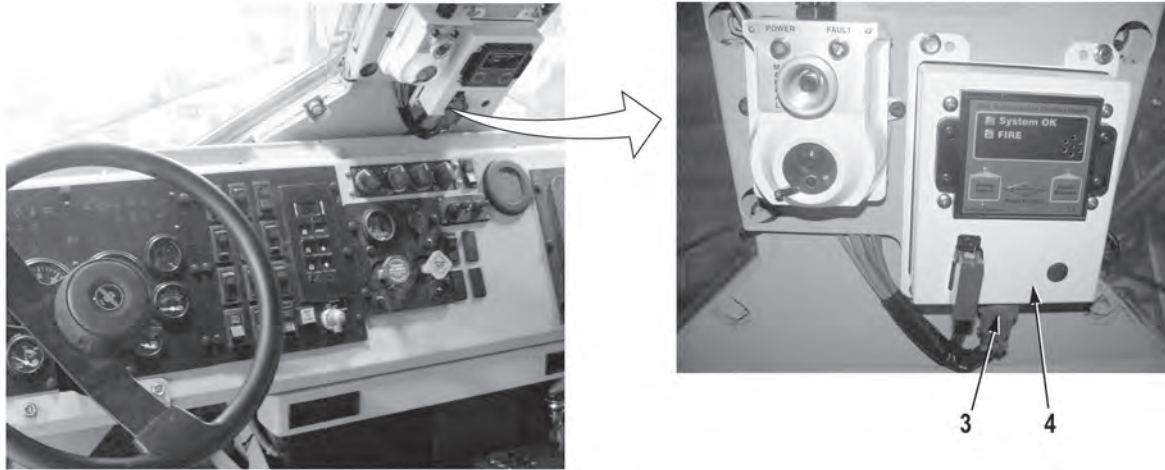
- Note routing of engine sensor line prior to removal to ensure proper installation.
- Tag and mark sensor lines prior to removal to ensure proper installation.
- Remove cable ties as required.
- Note location of cushion clips and remove as required.

2. Remove engine sensor line from underside of hood.

NOTE

- Route engine sensor line as noted prior to removal.
- Install cable ties as required.
- Install cushion clips in original locations as required.

3. Install engine sensor line on underside of hood.



4. Connect connector (3) to fire suppression control panel (4).
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM SERVICE AND GAUGE REPLACEMENT, UNDERCARRIAGE (AFES NITROGEN DETECTION)

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Tools and Special Tools

Nitrogen Service Kit
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cap and Plug Set
Line, Sensor (Item 1)
Tags, Identification
Ties, Cable

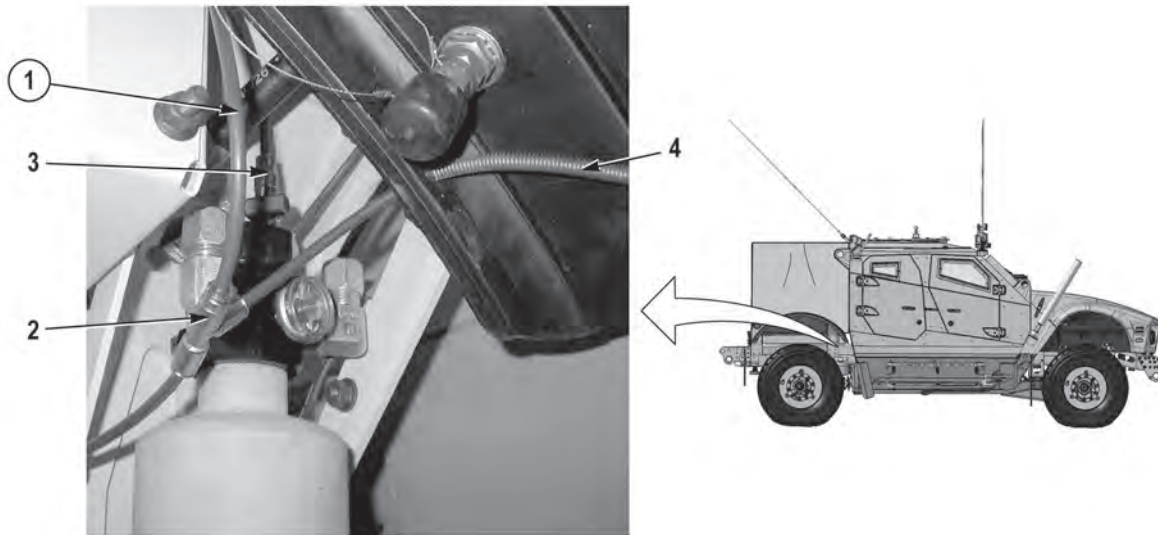
Follow-On Maintenance

Remove and stow wheel chocks

REPLACEMENT/SERVICE**WARNING**

Pressure wash area to remove discharged fire suppression chemicals prior to maintenance or service. Ensure fire suppression cylinder valves are in OFF position. Failure to comply may result in discharge of cylinder or injury to personnel.

1. Replace any discharged fire suppression cylinders (WP 0067).
2. Determine location of any damaged sensor lines. Refer to Fire Suppression System Sensor Line Replacement Chart, Undercarriage (AFES Nitrogen Detection) (WP 0072) for sensor line routing and component locations.



WARNING

Ensure pressure is 0 psi in sensor line system prior to sensor line replacement. Failure to comply may result in injury to personnel.

NOTE

- Fire suppression sensor lines are divided into two separate systems, front and rear. All sensor lines are removed the same way. Rear system shown.
- Tag and mark sensor lines and fittings prior to removal to ensure proper installation.
- Cap and plug sensor lines and fittings upon removal.
- Remove cable ties as required.
- Note position of cushion clips prior to removal to ensure proper installation.

3. Remove damaged sensor line (1) from fitting (2).
4. Remove damaged sensor line (1) from fitting (3). Discard damaged sensor line (1).

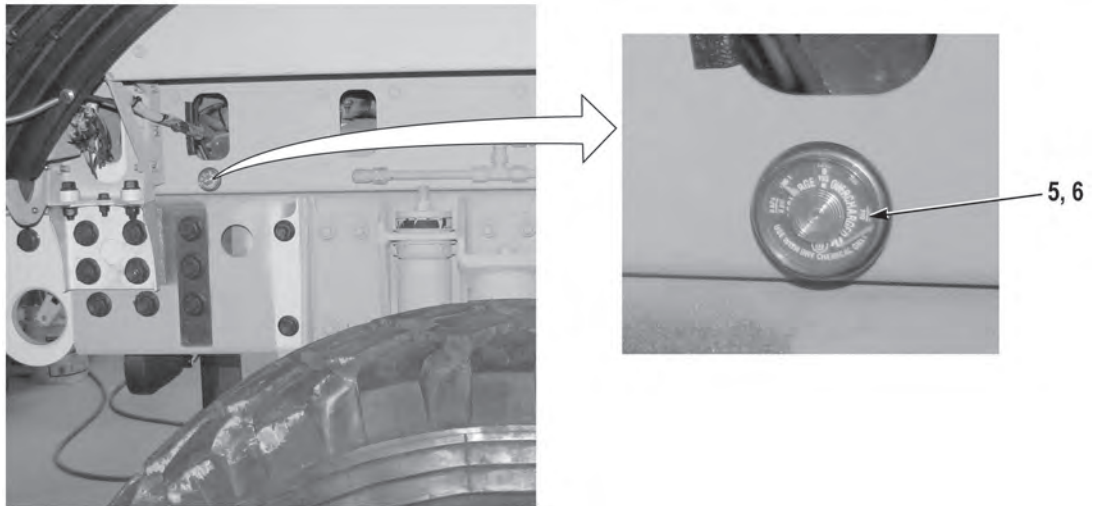
NOTE

Some sensor lines have protective sleeves, and others do not. Perform Step (5) for sensor lines that have protective sleeves.

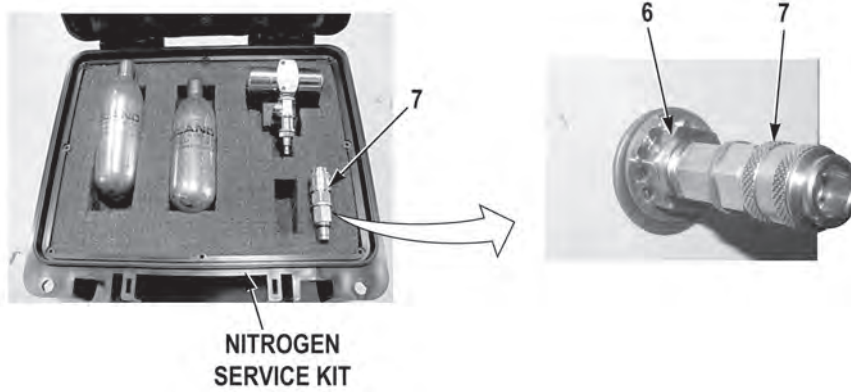
5. Install protective sleeve (4) on sensor line (1).
6. Install new sensor line (1) on fitting (3).

NOTE

- Install cushion clips as noted prior to removal.
 - Install cable ties as required.
7. Install sensor line (1) on fitting (2).



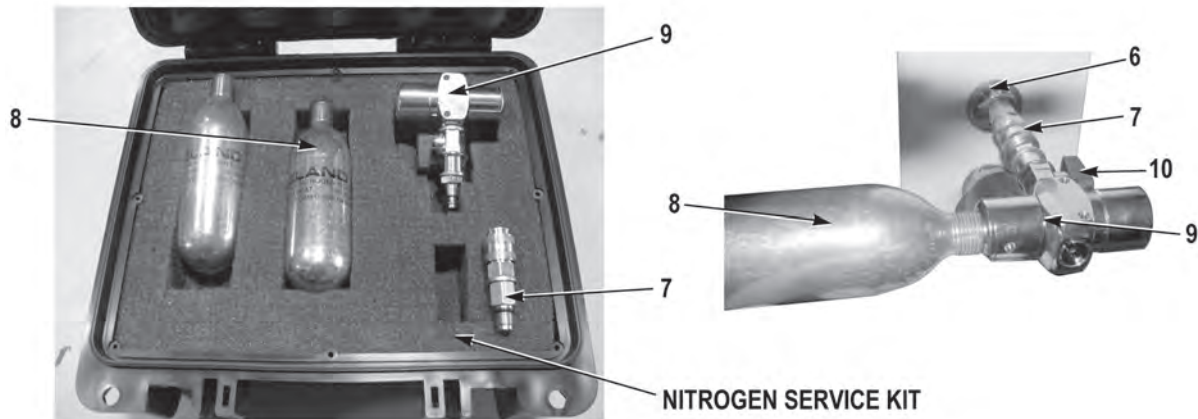
8. Remove pressure gauge (5) from sensor line fitting (6).



NOTE

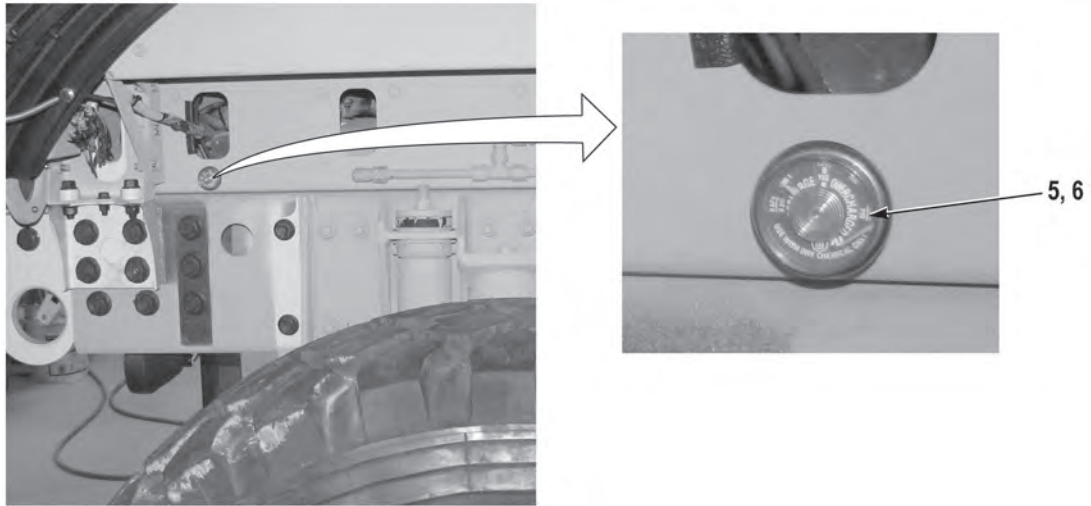
Ensure O-ring on quick disconnect fitting is seated on sensor line fitting.

9. Install quick disconnect fitting (7) on sensor line fitting (6).

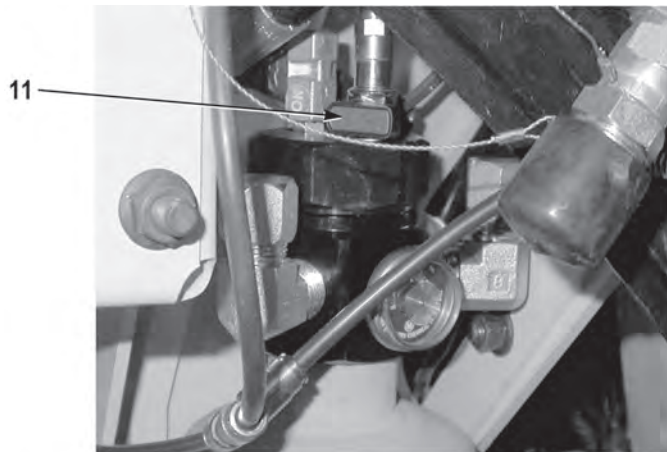


NOTE

- Ensure filler fitting valve is in OFF position prior to installing charge cylinder on filler fitting.
 - Ensure charge cylinder is screwed into filler fitting far enough to activate charge cylinder.
10. Install charge cylinder (8) on filler fitting (9).
 11. Install filler fitting (9) and charge cylinder (8) on quick disconnect fitting (7).
 12. Move filler fitting valve (10) to ON position and charge sensor system with nitrogen. Verify there are no air leaks after system has charged.
 13. Move filler fitting valve (10) to OFF position and remove filler fitting (9) and charge cylinder (8) from quick disconnect fitting (7).
 14. Remove quick disconnect fitting (7) from sensor line fitting (6).



15. Install pressure gauge (5) on sensor line fitting (6) and verify sensor line pressure is in the green area of pressure gauge (5). If not, check sensor line system for leaks, verify charge cylinder (8) has adequate pressure, and repeat Steps (8) through (15).
16. Wait thirty minutes and verify sensor line pressure is still in green area of pressure gauge (5). If not, check sensor line system for leaks, and repeat Steps (8) through (15).



WARNING

Ensure pressure indication on gauge for sensor line system is in green arc prior to moving valve on fire suppression system cylinders to ON position. Fire suppression system cylinders could discharge when valve is moved to ON position if sensor line pressure is not in the green arc on pressure gauge. Failure to comply may result in injury or death to personnel.

17. Move fire suppression cylinder valves (11) to ON position.
18. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEMS TESTING

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured

Tools and Special Tools

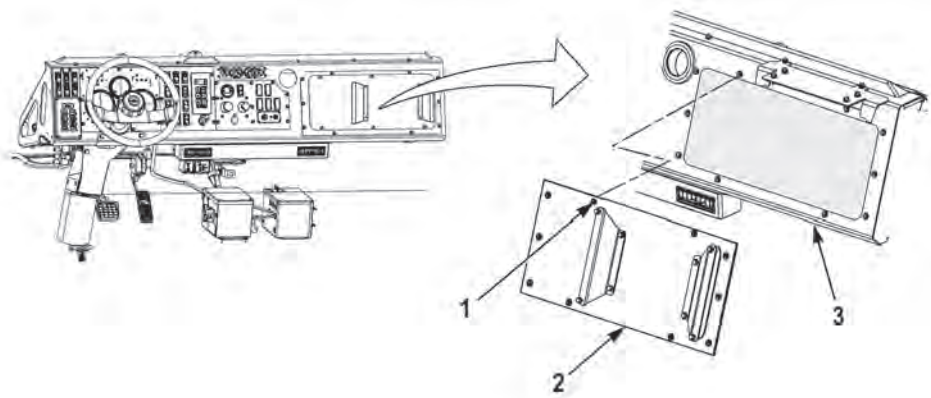
Test Kit, AFES
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Wire, Safety (1) (Item 41)
 Tags, Identification

Follow-On Maintenance

Close hood and secure
 Remove and stow wheel chocks

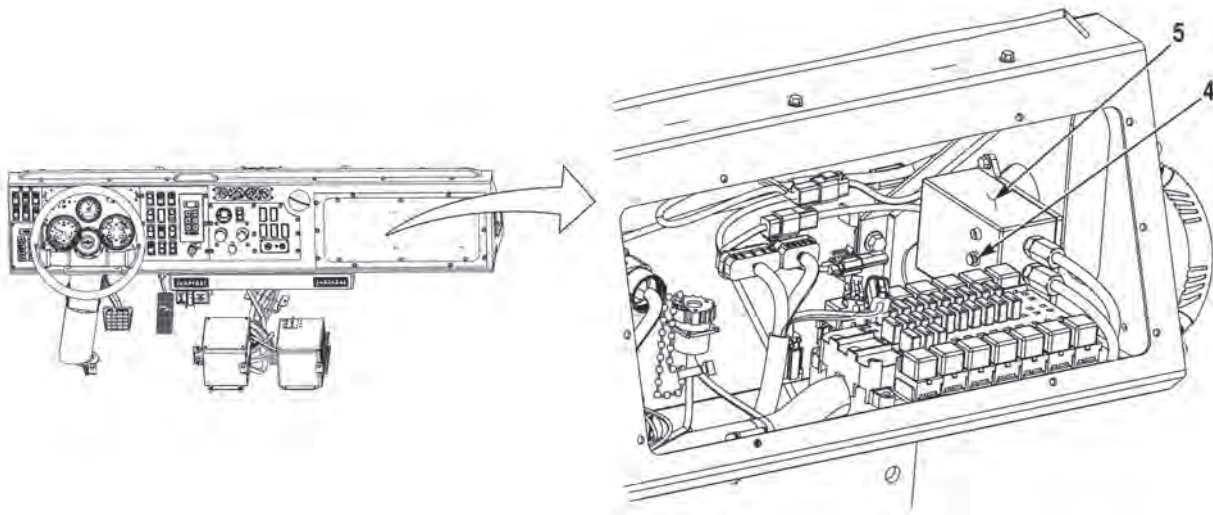
CAPSULE FIRE SUPPRESSION SYSTEM TEST**WARNING**

- Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.
- Capsule interior fire suppression system activation rapidly releases highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinder. Failure to comply may result in injury to personnel.

NOTE

Test equipment may take up to 20 seconds to respond.

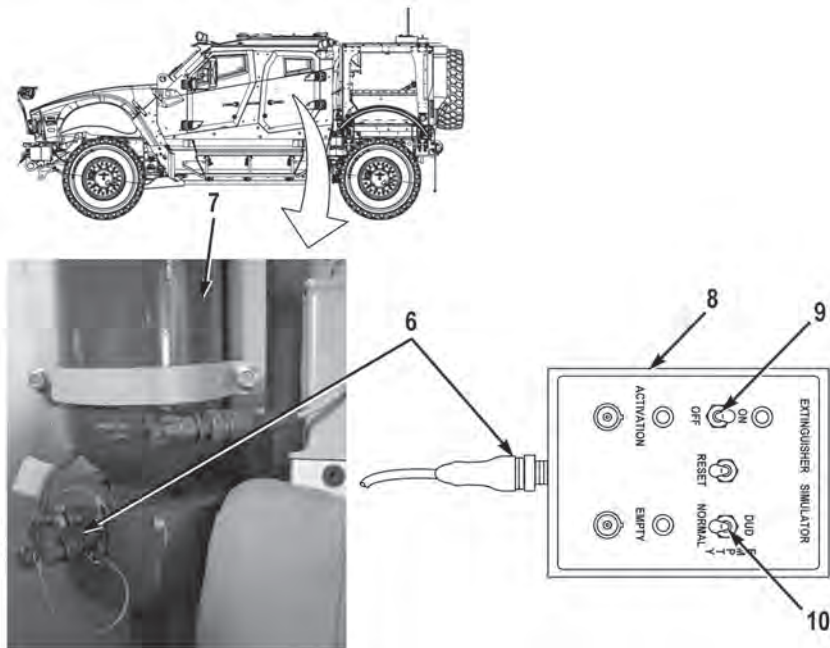
1. Visually inspect wiring, connectors, cylinder pressure gauge, and optical sensors. Replace or repair as required. If fault blink codes are noted, proceed to appropriate troubleshooting task in (WP 0014).
2. Remove ten screws (1) and dash circuit breaker cover (2) from dash (3).



NOTE

- Pull to open circuit breaker.
- Push to close circuit breaker.

3. Open circuit breaker (4) on battery backup box (5).



NOTE

Tag and mark connector prior to removal to ensure proper installation.

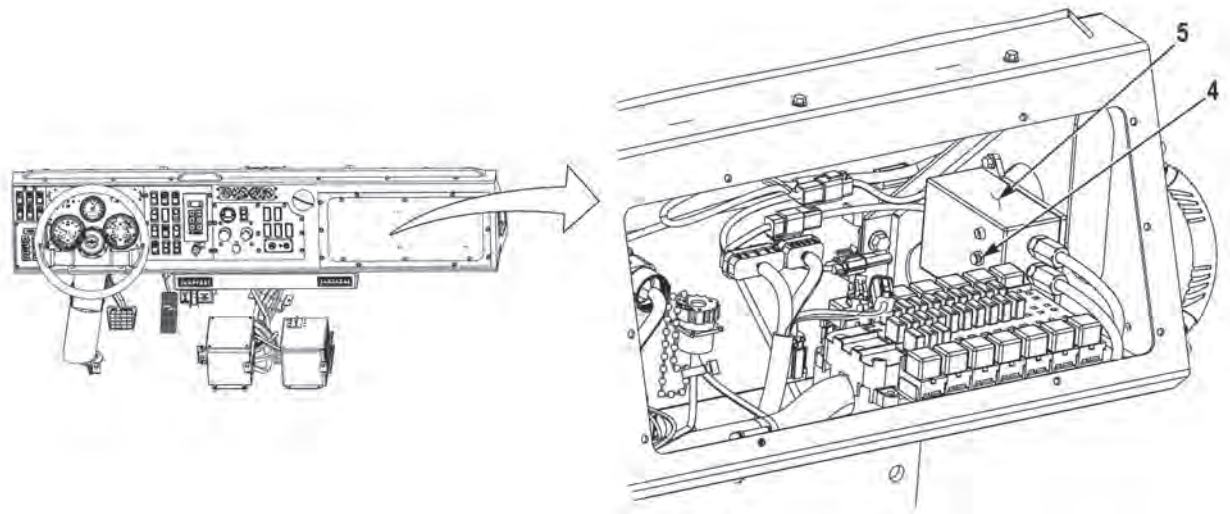
4. Disconnect connector (6) from cylinder (7).

5. Connect connector (6) to fire extinguisher simulator (8).

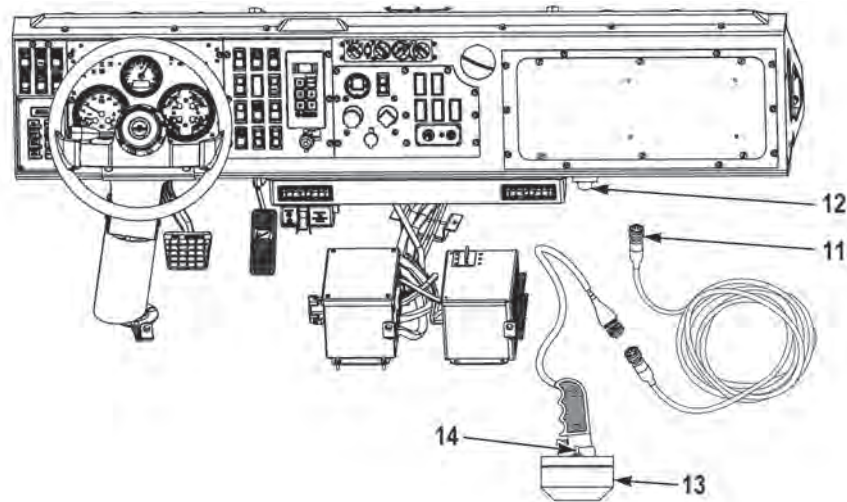
NOTE

Power switch must be lifted prior to being moved.

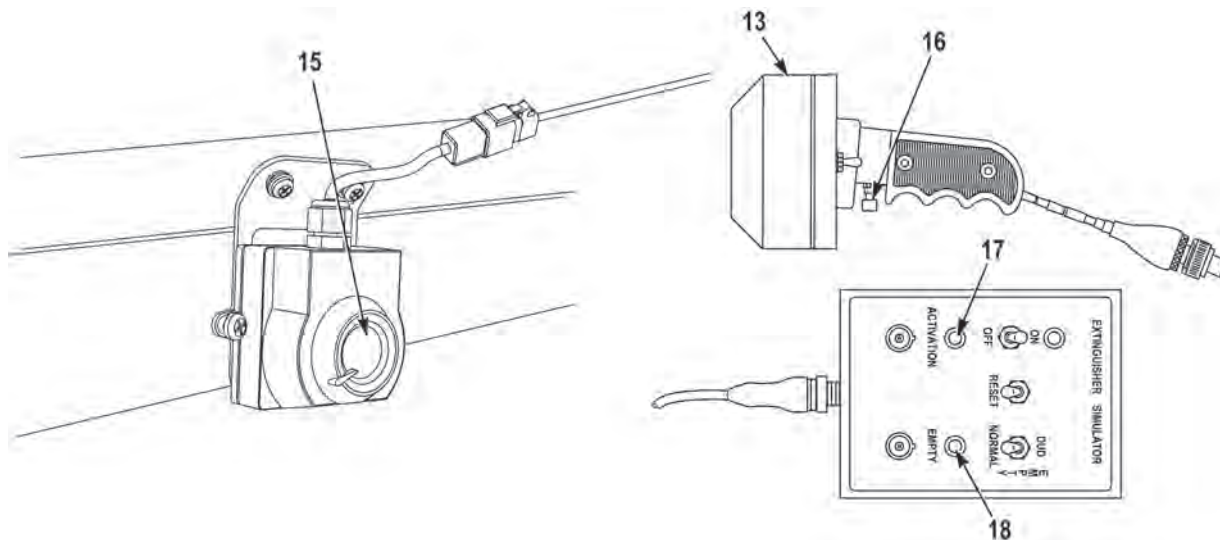
6. Position power switch (9) to ON position.
7. Position DUD/EMPTY/NORMAL switch (10) to NORMAL position.

**NOTE**

- Pull to open circuit breaker.
 - Push to close circuit breaker.
8. Close circuit breaker (4) on battery backup box (5).



9. Connect extension cable (11) to connector (12).
10. Connect fire simulator (13) to extension cable (11).
11. Position switch (14) to IR+UV position.
12. Battery disconnect switch ON.
13. Place ignition switch to ON (engine off).

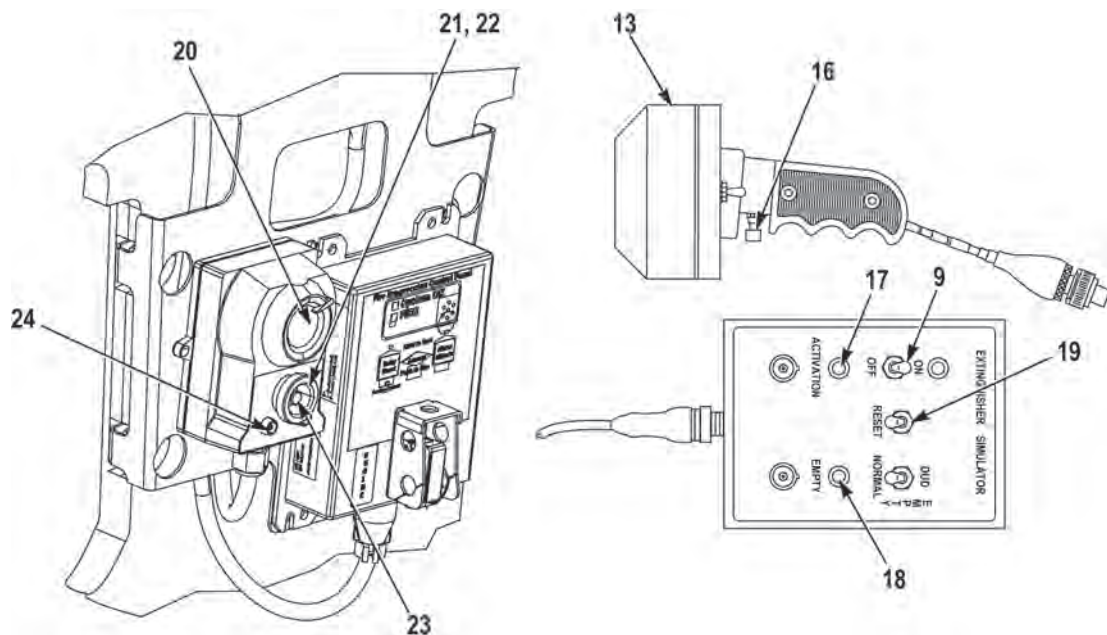


14. Position fire simulator (13) on rear optical sensor lens (15).
15. Depress trigger (16) and observe ACTIVATION indicator (17) and EMPTY indicator (18). If both ACTIVATION indicator (17) and EMPTY indicator (18) are illuminated system functions properly. If either indicator is not illuminated, note blink code indicated by fault LED (24) on front optical sensor.

NOTE

Perform Steps (a) through (e) if blink code is noted.

- a. Place ignition switch to OFF position.
- b. Battery disconnect switch OFF.
- c. Remove test equipment.
- d. Connect all fire suppression system connectors.
- e. Proceed to appropriate troubleshooting task in (WP 0014).

**NOTE**

Wait at least 30 seconds after resetting fire extinguisher simulator prior to performing another test.

16. Position RESET switch (19) to RESET position and release. Ensure ACTIVATION indicator (17) and EMPTY indicator (18) are not illuminated.
17. Position fire simulator (13) on front optical sensor lens (20).
18. Depress trigger (16) and observe ACTIVATION indicator (17) and EMPTY indicator (18). If both ACTIVATION indicator (17) and EMPTY indicator (18) are illuminated system functions properly. If either indicator is not illuminated, note blink code indicated by fault LED (24) on front optical sensor.

NOTE

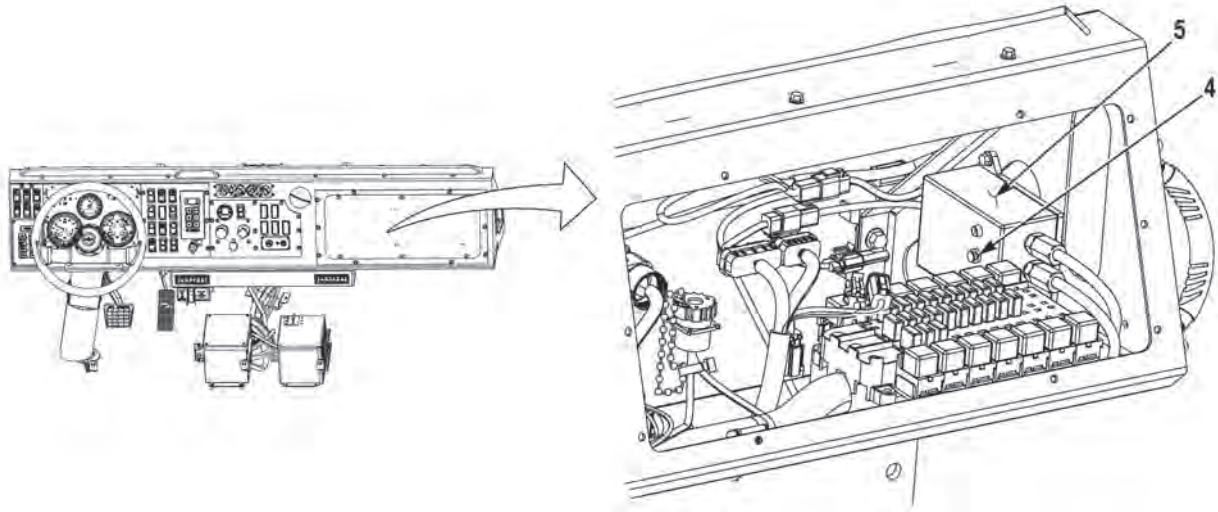
Perform Steps (a) through (e) if blink code is noted.

- a. Place ignition switch to OFF position.
 - b. Battery disconnect switch OFF.
 - c. Remove test equipment.
 - d. Connect all fire suppression system connectors.
 - e. Proceed to appropriate troubleshooting task in (WP 0014).
19. Position RESET switch (19) to RESET position and release. Ensure ACTIVATION indicator (17) and EMPTY indicator (18) are not illuminated.
 20. Remove retention ring (21) and plastic disc (22) from front optical sensor (20).
 21. Press manual activation button (23) and observe ACTIVATION indicator (17) and EMPTY indicator (18). If both ACTIVATION indicator (17) and EMPTY indicator (18) are illuminated system functions properly. If either indicator is not illuminated, note blink code indicated by fault LED (24) on front optical sensor.

NOTE

Perform Steps (a) through (e) if blink code is noted.

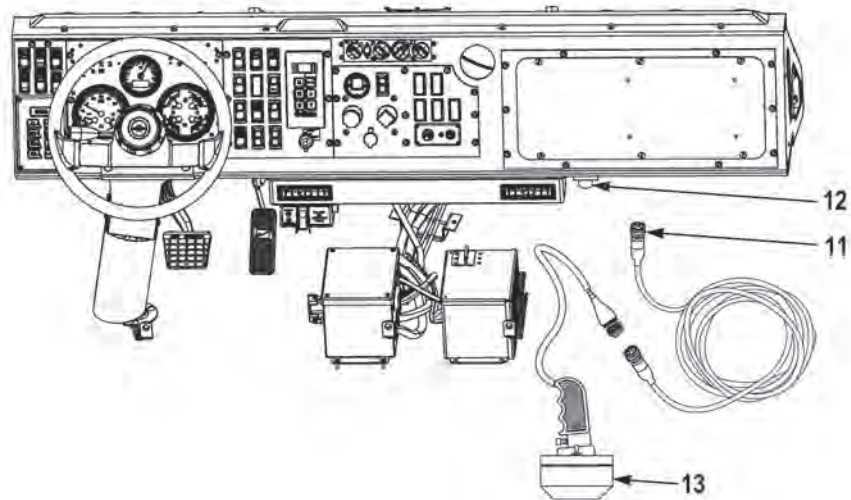
- a. Place ignition switch to OFF position.
 - b. Battery disconnect switch OFF.
 - c. Remove test equipment.
 - d. Connect all fire suppression system connectors.
 - e. Proceed to appropriate troubleshooting task in (WP 0014).
22. Install plastic disc (22) on front optical sensor (20) with retention ring (21).
 23. Position power switch (9) to OFF position.
 24. Place ignition switch to OFF.
 25. Position RESET switch (19) to RESET position and release.
 26. Battery disconnect switch OFF.



NOTE

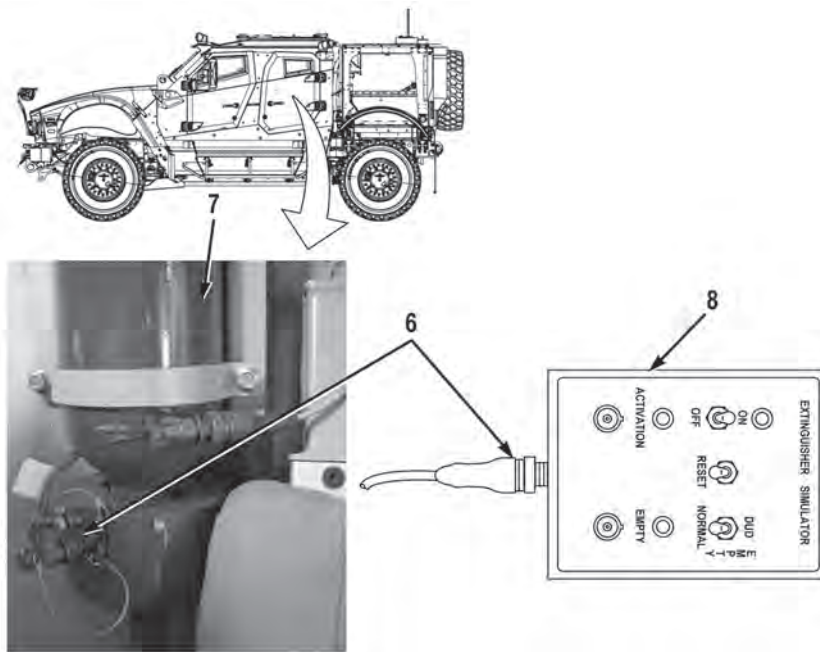
- Pull to open circuit breaker.
- Push to close circuit breaker.

27. Open circuit breaker (4) on battery backup box (5).

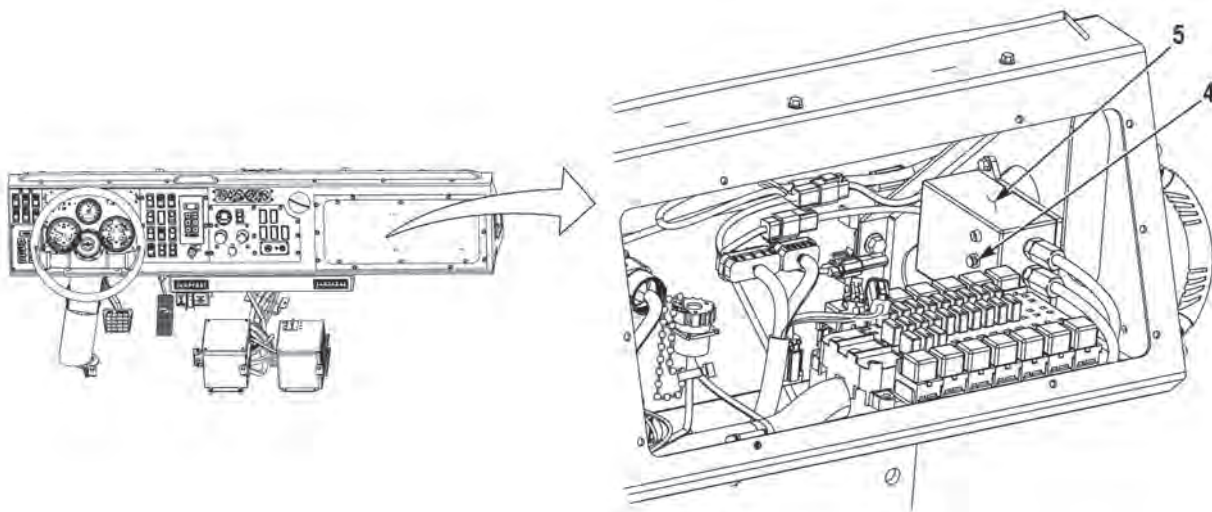


28. Disconnect fire simulator (13) from extension cable (11).

29. Disconnect extension cable (11) from connector (12).



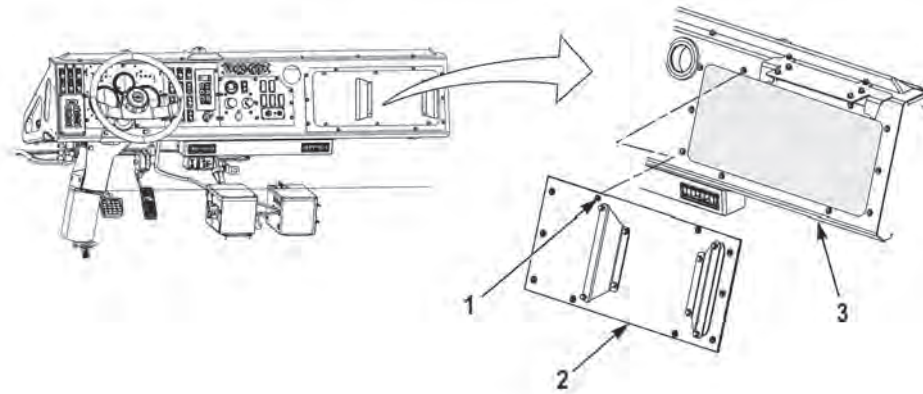
30. Disconnect connector (6) from fire extinguisher simulator (8).
31. Connect connector (6) to cylinder (7).



NOTE

- Pull to open circuit breaker.
- Push to close circuit breaker.

32. Close circuit breaker (4) on battery backup box (5).



33. Install dash circuit breaker cover (2) on dash (3) with ten screws (1).

END OF TASK

ENGINE FIRE SUPPRESSION SYSTEM TEST

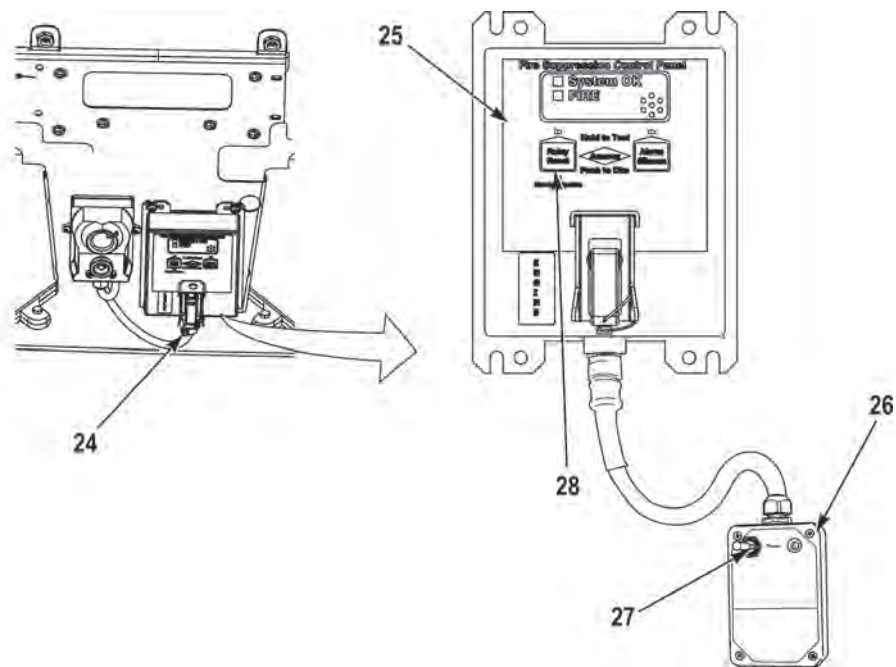
WARNING

M-ATV is equipped with an engine compartment fire suppression system. Before performing any welding, brazing, grinding operation, or using open flame in engine compartment, batteries must be disconnected. In addition, the automatic fire suppression system for the engine compartment must be disabled to prevent accidental activation of automatic fire suppression system. System components must also be covered. Failure to comply may result in injury to personnel. If welding, brazing, grinding, or open flame operations have been performed, any components subject to these operations must be allowed to cool before enabling automatic fire suppression system. Failure to comply may result in injury to personnel.

NOTE

Test equipment may take up to 20 seconds to respond.

1. Visually inspect wiring, connectors, aerosol generators, and control panel. Replace or repair as required. If fault blink codes are noted, proceed to appropriate troubleshooting task in (WP 0014).



NOTE

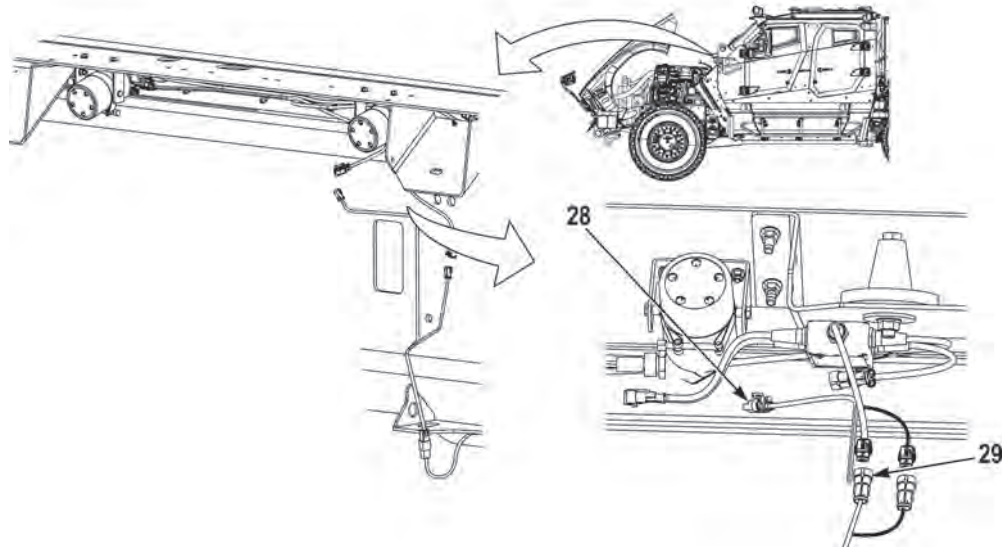
- Tag and mark connector prior to removal to ensure proper installation.
- Control panel may need to be removed to assist in connection of control panel test device.

2. Disconnect connector (24) from control panel (25).
3. Connect control panel test device (26) to control panel (25).
4. Position POWER switch (27) to POWER and observe LED on control panel test device (26) and system OK LED on control panel (25). If both indicators are illuminated control panel functions properly. If system OK indicator is not illuminated note blink code indicated by fault LED (28) on control panel (25).

NOTE

Perform Steps (a) through (c) if blink code is noted.

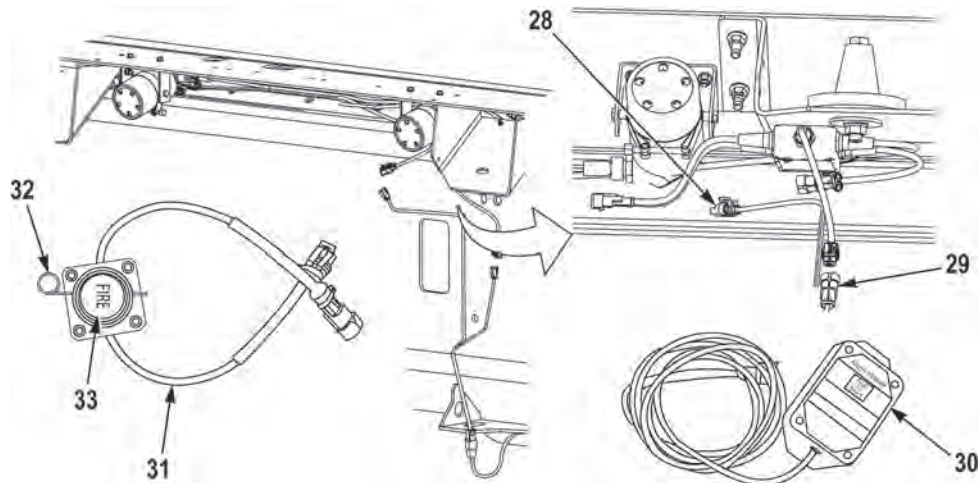
- a. Remove test equipment.
 - b. Connect all fire suppression system connectors.
 - c. Proceed to appropriate troubleshooting test in (WP 0014).
5. Disconnect control panel test device (26) from control panel (25).
 6. Connect connector (24) to control panel (25).



NOTE

- Tag and mark connectors prior to removal to ensure proper installation.
- Dummy couplings are covered with red wire.

7. Disconnect GREEN connector (28).
8. Disconnect YELLOW connector (29).



9. Connect alarm module (30) to capsule side of connector (29).
10. Connect fire button harness (31) to both sides of connector (28).
11. Battery disconnect switch ON.
12. Place ignition switch to ON (engine off).

WARNING

Ensure all test equipment is properly connected. Failure to comply may result in injury or death to personnel.

13. Remove pin (32) from FIRE button (33).
14. Press FIRE button (33).
15. Observe control panel for red fire indicator illuminated and audible alarm. If red indicator illuminates and audible alarm sounds, system functions properly. If red indicator or audible alarm fails to activate, note blink code indicated by fault LED (28) on control panel (25).

NOTE

Perform Steps (a) through (e) if blink code is noted.

- a. Place ignition switch to OFF position.
 - b. Battery disconnect switch OFF.
 - c. Remove test equipment.
 - d. Connect all fire suppression system connectors.
 - e. Proceed to appropriate troubleshooting task in (WP 0014).
16. Install pin (32) on FIRE button (33).
 17. Press RESET button on alarm module (30). Observe green system OK indicator illuminated on control panel.
 18. Place ignition switch to OFF.
 19. Battery disconnect switch OFF.
 20. Disconnect fire button harness (31) from both sides of connector (28).
 21. Disconnect alarm module (30) from capsule side of connector (29).
 22. Connect YELLOW connector (29).
 23. Connect GREEN connector (28).

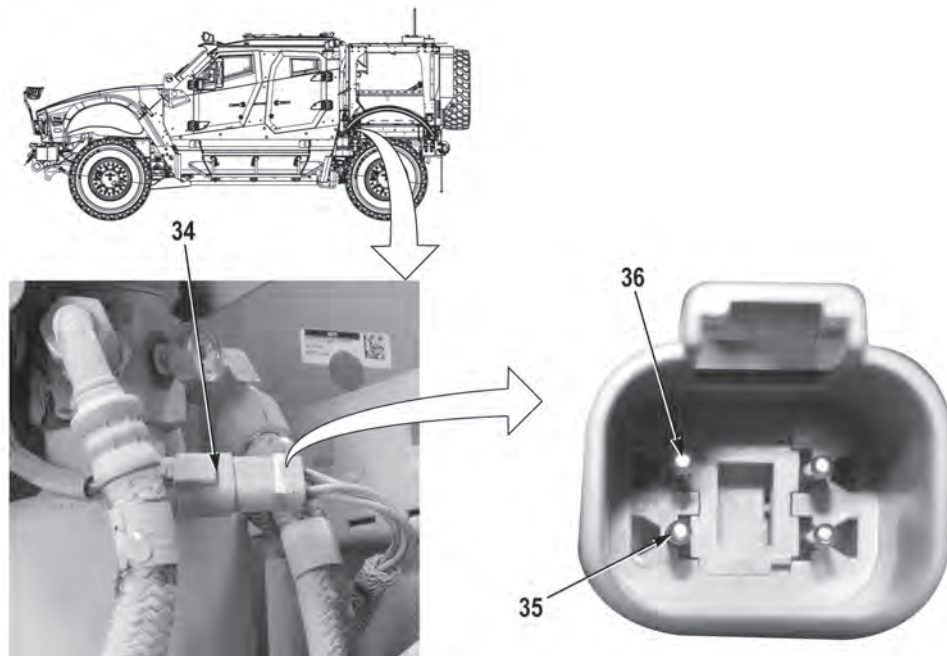
END OF TASK

UNDERCARRIAGE FIRE SUPPRESSION SYSTEM TEST

NOTE

When testing the M-ATV undercarriage fire suppression system, there are two variants concerning the number of suppression cylinders mounted on the vehicle, a four cylinder, or a six cylinder system. Both system variants consists of two zones of protection, a front tire zone and a rear tire/fuel zone.

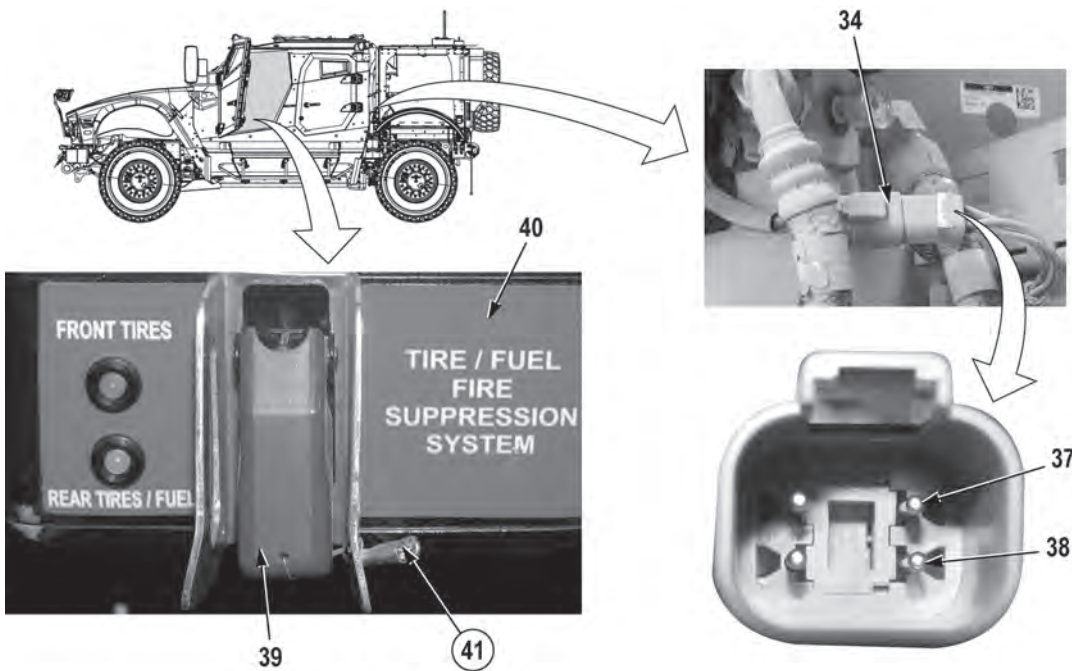
- The four cylinder system front tire zone has two cylinders mounted on the driver and passengers side front bumper area. The rear tire/fuel zone has two cylinders located forward of each rear wheel.
 - The six cylinder system front tire zone has four cylinders located on the driver and passenger side front bumper and splash guards. The rear tire/fuel zone has two cylinders located near the driver and passenger side antenna rack.
1. Visually inspect wiring, connectors, pressure gauges, cylinders, and discharge hoses. Replace or repair as required.



NOTE

- All connectors are tested the same way. Driver side rear shown.
 - Tag and mark connectors prior to removal to ensure proper installation.
2. Disconnect connector (34) on cylinder system.
 3. Battery disconnect switch ON.
 4. Place ignition switch to ON (engine off).
 5. Using a multimeter, test for 22 to 28 VDC between pin 3 (35) and pin 4 (36).

6. If 22 to 28 VDC is not present between pin 3 (35) and pin 4 (36), proceed to appropriate troubleshooting task in (WP 0014).
7. Place ignition switch to OFF.
8. Battery disconnect switch OFF.
9. Connect connector (34) on cylinder system.
10. Repeat Steps (1) through (8) for remaining connectors on four bottle or six bottle cylinder systems.



CAUTION

Ensure all connectors remain disconnected while performing Steps (11) through (22). Failure to comply may result in damage to equipment.

11. Disconnect six connectors (34) on six bottle cylinder systems or four connectors on four bottle cylinder systems.
12. Remove safety wire (41) from undercarriage controller (40) and switch (39). Discard safety wire (41).
13. Position switch (39) in the ON position.
14. Battery disconnect switch ON.
15. Place ignition switch to ON (engine off).
16. Using a multimeter, test for 22 to 28 VDC between pin 1 (37) and pin 2 (38) on connector (34).
17. If 22 to 28 VDC is not present between pin 1 (37) and pin 2 (38) proceed to appropriate troubleshooting task in (WP 0014).

18. Repeat Steps (16) and (17) for remaining connectors.
19. Place ignition switch to OFF.
20. Battery disconnect switch OFF.
21. Position switch (39) on undercarriage controller (40) in the OFF position and secure switch (39) on undercarriage controller (40) with new safety wire (41).
22. Connect six connectors (34) on six cylinder systems, or four connectors on four cylinder systems.
23. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FIRE SUPPRESSION SYSTEM TUBE AND DIFFUSER REPLACEMENT (WALL MOUNT CYLINDER)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Fire suppression cylinder (capsule) removed
 (WP 0066)

Tools and Special Tools

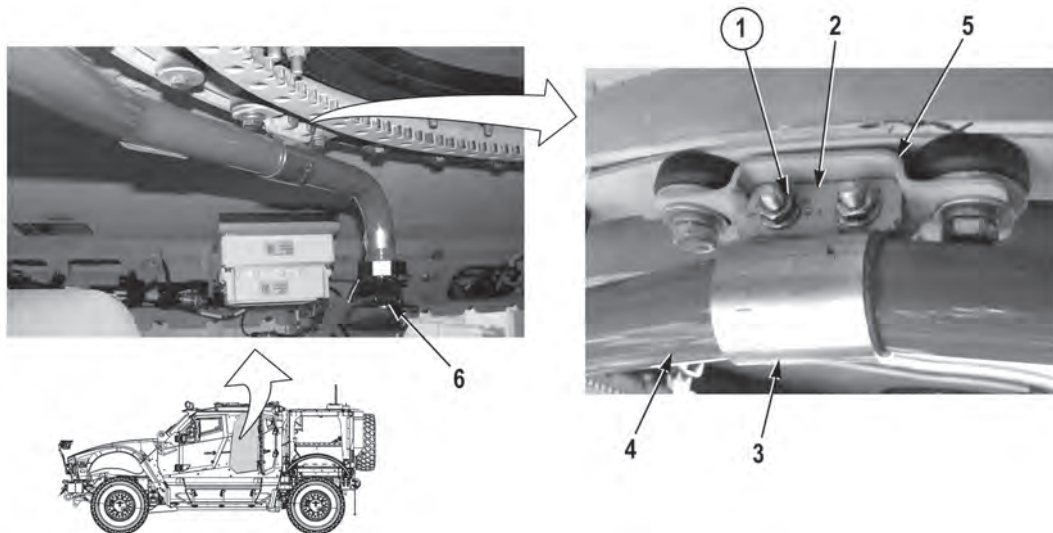
Tool Kit, General Mechanic's: Automotive
 Wrench, Adjustable, 0 to 3-5/8 in. Jaw

Materials/Parts

Locknut (4) (Item 1)
 Ties, Cable

Follow-On Maintenance

Install fire suppression cylinder (capsule)
 (WP 0066)
 Remove and stow wheel chocks

REMOVAL**NOTE**

Remove cable ties as required.

1. Remove four locknuts (1), two plates (2), hangers (3), and tube (4) from two brackets (5). Discard locknuts (1).

NOTE

Note position and placement of hangers prior to removal to ensure proper installation.

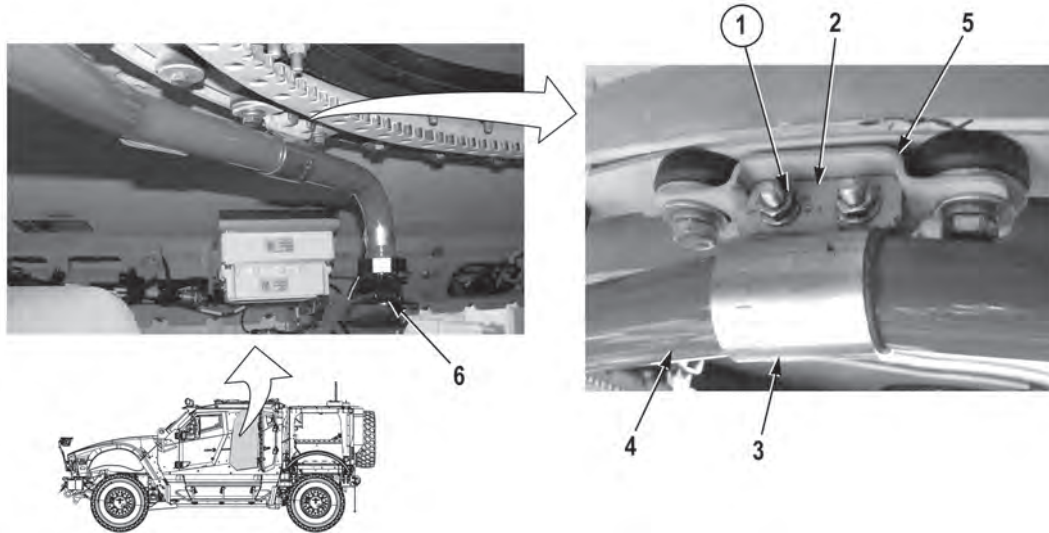
2. Remove two hangers (3) from tube (4).

NOTE

Perform Step (3) if removing diffuser.

3. Remove diffuser (6) from tube (4).

END OF TASK

INSTALLATION**NOTE**

Perform Step (1) if diffuser was removed.

1. Install diffuser (6) on tube (4).

NOTE

Position hangers as noted prior to removal.

2. Position two hangers (3) on tube (4).
3. Install two hangers (3), plates (2), and tube (4) on two brackets (5) with four new locknuts (1).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AXLE DIFFERENTIAL DRAIN/FILL

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

References

TM 9-2355-335-10

Tools and Special Tools

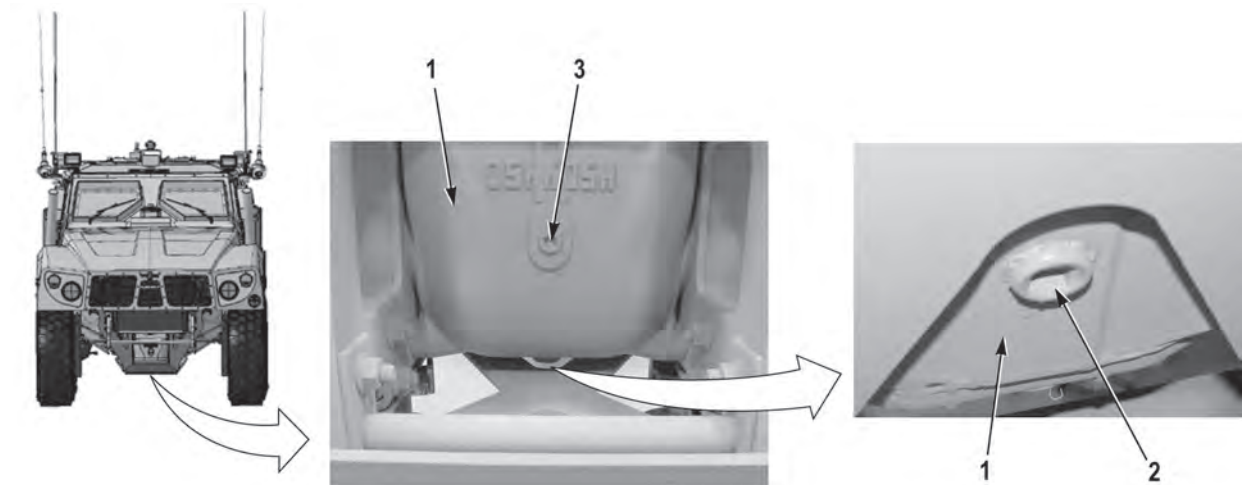
Pan, Drain
 Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

Remove and stow wheel chocks

Materials/Parts

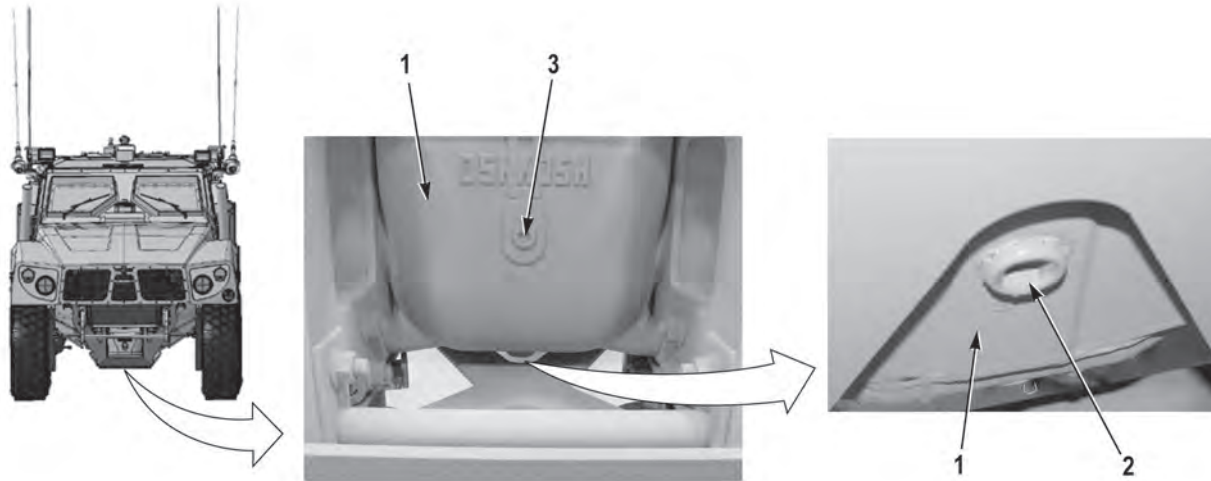
Compound, Sealing, Loctite 592
 Oil, Gear

DRAIN**NOTE**

- Ensure vehicle is on a level surface prior to performing this task.
- Both differentials are drained and filled the same way. Axle No. 1 shown.

1. Position drain pan under differential (1).
2. Remove drain plug (2) from differential (1).
3. Remove fill plug (3) from differential (1).
4. Drain differential (1) completely.
5. Clean all metal shavings from drain plug (2).

END OF TASK

FILL**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of two plugs (2 and 3).

CAUTION

Drain plug is magnetized and can not be exchanged with fill plug. Failure to comply may result in damage to equipment.

2. Install drain plug (2) in differential (1).
3. Fill differential (1) through hole for fill plug (3) until level of oil is even with fill hole.
4. Install fill plug (3) in differential (1).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

WHEEL/TIRE ASSEMBLY REPLACEMENT

Preconditions

Spare tire unstowed (WP 0038)

Personnel Required

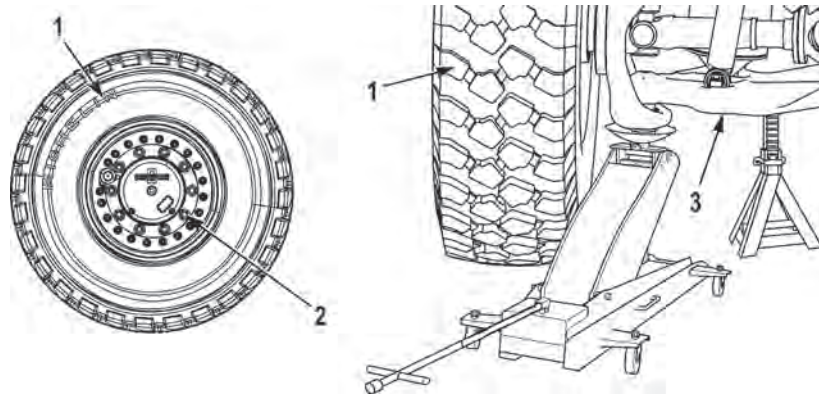
Two

Tools and Special Tools

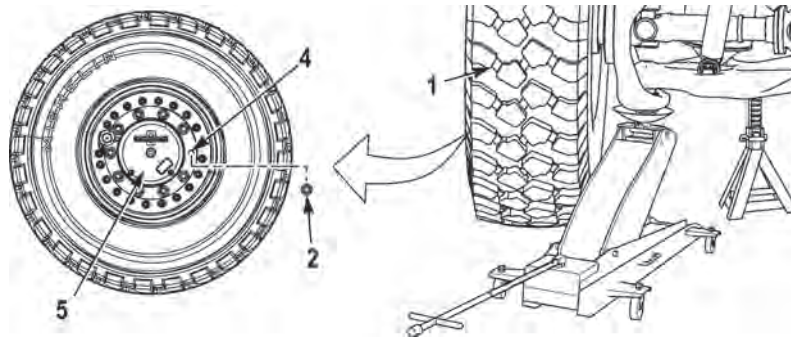
Floor Jack
 Jack Stand
 Lifting Device
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 600 ft-lb

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

- All wheel/tire assemblies are removed the same way. Passenger front shown.
 - Perform Step (1) if wheel studs are damaged.
1. Completely deflate tire (1) (TM 9-2355-335-10).
 2. Loosen ten lugnuts (2) on wheel/tire assembly (1). Do not remove lugnuts.
 3. Position hydraulic jack under lower control arm (3).
 4. Raise tire (1) until tire (1) is no longer touching ground.
 5. Support lower control arm (3) with jack stand.



WARNING

- Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.
- Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.
- Standard M1240A1 tire assembly weighs 600 lbs (272.4 kg). Do not attempt to lift or move tire assembly without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

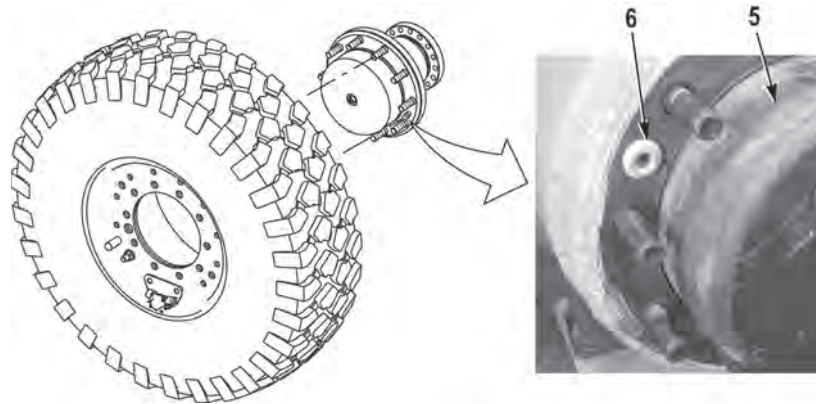
CAUTION

Use care when removing wheel/tire assembly. Dragging wheel/tire assembly across studs may result in damage to studs. Failure to comply may result in damage to equipment.

NOTE

Note position of CTIS valve prior to removal to ensure proper installation.

6. Remove ten lugnuts (2) from studs (4) and, with the aid of an assistant and a lifting device, remove tire (1) from wheel end assembly (5).

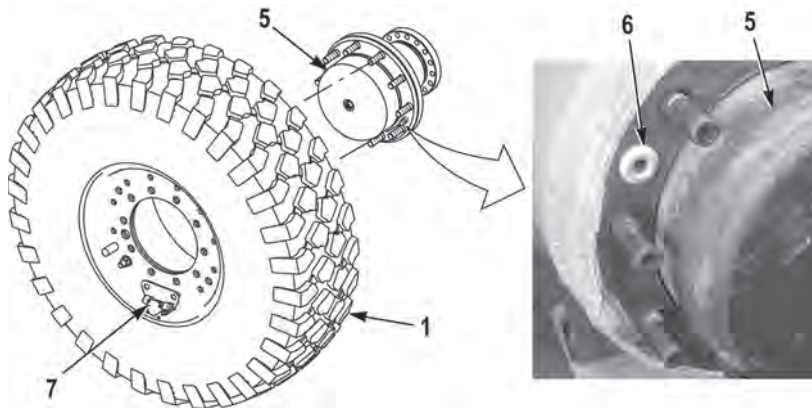
**WARNING**

Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.

7. Remove CTIS port seal (6) from wheel end assembly (5).

END OF TASK

INSTALLATION



1. Install CTIS port seal (6) on wheel end assembly (5).

WARNING

- Spare tire weighs 380 lbs (172. kg). Do not attempt to lift or move spare tire without the aid of two assistants and a lifting device. Failure to comply may result in injury or death to personnel.
- Standard M1240A1 tire assembly weighs 600 lbs (272.4 kg). Do not attempt to lift or move tire assembly without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

CAUTION

Use care when installing wheel/tire assembly. Dragging wheel/tire assembly across studs may result in damage to studs. Failure to comply may result in damage to equipment.

2. With the aid of an assistant, roll tire (1) up to wheel end assembly (5).

WARNING

Do not lower jack completely until tightening sequence is complete. Failure to comply may result in injury or death to personnel.

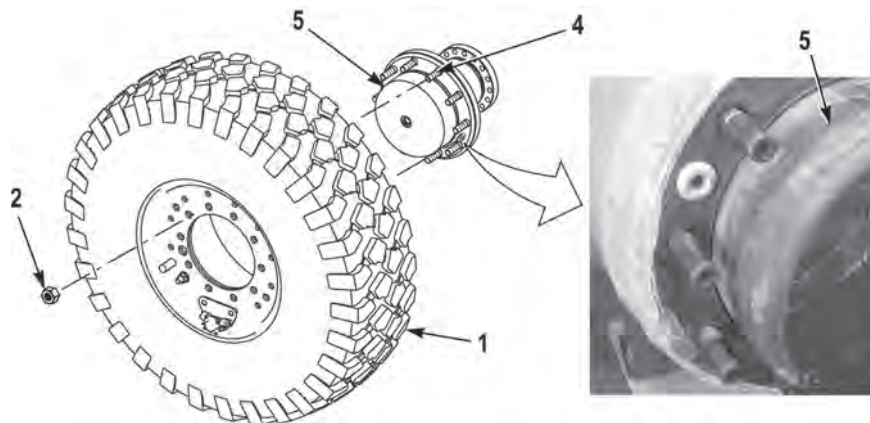
CAUTION

Position tire assembly so that CTIS hole in tire assembly is aligned with CTIS port. Damage to CTIS system may result if tire assembly is not correctly installed. Failure to comply may result in damage to equipment.

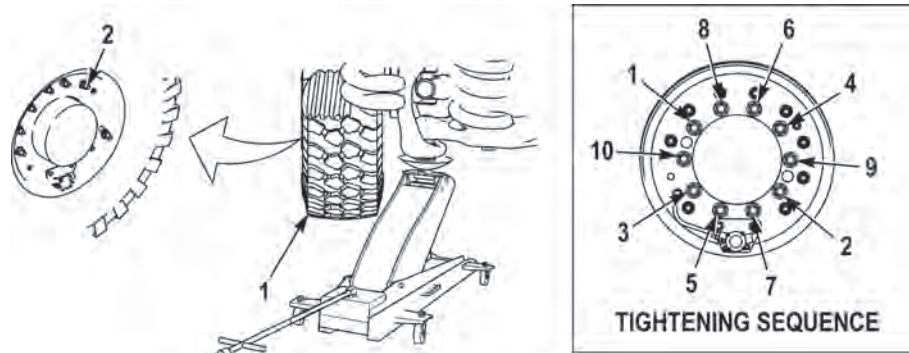
NOTE

Tire assembly should have CTIS valve facing outward.

3. With the aid of an assistant, line up CTIS valve (7) in tire (1) with CTIS port seal (6) in wheel end assembly (5) as noted prior to removal.



4. With the aid of an assistant, line up ten holes in tire (1) with ten studs (4) on wheel end assembly (5).
5. Install ten lugnuts (2) on studs (4). Tighten lugnuts until snug.
6. Remove jack stand.



7. Lower tire (1) until tire (1) contacts ground.
8. Alternately tighten ten lugnuts to 450 - 500 lb-ft (610 -678 N•m) (2) in sequence shown.
9. Lower jack and remove from under vehicle.

NOTE

Perform Steps (10) through (14) as required.

10. Stow flat tire (WP 0038, M1240), (WP 0039, M1240A1), or (WP 0040, M1245).
11. Start engine (TM 9-2355-335-10).
12. Operate CTIS (TM 9-2355-335-10).
13. Check tire and CTIS valve for leaks.

14. Shut OFF engine (TM 9-2355-335-10).

WARNING

If 395/85/20 tire was installed, configure vehicle in accordance with spare tire limp home procedure (TM 9-2355-335-10) prior to operating vehicle. Failure to comply may result in injury or death to personnel.

NOTE

Perform Step (15) if 395/85/20 tire was installed.

15. Perform Spare Tire Limp Home Procedures (TM 9-2355-335-10).

END OF WORK PACKAGE

COIL SPRING AND SEAT REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured (if removing front)
 Wheel/Tire removed (TM 9-2355-335-10)
 Shock absorbers removed (M1240/M1245)
 (WP 0092)
 Shock absorbers removed (M1240A1) (WP 0093)

Tools and Special Tools

Driver, Bearing, 2.00 in.
 Jack, Floor
 Socket, 1-1/8 in.
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (Item 3)
 Pin, Spring (Item 10)
 Pin, Spring (Item 11)

Materials/Parts (continued)

Seal (2) (Item 15)
 Bearing (Item 16)
 Grease, Automotive and Artillery
 Lubricating Oil, Gear

References

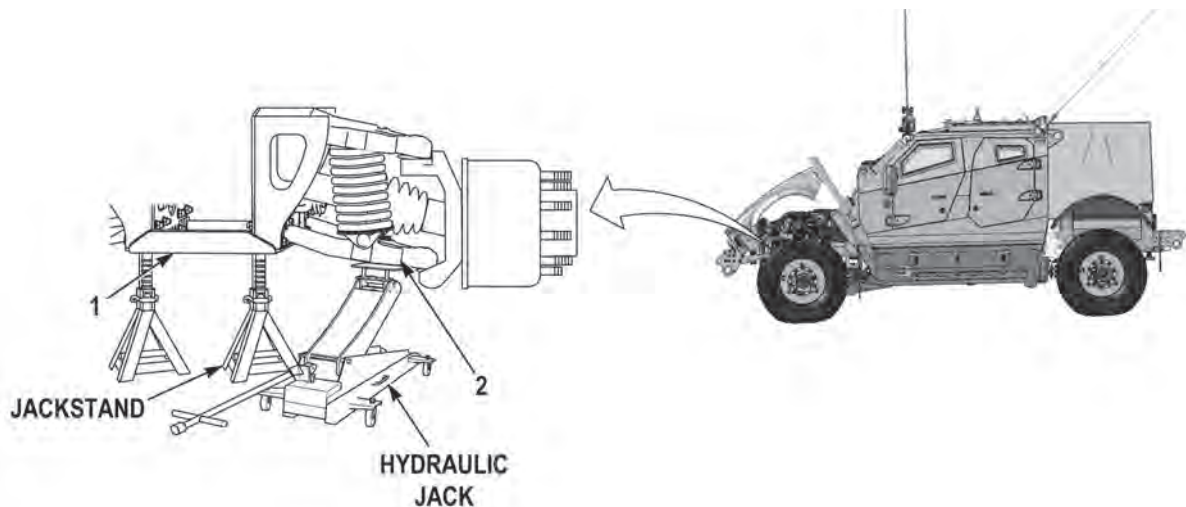
TM 9-2355-335-10

Personnel Required

Two

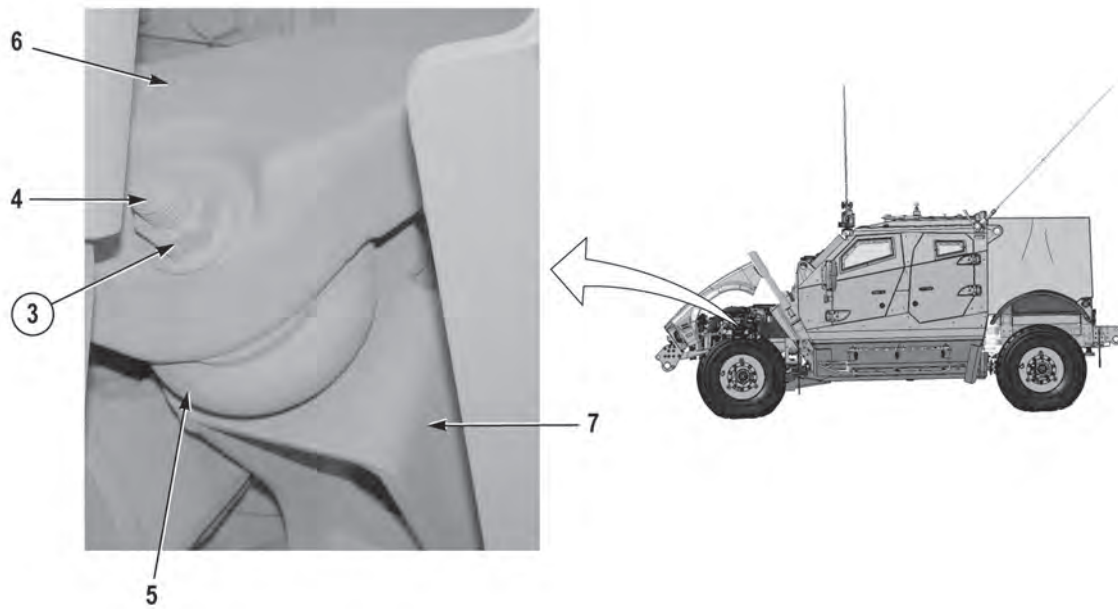
Follow-On Maintenance

Install shock absorbers (M1240/M1245)
 (WP 0092)
 Install shock absorbers (M1240A1) (WP 0093)
 Install wheel/tire (TM 9-2355-335-10)
 Lubricate spring seat
 Close hood and secure (if front installed)
 Remove and stow wheel chocks

REMOVAL**NOTE**

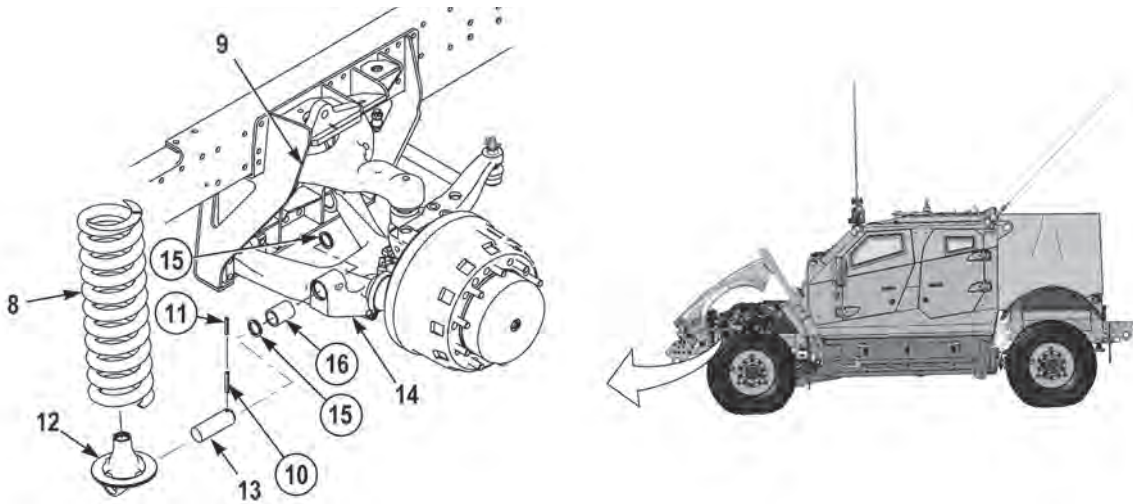
All coil springs are removed the same way.

1. Position two jackstands under skid plate (1).
2. Position hydraulic jack under lower control arm (2).
3. Raise lower control arm (2).



NOTE

- Perform Step (4) to remove rebound bumper. Axle No. 1 driver side shown.
 - Turning front wheels improves access to front rebound bumpers.
4. Remove locknut (3), screw (4), and rebound bumper (5) from upper control arm (6) and side plate (7). Discard locknut (3).



WARNING

- **Coil spring weighs 110 lbs (50 kg). Do not lift or move coil spring without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.**
- **Coil spring is under extreme spring tension and can act as a projectile when removed. Lower the lower control arm very slowly to keep spring from releasing uncontrollably. Failure to comply may result in injury or death to personnel.**
- **Spring may come free from vehicle while lowering jack. Spring may have to be rotated to aid in removal. Failure to comply may result in injury or death to personnel.**

NOTE

Spring may have to be rotated to aid in removal.

5. With the aid of an assistant, slowly lower hydraulic jack until top of coil spring (8) is free from side plate (9).

NOTE

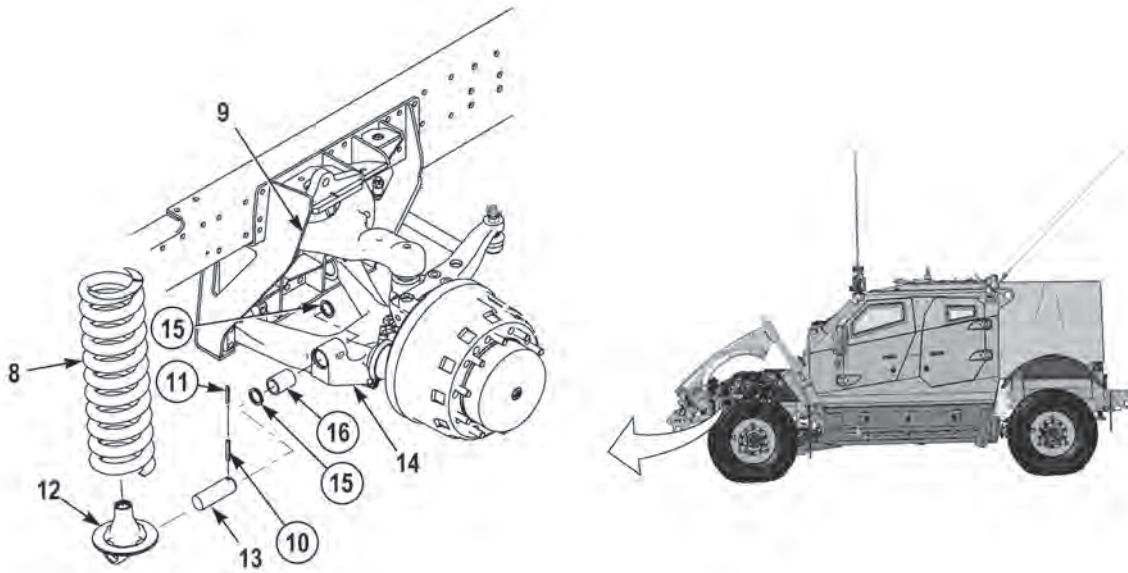
- Perform Steps (6) through (8) only if spring seat needs to be removed.
 - Spring pin (11) is installed inside of spring pin (10).
 - Spring pin must be removed from rear of vehicle towards front of vehicle.
6. Remove spring pin (10) and spring pin (11) from spring seat (12) and spring pivot pin (13). Discard spring pin (10) and spring pin (11).
 7. Remove spring pivot pin (13) and spring seat (12) from lower control arm (14).
 8. Remove two seals (15) from lower control arm (14). Discard seals (15).

NOTE

Bearing must be driven out from outside of control arm.

9. Remove bearing (16) from lower control arm (14) using bearing driver.

END OF TASK

INSTALLATION**CAUTION**

Use care when installing new bearing, to prevent accidental damage to bearing. Failure to comply may result in damage to equipment.

NOTE

- Coil springs are installed the same way.
- Perform Steps (1) through (7) only if spring seat and spring guide tube were removed.
- Hole in bearing must be aligned with fitting in lower control arm.

1. Install new bearing (16) in lower control arm (14) using bearing driver. Lightly tap bearing (16) until seated.

NOTE

Lip of seal must face outward when installed.

2. Lightly lubricate two new seals (15) with clean oil on the inside of seal (15).
3. Install two seals (15) in lower control arm (14).
4. Install spring seat (12) on lower control arm (14).

NOTE

- Hole in spring pivot pin must be aligned with hole for spring pin in spring seat.
- Do not invert lip of seal when installing spring pivot pin.
- Do not use a hammer to install spring pivot pin.

5. Apply automotive and artillery grease to new spring pivot pin (13).

NOTE

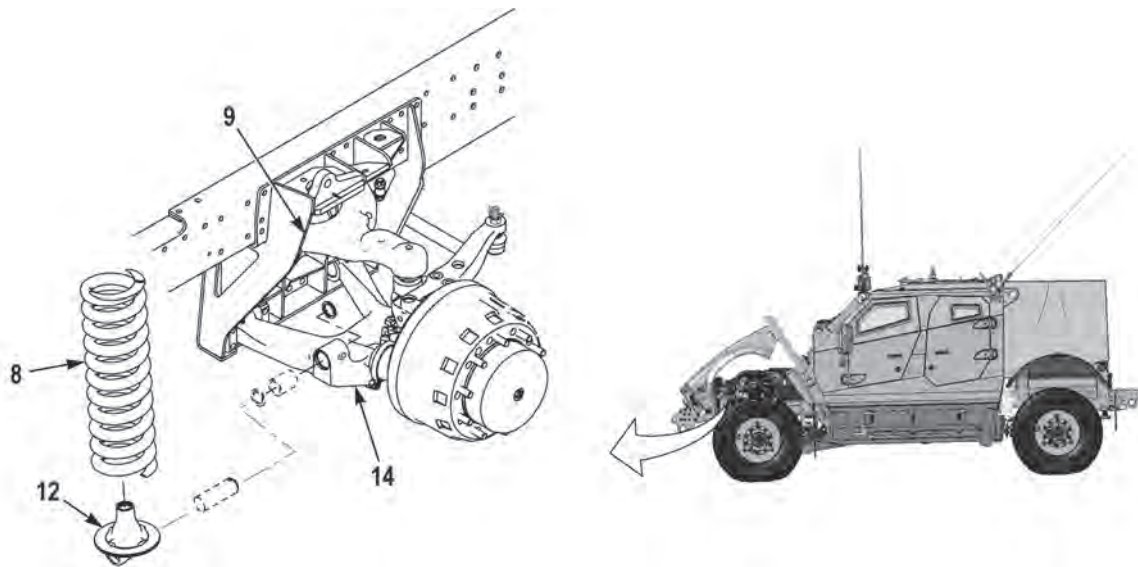
To aid in installation, rotate spring pivot pin back and forth while pressing spring pivot pin into lower control arm until spring pivot pin is completely installed.

6. Install spring pivot pin (13) in spring seat (12) and lower control arm (14).

NOTE

Spring pin (11) is installed inside spring pin (10).

7. Install new spring pin (10) and new spring pin (11) in spring pivot pin (13).
8. Stand coil spring (8) on either end.

**WARNING**

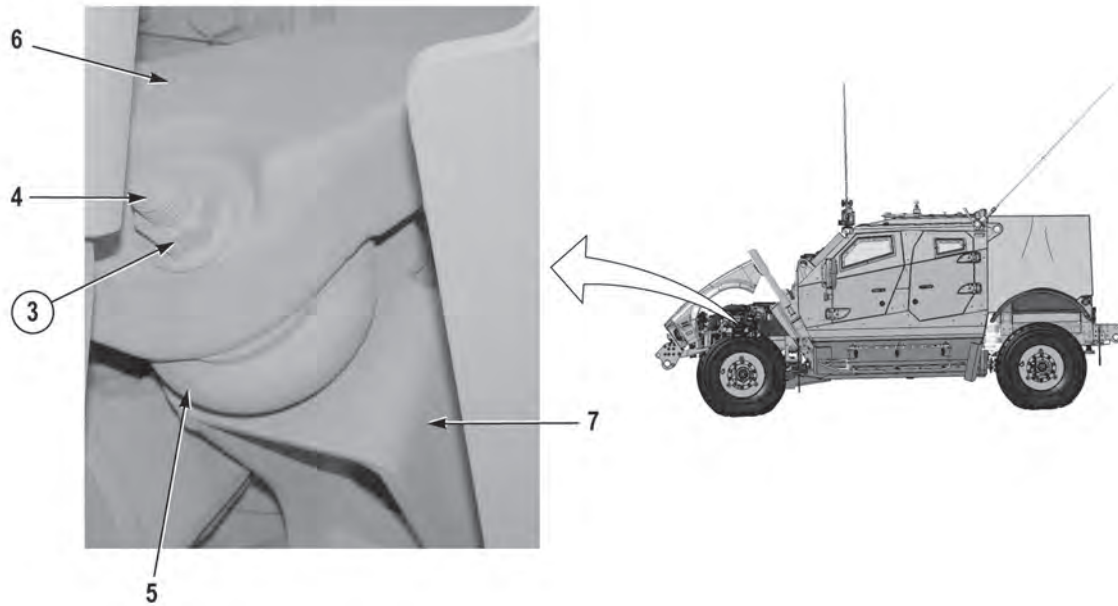
Coil spring weighs 110 lbs (50 kg). Do not lift or move coil spring without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

9. With the aid of an assistant, position coil spring (8) over spring seat (12) and under side plate (9).

WARNING

Coil spring is under extreme spring tension and can act as a projectile when installed. Raise the lower control arm very slowly to keep spring from releasing uncontrollably. Failure to comply may result in injury or death to personnel.

10. Raise lower control arm (14).

**NOTE**

Perform Step (11) to install rebound bumper. Axle No. 1 driver side shown.

11. Install rebound bumper (5) on side plate (7) and upper control arm (6) with screw (4) and new locknut (3).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CONTROL ARM BALL JOINT REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured
Coil spring removed (WP 0079)
Spider/spindle removed (WP 0095)

Tools and Special Tools

Boot Driver, 4 in.
Dial Caliper, 6 in.
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 600 ft-lbs

Materials/Parts

Ball Joint Boot Ring (Item 6)
Ball Joint Boot (Item 7)
Retaining Ring (Item 8)
O-Ring (Item 10)
Shim, 0.005 in. (0.127 mm) (Item 11 and 13, as required)
Shim, 0.007 in. (0.178 mm) (Item 11 and 13, as required)
Shim, 0.008 in. (0.203 mm) (Item 11 and 13, as required)

Materials/Parts (continued)

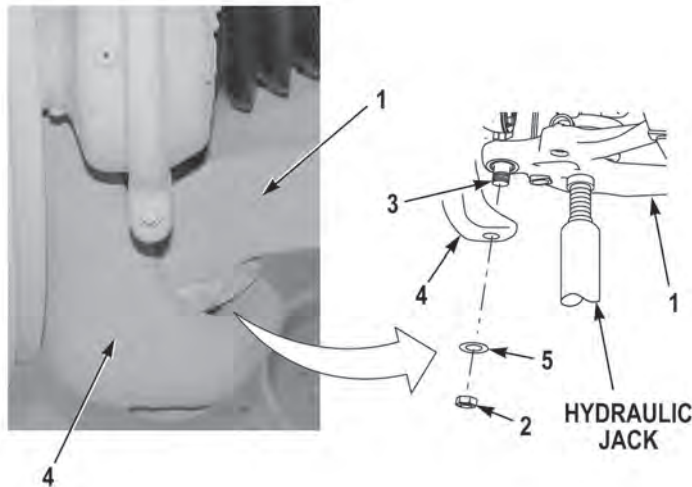
Compound, Sealing, Loctite 242
Compound, Sealing, Loctite 592
Grease, Automotive and Artillery
Lubricating Oil, Engine

Personnel Required

Two

Follow-On Maintenance

Install spider/spider (WP 0095)
Install coil spring (WP 0079)
Close hood
Remove and stow wheel chocks

REMOVAL**WARNING**

Wheel end assembly weighs 550 lbs (249 kg). Do not remove lower and upper control arm ball joints at the same time. Failure to comply may result in injury or death to personnel.

NOTE

All ball joints are removed the same way. Lower ball joint shown.

1. Position hydraulic jack under center of lower control arm (1).

WARNING

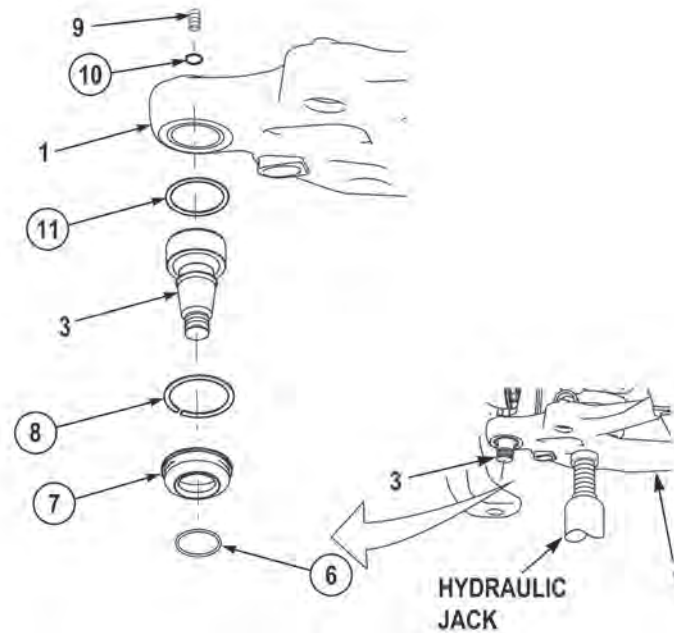
Do not remove nut until lower control arm is separated from knuckle. Failure to comply may result in injury or death to personnel.

2. Loosen nut (2) one rotation on control arm ball joint (3). Do not remove nut (2).
3. Raise control arm (1).
4. With the aid of an assistant and a pry bar, apply pressure between knuckle (4) and control arm (1) while striking on side of knuckle (4) until control arm ball joint (3) is loosened from knuckle (4).

WARNING

Wheel end assembly weighs 550 lbs (249 kg). Ensure wheel end is supported prior to removing nut. Failure to comply may result in injury or death to personnel.

5. Remove nut (2), washer (5), and control arm ball joint (3) from knuckle (4).



6. Remove ball joint boot ring (6) and ball joint boot (7) from control arm ball joint (3). Discard ball joint boot ring (6) and ball joint boot (7).

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being removed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

7. Remove retaining ring (8) from control arm (1). Discard retaining ring (8).
8. Remove plug (9) and O-ring (10) from control arm (1). Discard O-ring (10).

NOTE

To aid in removal of lower control arm ball joint, position brass punch through plug hole of lower control arm and tap lightly on lower control arm ball joint.

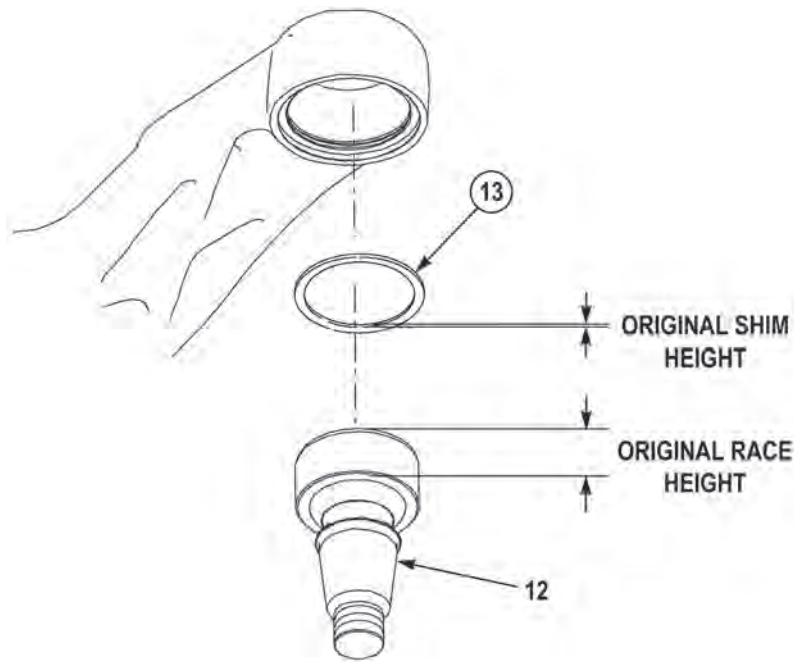
9. Remove control arm ball joint (3) from control arm (1).

NOTE

Number of shims may vary.

10. Remove shim(s) (11) from control arm (1). Do not discard shim(s) (11).
11. Clean all debris from ball joint socket in control arm (1).

END OF TASK

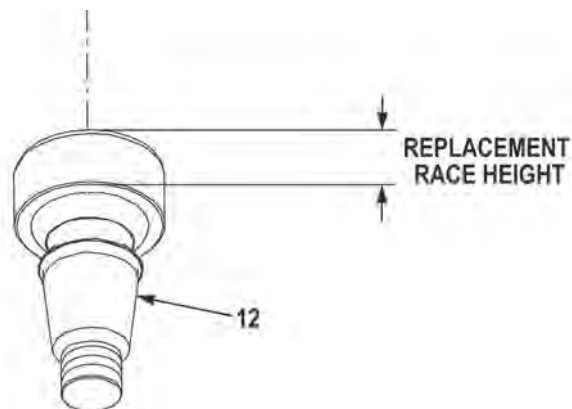
INSPECTION**NOTE**

- Perform inspection to determine height of new shim(s) for upper and lower control arms.
 - Procedure for determining new shim height is same for upper and lower control arms. Upper control arm shown.
 - Use dial caliper for all measurements. Measure to nearest .001 in.
1. Using dial caliper, measure and record race height of original upper control arm ball joint (12). Label value as "original race height."

NOTE

Shim stack is measured near inside diameter to avoid curled edge near outside diameter.

2. Measure and record height of original shim(s) (13). Label value as "original shim height."
3. Add original race height to original shim height. Label value as "original height."



4. Measure and record race height of replacement upper control arm ball joint (12). Label value as "replacement race height."
5. Subtract replacement race height from original height. Label value as "shim height."

NOTE

Measurement of 0.004 in. (0.102 mm) is added to shim height to account for retaining ring tolerance.

6. Add 0.004 in. (0.102 mm) to shim height. Record this number as "new shim height."
7. Discard original shim(s) (13).
8. Select new replacement shim(s) (13) to equal new shim height.

Table 1. Shim Table (in.)

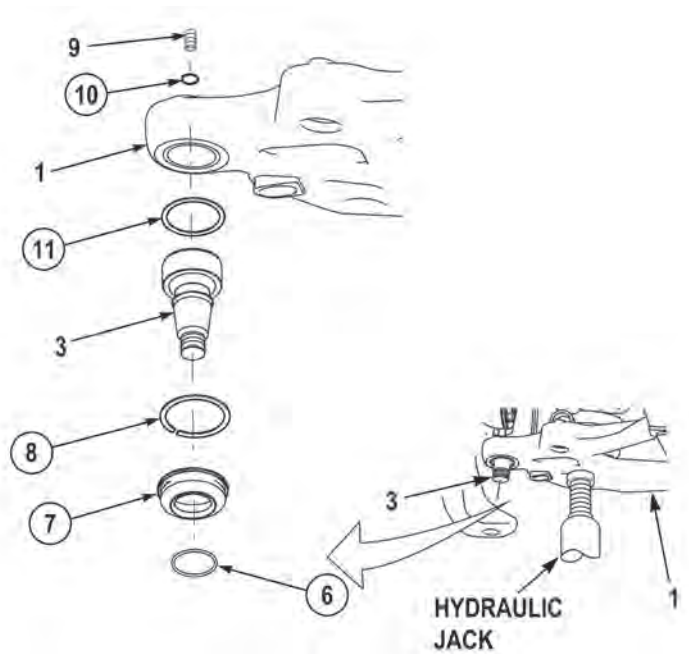
Shim sizes: 0.005 in., 0.007 in., and 0.008 in.		
0.005 = 0.005	0.012 = 0.005 + 0.007	0.019 = 0.005 + 0.007 + 0.007
0.006 = round to 0.007	0.013 = 0.005 + 0.008	0.020 = 0.005 + 0.007 + 0.008
0.007 = 0.007	0.014 = 0.007 + 0.007	0.021 = 0.007 + 0.007 + 0.007
0.008 = 0.008	0.015 = 0.008 + 0.007	0.022 = 0.007 + 0.007 + 0.008
0.009 = round to 0.010	0.016 = 0.008 + 0.008	0.023 = 0.007 + 0.008 + 0.008
0.010 = 0.005 + 0.005	0.017 = 0.005 + 0.005 + 0.007	0.024 = 0.008 + 0.008 + 0.008
0.011 = round to 0.012	0.018 = 0.005 + 0.005 + 0.008	0.025 = 0.005 + 0.005 + 0.007 + 0.008

Table 2. Metric Conversion Shim Table (mm)

Shim sizes: 0.127 mm, 0.178 mm, and 0.203 mm		
0.127 = 0.127	0.305 = 0.127 + 0.178	0.483 = 0.127 + 0.178 + 0.178
0.152 = round to 0.178	0.330 = 0.127 + 0.203	0.508 = 0.127 + 0.178 + 0.203
0.178 = 0.178	0.356 = 0.178 + 0.178	0.534 = 0.178 + 0.178 + 0.178
0.203 = 0.203	0.381 = 0.203 + 0.178	0.559 = 0.178 + 0.178 + 0.203
0.229 = round to 0.254	0.406 = 0.203 + 0.203	0.584 = 0.178 + 0.203 + 0.203
0.254 = 0.127 + 0.127	0.432 = 0.127 + 0.127 + 0.178	0.609 = 0.203 + 0.203 + 0.203
0.279 = round to 0.305	0.457 = 0.127 + 0.127 + 0.203	0.635 = 0.127 + 0.127 + 0.178 + 0.203

END OF TASK

INSTALLATION



NOTE

All ball joints are installed the same way. Lower ball joint shown.

1. Lightly lubricate ball joint socket in control arm (1) with grease.
2. Install new shim(s) (11) in control arm (1).
3. Install lower control arm ball joint (3) in control arm (1) until seated.

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

4. Install new retaining ring (8) on control arm (1).

NOTE

Perform Steps (5) through (9) if retaining ring cannot be installed in control arm.

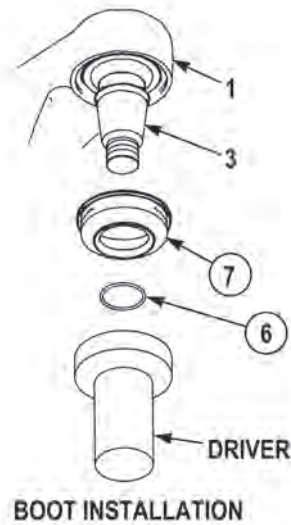
5. Remove retaining ring (8), lower control arm ball joint (3), and shim(s) (11) from control arm (1).

-
6. Subtract 0.002 in. (0.051 mm) from new shim height. Label value as “adjusted shim height.”
 7. Select replacement shim(s) (11) to equal adjusted shim height.
 8. Repeat Steps (3) and (4).
 9. Fill cavity under plug (9) with grease and wipe away excess grease.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

10. Apply sealing compound, Loctite 592, to threads of plug (9).
11. Lightly lubricate O-ring (10) with clean oil.
12. Install new O-ring (10) and plug (9) in control arm (1).



13. Install new ball joint boot ring (6) on new ball joint boot (7).

NOTE

Do not apply grease to region of control arm that will contact ball joint boot.

14. Apply approximately 1 cubic inch of grease to neck of control arm ball joint (3).

CAUTION

Do not fill ball joint boot with too much grease. If boot is bulging when installed, squeeze out excess grease. Failure to comply may result in damage to equipment.

NOTE

Do not apply grease to region of control arm ball joint that will contact control arm.

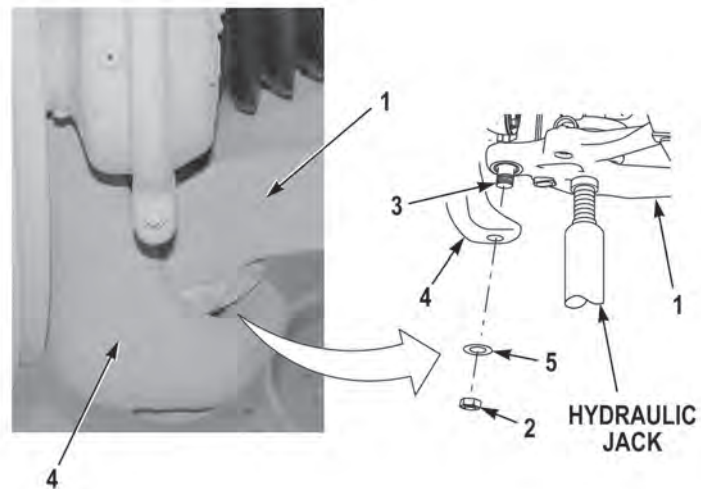
15. Fill ball joint boot (7) with approximately 3 cubic inches of grease.
16. Install ball joint boot (7) on control arm ball joint (3).

CAUTION

Boot damage will result if hammer is allowed to strike soft boot material. Strike only the metal boot band. Failure to comply may result in damage to equipment.

NOTE

- Ensure ball joint boot is seated in control arm bore.
 - Metal boot band must be flush with face of control arm.
17. Using flat-faced hammer, gently strike metal boot band until boot band is flush with bore.



18. With the aid of an assistant, align control arm ball joint (3) with knuckle (4).
19. Press down on control arm (1) until control arm ball joint (3) is seated in knuckle (4).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

20. Apply sealing compound, Loctite 242, to threads of control arm ball joint (3). Install washer (5) and nut (2) on control arm ball joint (3). Tighten nut (2) to 600 lb-ft (814 N•m).
21. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DIFFERENTIAL HOUSING AND DIFFERENTIAL REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Propeller shafts removed (WP 0090)
Halfshaft and seal removed (WP 0084)
Coil spring removed (WP 0079)
Inner shaft removed (WP 0087)
Jounce bumper removed (WP 0088)
Skid plate removed (WP 0094)
Differential fire suppression sensor line removed
(AFES Linear Detection) (WP 0073)

Tools and Special Tools

Jack, Transmission
Lifting Device
Socket, Deep Well, 1-1/8 in.
Tool Kit, General Mechanic's: Automotive
Wrench, 1-1/8 in.

Materials/Parts

Locknut (2) (Item 12)
Locknut (2) (Item 15)
Locknut (2) (Item 23)

Materials/Parts (Continued)

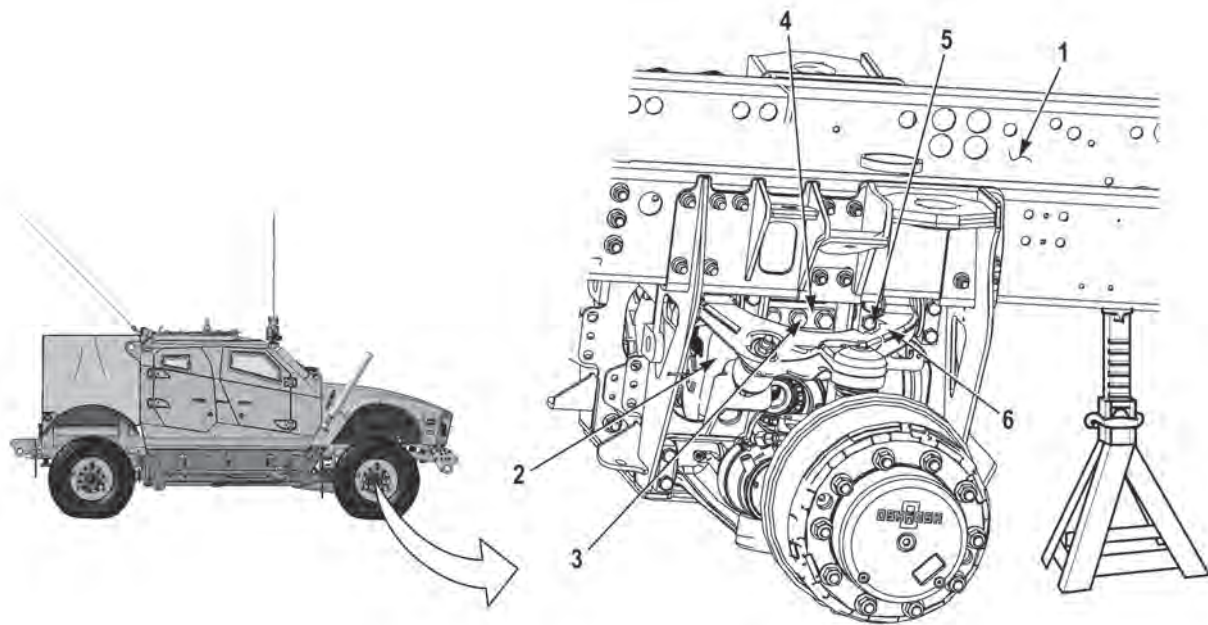
Locknut (2) (Item 25)
Locknut (3) (Item 9)
Cap and Plug Set
Compound, Sealing, Loctite 242
Compound, Sealing, Loctite 515
Compound, Sealing, Loctite 592
Tags, Identification
Ties, Cable

Personnel Required

Two

Follow-On Maintenance

Install differential fire suppression sensor line
(AFES Linear Detection) (WP 0073)
Install skid plate (WP 0094)
Install jounce bumper (WP 0088)
Install inner shaft (WP 0087)
Install coil spring (WP 0079)
Install halfshaft and seal (WP 0084)
Install propeller shafts (WP 0090)
Remove and stow wheel chocks

REMOVAL

1. Support vehicle with two jackstands under frame (1).

CAUTION

Differential housing must be secured to transmission jack with strap. Failure to comply may result in damage to equipment.

2. Position transmission jack under differential housing (2).

NOTE

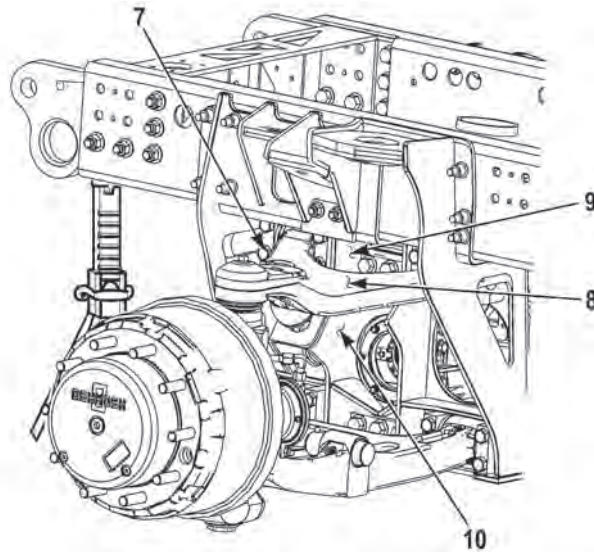
- Axle No. 1 and axle No. 2 differentials are removed the same way except where noted.
- Driver side and passenger side upper screws are removed the same way. Passenger side shown.

3. Remove three upper screws (3) from bulkhead (4) and differential housing (2).

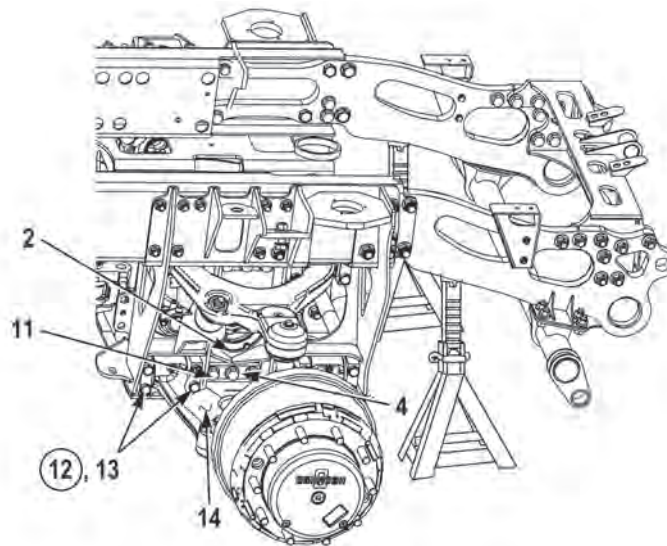
NOTE

- Upper control arm may need to be raised to allow removal of lower screws.
- Perform Step (4) for axle No. 1.
- Perform Step (5) for axle No. 2.

4. Remove screw (5) from upper control arm (6), bulkhead (4), and differential housing (2).



5. Remove screw (7) from upper control arm (8), bulkhead (9), and differential housing (10).



NOTE

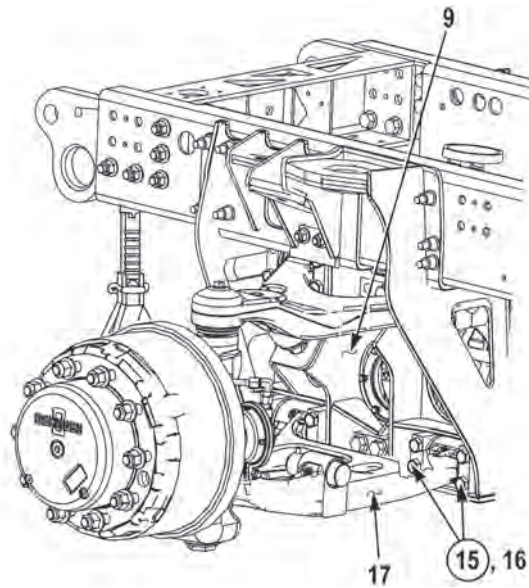
Driver side and passenger side lower screws are removed the same way. Passenger side shown.

6. Remove three screws (11) from bulkhead (4) and differential housing (2).

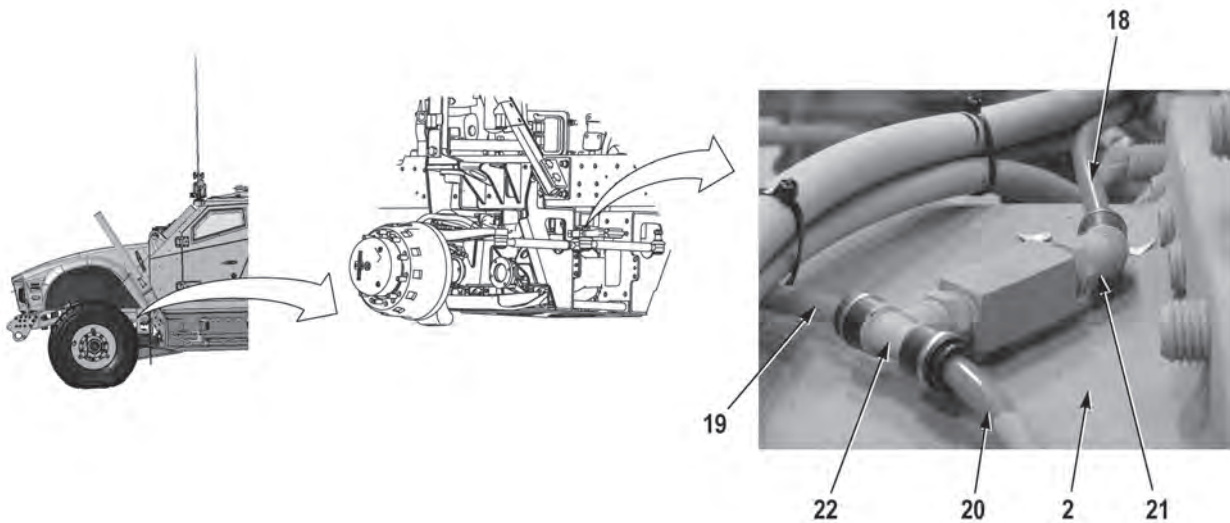
NOTE

- Perform Step (7) for axle No. 1.
- Perform Step (8) for axle No. 2.

7. Remove two locknuts (12) and screws (13) from lower control arm (14) and bulkhead (4). Discard locknuts (12).



8. Remove two locknuts (15) and screws (16) from lower control arm (17) and bulkhead (9). Discard locknuts (15).



WARNING

Front differential housing weighs 250 lbs (113 kg) and rear differential housing weighs 280 lbs (127 kg). Do not lift or move differential housing without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

All differential air lines are removed the same way. Axle No. 1 shown.

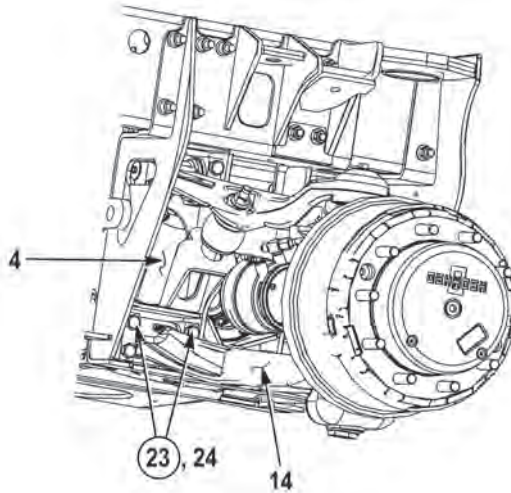
9. With the aid of an assistant and a lifting device, lower differential housing (2) enough to access three air lines (18, 19, and 20).

NOTE

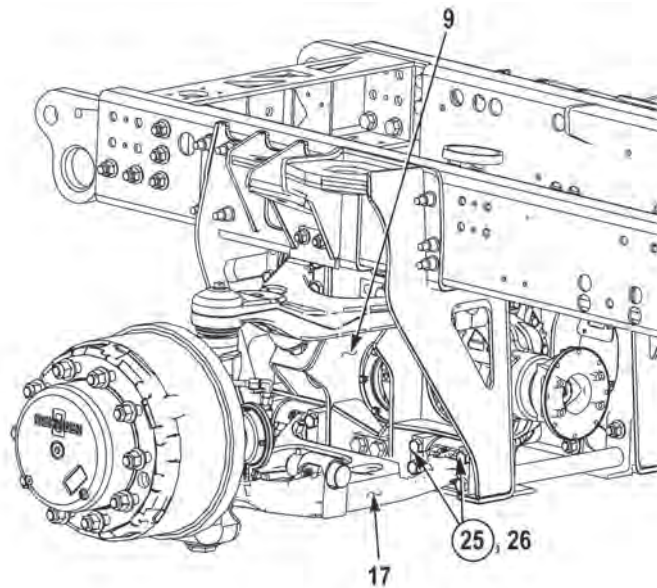
- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.
- Remove cable ties as required.
- Use strap secured to frame to hold air lines from differential housing while removing air lines.

10. Remove air line (18) from fitting (21).

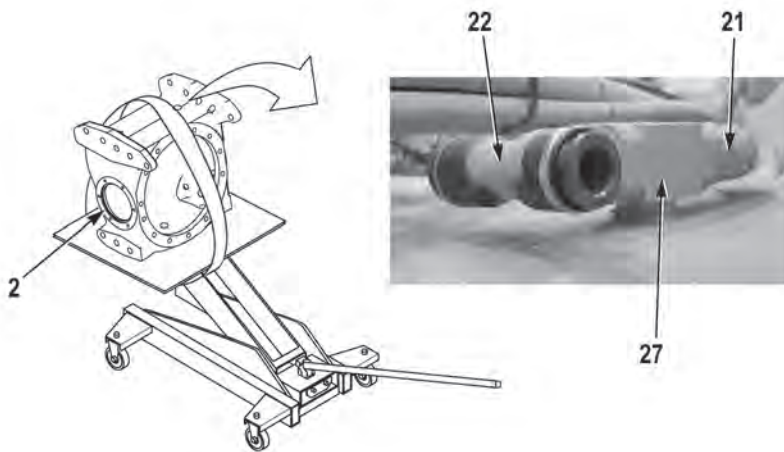
11. Remove two air lines (19 and 20) from fitting (22).

**NOTE**

- Lower control arm must be in raised position to remove screws.
 - Perform Step (12) for axle No.1.
 - Perform Step (13) for axle No. 2.
12. Remove two locknuts (23) and screws (24) from lower control arm (14) and bulkhead (4). Discard locknuts (23).

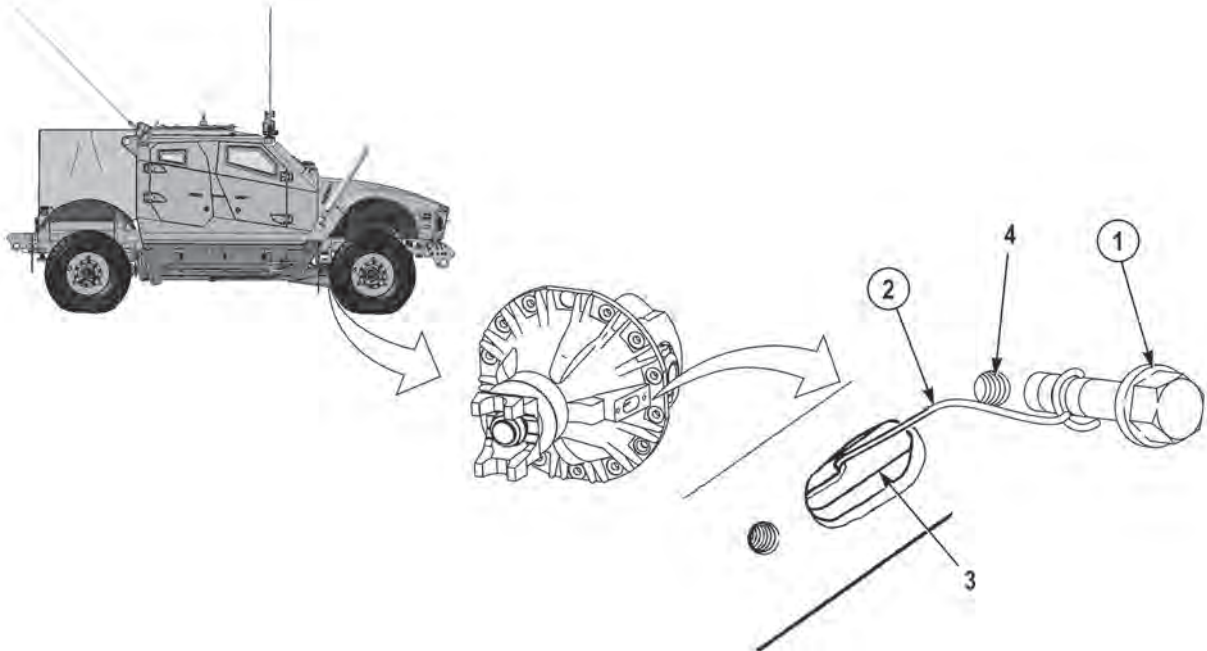


13. Remove two locknuts (25) and screws (26) from lower control arm (17) and bulkhead (9). Discard locknuts (25).



NOTE

- Both differentials are removed the same way. Axle No. 1 differential shown.
 - If removing axle No. 2, top rear screw may have to be loosened. Do not remove screw.
 - Note position of fittings and axle vent prior to removal to ensure proper installation.
14. With the aid of an assistant and a transmission jack, remove differential housing (2) from vehicle.
15. Remove fitting (21) from axle vent (27).
16. Remove fitting (22) from axle vent (27).
17. Remove axle vent (27) from differential housing (2).

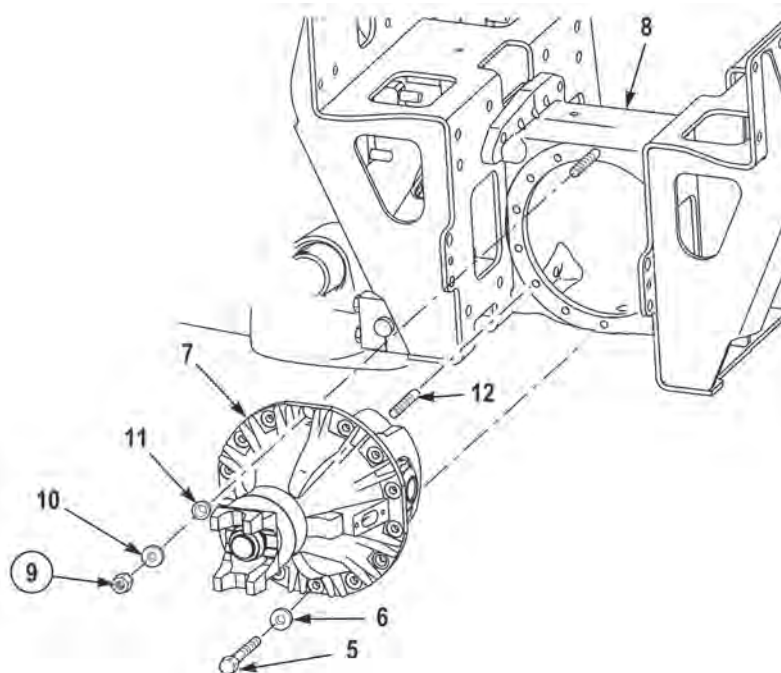
END OF TASK**DIFFERENTIAL REMOVAL****CAUTION**

- Failure to perform Step (1) may result in damage to equipment.
- For removal of differential from housing, install 3/8 x 1/2 in. screw into differential assembly lock-up screw hole prior to removing inner shaft. Failure to comply may result in damage to equipment.

NOTE

Axle No. 1 and axle No. 2 differentials are removed the same way. Axle No. 1 differential is shown.

1. Install screw (1) and wire (2) to retaining fork (3) in differential lock-up screw hole (4).



2. Remove 11 screws (5) and washers (6) from differential assembly (7) and housing (8).

WARNING

Differential assembly weighs 250 lbs (113 kg). Do not lift differential assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

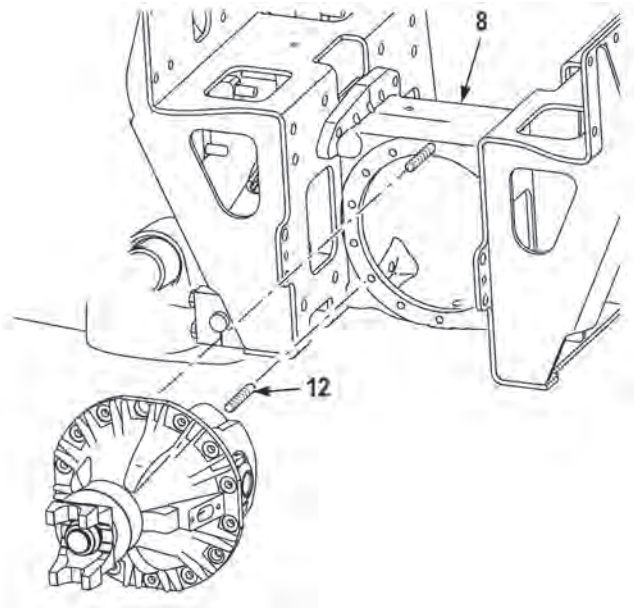
3. Attach lifting device to differential assembly (7).
4. With the aid of an assistant and a lifting device, remove three locknuts (9), washers (10), tapered dowels (11), and differential assembly (7) from three studs (12) and housing (8). Discard locknuts (9).

NOTE

Perform Step (5) only if studs are being removed.

5. Remove three studs (12) from housing (8).

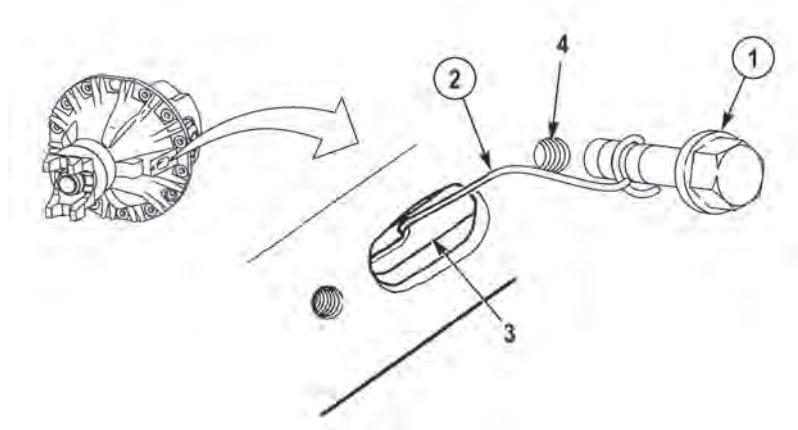
END OF TASK

DIFFERENTIAL INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

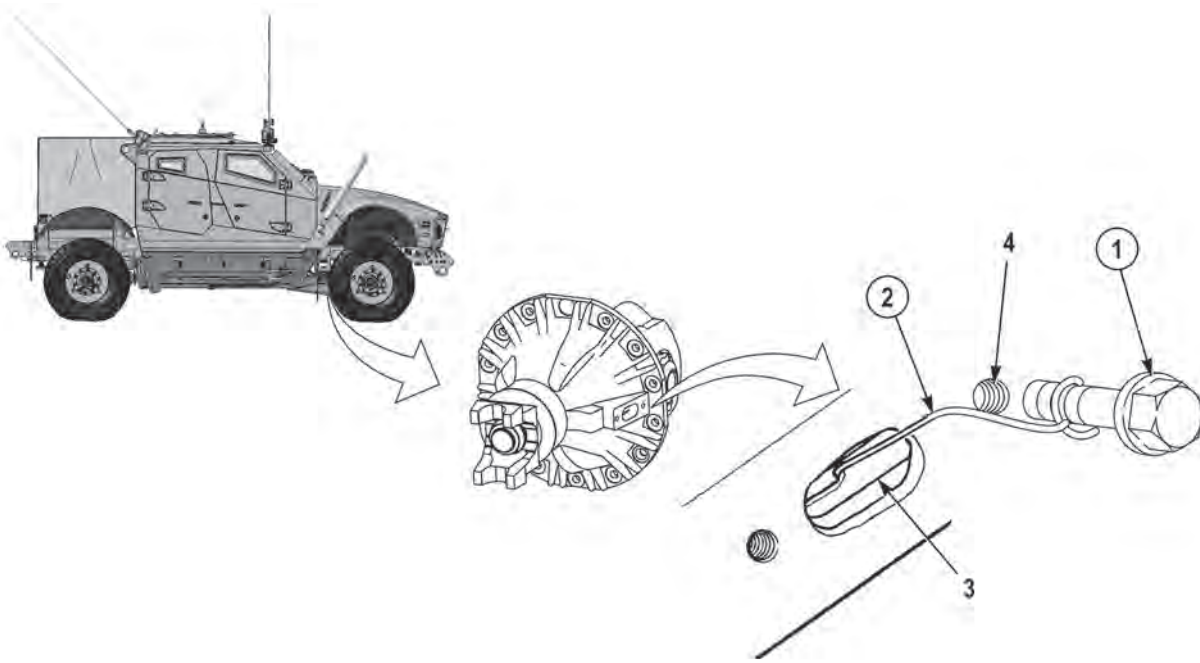
NOTE

- Perform Steps (1) and (2) if studs were removed.
 - Axle No. 1 and axle No. 2 differentials are installed the same way. Axle No. 1 shown.
1. Apply sealing compound, Loctite 515, to threads of three studs (12).
 2. Install three studs (12) in housing (8). Tighten studs (12) to 76 lb-ft (103 N•m).



CAUTION

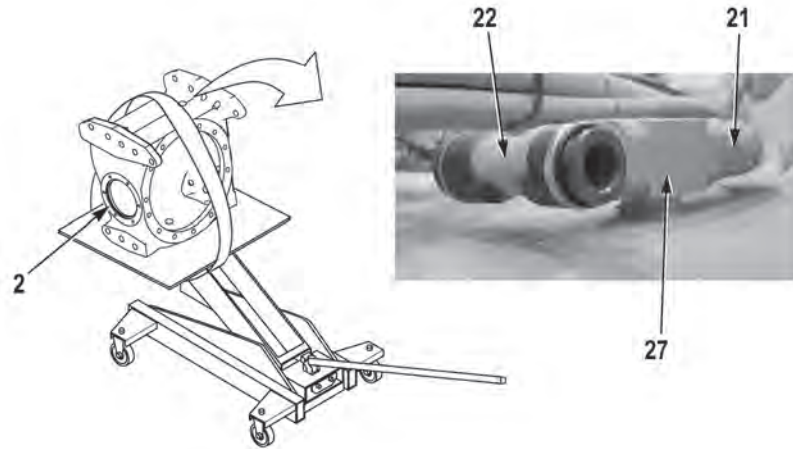
- Failure to perform Step (3) may result in damage to equipment.
 - For installation of differential in housing, install 3/8 x 1/2 inch screw into differential lock-up screw hole prior to installing differential assembly into housing. Failure to comply may result in damage to equipment.
3. Install new screw (1) and new wire (2) to retaining fork (3) in differential lock-up screw hole (4).



11. Remove wire (2) and screw (1) from retaining fork (3) and differential lock-up screw hole (4).

12. Perform all Follow-On Maintenance tasks.

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

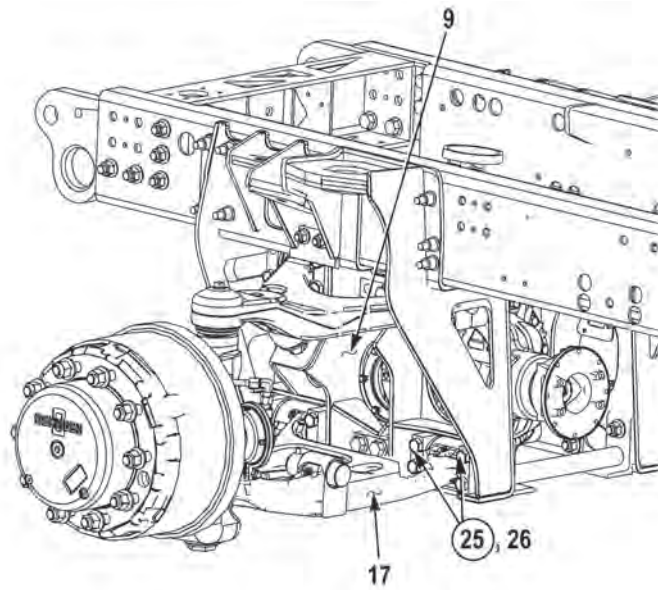
NOTE

Axle No. 1 and axle No. 2 differentials are installed the same way, except where noted.

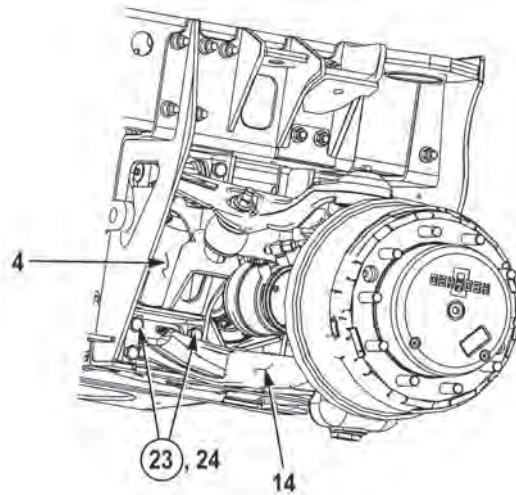
1. Apply sealing compound, Loctite 592, to threads of axle vent (27), fitting (22), and fitting (21).

NOTE

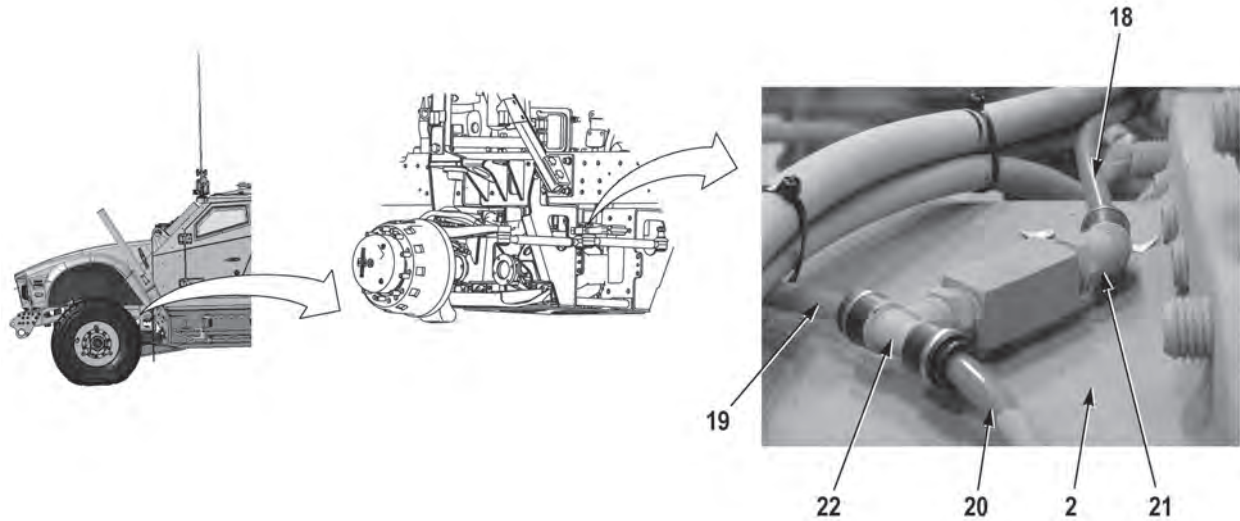
- Install axle vent as noted prior to removal.
 - Install fittings as noted prior to removal.
2. Install axle vent (27) on differential housing (2).
 3. Install fitting (22) on axle vent (27).
 4. Install fitting (21) on axle vent (27).

**NOTE**

- Perform Step (5) for axle No. 2.
 - Perform Step (6) for axle No. 1.
5. Install two screws (26) and new locknuts (25) on control arm (17) and bulkhead (9).



6. Install two screws (24) and new locknuts (23) on lower control arm (14) and bulkhead (4).



WARNING

Front differential housing weighs 250 lbs (113 kg) and rear differential housing weighs 280 lbs (127 kg). Do not lift or move differential housing without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

All differential air lines are installed the same way. Axle No. 1 shown.

7. With the aid of an assistant and a transmission jack, raise differential housing (2) enough to connect three air lines (18, 19, and 20).

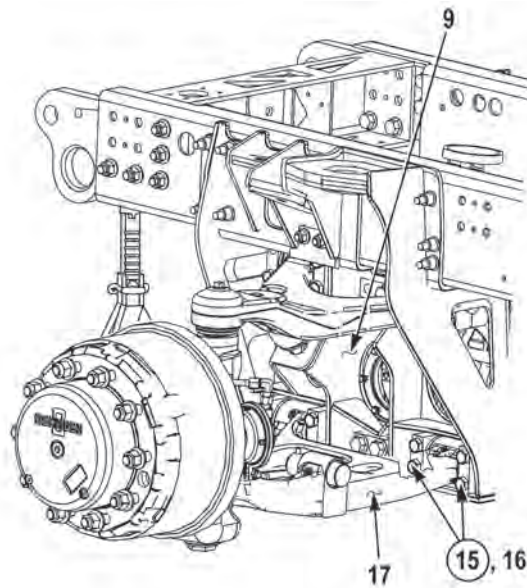
NOTE

Install cable ties as required.

8. Install two air lines (19 and 20) on fitting (22).
9. Install air line (18) on fitting (21).
10. With the aid of an assistant and transmission jack, install differential housing (2) on vehicle.

NOTE

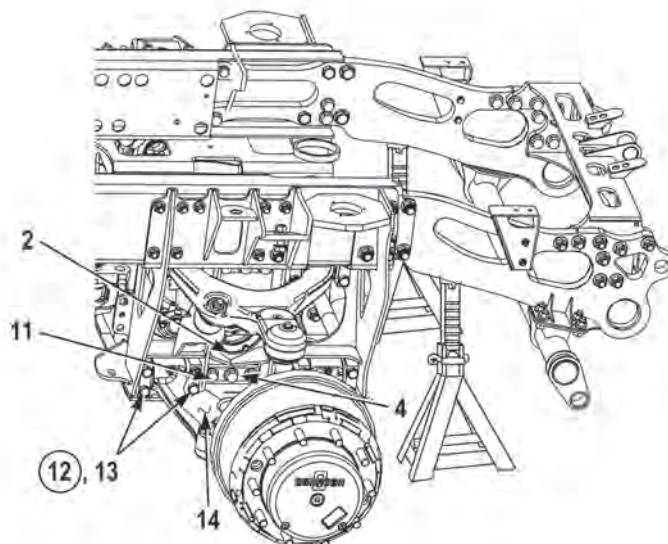
- Perform Step (11) for axle No. 2.
- Perform Step (12) for axle No. 1.



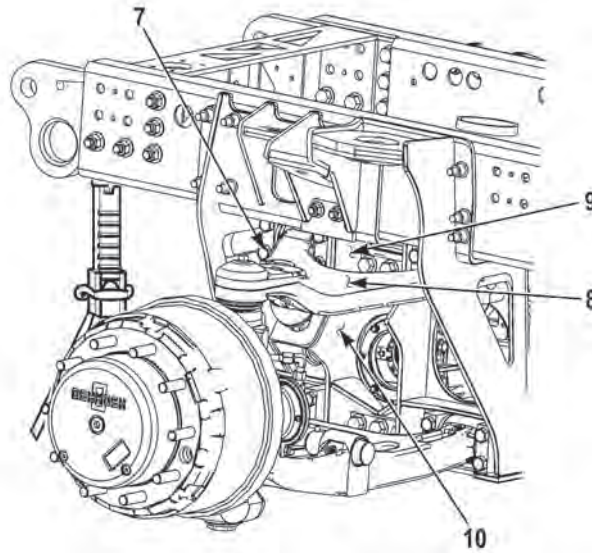
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

11. Apply sealing compound, Loctite 242 to threads of two screws (16) and install two screws (16) and new locknuts (15) on lower control arm (17) and bulkhead (9).



12. Apply sealing compound, Loctite 242 to threads of two screws (13) and install two screws (13) and new locknuts (12) on lower control arm (14) and bulkhead (4).
13. Apply sealing compound, Loctite 515 to threads of three screws (11) and install three screws (11) on bulkhead (4) and differential housing (2).

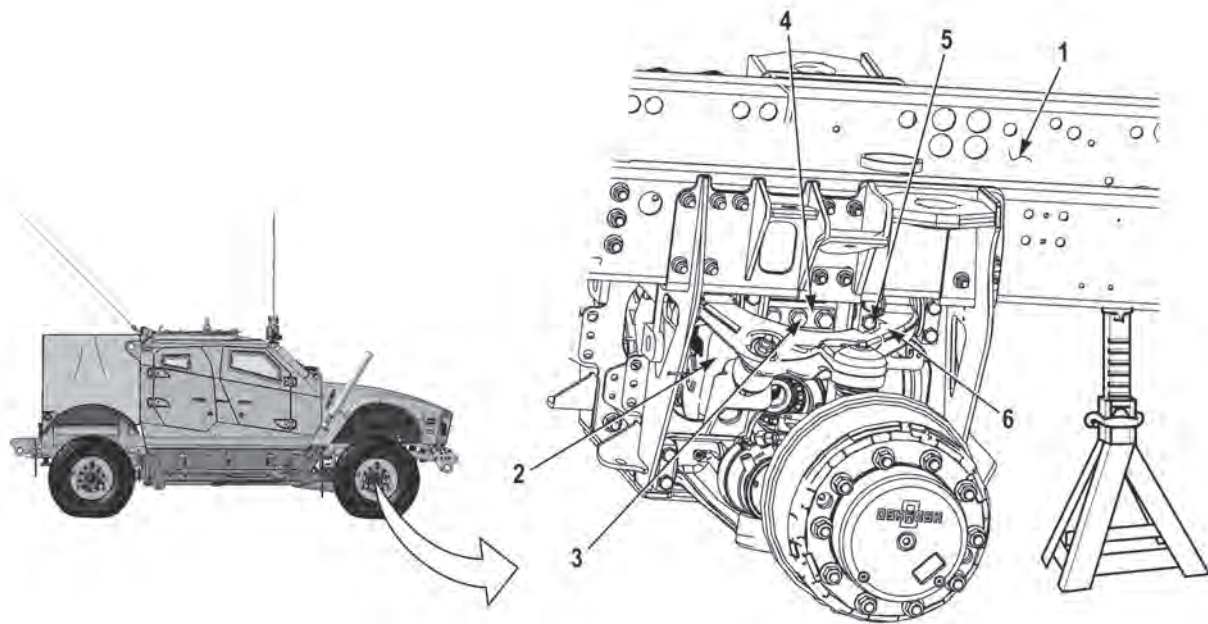


WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Upper control arm may need to be raised to allow installation of lower screws.
 - Perform Steps (14) and (15) for axle No. 2.
 - Perform Steps (16) and (17) for axle No.1.
14. Apply sealing compound, Loctite 515, to threads of screw (7).
 15. Install screw (7) in upper control arm (8), bulkhead (9), and differential housing (10).



16. Apply sealing compound, Loctite 515, to threads of screw (5).
17. Install screw (5) in upper control arm (6), bulkhead (4), and differential housing (2).
18. Apply sealing compound, Loctite 515, to threads of three upper screws (3).

NOTE

Driver side and passenger side upper screws are installed the same way. Passenger side shown.

19. Install three upper screws (3) in bulkhead (4) and differential housing (2).
20. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DIFFERENTIAL LOCK REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Caps and Plug Set
Compound, Sealing, Loctite 242
Compound, Sealing, Loctite 515
Compound, Sealing, Loctite 592
Tags, Identification

Follow-On Maintenance

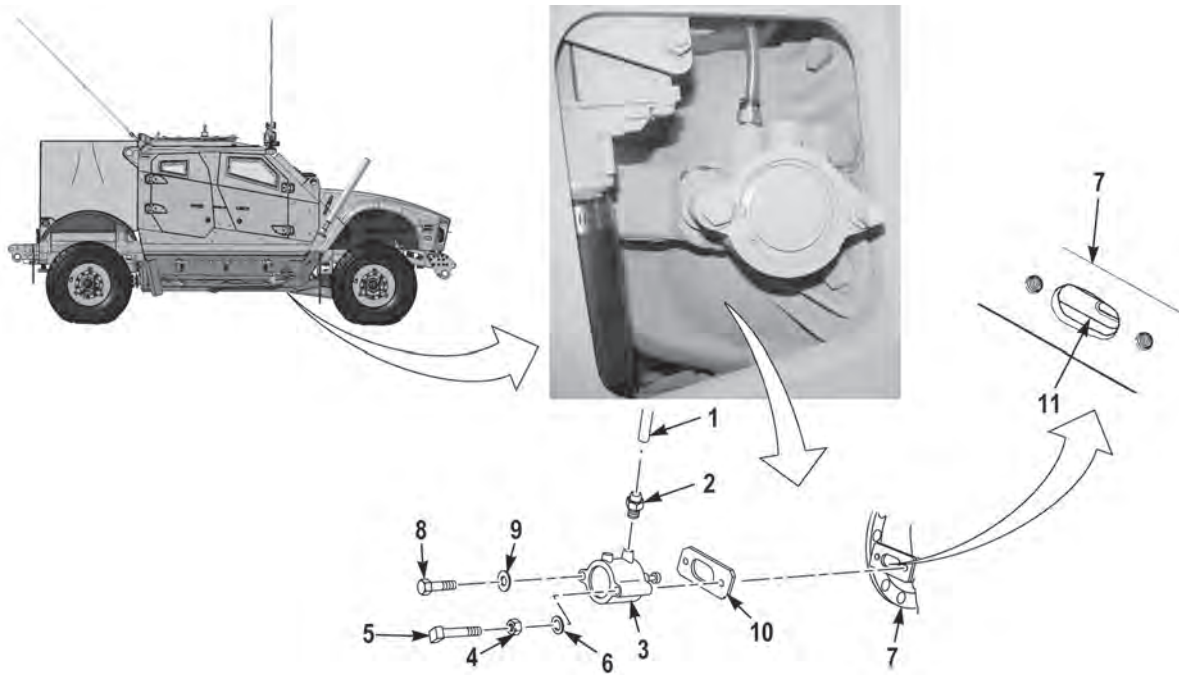
Remove and stow wheel chocks

REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.



1. Remove air line (1) from fitting (2).
2. Remove fitting (2) from differential lock chamber (3).

CAUTION

Loosen jam nut prior to removal of setscrew from differential lock chamber. Failure to comply may result in damage to equipment.

3. Loosen jam nut (4) and remove setscrew (5), jam nut (4), and washer (6) from differential lock chamber (3) and differential assembly (7).
4. Remove screw (8) and washer (9) from differential lock chamber (3) and differential assembly (7).

CAUTION

When removing differential lock chamber from differential assembly, note number of shims removed. Same number of shims must be used when installing lock chamber. Failure to comply may result in damage to equipment.

NOTE

- Number of shim plates may vary from a quantity of zero to a maximum quantity of three.
 - To aid in removal of differential lock chamber, tilt differential lock chamber toward differential housing and slide differential lock chamber's shaft from shift fork.
5. Remove differential lock chamber (3) and shim plate(s) (10) from differential assembly (7).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of fitting (2) and install fitting (2) on differential lock chamber (3).

CAUTION

Ensure mating surfaces of differential lock chamber, shim plates, and differential assembly are clean to prevent differential leaks. Failure to comply may result in damage to equipment.

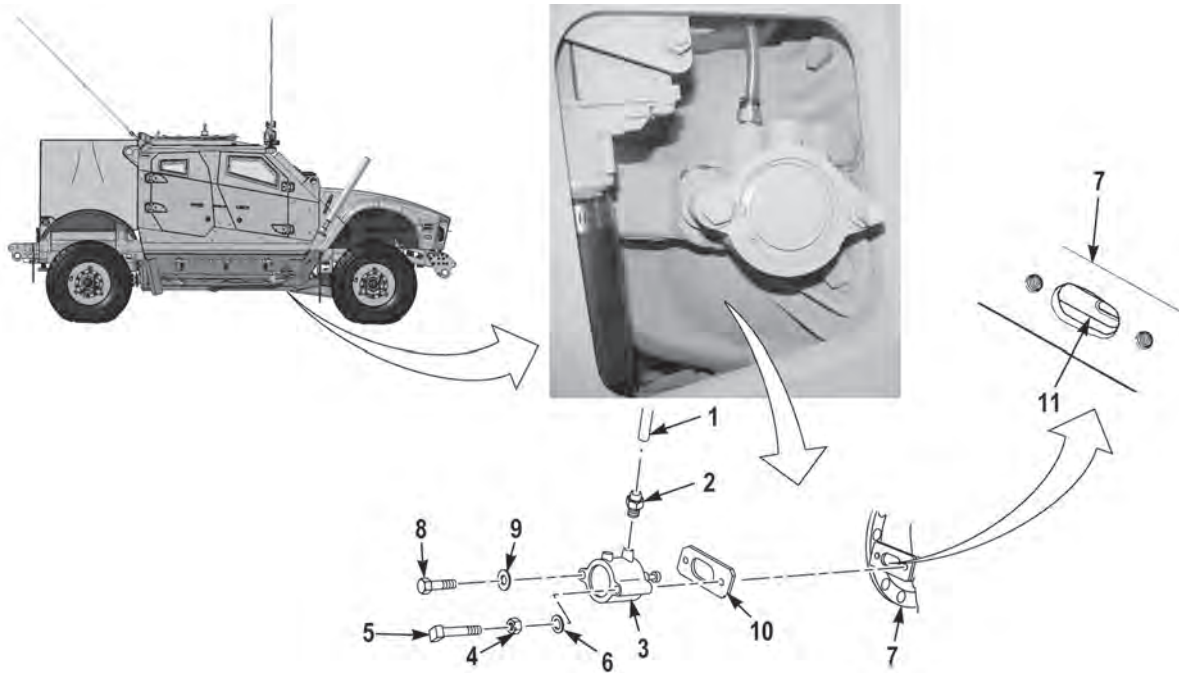
2. Apply sealing compound, Loctite 515, to mating surfaces of shim plate(s) (10).
3. Apply sealing compound, Loctite 242, to threads of screw (8) and setscrew (4).

CAUTION

Install same number of shim plates as was removed. Failure to comply may result in damage to equipment.

NOTE

- To aid in installation of differential lock chamber, tilt differential lock chamber toward differential housing until differential lock chamber's shaft engages shift fork.
 - Differential lock chamber is installed properly when differential lock chamber engages shift fork when attempting to pull differential lock chamber straight out of differential assembly.
4. Install shim plate(s) (10) and differential lock chamber (3) on differential assembly (7) with washer (9) and screw (8). Tighten screw (8) to 35 lb-ft (48 N•m).
 5. Install air line (1) on fitting (2).



CAUTION

Prior to installing and adjusting setscrew, air system must be charged. Failure to comply may result in damage to equipment.

6. Start engine and pressurize air system to a minimum of 100 psi (690 kPa).
7. Shut off engine.
8. Turn ignition switch to ON position.
9. Engage driveline lock.

NOTE

Jam nut may have to be loosened prior to installation.

10. Install setscrew (5) on differential lock chamber (3) until setscrew (5) contacts shift fork (11).
11. Turn setscrew (5) an additional 3/8 turn.
12. Tighten jam nut (4) to 26 lb-ft (35 N•m).
13. Turn ignition switch to OFF position.
14. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DIFFERENTIAL YOKE AND SEAL REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Propeller shaft removed (WP 0090)
 Remove rear tires (rear differential only) ()

Tools and Special Tools

Hammer, Dead Blow
 Nut, 3/8" x 16
 Screw 3/8" x 2
 Socket, 52 mm, 3/4 Drive
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 600 ft-lb
 Yoke and Flange Holder

Materials/Parts

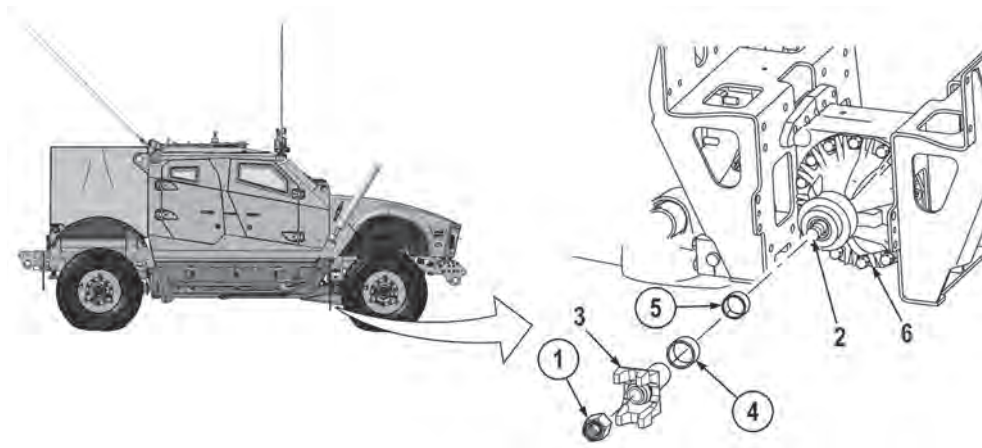
Nut (Item 1)
 Seal, V-ring (Item 4)
 Seal, Lip (Item 5)
 Adhesive, RTV 108
 Grease, Automotive and Artillery

Personnel Required

Two

Follow-On Maintenance

Install rear tires (rear differential only) ()
 Install propeller shaft (WP 0090)
 Remove and stow wheel chocks

FRONT DIFFERENTIAL YOKE AND SEAL REMOVAL

1. Remove nut (1) from pinion shaft (2). Discard nut (1).

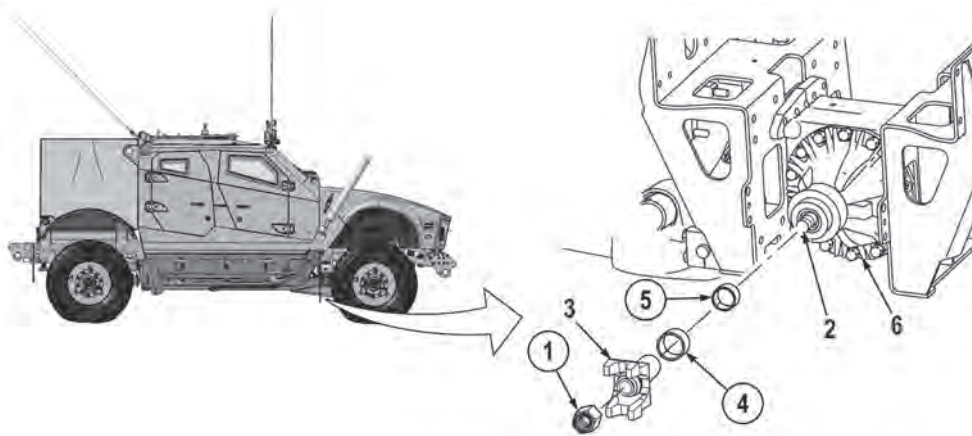
NOTE

Use soft faced hammer as required to remove yoke.

2. Remove yoke (3) from pinion shaft (2).
3. Remove seal (4) from yoke (3). Discard seal (4).
4. Remove seal (5) from differential assembly (6). Discard seal (5).

END OF TASK

FRONT YOKE AND SEAL INSTALLATION



1. Lightly lubricate the inside of two new seals (4 and 5) with grease.
2. Install seal (5) in differential assembly (6).

NOTE

Seal will properly position itself when yoke is installed on pinion shaft.

3. Position seal (4) on yoke (3) 1/4 in. (6 mm) from end of yoke (3).

NOTE

Use soft faced hammer as required to install yoke.

4. Install yoke (3) on pinion shaft (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

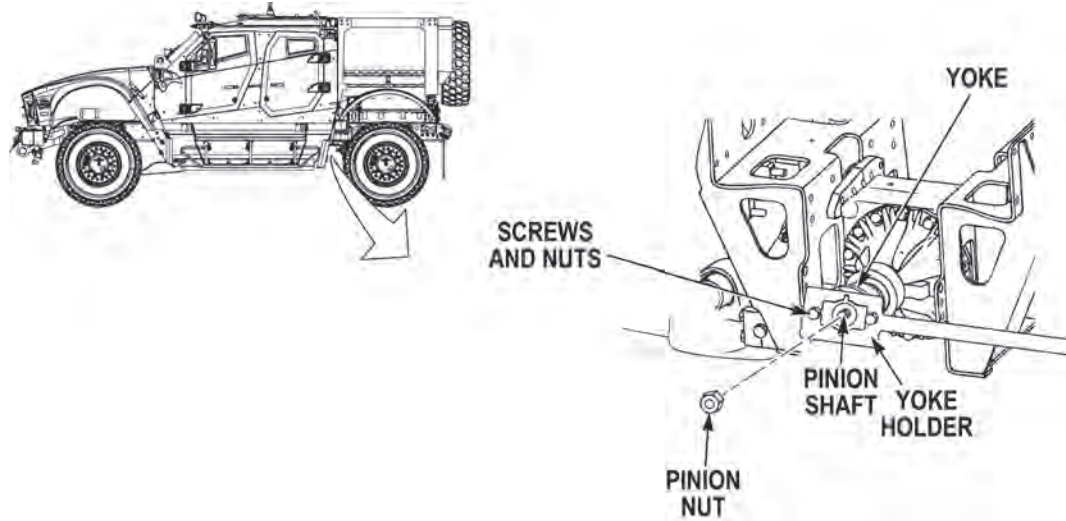
5. Apply a liberal amount of adhesive/sealant, RTV 108, to threads of pinion shaft (2) and face of yoke (3) where nut (1) seats.
6. Install new nut (1) on pinion shaft (2). Tighten nut (1) to 486 to 572 lb-ft (659 to 776 N•m).

NOTE

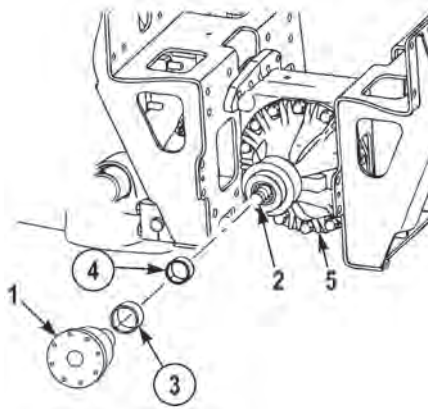
Ensure adhesive has squeezed out around entire diameter of nut (1).

7. If adhesive/sealant, RTV 108, is not visible around entire diameter of nut (1), remove and discard nut (1) and repeat Steps (4) through (6) until adhesive is visible around entire diameter of nut (1).
8. Stake nut (1) to pinion shaft (2).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

REAR DIFFERENTIAL YOKE AND SEAL REMOVAL

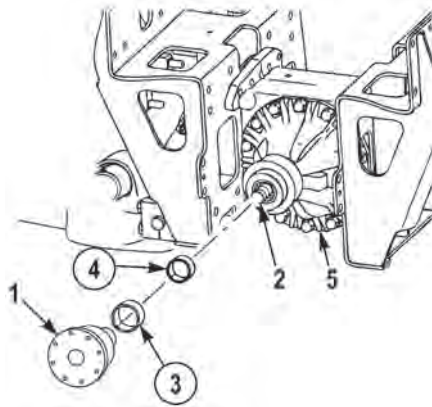
1. Install yoke holder on yoke with two screws and nuts.
2. With the aid of an assistant and yoke holder, remove pinion nut from pinion shaft.
3. Remove two nuts, screws, and yoke holder from yoke.

**NOTE**

Use dead blow hammer as required to remove yoke.

4. Remove yoke (1) from pinion shaft (2).
5. Remove seal (3) from yoke (1). Discard seal.
6. Remove seal (4) from differential assembly (5). Discard seal.

END OF TASK

REAR DIFFERENTIAL YOKE AND SEAL INSTALLATION

1. Lightly lubricate the inside of seal (3) and seal (4) with clean grease.
2. Install seal (4) in differential assembly (5).

NOTE

Seal will properly position itself when yoke is installed on pinion shaft.

3. Position seal (3) on yoke (1) 1/4 in. (6 mm) from end of yoke (1).

NOTE

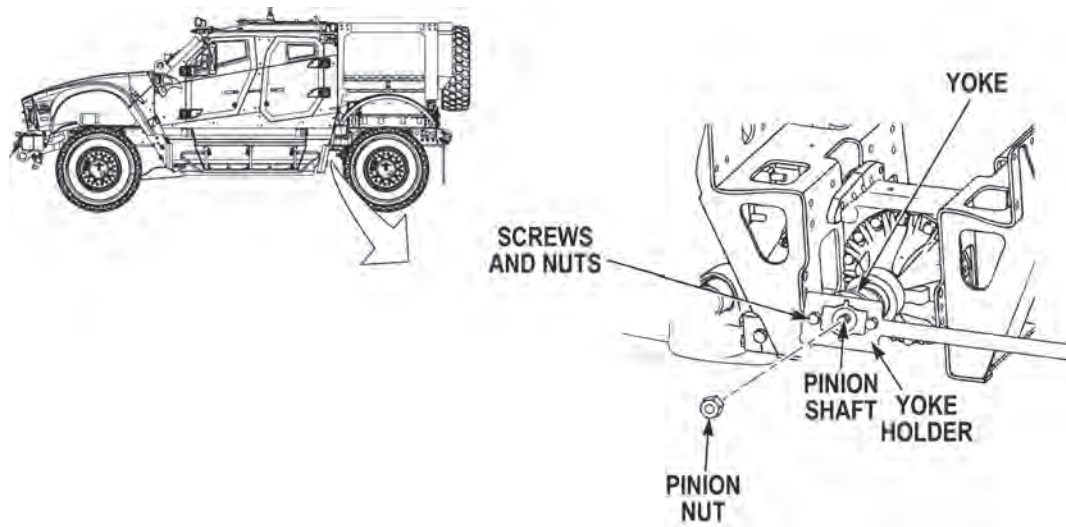
Use dead blow hammer as required to install yoke.

4. Install yoke (1) on pinion shaft (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

5. Apply a liberal amount of adhesive/sealant, RTV 108, to threads of pinion shaft (2) and face of yoke (1) where pinion nut seats.



6. Install yoke holder on yoke with two screws and nuts.
7. With the aid of an assistant and yoke holder, install pinion nut on pinion shaft. Tighten pinion nut to 490 to 580 lb-ft (664 to 786 N•m).
8. If adhesive/sealant, RTV 108, is not visible around entire diameter of pinion nut, remove and discard pinion nut, and repeat Steps (5) through (7) until adhesive is visible around entire diameter of pinion nut.
9. Remove two nuts, screws, and yoke holder from yoke.
10. Stake pinion nut to pinion shaft.
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HALFSHAFT AND SEAL REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Shock absorbers removed (M1240/M1245)
(WP 0092)
Shock absorbers removed (M1240A1) (WP 0093)
Axle No. 1 toe control link removed (if removing
halfshaft on axle No. 1) (WP 0288)
Axle No. 2 toe control link removed (if removing
halfshaft on axle No. 2) (WP 0289)
Drain wheel end (WP 0100)
Coil springs removed (WP 0079)

Tools and Special Tools

Driver, Bearing, 60 mm
Floor Jack
Pliers, Boot
Tool Kit, General Mechanic's: Automotive
Wrench, Allen 9/16 in.
Wrench, Torque, 250 ft-lb
Wrench, Torque 5 to 75 ft-lb

Materials/Parts

O-ring (Item 2)
Locknut (4) (Item 5)
Seal (Item 9)
Compound, Sealing, Loctite 242
Compound, Corrosion Preventive, Ultra Tef-Gel
05SA2
Lubricating Oil, Engine

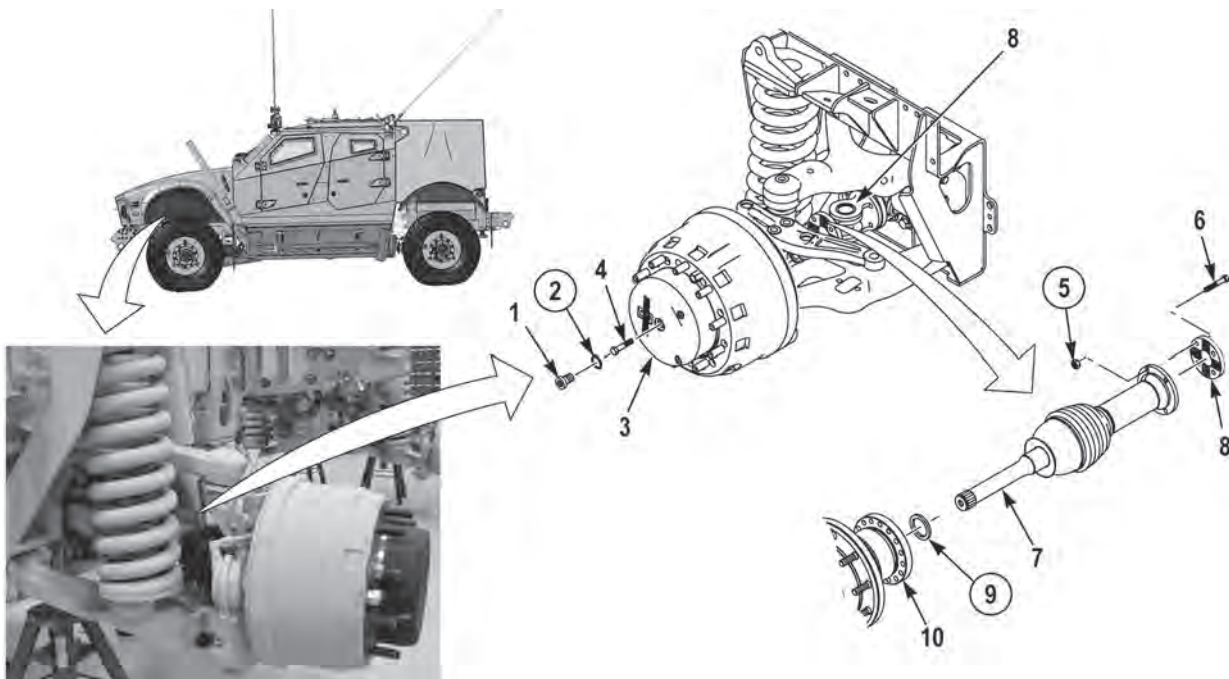
Personnel Required

Two

Follow-On Maintenance

Install coil spring (WP 0079)
Install axle No. 1 toe control link (if removing
halfshaft on axle No. 1) (WP 0288)
Install axle No. 2 toe control link (if removing
halfshaft on axle No. 2) (WP 0289)
Install shock absorbers (M1240/M1245)
(WP 0092)
Install shock absorbers (M1240A1) (WP 0093)
Fill wheel end (WP 0100)
Remove and stow wheel chocks

REMOVAL

**NOTE**

All halfshafts are removed the same way except where noted. Axle No. 1 driver side shown.

1. Remove plug (1) and O-ring (2) from wheel end (3). Discard O-ring (2).
2. Remove screw (4) from wheel end (3).
3. Remove four locknuts (5) and screws (6) from halfshaft (7) and inner shaft (8). Discard locknuts (5).

NOTE

Perform Steps (4) and (5) for axle No. 2 only.

4. Raise wheel end (3) with floor jack.
5. Turn rear of wheel end (3) towards vehicle.

WARNING

Halfshaft weighs 50 lbs (23 kg). Do not lift or move halfshaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

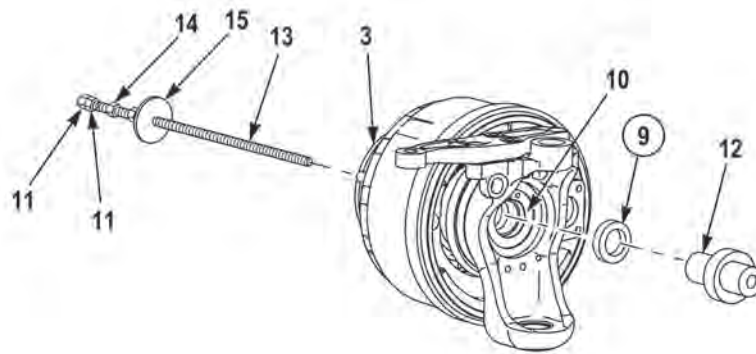
NOTE

Halfshaft seal may split in half while removing halfshaft from wheel end, causing portions of seal to remain in wheel end or on halfshaft.

6. With the aid of an assistant, swing disconnected portion of halfshaft (7) towards opposite end of vehicle wheel end (3) was turned to. Pull halfshaft (7) back and out of wheel end (3), removing halfshaft (7) from vehicle.

CAUTION

- A bearing is located directly behind seal in spindle. When prying seal from spindle, do not damage bearing. Failure to comply may result in damage to equipment.
 - When removing seal from spindle, do not damage spindle bore where seal is seated. Failure to comply may result in damage to equipment.
7. Using a chisel, collapse one side of seal (9) to relieve pressure off seal (9) and spindle (10). Once seal (9) is collapsed, pry seal (9) out of spindle (10). Discard seal (9).

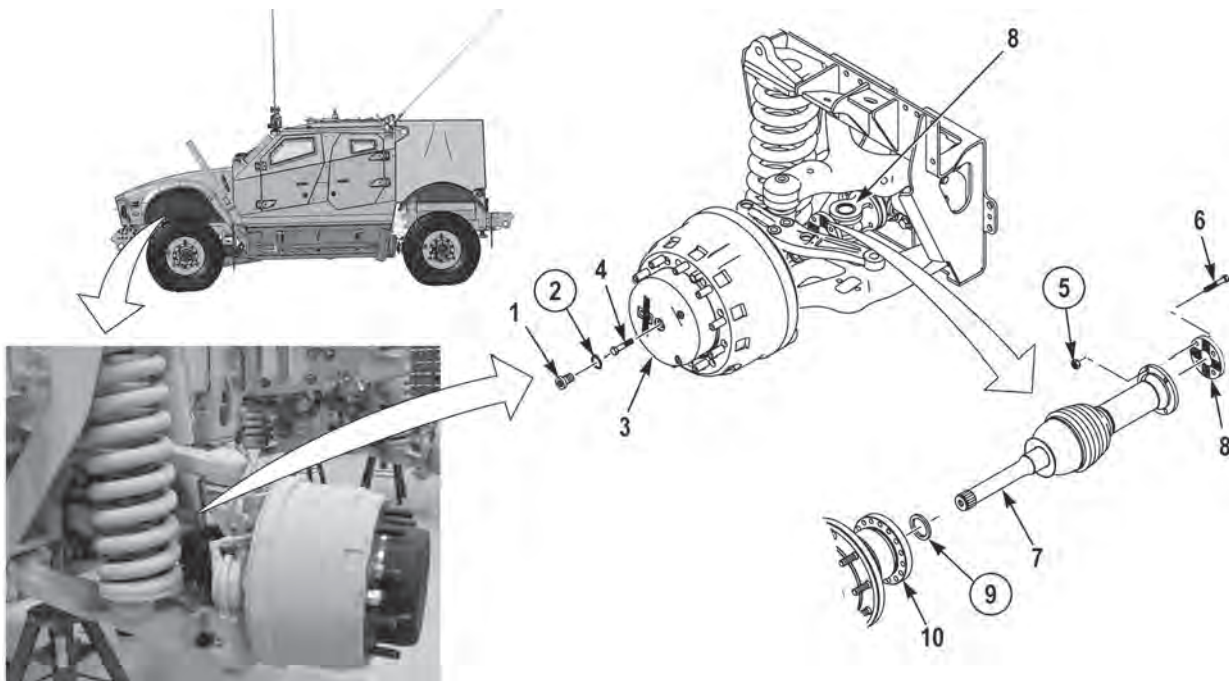
END OF TASK**INSTALLATION****NOTE**

- All halfshafts are installed the same way. Axle No. 1 driver side shown.
 - Perform Steps (1) through (11), using bearing driver, to install seal on spindle.
 - Use bearing side of press for bearing installation.
1. Jam two nuts (11) together.
 2. Remove press (12) from threaded rod (13).
 3. Install threaded rod (13) into wheel end (3).
 4. Install new seal (9) on press (12).
 5. Install seal (9) and press (12) on threaded rod (13).
 6. Position seal (9) and press (12) into back of spindle (10).

NOTE

Seal is properly installed when seal has bottomed out and seated evenly against spindle.

7. Turn nut (14) clockwise to move washer (15) until seal (9) and press (12) bottoms out against spindle (10).
8. Loosen nut (14) and remove press (12) from threaded rod (13).
9. Remove threaded rod (13) from wheel end (3).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

10. Apply sealing compound, Loctite 242, to threads of screw (4).

WARNING

Halfshaft weighs 50 lbs (23 kg). Do not lift or move halfshaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

CAUTION

Do not use a hammer to pound halfshaft into wheel end. Failure to comply may result in damage to equipment.

NOTE

It may be necessary to rotate and move halfshaft around to engage wheel end splines.

11. With the aid of an assistant, install halfshaft (7) in wheel end (3). Tighten screw (4) to 90 lb-ft (122 N•m).

WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

12. Apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to flange of halfshaft (7) and flange of inner shaft (8).
13. Install halfshaft (7) on inner shaft (8) with four screws (6) and new locknuts (5). Tighten four locknuts (5) to 88 lb-ft (119 N•m).
14. Lightly lubricate new O-ring (2) with clean oil and install O-ring (2) on plug (1).
15. Install O-ring (2) and plug (1) in wheel end (3). Tighten plug (1) to 23 to 27 lb-ft (31 to 37 N•m).
16. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HUB REPAIR

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hub removed (WP 0086)

Tools and Special Tools

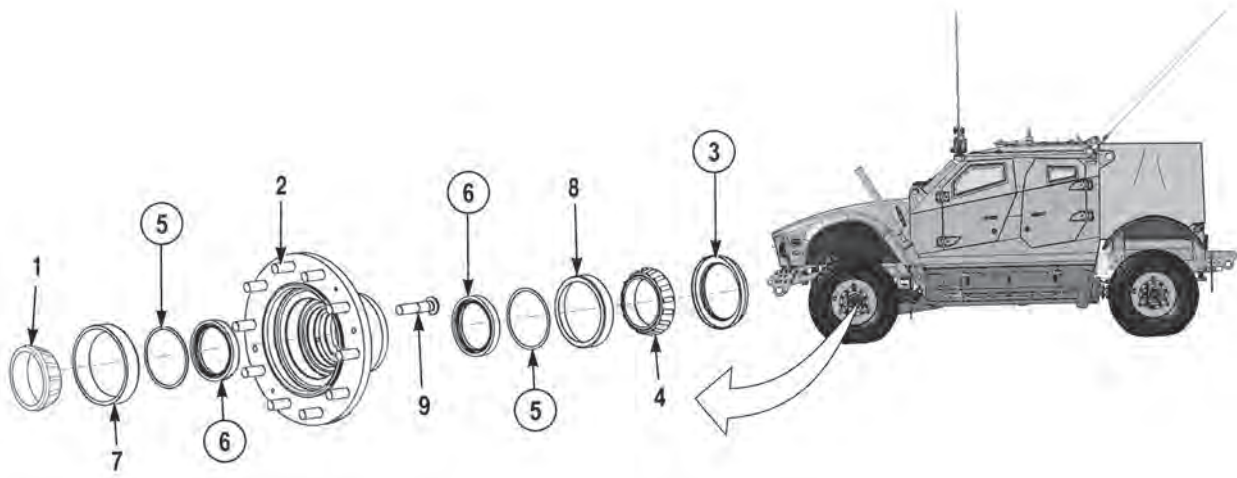
Driver, Seal, CTIS
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Seal (Item 3)
Retaining Ring (2) (Item 5)
CTIS Seal (2) (Item 6)
Lubricating Oil, Gear
Grease, Automotive and Artillery

Follow-On Maintenance

Install hub (WP 0086)
Remove and stow wheel chocks

DISASSEMBLY

1. Remove bearing (1) from hub (2).
2. Remove seal (3) from hub (2). Discard seal (3).
3. Remove bearing (4) from hub (2).

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being removed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

4. Remove two retaining rings (5) from hub (2). Discard retaining rings (5).
5. Remove two CTIS seals (6) from hub (2). Discard CTIS seals (6).

NOTE

- Perform Step (6) if bearing cups need to be removed.
- If a bearing cup needs to be replaced, the bearing must also be replaced.

6. Remove bearing cups (7 and 8) from hub (2).

END OF TASK

CLEANING/INSPECTION

1. Clean all parts.
2. Inspect two bearings (1 and 4) and bearing cups (7 and 8) for rust, damage, roughness, pitting, binding, or serious discoloration.
3. Inspect ten studs (9) for damage and wear.
4. Inspect all remaining parts for wear and damage.
5. Replace all parts failing inspection.

END OF TASK**ASSEMBLY****NOTE**

Perform Steps (1) and (2) only if bearing cups were removed.

1. Lightly lubricate bearing cups (8 and 7) with grease.
2. Install bearing cups (8 and 7) in hub (2).

CAUTION

- **Do not shorten springs on CTIS seals. Failure to comply may result in damage to equipment.**
- **Retaining springs may fit loosely in seals. Ensure retaining springs are installed during installation of seals. Failure to comply may result in damage to equipment.**

NOTE

Ensure seals are installed with flat surfaces facing each other.

3. Using seal driver, install two new CTIS seals (6) in hub (2).

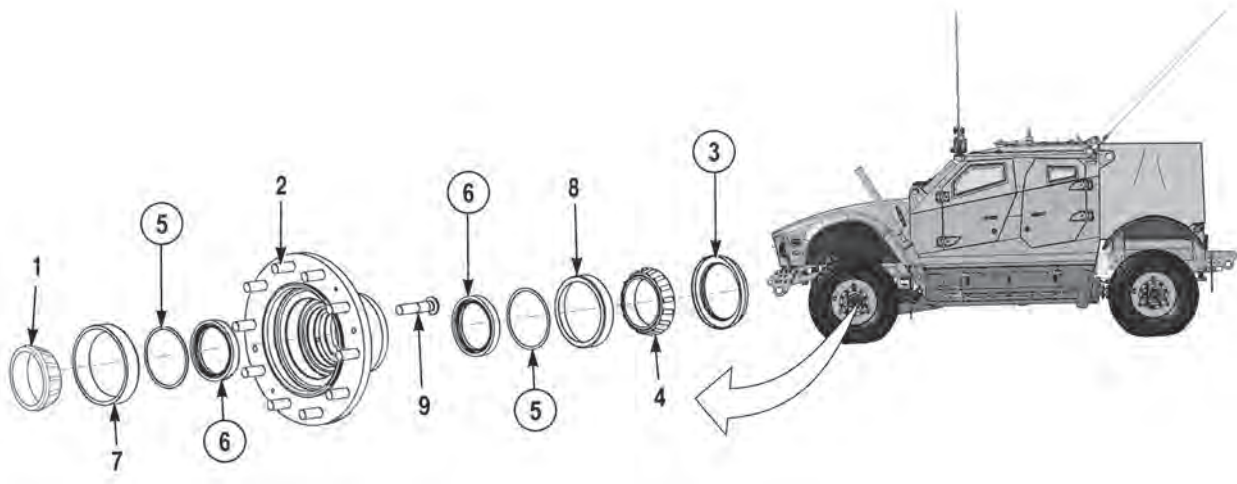
WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

NOTE

Ensure retaining rings are fully seated in grooves in hub.

4. Install two new retaining rings (5) in hub (2).
5. Pack bearing (4) with grease.
6. Install bearing (4) in hub (2).



7. Install new seal (3) in hub (2).
8. Fill cavity between bearing (4) and CTIS seal (6) with grease.
9. Fill cavity between bearing (4) and seal (3) with grease.
10. Lubricate bearing (1) with clean oil and install bearing (1) in hub (2).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HUB REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Wheel end removed (WP 0101)

Tools and Special Tools

Spline Cover
 Tool Kit, General Mechanic's: Automotive
 Wrench, Spindle Nut
 Wrench, Torque, 250 ft-lb

Materials/Parts

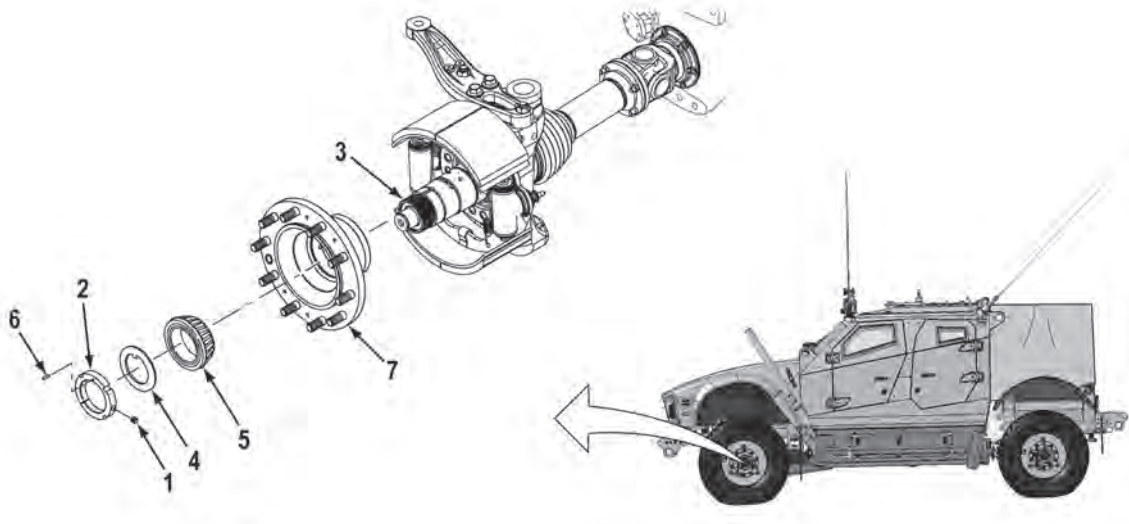
Seal, Hub (Item 8)
 Seal, CTIS (2) (Item 10)
 Cups, Bearing (Item 11)
 Compound, Sealing, Loctite 242
 Grease, Automotive and Artillery

Personnel Required

Two

Follow-On Maintenance

Install wheel end (WP 0101)
 Remove and stow wheel chocks

REMOVAL

1. Remove screw (1) from spindle nut (2).
2. Using spindle nut wrench, remove spindle nut (2) from spindle (3).

NOTE

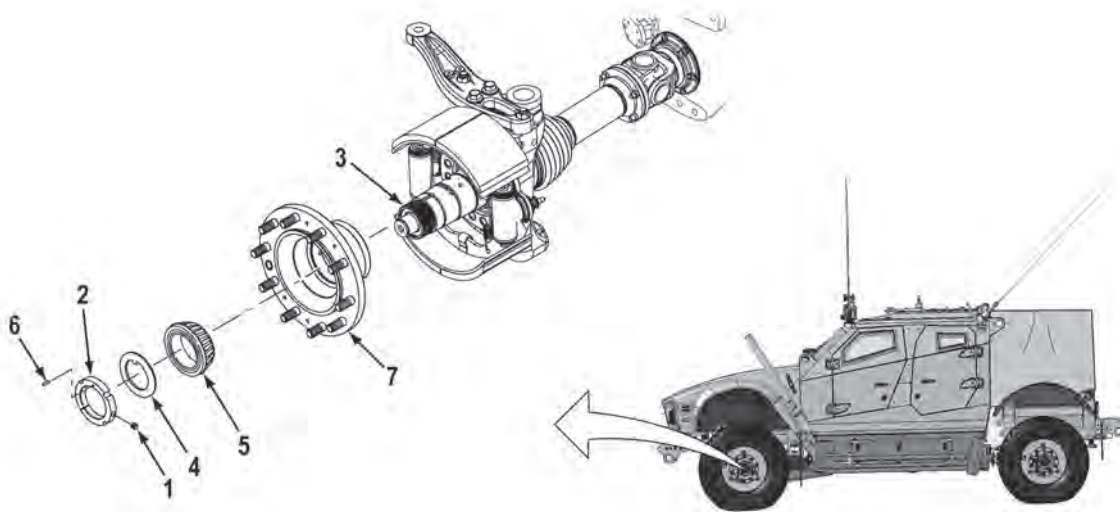
Note position of bearing and washer prior to removal to ensure proper installation.

3. Remove washer (4) and bearing (5) from spindle (3).

NOTE

Perform Step (4) only if dowel pin needs to be removed.

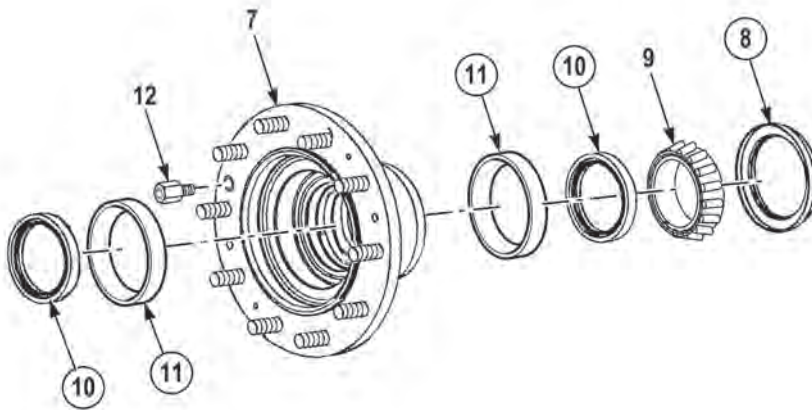
4. Remove dowel pin (6) from spindle nut (2).



WARNING

Hub assembly weighs 60 lbs (27 kg). Do not lift or move hub assembly without the aid of an assistant. Failure to comply may result in injury or death to personnel.

5. With the aid of an assistant, remove hub assembly (7) from spindle (3).



6. Remove hub seal (8) and bearing (9) from hub assembly (7). Discard hub seal (8).
7. Remove two CTIS seals (10) from hub assembly (7). Discard seals (10).
8. Remove two bearing cups (11) from hub assembly (7). Discard bearing cups (11).
9. Remove plug (12) from hub assembly (7).

END OF TASK

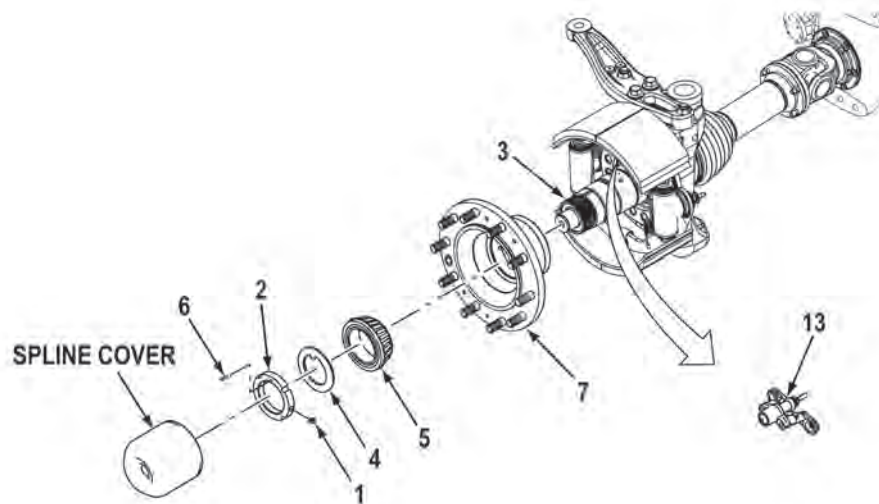
INSTALLATION

1. Install plug (12) on hub assembly (7).

CAUTION

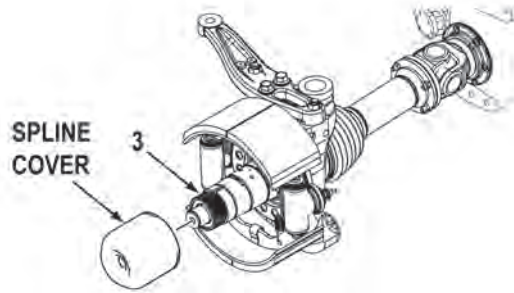
Use brass drift to tap in bearing cups. Failure to comply may result in damage to equipment.

2. Install new bearing cups (11) on hub assembly (7).
3. Install two new CTIS seals (10) on hub assembly (7).
4. Install bearing (9) and new hub seal (8) on hub assembly (7)

**NOTE**

Perform Step (5) if dowel pin was removed.

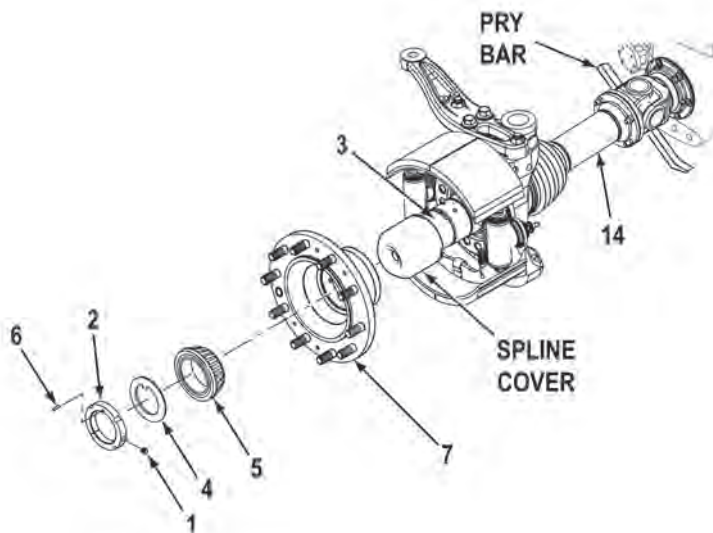
5. Install dowel pin (6) in spindle nut (2).
6. Push ABS sensor (13) out to ensure contact with hub assembly (7).



CAUTION

- Ensure spline cover is completely covering spindle splines and threads when installing hub assembly. Failure to comply may result in damage to equipment.
- When installing hub assembly on spindle, install hub assembly in one straight, smooth, continuous process. Do not stop during process and relax hub assembly on CTIS seals. Use care not to drag hub assembly along spindle shaft. Failure to comply may result in damage to equipment.

7. Install spline cover on spindle (3).



WARNING

Hub assembly weighs 60 lbs (27 kg). Do not lift or move hub assembly without the aid of an assistant. Failure to comply may result in injury or death to personnel.

8. With the aid of an assistant, install hub assembly (7) on spindle (3).
9. Remove spline cover from spindle (3).
10. Apply a light coating of grease to bearing (5).

NOTE

Install bearing and washer in same position as noted prior to removal.

11. Install bearing (5) and washer (4) on spindle (3).
12. Position pry bar through joint in halfshaft (14).
13. With the aid of an assistant, install spindle nut (2) on spindle (3). Tighten spindle nut to 250 lb-ft (339 N•m).
14. Remove pry bar from halfshaft (14).
15. Rotate hub assembly (7) and tap with soft-faced hammer until hub assembly (7) is fully seated.
16. With the aid of an assistant, position pry bar through joint in halfshaft (14) and retighten spindle nut (2) to 250 lb-ft (339 N•m).
17. Loosen spindle nut (2) until dowel pin (6) aligns with first root on splines of spindle (3).
18. Loosen spindle nut (2) two more roots on splines of spindle (3).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

19. Apply sealing compound, Loctite 242, to threads of screw (1), and install screw (1) on spindle nut (2). Tighten screw to 44 lb-ft (59.7 N•m).
20. Remove pry bar from halfshaft (14).
21. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

INNER SHAFT REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Differential drained (WP 0077)
Wheel/tire removed (TM 9-2355-335-10)
Shock absorbers removed (M1240/M1245)
(WP 0092)
Shock absorbers removed (M1240A1) (WP 0093)

Tools and Special Tools

Pliers, Lock Ring
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 250 ft-lb

Materials/Parts

Locknut (4) (Item 1)
O-ring (Item 7)
Retaining Ring (Item 9)

Materials/Parts (continued)

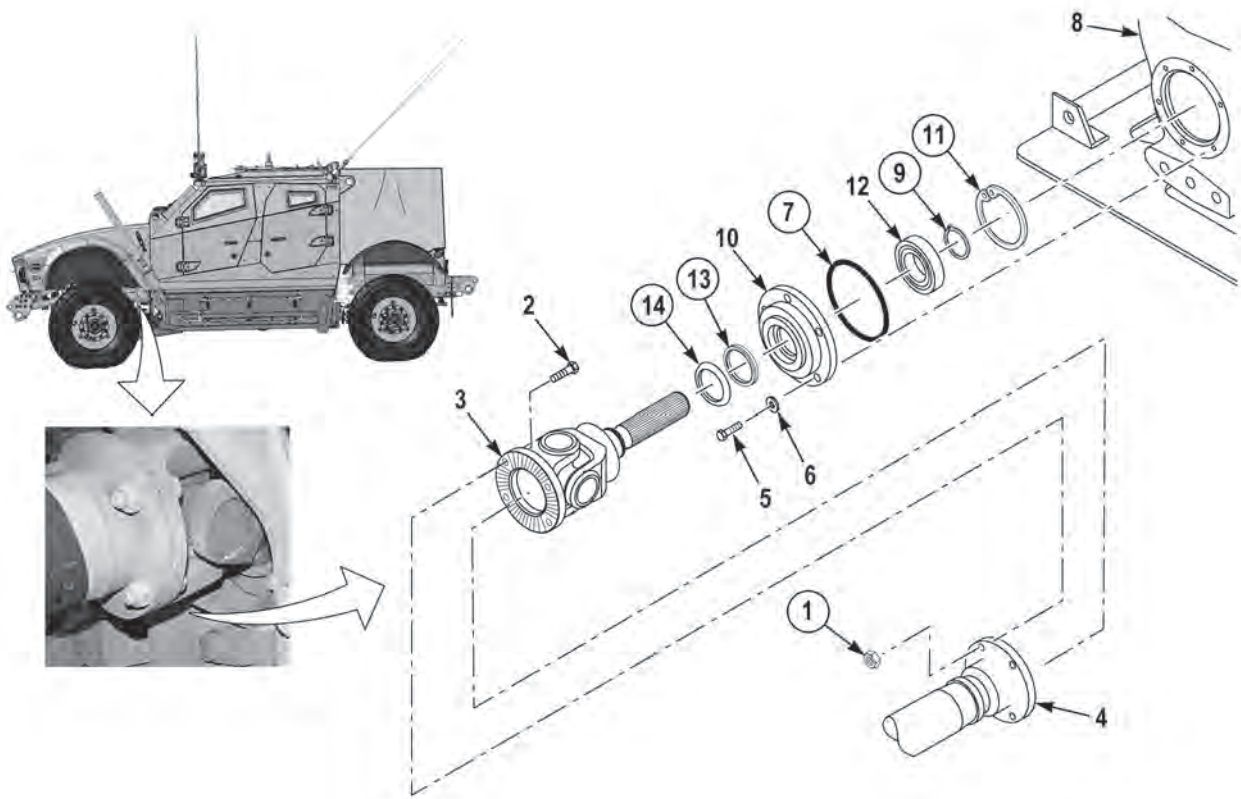
Retaining Ring (Item 11)
Seal (Item 13)
Seal (Item 14)
Compound, Sealing, Loctite 515
Lubrication Oil, Engine

Follow-On Maintenance

Install shock absorbers (M1240/M1245)
(WP 0092)
Install shock absorbers (M1240A1) (WP 0093)
Install wheel/tire (TM 9-2355-335-10)
Fill differential (WP 0077)
Remove and stow wheel chocks

REMOVAL**NOTE**

- All inner shafts are removed the same way. Axle No. 1 driver side shown.
- Note position of four screws and locknuts prior to removal.



1. Remove four locknuts (1) and screws (2) from inner shaft (3) and halfshaft (4). Discard locknuts (1).

CAUTION

Use care not to damage components while prying apart. Failure to comply may result in damage to equipment.

2. Lightly pry halfshaft (4) away from inner shaft (3).
3. Remove six screws (5), washers (6), inner shaft (3), and O-ring (7) from differential housing (8). Discard O-ring (7).

WARNING

Springs, retaining rings, and snap rings are under extreme tension and can act as projectiles when being removed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

NOTE

Perform Steps (3) through (7) if O-ring, seals, or bearing needs to be removed.

4. Remove retaining ring (9) from inner shaft (3). Discard retaining ring (9).
5. Remove bearing housing (10) from inner shaft (3).

6. Remove retaining ring (11) and bearing (12) from bearing housing (10). Discard retaining ring (11).
7. Remove seal (13) from bearing housing (10). Discard seal (13).
8. Remove seal (14) from inner shaft (3). Discard seal (14).

END OF TASK

CLEANING/INSPECTION

1. Clean all parts.
2. Inspect bearing (12) for wear or damage.
3. Replace bearing (12) if damaged.

END OF TASK

INSTALLATION

NOTE

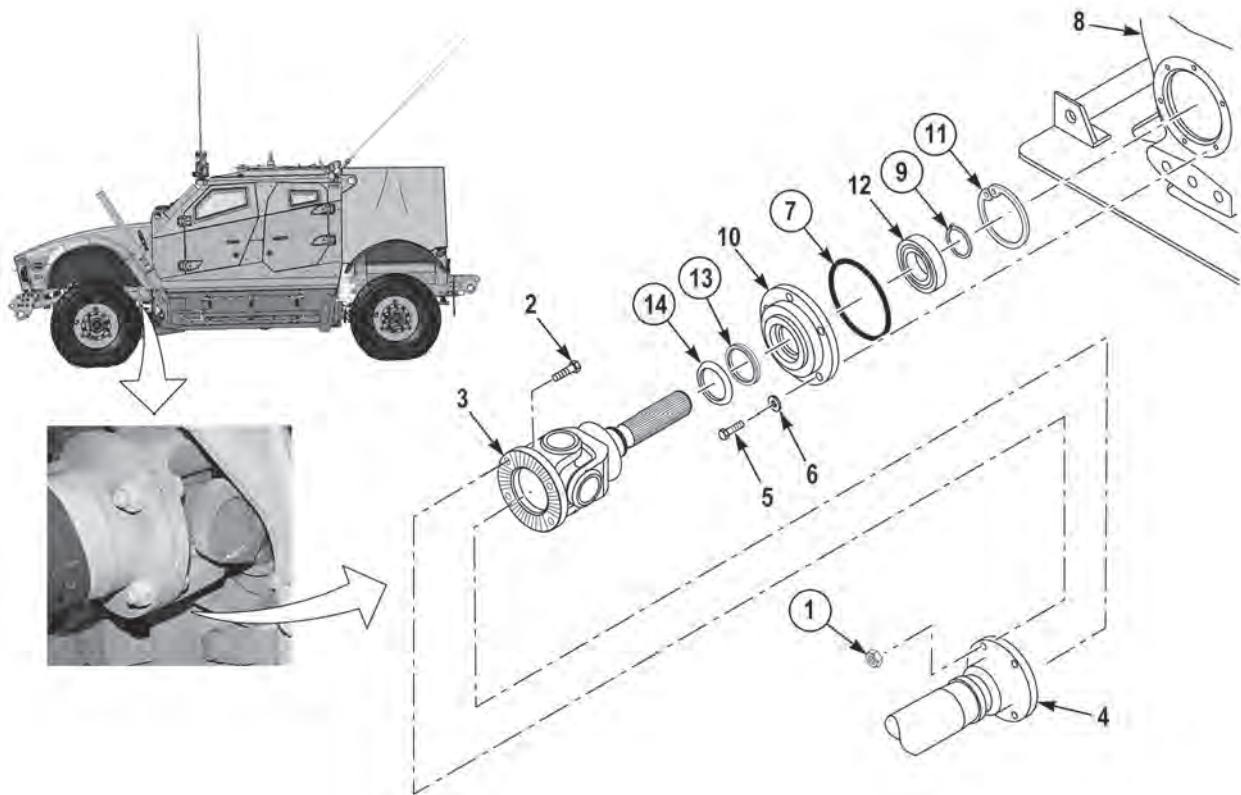
- All inner shafts are installed the same way. Axle No. 1 driver side shown.
 - Perform Steps (1) through (10) if O-ring, seals, or bearing were removed.
1. Lightly lubricate lip of new seal (14) with clean oil and install seal (14) on inner shaft (3).

NOTE

- Shaft seal is installed with springed lip facing bearing housing. Shaft seal must be fully seated on bearing housing for proper installation.
2. Lightly lubricate outside edge of new seal (13) with clean oil and install seal (13) on bearing housing (10).
 3. Fill cavity of seal (14) with grease.
 4. Apply a light coat of oil to bearing (12).

WARNING

- Springs, retaining rings, and snap rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.**
5. Install bearing (12) and new retaining ring (11) on bearing housing (10).
 6. Lightly lubricate inside surface of bearing (12), seal (13), and mating surface of inner shaft (3) with clean oil.
 7. Install bearing housing (10) on inner shaft (3).
 8. Install new retaining ring (9) on inner shaft (3).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

9. Apply sealing compound, Loctite 515, to threads of six screws (5) and flange of bearing housing (10).

NOTE

O-ring must be installed on face of differential housing for proper installation.

10. Lightly lubricate new O-ring (7) with clean oil and install O-ring (7) and inner shaft (3) on differential housing (8) with six washers (6) and screws (5).

NOTE

Install four screws and locknuts as noted prior to removal.

11. Install inner shaft (3) on halfshaft (4) with four screws (2) and new locknuts (1). Tighten four locknuts (1) to 88 lb-ft (119 N•m).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

JOUNCE BUMPER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

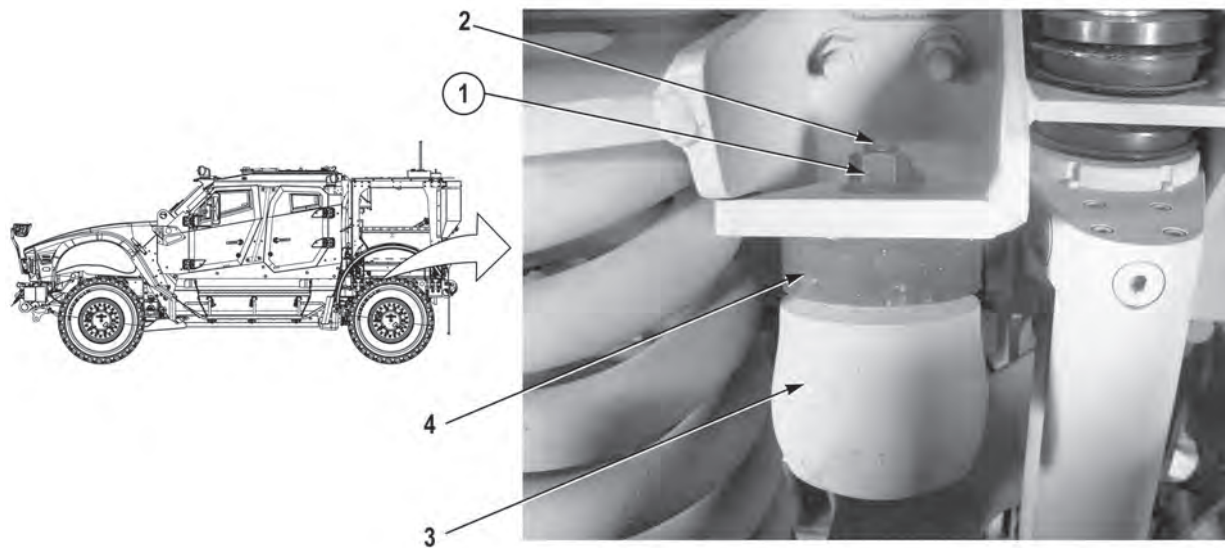
Socket, Deep Well, 1-1/8 in.
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 250 ft-lb
 Wrench, 1-1/8 in.

Materials/Parts

Locknut (Item 1)

Follow-On Maintenance

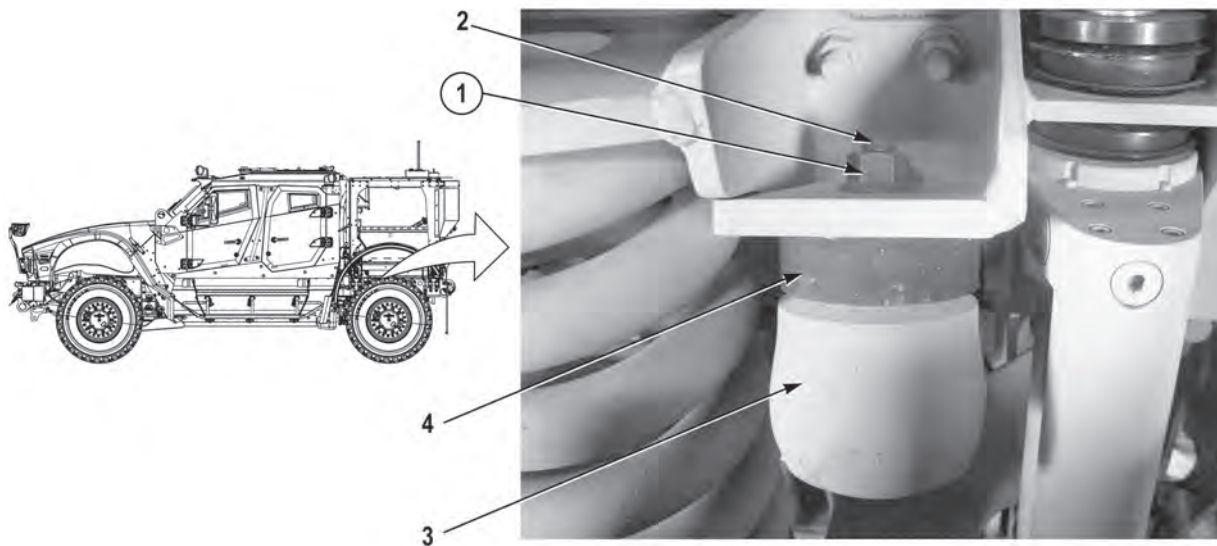
Remove and stow wheel chocks

REMOVAL**NOTE**

- All jounce bumpers are removed the same way. Axle No. 2 driver side shown.
- Perform Step (2) for M1240A1 rear jounce bumper.

1. Remove locknut (1), screw (2), and jounce bumper (3) from vehicle. Discard locknut (1).
2. Remove locknut (1), screw (2), shim (4), and jounce bumper (3) from vehicle. Discard locknut (1).

END OF TASK

INSTALLATION**NOTE**

- Jounce bumpers are installed the same way. Axle No. 2 driver side shown.
- Perform Step (2) for M1240A1 rear jounce bumper.

1. Install jounce bumper (3) on vehicle with screw (2) and new locknut (1). Tighten locknut (1) to 120 lb-ft (163 N•m).
2. Install jounce bumper (3) on shim (4) on vehicle with screw (2) and new locknut (1). Tighten locknut (1) to 120 lb-ft (163 N•m).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

KNUCKLE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Spider/Spindle removed (WP 0095)
 Steering arm removed (WP 0281)
 Shock absorbers removed (M1240/M1245)
 (WP 0092)
 Shock absorbers removed (M1240A1) (WP 0093)
 Coil spring removed (WP 0079)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 600 ft-lb
 Socket, 52 mm

Materials/Parts

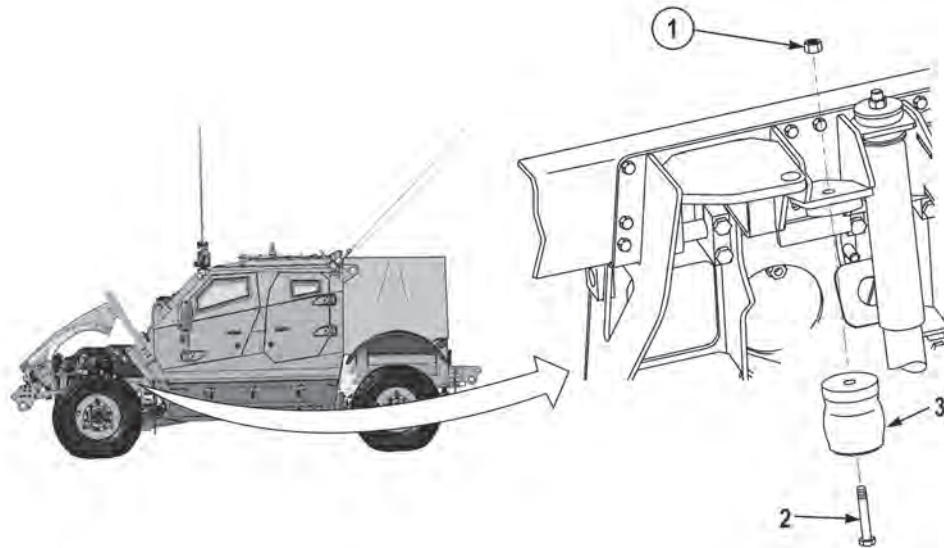
Locknut (Item 1)
 Compound, Sealing, Loctite 242

Personnel Required

Two

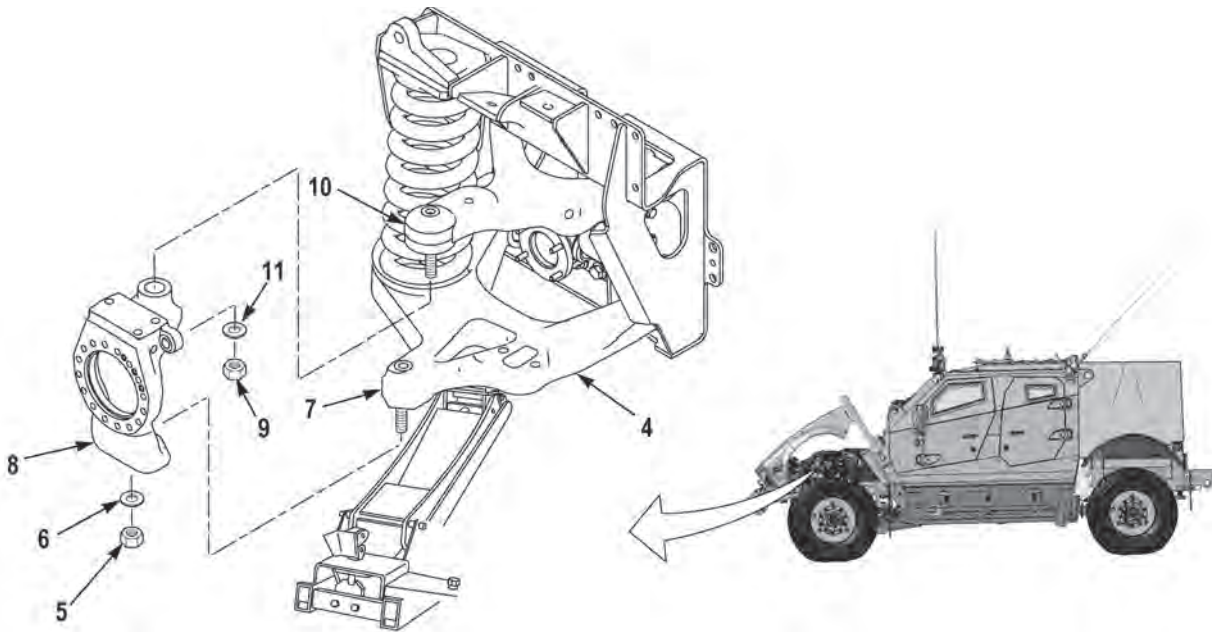
Follow-On Maintenance

Install coil spring (WP 0079)
 Install shock absorbers (M1240/M1245)
 (WP 0092)
 Install shock absorbers (M1240A1) (WP 0093)
 Install front steering arm (WP 0281)
 Install spider/spindle (WP 0095)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL**NOTE**

All jounce bumpers are removed the same way. Axle No. 1 driver side shown.

1. Remove locknut (1), screw (2), and jounce bumper (3) from vehicle. Discard locknut (1).



WARNING

Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.

NOTE

All knuckles are removed the same way. Axle No. 1 driver side shown.

2. Position floor jack under lower control arm (4).
3. Remove nut (5) and washer (6) from lower control arm ball joint (7).
4. With the aid of an assistant and pry bar, apply pressure between knuckle (8) and lower control arm ball joint (7) while hammering on side of knuckle (8).
5. Loosen nut (9) on upper control arm ball joint (10).

CAUTION

Ensure assistant is holding knuckle securely. Failure to comply may result in damage to equipment.

6. With the aid of an assistant and pry bar, apply pressure between knuckle (8) and upper control arm ball joint (10) while hammering on side of knuckle (8).
7. With assistant lifting up on knuckle (8), remove nut (9), washer (11), and knuckle (8) from upper and lower control arm ball joints (7 and 10).
8. Lower the lower control arm (4) with floor jack.

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

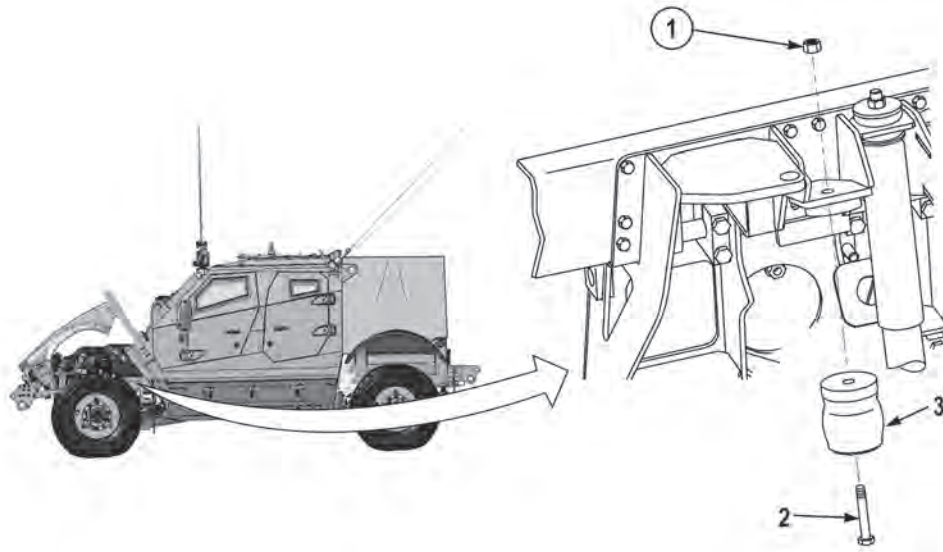
NOTE

- All knuckles are installed the same way. Axle No. 1 driver side shown.
 - Check axle No. 1 coil springs to ensure two springs are seated properly on two boots.
1. Apply sealing compound, Loctite 242, to threads of lower control arm ball joint (7).
 2. With the aid of an assistant, install knuckle (8) on upper control arm ball joint (10) with washer (11) and nut (9). Do not tighten nut (9).
 3. Support lower control arm (4) with floor jack while assistant is pushing down and aligning lower control arm ball joint (7) on knuckle (8).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to threads of lower control arm ball joint (7).
5. Install washer (6) and nut (5) on lower control arm ball joint (7).
6. Tighten two nuts (5) and (9) to 600 lb-ft (814 N•m).



NOTE

All jounce bumpers are replaced the same way. Axle No. 1 driver side shown.

7. Install jounce bumper (3) on vehicle with screw (2) and new locknut (1). Tighten nut (1) to 120 lb-ft (163 N•m).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

PROPELLER SHAFT REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Center belly deflector removed (M1240/M1245)
(WP 0048)
Center belly deflector removed (M1240A1)
(WP 0056)
Remove propeller shaft axle No. 1 to transfer
case (if removing transmission to transfer case
propeller shaft)

Tools and Special Tools

Crowfoot, 9/16 in. 3/8 in. Dr.
Tool Kit, General Mechanic's: Automotive
Wrench, Torque 75 ft-lb
Wrench, Torque, 250 ft-lb

Materials/Parts

Locknut (2) (Item 8)
Lockwasher (8) (Item 14)

Materials/Parts (continued)

Lockwasher (8) (Item 22)
Tabs, Locking (4) (Item 27)
Locknut (2) (Item 32)
Lockwasher (16) (Item 37 and 41)
Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

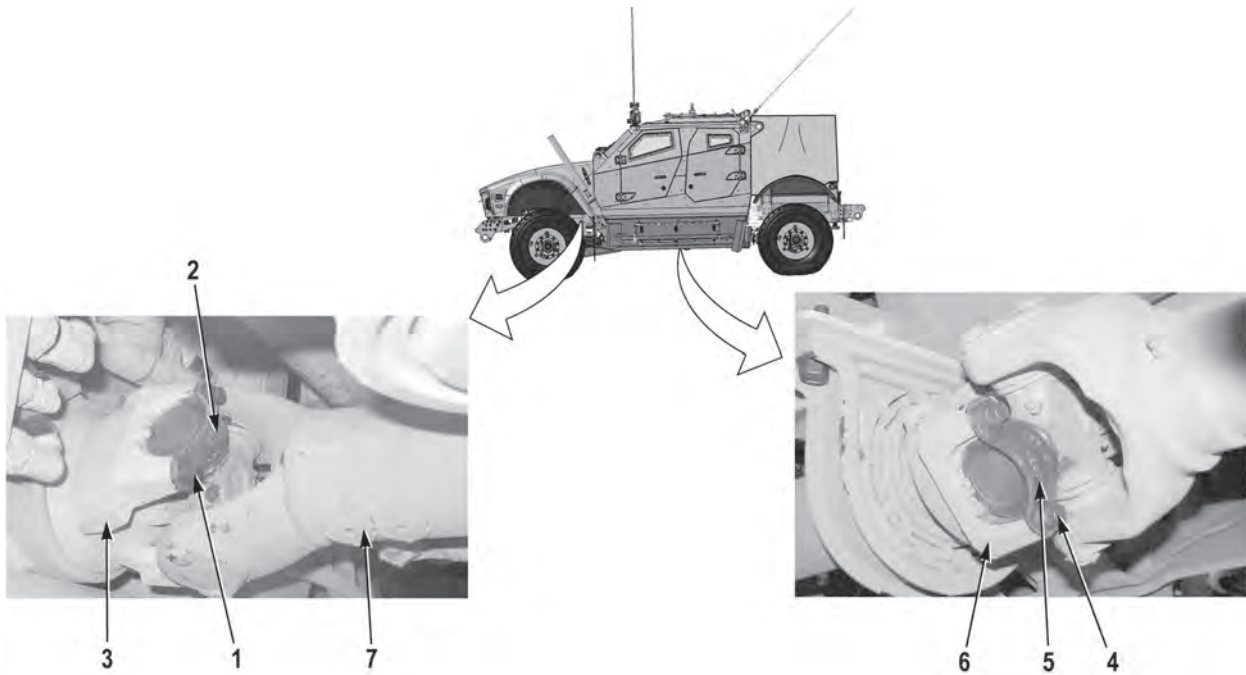
Install center belly deflector (M1240/M1245)
(WP 0048)
Install center belly deflector (M1240A1)
(WP 0056)
Remove and stow wheel chocks

REMOVAL (PROPELLER SHAFTS FROM AXLE NO. 1 TO TRANSFER CASE)**WARNING**

Propeller shaft is awkward. Do not lift or move propeller shaft without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

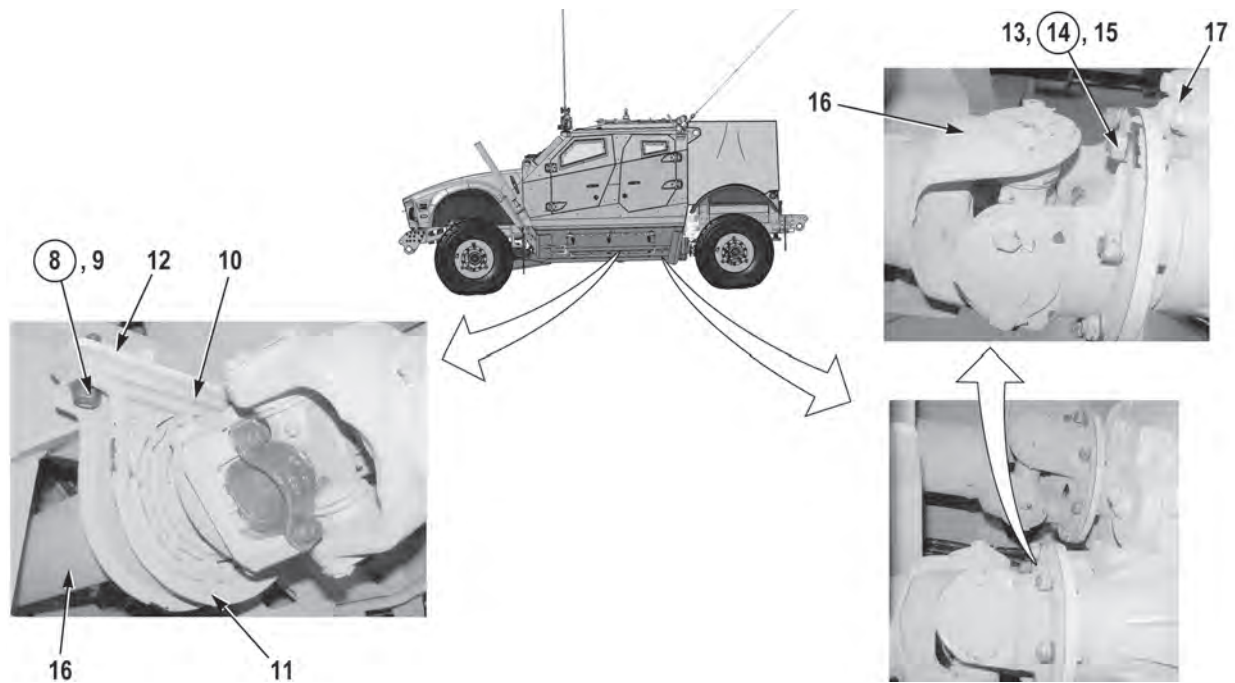
- A pry bar may be necessary to hold yokes from turning during removal.
- Perform Steps (1) through (3) to remove propeller shaft (1) from axle No. 1 and propeller shaft (7).
- Perform Steps (4) through (6) to remove propeller shaft (7) from transfer case and bracket.



1. With the aid of an assistant, remove four screws (1) and two bearing straps (2) from axle No. 1 yoke (3).
2. With the aid of an assistant, remove four screws (4) and two bearing straps (5) from propeller shaft yoke (6).

CAUTION

- **When removing propeller shaft from yokes, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.**
 - **Do not allow slip yoke to come off propeller shaft. Failure to comply may result in misalignment of propeller shaft yokes and could cause damage to equipment.**
3. With the aid of an assistant, compress and remove propeller shaft (7) from axle No. 1 yoke (3) and propeller shaft yoke (6).

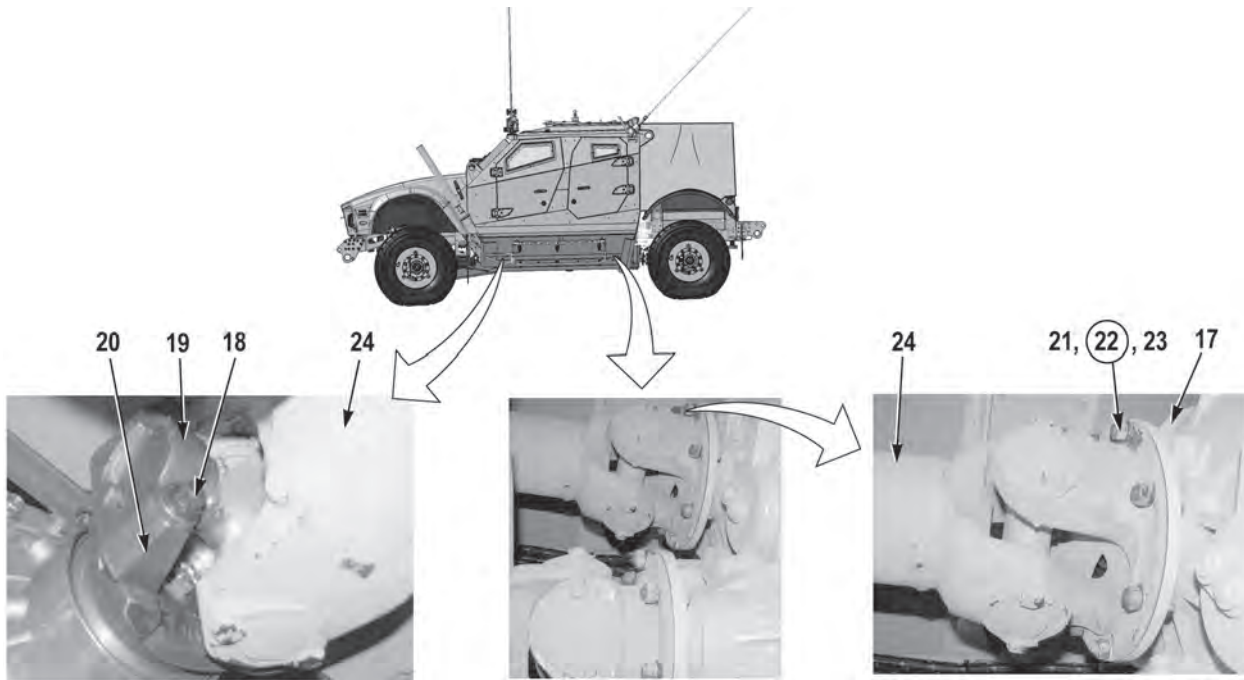


WARNING

Propeller shaft is awkward. Do not lift or move propeller shaft without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

4. With the aid of an assistant, remove two locknuts (8), screws (9), spacer (10), and propeller shaft bracket (11) from bracket (12). Discard locknuts (8).
5. With the aid of an assistant, remove eight nuts (13), lockwashers (14), and screws (15), from propeller shaft (16) and transfer case (17). Discard lockwashers (14).
6. With the aid of an assistant, compress and remove propeller shaft (16) from transfer case (17).

END OF TASK

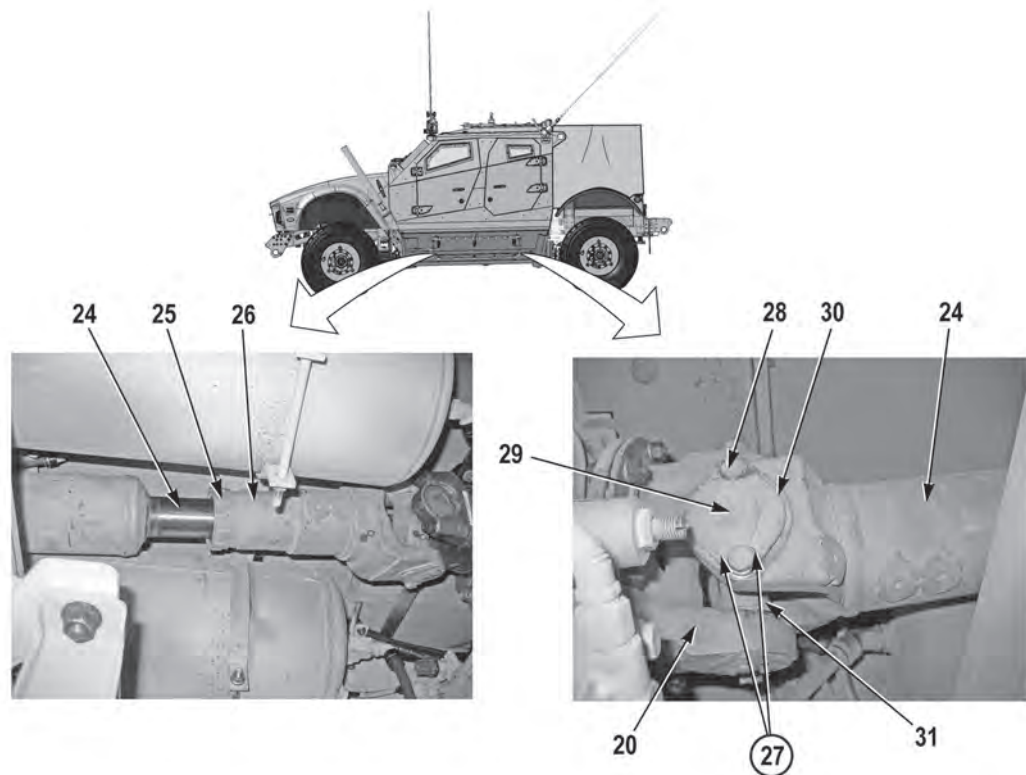
REMOVAL (PROPELLER SHAFT FROM TRANSMISSION TO TRANSFER CASE)**WARNING**

Propeller shaft weighs 88 lbs (40 kg). Do not lift or move propeller shaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

NOTE

A pry bar may be necessary to hold yokes from turning during removal.

1. With the aid of an assistant, remove four screws (18) and two bearing straps (19) from transmission yoke (20).
2. With the aid of an assistant, remove eight nuts (21), lockwashers (22), and screws (23) from propeller shaft (24) and transfer case (17). Discard lockwashers (22).



3. Loosen collar (25) from slip yoke (26).

NOTE

Note position of yoke prior to removal to ensure proper installation.

4. Remove slip yoke (26) from propeller shaft (24).

NOTE

Note position of lock tabs prior to removal to ensure proper installation.

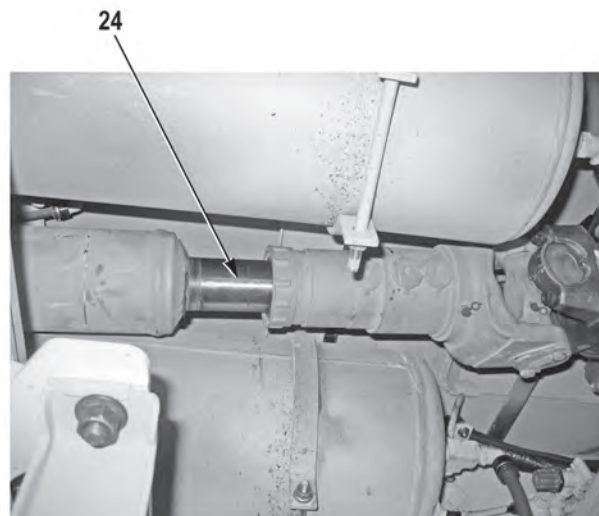
5. Bend four locking tabs (27) away from screws (28).

CAUTION

- **When removing propeller shaft from yokes, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.**
 - **Do not allow slip yoke to come off propeller shaft. Failure to comply may result in misalignment of propeller shaft yokes and could cause damage to equipment.**
6. Remove four screws (28), four locking tabs (27), two lock plates (29), bearing plates (30), bearing caps (31), and transmission yoke (20) from propeller shaft (24). Discard locking tabs (27).

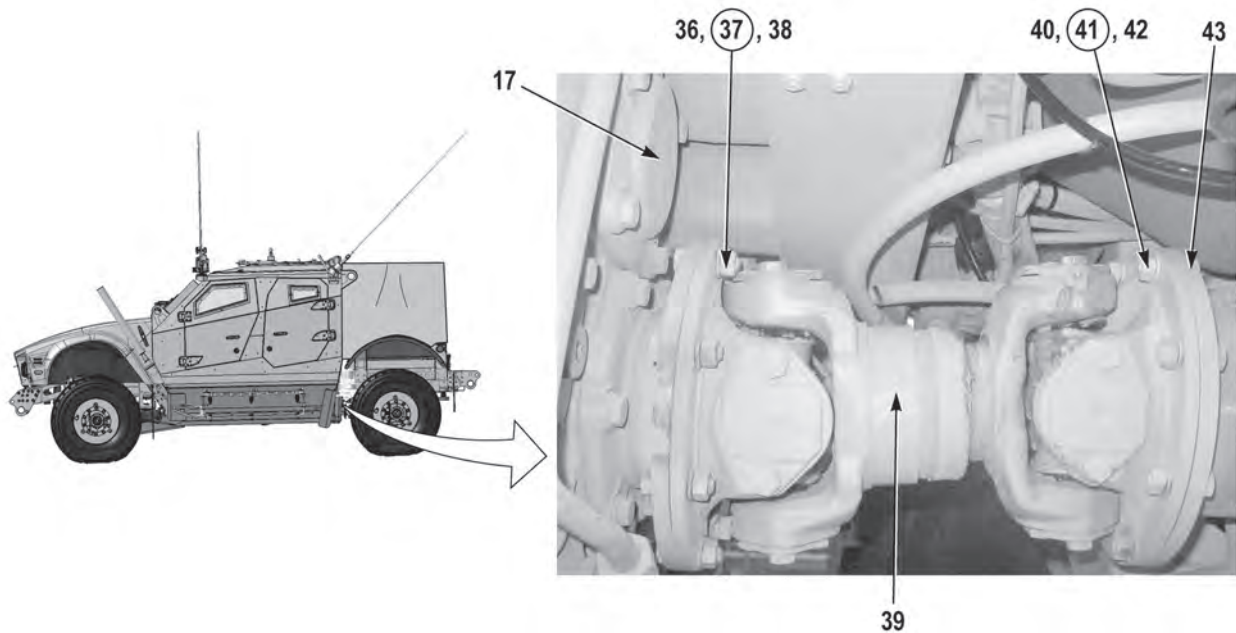


7. Remove two locknuts (32), screws (33), and bracket (34) from frame (35). Discard locknuts (32).



8. With the aid of an assistant remove propeller shaft (24) from vehicle.

END OF TASK

REMOVAL (PROPELLER SHAFT FROM AXLE NO. 2 TO TRANSFER CASE)**WARNING**

Propeller shaft weighs 60 lbs (27 kg). Do not lift or move propeller shaft without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

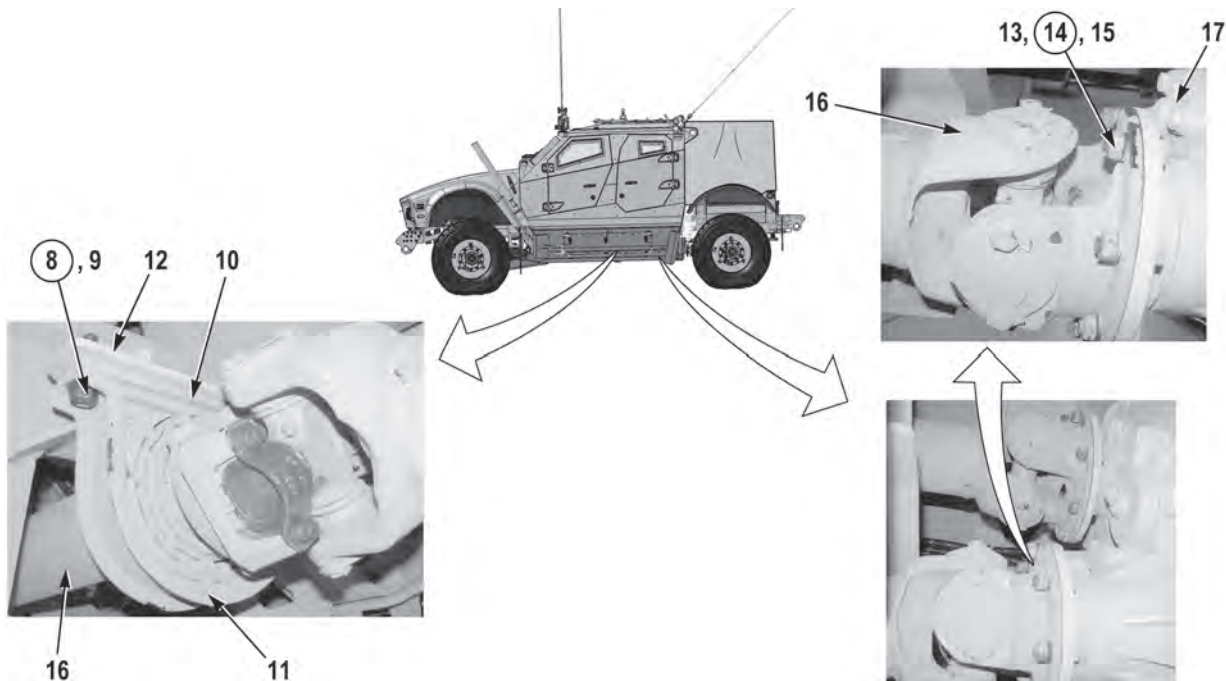
NOTE

A pry bar may be necessary to hold yokes from turning during removal.

1. With the aid of an assistant, remove eight nuts (36), lockwashers (37), and screws (38) from transfer case (17) and propeller shaft (39). Discard lockwashers (37).
2. With the aid of an assistant, remove eight nuts (40), lockwashers (41), and screws (42) from axle No. 2 (43) and propeller shaft (39). Discard lockwashers (41).
3. With the aid of an assistant, compress and remove propeller shaft (39) from transfer case (17) and axle No. 2 (43).

END OF TASK

INSTALLATION (PROPELLER SHAFTS FROM AXLE NO. 1 TO TRANSFER CASE)

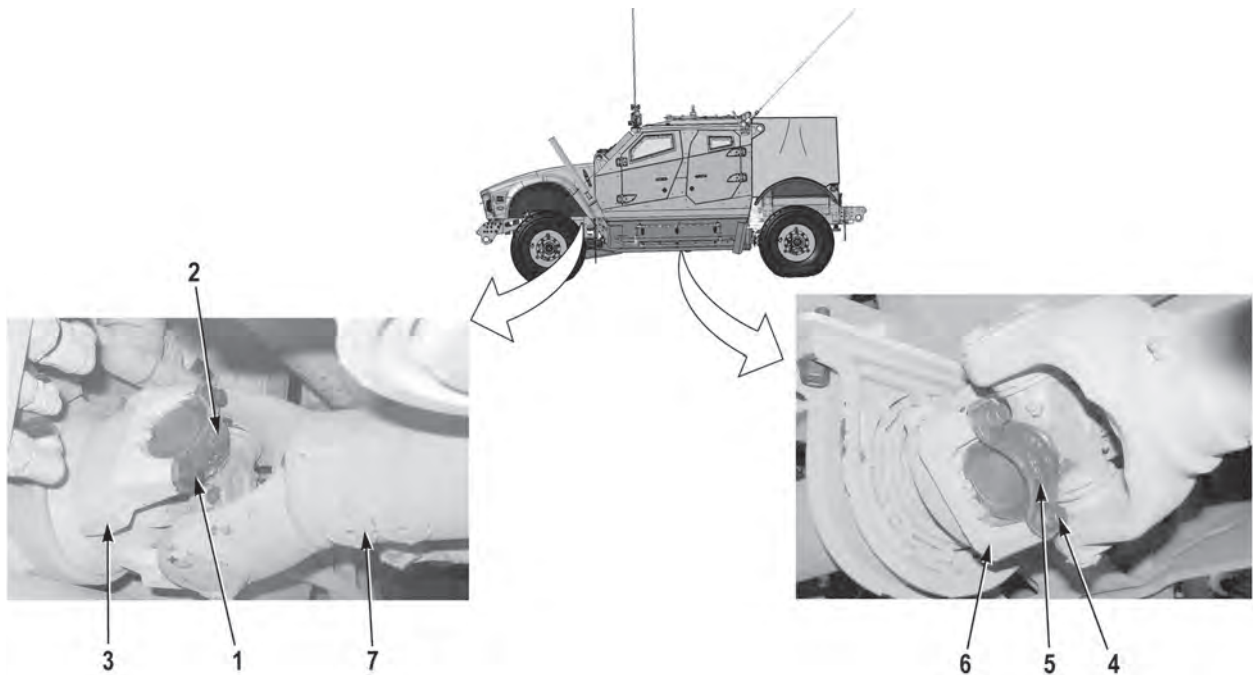


WARNING

Propeller shaft is awkward. Do not lift or move propeller shaft without the aid of an assistant and/or a lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- A pry bar may be necessary to hold yokes during installation.
 - Perform Steps (1) through (3) to install propeller shaft (16) on transfer case and bracket.
 - Perform Steps (4) through (7) to install propeller shaft (1) on axle No. 1 and propeller shaft (7).
1. With the aid of an assistant, position and extend propeller shaft (16) onto transfer case (17).
 2. With the aid of an assistant, install eight screws (15), new lockwashers (14), and nuts (13) on transfer case (17) and propeller shaft (16). Tighten eight screws (15) to 40 to 48 lb-ft (54 to 65 N•m).
 3. With the aid of an assistant, install propeller shaft bracket (11) and spacer (10) on bracket (12) with two screws (9) and new locknuts (8).



CAUTION

When installing propeller shaft on yoke, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

NOTE

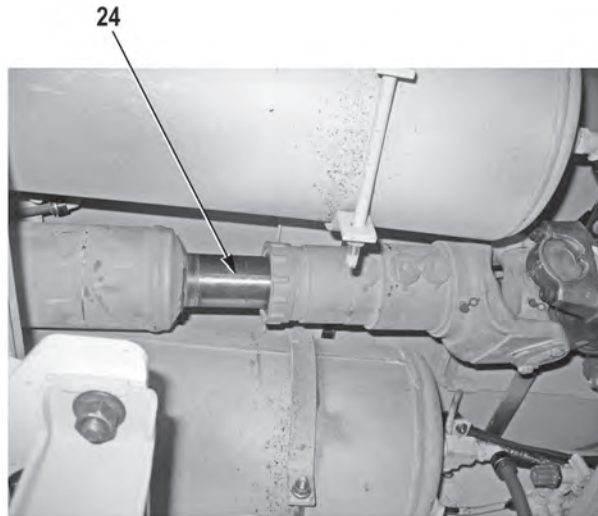
- A pry bar may be necessary to hold yokes from turning during installation.
 - Install propeller shaft (7) with slip yoke facing axle No. 1.
4. With the aid of an assistant, position and extend propeller shaft (7) in propeller shaft yoke (6) and axle No. 1 yoke (3).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

5. Apply sealing compound, Loctite 242, to threads of eight screws (4 and 1).
6. Install two bearing straps (5) on propeller shaft yoke (6) with four screws (4). Tighten four screws (4) to 55 to 60 lb-ft (75 to 81 N•m).
7. Install two bearing straps (2) on axle No.1 yoke (3) with four screws (1). Tighten four screws (1) to 55 to 60 lb-ft (75 to 81 N•m).

END OF TASK

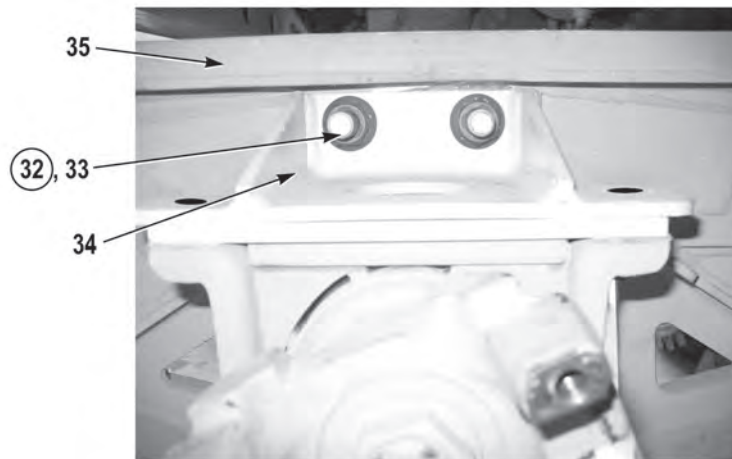
INSTALLATION (PROPELLER SHAFT FROM TRANSMISSION TO TRANSFER CASE)**WARNING**

Propeller shaft weighs 88 lbs (40 kg). Do not lift or move propeller shaft without the aid of an assistant. Failure to comply may result in injury or death to personnel.

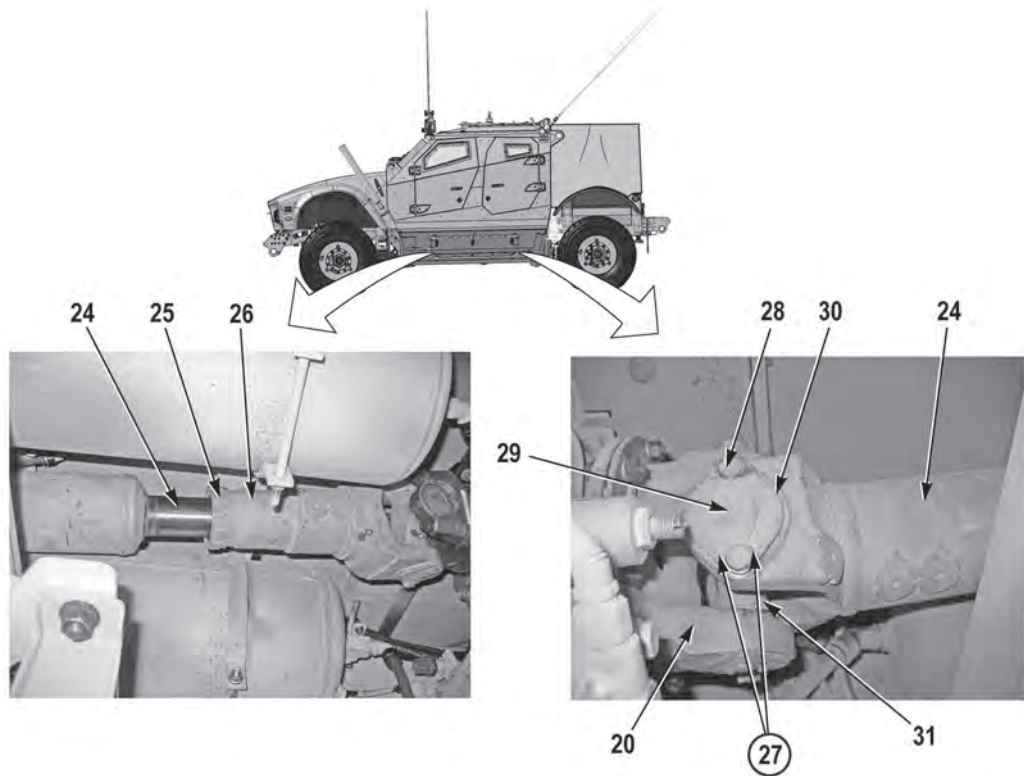
NOTE

A pry bar may be necessary to hold yokes from turning during installation.

1. With the aid of an assistant install propeller shaft (24) on vehicle.



2. Install bracket (34) on frame (35) with screws (33) and new locknuts (32).

**NOTE**

Install yoke as noted prior to removal.

3. Install transmission yoke (20), two bearing caps (31), bearing plates (30), lock plates (29), and four locking tabs (27) on propeller shaft (24) with four screws (28).

NOTE

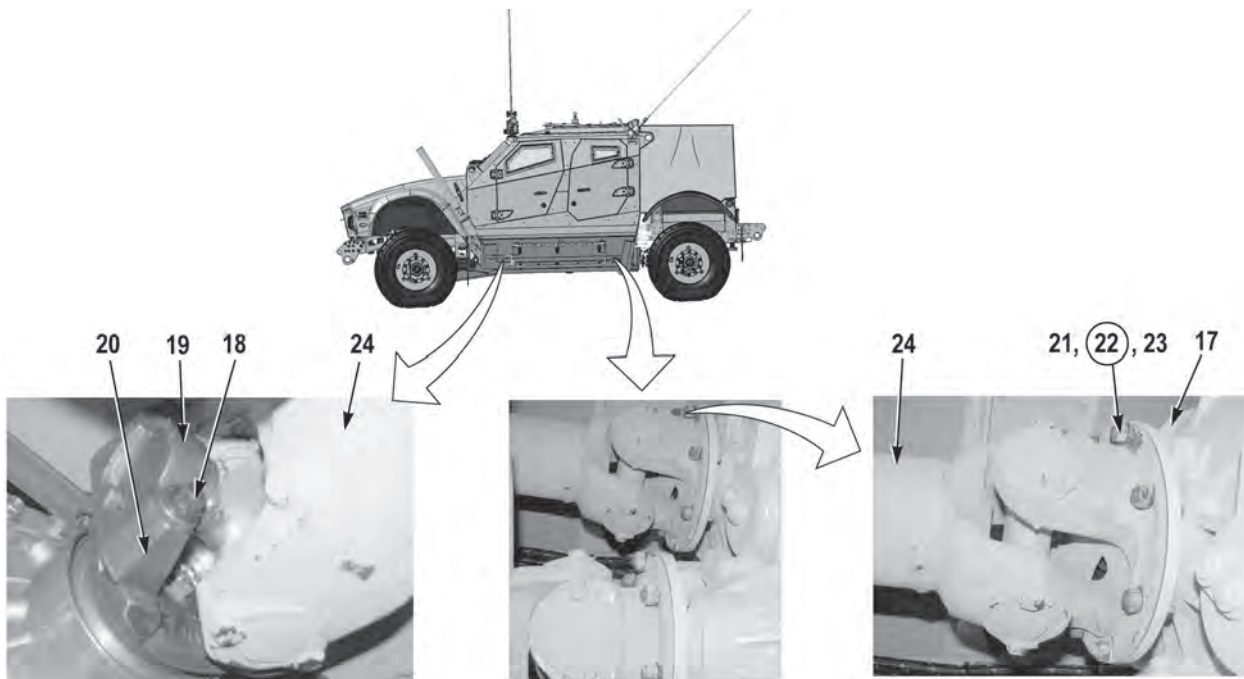
Install lock tabs as noted prior to removal.

4. Bend lock tabs (27) towards screws (28).

NOTE

Install propeller shaft as noted prior to removal.

5. Install slip yoke (26) on propeller shaft (24).
6. Install collar (25) on slip yoke (26).



CAUTION

When installing propeller shaft on yoke, ensure bearing caps remain on universal joint. Failure to comply may result in lost or damaged needle bearings.

NOTE

Install transfer case to transmission propeller shaft with slip yoke facing transmission.

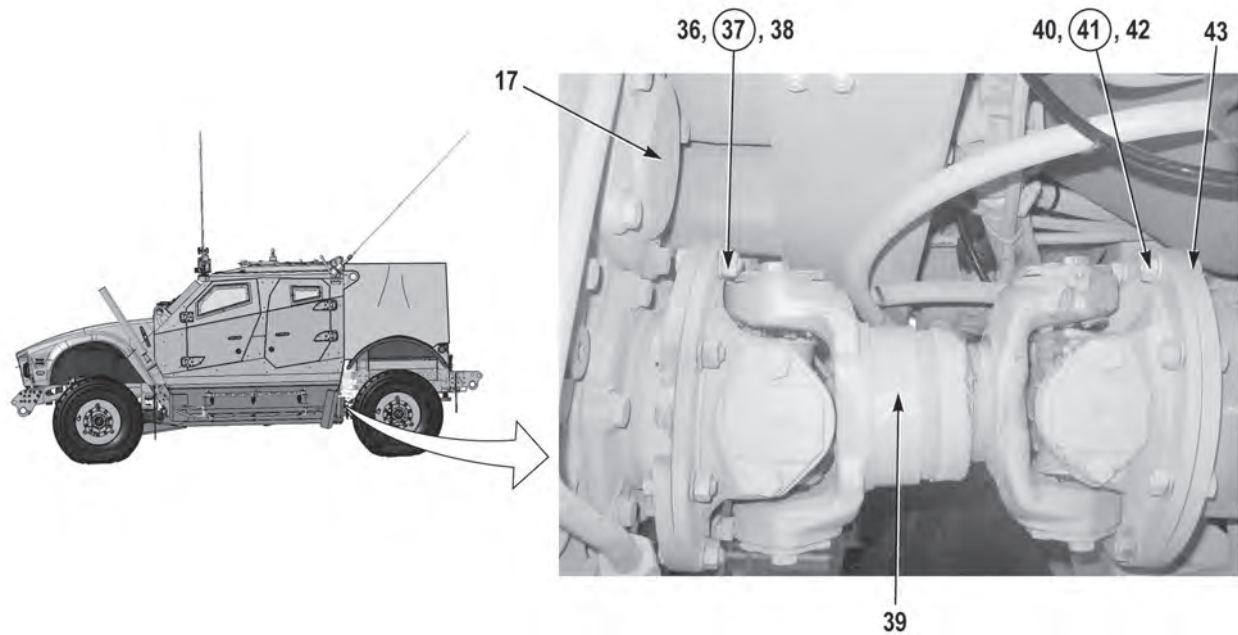
7. With the aid of an assistant, position and extend propeller shaft (24) into transfer case (17) and transmission yoke (20).
8. Install eight screws (23), new lockwashers (22), and nuts (21) on transfer case (17) and propeller shaft (24). Tighten eight screws (23) to 40 to 48 lb-ft (54 to 65 N•m).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

9. Apply sealing compound, Loctite 242, to threads of four screws (18).
10. Install two bearing straps (19) on transmission yoke (20) with four screws (18). Tighten four screws (18) to 130 to 135 lb-ft (176 to 183 N•m).

END OF TASK

INSTALLATION (PROPELLER SHAFT FROM AXLE NO. 2 TO TRANSFER CASE)**WARNING**

Propeller shaft weighs 60 lbs (27 kg). Do not lift or move propeller shaft without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

A pry bar may be necessary to hold yokes from turning during removal.

1. With the aid of an assistant, position and extend propeller shaft (39) onto axle No. 2 (43) and transfer case (17).
2. Install eight screws (42), new lockwashers (41), and nuts (40) on propeller shaft (39) and axle No. 2 (43). Tighten eight screws (42) to 40 to 48 lb-ft (54 to 65 N•m).
3. Install eight screws (38), new lockwashers (37), and nuts (36) on propeller shaft (39) and transfer case (17). Tighten eight screws (38) to 40 to 48 lb-ft (54 to 65 N•m).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

REBOUND BUMPER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Coil spring removed (front rebound bumper)
 (WP 0079)

Tools and Special Tools

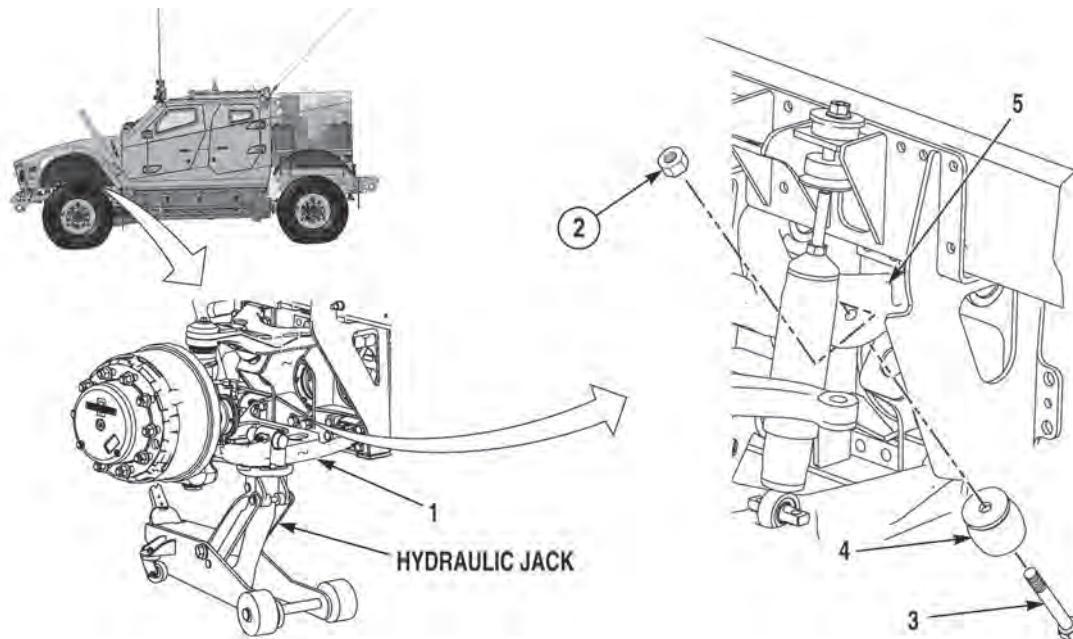
Socket, 1-1/8 in.
 Tool Kit, General Mechanic's: Automotive
 Wrench, 1-1/8 in.
 Wrench, Torque, 250 ft-lb

Materials/Parts

Locknut (Item 2)

Follow-On Maintenance

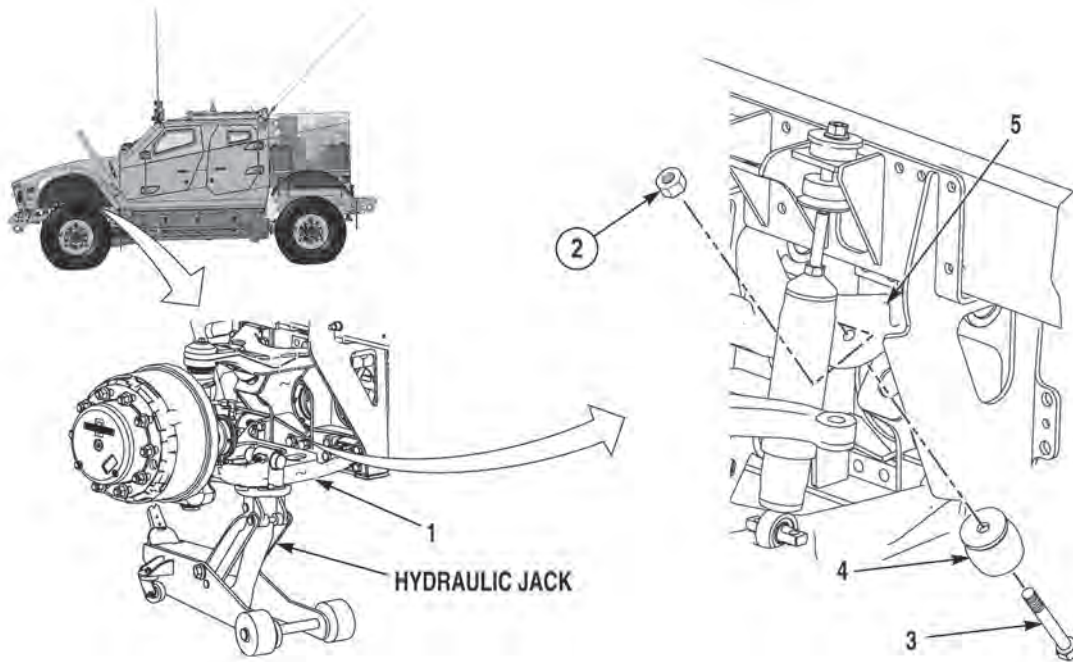
Install coil spring (front rebound bumper)
 (WP 0079)
 Remove and stow wheel chocks

REMOVAL**NOTE**

Rebound bumpers are removed the same way. Driver side shown.

1. Position hydraulic jack under lower control arm (1).
2. Raise lower control arm (1) completely.
3. Remove locknut (2), screw (3), and rebound bumper (4) from bracket (5). Discard locknut (2).

END OF TASK

INSTALLATION**NOTE**

Rebound bumpers are installed the same way. Driver side shown.

1. Install rebound bumper (4) on bracket (5) with screw (3) and new locknut (2). Tighten locknut (2) to 120 lb-ft (163 N•m).
2. Lower lower control arm (1).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

SHOCK ABSORBER REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Passenger side engine panel removed (WP 0226)
(Front passenger side shock only)

Tools and Special Tools

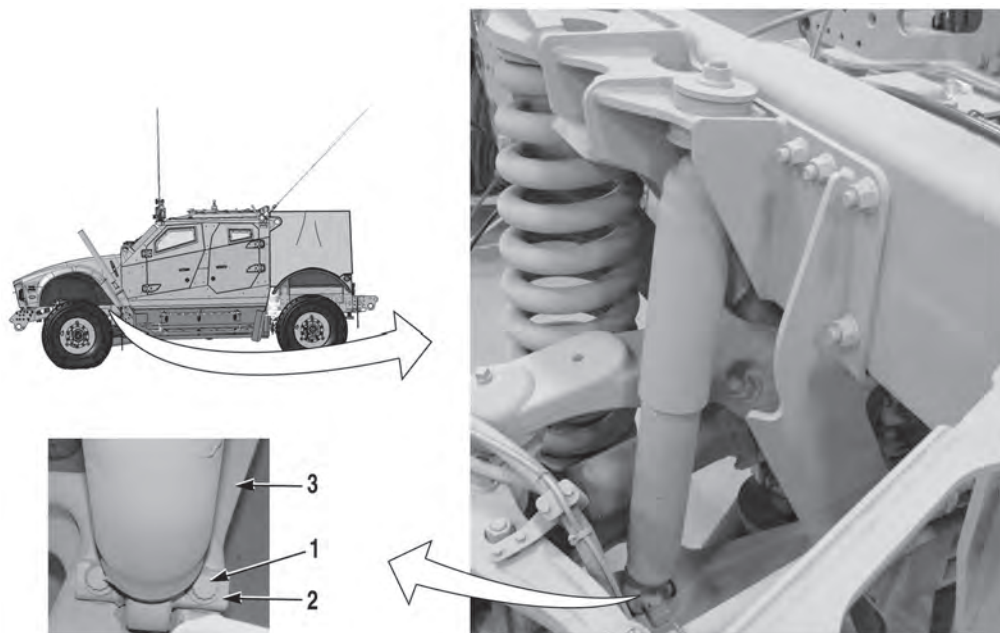
Adapter, Torque, 5/8 in.
Socket, Deep Well, 1 in.
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 250 ft-lbs

Materials/Parts

Locknut (Item 4)
Compound, Sealing, Loctite 242

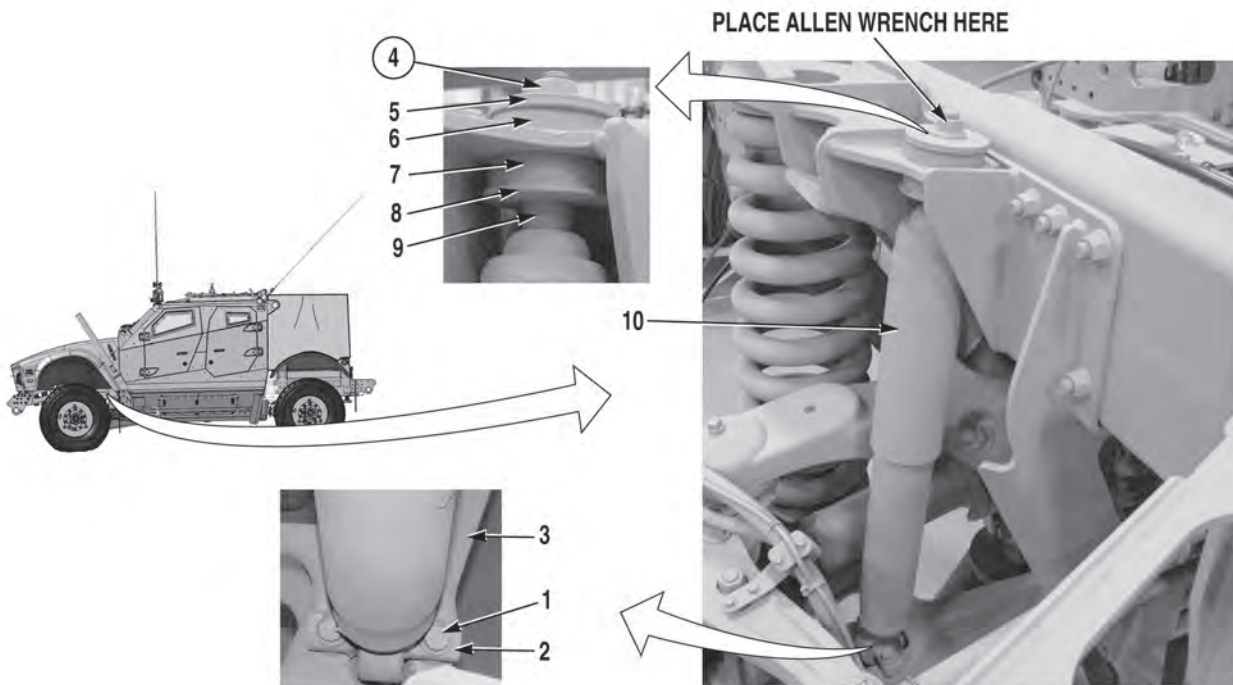
Follow-On Maintenance

Install passenger side engine panel (WP 0226)
(Front passenger side shock only)
Remove and stow wheel chocks

REMOVAL**NOTE**

All shock absorbers are removed the same way. Axle No. 1 driver side shown.

1. Remove two screws (1) from lower shock mount (2) and lower control arm (3).



CAUTION

Washer (5) and washer (8) are not interchangeable. Note their location. Failure to comply may result in damage to equipment.

NOTE

Allen wrench must be placed in end of top shock stud to secure shock while performing Step (2).

2. Remove locknut (4), washer (5), rubber mount (6), rubber mount (7), washer (8), bushing (9), and shock absorber (10) from vehicle. Discard locknut (4).

END OF TASK

INSTALLATION

CAUTION

Washers (5 and 8) are not interchangeable. Switching washers during installation may cause damage to equipment.

NOTE

All shock absorbers are installed the same way. Axle No. 1 driver side shown.

1. Install shock absorber (10) on vehicle with bushing (9), washer (8), rubber mount (7), rubber mount (6), washer (5), and new locknut (4). Do not tighten locknut (4).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 242, to threads of two screws (1).
3. With torque adapter install lower shock mount (2) on lower control arm (3) with two screws (1). Tighten screws (1) to 153 to 187 lb-ft (207 to 254 N•m).

NOTE

Allen wrench must be placed in end of top shock stud to secure shock while performing Step (4).

4. Tighten locknut (4) to 147 lb-ft (200 N•m).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

SHOCK ABSORBER REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

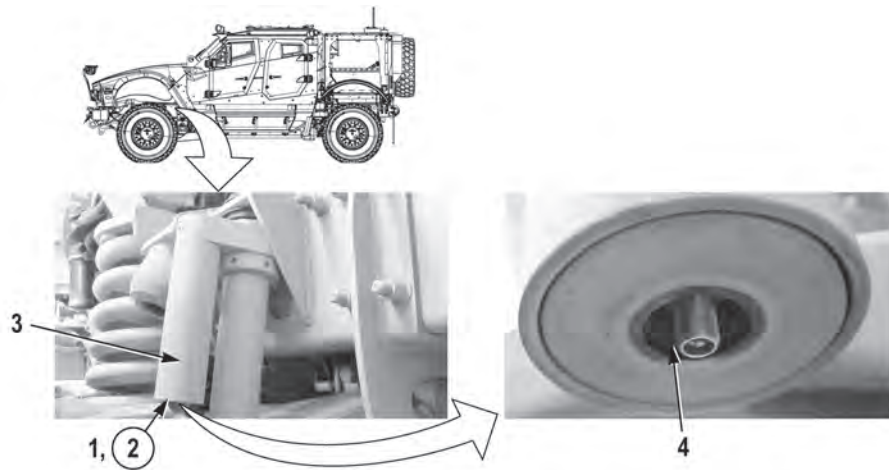
Adapter, Torque Wrench, 5/8 in., 12 pt
 Adapter, Torque Wrench, 30 mm
 Inflation Tool Kit
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 250 lb-ft
 Regulator, Torpedo

Materials/Parts

O-ring (Item 2)
 Locknut (Item 7)
 Compound, Sealing, Loctite 242
 Compound, Sealing, Loctite 567
 Nitrogen, Technical

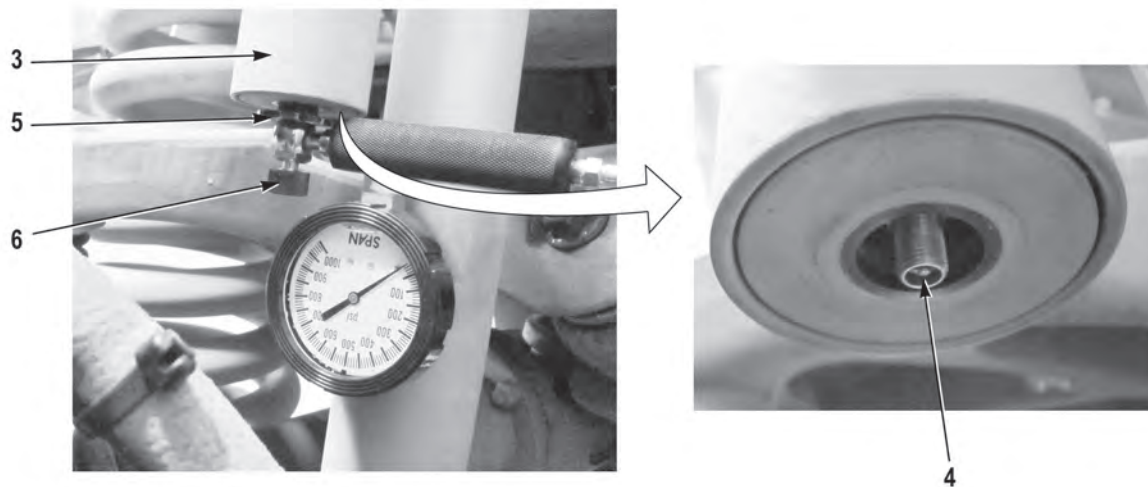
Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

All shock absorbers are removed the same way. Driver side front shock absorber shown.

1. Remove cap (1) and O-ring (2) from shock absorber reservoir (3) and shock absorber valve (4). Discard O-ring (2).



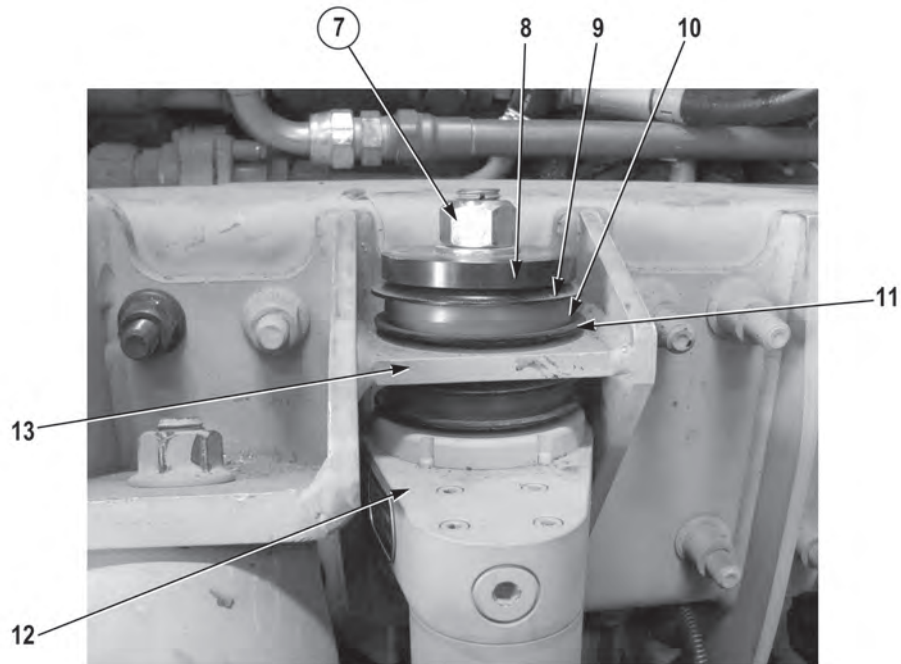
WARNING

Shock absorbers are filled with high pressure gas. Service shock absorbers with adequate ventilation. Do not use or store cylinder near heat or open flame. Cylinder temperature should not exceed 125°F (52°C). Use with equipment rated for cylinder pressure. Open valve slowly. Close valve after each use and in storage. Use in accordance with Material Safety Data Sheet for Nitrogen. If inhaled, move to area with fresh air. Failure to comply may result in injury or death to personnel.

2. Install inflation tool star wheel (5) on shock absorber valve (4), and route hose away from personnel.

NOTE

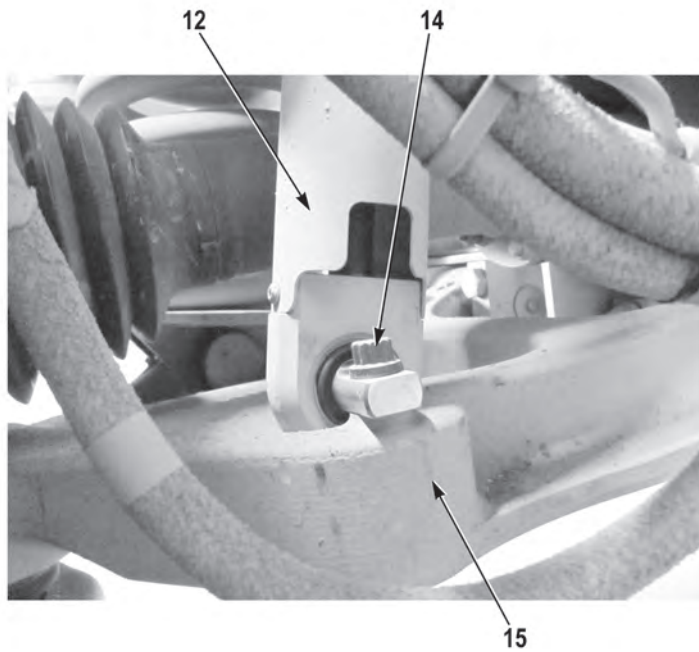
- Turning valve knob clockwise (IN) opens shock absorber valve.
 - Turning valve knob counterclockwise (OUT) closes shock absorber valve.
3. Slowly turn valve knob (6) clockwise (IN) to evacuate nitrogen from shock absorber reservoir (3).
 4. Remove inflation tool and hose.



NOTE

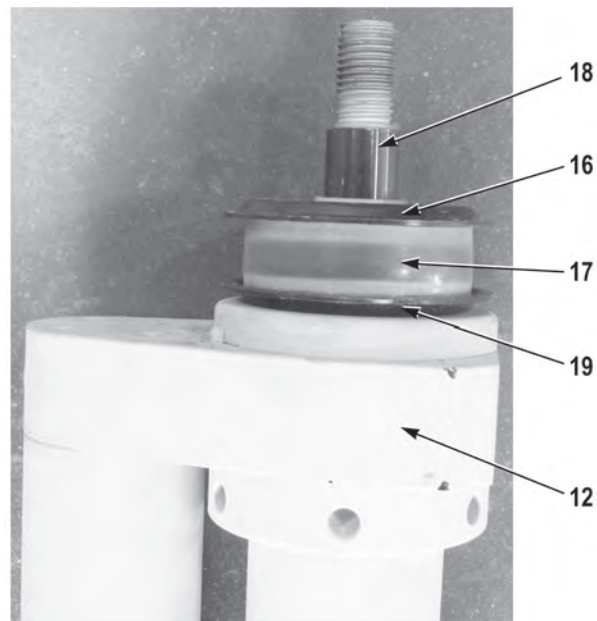
Note position and placement of washers and bushings prior to removal to ensure proper installation.

5. Remove locknut (7), washer (8), washer (9), bushing (10), and washer (11) from shock absorber (12) and sideplate (13). Discard locknut (7).



Shock may have to be compressed prior to removal.

6. Remove two screws (14) and shock absorber (12) from lower control arm (15).

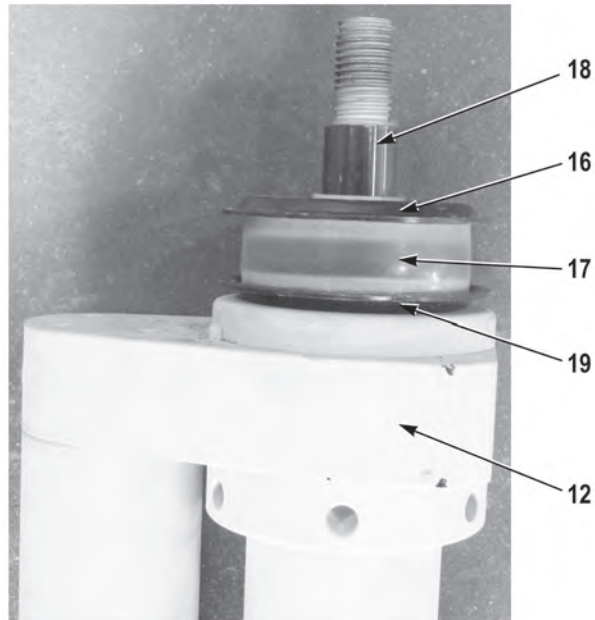


NOTE

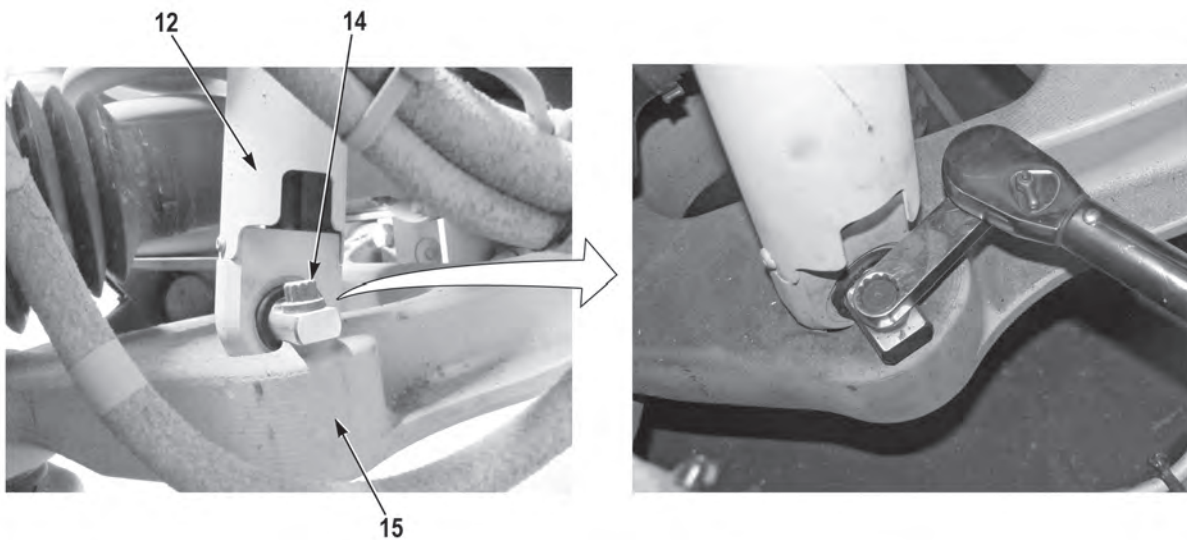
Note position and placement of washers, bushings, and spacers prior to removal to ensure proper installation.

7. Remove washer (16), bushing (17), spacer (18), and washer (19) from shock absorber (12).

END OF TASK

INSTALLATION**NOTE**

- All shock absorbers are installed the same way. Driver side front shock absorber shown.
 - Position washers, bushings, and spacers on shock absorber as noted prior to removal.
1. Position washer (19), spacer (18), bushing (17), and washer (16) on shock absorber (12).



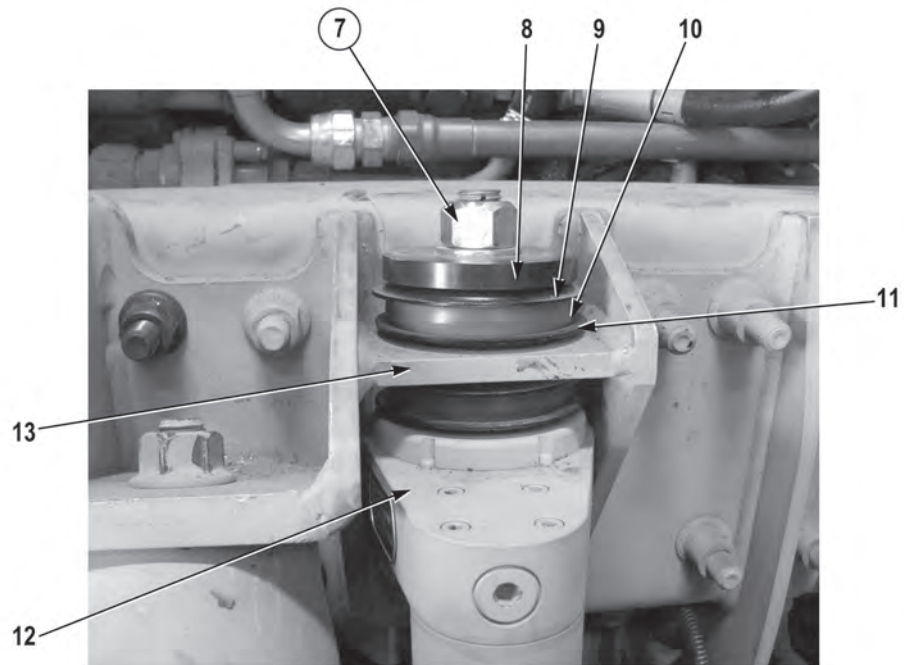
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

Torque adapter must be 90° to torque wrench. Failure to comply may result in damage to equipment.

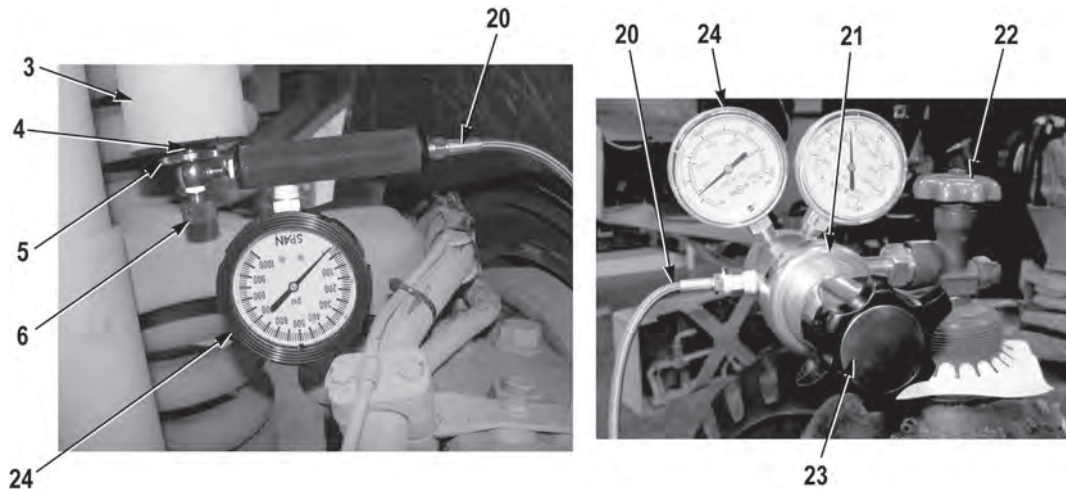
2. Apply sealing compound, Loctite 242, to the threads of two screws (14).
3. With torque adapter, install shock absorber (12) on lower control arm (15) with two screws (14). Tighten screws (14) to 170 lb-ft (231 N•m).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to the threads of locknut (7).
5. Install shock absorber (12), washer (11), bushing (10), washer (9), and washer (8) on sideplate (13) with new locknut (7). Tighten locknut (7) to 150 lb-ft (203 N•m).



WARNING

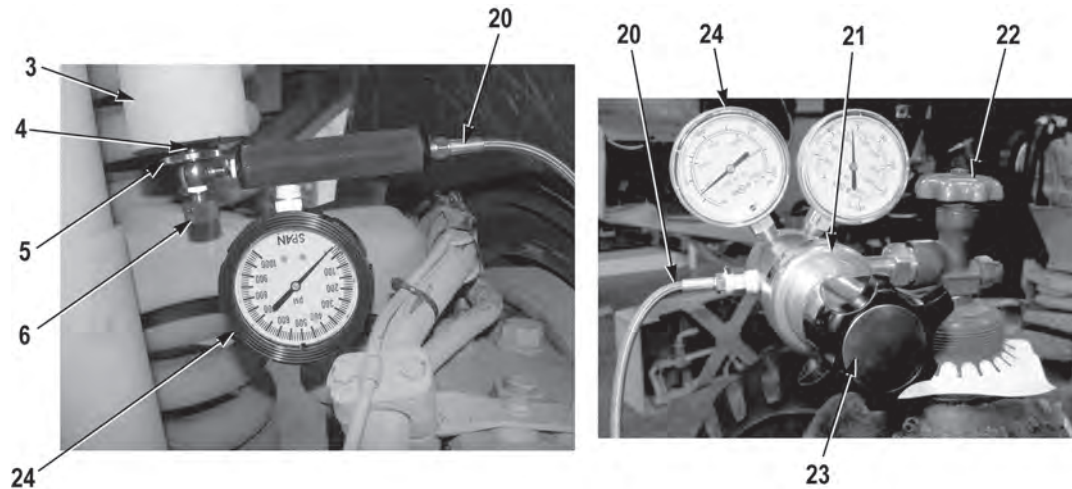
- Shock absorbers are filled with high pressure gas. Service shock absorbers with adequate ventilation. Do not use or store cylinder near heat or open flame. Cylinder temperature should not exceed 125°F (52°C). Use with equipment rated for cylinder pressure. Open valve slowly. Close valve after each use and in storage. Use in accordance with Material Safety Data Sheet for Nitrogen. If inhaled, move to area with fresh air. Failure to comply may result in injury or death to personnel.
- Ensure valve knob on inflation tool is fully closed (turned out counterclockwise) prior to installation. Failure to comply may result in injury or death to personnel.

6. Install inflation tool star wheel (5) on shock absorber reservoir valve (4).
7. Install pressure regulator (21) on nitrogen supply tank.
8. Connect inflation tool hose (20) to pressure regulator (21).

WARNING

Ensure valve knob on inflation tool is fully closed (OUT) before proceeding. Failure to comply may result in injury or death to personnel.

9. Open nitrogen supply tank main valve (22).
10. Turn pressure regulator adjustment knob (23) clockwise or counterclockwise until 425 to 475 psi (24 to 26 bar) is indicated on both hose pressure gauges (24) and (25).



CAUTION

Fill shock slowly. Failure to comply may result in damage to equipment.

11. Slowly turn inflation tool valve knob (6) clockwise (IN) and charge shock absorber reservoir (3).

CAUTION

After charging, allow charge to set 10 to 15 minutes. This allows time for the gas temperature to stabilize. Failure to comply may result in damage to equipment.

12. Turn inflation tool valve knob (6) counterclockwise (OUT) to close shock absorber reservoir valve.

WARNING

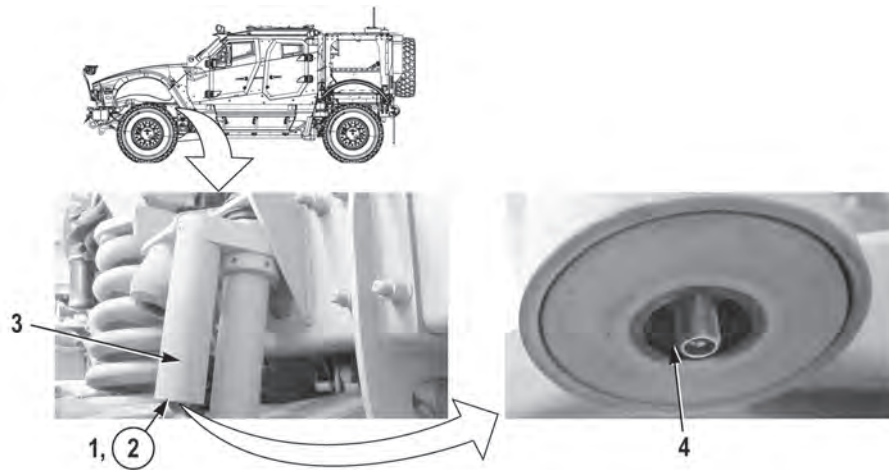
Nitrogen lines under pressure will move violently when removed. Ensure nitrogen supply is shut off prior to removing air lines. Failure to comply may result in injury or death to personnel.

13. Close nitrogen supply tank main valve (22).

NOTE

When removing inflation tool hose, residual pressure trapped in hose between regulator and inflation tool will release.

14. Slowly remove inflation tool hose (20) from pressure regulator (21).
15. Remove pressure regulator (21) from nitrogen supply tank.
16. Remove inflation tool and pressure regulator from vehicle.

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

17. Apply sealing compound, Loctite 567, to threads of cap (1) and install new O-ring (2) and cap (1) on shock absorber valve (4) and shock absorber reservoir (3).
18. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SKID PLATE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

Socket, 1-1/4 in.
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 600 ft-lb

Materials/Parts

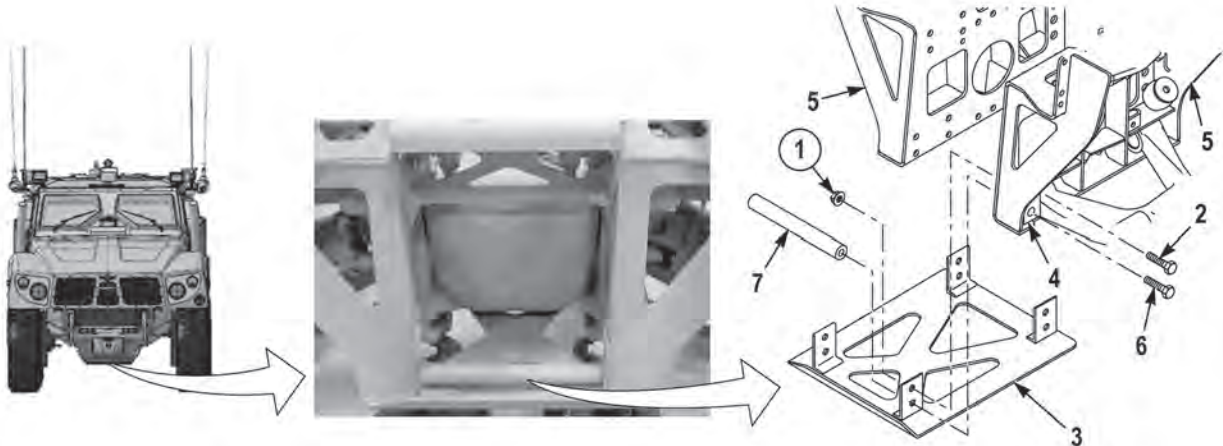
Locknut (4) (Item 1)
 Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**WARNING**

Ensure skid plate is supported during removal to avoid pinching and binding. Failure to comply may result in injury or death to personnel.

NOTE

Both skid plates are removed the same way. Axle No. 1 shown.

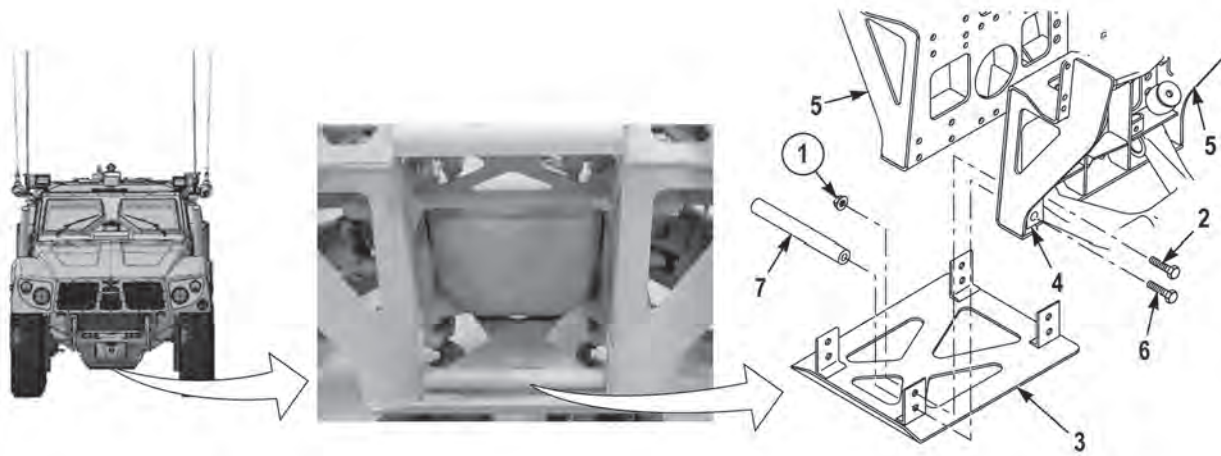
1. Remove four locknuts (1) and screws (2) from skid plate (3), four control arm pivot blocks (4), and two side plates (5). Discard locknuts (1).

WARNING

Skid plate weighs 53 lbs (24 kg). Do not lift or move skid plate without the aid of an assistant. Failure to comply may result in injury or death to personnel.

2. With the aid of an assistant, remove four screws (6), two spacer tubes (7), and skid plate (3) from four control arm pivot blocks (4) and two side plates (5).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Both skid plates are installed the same way. Axle No. 1 shown.

1. Apply sealing compound, Loctite 242, to eight screws (6 and 2).

WARNING

Skid plate weighs 53 lbs (24 kg). Do not lift or move skid plate without the aid of an assistant. Failure to comply may result in injury or death to personnel.

2. With the aid of an assistant, install skid plate (3) and two spacer tubes (7) on side plates (5) and four control arm pivot blocks (4) with four screws (6). Do not tighten screws (6).
3. Install four screws (2) and new locknuts (1) on two side plates (5), four control arm pivot blocks (4), and skid plate (3). Tighten locknuts (1) to 375 lb-ft (509 N•m).
4. Tighten four screws (6) to 280 lb-ft (379.7 N•m).
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPIDER/SPINDLE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Half shaft and seal removed (WP 0084)
Wheel end removed (WP 0101)
Hub removed (WP 0086)
Brake chamber removed (WP 0120)
Brake drum removed (WP 0122)

Tools and Special Tools

Driver, Bearing, 60 mm
Tool Kit, General Mechanic's: Automotive
Wrench, Allen Socket 1/2 in.
Wrench, Torque, 250 ft-lbs

Materials/Parts

Lockwasher (2) (Item 5)
O-ring (3) (Item 19)
Seal (Item 23)

Materials/Parts (continued)

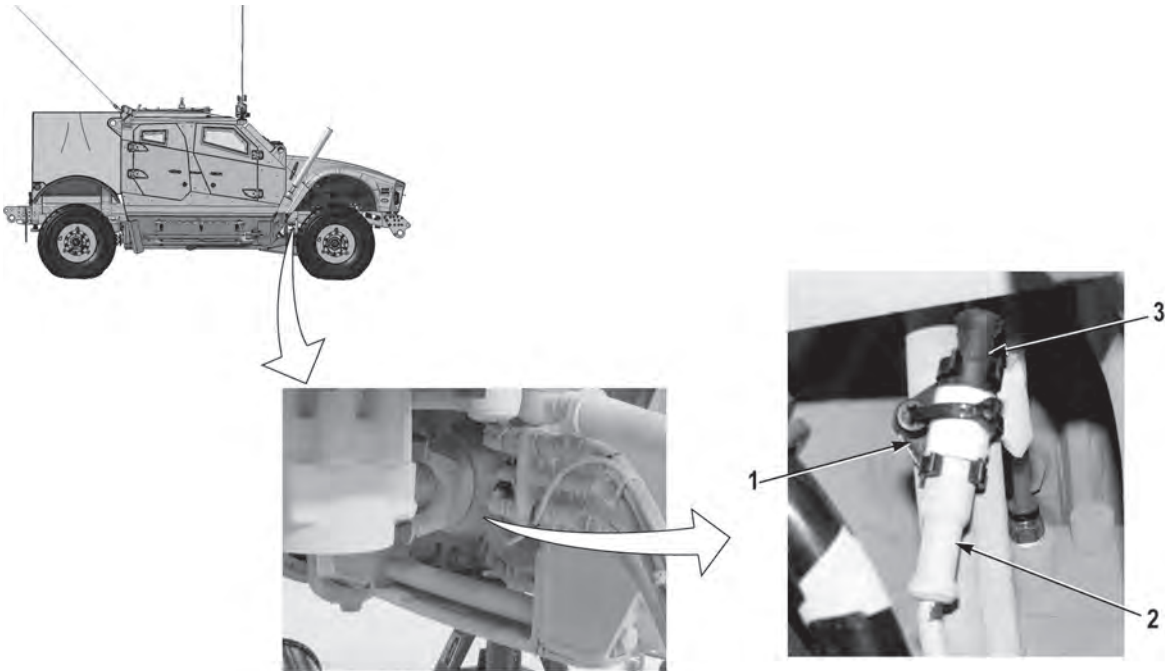
Adhesive, Sealant, Silicone, RTV
Compound, Sealing, Loctite 242
Grease, Automotive and Artillery
Lubricant, Connector, Nyogel 760G
Ties, Cable

Personnel Required

Two

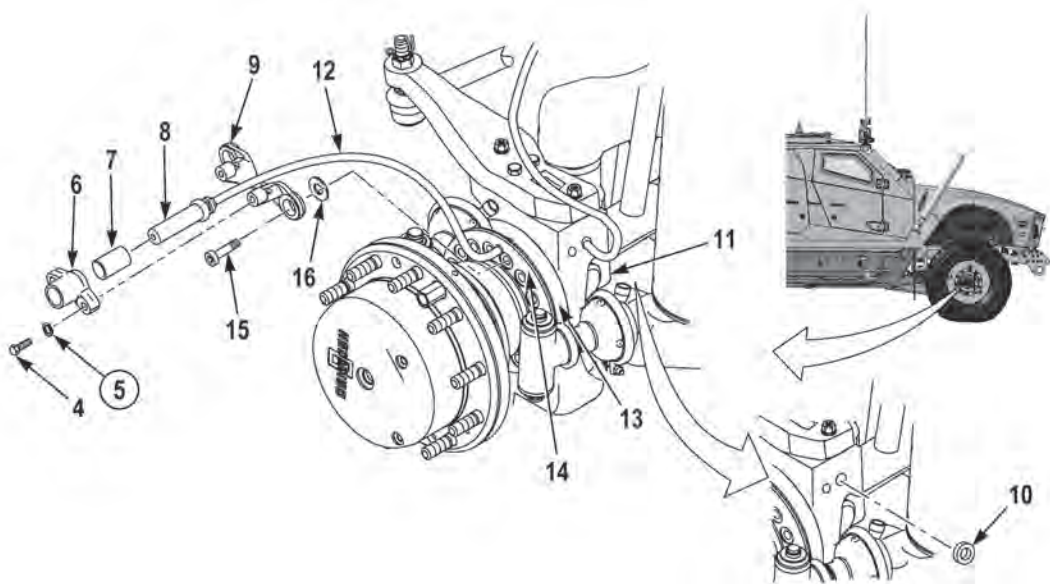
Follow-On Maintenance

Install brake chamber (WP 0120)
Install hub (WP 0086)
Install wheel end (WP 0101)
Install half shaft and seal (WP 0084)
Install brake drum (WP 0122)
Remove and stow wheel chocks

REMOVAL**NOTE**

- All ABS sensors are removed the same way. Axle No. 1 passenger side shown.
- Remove cushion clips and cable ties as required.

1. Remove connector lock (1) from two connectors (2 and 3).
2. Disconnect connector (2) from connector (3).



CAUTION

Prior to removing sensor, carefully remove sealant from cable and knuckle. Failure to comply may result in damage to equipment.

NOTE

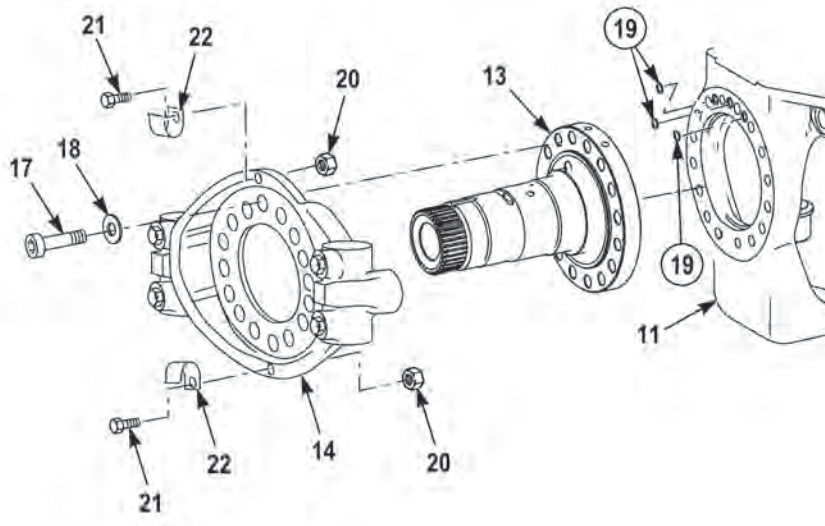
Note location of sensor cable prior to removal to ensure proper installation.

3. Remove two screws (4), lockwashers (5), pilot (6), and bushing (7) from ABS sensor (8) and base (9). Discard lockwashers (5).
4. Remove grommet (10) from knuckle (11).
5. Remove ABS sensor (8) and cable (12) from knuckle (11), spindle (13), and spider (14).

CAUTION

Ensure pilot is installed on base prior to removal. Failure to comply may result in damage to equipment.

6. Remove two screws (15), base (9), and two washers (16) from spider (14).



WARNING

Spindle may become loose when removing spider. Support spindle when removing spider. Failure to comply may result in injury to personnel.

NOTE

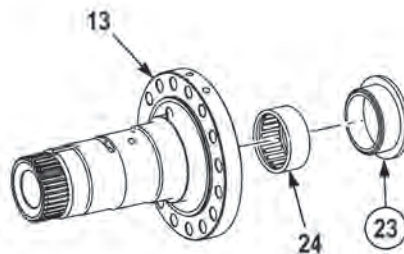
- All spider/spindles are removed the same way. Axle No. 1 passenger side shown.
- Note position of spider and spindle prior to removal to ensure proper installation.

7. With the aid of an assistant, remove 13 screws (17), washers (18), spider (14), spindle (13), and three O-rings (19) from knuckle (11). Discard O-rings (19).

NOTE

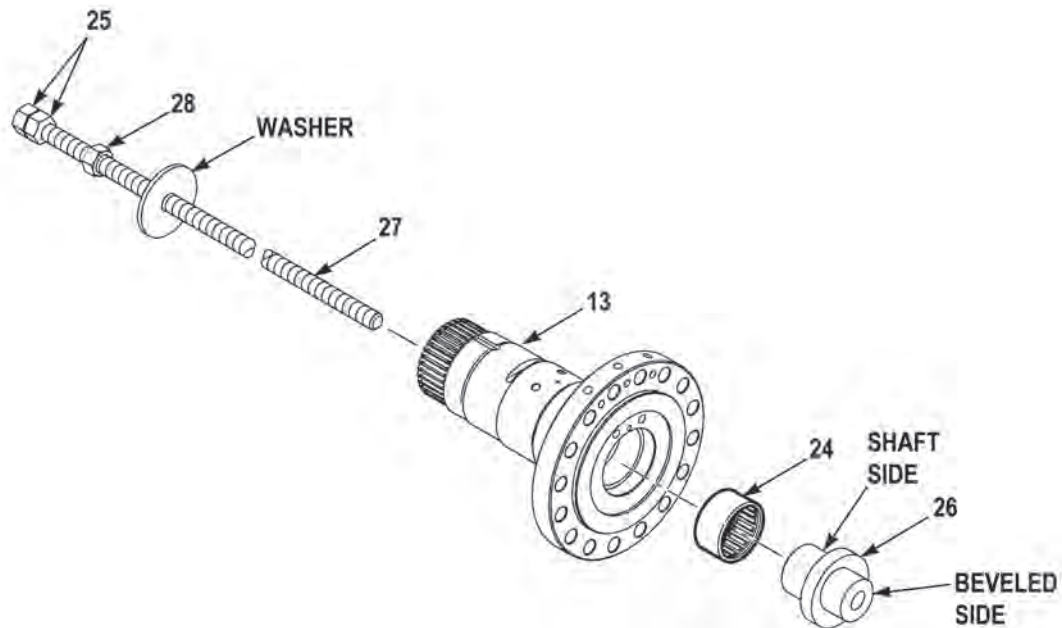
Perform Step (8) if brackets need to be removed.

8. Remove two nuts (20), screws (21), and brackets (22) from spider (14).



9. Remove seal (23) from spindle (13). Discard seal (23).
10. Remove bearing (24) from spindle (13).

END OF TASK

INSTALLATION**NOTE**

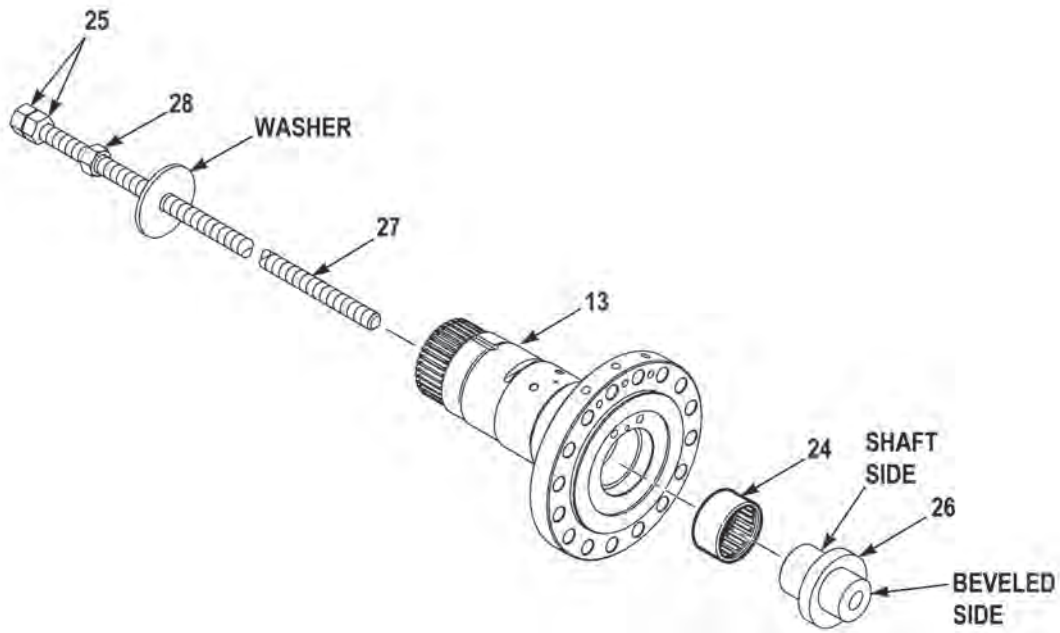
- Perform Steps (1) through (11) only if installing a new spindle.
- Perform Steps (1) through (11), using bearing driver, to install bearing on spindle.

1. Lightly lubricate outside of bearing (24).
2. Apply a light coat of grease to inside of bearing (24).
3. Tighten two nuts (25) together.
4. Remove press (26) from threaded rod (27).
5. Install threaded rod (27) into spindle (13).
6. Install bearing (24) on press (26).

NOTE

Install shaft side of press on threaded rod.

7. Install bearing (24) and press (26) on threaded rod (27).
8. Position bearing (24) and press (26) into back of spindle (13).
9. Turn nut (28) clockwise until bearing (24) and press (26) bottoms out against spindle (13).
10. Loosen nut (28) and remove press (26) from threaded rod (27).
11. Install beveled side of press (26) on threaded rod (27).
12. Install press (26) on threaded rod (27).
13. Turn nut (28) clockwise until bearing (24) and press (26) bottoms out against spindle (13).

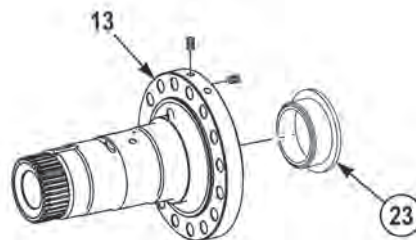


14. Loosen nut (28) and remove press (26) from threaded rod (27).

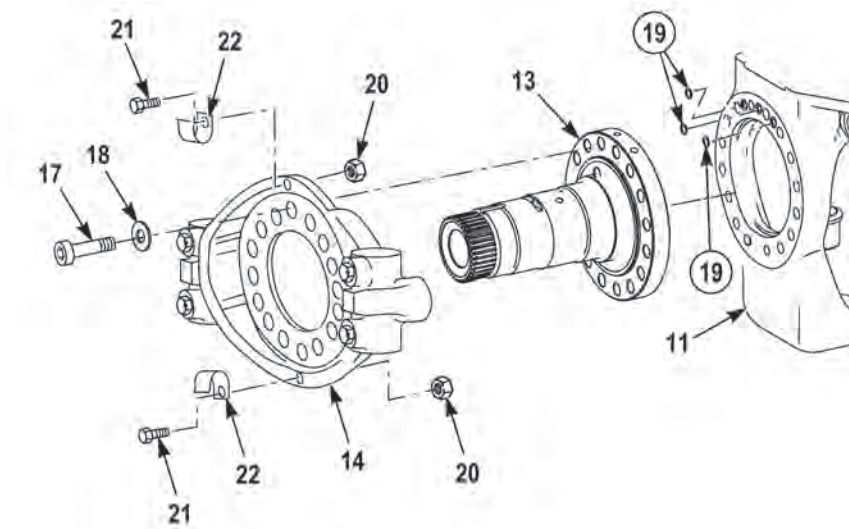
NOTE

Bearing is properly installed when bearing has bottomed out against spindle and seated evenly against spindle.

15. Remove threaded rod (27) from spindle (13).



16. Install new seal (23) on spindle (13).



NOTE

- All spider/spindles are installed the same way. Axle No. 1 shown.
- Perform Step (17) if brackets were removed.

17. Install two brackets (22) on spider (14) with two screws (21) and nuts (20).

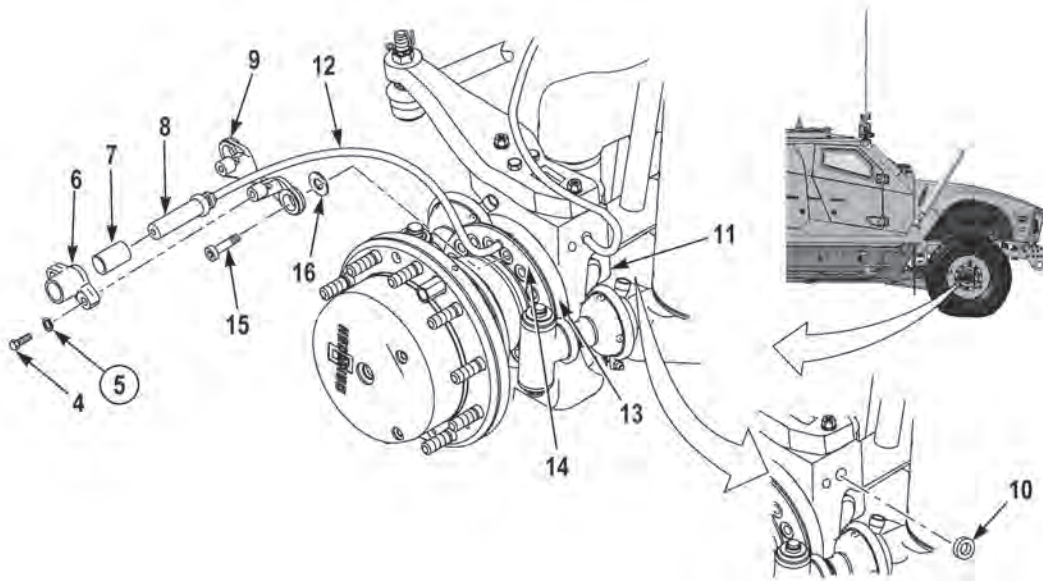
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install spindle and spider in same position as noted prior to removal.

18. Apply sealing compound, Loctite 242, to threads of 13 screws (17).
19. With the aid of an assistant, install three new O-rings (19), spindle (13), and spider (14) on knuckle (11) with 13 washers (18) and screws (17). Tighten screws (17) to 212 lb-ft (288 N•m).



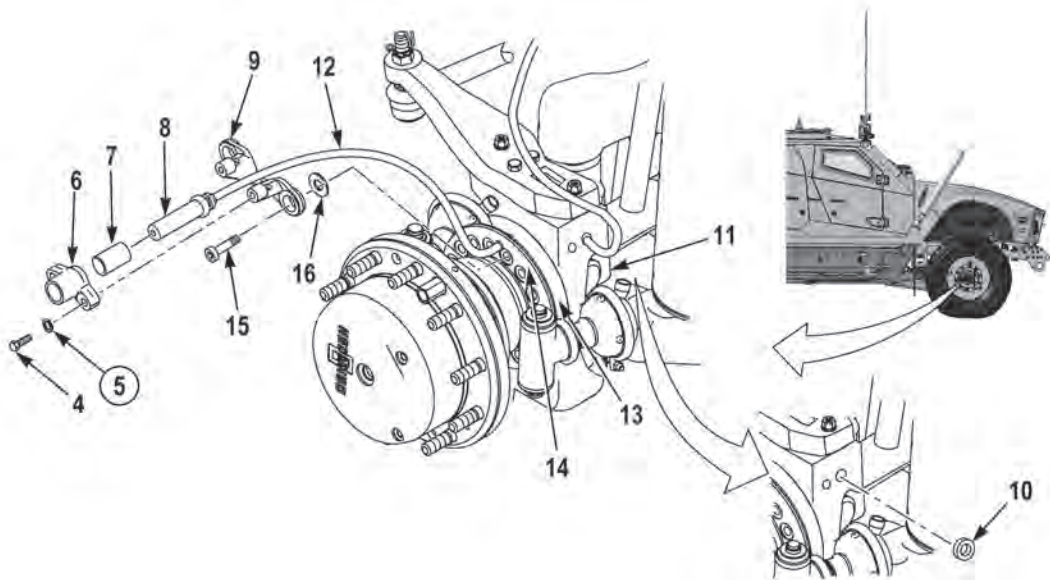
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- All ABS sensors are replaced the same way. Axle No. 1 passenger side shown.
- Install cushion clips and cable ties as required.
- Perform Steps (20) and (21) if grommet was removed.

20. Apply sealant, adhesive, to grommet (10).
21. Apply sealing compound, Loctite 242, to threads of two screws (15).
22. Install two washers (16) and base (9) on spider (14) with two screws (15). Tighten screws (15) to 180 lb-ft (244 N•m).
23. Install ABS sensor (8) and cable (12) in spider (14), spindle (13), and knuckle (11).
24. Install grommet (10) on knuckle (11).

**NOTE**

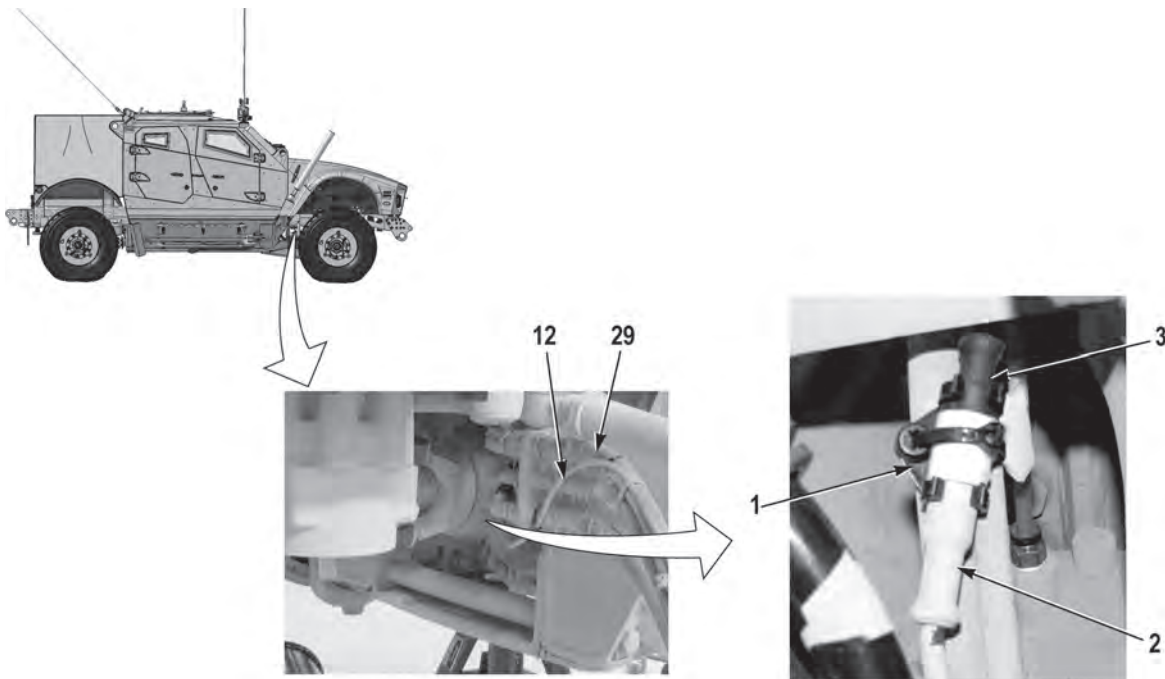
Install cable ties as required.

25. Apply grease to bore of pilot (6), bushing (7), and ABS sensor (8).
26. Install ABS sensor (8), bushing (7), and pilot (6) on base (9) with two new lockwashers (5) and screws (4).

NOTE

Install sensor cable as noted prior to removal.

27. Remove slack from cable (12).



WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

28. Apply connector lubricant, Nyogel 760G, to two connectors (2 and 3).
29. Connect connector (2) to connector (3).

NOTE

Install cushion clips and cable ties as required.

30. Install connector lock (1) on two connectors (2 and 3).

CAUTION

Excess sensor cable must be secured to air line to prevent it from contacting propeller shaft. Failure to comply may result in damage to equipment.

31. Secure excess cable (12) of ABS sensor (8) to air line (29).
32. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

TRANSFER CASE ASSEMBLY REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Driver side belly deflector panel removed
(M1240/M1245) WP 0049
Driver side belly deflector panel removed
(M1240A1) (WP 0056)
Passenger side belly deflector panel removed
(M1240/M1245) (WP 0052)
Passenger side belly deflector panel removed
(M1240A1) (WP 0056)
Transfer case drained (WP 0097)
Propeller shafts removed (WP 0090)
Transfer case shift stop switch removed
(WP 0098)
Fuel tank removed (WP 0264)

Tools and Special Tools

Jack, Transmission
Strap, Ratchet
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 250 ft-lb

Materials/Parts

Locknut (4) (Item 14)
Cap and Plug Set
Compound, Sealing, Loctite 242
Compound, Sealing, Loctite 592
Tags, Identification
Ties, Cable

Personnel Required

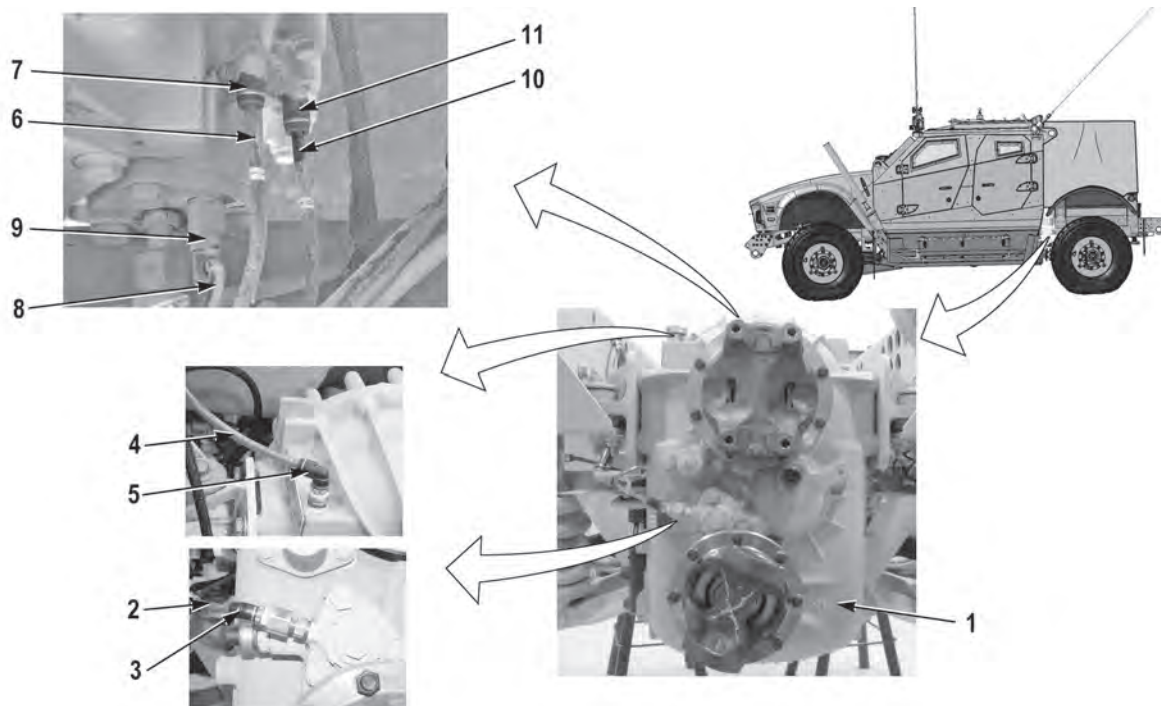
Two

Follow-On Maintenance

Install fuel tank (WP 0264)
Install transfer case shift stop switch (WP 0098)
Fill transfer case (WP 0097)
Install propeller shafts (WP 0090)
Install passenger side belly deflector panel
(M1240/M1245) (WP 0052)
Install passenger side belly deflector panel
(M1240A1) (WP 0056)
Install driver side belly deflector panel
(M1240/M1245) (WP 0049)
Install driver side belly deflector panel (M1240A1)
(WP 0056)
Remove and stow wheel chocks

REMOVAL**NOTE**

Pictures used in work package with capsule removed are for clarity purposes only.



WARNING

Transfer case weighs 312 lbs (142 kg). Do not lift or move transfer case without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

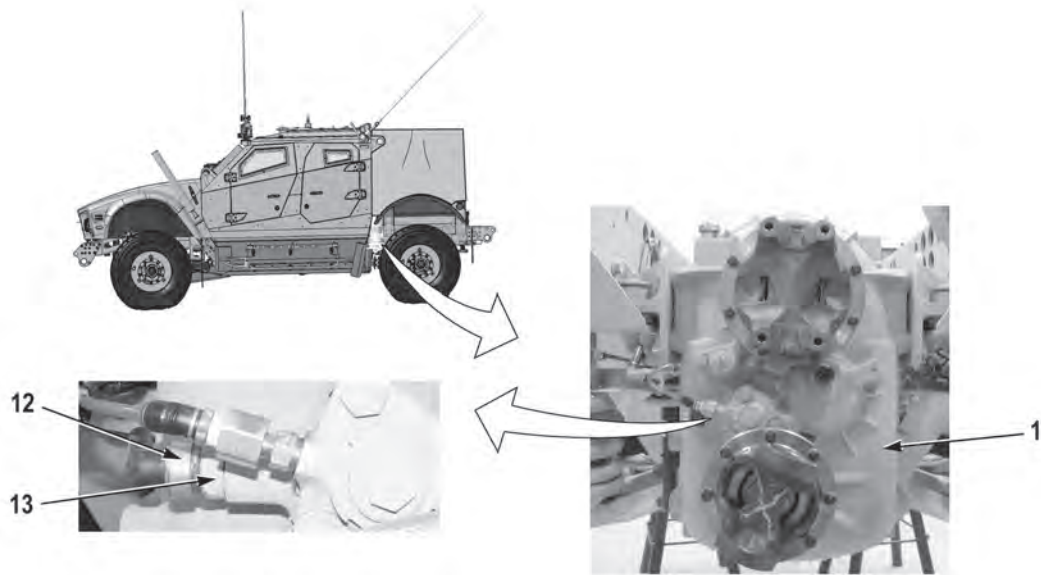
1. Position transmission jack under transfer case (1).

WARNING

Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.

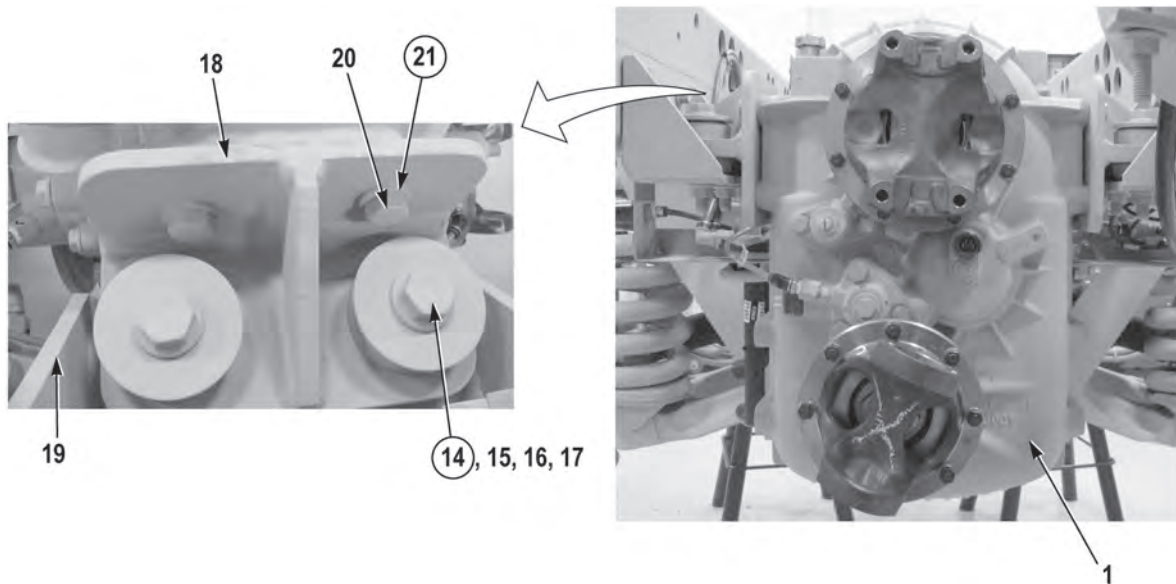
NOTE

- Remove cable ties as required.
 - Tag and mark air lines and wire connections prior to removal to ensure proper installation.
 - Cap and plug fittings upon removal.
2. Remove air line (2) from fitting (3).
 3. Remove air line (4) from fitting (5).
 4. Remove air line (6) from fitting (7).
 5. Remove air line (8) and fitting (9) from transfer case (1).
 6. Remove air line (10) from fitting (11).

**NOTE**

Tag and mark connectors prior to removal to ensure proper installation.

7. Disconnect connector (12) from sending unit (13).



WARNING

Secure transfer case to transmission jack with ratchet strap. Failure to comply may result in injury or death to personnel.

8. Support transfer case (1) with transmission jack. Secure transfer case (1) to transmission jack with ratchet strap.

WARNING

Do not place hand or fingers between bracket and frame when removing mounting cushions. Failure to comply may result in injury or death to personnel.

NOTE

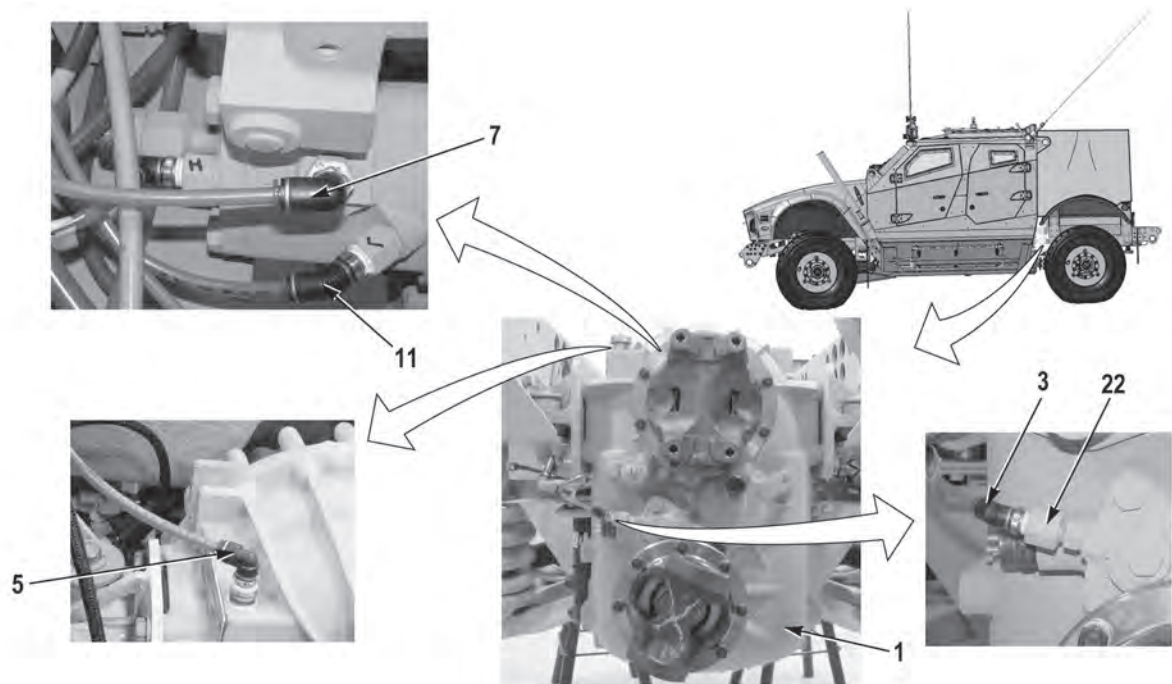
Transfer case will need to be raised and lowered to perform Steps (9) and (10).

9. Remove, four locknuts (14), eight mounting cushions (15), four washers (16), and screws (17) from two transfer case brackets (18) and brackets (19). Discard locknuts (14).

WARNING

Transfer case weighs 312 lbs (142 kg). Do not lift or move transfer case without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

10. With the aid of an assistant and transmission jack, remove eight screws (20), washers (21), and transfer case (1) from two transfer case brackets (18).

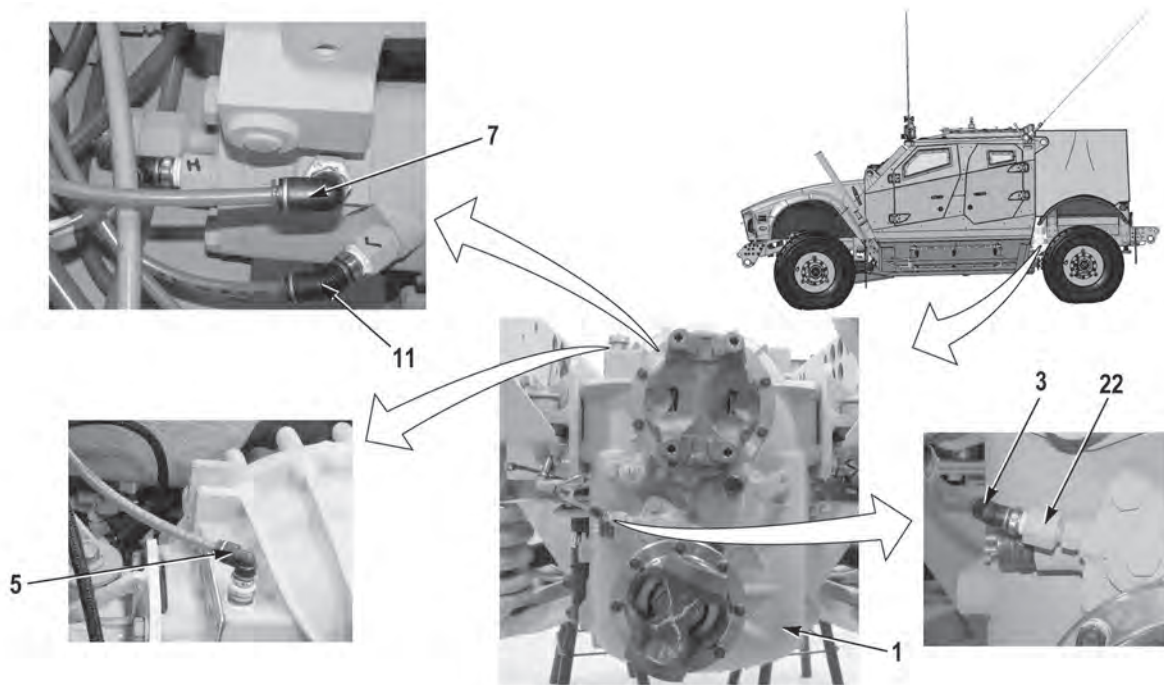


NOTE

Note position of fittings prior to removal to ensure proper installation.

11. Remove fitting (3) from fitting (22).
12. Remove fitting (22) from transfer case (1).
13. Remove fitting (5) from transfer case (1).
14. Remove fitting (11) from transfer case (1).
15. Remove fitting (7) from transfer case (1).

END OF TASK

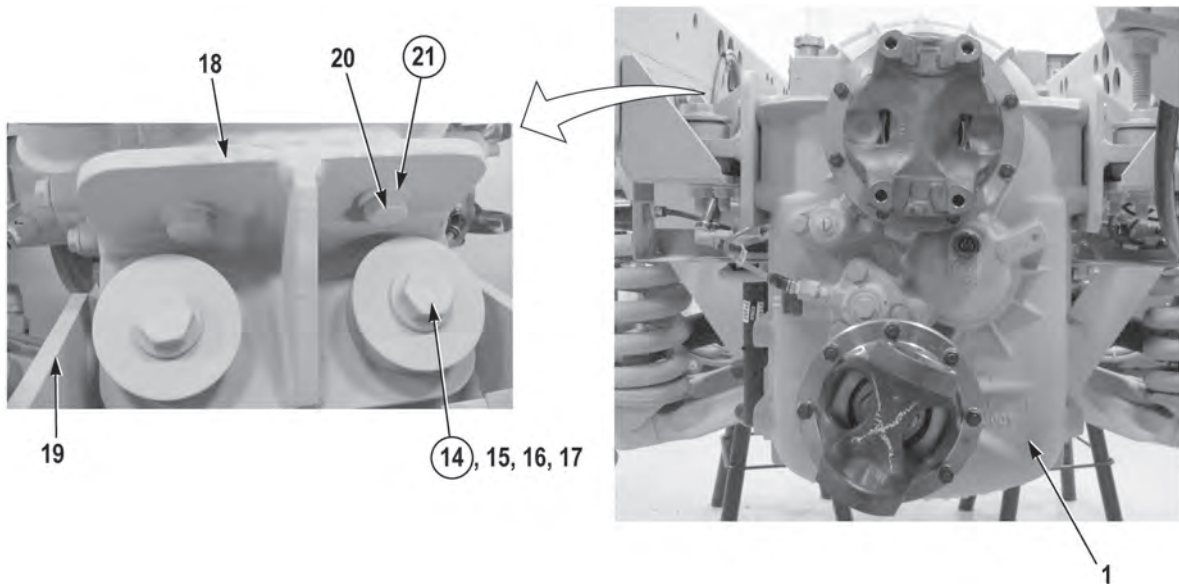
INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of six fittings (22, 11, 9, 7, 5, and 3).
2. Install fitting (11) on transfer case (1).
3. Install fitting (9) on transfer case (1).
4. Install fitting (7) on transfer case (1).
5. Install fitting (5) on transfer case (1).
6. Install fitting (22) on transfer case (1).
7. Install fitting (3) on fitting (22).



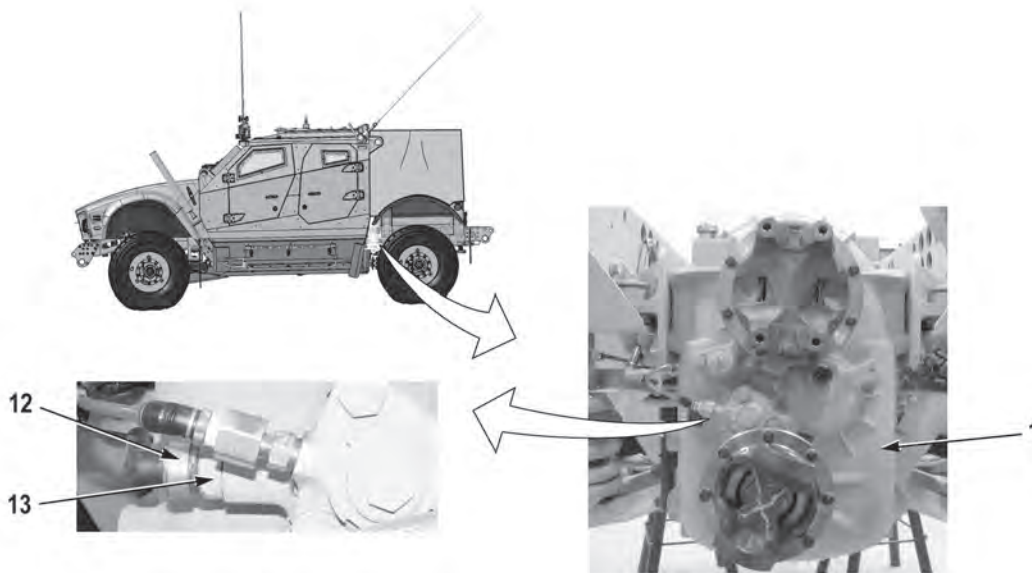
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply sealing compound, Loctite 242, to threads of eight screws (20).

WARNING

- **Transfer case weighs 312 lbs (142 kg). Do not lift or move transfer case without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.**
 - **Secure transfer case to transmission jack with ratchet strap. Failure to comply may result in injury or death to personnel.**
9. Raise transfer case (1) in position between frame bracket (19), to approximate mounting location. Install brackets (18) on transfer case (1) with eight washers (21) and screws (20). Tighten eight screws (20) to 170 lb-ft (231 N•m).
 10. Install two transfer case brackets (18) on brackets (19) with four screws (17), washers (16), eight mounting cushions (15), and four new locknuts (14). Tighten new locknuts (14) to 170 lb-ft (231 N•m).
 11. Remove ratchet strap and transmission jack from transfer case (1).



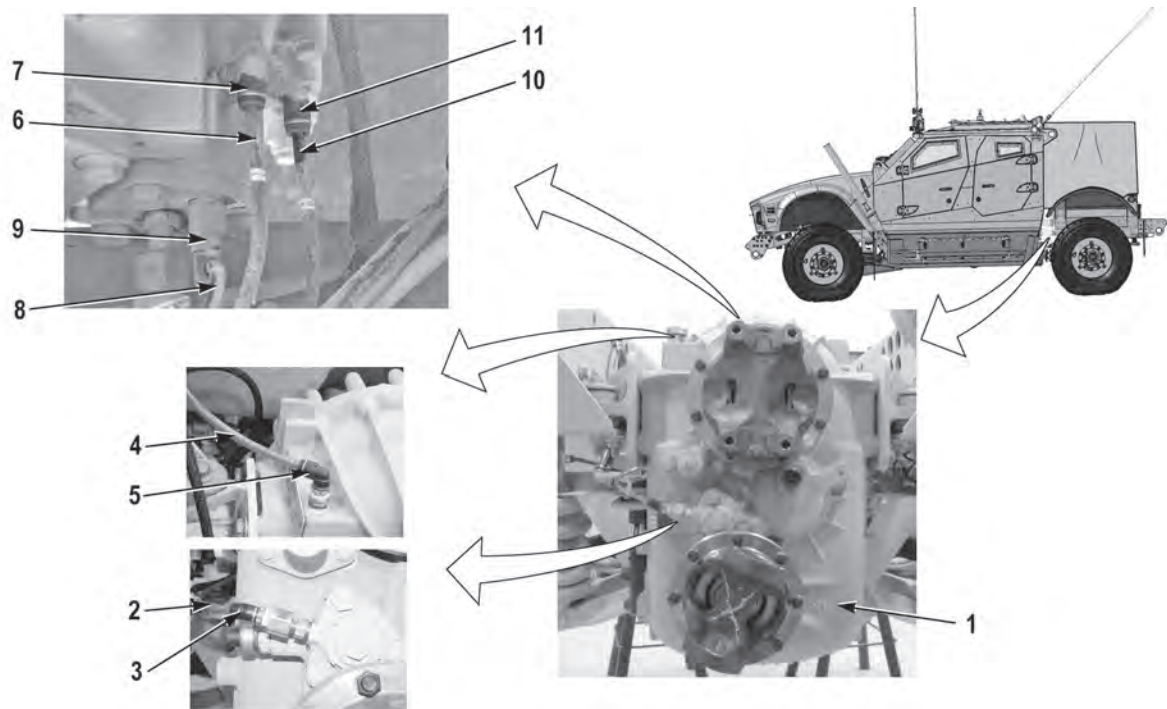
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install cable ties as required.

12. Apply sealing compound, Loctite 592, to threads of fitting (13) (of sending unit).
13. Connect connector (12) to sending unit (13).
14. Install sending unit (13) to transfer case (1).



15. Install air line (10) on fitting (11).
16. Install air line (8) and fitting (9) on transfer case (1).
17. Install air line (6) on fitting (7).
18. Install air line (4) on fitting (5).
19. Install air line (2) on fitting (3).
20. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

TRANSFER CASE DRAIN/FILL

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

Bit, hex 3/8, 3/8 dr.
 Pan, Drain
 Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 20 to 100 ft-lb

Materials/Parts

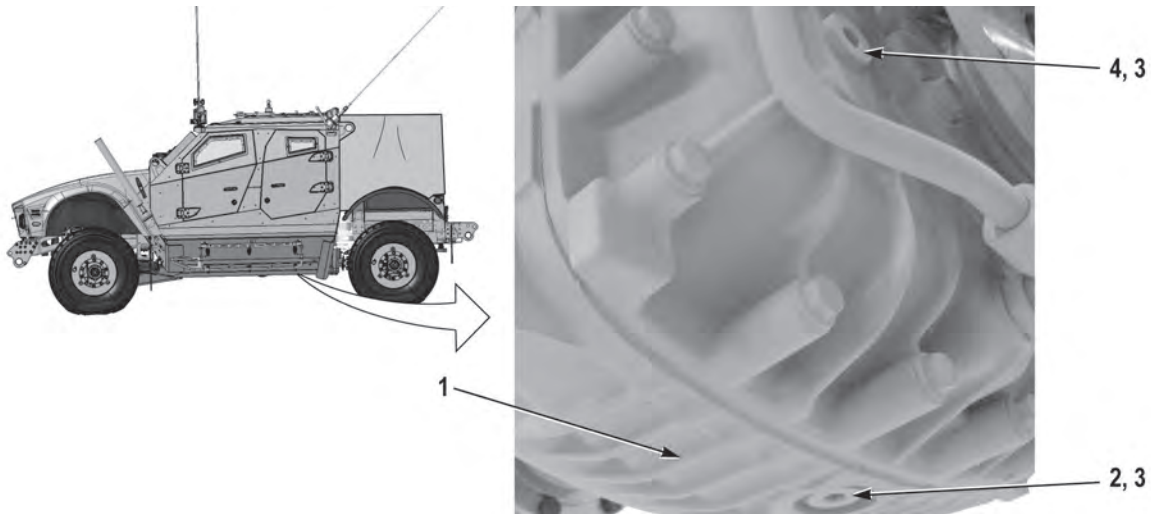
Washer, Sealing (2) (Item 3 and 5)
 Oil, Lubricating (WP 0294, Item 38)

References

TM 9-2355-335-10

Follow-On Maintenance

Remove and stow wheel chocks

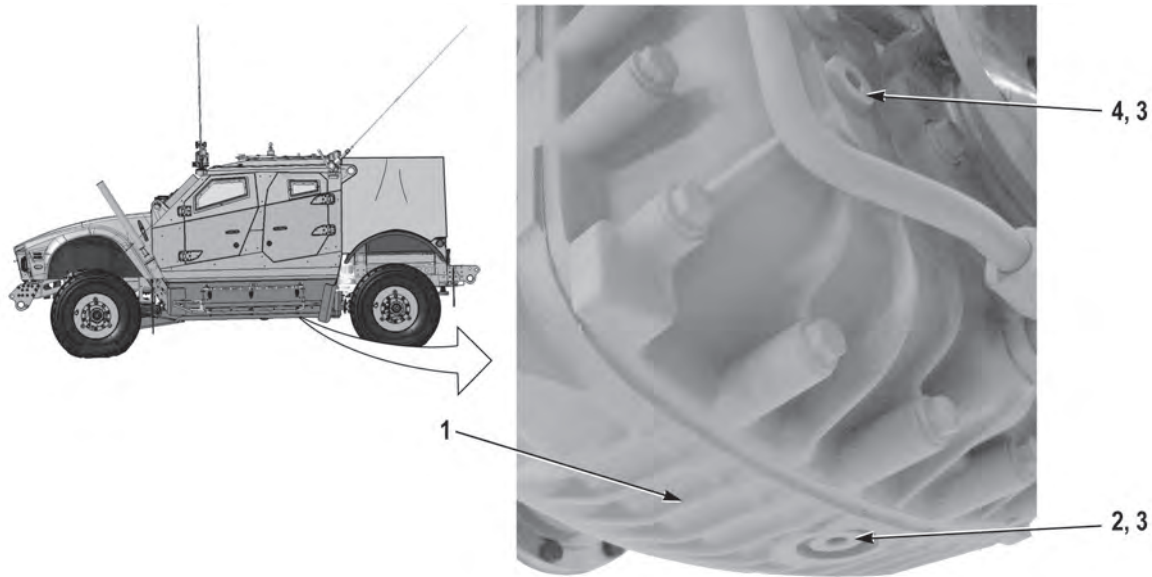
DRAIN**CAUTION**

Drain plug is magnetized and can not be exchanged with fill plug. Failure to comply may result in damage to equipment.

NOTE

- Ensure vehicle is on a level surface prior to performing this task.
 - Oil change is recommended in warm condition.
1. Position drain pan under transfer case (1).
 2. Remove drain plug (2) and sealing washer (3) from transfer case (1). Discard sealing washer (3).
 3. Remove fill plug (4) and sealing washer (5) from transfer case (1). Discard sealing washer (5).
 4. Drain transfer case (1) completely.
 5. Clean all metal shavings from drain plug (2).

END OF TASK

FILL

1. Install drain plug (2) and new sealing washer (3) on transfer case (1). Tighten drain plug (2) to 59 lb-ft (80 N•m).

CAUTION

- **Drain plug is magnetized and can not be exchanged with fill plug. Failure to comply may result in damage to equipment.**
 - **Ensure correct oil level. Low level causes lack of lubrication and reduces durability. High level causes splashing and leads to overheating of transfer case.**
2. Fill transfer case (1) with clean gear oil through fill bore/level for fill plug (4) until gear oil flows over.
 3. Install fill plug (4) and new sealing washer (5) on transfer case (1). Tighten fill plug (4) to 59 lb-ft (80 N•m).
 4. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

TRANSFER CASE SHIFT STOP SWITCH REPLACEMENT/ADJUSTMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Fuel tank removed (WP 0264)

Tools and Special Tools

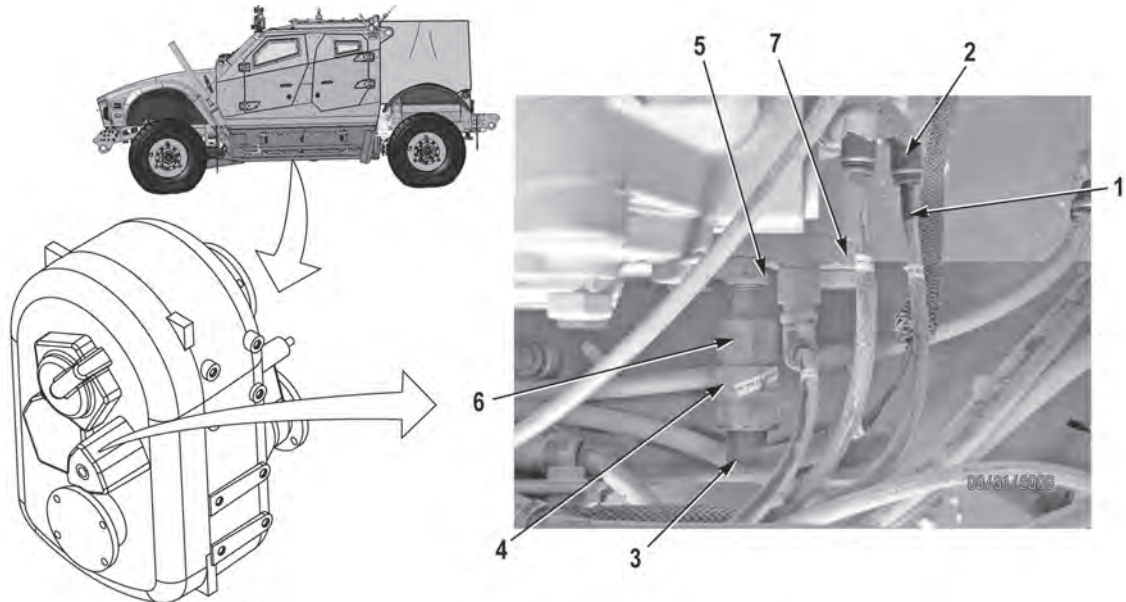
Cap and Plug Set
 Gun, Air (Rubber Tip)
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Compound, Sealing, Loctite 243
 Tags, Identification

Follow-On Maintenance

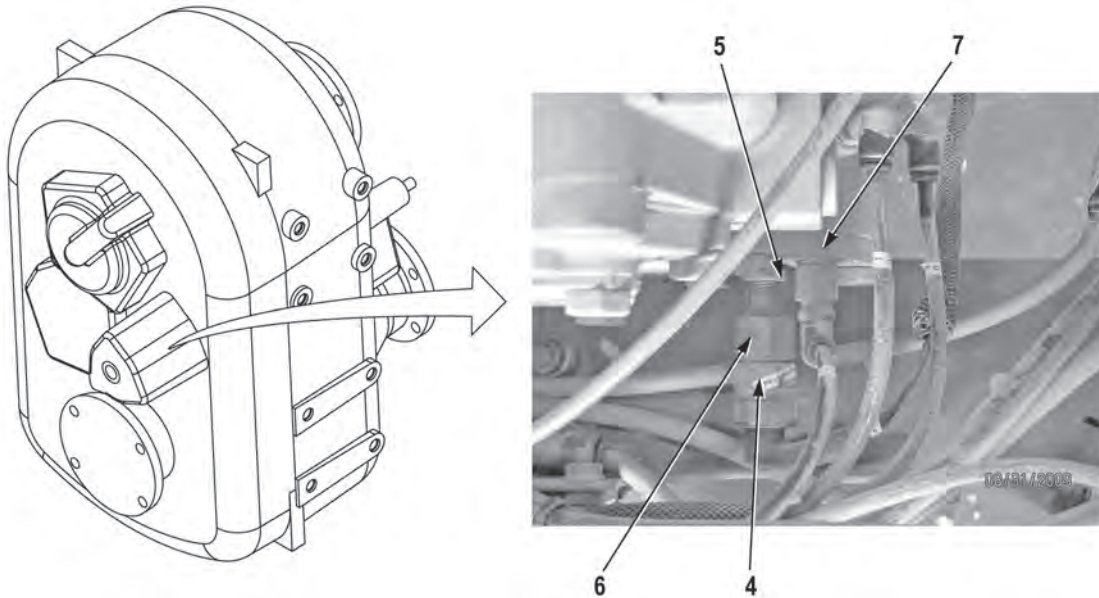
Install fuel tank (WP 0264)
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Tag and mark air line and fitting prior to removal to ensure proper installation.
- Cap and plug air line and fitting upon removal.

1. Remove air line (1) from fitting (2).
2. Remove connector (3) from shift stop switch (4).
3. Loosen jam nut (5).
4. Remove adjusting screw (6) and shift stop switch (4) from gear shift cylinder cover (7).
5. Remove shift stop switch (4) from adjusting screw (6).
6. Remove jam nut (5) from adjusting screw (6).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

CAUTION

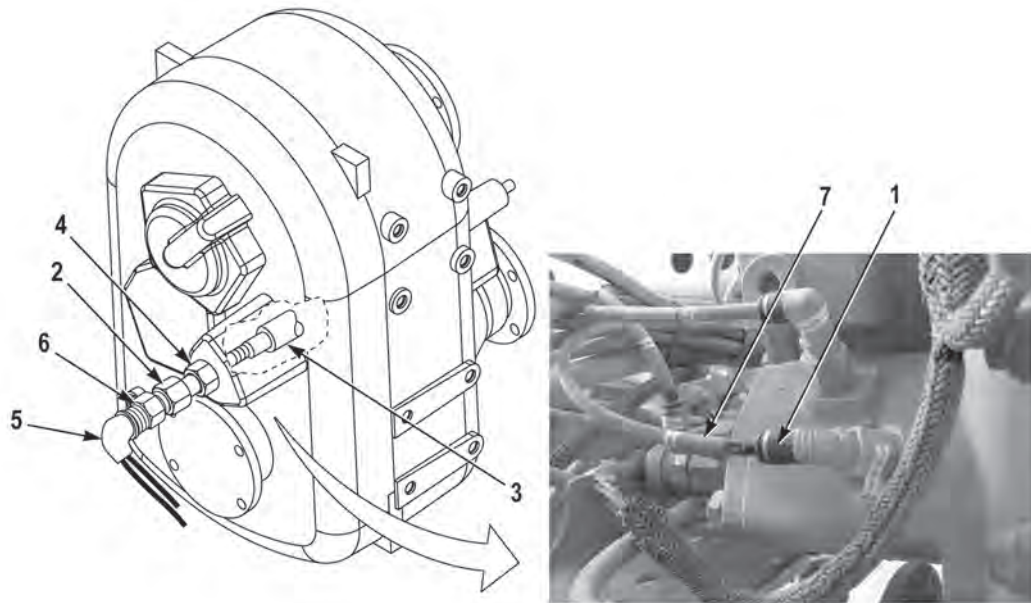
Remove old sealing remainders from threads on the shift cylinder cover, adjustment screw, and locknut. Failure to comply may result in damage to equipment.

1. Apply sealing compound, Loctite 243, to threads on shift cylinder cover (7), adjusting screw (6), and locknut (5).
2. Install jam nut (5) on adjusting screw (6).
3. Install shift stop switch (4) on adjustment screw (6).
4. Install but do not tighten adjusting screw (6) on shift cylinder cover (7).

NOTE

Electrical connection to shift stop switch should only be installed after adjustment of adjusting screw (6).

END OF TASK

ADJUSTMENT

1. Apply 94 psi (648 kpa) of compressed air to fitting (1).
2. Turn adjusting screw (2) clockwise until it touches shift rod (3).
3. Turn adjusting screw (2) clockwise another 1/4 turn.
4. Tighten jam nut (4) to lock adjusting screw (2).
5. Install connector (5) on shift stop switch (6).
6. Install air line (7) on fitting (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

UPPER AND LOWER CONTROL ARM REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Knuckle removed (WP 0089)
Shock absorber removed (M1240/M1245)
(WP 0092)
Shock absorber removed (M1240A1) (WP 0093)
Coil spring removed (WP 0079)
Skid plate removed (WP 0094)

Tools and Special Tools

Driver, Bearing, 60 mm
Lifting Device
Tool Kit, General Mechanic's: Automotive
Socket 1-1/8 in.
Wrench 1-1/8 in.

Materials/Parts

Locknut (8) (Item 1 and 10)
Zerk (5) (Item 6 and 12)
Compound, Sealing, Loctite 242
Compound, Sealing, Loctite 592

Personnel Required

Two

Follow-On Maintenance

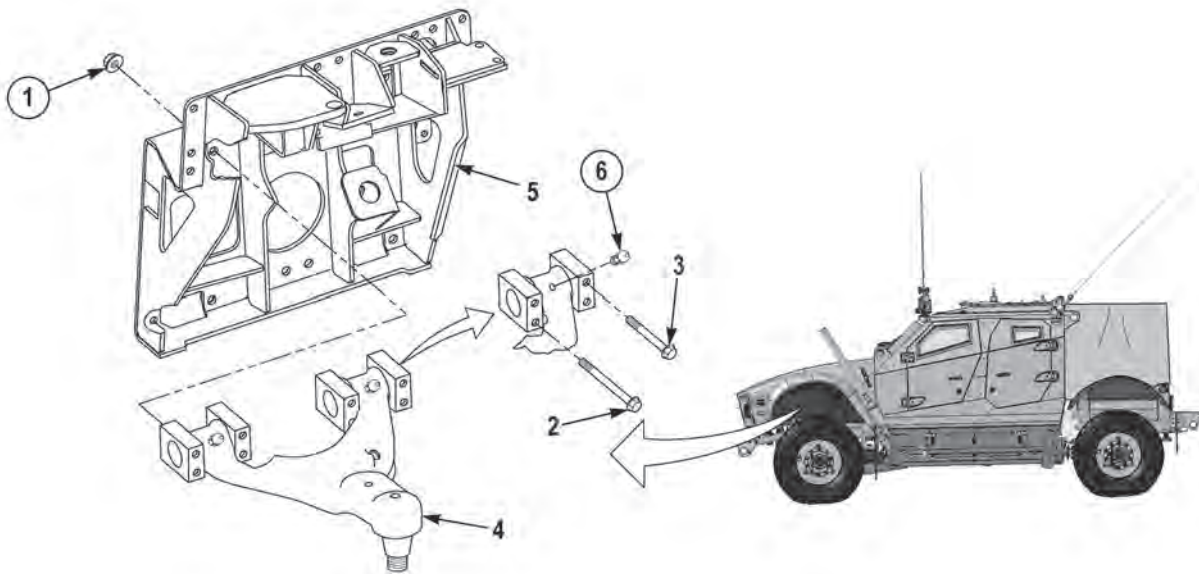
Install skid plate (WP 0094)
Install coil spring (WP 0079)
Install shock absorber (M1240/M1245)
(WP 0092)
Install shock absorber (M1240A1) (WP 0093)
Install knuckle (WP 0089)
Remove and stow wheel chocks

REMOVAL**WARNING**

Upper control arm weighs 80 lbs (36 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Prior to removing screws on lower control arm, control arm must be raised to gain proper clearance for screw removal.
- Note position of screws prior to removal to ensure proper installation. Two longer screws (2) are removed from differential housing.

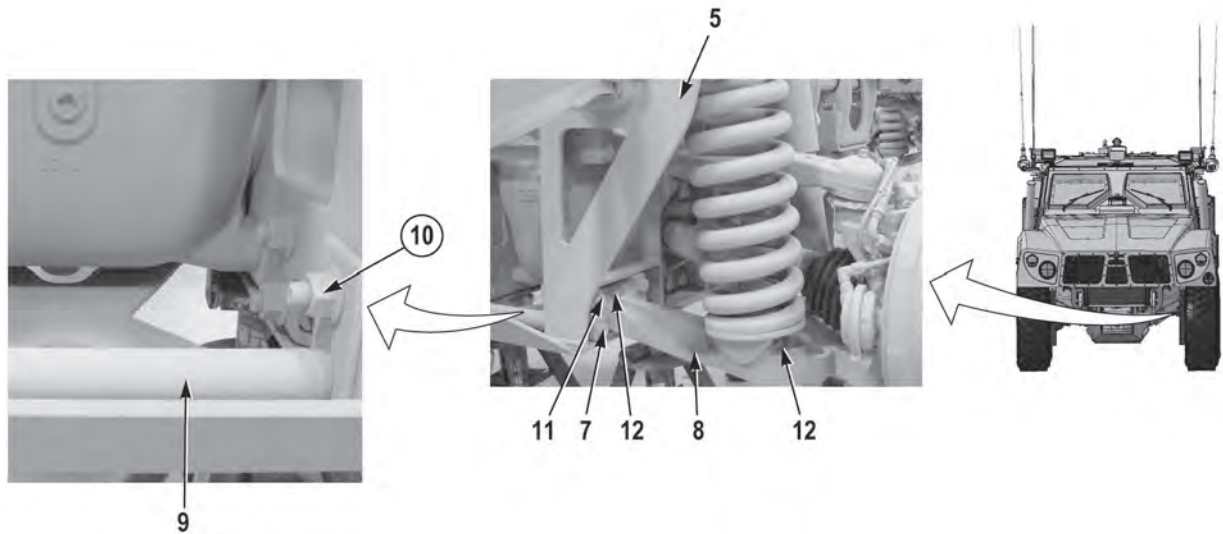


1. With the aid of an assistant and lifting device, remove four locknuts (1), two screws (2), four screws (3), and upper control arm (4) from side plate (5). Discard locknuts (1).

NOTE

Perform Step (2) if grease zercks need to be removed.

2. Remove two grease zercks (6) from upper control arm (4). Discard grease zercks (6).



WARNING

- Ensure skid plate is supported during removal to avoid pinching and binding. Failure to comply may result in injury or death to personnel.
- Lower control arm weighs 90 lbs (41 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- All lower control arms are removed the same way. Axle No. 1 driver side shown.
 - Prior to removing screws on lower control arm, control arm must be raised to gain proper clearance for screw removal.
 - Note position of screws prior to removal to ensure proper installation.
3. Remove two screws (7) from lower control arm (8) and two spacer tubes (9).
 4. With the aid of an assistant and lifting device, remove four locknuts (10), screws (11), and lower control arm (8) from side plate (5). Discard locknuts (10).

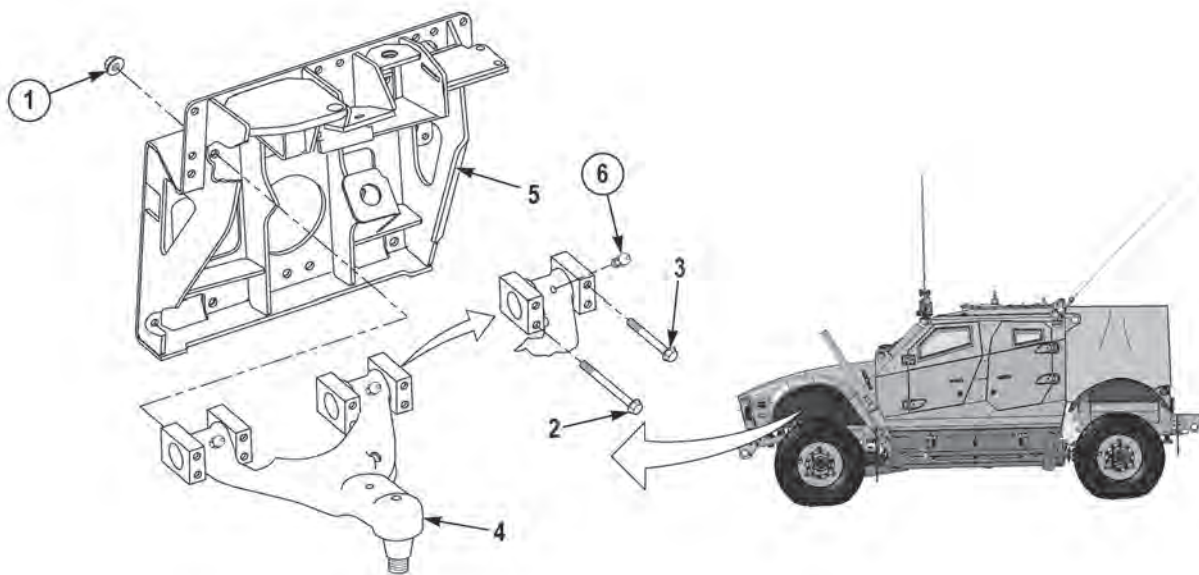
NOTE

Perform Step (5) if grease zerks need to be removed.

5. Remove three grease zerks (12) from lower control arm (8).

END OF TASK

INSTALLATION



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- All upper control arms are installed the same way. Axle No. 1 driver side shown.
- Perform Steps (1) through (6) to install upper control arm.
- Perform Steps (7) through (12) to install lower control arm.

1. Apply sealing compound, Loctite 592, to threads of two grease zerks (6).
2. Install two new zerks (6) on upper control arm (4).

NOTE

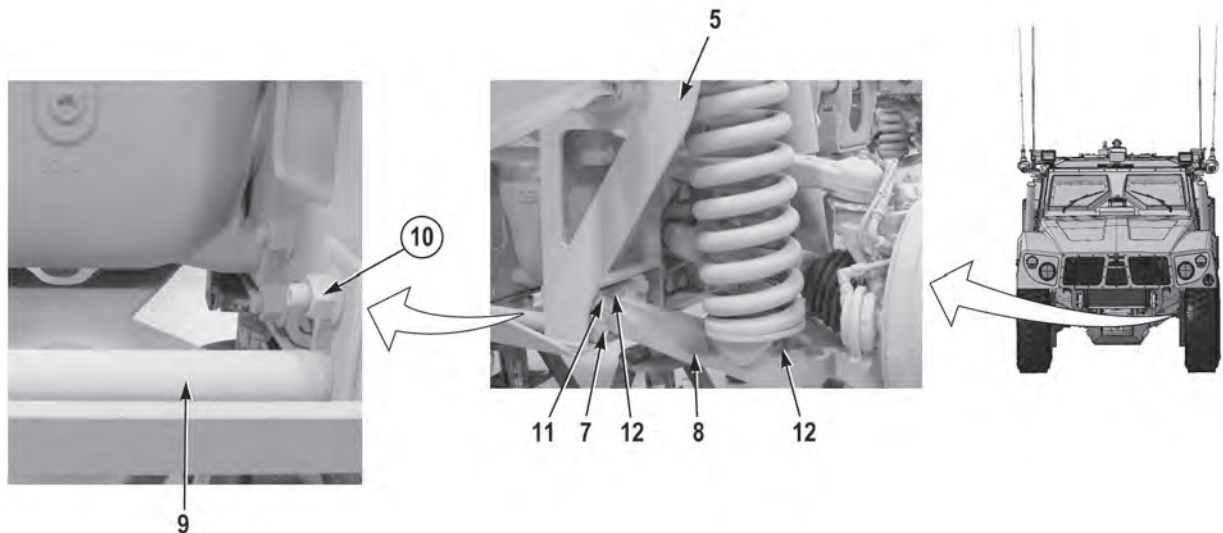
Install screws as noted prior to removal. Two longer screws (2) are installed in differential housing.

3. Apply sealing compound, Loctite 242, to threads of four screws (3) and two screws (2).

WARNING

Upper control arm weighs 80 lbs (36 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

4. With the aid of an assistant and lifting device, position upper control arm (4) on vehicle.
5. Install four screws (3), two screws (2), and six new locknuts (1) on upper control arm (4) and side plate (5).
6. Lubricate two zerks (6) on upper control arm (4).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

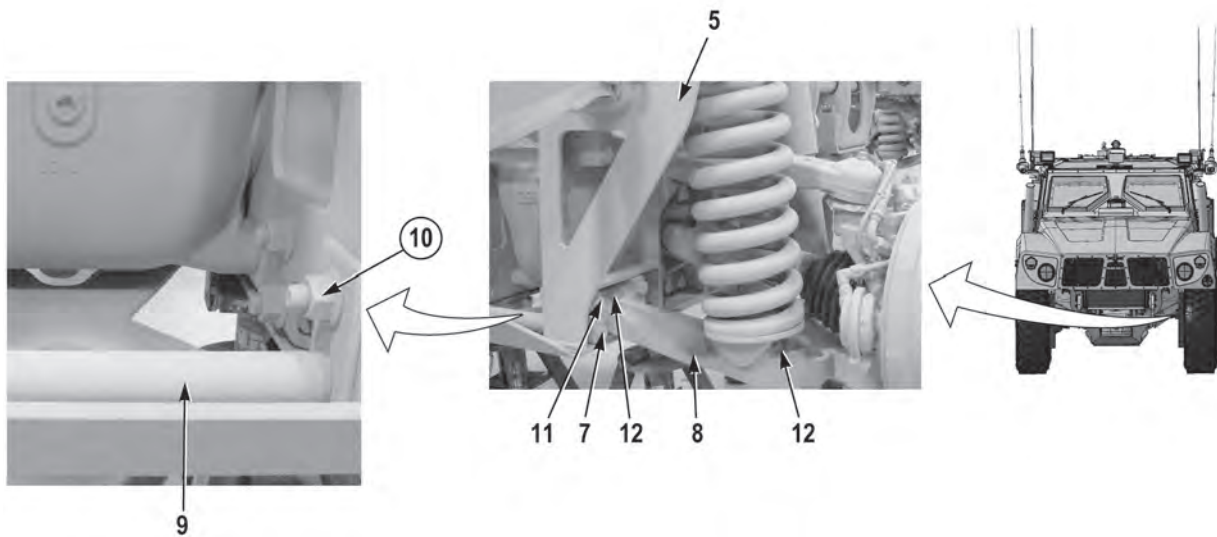
NOTE

- All lower control arms are installed the same way. Axle No. 1 driver side shown.
 - Perform Steps (7) and (8) if grease zerks were removed.
7. Apply sealing compound, Loctite 592, to threads of three grease zerks (12).
 8. Install three new zerks (12) on lower control arm (8).

NOTE

Install screws as noted prior to removal.

9. Apply sealing compound, Loctite 242, to threads of four screws (11) and two screws (7).



WARNING

Lower control arm weighs 90 lbs (41 kg). Do not attempt to lift or move upper control arm without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

10. With the aid of an assistant and lifting device, install lower control arm (8) on side plate (5) with four screws (11) and new locknuts (10).
11. Install two screws (7) on spacer tubes (9) and lower control arm (8).
12. Lubricate three zerks (12) on lower control arm (8).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

WHEEL END DRAIN/FILL

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Brakes caged (if draining rear wheel end)
 (WP 0125)

Tools and Special Tools

Bit, hex 1/4, 3/8 dr.
 Pan, Drain
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

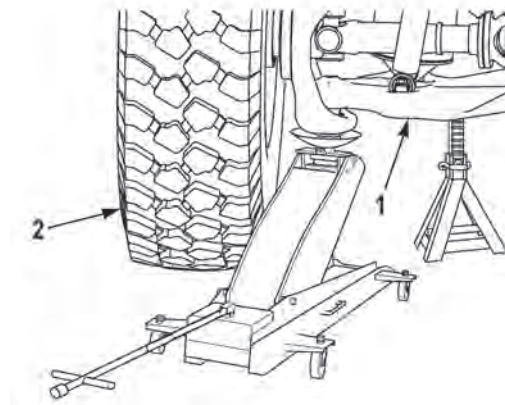
O-ring (2) (Item 6 and 7)
 Lubricating Oil, Gear

References

TM 9-2355-335-10

Follow-On Maintenance

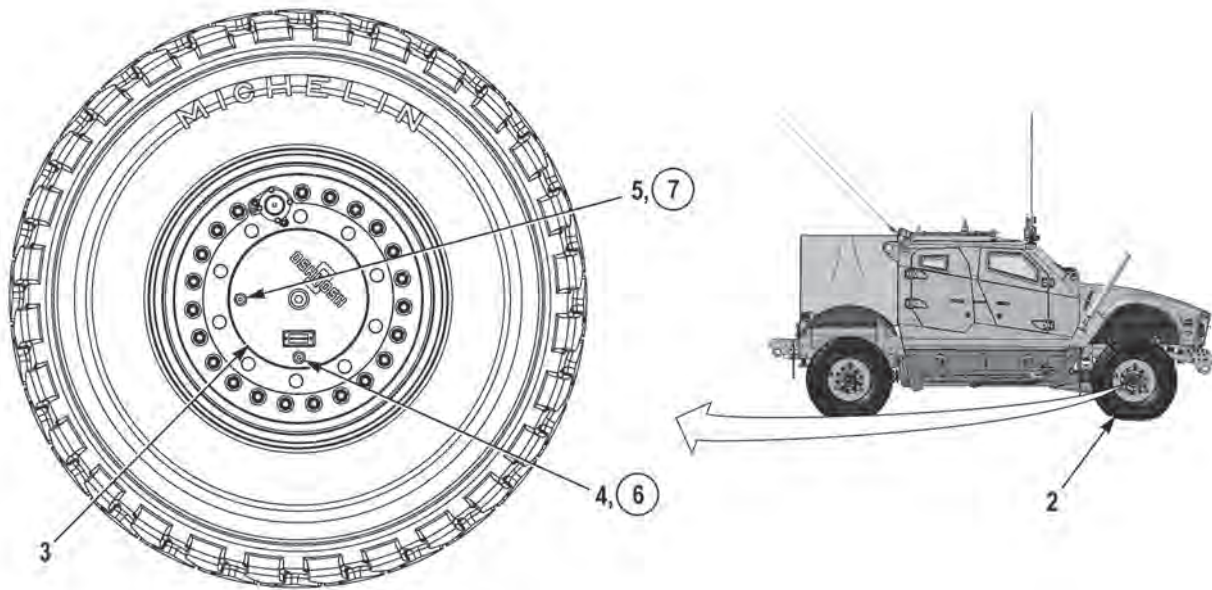
Uncage brakes (for rear wheel end) (WP 0125)
 Remove and stow wheel chocks

DRAIN**WARNING**

Hydraulic jack is intended only for lifting vehicle, not for supporting vehicle while performing maintenance. Do not get under vehicle after vehicle has been raised, unless vehicle is properly supported with jack stands. Failure to comply may result in injury or death to personnel.

NOTE

- All wheel ends are drained the same way.
 - Wheel ends should be at room temperature to allow for proper drainage of oil.
1. Position hydraulic jack under lower control arm (1).
 2. Raise tire (2) until tire (2) is no longer touching ground.
 3. Support lower control arm (1) with jackstand.



4. Position drain pan under wheel end (3).

NOTE

Plug position is important to ensure complete drainage of wheel end.

5. Rotate tire (2) and position plug (4) at 6 o'clock position.
6. Remove two plugs (4 and 5) and O-rings (6 and 7) from wheel end (3). Discard O-rings (6 and 7).
7. Drain oil from wheel end (3).

END OF TASK

FILL

NOTE

All wheel ends are filled the same way.

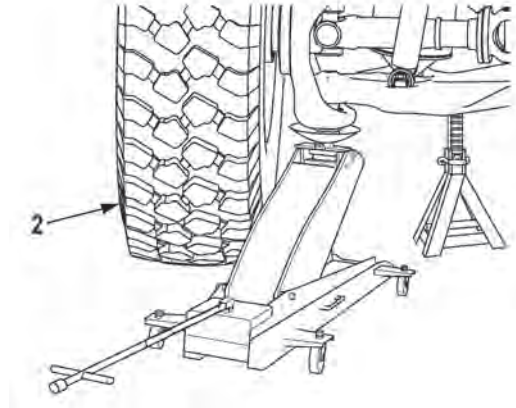
1. Rotate wheel end (3) until hole for plug (4) is at 9 o'clock and hole for plug (5) is at 12 o'clock.
2. Fill wheel end (3) with oil through hole for plug (5) until oil starts to drain from hole for plug (4).
3. Wait approximately three to five minutes for oil to stabilize.

NOTE

If no oil is present, repeat Steps (2) and (3) until only several drops of oil drain from hole for plug (4).

4. Lightly lubricate two new O-rings (6 and 7) with clean oil.

5. Install two O-rings (6 and 7) and plugs (4 and 5) in wheel end (3). Tighten plugs (4 and 5) to 15 ± 1 lb-ft (20 ± 2 N•m).
6. Remove jackstand.



7. Lower tire (2) to ground.
8. Remove hydraulic jack.
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

WHEEL END REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Wheel end drained (WP 0100)
Wheel/Tire removed
Brake drum removed (WP 0122)

Tools and Special Tools

Bit, Hex, 3/8", 3/8" dr.
Pan, Drain
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 20 to 100 ft-lbs

Materials/Parts

Screw, 3/8 in. x 18 (Item 3)
Retaining Ring (Item 10)
O-ring (Item 13)
Compound, Sealing, Loctite 242
Grease, Lubriplate
Lubricating Oil, Gear

Personnel Required

Two

Follow-On Maintenance

Install brake drum (WP 0122)
Install wheel/tire
Fill/lube wheel end (WP 0100)
Remove and stow wheel chocks

CAUTION

When removing washer from sun gear, do not damage surface of sun gear. Failure to comply may result in damage to equipment.

6. Remove washer (7) from sun gear (8).

NOTE

- Perform Step (8) if removing sun gear from rear axles.
 - When removing sun gear from front axle, a clamping wrench/pliers may be used to stop axle from spinning.
7. Place pry bar through joint in halfshaft (6) to prevent hub assembly (4) from turning.
 8. Remove screw (9) and sun gear (8) from halfshaft (6).

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being removed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

9. Remove retaining ring (10) and ring gear (11) from spindle (12). Discard retaining ring (10).
10. Remove O-ring (13) from hub assembly (4). Discard O-ring (13).

END OF TASK**INSTALLATION**

1. Lightly lubricate new O-ring (13) with clean gear lubricating oil.
2. Install O-ring (13) on hub assembly (4).

WARNING

Springs and retaining rings are under extreme tension and can act as projectiles when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

NOTE

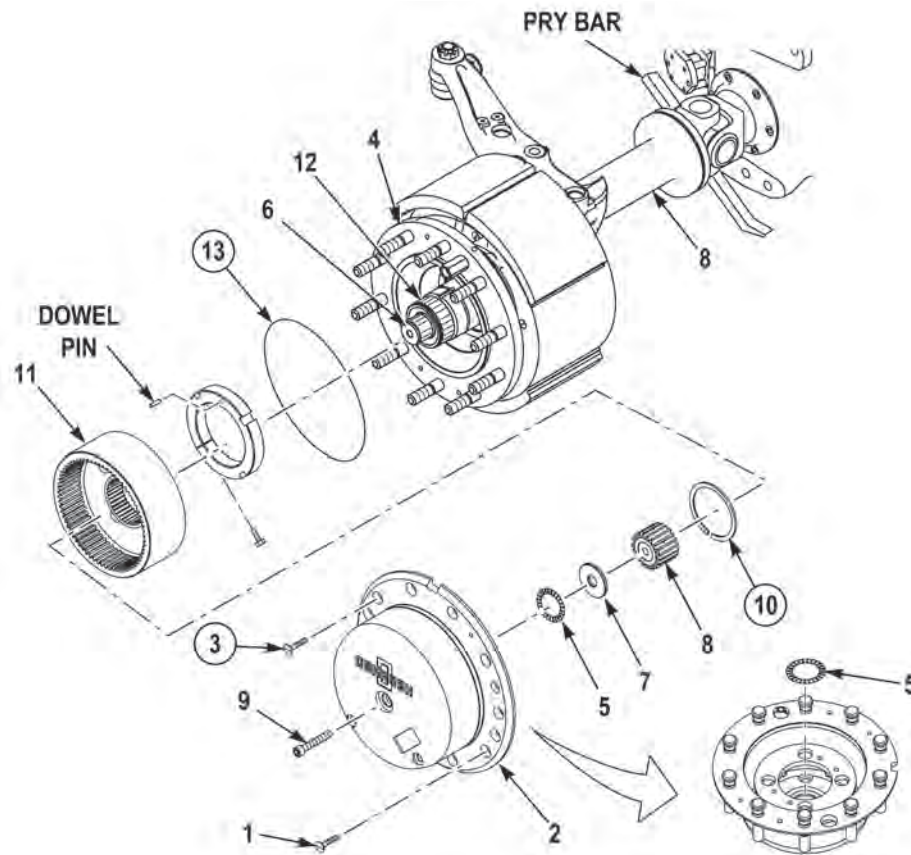
When installing ring gear, ensure dowel pin hole in ring gear is aligned with dowel pin.

3. Install ring gear (11) on spindle (12) with new retaining ring (10).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to threads of screw (9).



5. Install sun gear (8) on halfshaft (6) with screw (9). Tighten screw (9) to 90 lb-ft (122 N•m).

NOTE

Perform Step (6) for rear axles only.

6. Remove pry bar from joint in halfshaft (6).
7. Lightly grease washer (7) and needle bearing (5).
8. Install washer (7) on sun gear (8).
9. Install needle bearing (5) in wheel cover (2).

NOTE

Install wheel cover in same position as noted prior to removal.

10. While assistant aligns planetary gears by turning halfshaft (6), install wheel cover (2) on hub assembly (4) with two screws (1).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR DRYER FILTER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Driver side rear fender extension removed
 (if equipped) (WP 0037)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

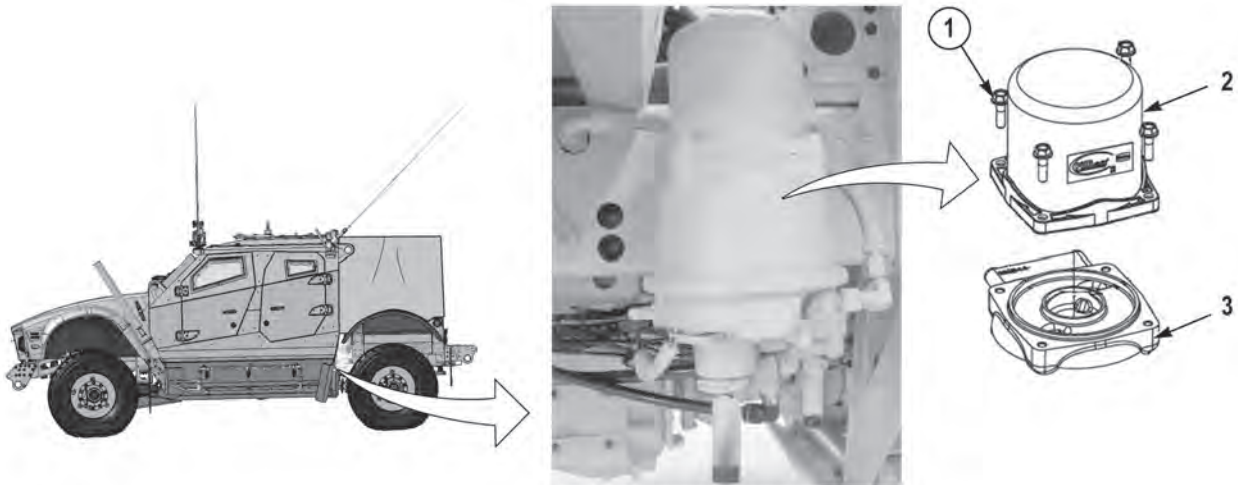
Air dryer service kit (Items 1, 4, and 5)

Personnel Required

Two

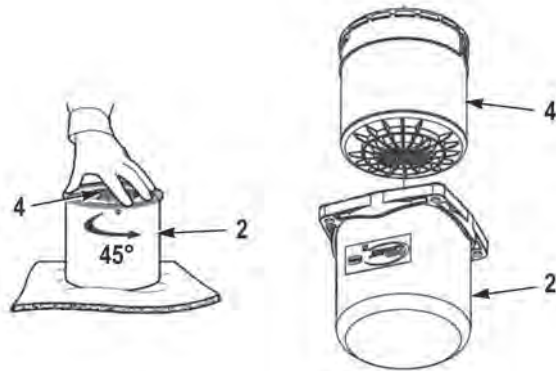
Follow-On Maintenance

Install driver side rear fender extension
 (if equipped) (WP 0037)
 Remove and stow wheel chocks

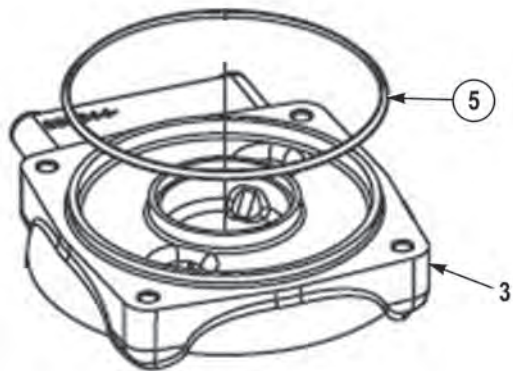
REMOVAL**WARNING**

Air system must be drained prior to removing air dryer filter. Failure to comply may result in injury or death to personnel.

1. Remove four screws (1) and canister (2) from base (3). Discard four screws (1).



2. Place canister (2) upside-down on a clean cloth and hard surface.
3. Remove filter (4) from canister (2) by pressing filter (4) downward and rotating filter (4) counterclockwise 45 degrees. Discard filter.



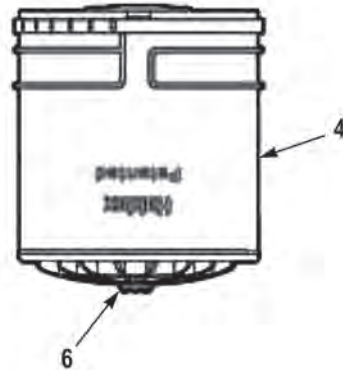
NOTE

Retain O-ring if air system leak check will be performed.

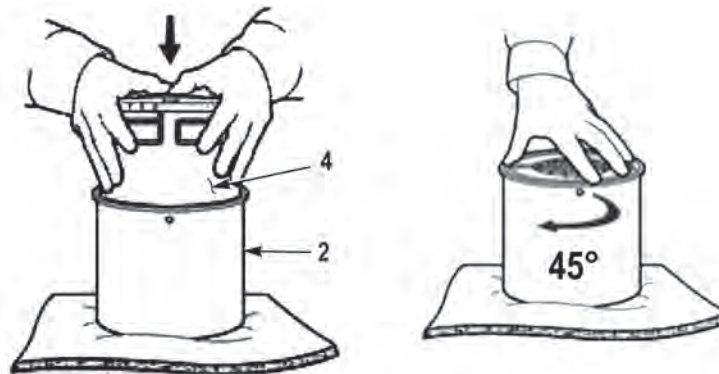
4. Remove O-ring (5) from base (3). Discard O-ring (5).

END OF TASK

INSTALLATION



1. Visually inspect filter (4). Ensure rubber spring (6) is attached to filter (4).

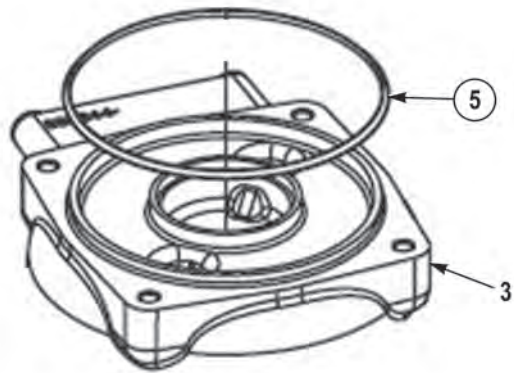


CAUTION

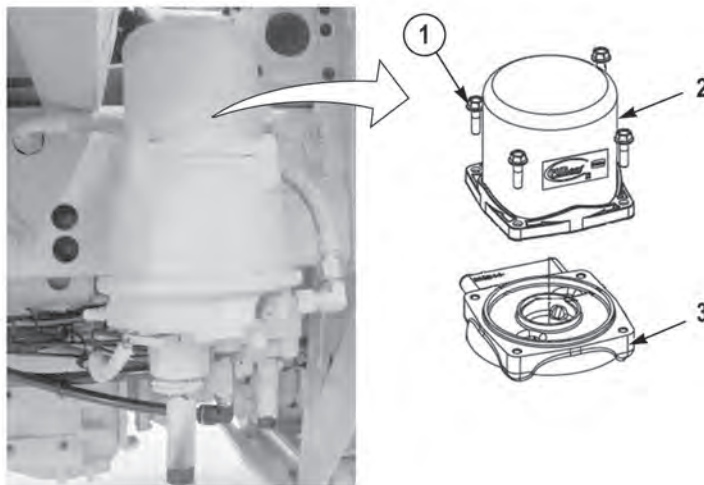
Prior to performing the installation process, ensure inside of canister and housing are clean. Place clean cloth on hard surface. Failure to comply may result in damage to equipment.

NOTE

- Prior to installing filter in canister, align filter slots with air dryer canister dimples.
 - Filter, O-ring, screws, and grease come packaged in air dryer service kit.
2. Install new filter (4) in canister (2) by pressing down and rotating filter (4) clockwise 45 degrees.



3. Lightly lubricate new O-ring (5) with clean grease and install O-ring (5) on base (3).



NOTE

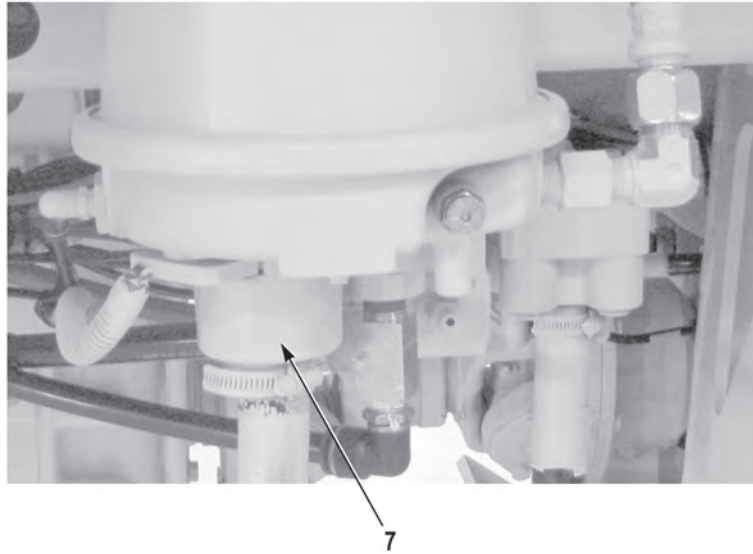
Tighten screws in criss-cross pattern.

4. Install canister (2) on base (3) with four new screws (1). Tighten screws (1) to 35 to 40 lb-ft (47.5 to 54.2 N•m).

CAUTION

Perform Steps (5) through (8) for operation checks. Failure to comply may cause damage to vehicle.

5. Start engine and build air pressure to 100 psi (690 kPa).
6. Shut off engine.
7. Check for air leaks and correct any leakage problem.
8. Restart engine and build air pressure to cut-out pressure.

**NOTE**

- If cut-out pressure opens air dryer purge valve (7) and immediately expels a large volume of air followed by a slow flow of air lasting approximately thirty seconds, system is operational.
- Perform Step (9) if system is not operational.

9. Repeat Steps (1) through (8).

10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR DRYER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 Driver side rear fender extension removed
 (if equipped) (WP 0037)
 Air system drained
 Fuel tank removed (WP 0264)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

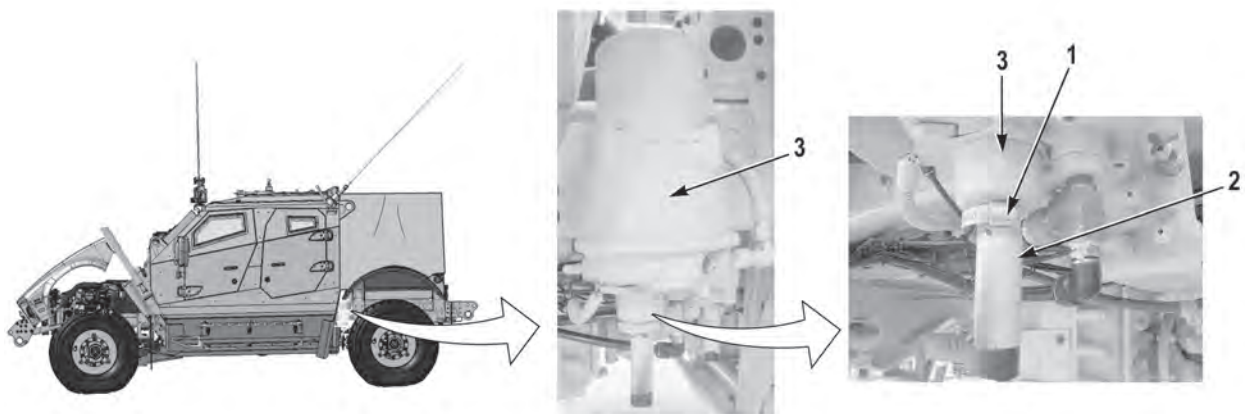
Locknut (4) (Item 13)
 Lockwashers (3) (Item 19)

Materials/Parts (continued)

Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification
 Ties, Cable

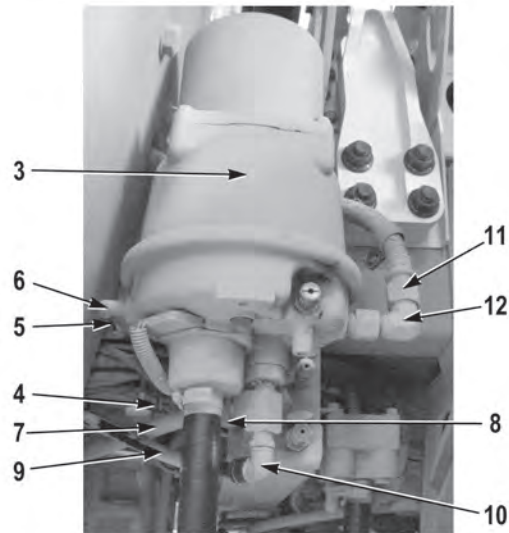
Follow-On Maintenance

Install fuel tank (WP 0264)
 Install driver side rear fender extension
 (if equipped) (WP 0037)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

REMOVAL**WARNING**

Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.

1. Remove clamp (1) and vent line (2) from air dryer (3).

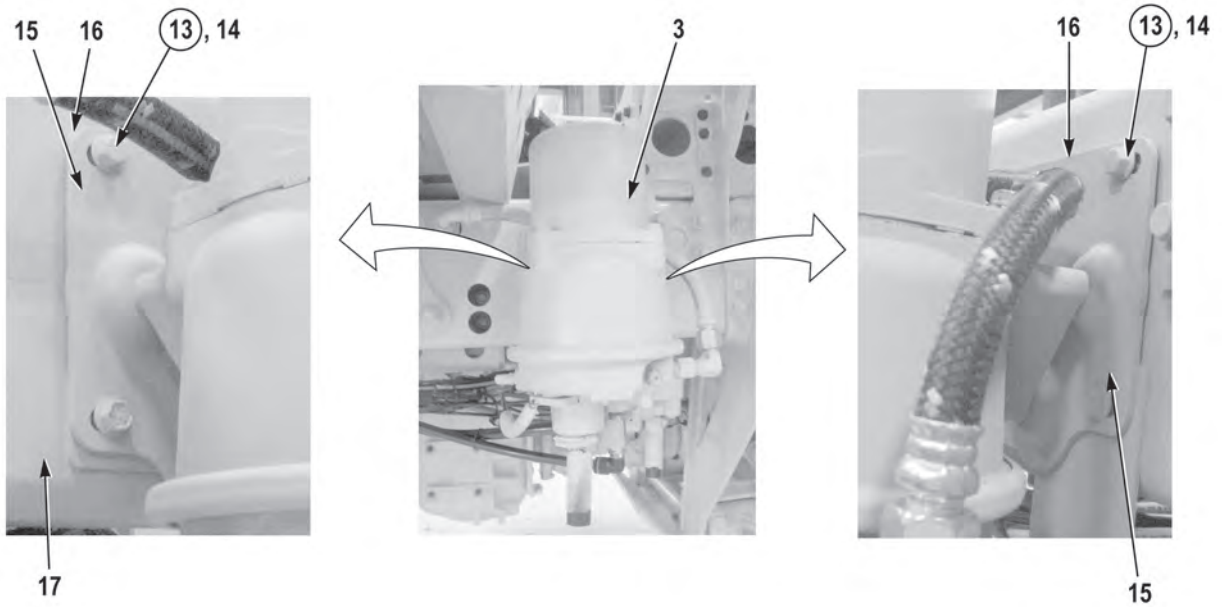


WARNING

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

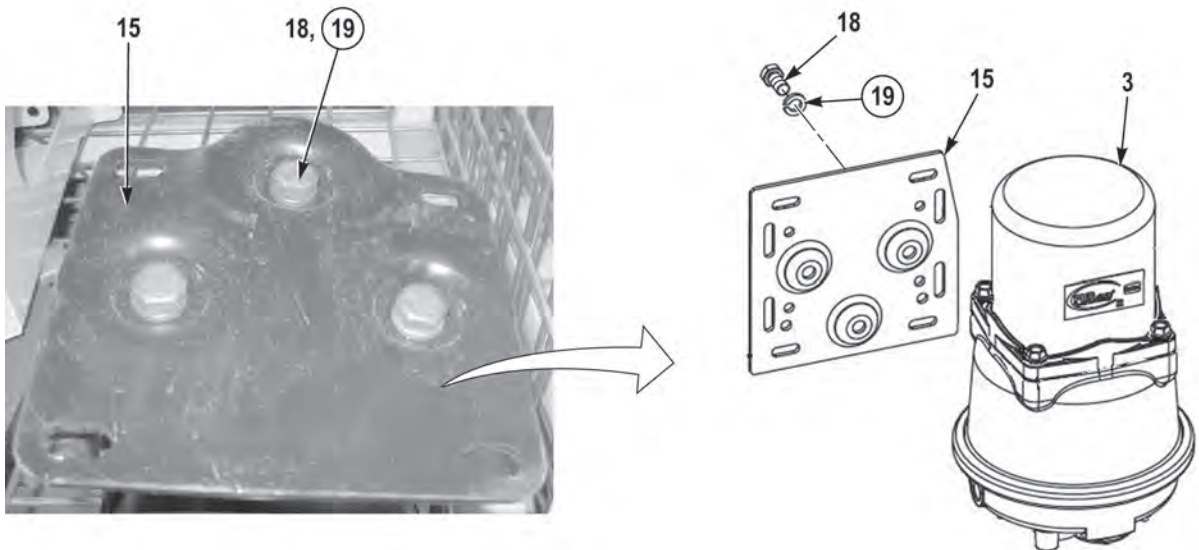
- Tag and mark connectors and air lines prior to removal to ensure proper installation.
 - Cap and plug air lines and fittings upon removal.
2. Disconnect connector (4).
 3. Remove air line (5) from fitting (6).
 4. Remove air line (7) from fitting (8).
 5. Remove air line (9) from fitting (10).
 6. Remove air line (11) from fitting (12).



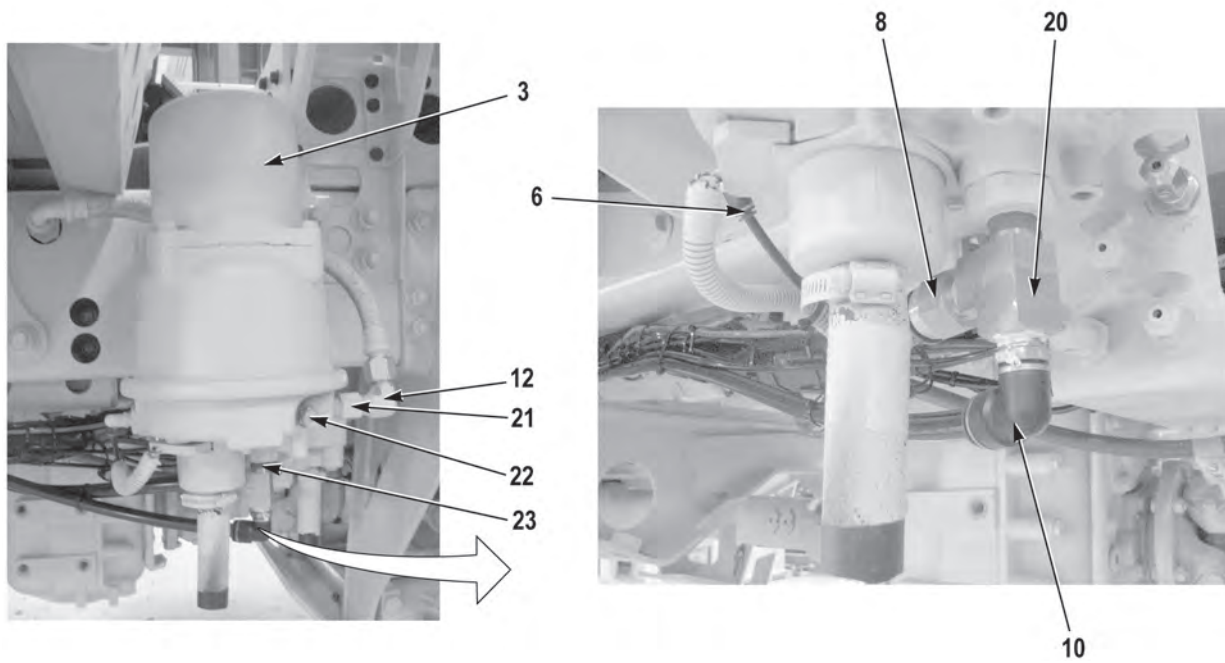
NOTE

Note position of three spacers prior to removal to ensure proper installation.

7. Remove four locknuts (13), screws (14), bracket (15), air dryer (3), and three spacers (16) from frame (17). Discard locknuts (13).



8. Remove three screws (18), lockwashers (19), and bracket (15) from air dryer (3). Discard lockwashers (19).



NOTE

Note position of fittings prior to removal to ensure proper installation.

9. Remove fitting (8) from fitting (20).
10. Remove fitting (10) from fitting (20).
11. Remove fitting (12) from fitting (21).
12. Remove three fittings (6, 20, and 21) and safety valve (22) from air dryer (3).
13. Remove fitting (23) from air dryer (3).

END OF TASK

INSTALLATION**WARNING**

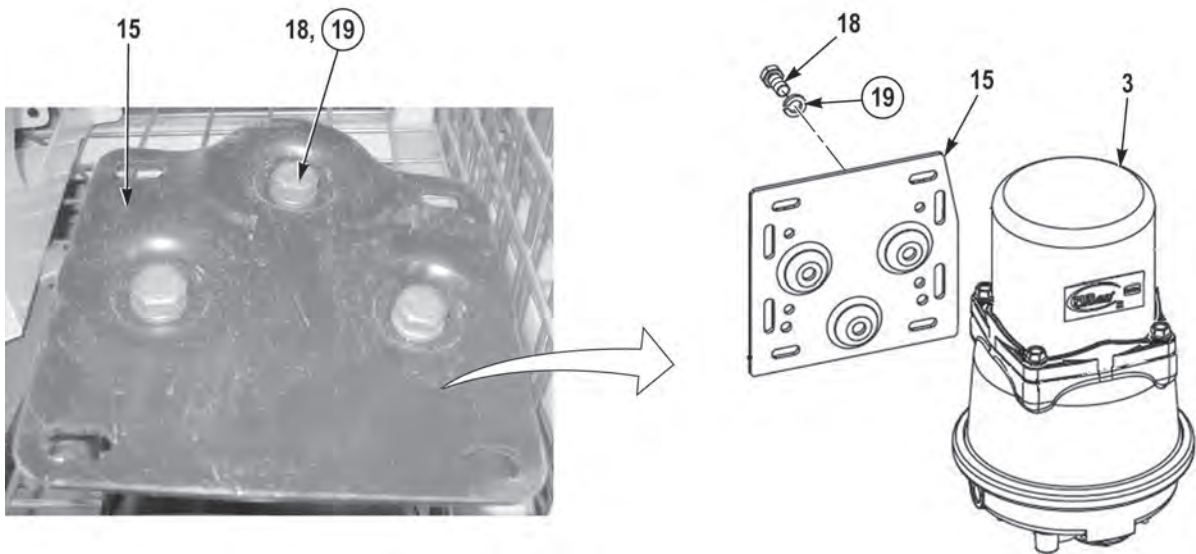
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of six fittings (21, 20, 12, 10, 8, and 6) and safety valve (22).

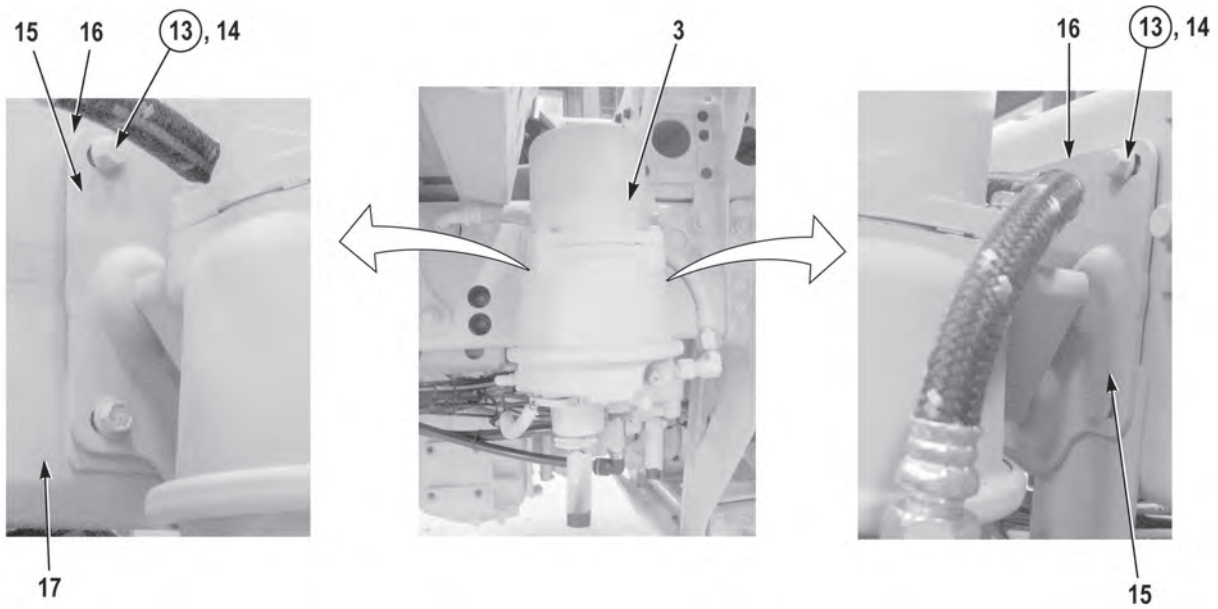
NOTE

Install fittings as noted prior to removal.

2. Install safety valve (22) and three fittings (21, 20, and 6) on air dryer (3).
3. Install fitting (12) on fitting (21).
4. Install fitting (10) on fitting (20).
5. Install fitting (8) on fitting (20).



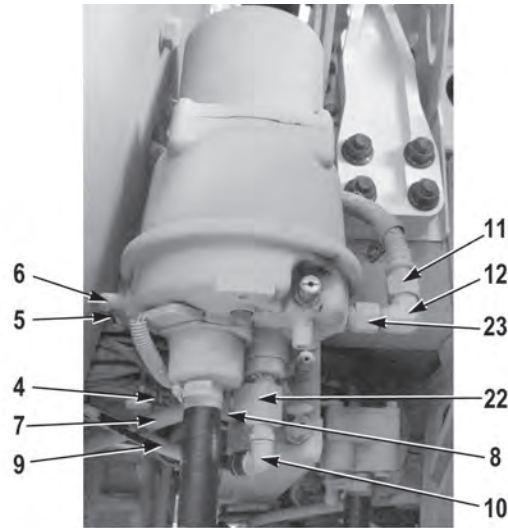
6. Install bracket (15) on air dryer (3) with three new lockwashers (19) and screws (18). Tighten screws (18) to 45 to 55 lb-ft (61 to 75 N•m).



NOTE

Install spacers as noted prior to removal.

7. Install three spacers (16), bracket (15), and air dryer (3) on frame (17) with four screws (14) and new locknuts (13).

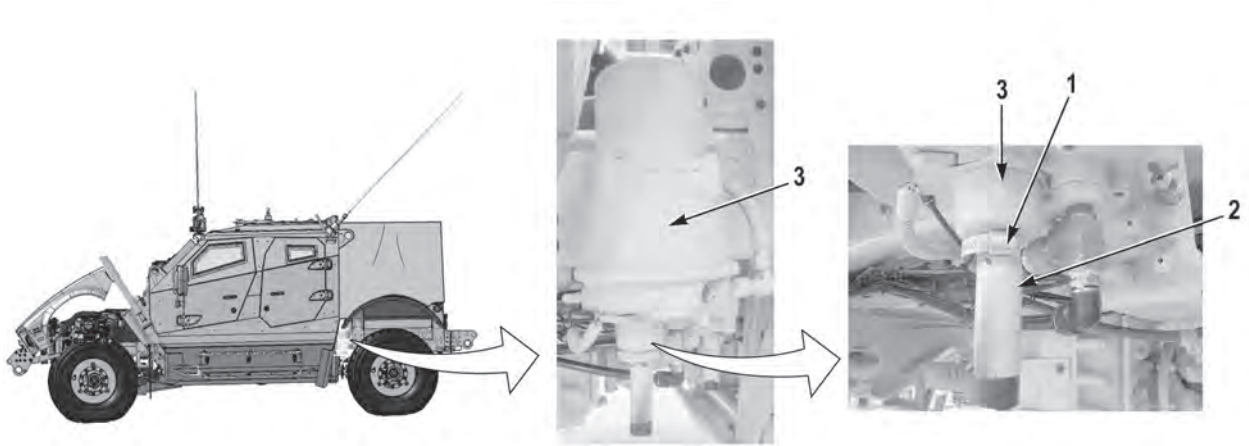


NOTE

Install cable ties as required.

8. Install air line (11) on fitting (12).
9. Install air line (9) on fitting (10).
10. Install air line (7) on fitting (8).

11. Install air line (5) on fitting (6).
12. Connect connector (4).



13. Install vent line (2) on air dryer (3) with clamp (1).
14. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR GOVERNOR ADJUSTMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured

Materials/Parts

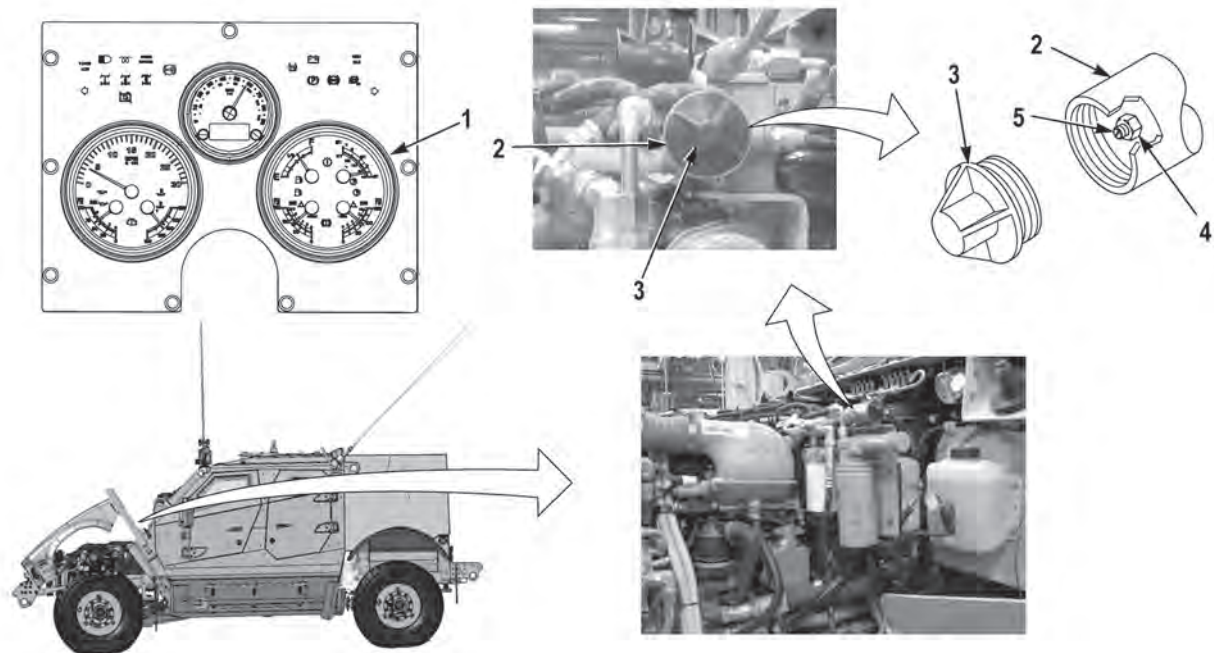
None

Follow-On Maintenance

Close hood and secure
 Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

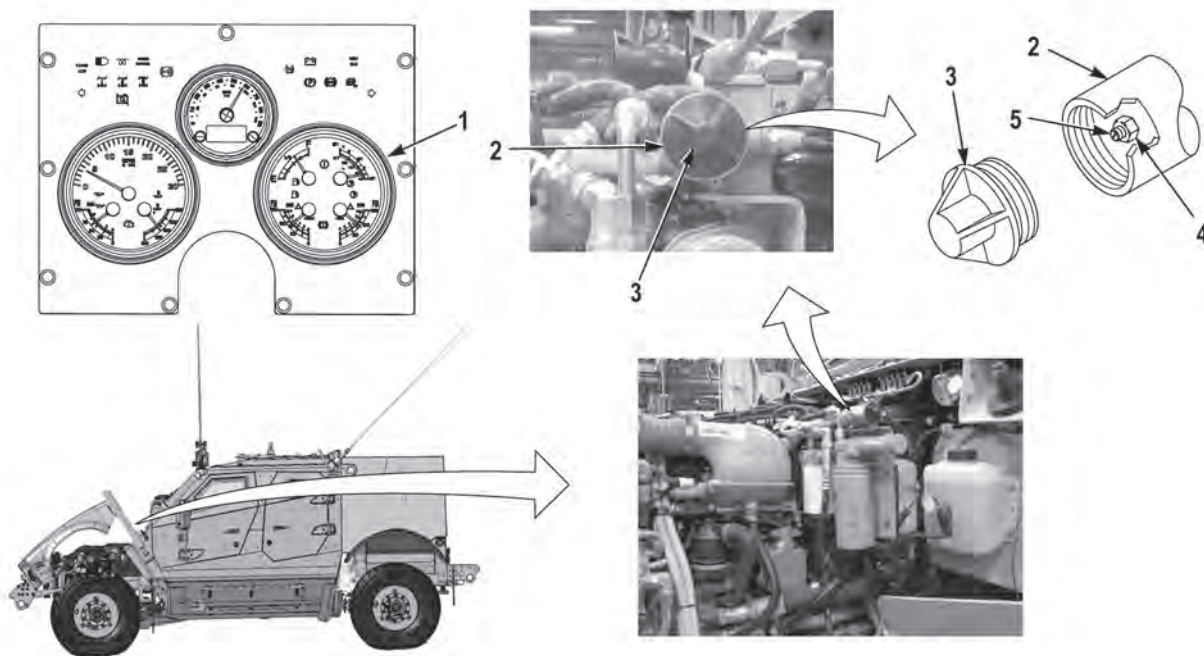
TEST

1. Start engine.

NOTE

Air dryer will discharge air when air governor cuts out. Air governor cut out limit is 130 psi (896 kPa).

2. Build up air pressure until air dryer discharge is heard.
3. Shut off engine.
4. Check air pressure gauge (1).
5. If air pressure gauge (1) reads 100 to 130 psi (690 to 896 kPa), no adjustment is necessary.
6. If air pressure gauge (1) reads below 100 psi (690 kPa) or more than 130 psi (896 kPa), adjust air governor (2).



WARNING

Air lines may be under extreme pressure. Ensure all personnel wear protective goggles when working around compressed air. Failure to comply may result in injury or death to personnel.

7. Drain air pressure.

END OF TASK

ADJUSTMENT

1. Remove cover (3) from air governor (2).
2. Loosen locknut (4) while holding adjusting screw (5).

NOTE

One complete turn of adjusting screw will change cut out pressure approximately 15 psi (103 kPa).

3. If air pressure gauge (1) reads below 100 psi (690 kPa), hold locknut (4) and turn adjusting screw (5) counterclockwise to increase cut out pressure.
4. If air pressure gauge (1) reads above 130 psi (896 kPa), hold locknut (4) and turn adjusting screw (5) clockwise to decrease cut out pressure.
5. Hold adjusting screw (5) and tighten locknut (4).
6. Start engine.

7. Build up air pressure until air dryer discharge is heard.
8. Shut off engine.
9. Note air pressure gauge (1) reading.
10. If air pressure gauge (1) reads below 100 psi (690 kPa) or more than 130 psi (896 kPa), repeat Steps (1) through (9).
11. If air pressure gauge (1) reads 100 to 130 psi (690 to 896 kPa) adjustment is complete.
12. Install cover (3) on air governor (2).

WARNING

Air lines may be under extreme pressure. Ensure all personnel wear protective goggles when working around compressed air. Failure to comply may result in injury or death to personnel.

13. Drain air pressure.
14. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR GOVERNOR REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Air system drained

Tools and Special Tools

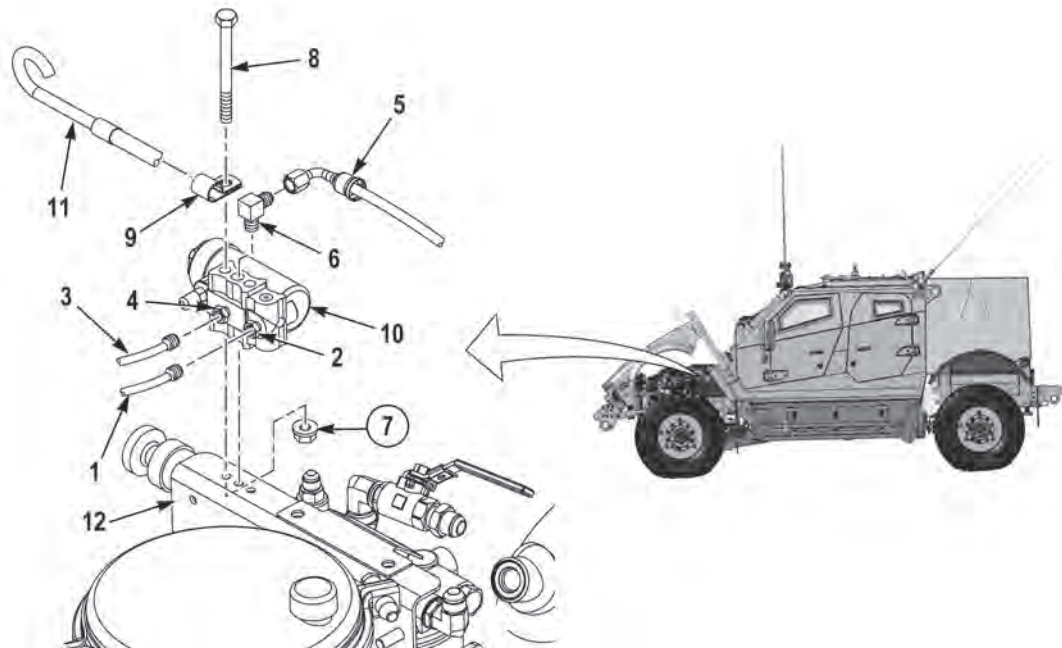
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 7)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

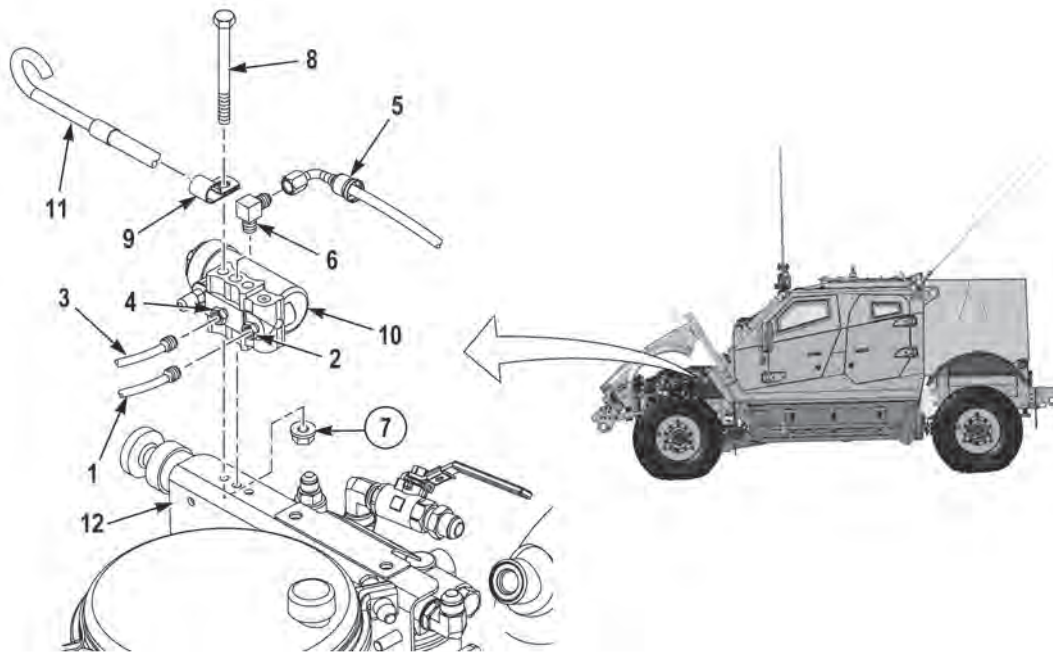
Follow-On Maintenance

Close hood and secure
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Tag and mark air lines and hoses prior to removal to ensure proper installation.
- Cap and plug air lines and hoses prior to removal.

1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).

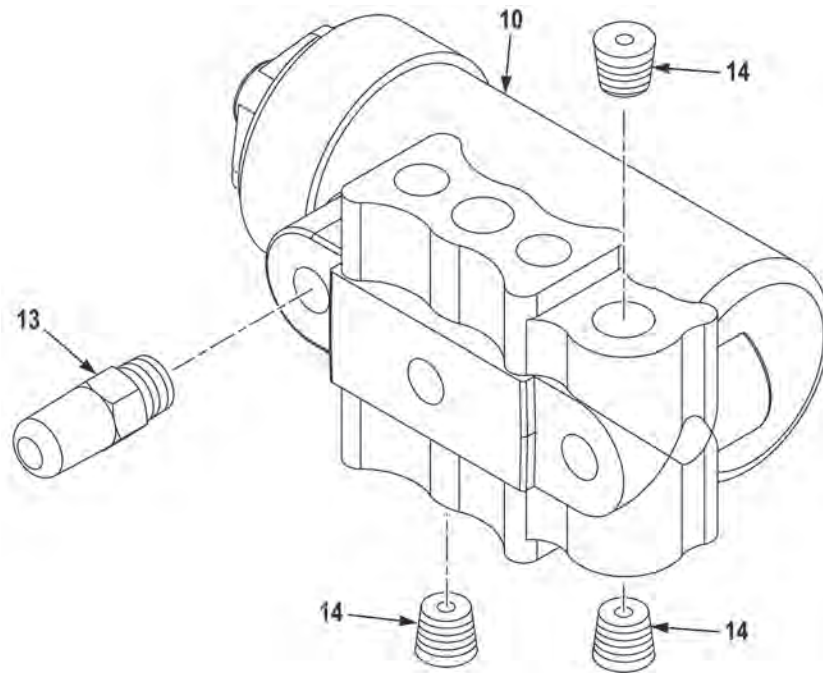


3. Remove hose (5) from fitting (6).
4. Remove two locknuts (7), screws (8), cushion clip (9), and air governor (10) from oil dipstick (11) and bracket (12). Discard locknuts (7).

NOTE

Note position of fittings and plugs prior to removal to ensure proper installation.

5. Remove fitting (2) from air governor (10).
6. Remove fitting (4) from air governor (10).
7. Remove fitting (6) from air governor (10).



8. Remove fitting (13) from air governor (10).
9. Remove three plugs (14) from air governor (10).

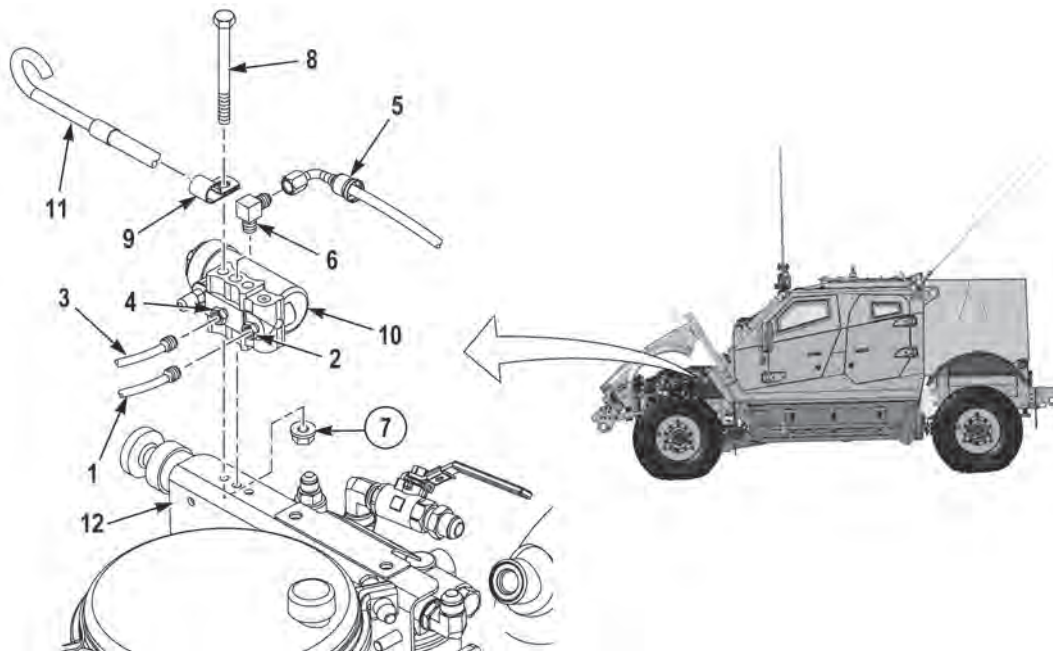
END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of three plugs (14) and fitting (13).
2. Install three plugs (14) on air governor (10).
3. Install fitting (13) on air governor (10).



4. Install air governor (10) on bracket (12) and oil dipstick (11) with cushion clip (9), two screws (8), and new locknuts (7).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

5. Apply sealing compound, Loctite 592, to threads of three fittings (6), (4), and (2).

NOTE

Install fittings and plugs as noted prior to removal.

6. Install fitting (6) on air governor (10).
7. Install fitting (4) on air governor (10).
8. Install fitting (2) on air governor (10).
9. Install hose (5) on fitting (6).
10. Install air line (3) on fitting (4).
11. Install air line (1) on fitting (2).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR PRESSURE ALARM REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 CTIS dash panel removed (WP 0168)

Materials/Parts

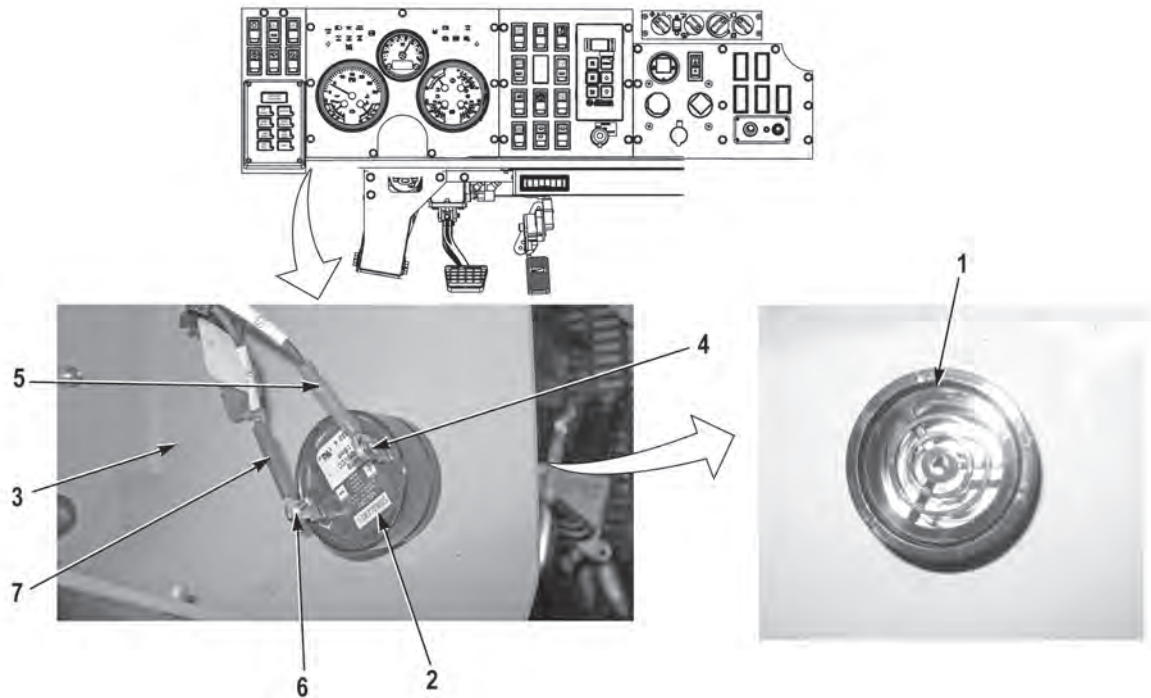
Tags, Identification

Follow-On Maintenance

Install CTIS dash panel (WP 0168)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

Tools and Special Tools

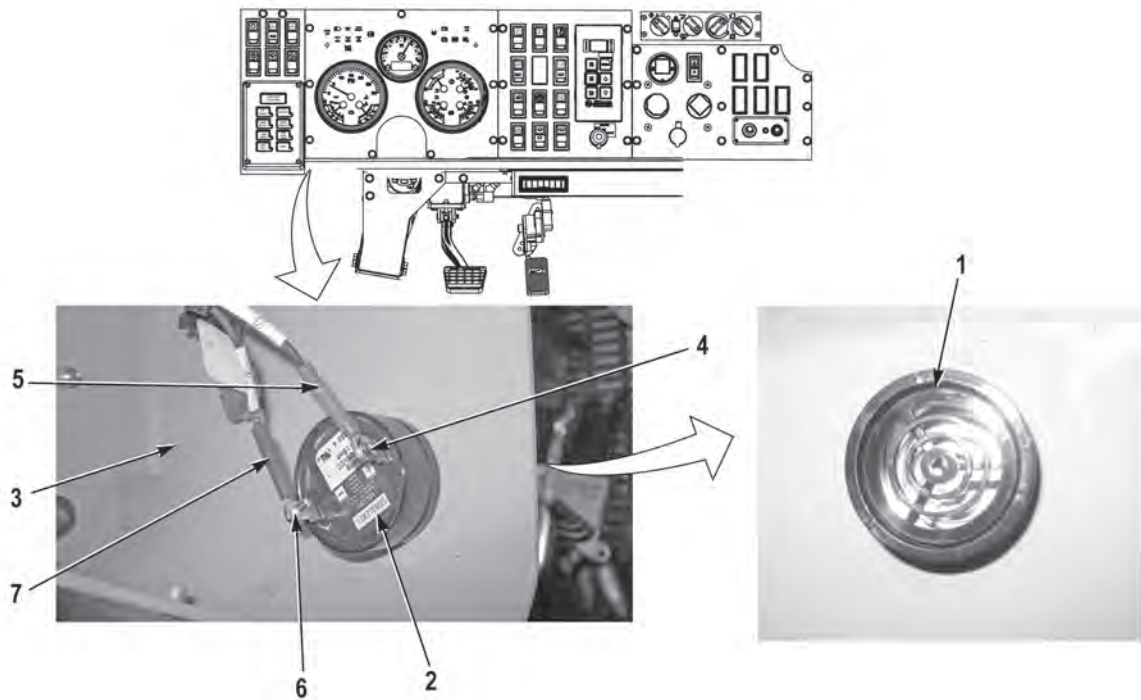
Tool Kit, General Mechanic's: Automotive

REMOVAL**NOTE**

Tag and mark wires prior to removal to ensure proper installation.

1. Remove retaining ring (1) and alarm (2) from dash (3).
2. Remove screw (4) and wire (5) from positive terminal of alarm (2).
3. Remove screw (6) and wire (7) from negative terminal of alarm (3).

END OF TASK

INSTALLATION

1. Install wire (7) on negative terminal of alarm (2) with screw (6).
2. Install wire (5) on positive terminal of alarm (2) with screw (4).
3. Install alarm (2) on dash (3) with retaining ring (1).
4. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

AIR RESERVOIR CHECK VALVE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Center belly deflector removed (M1240/M1245)
(WP 0048)
Underbody improvement and center belly
deflector armor panel removed (M1240A1)
(WP 0277)
Propeller shafts removed (WP 0090)
Supply air reservoir removed (if removing primary
reservoir check valve (WP 0111)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Wrench, Combination 1-3/8

Follow-On Maintenance

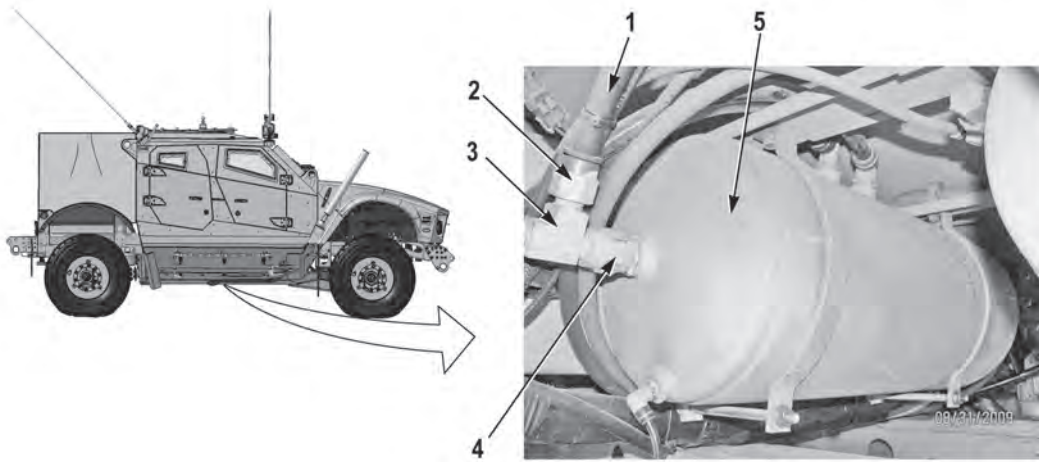
Install supply air reservoir (if removed for primary
reservoir check valve) (WP 0111)
Install propeller shafts (WP 0090)
Install center belly deflector (M1240/M1245)
(WP 0048)
Install center belly deflector armor panel and
underbody improvement (M1240A1)
(WP 0277)
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Primary reservoir check valve is not accessible on two tank system.
- Perform Steps (1) through (3) for primary reservoir check valve.
- Perform Steps (4) through (6) for secondary reservoir check valve.
- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

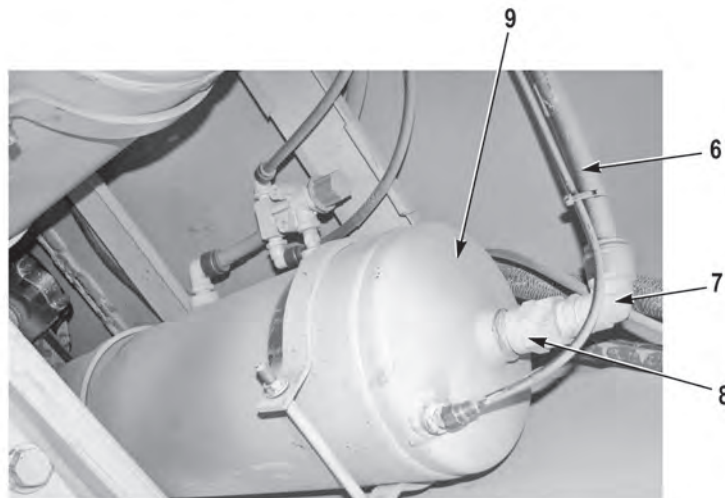


1. Remove air line (1) from fitting (2).

NOTE

Note position of fittings prior to removal to ensure proper installation.

2. Remove two fittings (2 and 3) from check valve (4).
3. Remove check valve (4) from primary reservoir (5).



4. Remove air line (6) from fitting (7).
5. Remove fitting (7) from check valve (8).
6. Remove check valve (8) from secondary reservoir (9).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Perform Steps (1) through (3) for secondary reservoir.
 - Perform Steps (4) through (6) for primary reservoir.
 - Install fittings as noted during removal.
1. Apply sealing compound, Loctite 592, to threads of check valve (8) and install check valve (8) on secondary reservoir (9).
 2. Apply sealing compound, Loctite 592, to threads of fitting (7) and install fitting (7) on check valve (8).
 3. Install air line (6) on fitting (7).
 4. Apply sealing compound, Loctite 592, to threads of check valve (4) and install check valve (4) on primary reservoir (5).
 5. Apply sealing compound, Loctite 592, to threads of two fittings (2 and 3) and install two fittings (2 and 3) on check valve (4).
 6. Install air line (1) on fitting (2).
 7. Perform air system leak test (WP 0291).
 8. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

AIR RESERVOIR REPLACEMENT, PRIMARY (FOUR TANK SYSTEM)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Center belly deflector panel removed (WP 0048)
Propeller shafts removed (WP 0090)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, combination, 1-1/4 in.

Materials/Parts

Locknut (2) (Item 12)
Locknut (2) (Item 17)
Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Tape, Insulation
Ties, Cable

Follow-On Maintenance

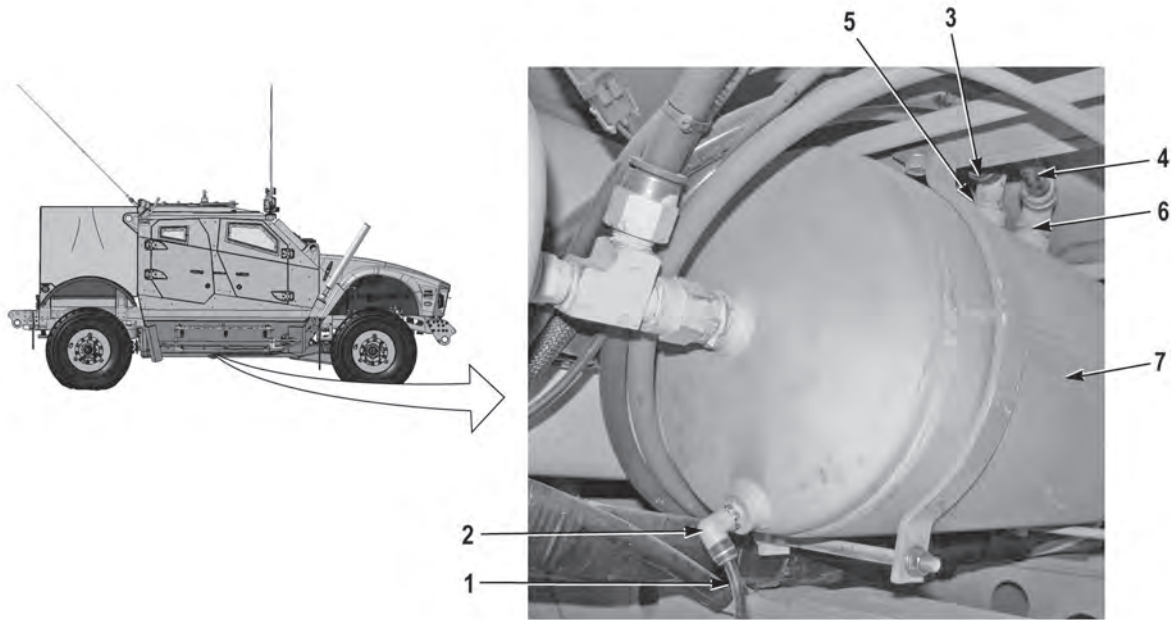
Install propeller shafts (WP 0090)
Install center belly deflector panel (WP 0048)
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.

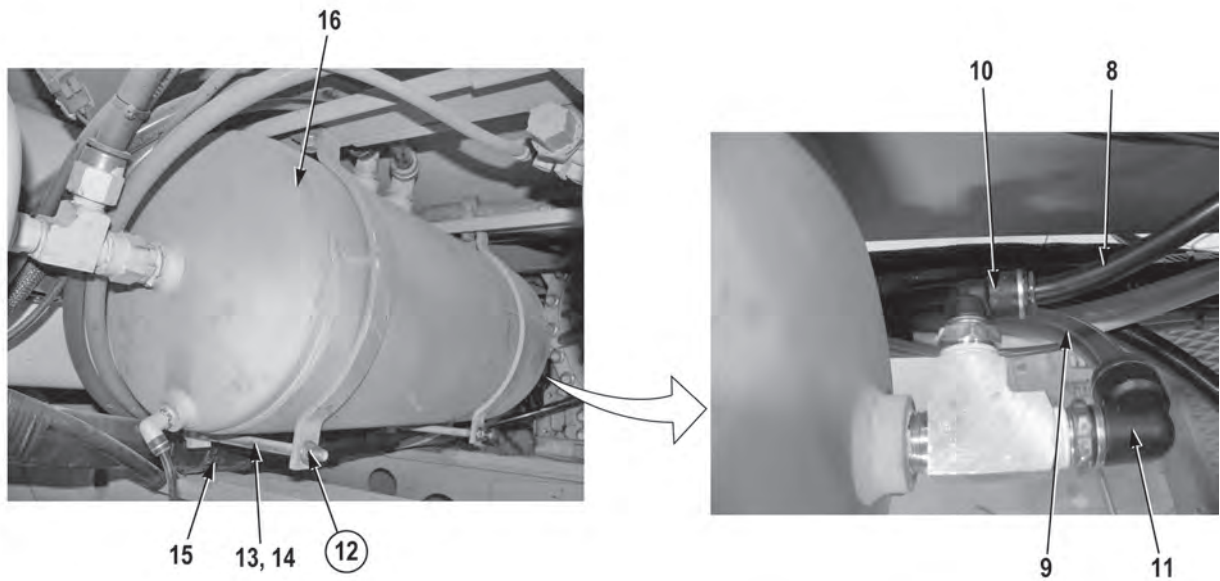


1. Remove air line (1) from fitting (2).
2. Remove two air lines (3 and 4) from two fittings (5 and 6).

NOTE

Note position of fittings prior to removal to ensure proper installation.

3. Remove two fittings (5 and 6) from primary reservoir (7).

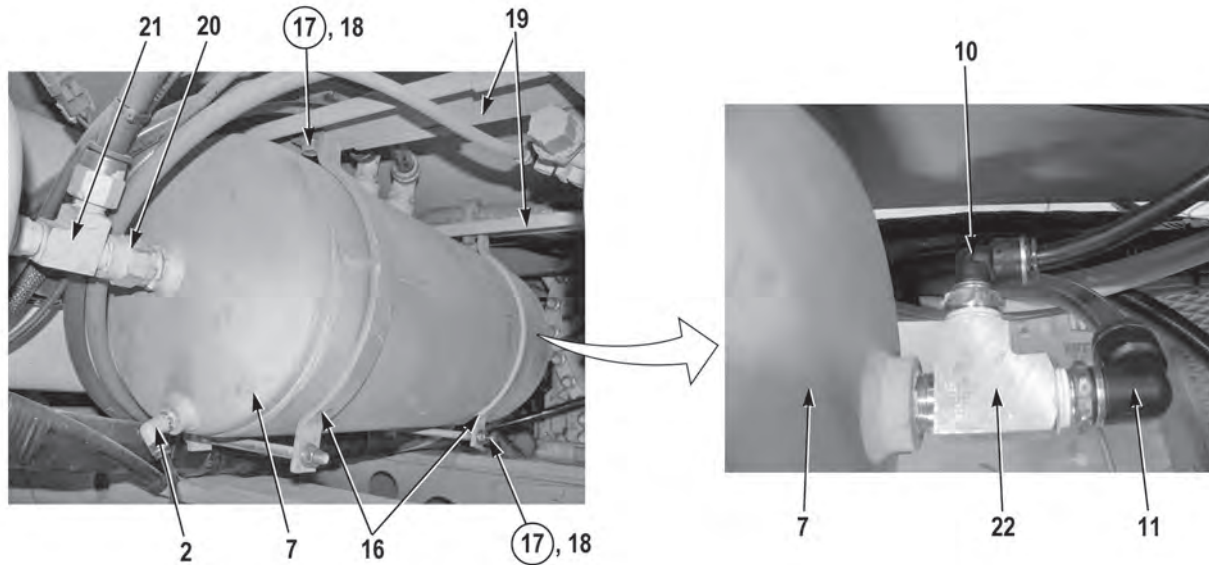


4. Remove two air lines (8 and 9) from two fittings (10 and 11).

NOTE

Note position of primary reservoir prior to removal to ensure proper installation.

5. Remove two locknuts (12), screws (13), washers (14), and cushion clips (15) from four mounting brackets (16). Discard locknuts (12).



6. Remove two locknuts (17), screws (18), and mounting brackets (16) from two brackets (19). Discard locknuts (17).
7. Remove fitting (2) from primary reservoir (7).
8. Remove check valve (20) and primary reservoir (7) from fitting (21) and remaining two mounting brackets (16).
9. Remove two fittings (10 and 11) from fitting (22).
10. Remove fitting (22) from primary reservoir (7).
11. Remove check valve (20) from primary reservoir (7).

END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

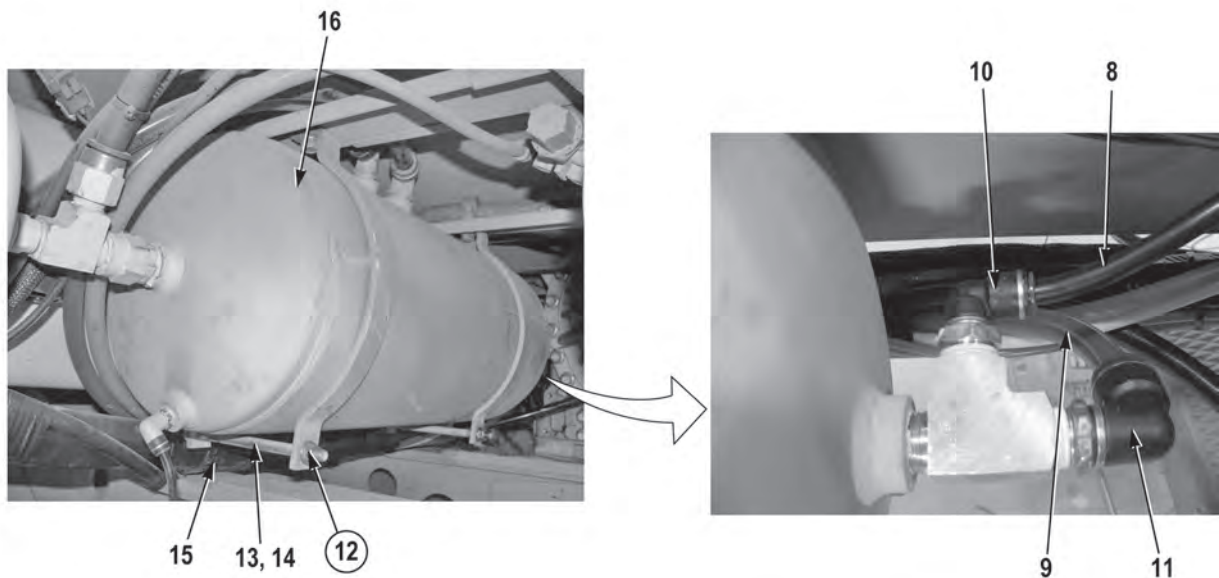
1. Apply sealing compound, Loctite 592, to threads of check valve (20) and install check valve (20) on primary reservoir (7).

2. Apply sealing compound, Loctite 592, to threads of fitting (2) and install fitting (2) on primary reservoir (7).
3. Apply sealing compound, Loctite 592, to threads of fitting (22) and install fitting (22) on primary reservoir (7).
4. Apply sealing compound, Loctite 592, to threads of two fittings (10 and 11) and install two fittings (10 and 11) on fitting (22).
5. Apply insulator tape to mating surface of four brackets (16).

NOTE

Install primary reservoir as noted prior to removal.

6. Apply sealing compound, Loctite 592, to threads of fitting (21) and install check valve (20) and primary reservoir (7) on fitting (21).
7. Install two mounting brackets (16) on two brackets (19) with two screws (18) and new locknuts (17).

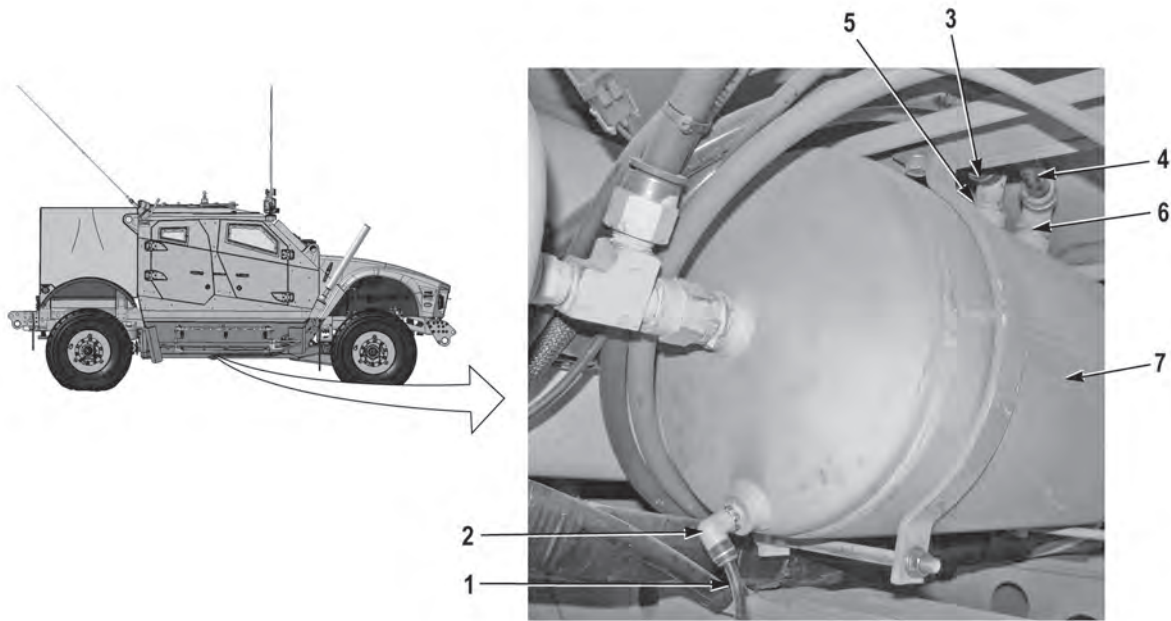


8. Install two cushion clips (15), washers (14), screws (13), and new locknuts (12) on four mounting brackets (16).

NOTE

Install cable ties as required.

9. Install two air lines (8 and 9) on two fittings (10 and 11).



10. Apply sealing compound, Loctite 592, to threads of two fittings (5 and 6) and install two fittings (5 and 6) on primary reservoir (7).
11. Install two air lines (3 and 4) on two fittings (5 and 6).
12. Install air line (1) on fitting (2).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR RESERVOIR REPLACEMENT, SECONDARY (FOUR TANK SYSTEM)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Center belly deflector panel removed (WP 0048)
Propeller shafts removed (WP 0090)
Pressure protection valve (secondary) removed
(WP 0127)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 9)
Locknut (2) (Item 13)
Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Tape, Insulator
Ties, Cable

Follow-On Maintenance

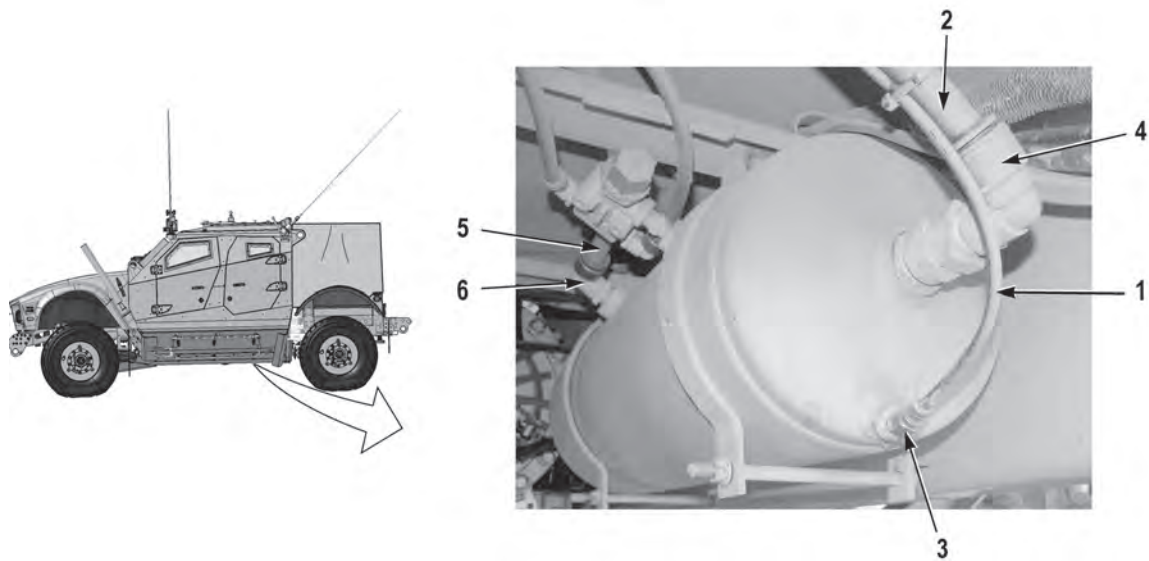
Install pressure protection valve (secondary)
(WP 0127)
Install propeller shafts (WP 0090)
Install center belly deflector panel (WP 0048)
Remove and stow wheel chocks

REMOVAL**WARNING**

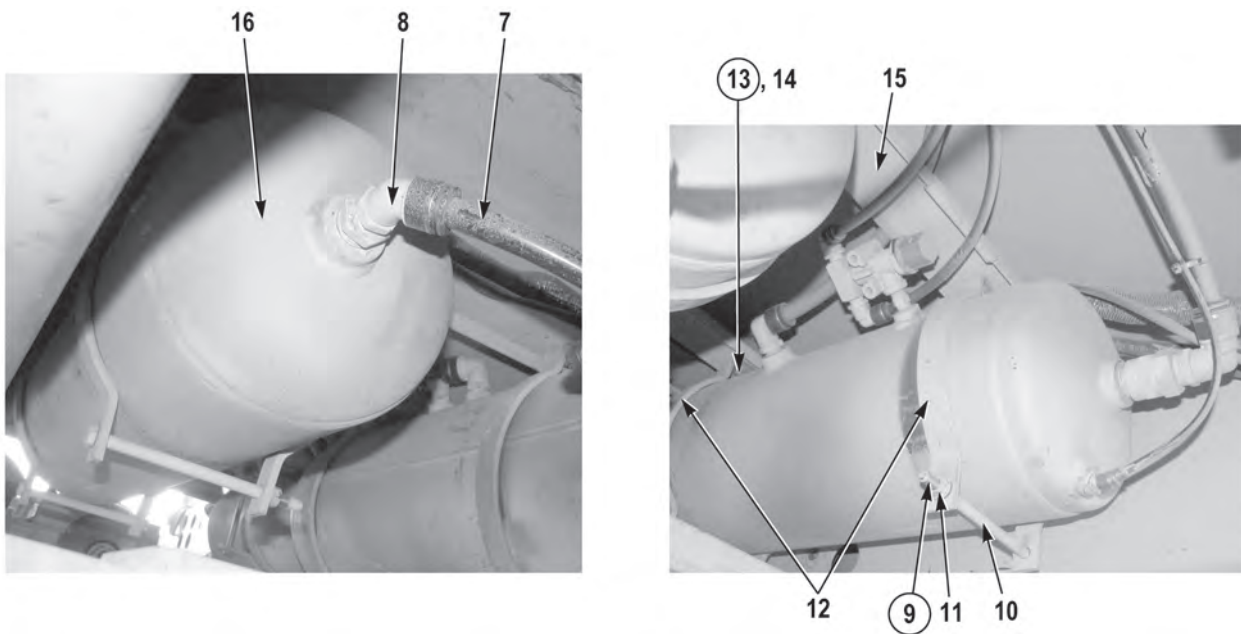
- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.



1. Remove two air lines (1 and 2) from two fittings (3 and 4).
2. Remove air line (5) from fitting (6).

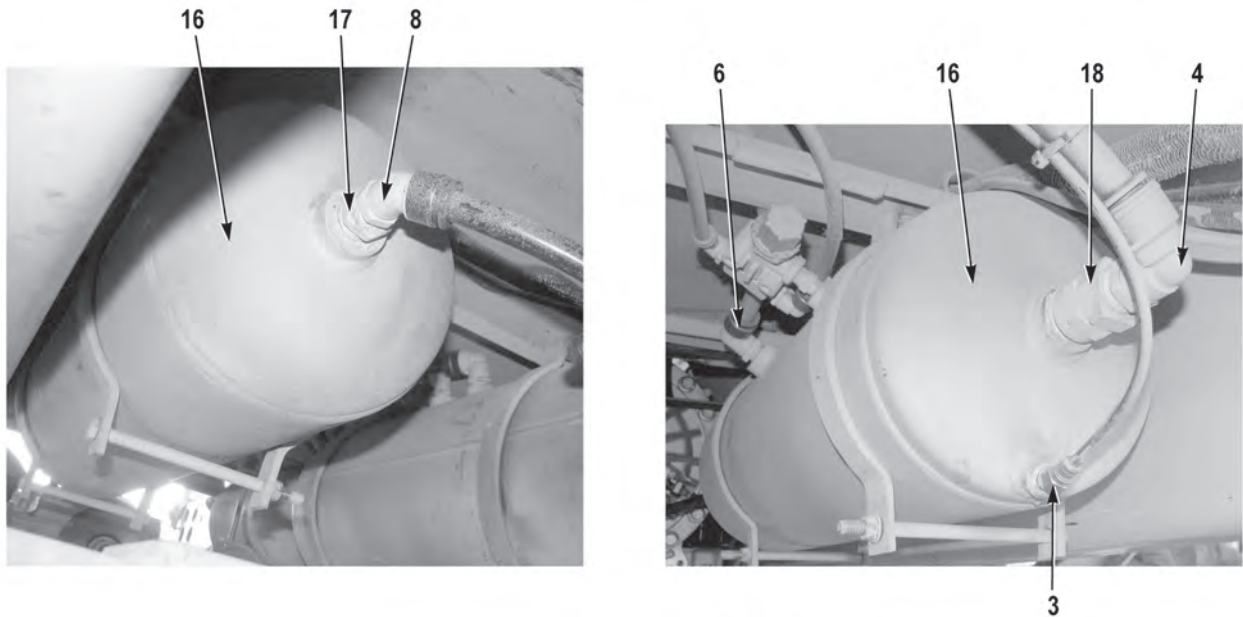


3. Remove air line (7) from fitting (8).
4. Remove two locknuts (9), screws (10), and washers (11) from four mounting brackets (12). Discard locknuts (9).

NOTE

Note position of secondary reservoir prior to removal to ensure proper installation.

5. Remove two locknuts (13), screws (14), and mounting brackets (12) from two brackets (15) and remove secondary reservoir (16) from remaining two mounting brackets (12). Discard locknuts (13).



NOTE

Note position of fittings prior to removal to ensure proper installation.

6. Remove fitting (8) from fitting (17).
7. Remove two fittings (6 and 17) from secondary reservoir (16).
8. Remove fitting (4) from check valve (18).
9. Remove check valve (18) from secondary reservoir (16).
10. Remove fitting (3) from secondary reservoir (16).

END OF TASK

INSTALLATION

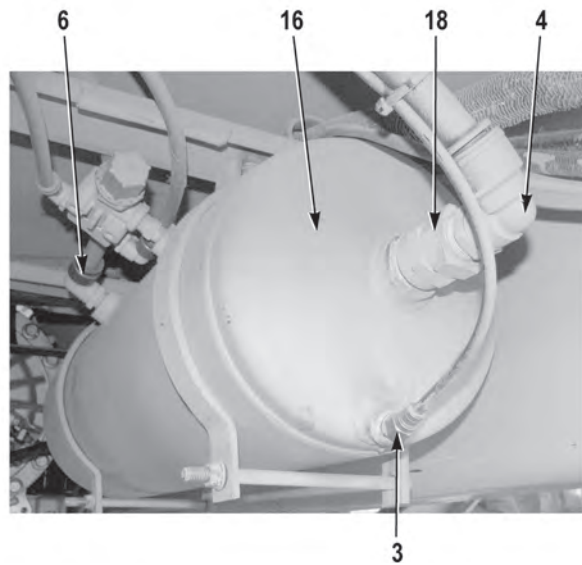
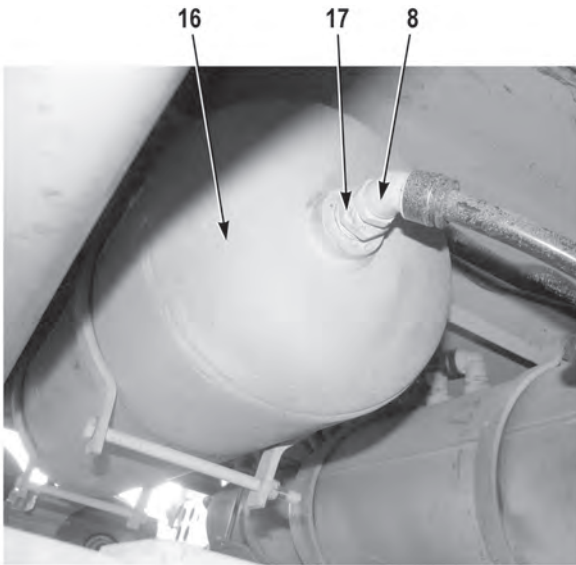
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

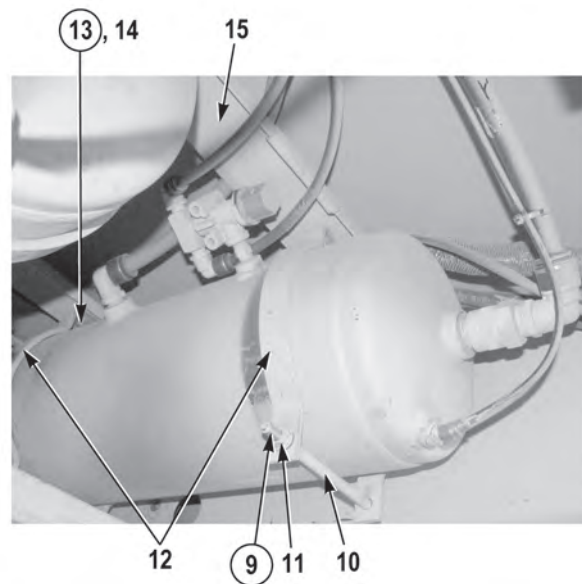
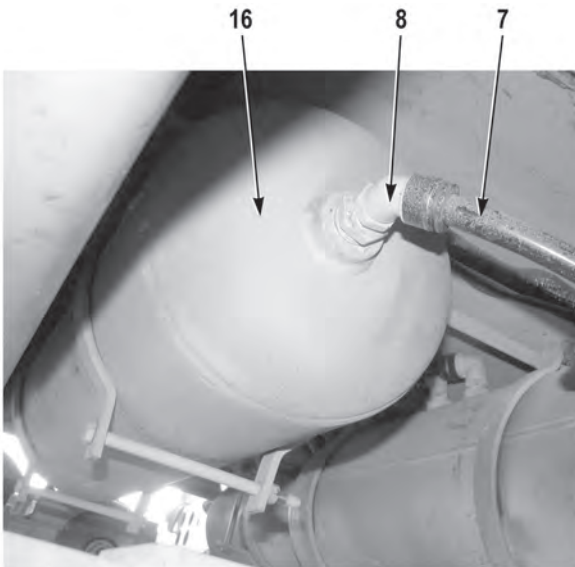
NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of fitting (3) and install fitting (3) on secondary reservoir (16).
2. Apply sealing compound, Loctite 592, to threads of check valve (18) and install check valve (18) on secondary reservoir (16).



3. Apply sealing compound, Loctite 592, to threads of fitting (4) and install fitting (4) on check valve (18).
4. Apply sealing compound, Loctite 592, to threads of two fittings (6 and 17) and install two fittings (6 and 17) on secondary reservoir (16).
5. Apply sealing compound, Loctite 592, to threads of fitting (8) and install fitting (8) on fitting (17).

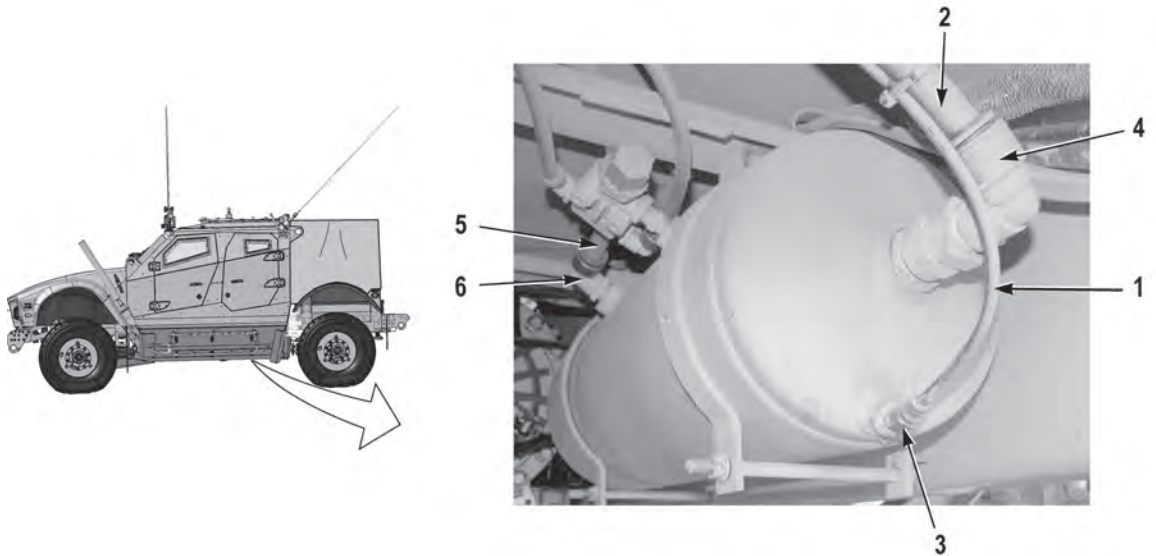


NOTE

Install secondary reservoir as noted prior to removal.

6. Apply insulator tape to mating surface of four brackets (12).

7. Position secondary reservoir (16) on two mounting brackets (12).
8. Install two mounting brackets (12) on two brackets (15) with two screws (14) and new locknuts (13).
9. Install two washers (11), screws (10), and new locknuts (9) on four mounting brackets (12).
10. Install air line (7) on fitting (8).



11. Install air line (5) on fitting (6).
12. Install two air lines (1 and 2) on two fittings (3 and 4).
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR RESERVOIR REPLACEMENT, SECONDARY (TWO TANK SYSTEM)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Pressure protection valve (secondary air reservoir) removed (WP 0127)
 Secondary air reservoir check valve removed (WP 0107)

Tools and Special Tools

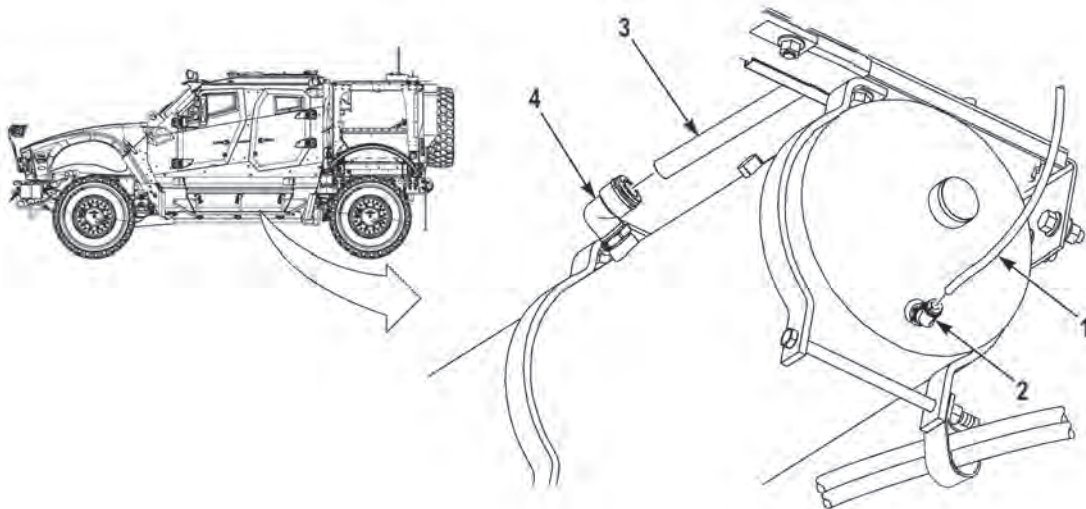
Cap and Plug Set
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (9) (Item 7, 11, 14, 18, and 22)
 Compound, Sealing, Loctite 567
 Tags, Identification
 Ties, Cable

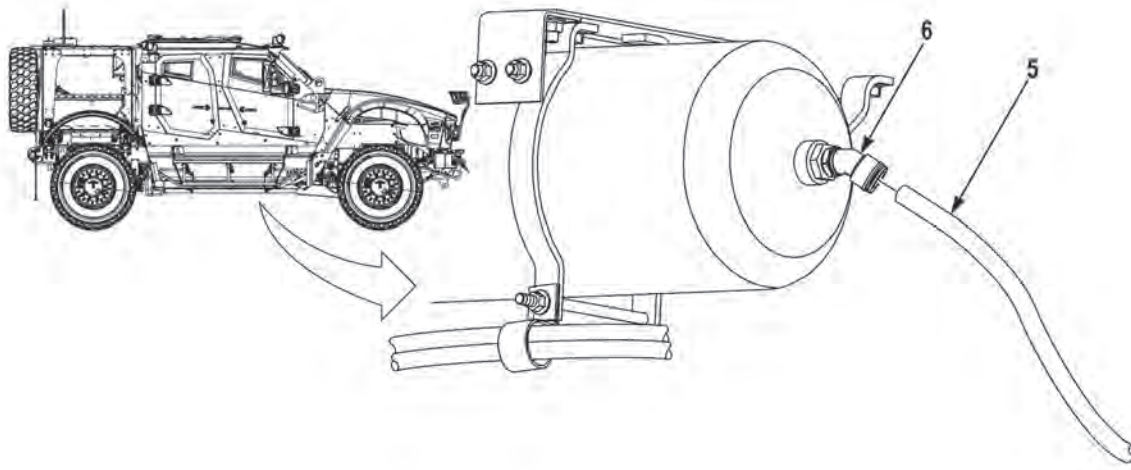
Follow-On Maintenance

Install secondary air reservoir check valve (WP 0107)
 Install pressure protection valve (secondary air reservoir) (WP 0127)
 Remove and stow wheel chocks

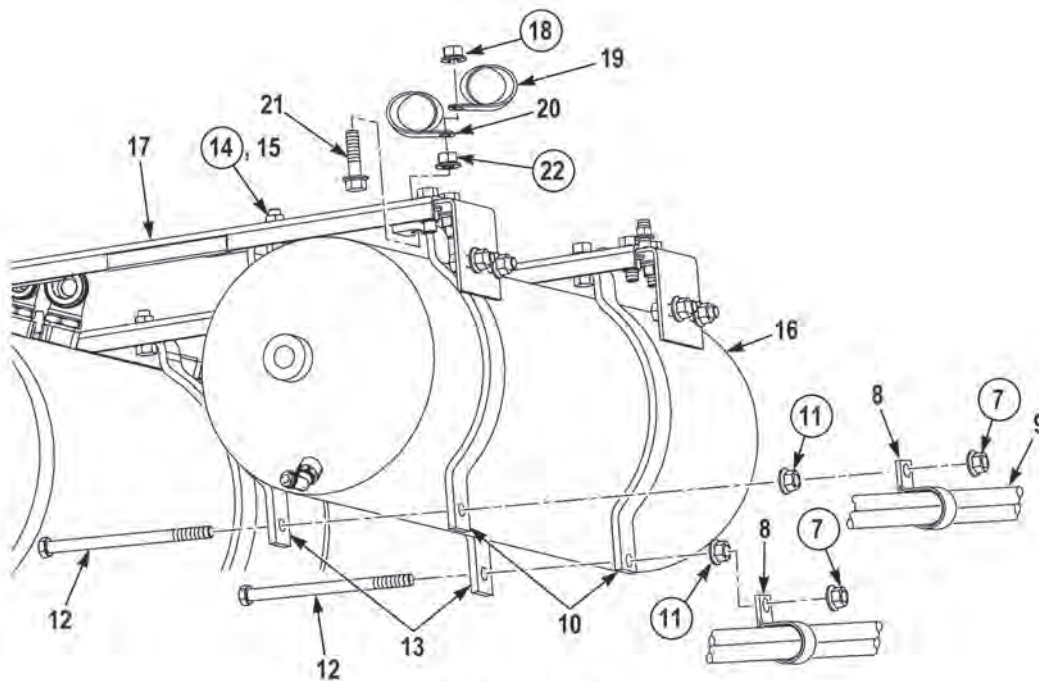
REMOVAL**NOTE**

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.

1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).



3. Remove air line (5) from fitting (6). Refer to schematics.



WIRING HARNESS
SHOWN REMOVED FOR CLARITY

NOTE

Note position of cushion clips prior to removal to ensure proper installation.

4. Remove two locknuts (7), cushion clips (8), and wire bundle (9) from two mounting brackets (10). Discard locknuts (7).

NOTE

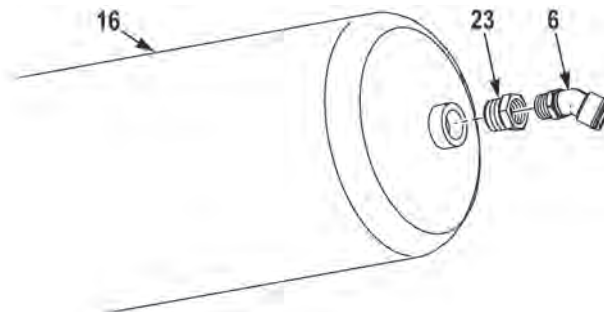
Note position of secondary air reservoir prior to removal to ensure proper installation.

5. Remove two locknuts (11) and screws (12) from four mounting brackets (10 and 13). Discard locknuts (11).
6. Remove rear locknut (14), screw (15), rear mounting bracket (13), and secondary air reservoir (16) from support bracket (17). Discard locknut (14).
7. Remove front locknut (14), screw (15), and front mounting bracket (13) from front support bracket (17). Discard locknut (14).

NOTE

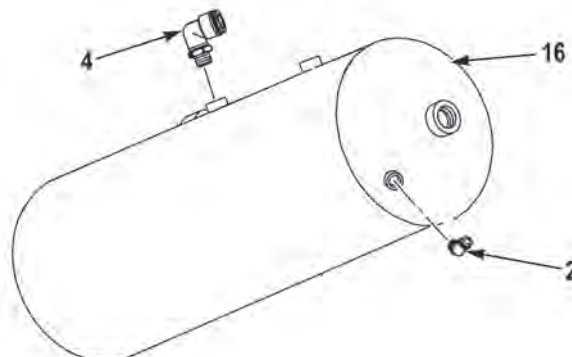
Perform Steps (8) and (9) if cushion clips and brackets need to be removed.

8. Remove locknut (18), cushion clip (19), and cushion clip (20) from screw (21). Discard locknut (18).
9. Remove two locknuts (22), screws (21), and mounting brackets (10) from two support brackets (17). Discard locknuts (22).

**NOTE**

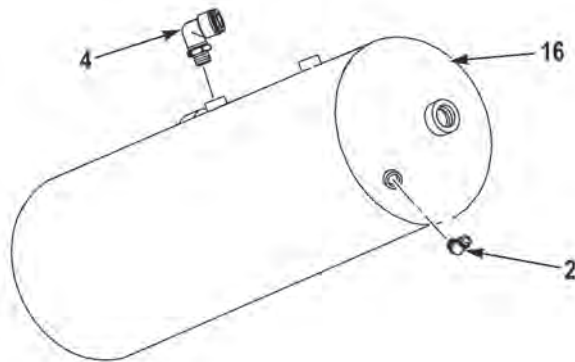
Note position of fittings prior to removal to ensure proper installation.

10. Remove fitting (23) from secondary air reservoir (16).
11. Remove fitting (6) from fitting (23).



12. Remove fitting (4) from secondary air reservoir (16).
13. Remove fitting (2) from secondary air reservoir (16).

END OF TASK

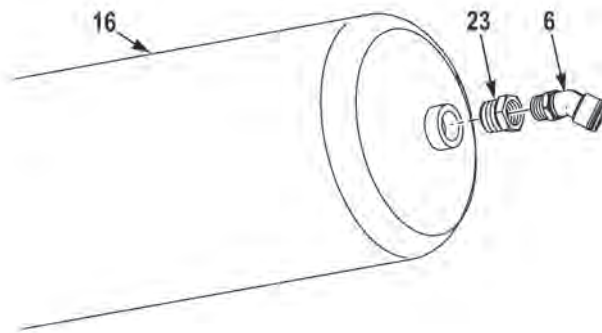
INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

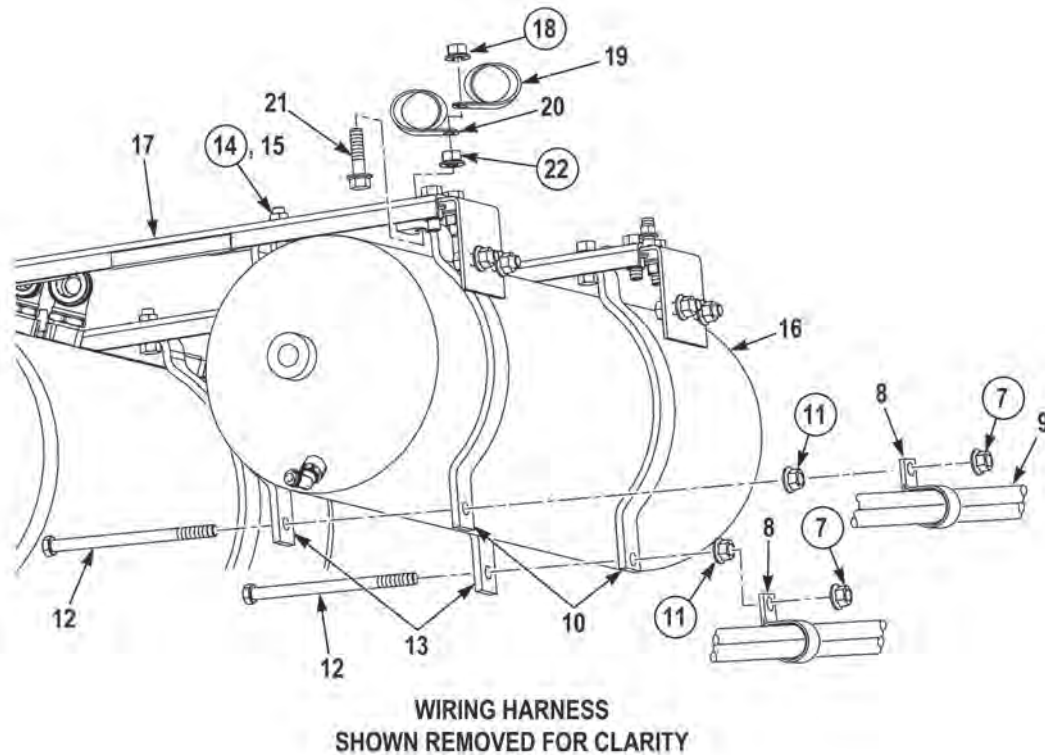
NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 567 to threads of fitting (2) and install fitting (2) on secondary air reservoir (16).
2. Apply sealing compound, Loctite 567 to threads of fitting (4) and install fitting (4) on secondary air reservoir (16).



3. Apply sealing compound, Loctite 567 to threads of fitting (6) and install fitting (6) on fitting (23).
4. Apply sealing compound, Loctite 567 to threads of fitting (23) and install fitting (23) on secondary air reservoir (16).

**NOTE**

- Perform Steps (5) and (6) if mounting brackets and cushion clips were removed.
- Install mounting brackets as noted prior to removal.

5. Install two mounting brackets (10) on support brackets (17) with screws (21) and new locknuts (22).

NOTE

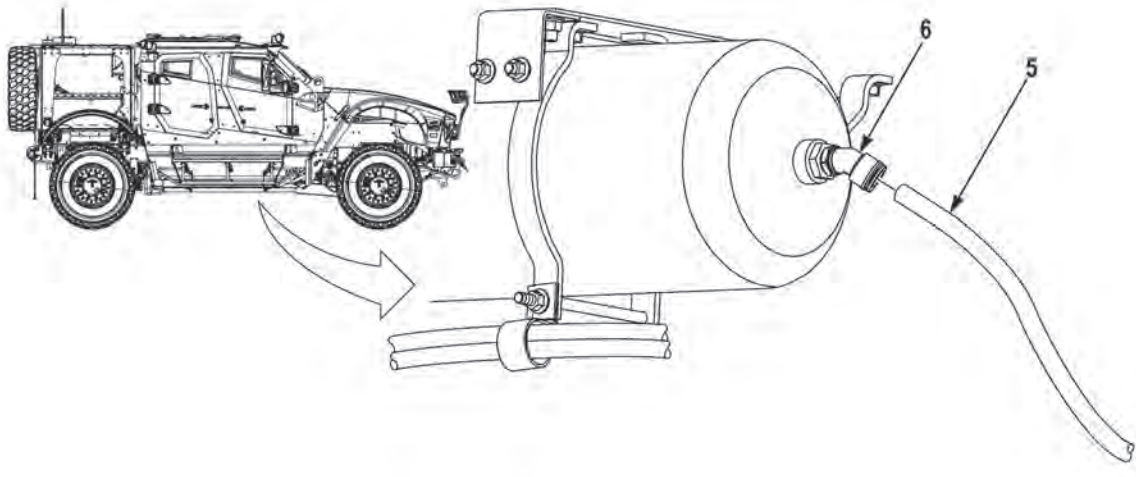
Install cushion clips as noted prior to removal.

6. Install cushion clip (20) and cushion clip (19) on screw (21) with new locknut (18).

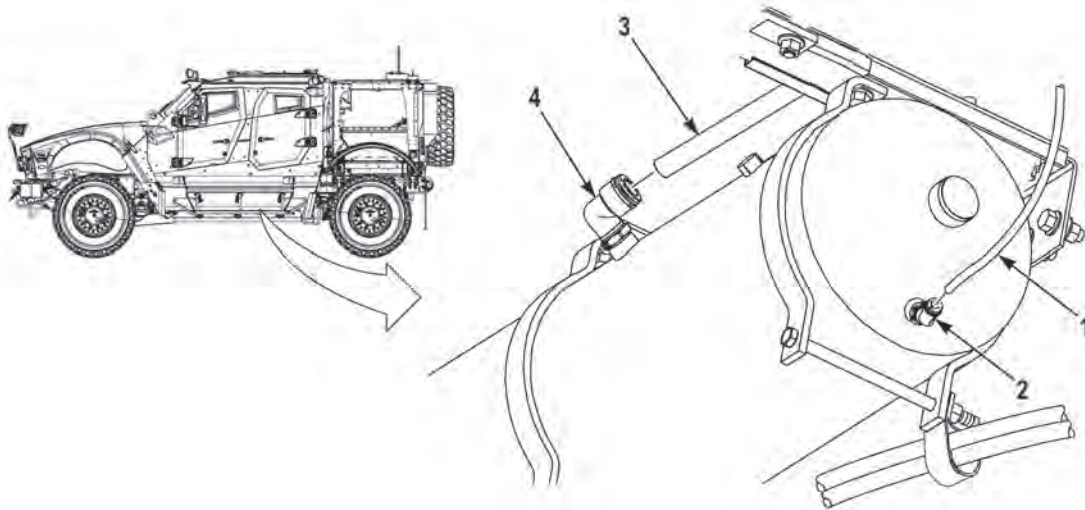
NOTE

Install secondary air reservoir as noted prior to removal.

7. Position secondary air reservoir (16) on two mounting brackets (10) and install front mounting bracket (13) on front support bracket (17) with screw (15) and new locknut (14).
8. Secure secondary air reservoir (16) with rear mounting bracket (13) on support bracket (17) with screw (15) and new locknut (14).
9. Secure secondary air reservoir (16) on four mounting brackets (13 and 10) with two screws (12) and new locknuts (11).
10. Install wire bundle (9) and two cushion clips (8) on two mounting brackets (10) with new locknuts (7).



11. Install air line (5) on fitting (6). Refer to schematics.



12. Install air line (3) on fitting (4).
 13. Install air line (1) on fitting (2).
 14. Perform air system leak test (WP 0291).
 15. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR RESERVOIR REPLACEMENT, SUPPLY NO. 1 (FOUR TANK SYSTEM)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Batteries disconnected (WP 0186)
Batteries disconnected (M1245) (WP 0187)
Center belly deflector removed (WP 0048)
Propeller shafts removed (WP 0090)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (1) (Item 16)
Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Tape, Insulator

Follow-On Maintenance

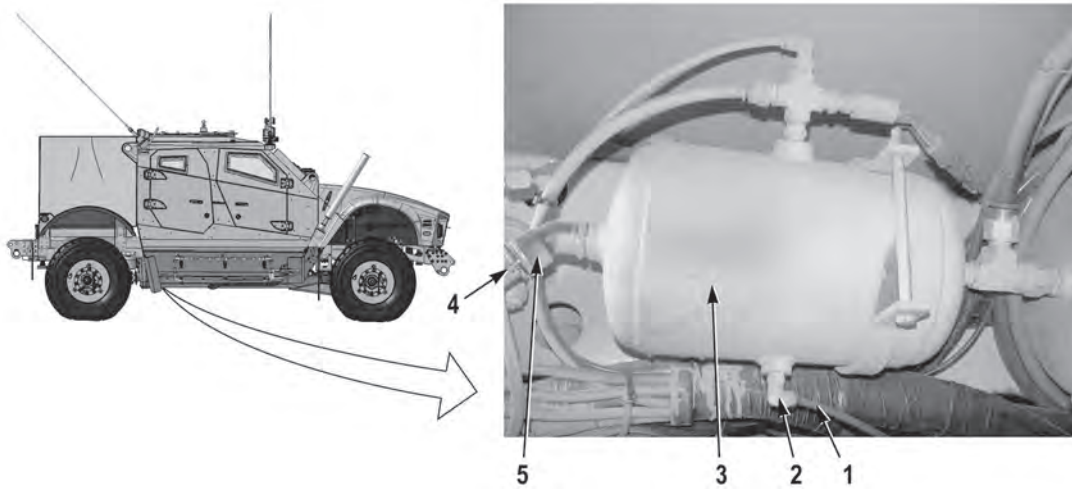
Connect batteries (WP 0186)
Connect batteries (M1245) (WP 0187)
Install propeller shafts (WP 0090)
Install center belly deflector (WP 0048)
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

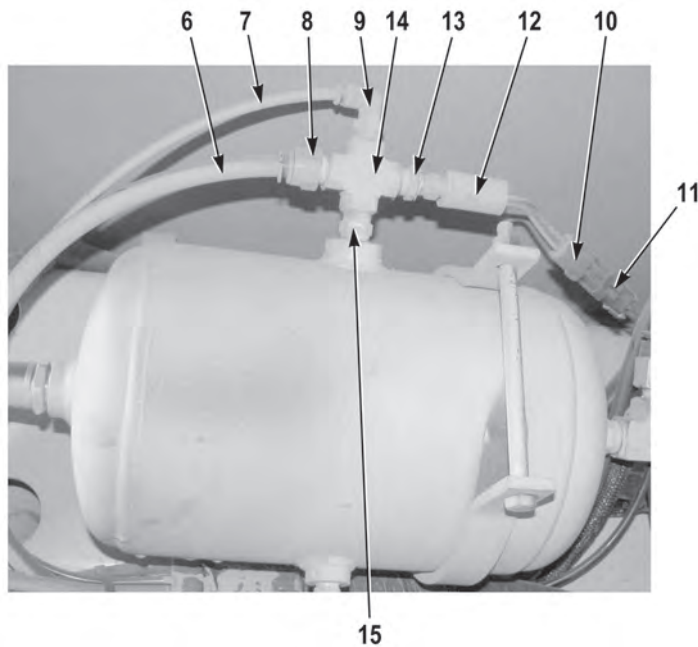


1. Remove air line (1) from fitting (2).

NOTE

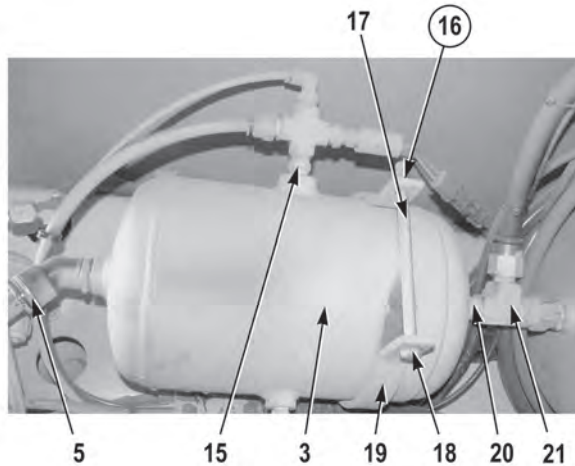
Note location of fittings prior to removal to ensure proper installation.

2. Remove fitting (2) from supply reservoir (3).
3. Remove air line (4) from fitting (5).



4. Remove two air lines (6 and 7) from two fittings (8 and 9).
5. Disconnect connector (10) from connector (11).

6. Remove CTIS switch (12) from fitting (13).
7. Remove three fittings (8, 9, and 13) from fitting (14).
8. Remove fitting (14) from fitting (15).



9. Remove fitting (15) from supply reservoir (3).
10. Remove locknut (16), screw (17), and washer (18) from mounting bracket (19). Discard locknut (16).

NOTE

Note location of supply tank prior to removal to ensure proper installation.

11. Remove fitting (20) and supply reservoir (3) from fitting (21) and mounting bracket (19).
12. Remove two fittings (20) and (5) from supply reservoir (3).

END OF TASK

INSTALLATION

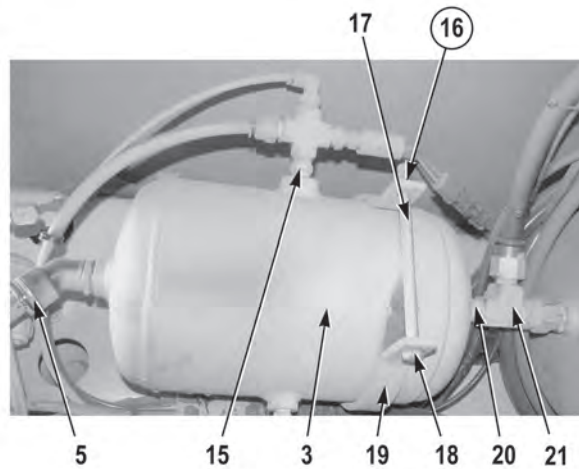
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of two fittings (5 and 20) and install two fittings (5 and 20) on supply reservoir (3).

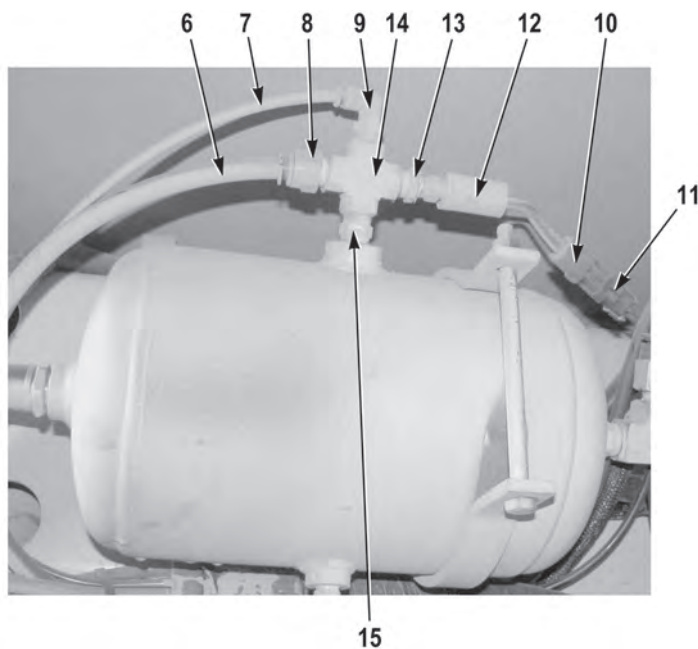


2. Apply insulator tape to mating surface of bracket (19).

NOTE

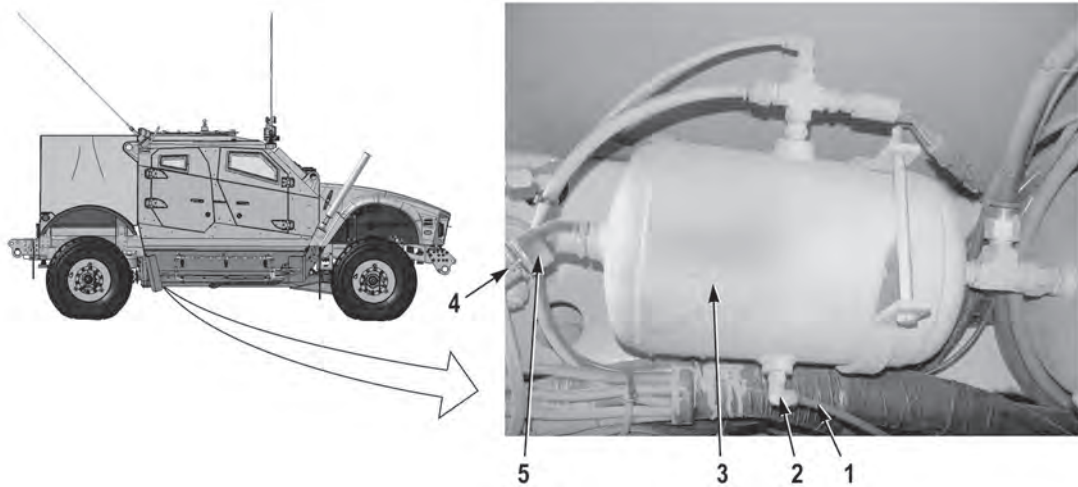
Install supply reservoir as noted prior to removal.

3. Apply sealing compound, Loctite 592, to threads of fitting (20) and install fitting (20) and supply reservoir (3) on fitting (21) and mounting bracket (19).
4. Secure supply reservoir (3) on mounting bracket (19) with washer (18), screw (17), and new locknut (16).
5. Apply sealing compound, Loctite 592, to threads of fitting (15) and install fitting (15) on supply reservoir (3).



6. Apply sealing compound, Loctite 592, to threads of fitting (15) and install fitting (14) on fitting (15).
7. Apply sealing compound, Loctite 592, to threads of three fittings (8, 9, and 13) and install three fittings (8, 9, and 13) on fitting (14).

8. Apply sealing compound, Loctite 592, to threads of CTIS switch (12) and install CTIS switch (12) on fitting (13).
9. Connect connector (11) to connector (10).
10. Install two air lines (6 and 7) on two fittings (8 and 9).



11. Install air line (4) on fitting (5).
12. Apply sealing compound, Loctite 592, to threads of fitting (2) and install fitting (2) on supply reservoir (3).
13. Install air line (1) on fitting (2).
14. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR RESERVOIR REPLACEMENT, SUPPLY NO. 2 (FOUR TANK SYSTEM)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Driver side belly deflector panel removed
 (WP 0049)
 Air system drained

Tools and Special Tools

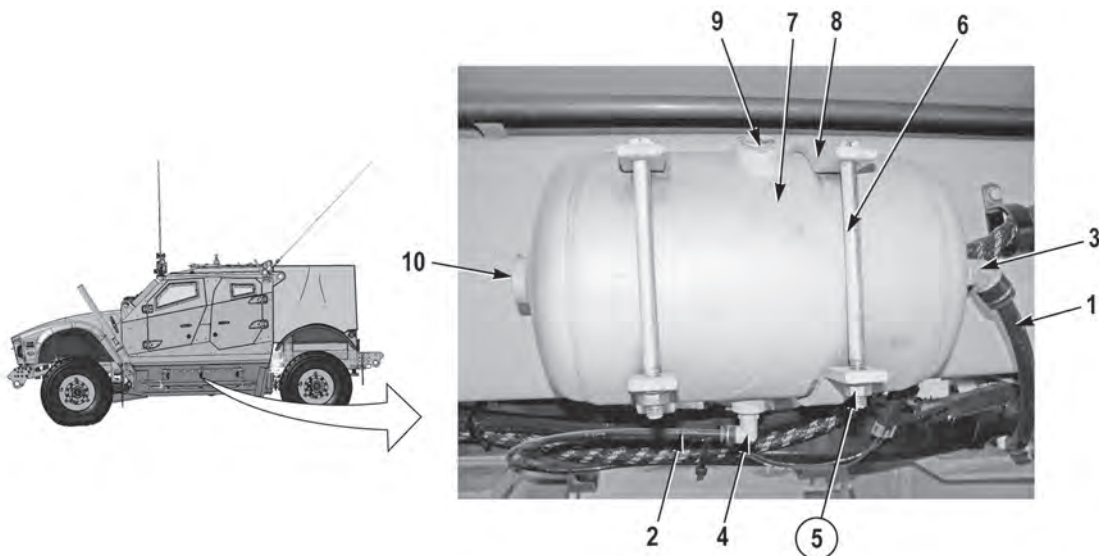
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknuts (2) (Item 5)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification
 Tape, Insulator

Follow-On Maintenance

Install driver side belly deflector panel (WP 0049)
 Remove and stow wheel chocks

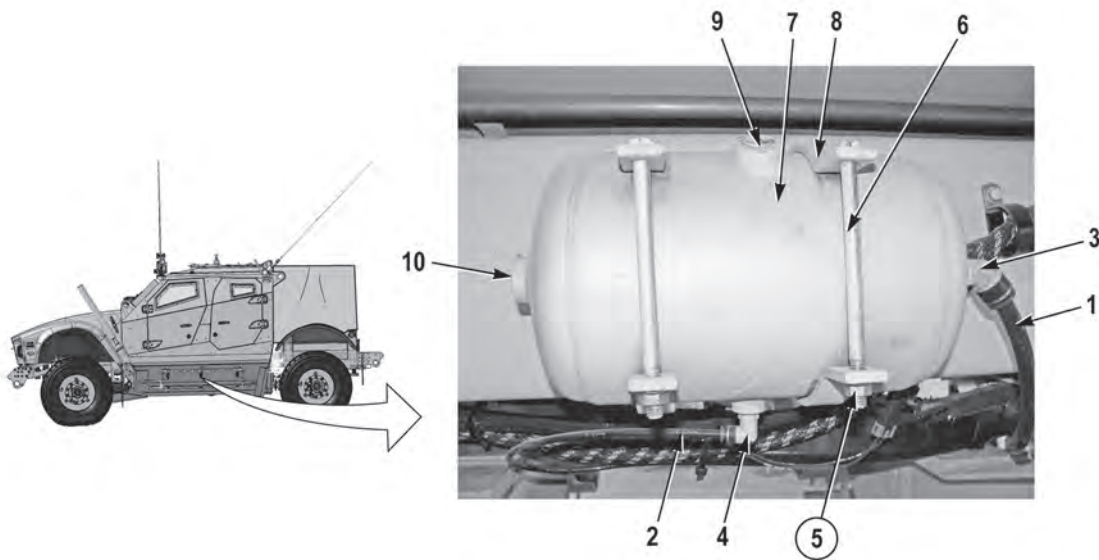
REMOVAL**WARNING**

- Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.
- Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

1. Remove two air lines (1 and 2) from two fittings (3 and 4).
2. Remove two locknuts (5), screws (6), and supply reservoir (7) from two brackets (8). Discard locknuts (5).



NOTE

Note position of fittings prior to removal to ensure proper installation.

3. Remove two fittings (3 and 4) from supply reservoir (7).
4. Remove two plugs (9 and 10) from supply reservoir (7).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of two plugs (9 and 10) and install two plugs (9 and 10) on supply reservoir (7).
2. Apply sealing compound, Loctite 592, to threads of two fittings (3 and 4) and install two fittings (3 and 4) on supply reservoir (7).
3. Apply insulator tape to mating surface of two brackets (8) and install supply reservoir (7) on two brackets (8) with new locknuts (5), and screws (6).
4. Install two air lines (1 and 2) on two fittings (3 and 4).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

AIR RESERVOIR REPLACEMENT, SUPPLY/PRIMARY (TWO TANK SYSTEM)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Transmission propeller shaft removed (WP 0090)
Belly deflector crossmember weldment removed
(WP 0046)

Tools and Special Tools

Cap and Plug Set
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Compound, Sealing, Loctite 567
Locknut (9) (Item 22, 27, 31, 35, and 38)
Tags, Identification
Ties, Cable

Personnel Required

Two

Follow-On Maintenance

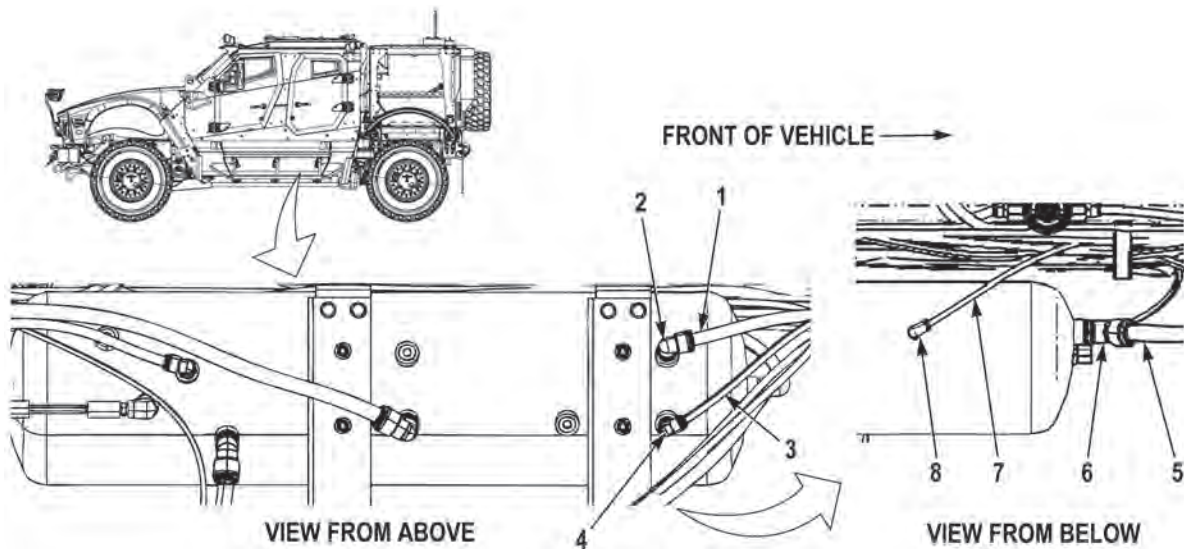
Install belly deflector crossmember weldment
(WP 0046)
Install transmission propeller shaft (WP 0090)
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Air system must be drained prior to removing air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

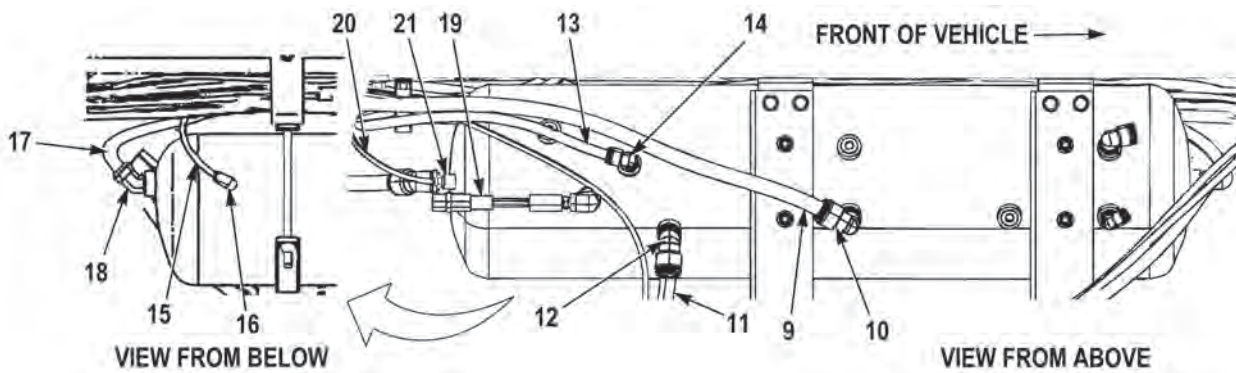
- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.



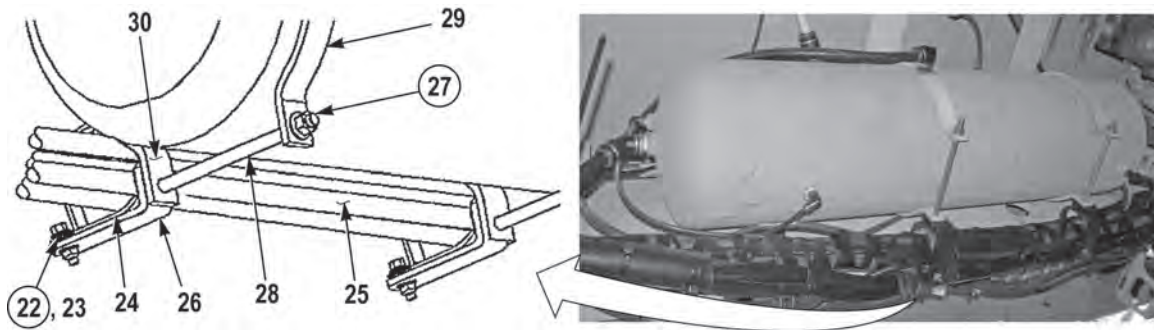
NOTE

Refer to schematics for guidance in identifying air lines.

1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Remove air line (7) from fitting (8).



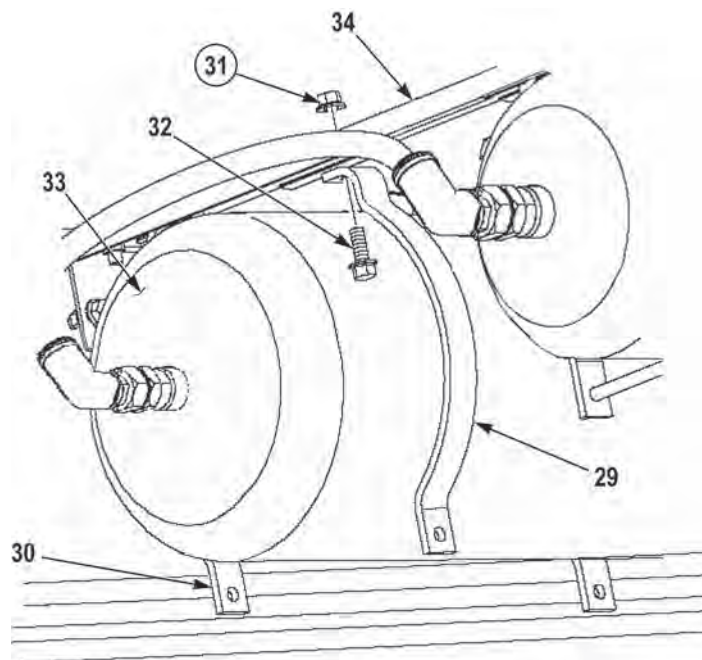
5. Remove air line (9) from fitting (10).
6. Remove air line (11) from fitting (12).
7. Remove air line (13) from fitting (14).
8. Remove air line (15) from fitting (16).
9. Remove air line (17) from fitting (18).
10. Disconnect connector (19).
11. Remove air line (20) from fitting (21).



NOTE

Note position of cushion clips and standoff bracket prior to removal to ensure proper installation.

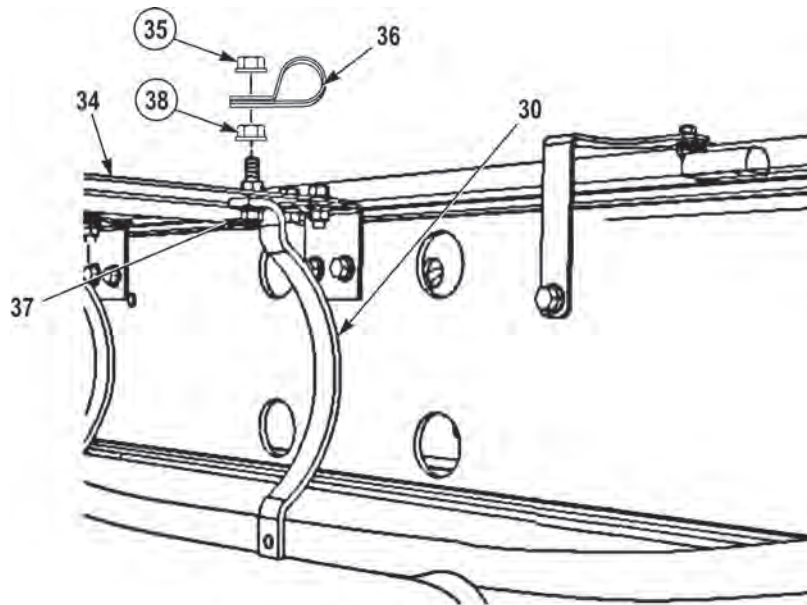
12. Remove two locknuts (22), screws (23), cushion clips (24), and wire bundle (25) from two standoff brackets (26). Discard locknuts (22).
13. Remove two locknuts (27), screws (28), and standoff brackets (26) from two mounting brackets (29) and mounting brackets (30). Discard locknuts (27).



NOTE

Note position of air reservoir prior to removal to ensure proper installation.

14. With the aid of an assistant, remove two locknuts (31), screws (32), mounting brackets (29), and primary air reservoir (33) from two support brackets (34) and mounting brackets (30). Discard locknuts (31).

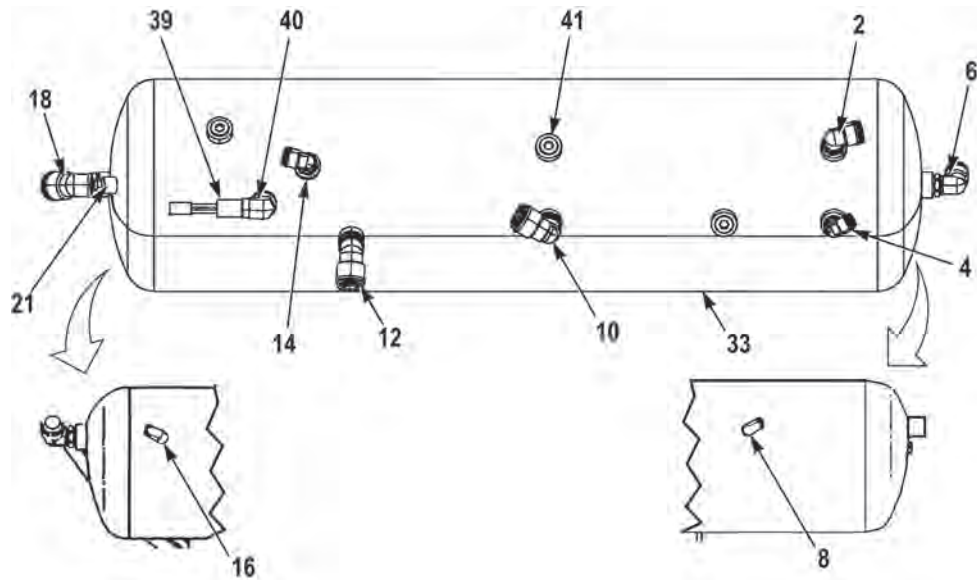


WIRE HARNESS SHOWN REMOVED FOR CLARITY

NOTE

- Perform Steps (15) and (16) if mounting brackets and cushion clip need to be removed.
- Note position of mounting brackets prior to removal to ensure proper installation.

15. Remove locknut (35) and cushion clip (36) from screw (37). Discard locknut (35).
16. Remove two locknuts (38), screws (37) and mounting brackets (30) from two support brackets (34). Discard locknuts (38).



NOTE

- Perform Steps (17) through (20) if pressure switch and fittings need to be removed.
- Note position of fittings prior to removal to ensure proper installation.

17. Remove fittings (2, 4, 6, 8, 10, 12, 14, 16, 18, and 21) from primary air reservoir (33).
18. Remove pressure switch (39) from fitting (40).
19. Remove fitting (40) from primary air reservoir (33).
20. Remove three fittings (41) from primary air reservoir (33).

END OF TASK

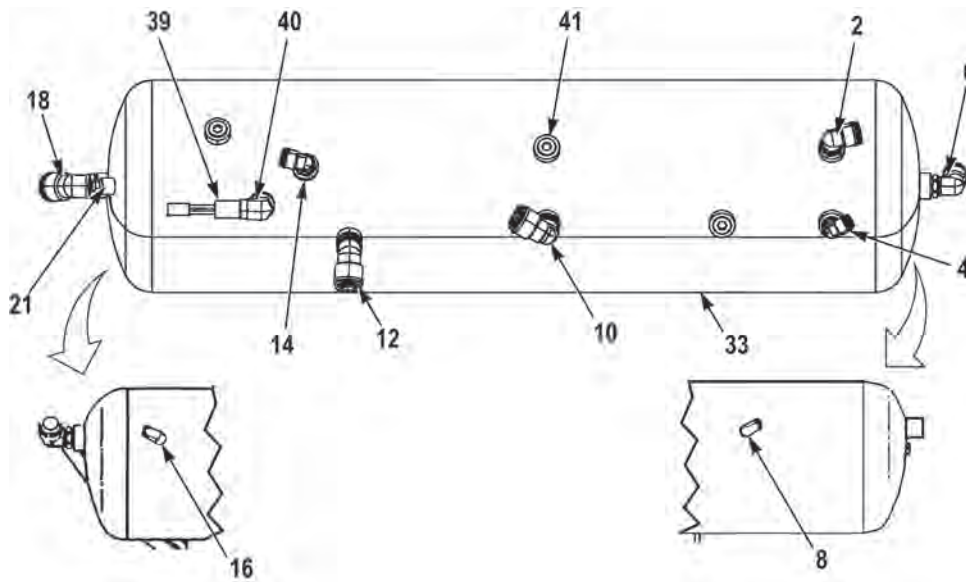
INSTALLATION

WARNING

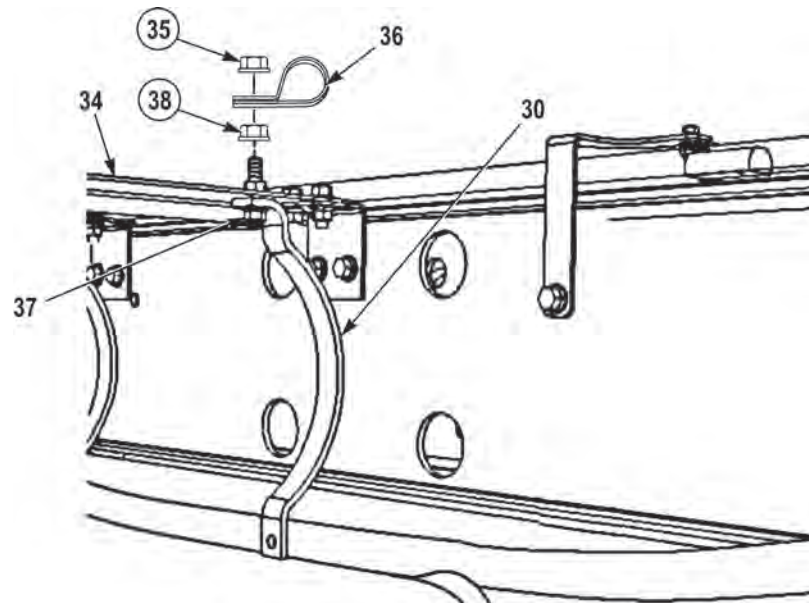
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Perform Steps (1) through (12) if fitting and pressure switch were removed.
 - Install fittings as noted prior to removal.
1. Apply sealing compound, Loctite 567 to threads of three fittings (41) and install three fittings (41) on primary air reservoir (33).



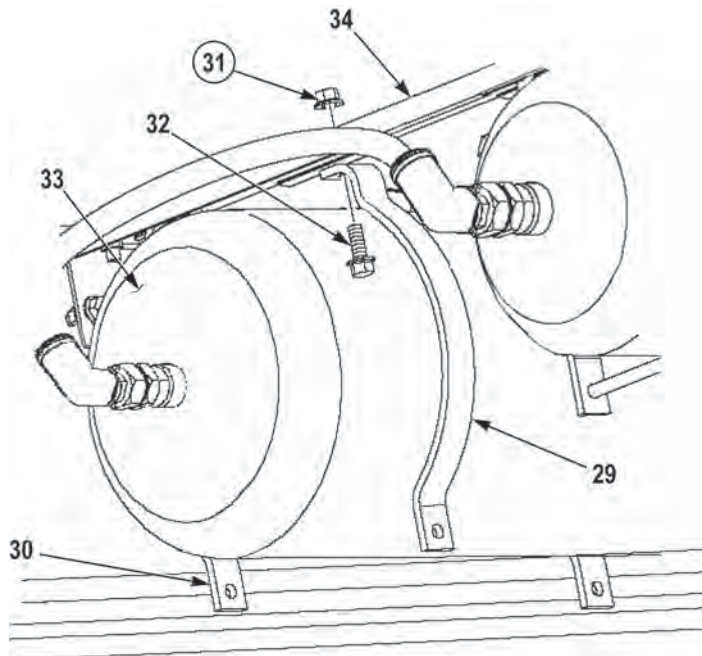
2. Apply sealing compound, Loctite 567 to threads of fitting (40) and install fitting (40) on primary air reservoir (33).
3. Apply sealing compound, Loctite 567 to threads of pressure switch (39) and install pressure switch (39) on fitting (40).
4. Apply sealing compound, Loctite 567 to threads of fitting (21) and install fitting (21) on primary air reservoir (33).
5. Apply sealing compound, Loctite 567 to threads of fitting (18) and install fitting (18) on primary air reservoir (33).
6. Apply sealing compound, Loctite 567 to threads of fitting (16) and install fitting (16) on primary air reservoir (33).
7. Apply sealing compound, Loctite 567 to threads of fitting (14) and install fitting (14) on primary air reservoir (33).
8. Apply sealing compound, Loctite 567 to threads of fitting (12) and install fitting (12) on primary air reservoir (33).
9. Apply sealing compound, Loctite 567 to threads of fitting (10) and install fitting (10) on primary air reservoir (33).
10. Apply sealing compound, Loctite 567 to threads of fitting (8) and install fitting (8) on primary air reservoir (33).
11. Apply sealing compound, Loctite 567 to threads of fitting (6) and install fitting (6) on primary air reservoir (33).
12. Apply sealing compound, Loctite 567 to threads of fitting (4) and install fitting (4) on primary air reservoir (33).
13. Apply sealing compound, Loctite 567 to threads of fitting (2) and install fitting (2) on primary air reservoir (33).



WIRE HARNESS SHOWN REMOVED FOR CLARITY

NOTE

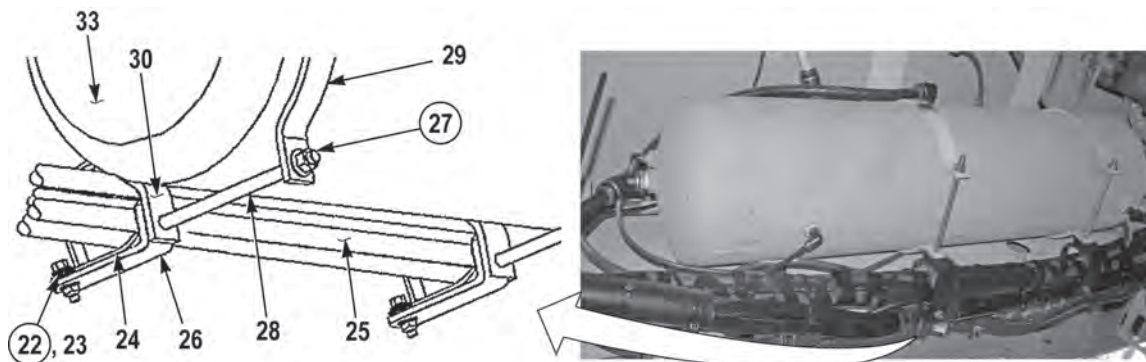
- Perform Steps (14) and (15) if mounting brackets and cushion clips were removed.
 - Install mounting brackets as noted prior to removal.
14. Install two mounting brackets (30) on two support brackets (34) with two screws (37) and new locknuts (38).
 15. Install cushion clip (36) on screw (37) with new locknut (35).



NOTE

- Install mounting brackets as noted prior to removal.
- Install primary air reservoir as noted prior to removal.

16. With the aid of an assistant, position air primary reservoir (33) on two mounting brackets (30) and install two mounting brackets (29) on two support brackets (34) with two screws (32) and new locknuts (31).

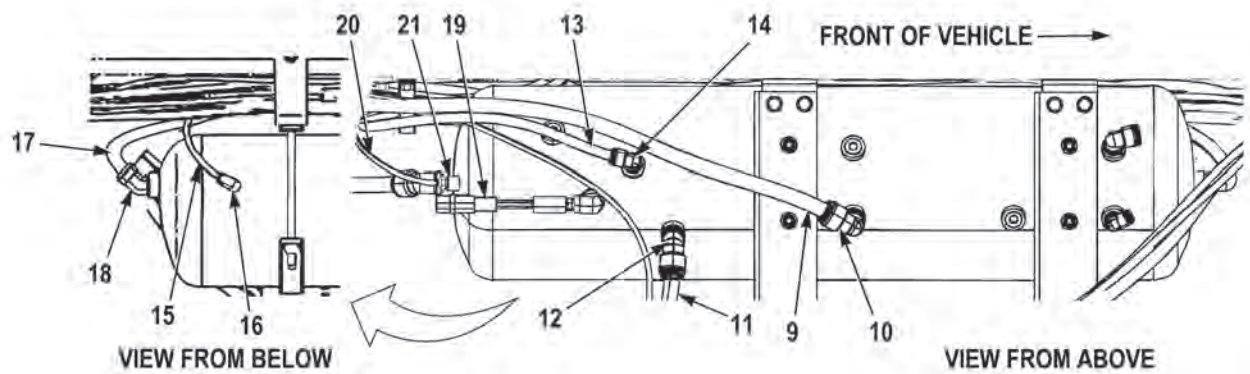


NOTE

Install standoff brackets and cushion clips as noted prior to removal.

17. Install two standoff brackets (26) and primary air reservoir (33) on two mounting brackets (30) and mounting brackets (29) with two screws (28) and new locknuts (27).

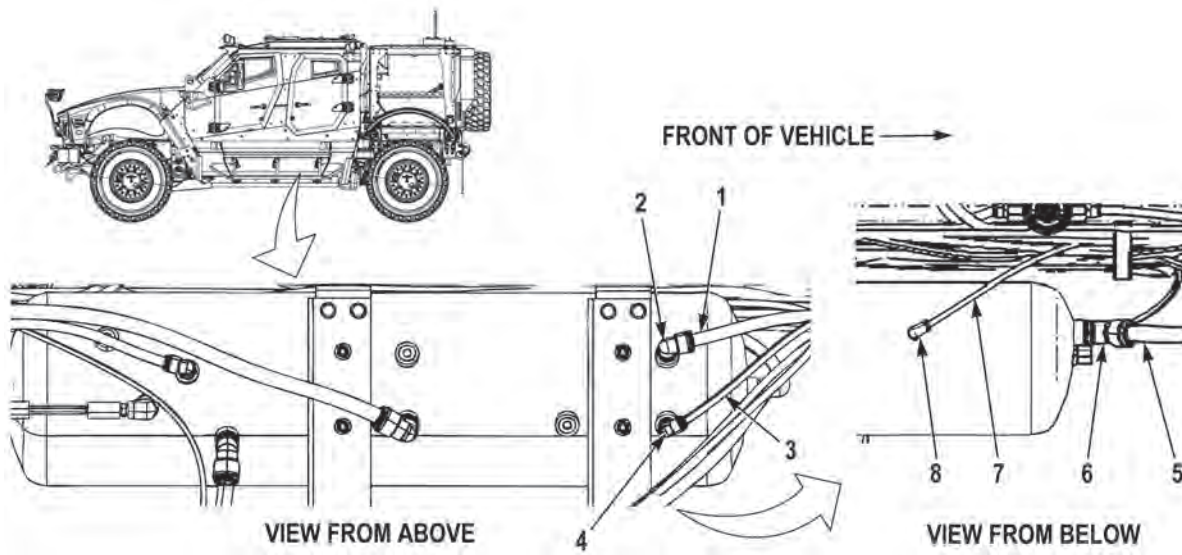
18. Install wire bundle (25) and two cushion clips (24) on standoff brackets (26) with two screws (23) and new locknuts (22).



NOTE

Refer to schematics for guidance in identifying air lines.

19. Install air line (20) on fitting (21).
20. Connect connector (19).
21. Install air line (17) on fitting (18).
22. Install air line (15) on fitting (16).
23. Install air line (13) on fitting (14)
24. Install air line (11) on fitting (12)
25. Install air line (9) on fitting (10).



26. Install air line (7) on fitting (8).
27. Install air line (5) on fitting (6).
28. Install air line (3) on fitting (4).
29. Install air line (1) on fitting (2).
30. Perform air system leak test (WP 0291).
31. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AIR SOLENOID MANIFOLDS REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secured
Air system drained
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

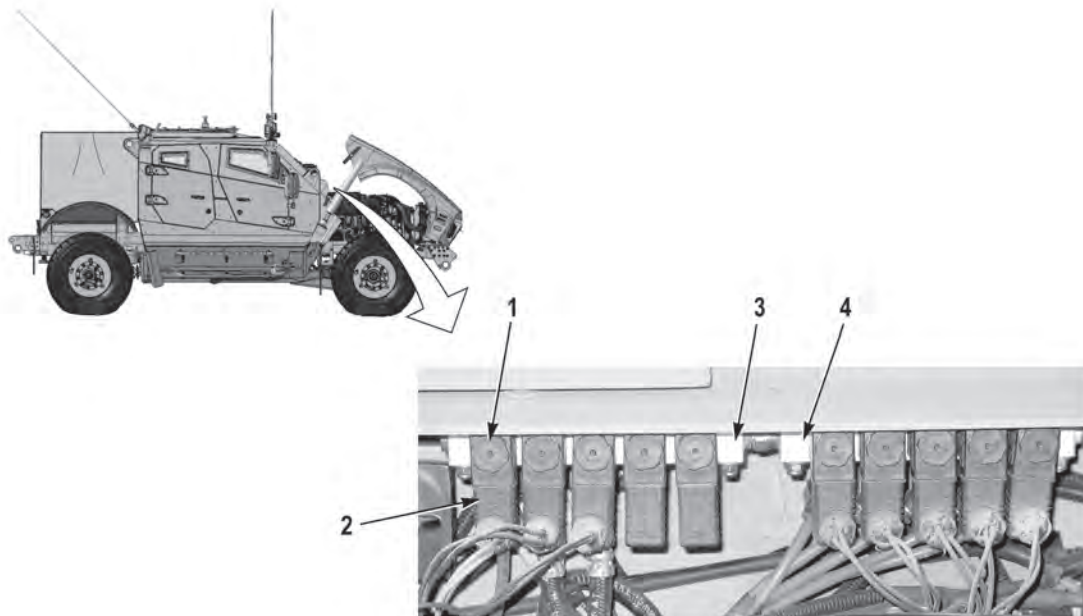
Gasket (10) (Item 7)
Locknut (4) (Item 27)

Materials/Parts (continued)

Cap and Plug Set
Compound, Corrosion Preventive, Ultra Tef-Gel
05SA2
Compound, Sealing, Loctite 592
Tags, Identification
Tape, Insulator

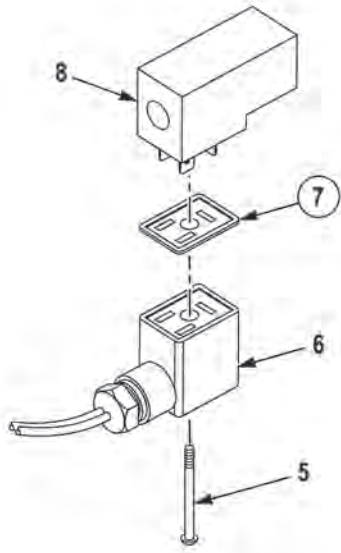
Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Close hood and secure
Remove and stow wheel chocks

REMOVAL**NOTE**

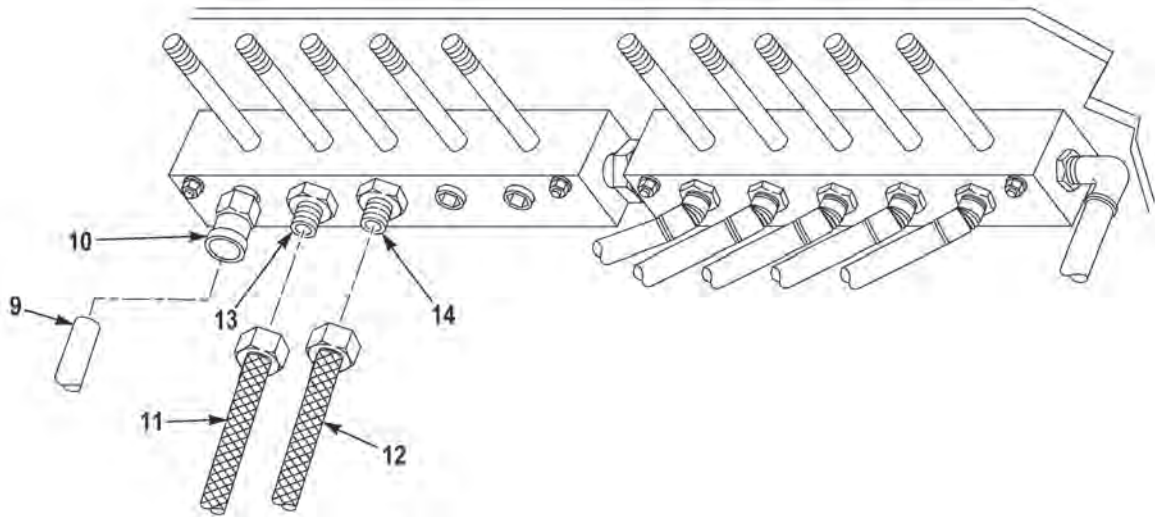
Tag and mark solenoids prior to removal to ensure proper installation.

1. Remove ten caps (1) and solenoid assemblies (2) from two manifold assemblies (3 and 4).



NOTE

- All connectors are removed the same way.
 - Perform Step (2) if solenoids need to be replaced.
 - Tag and mark connectors prior to removal to ensure proper installation.
2. Loosen screw (5) and remove connector (6) and gasket (7) from solenoid (8). Discard gasket (7).

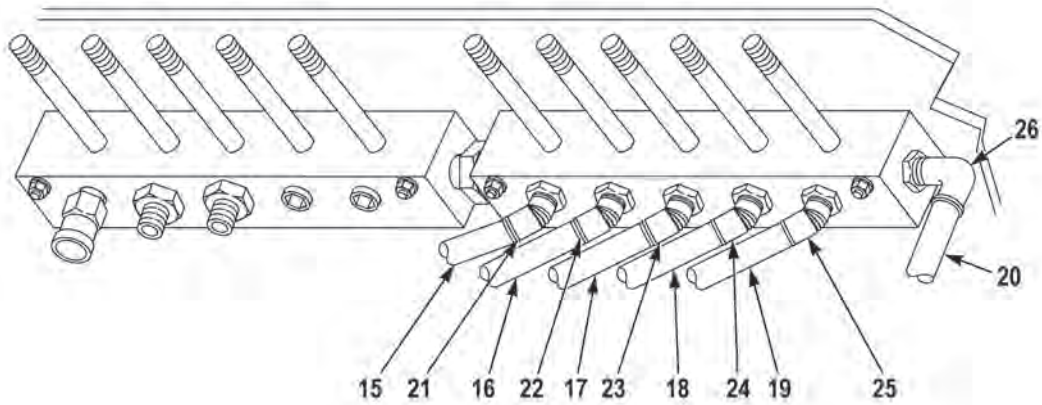


WARNING

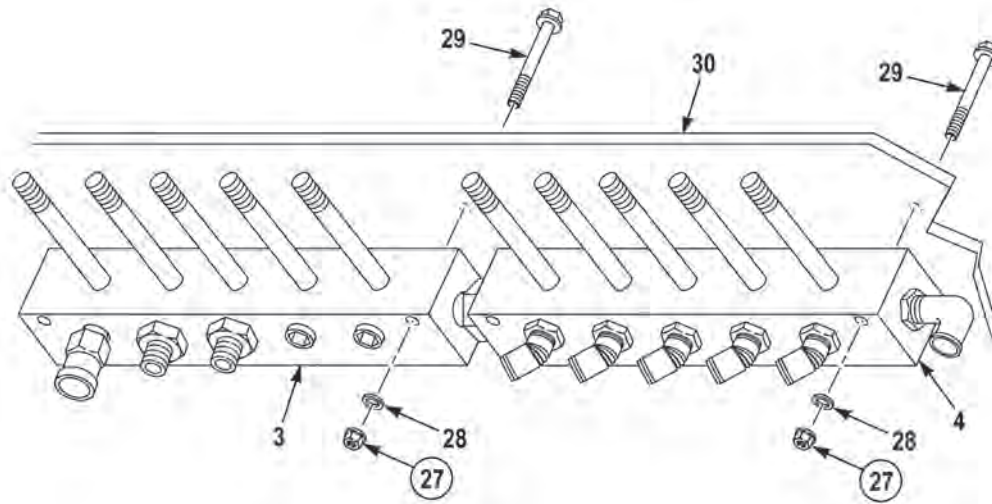
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**
- **When removing air lines, loosen couplings slowly to bleed off air pressure in air lines. Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

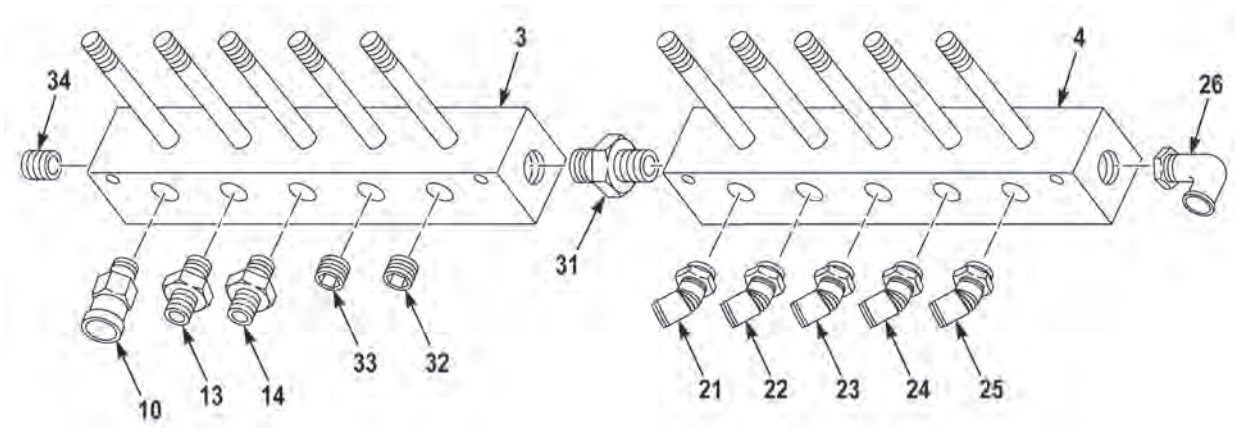
- Tag and mark air lines, fittings, and hoses prior to removal to ensure proper installation.
 - Cap and plug air lines, fittings, and hoses upon removal.
3. Remove air line (9) from fitting (10).
 4. Remove two hoses (11 and 12) from two fittings (13 and 14).



5. Remove six air lines (15, 16, 17, 18, 19, and 20) from six fittings (21, 22, 23, 24, 25, and 26).



6. Remove four locknuts (27), washers (28), screws (29), and two manifold assemblies (3 and 4) from cover plate (30). Discard locknuts (27).



- Remove manifold assembly (4) from fitting (31).

NOTE

Note position of fittings prior to removal to ensure proper installation.

- Remove seven fittings (10, 13, 14, 31, 32, 33, and 34) from manifold assembly (3).
- Remove six fittings (21, 22, 23, 24, 25, and 26) from manifold assembly (4).

END OF TASK

INSTALLATION

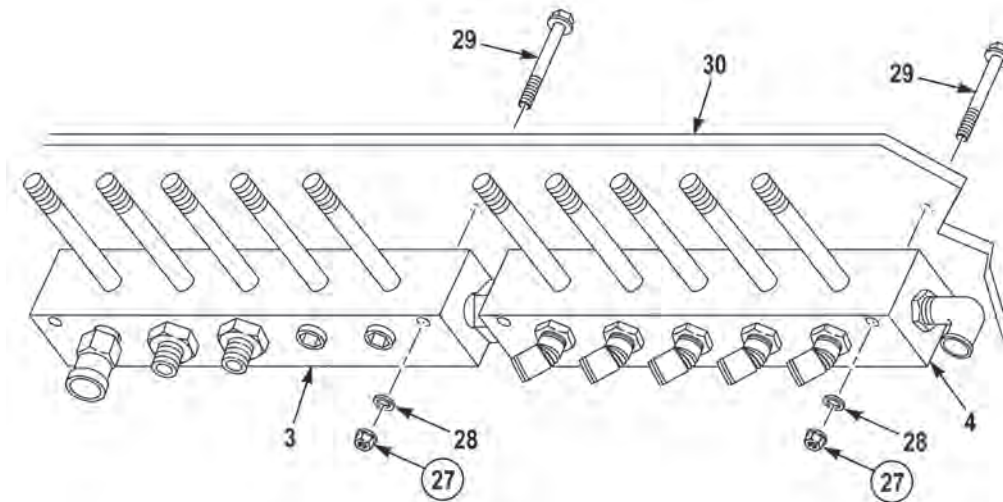
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

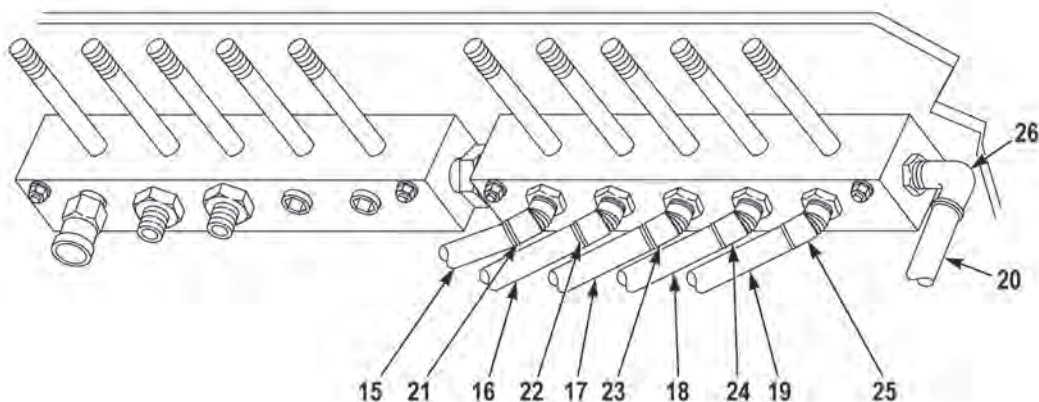
- Apply sealing compound, Loctite 592, to threads of six fittings (26, 25, 24, 23, 22, and 21) and install six fittings (26, 25, 24, 23, 22, and 21) on manifold assembly (4).
- Apply sealing compound, Loctite 592, to threads of seven fittings (34, 33, 32, 31, 14, 13, and 10) and install seven fittings (34, 33, 32, 31, 14, 13, and 10) on manifold assembly (3).
- Apply sealing compound, Loctite 592, to threads of fitting (31) and install manifold assembly (4) on fitting (31).



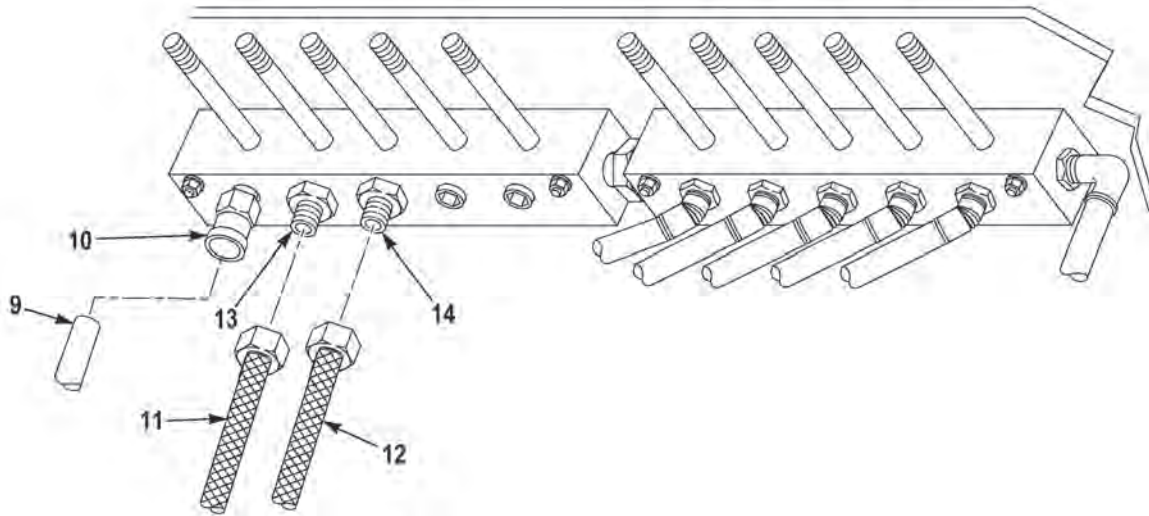
WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

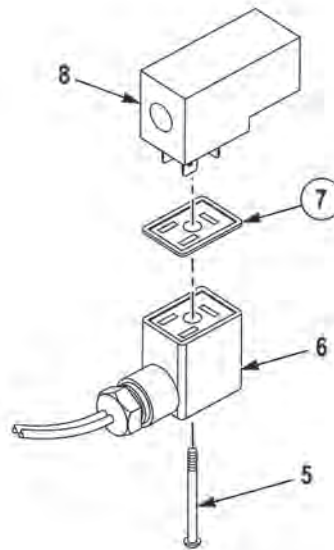
4. Apply insulator tape to mating surfaces of two manifold assemblies (3 and 4) and apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to threads of four screws (29) and install two manifold assemblies (3 and 4) on cover plate (30) with four washers (28), screws (29), and new locknuts (27).



5. Install six air lines (20, 19, 18, 17, 16, and 15) on six fittings (26, 25, 24, 23, 22, and 21).

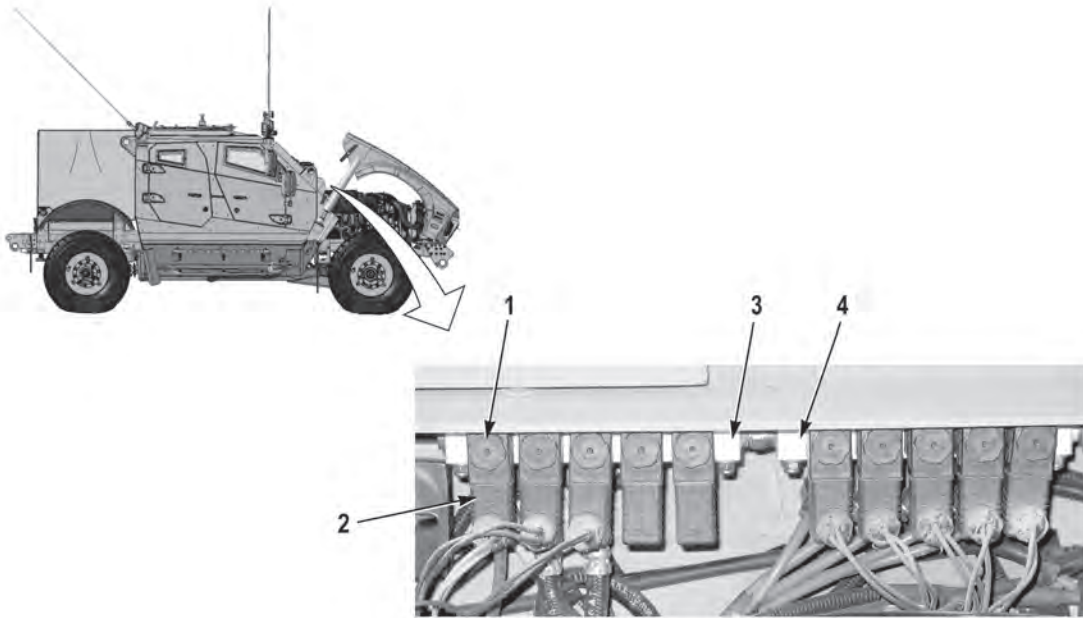


6. Install two hoses (12 and 11) on two fittings (14 and 13).
7. Install air line (9) on fitting (10).



NOTE

- All connectors are installed the same way.
 - Perform Step (8) if solenoids were replaced.
8. Install new gasket (7) and connector (6) on solenoid (8) and tighten screw (5).



9. Install ten solenoids (2) on two manifold assemblies (3 and 4) with ten caps (1).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

ANTI-LOCK BRAKE SYSTEM (ABS) ELECTRONIC CONTROL UNIT (ECU) REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 Driver side belly deflector removed
 (M1240/M1245) (WP 0049)
 Driver side belly deflector removed (M1240A1)
 (WP 0056)

Materials/Parts

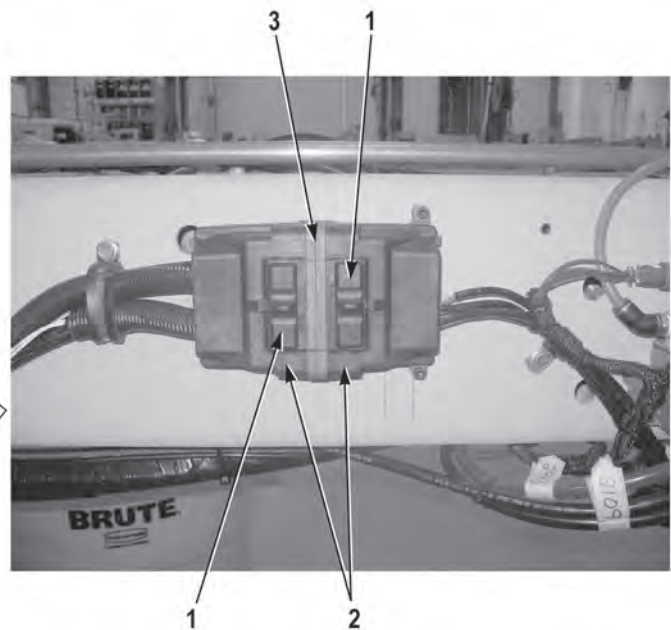
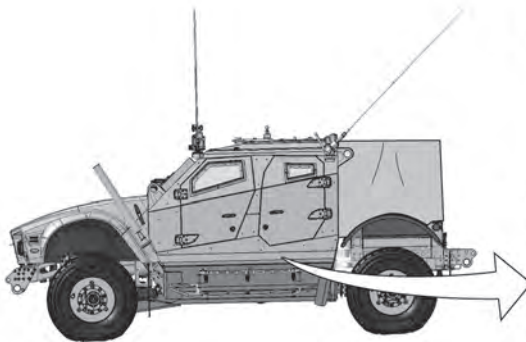
Tags, Identification

Follow-On Maintenance

Install driver side belly deflector (M1240/M1245)
 (WP 0049)
 Install driver side belly deflector (M1240A1)
 (WP 0056)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

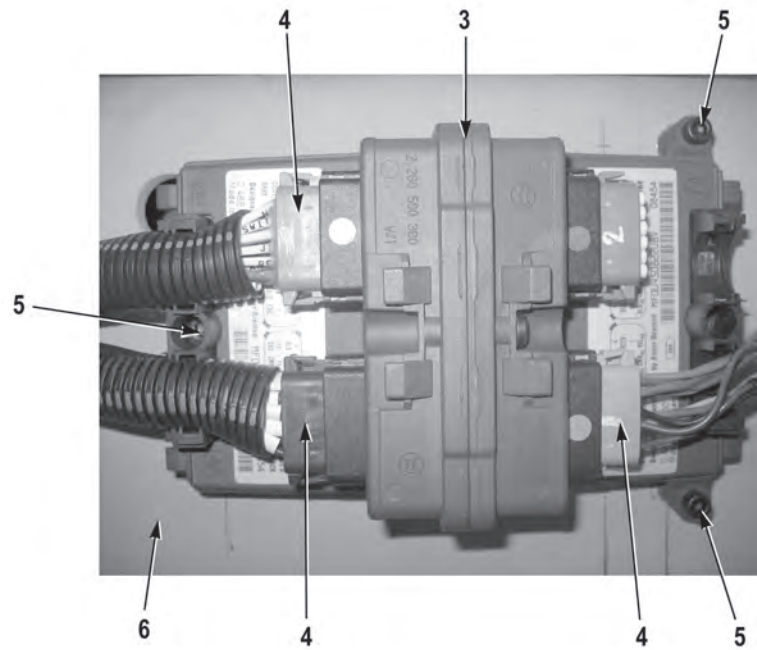
Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL**NOTE**

Tag and mark wires prior to removal to ensure proper installation.

1. Unlock two slide locks (1) and remove covers (2) from ABS ECU (3).

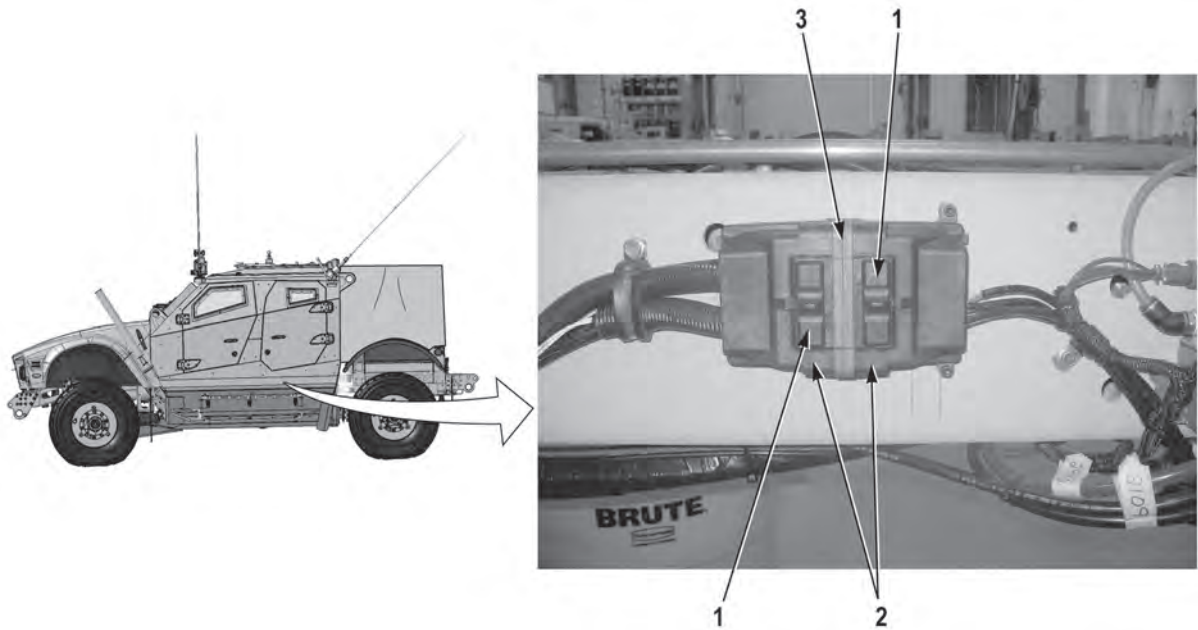


2. Disconnect three connectors (4) from ABS ECU (3).
3. Remove three screws (5) and ABS ECU (3) from frame (6).

END OF TASK

INSTALLATION

1. Install ABS ECU (3) on frame (6) with three screws (5).
2. Connect three connectors (4) on ABS ECU (3).



3. Install two covers (2) on ABS ECU (3) and move two slide locks (1) to locked position.
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

ANTI-LOCK BRAKE SYSTEM (ABS) VALVE REPLACEMENT, AXLE NO. 1

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Drain air system
Passenger side splash guard removed
(AFES Nitrogen Detection) (WP 0034)
Passenger side splash guard removed
(AFES Linear Wire Detection) (WP 0035)
Skid plate removed (WP 0094)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 9)
Cap and Plug Set
Compound, Anti-Corrosion Spray, 2233850
Compound, Sealing, Loctite 592
Lubricant, Connector, Nyogel 760G
Tags, Identification

Follow-On Maintenance

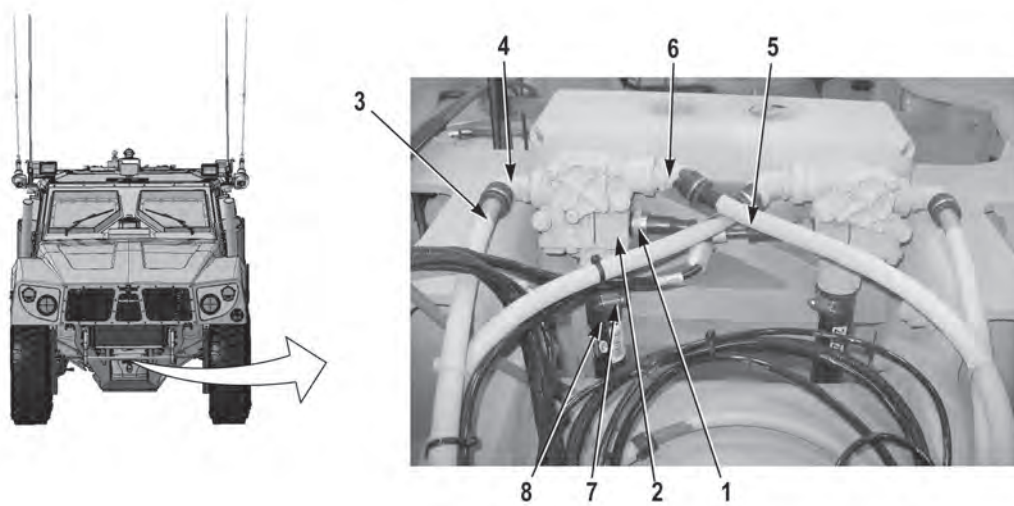
Install skid plate (WP 0094)
Install passenger side splash guard
(AFES Nitrogen Detection) (WP 0034)
Install passenger side splash guard
(AFES Linear Detection) (WP 0035)
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187))
Remove and stow wheel chocks

REMOVAL**WARNING**

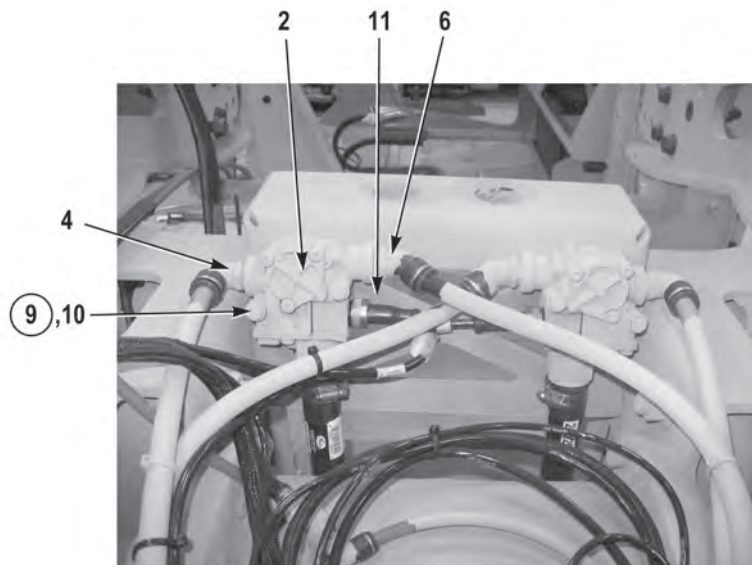
Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Note driver side and passenger side ABS valves are removed the same way. Driver side shown.
- If removing passenger side ABS valve, remove driver side ABS valve first.
- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.



1. Remove connector (1) from ABS valve (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Loosen clamp (7) and remove hose (8) and clamp (7) from ABS valve (2).



5. Remove two locknuts (9), screws (10), and ABS valve (2) from bracket (11). Discard locknuts (9).
6. Remove fitting (4) and fitting (6) from ABS valve (2).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

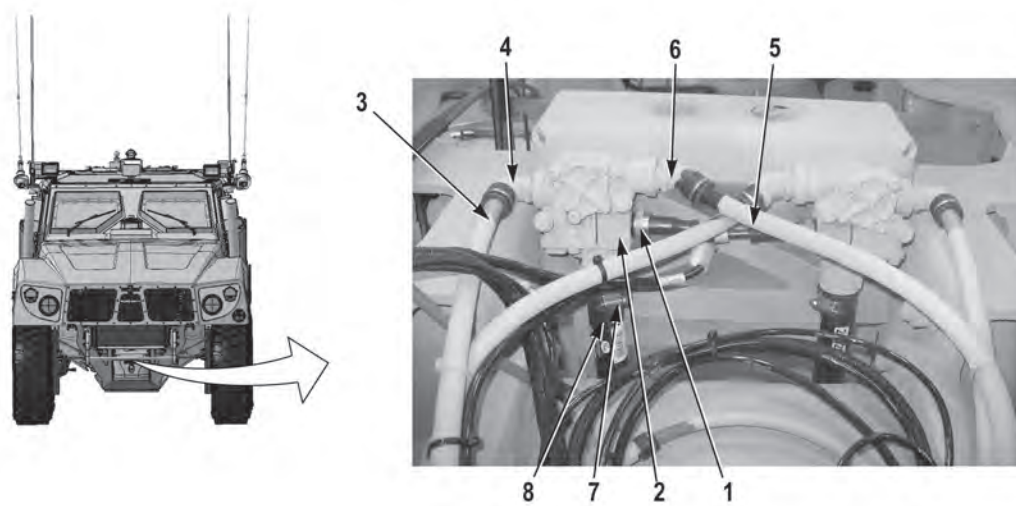
NOTE

- Driver side and passenger side ABS valves are installed the same way. Driver side shown.
 - If both ABS valves were removed, install passenger side ABS valve first.
1. Apply sealing compound, Loctite 592, to threads of fitting (6) and fitting (4).
 2. Install fitting (6) and fitting (4) on ABS valve (2).

WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

3. Apply anti-corrosion spray, 2233850, to mating surface of bracket (11) and ABS valve (2).
4. Install ABS valve (2) on bracket (11) with two screws (10), and new locknuts (9).
5. Install hose (8) on ABS valve (2) with clamp (7).
6. Install air line (5) on fitting (6).
7. Install air line (3) on fitting (4).

**WARNING**

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply connector lubricant, Nyogel 760G, to connector (1).
9. Install connector (1) on ABS valve (2).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

ANTI-LOCK BRAKE SYSTEM (ABS) VALVE REPLACEMENT, AXLE NO. 2

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Drain air system

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 9)
Cap and Plug Set

Materials/Parts (continued)

Compound, Anti-Corrosion Spray, 2233850
Compound, Sealing, Loctite 592
Lubricant, Connector, Nyogel 760G
Tags, Identification

Follow-On Maintenance

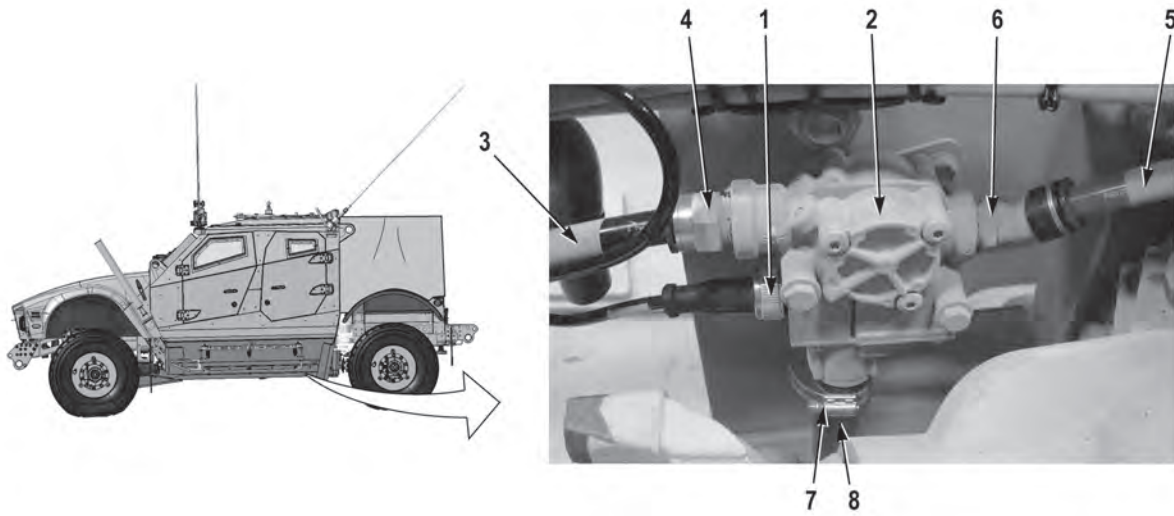
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL**WARNING**

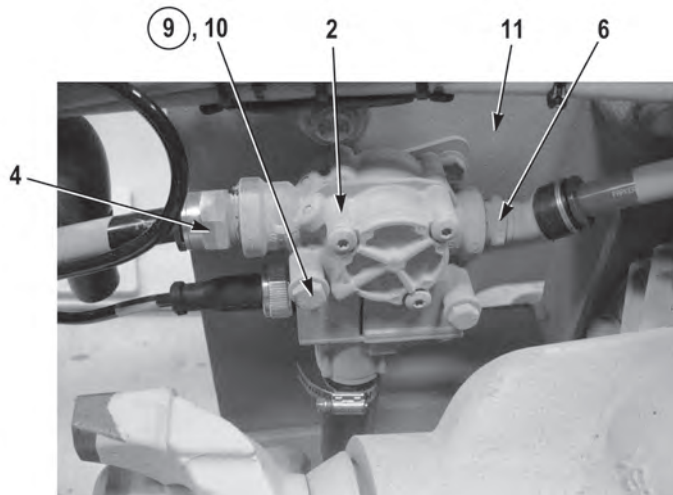
Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Both ABS valves are removed the same way. Driver side shown.
- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.



1. Remove connector (1) from ABS valve (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Loosen clamp (7) and remove hose (8) and clamp (7) from ABS valve (2).



5. Remove two locknuts (9), screws (10), and ABS valve (2) from bracket (11). Discard locknuts (9).
6. Remove fitting (4) and fitting (6) from ABS valve (2).

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

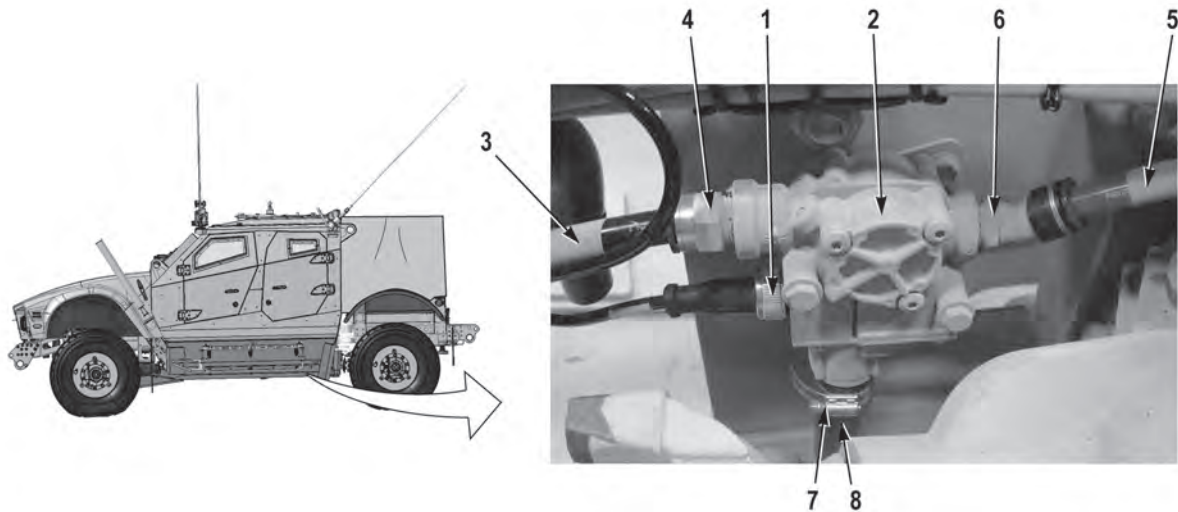
Both ABS valves are installed the same way. Driver side shown.

1. Apply sealing compound, Loctite 592, to threads of fitting (6) and fitting (4).
2. Install fitting (6) and fitting (4) on ABS valve (2).

WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

3. Apply anti-corrosion spray, 2233850, to mating surface of bracket (11) and ABS valve (2).
4. Install ABS valve (2) on bracket (11) with two screws (10) and new locknuts (9).



5. Install hose (8) on ABS valve (2) with clamp (7).
6. Install air line (5) on fitting (6).
7. Install air line (3) on fitting (4).

WARNING

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply connector lubricant, Nyogel 760G, to connector (1).
9. Install connector (1) on ABS valve (2).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

AUTOMATIC TRACTION CONTROL (ATC) VALVE DOUBLE CHECK VALVE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained

Materials/Parts

Locknut (1) (Item 7)
Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

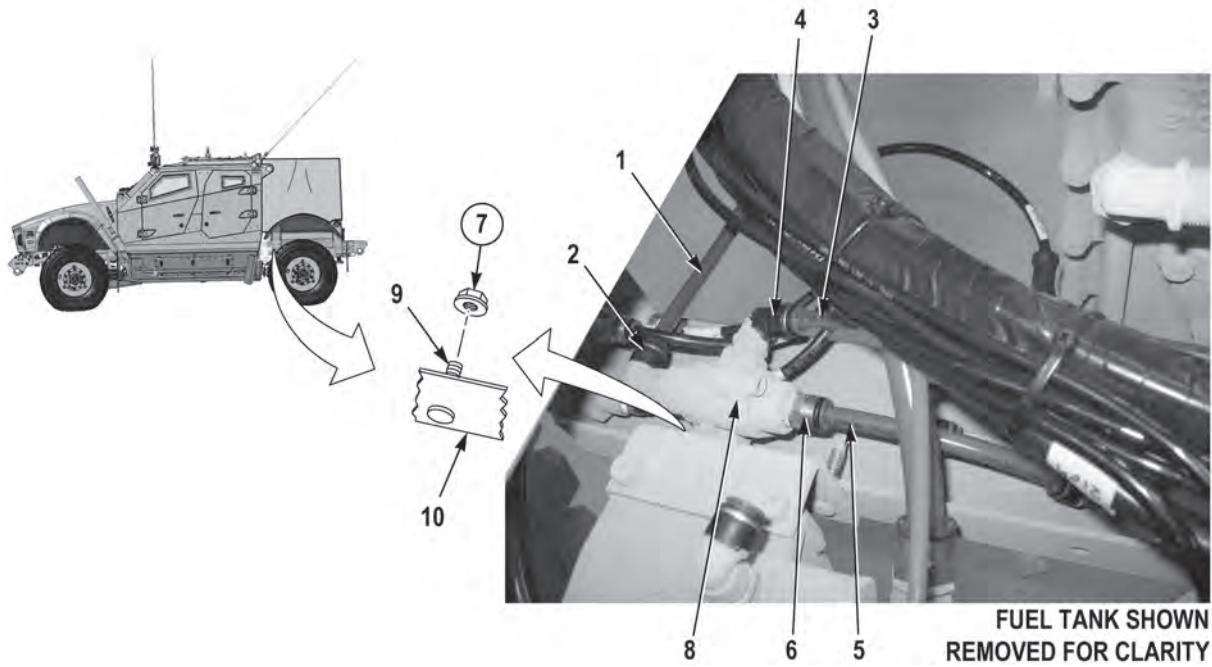
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**
- **Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.
- ATC double check valve located on support bracket to rear of transfer case behind air tank drain valves.



1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Remove locknut (7) and double check valve (8) from mounting stud (9) and bracket (10). Discard locknut (7).
5. Remove three fittings (2, 4, and 6) from double check valve (8).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of three fittings (6, 4, and 2).
2. Install three fittings (6, 4, and 2) on double check valve (8).
3. Install double check valve (8) on bracket (10) and mounting stud (9) with new locknut (7).
4. Install air line (5) on fitting (6).
5. Install air line (3) on fitting (4).
6. Install air line (1) on fitting (2).
7. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

AUTOMATIC TRACTION CONTROL (ATC) VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 Air system drained

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

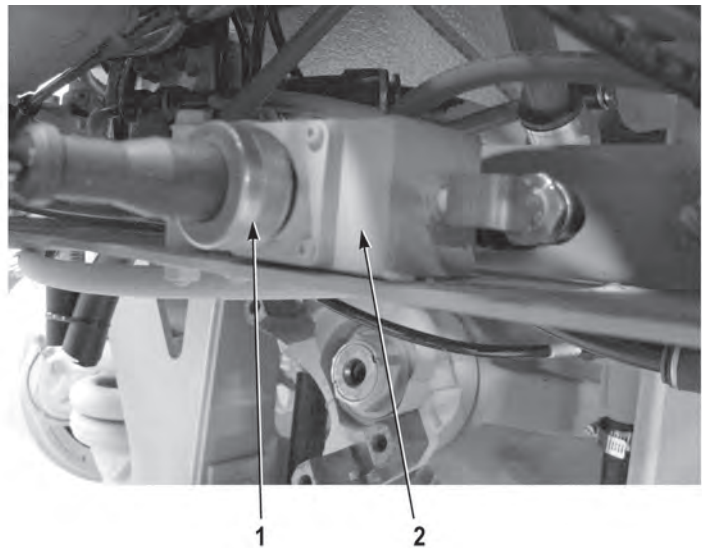
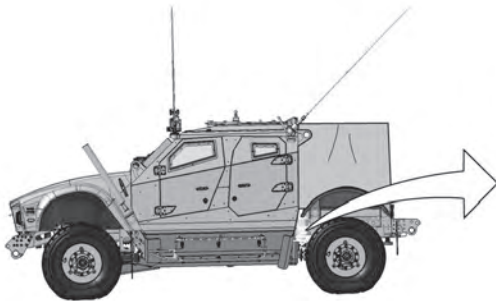
Locknut (2) (Item 10)
 Cap and Plug Set

Materials/Parts (continued)

Compound, Corrosion Preventive, Ultra Tef-Gel
 05SA2
 Compound, Sealing, Loctite 592
 Lubricant, Connector, Nyogel 760G
 Tags, Identification
 Ties, Cable

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

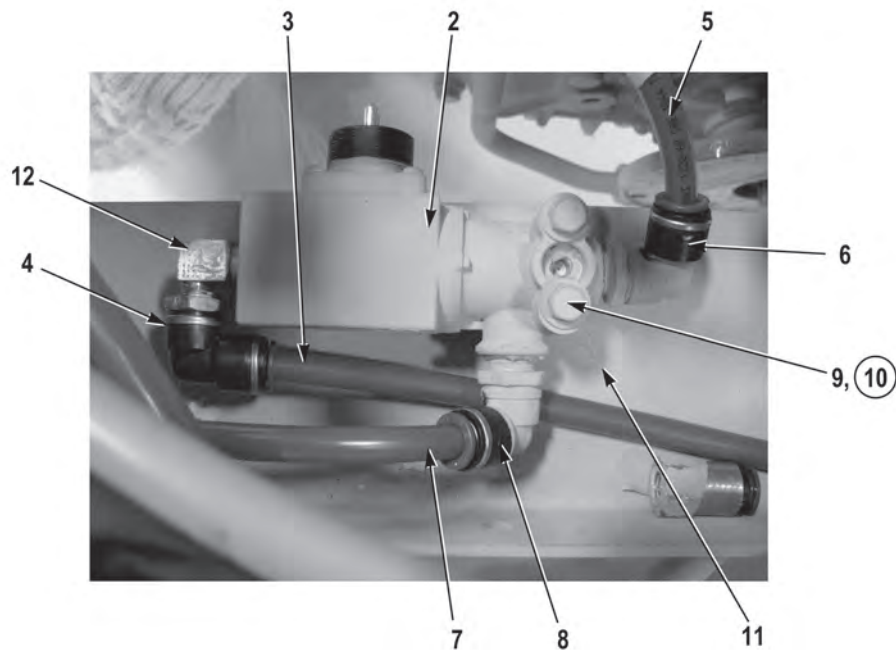
REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.
- Remove cable ties as required.

1. Disconnect connector (1) from ATC valve (2).



NOTE

Fuel tank is removed for clarity.

2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Remove air line (7) from fitting (8).
5. Remove two screws (9), locknuts (10), and ATC valve (2) from bracket (11). Discard locknuts (10).
6. Remove three fittings (8, 6, and 4) from ATC valve (2).

NOTE

Note position of fitting on ATC valve prior to removal to ensure proper installation on new valve.

7. Remove fitting (12) from ATC valve (2).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of four fittings (12, 8, 6, and 4).
2. Install four fittings (12, 8, 6, and 4) on ATC valve (2).

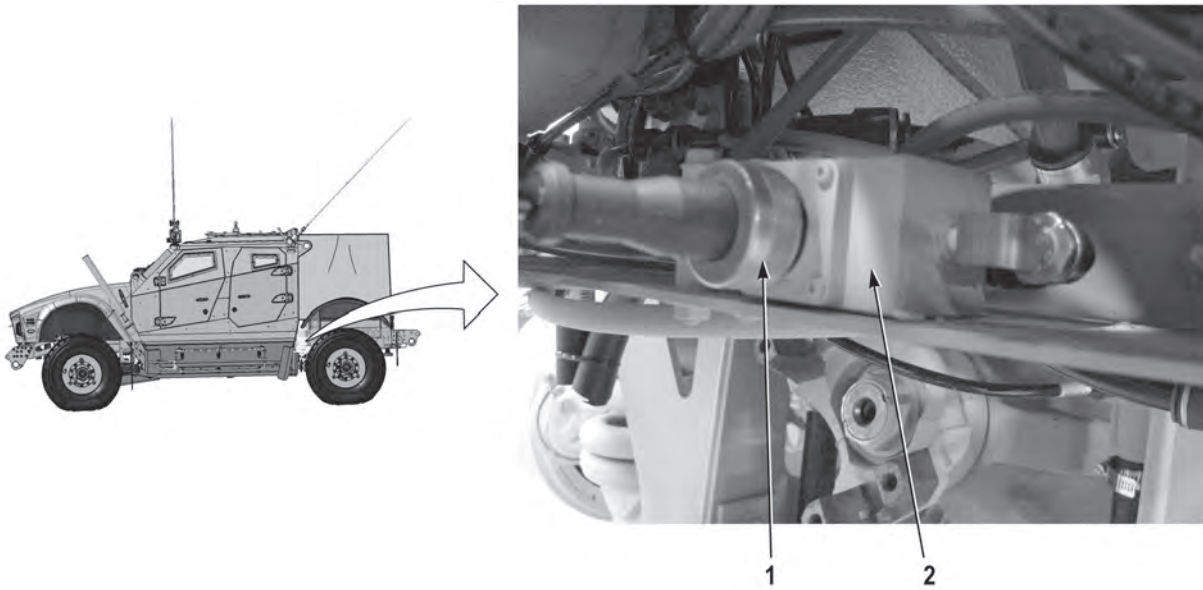
WARNING

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

3. Apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to new locknuts (10) and screws (9).
4. Install ATC valve (2) on bracket (11) with two screws (9) and locknuts (10).

NOTE

- Install cable ties as required.
 - Install hoses and connectors as noted prior to removal.
5. Install air line (7) on fitting (8).
 6. Install air line (5) on fitting (6).
 7. Install air line (3) on fitting (4).

**WARNING**

Connector lubricant is harmful to skin. Prolonged or repeated contact with skin or contact with eyes may cause irritation. If eyes are contacted, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in injury or death to personnel.

8. Apply connector lubricant, Nyogel 760G, to connector (1).
9. Connect connector (1) to ATC valve (2).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

BRAKE CHAMBER REPLACEMENT, AXLE NO. 1

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Brake drum removed (WP 0122)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (Item 7)
Compound, Sealing, Loctite 567
Compound, Sealing, Loctite 592
Grease, Automotive and Artillery

Follow-On Maintenance

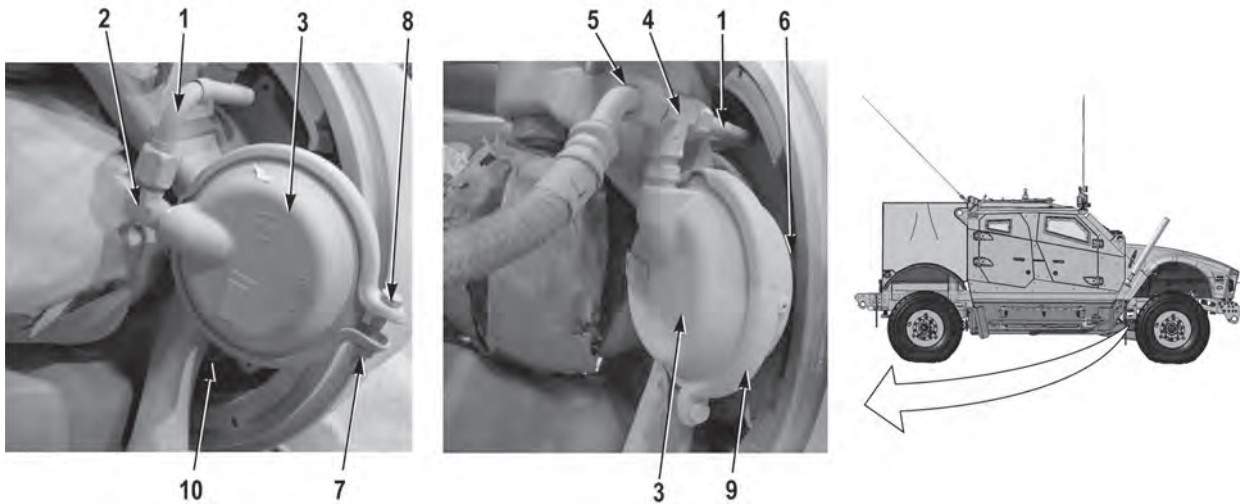
Install brake drum (WP 0122)
Remove and stow wheel chocks

REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- If removing front brake chamber, perform Steps (1) through (2).
- If removing rear front brake chamber, perform Steps (3) through (5).
- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.



1. Remove tube (1) from fitting (2).

NOTE

Note position of fittings prior to removal to ensure proper installation.

2. Remove fitting (2) from brake chamber (3).
3. Remove tube (1) from fitting (4).
4. Remove air line (5) from fitting (4).
5. Remove fitting (4) from brake chamber (3).
6. Loosen collet nut (6).
7. Remove locknut (7) and screw (8) from clamp (9). Discard locknut (7).
8. Remove clamp (9) from brake chamber (3).
9. Remove brake chamber (3) from spider (10).

NOTE

Perform Step (10) only if collet nut is damaged.

10. Remove collet nut (6) from brake chamber (3).

END OF TASK

INSTALLATION

NOTE

Perform Step (1) only if collet nut was removed.

1. Install collet nut (6) with tapered side of collet nut (6) toward brake chamber (3) as far as possible.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 567, to first three threads of brake chamber (3).

NOTE

- Ensure wedge assembly is properly seated in plunger housing prior to installing brake chamber.
 - Ensure collet nut does not prevent brake chamber from being completely tightened.
3. Install brake chamber (3) in spider (10) until brake chamber (3) is seated.
 4. Turn brake chamber (3) out 1/2 turn.
 5. Install clamp (9) on brake chamber (3) with screw (8) and new locknut (7).

NOTE

- If installing front brake chamber, perform Steps (6) through (9).
 - If installing rear brake chamber, perform Steps (10) through (13).
6. Apply sealing compound, Loctite 592, to threads of fitting (2).
 7. Install fitting (2) on brake chamber (3).

NOTE

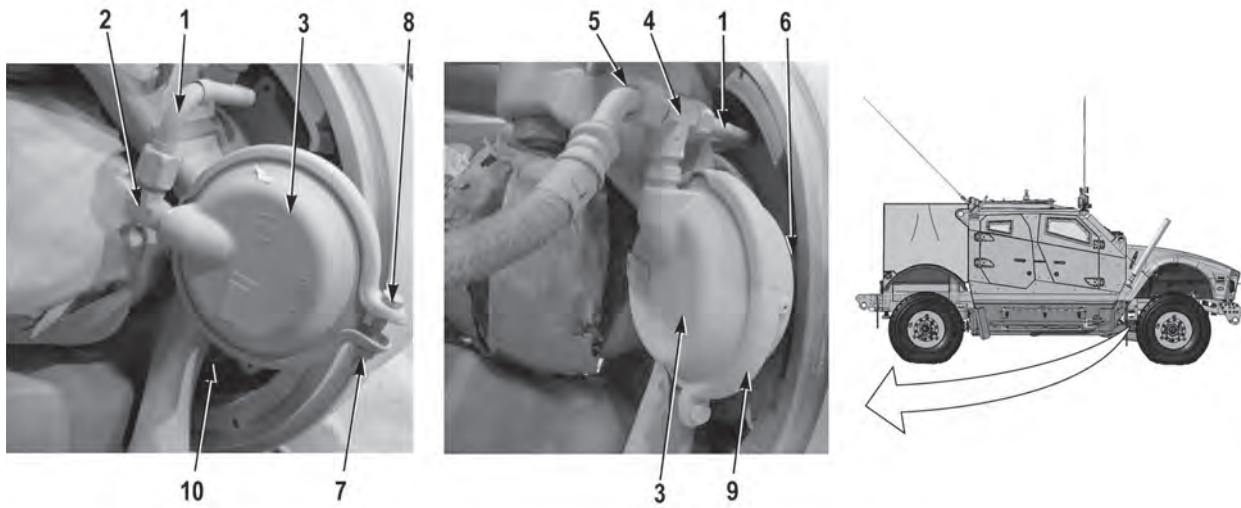
Perform Step (8) only if needed.

8. Loosen brake chamber (3) no more than one turn to align fitting (2) with tube (1).
9. Install tube (1) on fitting (2)
10. Apply sealing compound, Loctite 592, to threads of fitting (4).
11. Install fitting (4) on brake chamber (3).

NOTE

Perform Step (12) only if needed.

12. Loosen brake chamber (3) no more than one turn to align fitting (4) with tube (1) and air line (5).
13. Install air line (5) and tube (1) on fitting (4).
14. Tighten collet nut (6) against spider (10) by hand.



15. Using a brass drift and hammer, tighten collet nut (6) an additional 1/4 to 1/2 turn.
16. Start engine and build up air pressure to 125 psi (862 kPa).
17. Turn off engine.
18. Release parking brake.
19. Check for air leaks.
20. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

BRAKE CHAMBER REPLACEMENT, AXLE NO. 2

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Wheels removed
Brake drum removed (WP 0122)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cap and Plug Set
Compound, Sealing, Loctite 567
Compound, Sealing, Loctite 592
Tags, Identification

Follow-On Maintenance

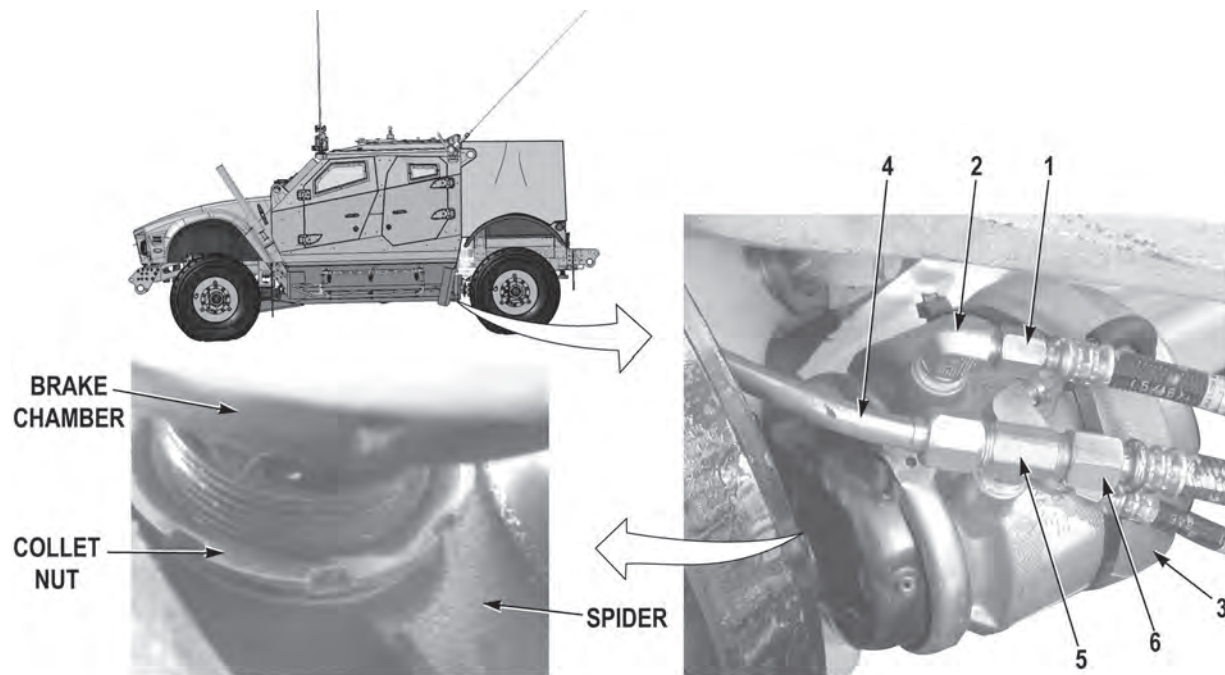
Install brake drum (WP 0122)
Install wheels
Remove and stow wheel chocks

REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Each wheel on axle No. 2 has a large brake chamber and a small brake chamber.
- Perform Steps (1) through (9) to remove large brake chambers.
- Perform Steps (10) through (15) to remove small brake chambers.
- All large brake chambers are removed the same way. Axle No. 2 driver side shown.
- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.



1. Remove air line (1) from fitting (2).

NOTE

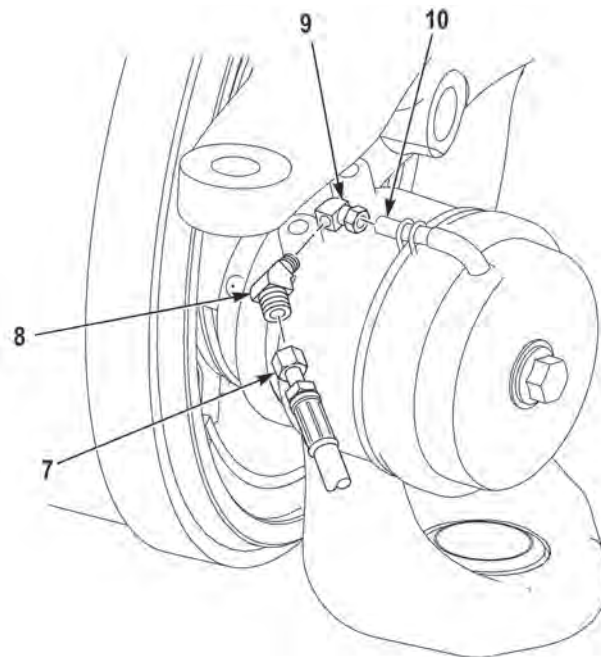
- If necessary, loosen collet nut and turn brake chamber to remove fitting.
- Note position of fittings prior to removal to ensure proper installation.

2. Remove fitting (2) from brake chamber (3).
3. Remove tube (4) from fitting (5).
4. Remove air line (6) from fitting (5).

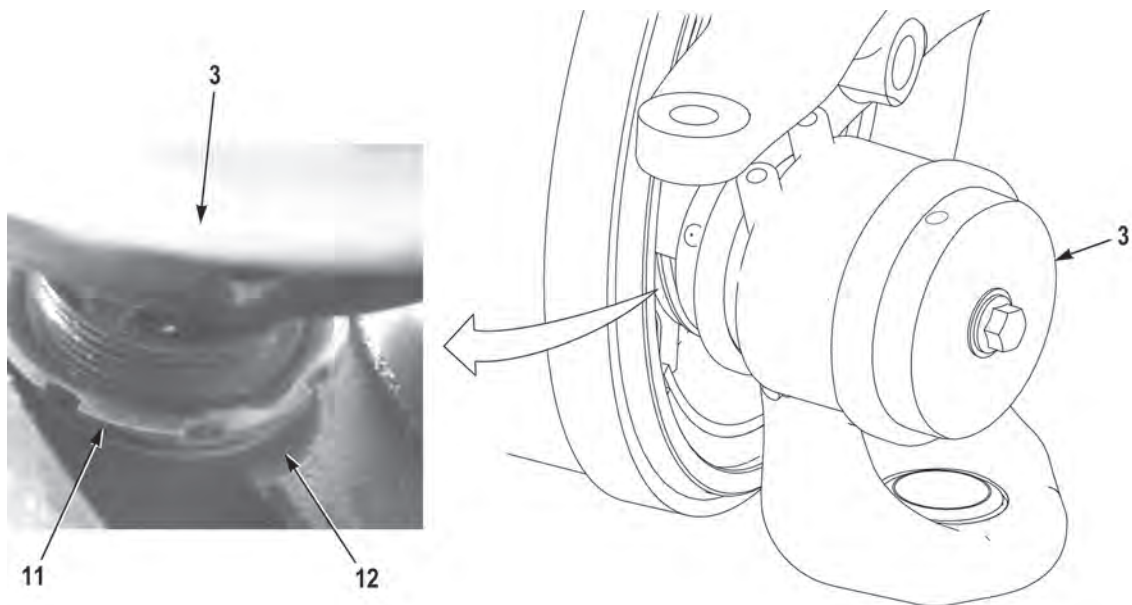
NOTE

If necessary, loosen collet nut and turn brake chamber to remove fitting.

5. Remove fitting (5) from brake chamber (3).



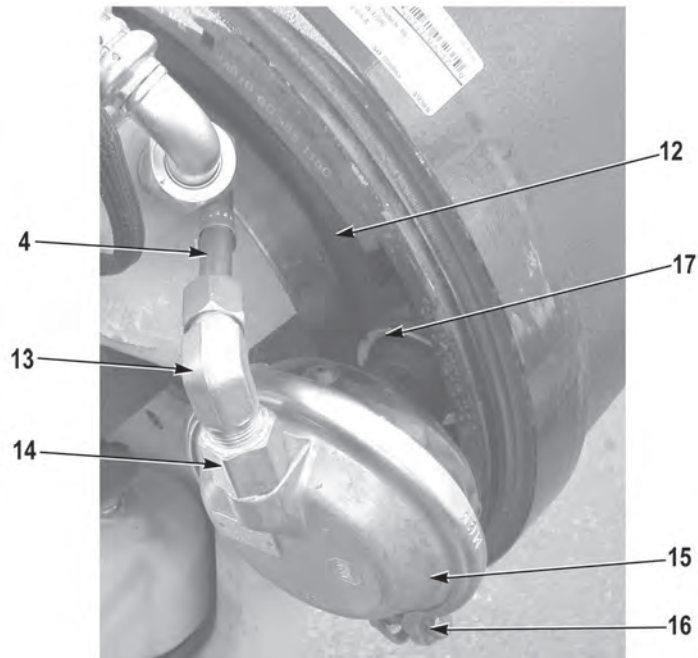
6. Remove air line (7) from fitting (8).
7. Remove two fittings (8 and 9) from vent tube (10).



WARNING

Do not remove clamp from brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

8. Loosen collet nut (11) and remove brake chamber (3) from spider (12).
9. Remove collet nut (11) from brake chamber (3).



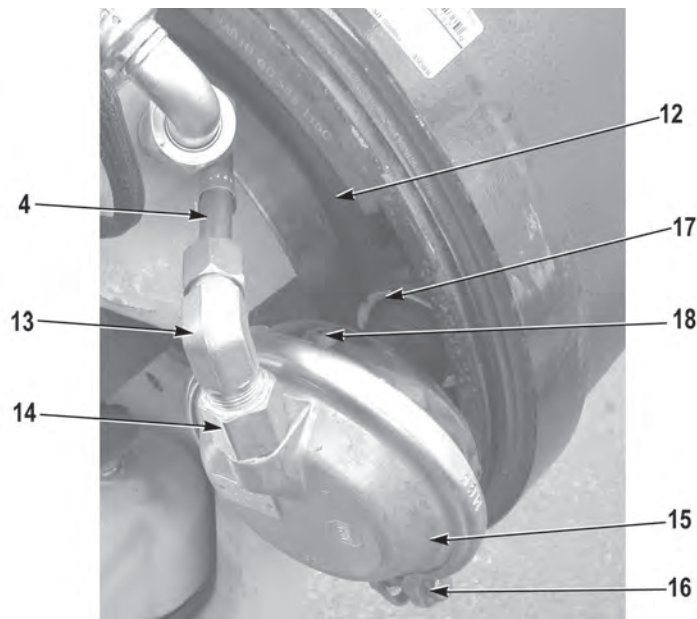
NOTE

- Perform Steps (10) through (15) to remove small brake chambers.
- All small brake chambers are removed the same way. Axle No. 2 driver side shown.
- Note position of fittings before removal to ensure proper installation.

10. Remove tube (4) from fitting (13).
11. Remove fitting (13) from fitting (14).
12. Remove fitting (14) from brake chamber (15).
13. Remove clamp (16) from brake chamber (15).
14. Loosen collet nut (17) and remove brake chamber (15) from spider (12).
15. Remove collet nut (17) from brake chamber (15).

END OF TASK

INSTALLATION



NOTE

- Perform Steps (1) through (10) to install small brake chambers.
- Perform Steps (11) through (22) to install large brake chambers.
- All small brake chambers are installed the same way. Axle No. 2 driver side shown.

NOTE

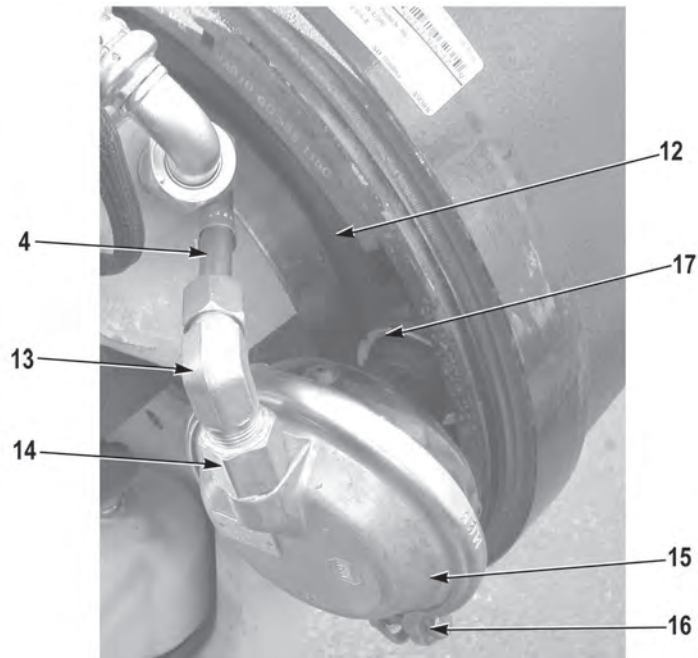
- Perform Step (1) only for new brake chambers.
 - New brake chamber has four equally-spaced plugs.
1. Remove plug (18) from bottom of brake chamber (15).
 2. Install collet nut (17) on brake chamber (15) with tapered side of collet nut (17) toward brake chamber (15) as far as possible.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Ensure wedge assembly is properly seated in plunger housing prior to installing brake chamber.
 - Ensure collet nut does not prevent brake chamber from being completely tightened.
3. Apply sealing compound, Loctite 567, to first three threads of brake chamber (15) and install brake chamber (15) on spider (12) until brake chamber (15) is seated.



4. Turn brake chamber (15) out 1/2 turn.
5. Install clamp (16) on brake chamber (15).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

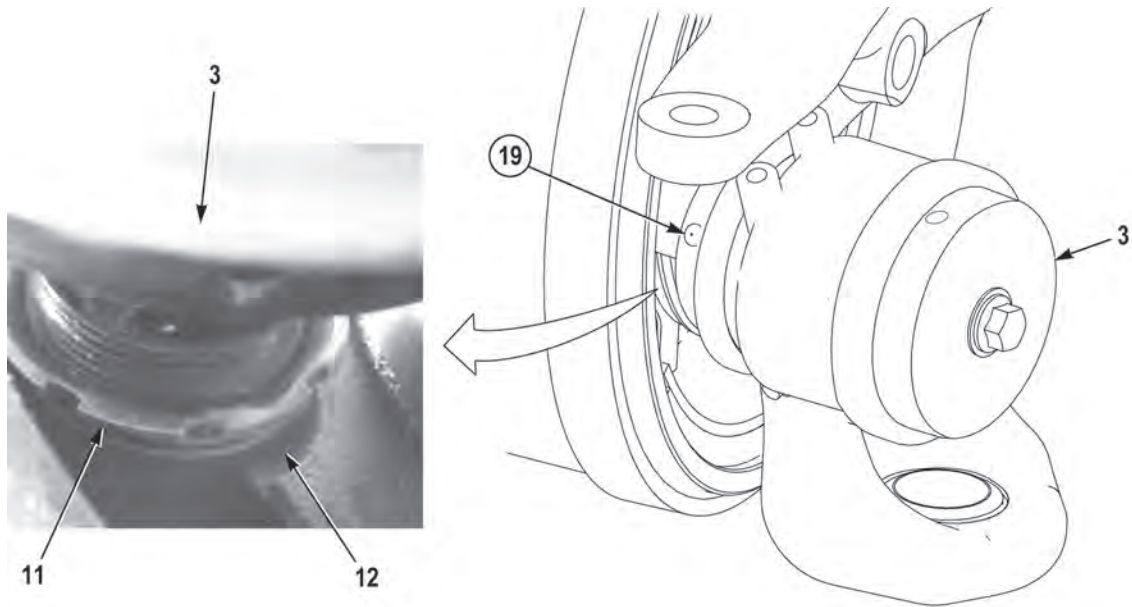
Install fittings as noted prior to removal.

6. Apply sealing compound, Loctite 592, to threads of fitting (14) and fitting (13).
7. Install fitting (14) on brake chamber (15).
8. Install fitting (13) on fitting (14).

NOTE

Perform Step (9) to align tube only if needed.

9. Loosen brake chamber (15) no more than one turn to align fitting (13) with tube (4).
10. Install tube (4) on fitting (13).



NOTE

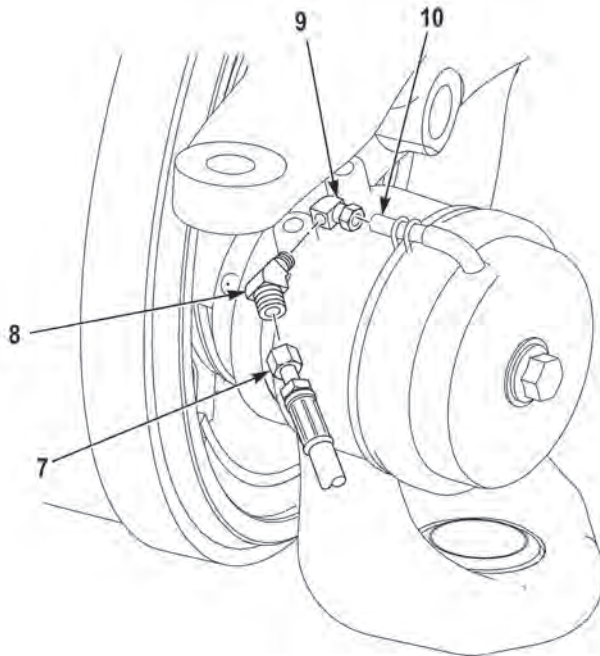
- Perform Steps (11) through (22) to install large brake chamber.
 - All large brake chambers are installed the same way. Axle No. 2 driver side shown.
 - If installing new brake chamber, proceed to Step (11).
 - New brake chamber has four equally spaced plugs.
 - Install plugs as noted prior to removal.
11. Remove one of bottom two plugs (19) from brake chamber (3).
 12. Install collet nut (11) on brake chamber (3) with tapered side of collet nut (11) toward brake chamber (3) as far as possible.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

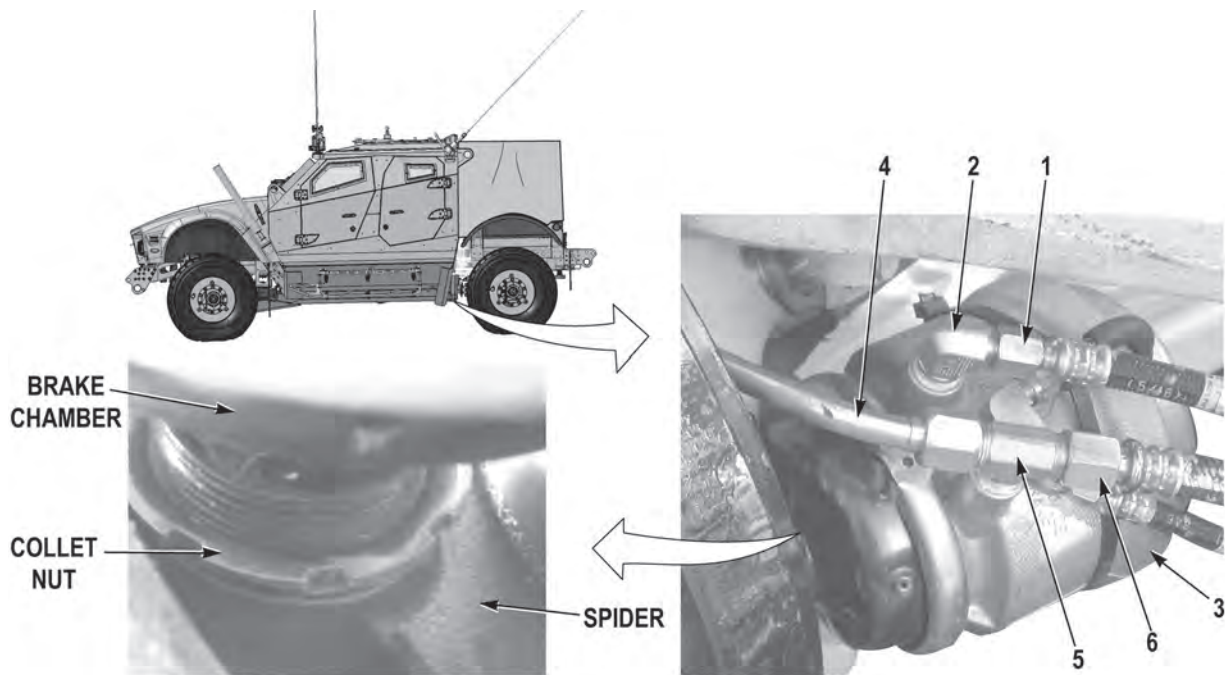
NOTE

- Ensure wedge assembly is properly seated in plunger housing prior to installing brake chamber.
 - Ensure collet nut does not prevent brake chamber from being completely tightened.
13. Apply sealing compound, Loctite 567, to first three threads of brake chamber (3) and install brake chamber (3) on spider (12) until brake chamber (3) bottoms out.

**NOTE**

Install fittings as noted prior to removal.

14. Apply sealing compound, Loctite 592, to threads of two fittings (8 and 9) and install two fittings (8 and 9) on vent tube (10).
15. Install air line (7) on fitting (8).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

16. Apply sealing compound, Loctite 592, to all threads of fitting (5) and install fitting (5) on brake chamber (3).

NOTE

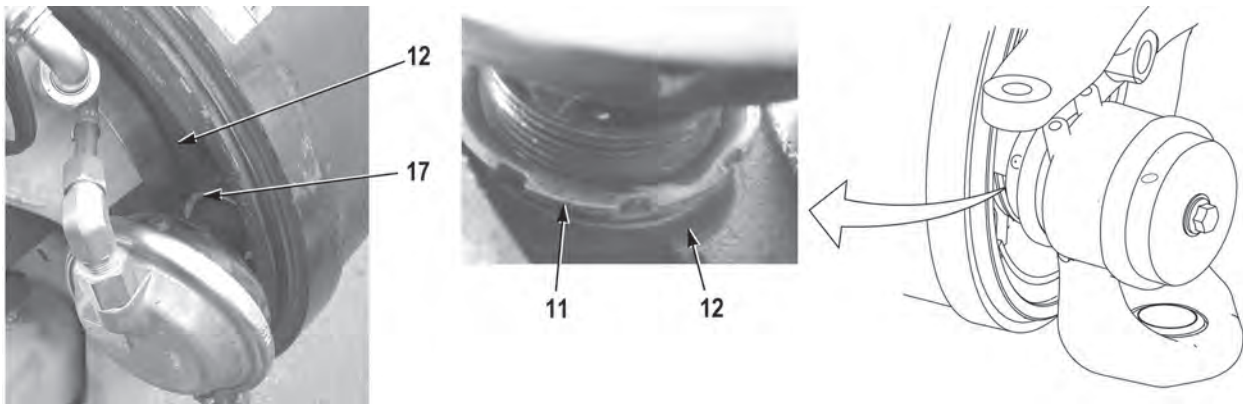
Perform Step (17) only if needed.

17. Loosen brake chamber (3) no more than one turn to align fitting (5) with air line (6) and tube (4).
18. Install air line (6) on fitting (5).
19. Install tube (4) on fitting (5).
20. Apply sealing compound, Loctite 592, to all threads of fitting (2) and install fitting (2) on brake chamber (3).

NOTE

Perform Step (21) only if needed.

21. Loosen brake chamber (3) no more than one turn to align fitting (2) with air line (1).
22. Install air line (1) on fitting (2).



23. Tighten two collet nuts (11 and 17) against spider (12) by hand.
24. Using a brass drift and hammer, tighten two collet nuts (11 and 17) an additional 1/4 to 1/2 turn.
25. Start engine and build air pressure to 125 psi (862 kPa).
26. Turn OFF engine.
27. Apply parking brake.
28. Check for air leaks.
29. Release parking brake and apply service brakes.
30. Check for air leaks.
31. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

BRAKE DRUM REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Wheel/tire removed (WP 0078)

Personnel Required

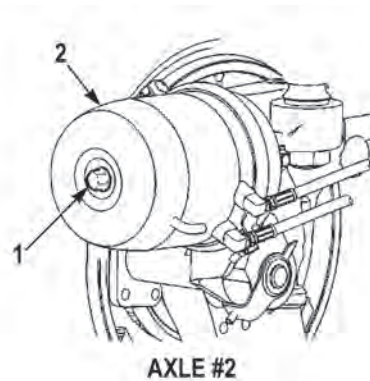
Two

Follow-On Maintenance

Install wheel/tire (WP 0078)
 Adjust brakes (WP 0123)
 Remove and stow wheel chocks

Tools and Special Tools

Lifting Device
 Strap, Nylon (from BII, TM 9-2355-335-10)
 Tool Kit, General Mechanic's: Automotive

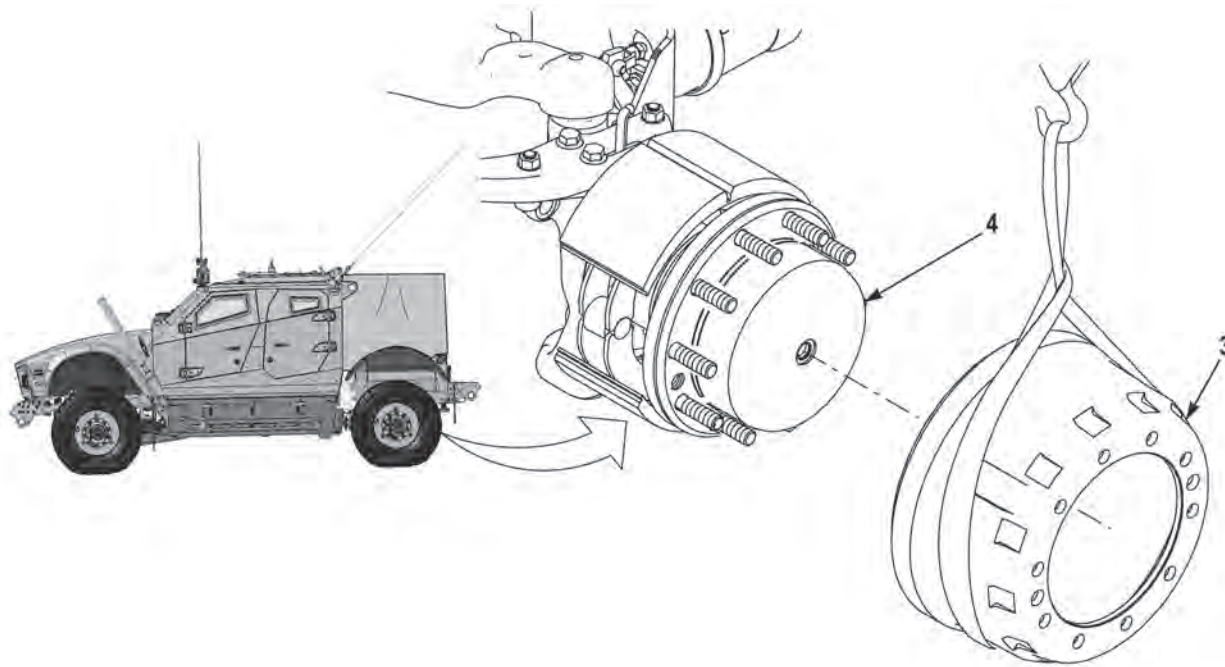
REMOVAL**WARNING**

- Vehicle must not be driven with brake chambers caged. Caging brakes renders brakes inoperative. Failure to comply may result in injury or death to personnel.
- Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

NOTE

- Brakes can only be caged on axle No. 2. Passenger side shown.
- Perform Step (1) only when removing brake drum on axle No. 2.

1. Turn caging bolt (1) of spring brake chamber (2) counterclockwise until caging bolt (1) stops turning.



WARNING

- Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.
- Brake drum weighs 116 lbs (53 kg). Do not lift or move brake drum without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

CAUTION

Front and rear brake drums are not interchangeable. Ensure brake drums are not switched during removal and installation. Failure to comply may result in damage to equipment.

NOTE

Note position of brake drum prior to removal to ensure proper installation.

2. With the aid of an assistant, a lifting device, and a strap centered on brake drum (3), remove brake drum (3) from planet carrier housing (4).

END OF TASK

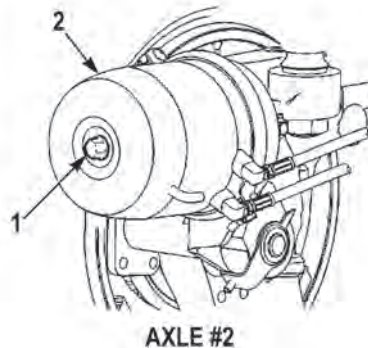
INSTALLATION**WARNING**

Brake drum weighs 116 lbs (53 kg). Do not lift or move brake drum without the aid of an assistant and a lifting device. Failure to comply may result in injury to personnel.

NOTE

Install brake drum as noted prior to removal.

1. With the aid of an assistant, a lifting device, and strap centered on brake drum (3), install brake drum (3) on planet carrier housing (4).

**WARNING**

Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

NOTE

Perform Step (2) only when installing brake drum on axle No. 2.

2. Turn caging bolt (1) of spring brake chamber (2) clockwise until head of caging bolt (1) is seated against spring brake chamber (2).
3. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

BRAKE INSPECTION AND ADJUSTMENT, AXLE NO. 1 AND AXLE NO. 2

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Brake drum removed (WP 0122)
 Spring brake chamber removed (axle No. 2)
 (WP 0121) (if adjusting axle No. 2 brake)

Personnel Required

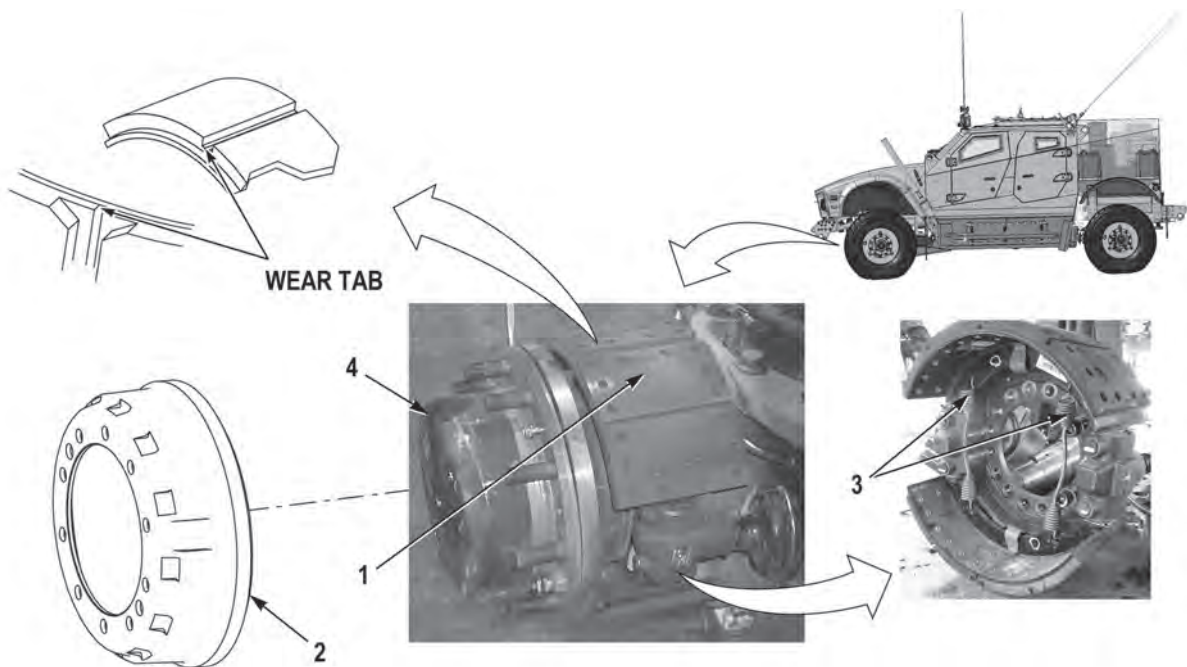
Two

Follow-On Maintenance

Install spring brake chamber (axle No. 2)
 (WP 0121) (if adjusting axle No. 2 brake)
 Remove and stow wheel chocks

Tools and Special Tools

Lifting Device
 Strap, Nylon (from BII, TM 9-2355-335-10)
 Tool Kit, General Mechanic's: Automotive

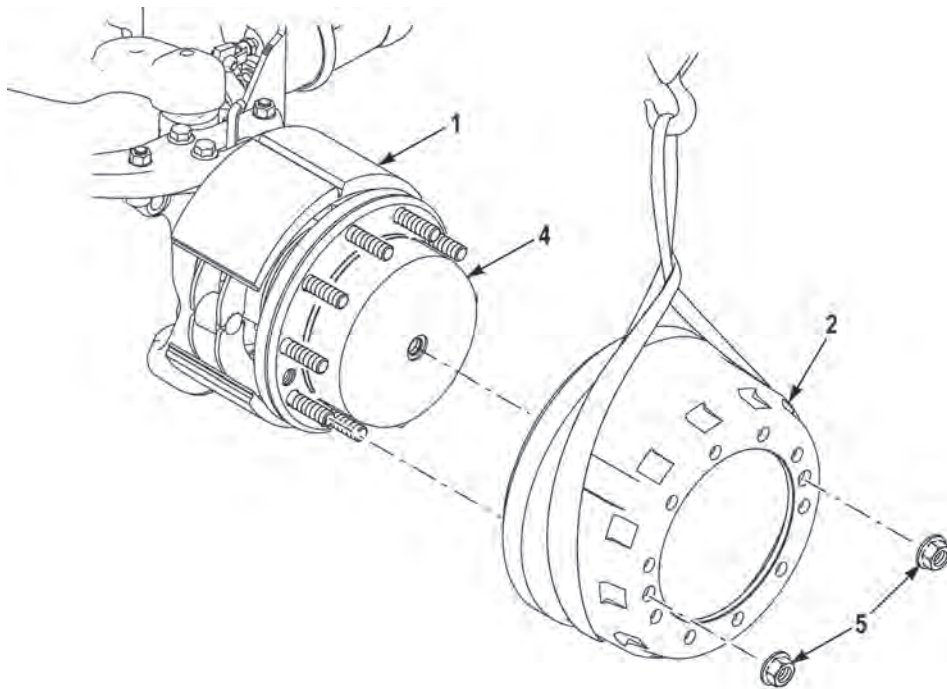
CLEANING/INSPECTION**WARNING**

Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.

NOTE

All brakes are inspected the same way. Axle No. 1 shown.

1. Clean dust and dirt from brake shoe (1) and brake drum (2).
2. Inspect brake shoes (1) for missing or damaged springs (3).



NOTE

Replace brake shoes if there are signs of discoloration and excessive cracking, if step on center wear tab or brake shoe lining is not visible, if thickness on any part of brake shoe is 1/4 in. (6 mm) or less, or rivets are exposed.

3. Inspect brake shoes (1) for obvious grooves, uneven wear, signs of discoloration, excessive cracking, thickness, and where pad rivets are riding on brake drum (2).
4. Inspect brake drum (2) for signs or excessive scoring, gouging and warpage.

WARNING

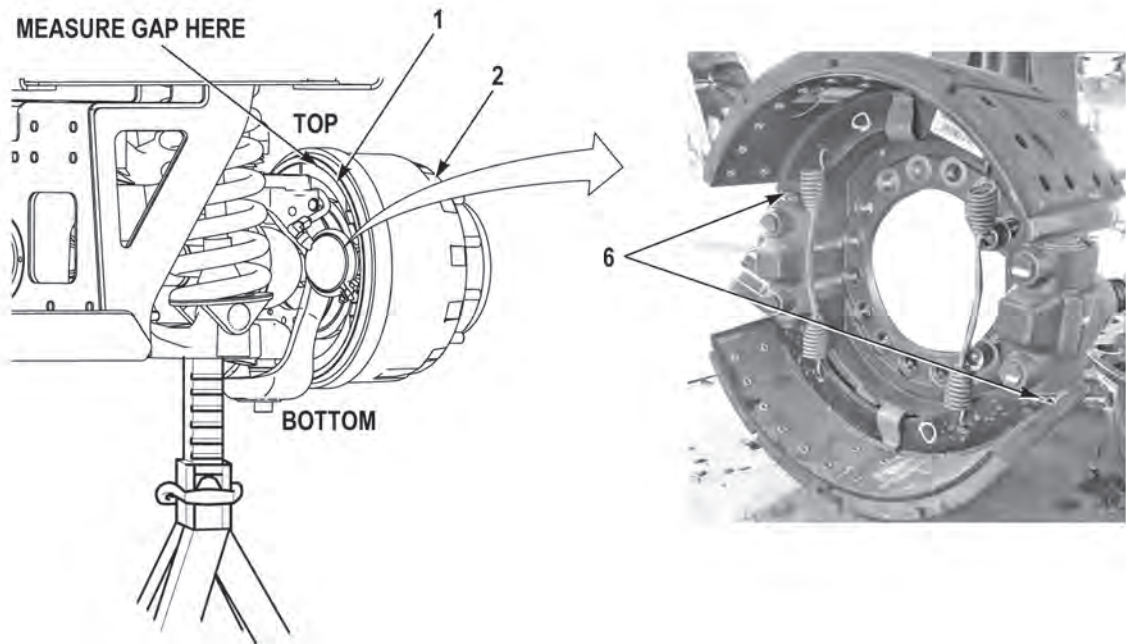
Brake drum weighs 116 lbs (53 kg). Do not lift or move brake drum without the aid of an assistant and lifting device. Failure to comply may result in injury to personnel.

NOTE

Wheel nuts are needed to secure drum in place for adjustment.

5. With the aid of an assistant, lifting device, and strap centered on brake drum (2) install brake drum (2) on planet carrier housing (4) with two wheel nuts (5) placed at 9 o'clock and 3 o'clock position until drum is fully seated.

END OF TASK

ADJUSTMENT**NOTE**

- Turn both star wheels the same amount of clicks to center brake shoes evenly.
- Turn top star wheel counterclockwise to adjust top brake shoe. Turn bottom star wheel clockwise to adjust bottom brake shoe.
- It is normal to experience initial high breakaway torque on some adjusting screws. After initial adjustment subsequent torque will be normal.

1. Tighten star wheel (6) for top brake and star wheel for bottom brake, one click at a time until brake shoes (1) are fully seated against brake drum (2).

NOTE

Gap between brake drum and each brake shoe should be measured in two spots at center.

2. Using a feeler gauge, check clearance at brake shoe (1) centers. Back off two star wheels (6) alternately one click at a time until gap between brake drum (2) and brake shoe (1) is 0.035 in. (0.8 mm) minimum and 0.0472 in. (1.2 mm) maximum.
3. Turn brake drum (2) by hand. If brake drum (2) does not turn freely by hand, repeat Steps (1) and (2).
4. Remove two wheel nuts (5) from carrier housing (4).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

BRAKE SHOE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Remove brake drum (WP 0122)

Materials/Parts

Spring, Brake (2) (Item 1 and 6)

Personnel Required

Two

Tools and Special Tools

Tool, Removal, Brake Return Spring
Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

Install brake drum (WP 0122)
Inspect and adjust brake (axle No. 1) (WP 0123)
Remove and stow wheel chocks

REMOVAL**WARNING**

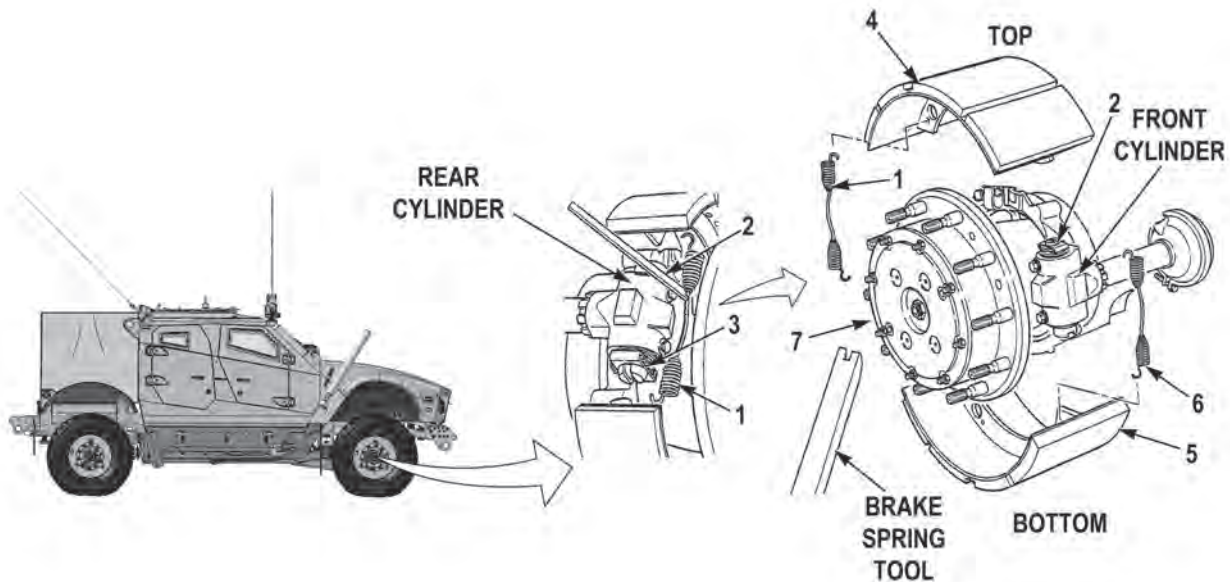
- Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.
- Springs and retaining rings are under extreme tension and can act as projectiles when being removed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

CAUTION

- Front and rear brake drums are not interchangeable. Ensure brake drums are not switched during removal and installation. Failure to comply may result in damage to equipment.
- When one brake shoe needs to be replaced, all brake shoes for that axle must be replaced. Failure to comply may result in damage to equipment.

NOTE

- Note position of brake drum prior to removal to ensure proper installation.
- Two pair of brake shoes are required per axle.
- Note position and location of brake shoes and anchor point prior to removal to ensure proper installation.
- Ensure notch in brake spring tool engages spring.



1. At rear return spring (1), position brake spring tool against adjusting bolt (2) or spider assembly (3) and pry up to release upper end of rear return spring (1) from upper brake shoe (4).

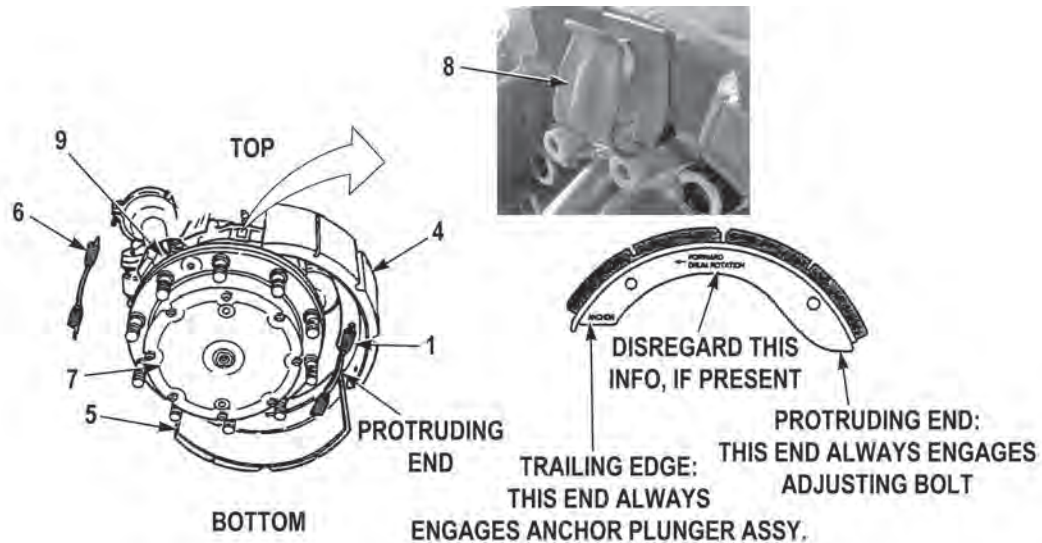
NOTE

Discard old springs and replace new springs when installing new brake shoes or springs.

2. Remove lower end of rear return spring (1) from lower brake shoe (5).
3. With the aid of an assistant, support lower brake shoe (5). Repeat Steps (1) and (2) with brake spring tool for forward return spring (6).
4. Remove lower brake shoe (5) from hub (7).
5. Remove upper brake shoe (4) from hub (7).

END OF TASK

INSTALLATION



WARNING

Brake shoes and inside surface of brake drum may be coated with dust. Breathing dust may be harmful to your health. Do not use compressed air to clean brake drum. Using the wet method, spray down brake drum and brake shoes with water to remove dust residue. Failure to comply may result in injury or death to personnel.

CAUTION

During installation of bottom brake shoe, an assistant is required to support brake shoe until springs are installed. Failure to comply may result in damage to equipment.

NOTE

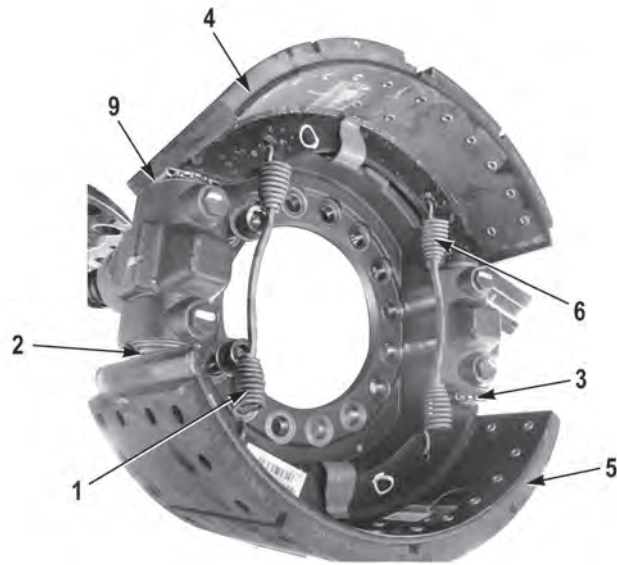
- Protruding ends of brake shoes fit in slots of adjusting bolts.
- Only newer brake shoe assemblies are marked with ANCHOR at trailing edge.

1. Install forward return spring (6) on upper brake shoe (4).

NOTE

- Install brake shoes and return springs as noted prior to removal.
- Upper and lower brake shoes must fit on hub clips.
- Ensure shoes engage adjusting bolt.

2. With the aid of an assistant, position upper and lower brake shoes (4) and (5) on hub (7) and hub clips (8).

**WARNING**

Brake spring is under extreme tension and can act as projectile when being installed. Ensure all personnel wear protective goggles. Failure to comply may result in injury to personnel.

3. Install forward return spring (6) on lower brake shoe (5).
4. Install rear return spring (1) on upper brake shoe (4).
5. With the aid of an assistant, use brake shoe tool to pry rear return spring (1) downward and pull return spring hook through hole of lower brake shoe (5) ensuring that brake shoe (5) is positioned in adjusting bolt (2), and upper brake shoe (4) is positioned in anchor plunger (9).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CAGING/UNCAGING BRAKES

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained

Materials/Parts

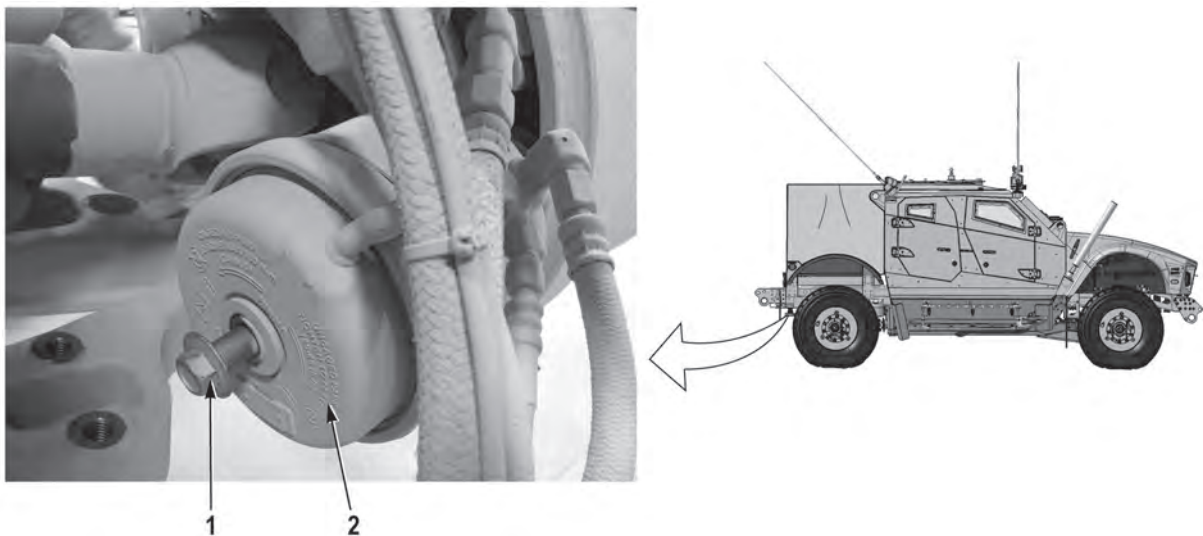
None

Follow-On Maintenance

Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

CAGING BRAKES**WARNING**

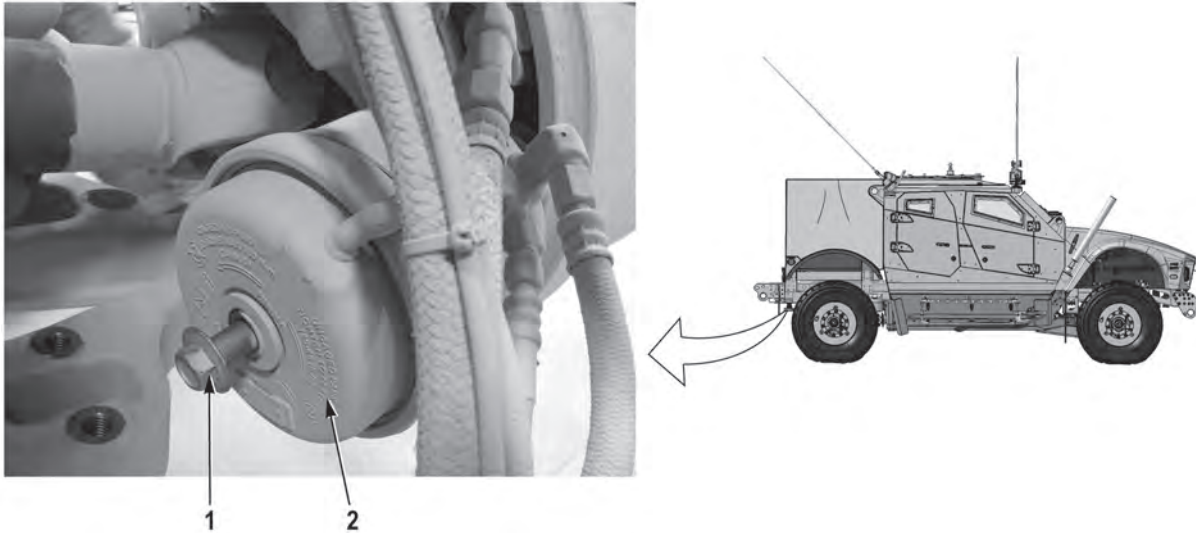
- Vehicle must not be driven with brake chambers caged. Caging brakes renders brakes inoperative. Failure to comply may result in injury or death to personnel.
- Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

NOTE

- Brakes can only be caged on axle No. 2.
- Driver side and passenger side brakes are caged the same way. Passenger side shown.

1. Turn caging bolt (1) of spring brake chamber (2) counterclockwise until caging bolt (1) stops turning.

END OF TASK

UNCAGING BRAKES**WARNING**

Spring brake chamber contains a spring under great pressure. Never work directly behind spring brake chamber. Failure to comply may result in injury or death to personnel and damage to equipment.

NOTE

Driver side and passenger side brakes are uncaged the same way. Passenger side shown.

1. Turn caging bolt (1) of spring brake chamber (2) clockwise until head of caging bolt (1) is seated against spring brake chamber (2).
2. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

PRESSURE PROTECTION VALVE REPLACEMENT, EMERGENCY SUPPLY

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Propeller shafts removed (WP 0090)

Tools and Special Tools

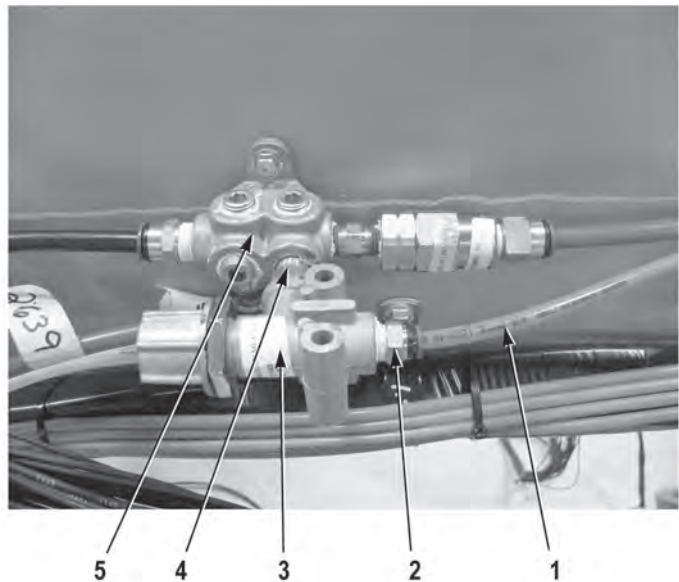
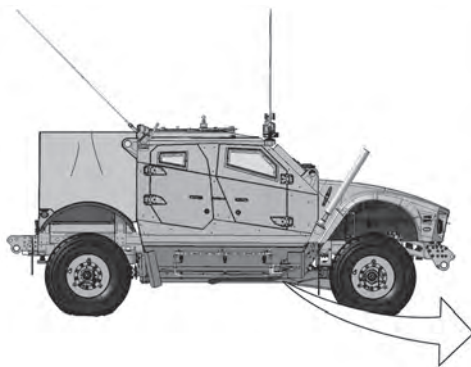
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

Install propeller shafts (WP 0090)
 Remove and stow wheel chocks

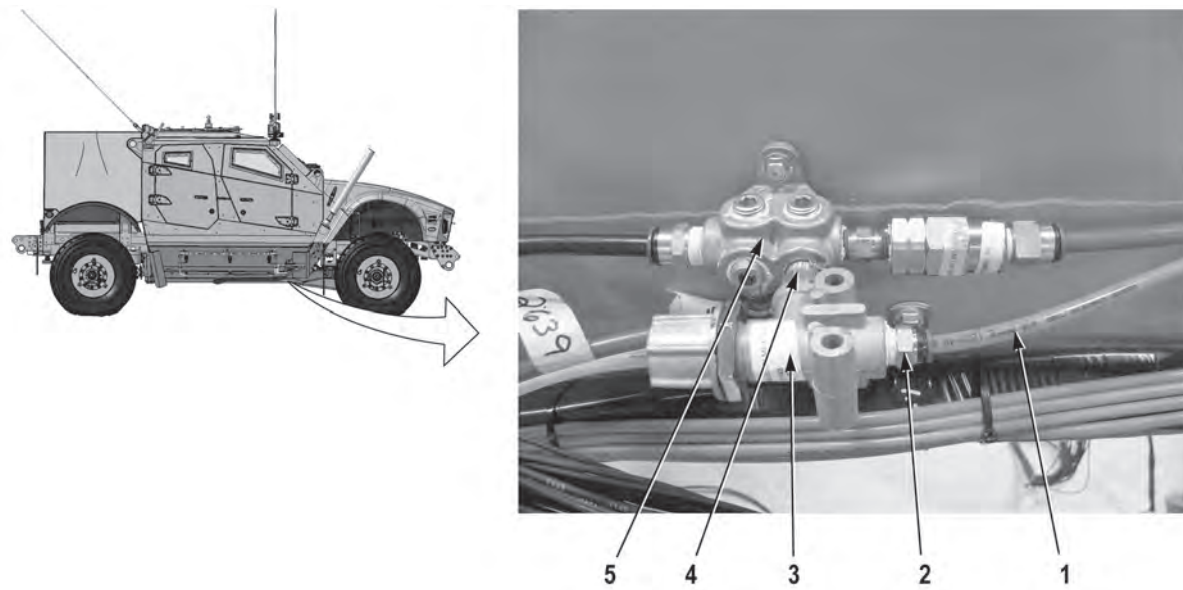
REMOVAL**WARNING**

- Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.
- Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

1. Remove air line (1) from fitting (2).

**NOTE**

Note position of pressure protection valve prior to removal to ensure proper installation.

2. Remove pressure protection valve (3) and fitting (4) from manifold (5).

NOTE

Note position of fittings prior to removal to ensure proper installation.

3. Remove two fittings (2 and 4) from pressure protection valve (3).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of two fittings (2 and 4) and install two fittings (2 and 4) on pressure protection valve (3).

NOTE

Install pressure protection valve as noted prior to removal.

2. Apply sealing compound, Loctite 592, to threads of fitting (4) and install fitting (4) and pressure protection valve (3) on manifold (5).
3. Install air line (1) on fitting (2).
4. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

PRESSURE PROTECTION VALVE REPLACEMENT, SECONDARY AIR RESERVOIR

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Propeller shafts removed (WP 0090)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Ties, Cable

Follow-On Maintenance

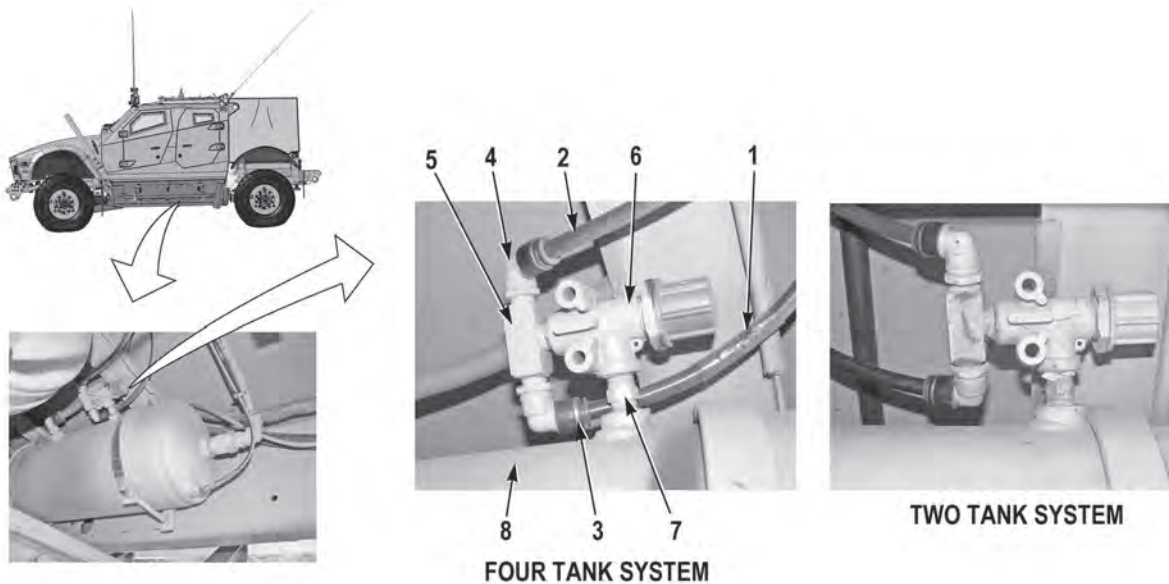
Install propeller shafts (WP 0090)
Remove and stow wheel chocks

REMOVAL**WARNING**

- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.



1. Remove two air lines (1 and 2) from two fittings (3 and 4).

NOTE

Note position of fittings prior to removal to ensure proper installation.

2. Remove two fittings (3 and 4) from fitting (5).
3. Remove fitting (5) from pressure protection valve (6).

NOTE

- Brackets may need to be loosened and secondary reservoir rotated to remove pressure protection valve.
- Note position of pressure protection valve prior to removal to ensure proper installation.

4. Remove fitting (7) and pressure protection valve (6) from secondary reservoir (8).
5. Remove fitting (7) from pressure protection valve (6).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of fitting (7) and install fitting (7) on pressure protection valve (6).

NOTE

- If secondary reservoir brackets were loosened during pressure protection valve removal, tighten brackets after pressure protection valve is installed.
 - Install pressure protection valve as noted prior to removal.
2. Apply sealing compound, Loctite 592, to threads of fitting (7) and install fitting (7) and pressure protection valve (6) on secondary reservoir (8).

NOTE

Install fittings as noted prior to removal.

3. Apply sealing compound, Loctite 592, to threads of fitting (5) and install fitting (5) on pressure protection valve (6).
4. Apply sealing compound, Loctite 592 to threads of two fittings (3 and 4) and install two fittings (3 and 4) on fitting (5).

NOTE

Install cable ties as required.

5. Install two air lines (1 and 2) on two fittings (3 and 4).
6. Perform air system leak test (WP 0291).
7. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

QUICK RELEASE VALVE REPLACEMENT, AXLE NO. 1

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Propeller shaft removed (WP 0090)

Materials/Parts

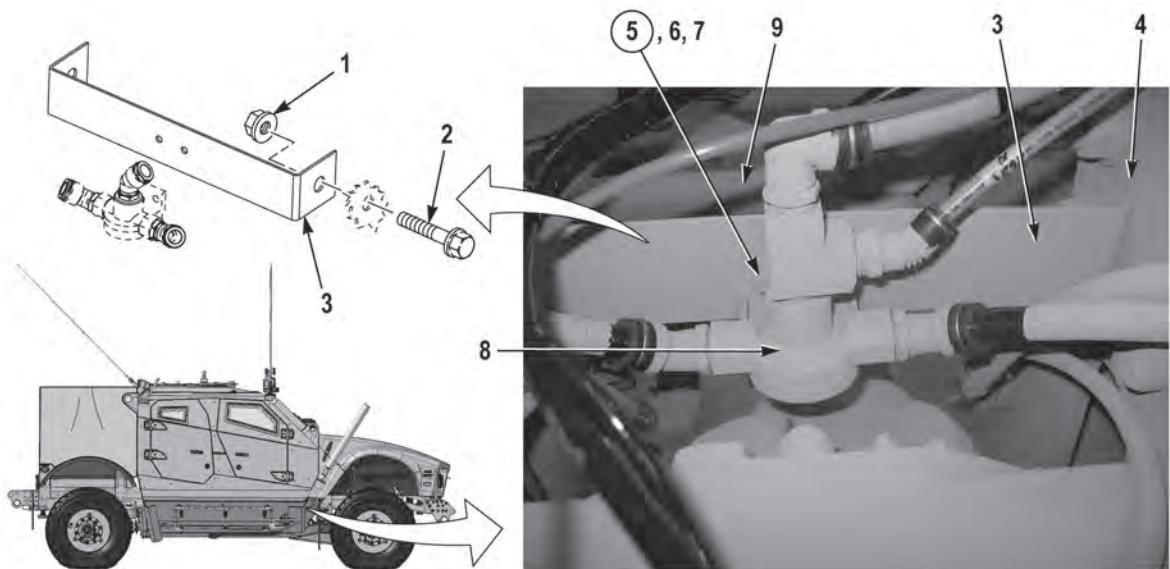
Locknut (Item 1)
 Locknut (2) (Item 5)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 250 ft-lb

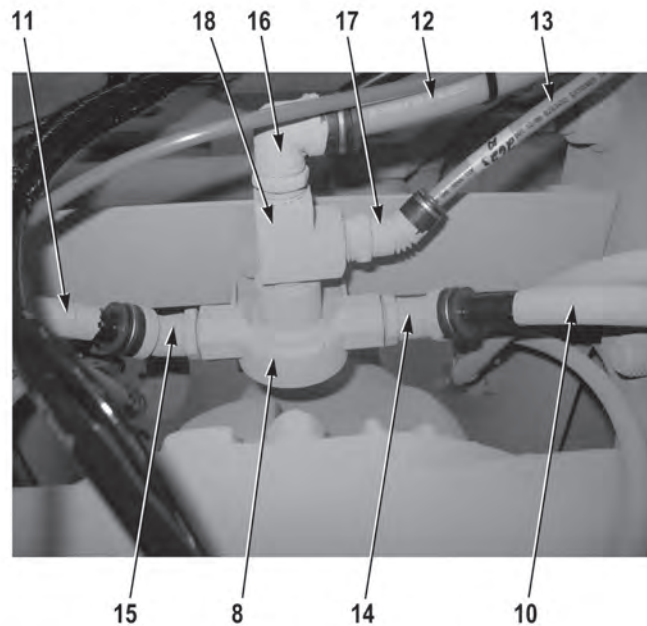
Follow-On Maintenance

Install propeller shaft (WP 0090)
 Remove and stow wheel chocks

REMOVAL**NOTE**

Both sides of bracket removed the same way. Driver side shown.

1. Remove locknut (1), screw (2), and bracket (3) from bulkhead (4). Discard locknut (1).
2. Remove two locknuts (5), screws (6), washers (7), and quick release valve (8) from bracket (3) and CTIS valve (9). Discard locknuts (5).



WARNING

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark hoses prior to removal to ensure proper installation
- Cap and plug air lines upon removal.

3. Remove hoses (10, 11, 12, and 13) from fittings (14, 15, 16, and 17).

NOTE

Note position of fittings prior to removal to ensure proper installation.

4. Remove fitting (18) from quick release valve (8).
5. Remove fitting (15) and fitting (14) from quick release valve (8).
6. Remove fitting (16) and fitting (17) from fitting (18).

END OF TASK

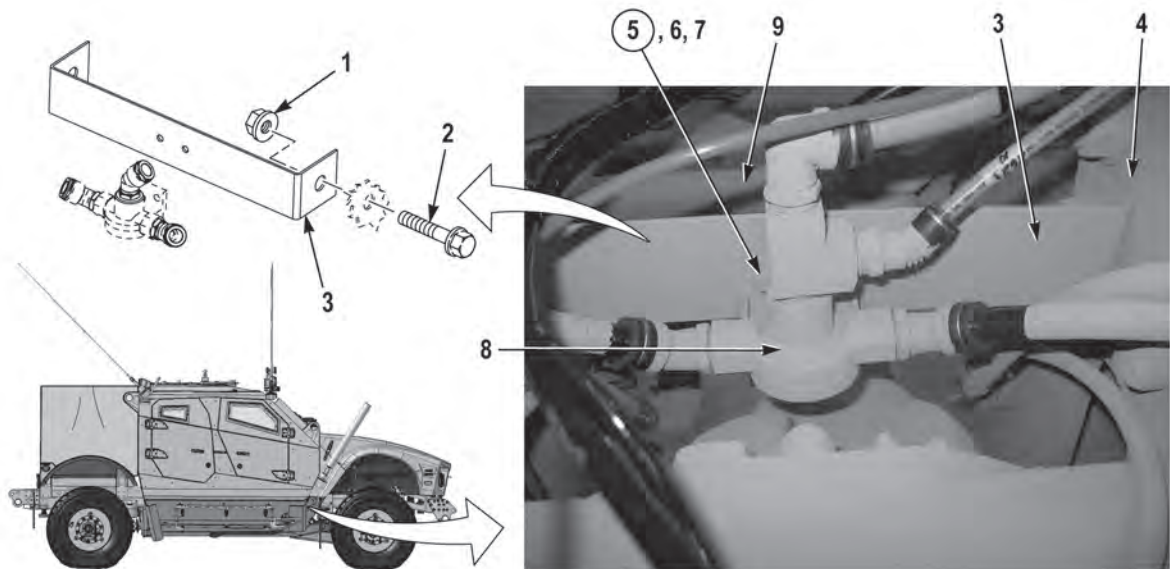
INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 592, to threads of fittings (18, 17, 16, 15, and 14).
2. Install fitting (16) and fitting (17) on fitting (18).
3. Install fitting (15) and fitting (14) on quick release valve (8).
4. Install fitting (18) on quick release valve (8).
5. Install hoses (13, 12, 11, and 10) on fittings (17, 16, 15, and 14).



6. Install quick release valve (8) on CTIS valve (9) and bracket (3) with two washers (7), screws (6), and new locknuts (5).

NOTE

Both sides of bracket are installed the same way. Driver side shown.

7. Install bracket (3) on bulkhead (4) with screw (2) and locknut (1). Tighten locknut (1) to 215 lb-ft (292 N•m).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

QUICK RELEASE VALVE REPLACEMENT, AXLE NO. 2

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained

Tools and Special Tools

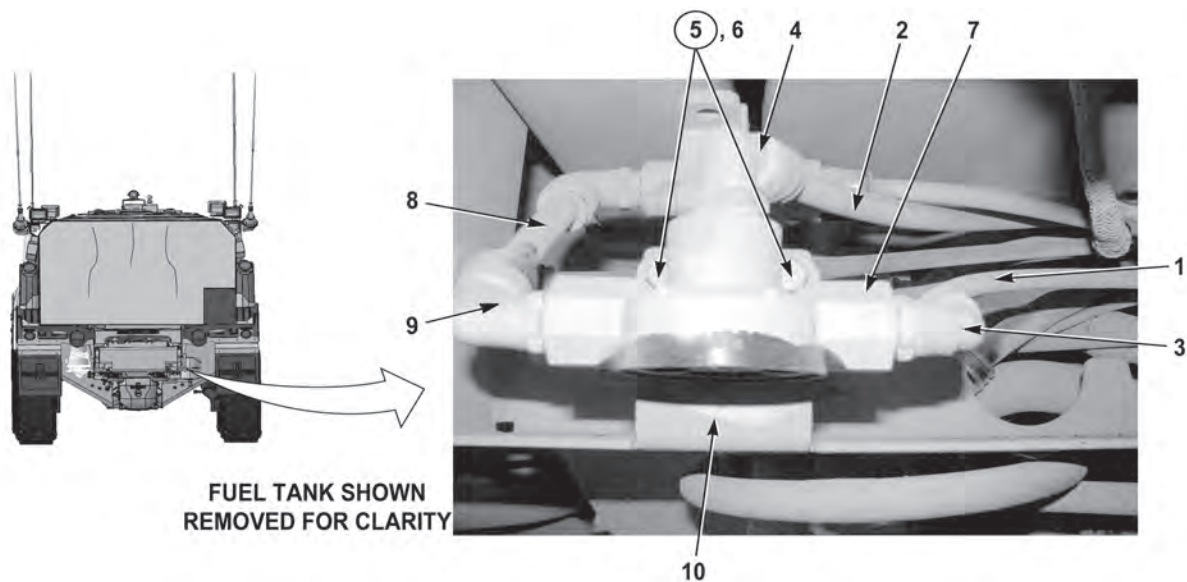
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 5)
 Cap and Plug Set
 Compound, Corrosion Preventive, Ultra Tef-Gel
 05SA2
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

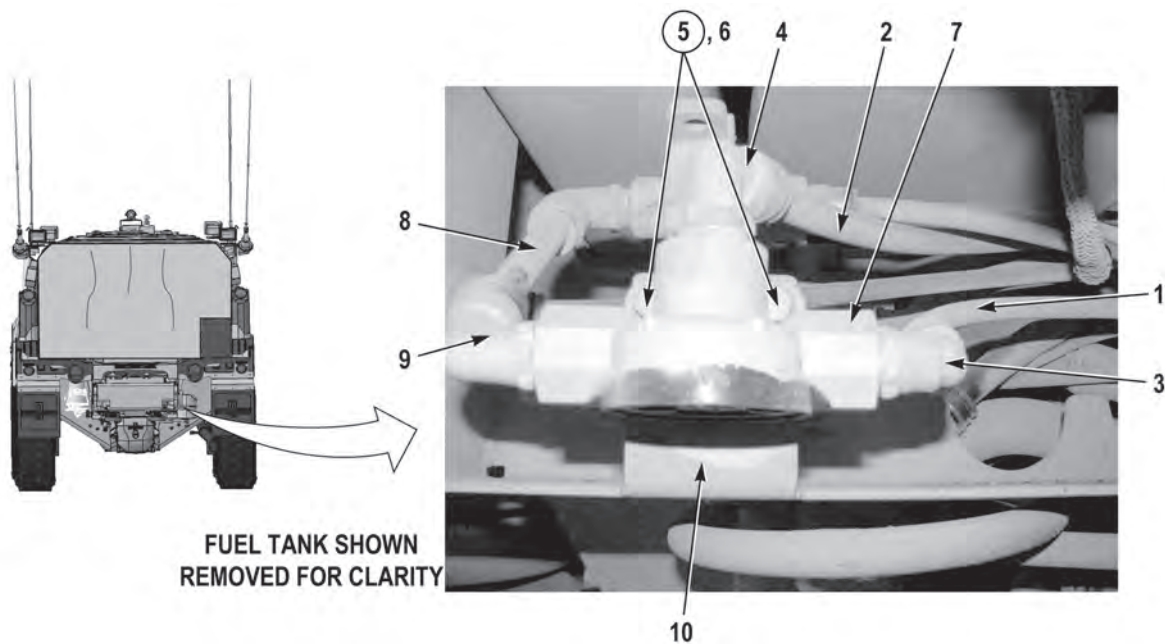
NOTE

- Tag and mark hoses prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.

1. Remove hoses (1 and 2) from fittings (3 and 4).
2. Remove two locknuts (5) and screws (6) from quick release valve (7). Discard locknuts (5).
3. Remove hose (8) and quick release valve (7) from fittings (9) and bracket (10).

END OF TASK

INSTALLATION



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of fittings (9, 4, and 3).
2. Install quick release valve (7) and hose (8) on bracket (10) and fitting (9).
3. Install quick release valve (7) on bracket (10) with two screws (6) and new locknuts (5).
4. Install hoses (2 and 1) on fittings (4 and 3).
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

REAR GLADHANDS QUICK RELEASE VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Spring brake double check valve removed
 (WP 0134)
 Air system drained

Tools and Special Tools

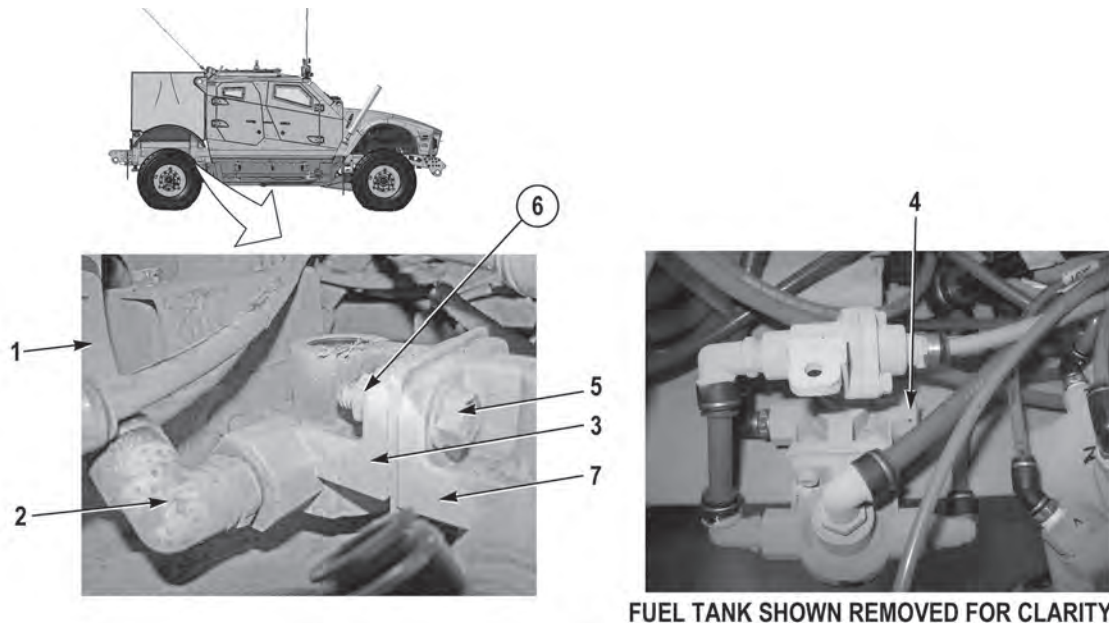
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 6)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

Install spring brake double check valve
 (WP 0134)
 Remove and stow wheel chocks

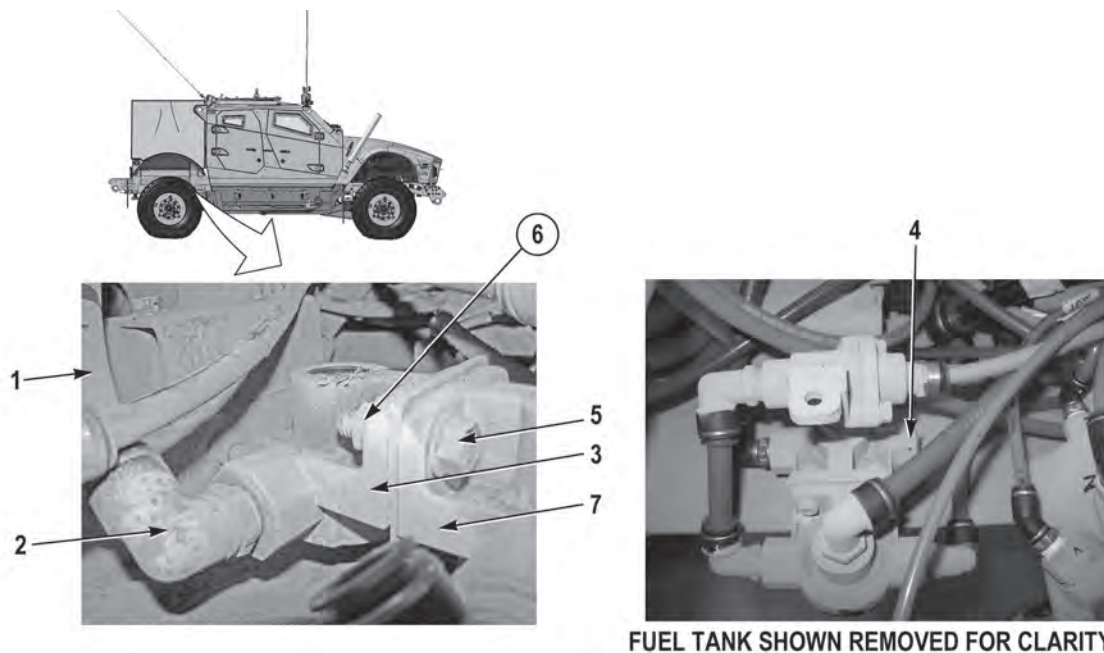
REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.

1. Remove air line (1) from fitting (2).
2. Remove fitting (2) from quick release valve (3).
3. Remove plug (4) from quick release valve (3).



- Remove two screws (5), locknuts (6), and quick release valve (3) from relay valve (7) and vehicle. Discard locknuts (6).

END OF TASK

INSTALLATION

- Install quick release valve (3) on relay valve (7) and vehicle with two locknuts (6) and screws (5).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

- Apply sealing compound, Loctite 592, to threads of fitting (2) and plug (4).
- Install plug (4) on quick release valve (3).
- Install fitting (2) on quick release valve (3).
- Install air line (1) on fitting (2).
- Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SAFETY RELIEF VALVE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained

Tools and Special Tools

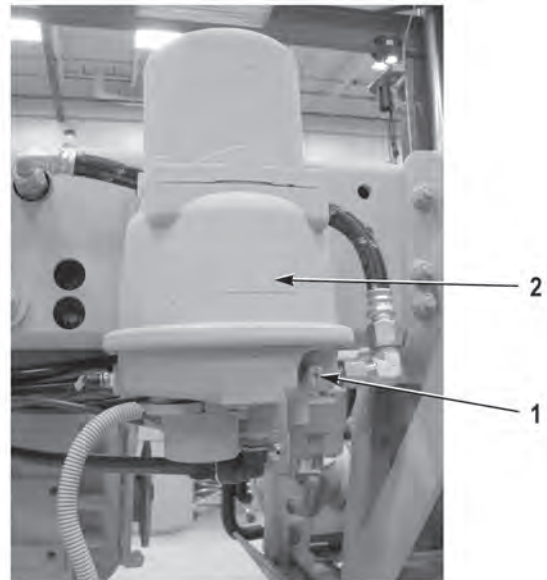
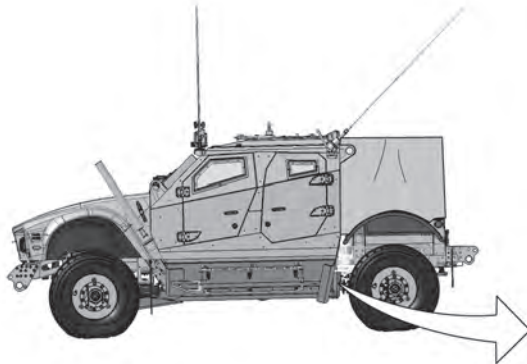
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Compound, Sealing, Loctite 592

Follow-On Maintenance

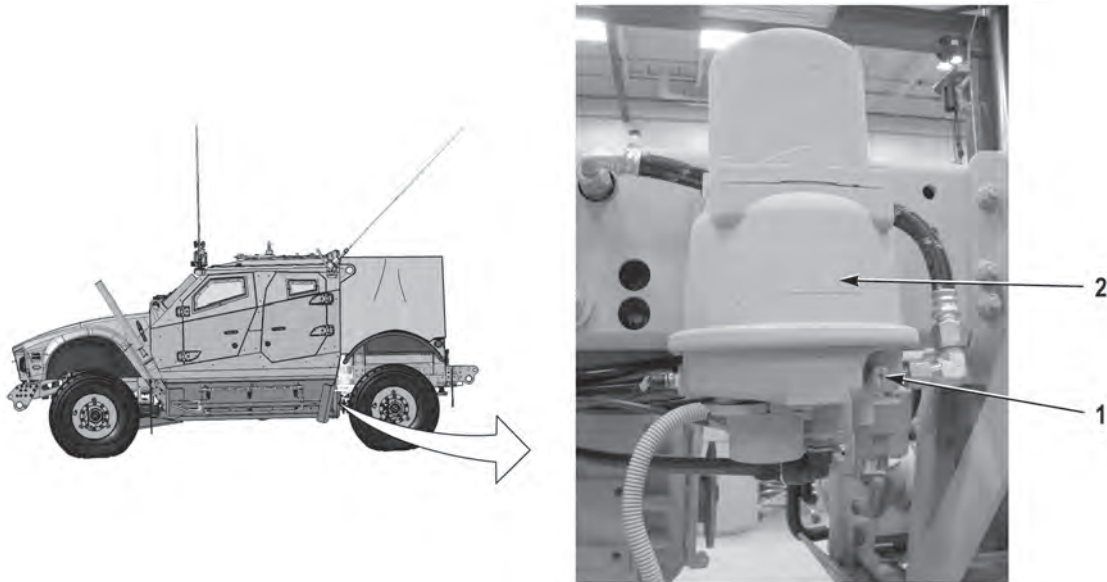
Start vehicle and build air pressure to 125 psi
(862 kPa)
Engine OFF
Check for air leaks
Remove and stow wheel chocks

REMOVAL**WARNING**

- Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.
- When removing relief valves, loosen relief valves slowly to bleed off any trapped pressure that might be present. Ensure personnel wear protective goggles when removing relief valves. Failure to comply may result in injury or death to personnel.

1. Remove relief valve (1) from air dryer (2).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of relief valve (1) and install relief valve (1) on air dryer (2).
2. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

SERVICE BRAKE RELAY DOUBLE CHECK VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained

Materials/Parts

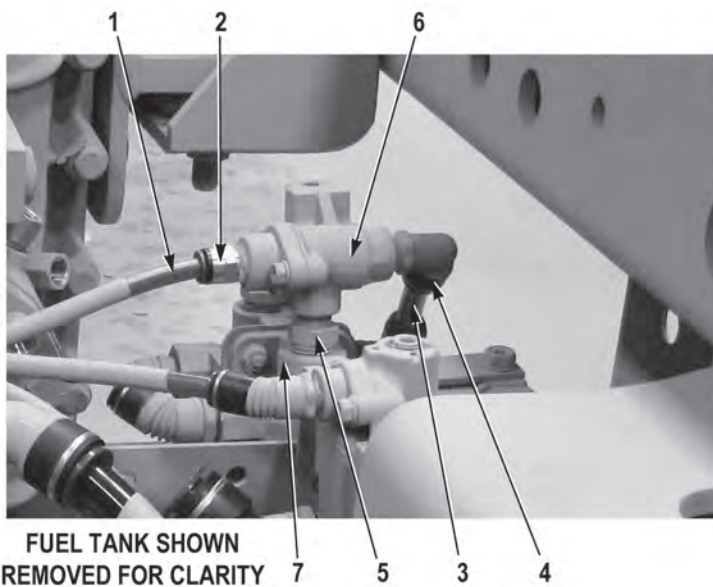
Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

Remove and stow wheel chocks

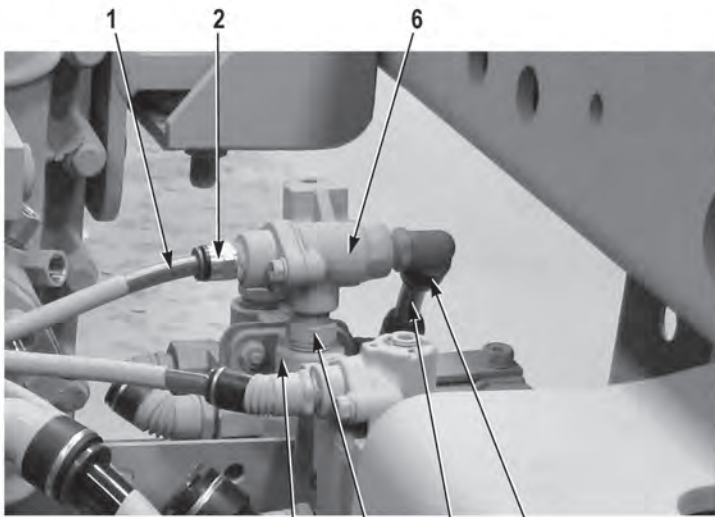
REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Valve located behind auxiliary air chuck mounting plate.
- Tag and mark air lines prior to removal to ensure proper installation.

1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Remove fitting (5) and check valve (6) from quick release valve (7).
4. Remove fitting (2) from check valve (6).
5. Remove fitting (4) from check valve (6).



FUEL TANK SHOWN
REMOVED FOR CLARITY 7 5 3 4



6. Remove fitting (5) from check valve (6).

END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of three fittings (2, 4, and 5).
2. Install fitting (5) on check valve (6).
3. Install check valve (6) and fitting (5) on quick release valve (7).
4. Install fitting (4) on check valve (6).
5. Install fitting (2) on check valve (6).
6. Install air line (3) on fitting (4).
7. Install air line (1) on fitting (2).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SERVICE BRAKE RELAY VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained

Tools and Special Tools

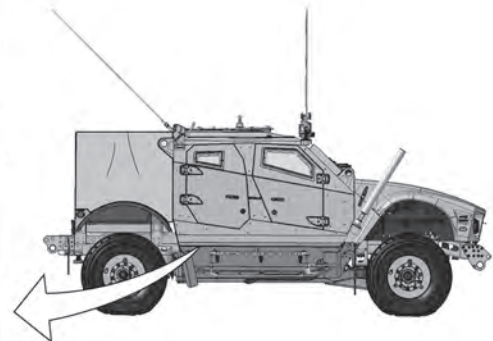
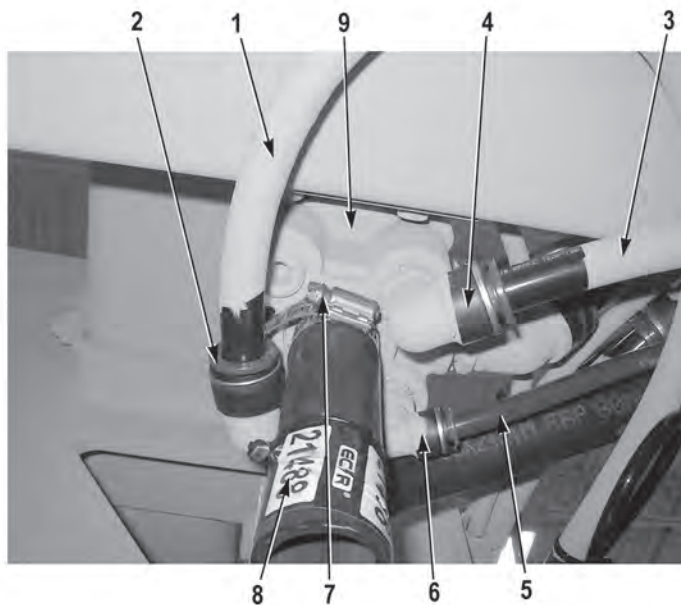
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (Item 17)
 Locknut (2) (Item 20)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification
 Ties, Cable

Follow-On Maintenance

Remove and stow wheel chocks

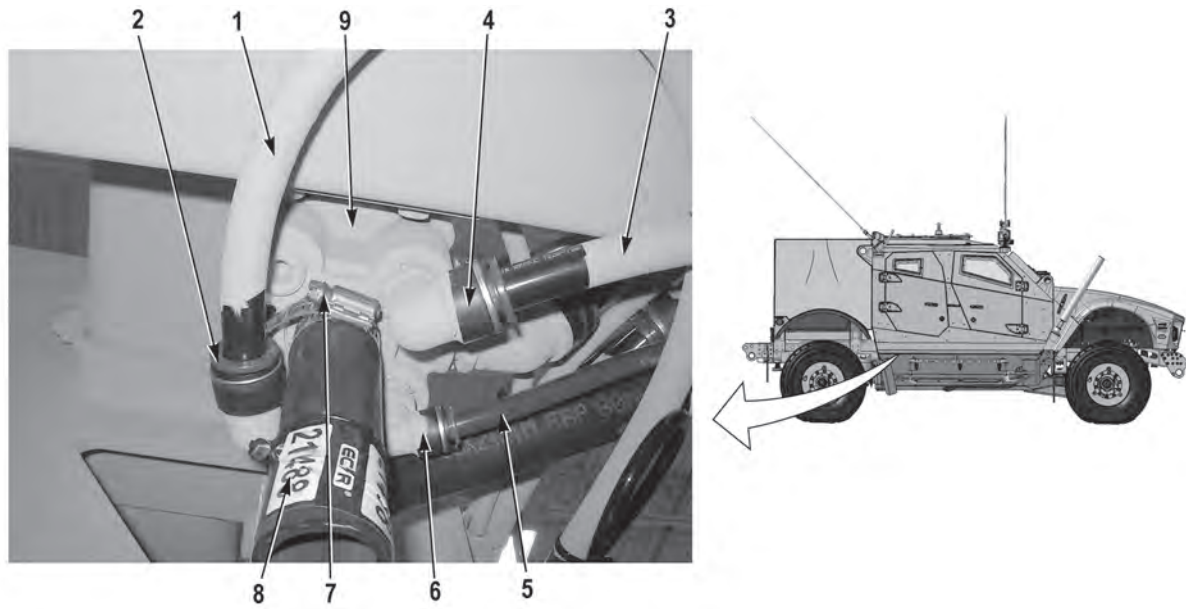
REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

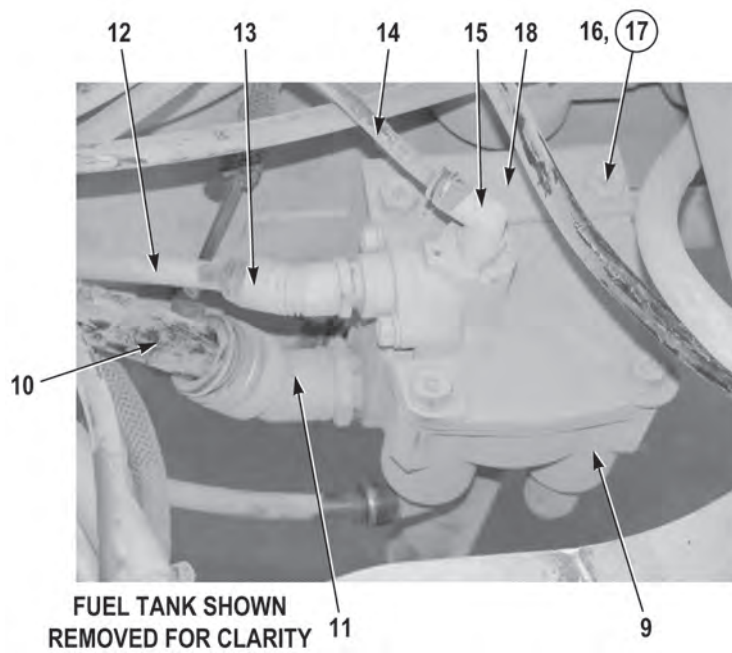
NOTE

- Cap and plug air lines upon removal.
- Tag and mark air lines upon removal to ensure proper installation.
- Remove cable ties as required.

1. Remove air line (1) from fitting (2).

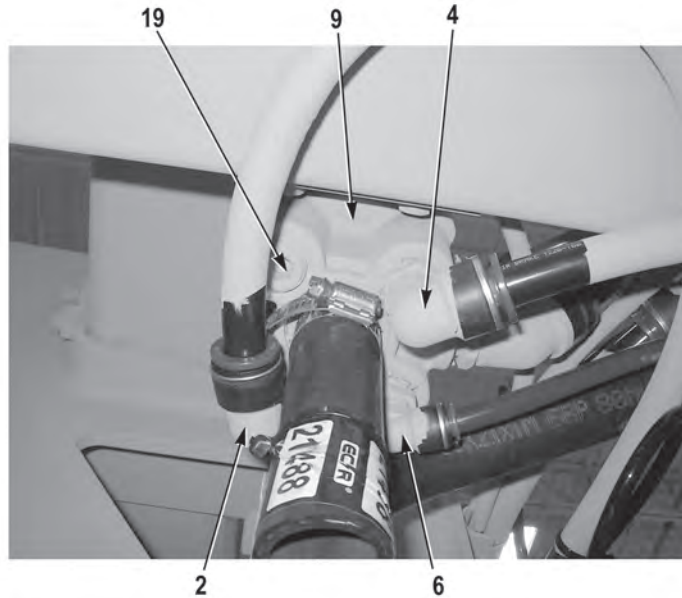


2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Loosen clamp (7) and remove hose (8) and clamp (7) from relay valve (9).



5. Remove air line (10) from fitting (11).
6. Remove air line (12) from fitting (13).

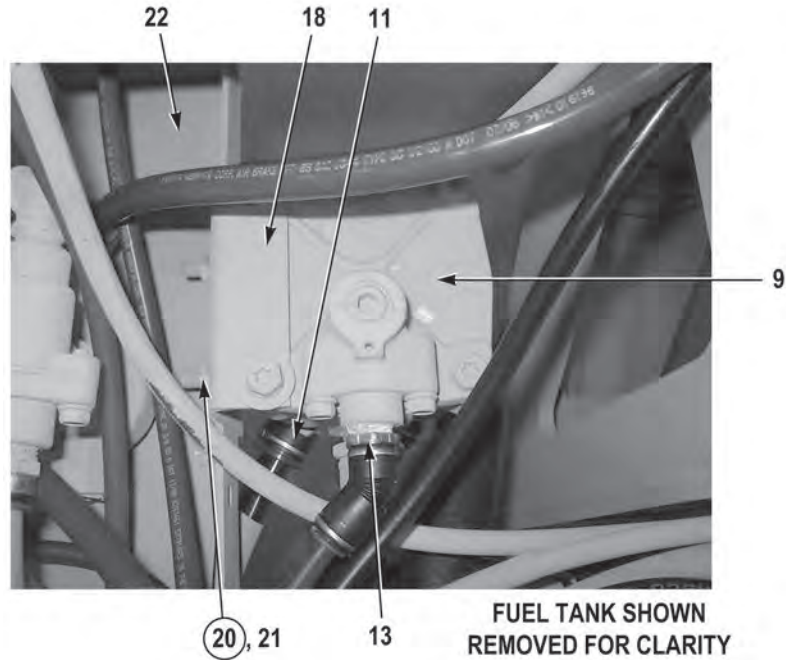
7. Remove air line (14) from fitting (15).
8. Remove two screws (16), lockwasher (17), and relay valve (9) from bracket (18). Discard lockwasher (17).



NOTE

Note position of fittings prior to removal to ensure proper installation.

9. Remove four fittings (2, 4, 6, and 15) from relay valve (9).
10. Remove plug (19) from relay valve (9).



11. Remove two fittings (11 and 13) from relay valve (9).

NOTE

Perform Step (12) only if bracket needs to be removed.

12. Remove two locknuts (20), screws (21), and bracket (18) from crossmember (22). Discard locknuts (20).

END OF TASK

INSTALLATION

NOTE

- Perform Step (1) if bracket has been removed.
- Install cable ties as required.

1. Install bracket (18) on crossmember (22) with two screws (21) and new locknuts (20).

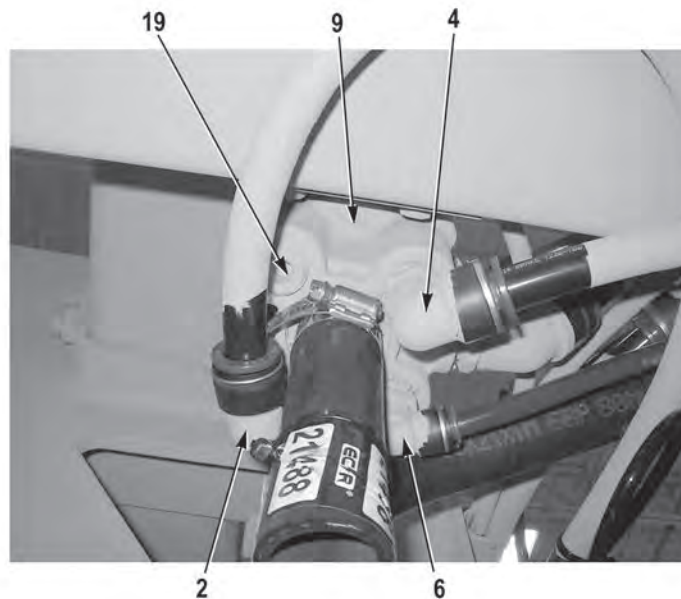
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

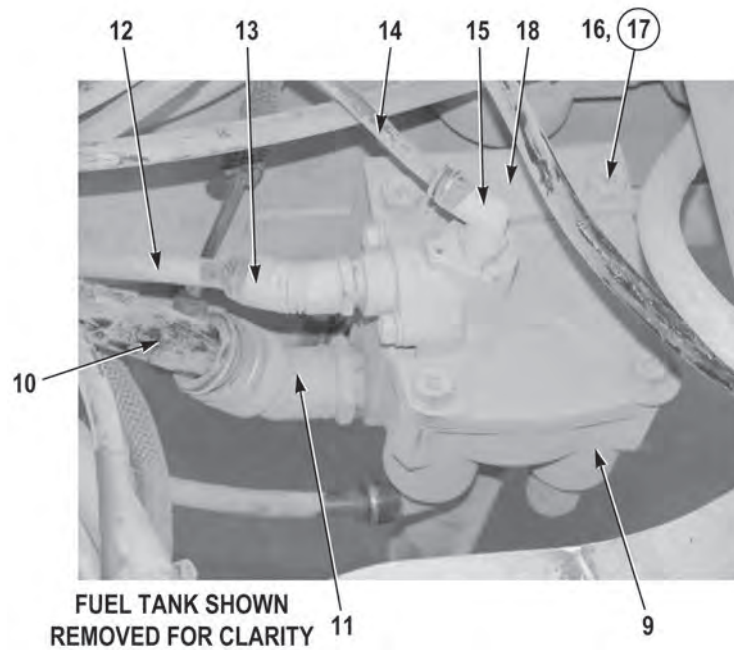
NOTE

Install fittings as noted prior to removal.

2. Apply sealing compound, Loctite 592, to threads of plug (19) and threads of six fittings (15, 13, 11, 6, 4, and 2).
3. Install fitting (13 and 11) on relay valve (9).



4. Install plug (19) on relay valve (9).
5. Install three fittings (6, 4, and 2) on relay valve (9).

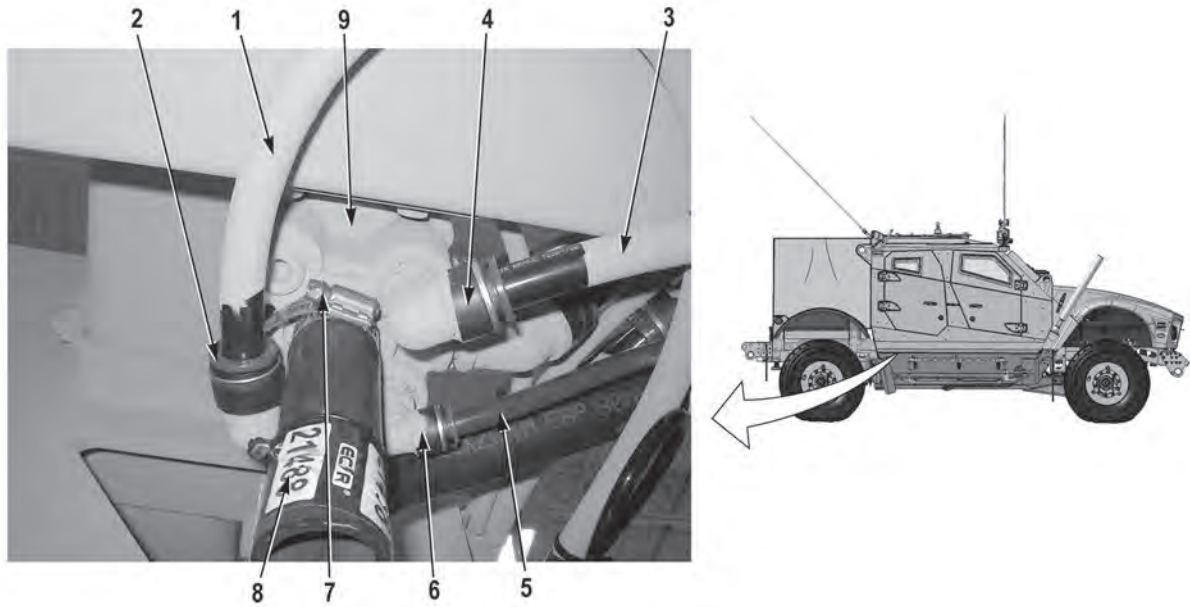


6. Install fitting (15) on relay valve (9).
7. Install relay valve (9) on bracket (18) with two new lockwashers (17) and screws (16).

NOTE

Install air lines as noted prior to removal.

8. Install air line (14) on fitting (15).
9. Install air line (12) on fitting (13).
10. Install air line (10) on fitting (11).



11. Install hose (8) on relay valve (9) with clamp (7).
12. Install air line (5) on fitting (6).
13. Install air line (3) on fitting (4).
14. Install air line (1) on fitting (2).
15. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPRING BRAKE DOUBLE CHECK VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained

Tools and Special Tools

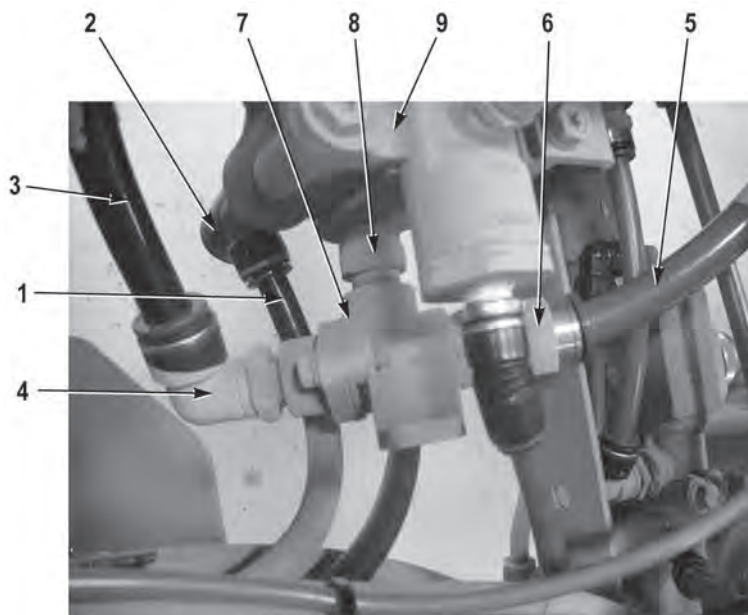
Tool Kit, General Mechanic's: Automotive

Materials/Parts

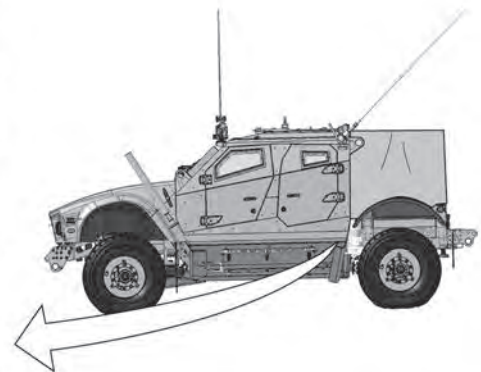
Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL

FUEL TANK SHOWN REMOVED FOR CLARITY

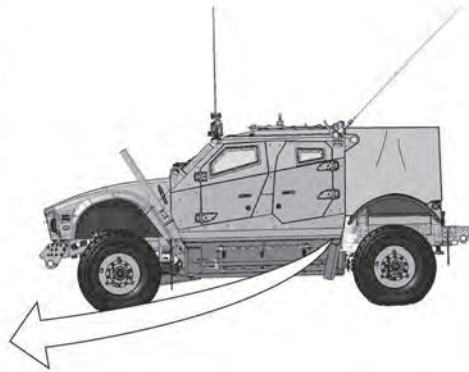
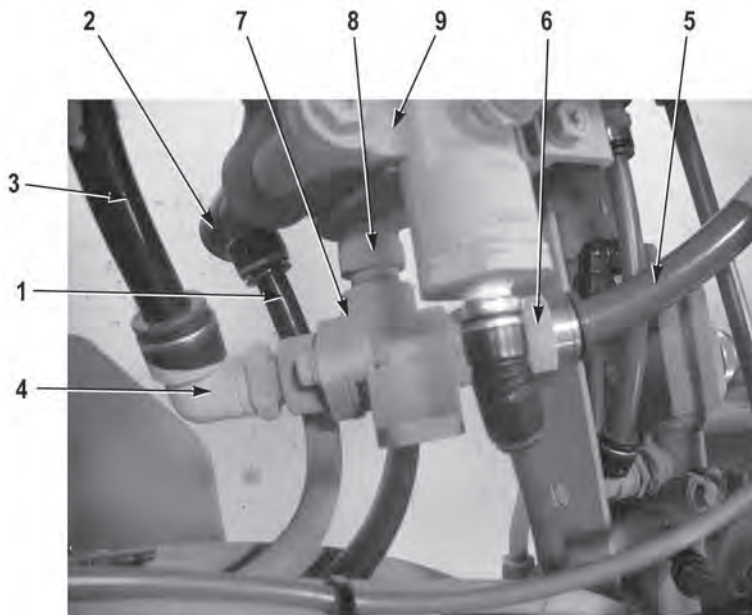
**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.

1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).



FUEL TANK SHOWN REMOVED FOR CLARITY

4. Remove fittings (2, 4, and 6) from check valve (7).
5. Remove fitting (8) and check valve (7) from relay valve (9).
6. Remove fitting (8) from check valve (7).

END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of four fittings (8, 6, 4, and 2).
2. Install fitting (8) on check valve (7).
3. Install fitting (8) and check valve (7) on relay valve (9).
4. Install three fittings (6, 4, and 2) on check valve (7).

5. Install air line (5) on fitting (6).
6. Install air line (3) on fitting (4).
7. Install air line (1) on fitting (2).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPRING BRAKE RELAY VALVE REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Spring brake double check valve removed
(WP 0134)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 13)
Locknut (2) (Item 16)

Materials/Parts (continued)

Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification

Follow-On Maintenance

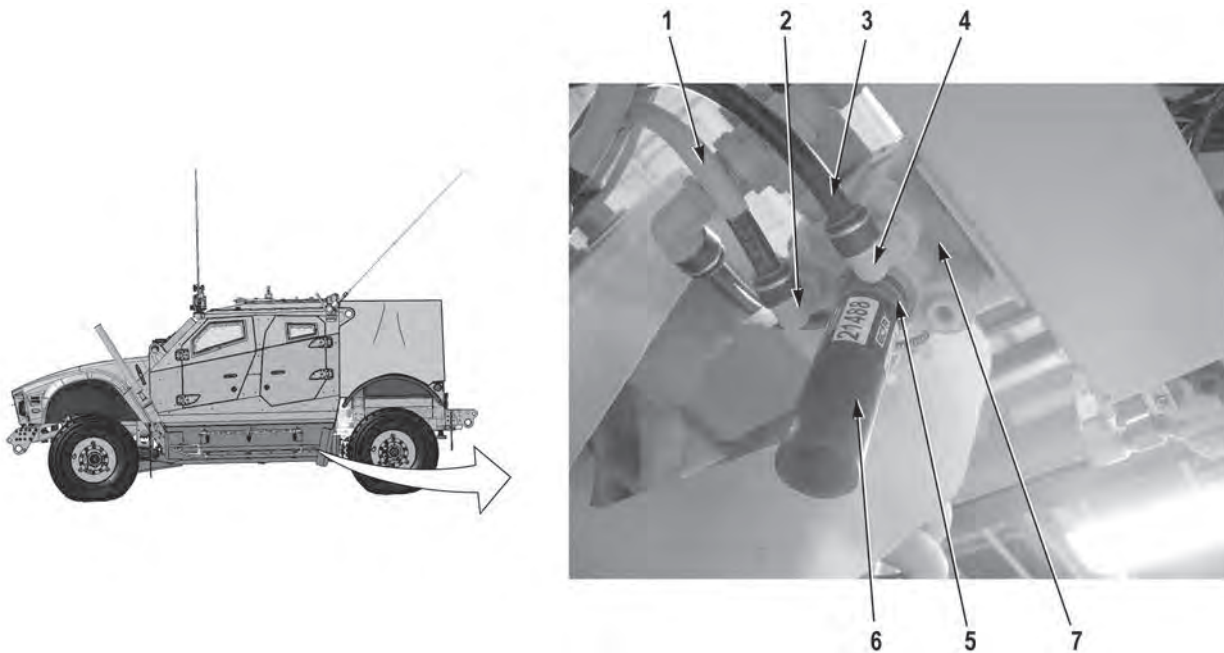
Remove and stow wheel chocks
Install spring brake double check valve
(WP 0134)

REMOVAL**WARNING**

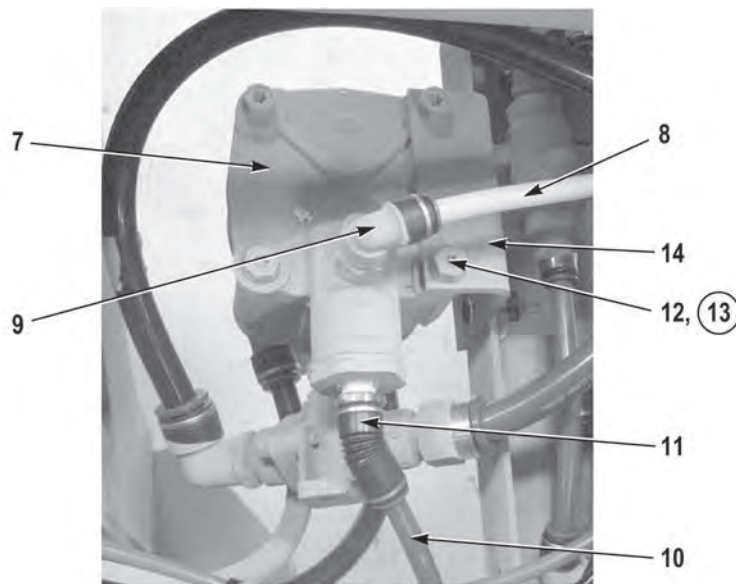
Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines upon removal.

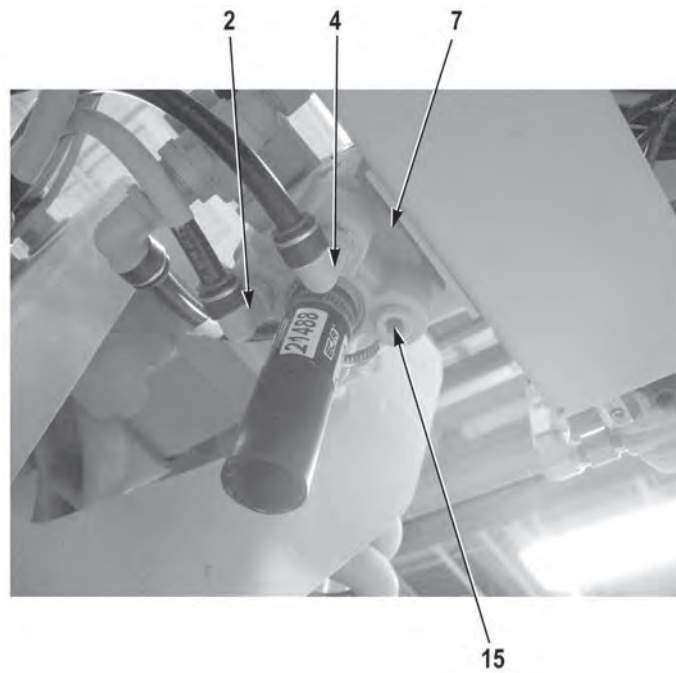


1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Loosen and remove clamp (5) and hose (6) from relay valve (7).



FUEL TANK SHOWN REMOVED FOR CLARITY

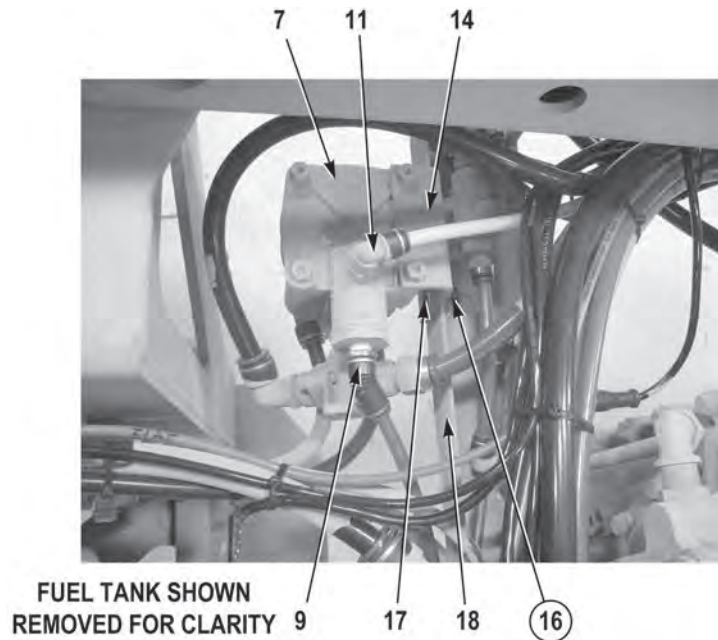
4. Remove air line (8) from fitting (9).
5. Remove air line (10) from fitting (11).
6. Remove two screws (12), lockwashers (13), and relay valve (7) from bracket (14). Discard lockwashers (13).



NOTE

Note position of fittings prior to removal to ensure proper installation.

7. Remove two fittings (2 and 4) from relay valve (7).
8. Remove two plugs (15) from relay valve (7).



9. Remove two fittings (9 and 11) from relay valve (7).

NOTE

Perform Step (11) if bracket needs to be removed.

10. Remove two locknuts (16), screws (17), and bracket (14) from crossmember (18). Discard locknuts (16).

END OF TASK

INSTALLATION

NOTE

Perform Step (1) if bracket was removed.

1. Install bracket (14) on crossmember (18) with two screws (17) and new locknuts (16).

WARNING

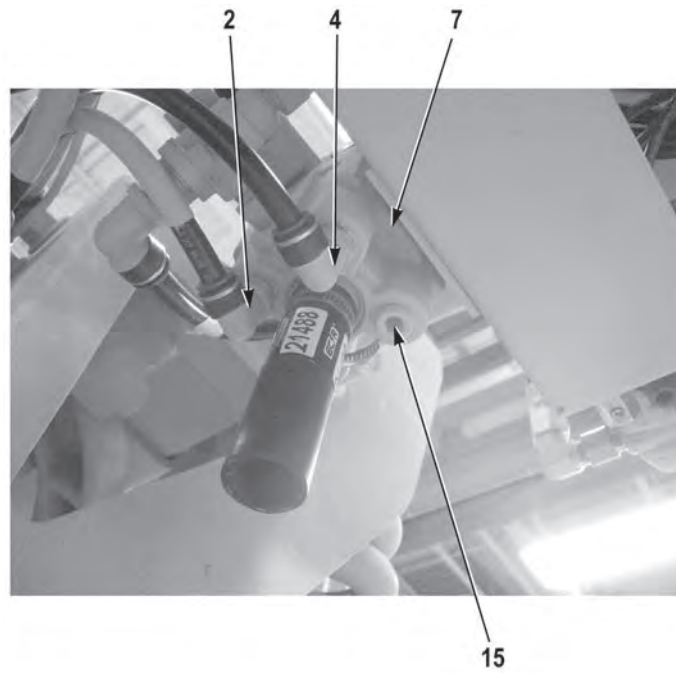
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 592, to threads of four fittings (11, 9, 4, and 2) and threads of two plugs (15).

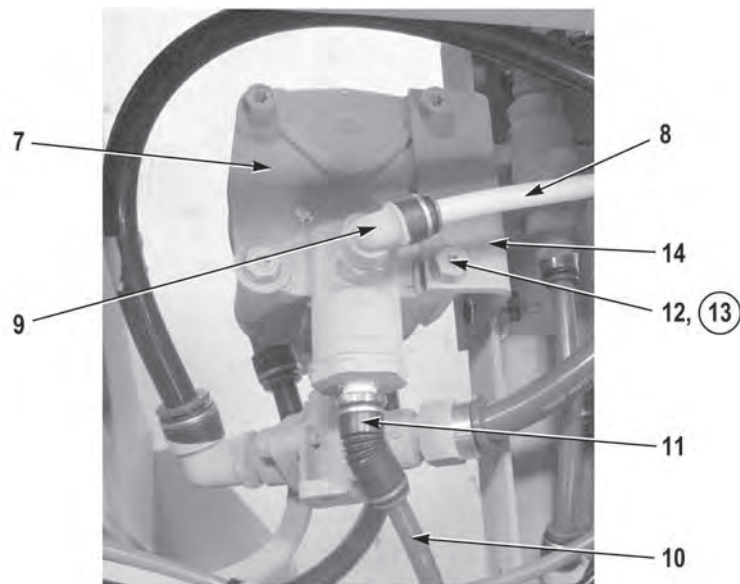
NOTE

Install fittings as noted prior to removal.

3. Install two fittings (11 and 9) on relay valve (7).

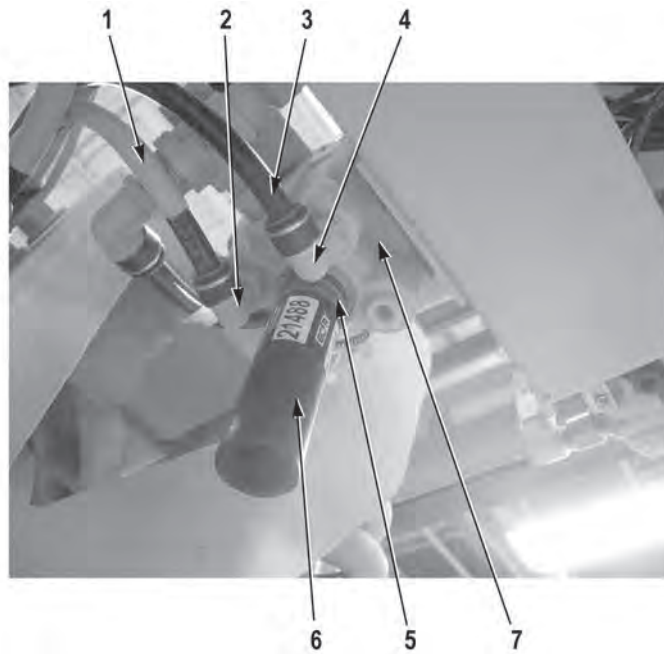
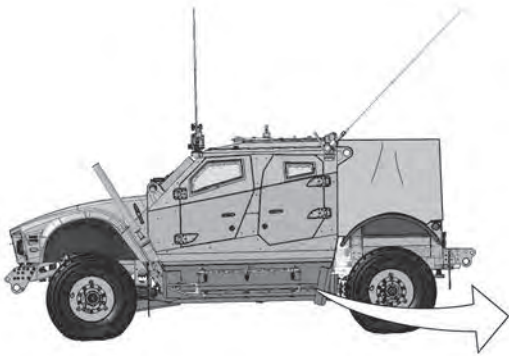


4. Install two plugs (15) on relay valve (7).
5. Install two fittings (4 and 2) on relay valve (7).



FUEL TANK SHOWN REMOVED FOR CLARITY

6. Install relay valve (7) on bracket (14) with two new lockwashers (13), and screws (12). Tighten screws (12) to 80 to 120 lb-in (9 to 13.6 N•m).
7. Install air line (10) on fitting (11).
8. Install air line (8) on fitting (9).



9. Install hose (6) on relay valve (7) with clamp (5).
10. Install air line (3) on fitting (4).
11. Install air line (1) on fitting (2).
12. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPRING BRAKE VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Center belly deflector panel removed
 (M1240/M1245) (WP 0056)
 Center belly deflector panel removed (M1240A1)
 (WP 0056)
 Air system drained

Tools and Special Tools

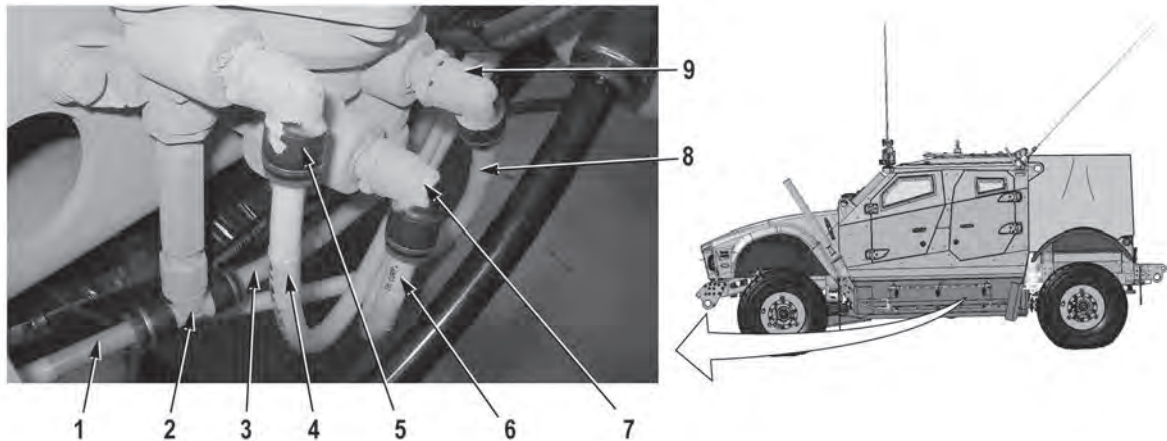
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 11)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

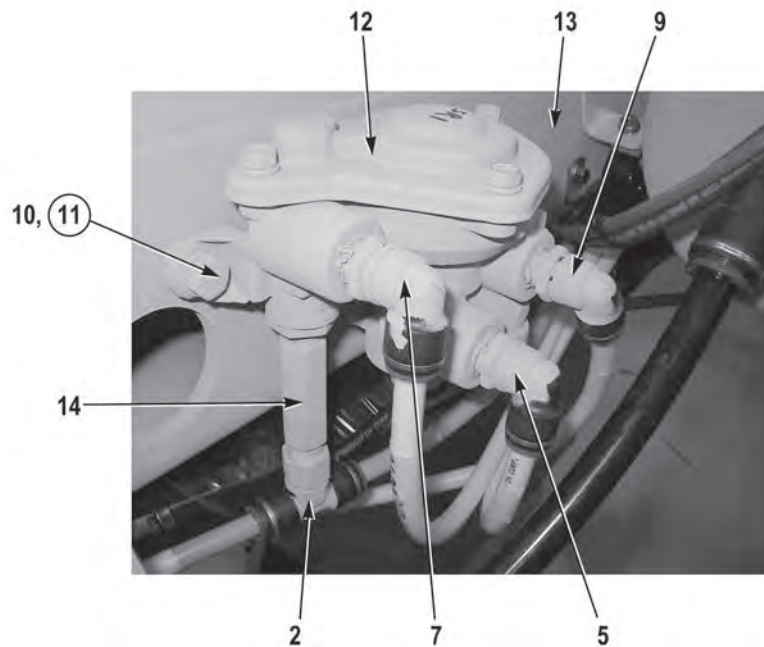
Install center belly deflector panel
 (M1240/M1245) (WP 0056)
 Install center belly deflector panel (M1240A1)
 (WP 0056)
 Remove and stow wheel chocks

REMOVAL**WARNING**

When removing air lines, loosen couplings slowly to bleed off air pressure in air lines. Ensure personnel wear protective goggles when removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
 - Cap and plug air lines upon removal.
1. Remove air line (1) from fitting (2).
 2. Remove air line (3) from fitting (2).
 3. Remove air line (4) from fitting (5).
 4. Remove air line (6) from fitting (7).
 5. Remove air line (8) from fitting (9).



6. Remove two screws (10), lockwashers (11), and spring brake valve (12) from frame (13). Discard lockwashers (11).

NOTE

Note position of fittings prior to removal to ensure proper installation.

7. Remove fitting (2) from fitting (14).
8. Remove three fittings (5, 7, and 9) from spring brake valve (12).
9. Remove fitting (14) from spring brake valve (12).

END OF TASK

INSTALLATION

WARNING

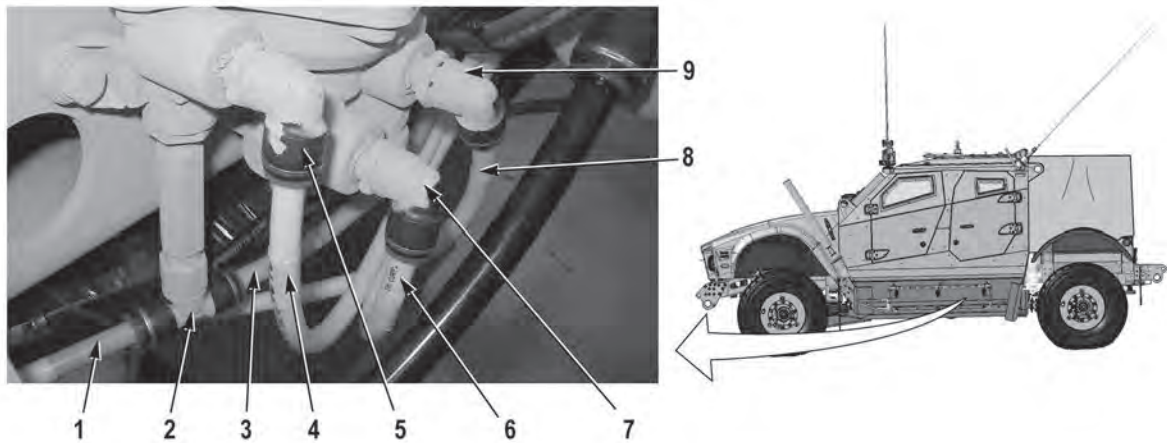
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to fittings (14, 9, 7, 5, and 2).
2. Install fitting (14) on spring brake valve (12).

NOTE

Install fittings as noted prior to removal.

3. Install fitting (2) on fitting (14).
4. Install three fittings (9, 7, and 5) on spring brake valve (12).
5. Install spring brake valve (12) on frame (13) with two new lockwashers (11), and screws (10).



6. Install air line (8) on fitting (9).
7. Install air line (6) on fitting (7).
8. Install air line (4) on fitting (5).
9. Install air line (3) on fitting (2).
10. Install air line (1) on fitting (2).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

TRACTOR PROTECTION VALVE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Service gladhand removed (WP 0250)

Tools and Special Tools

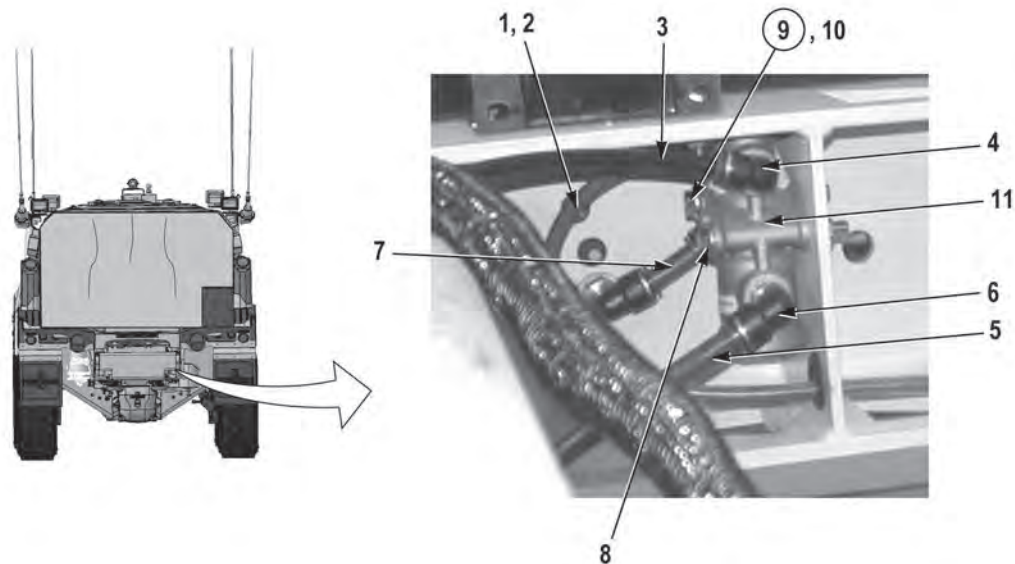
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 9)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

Follow-On Maintenance

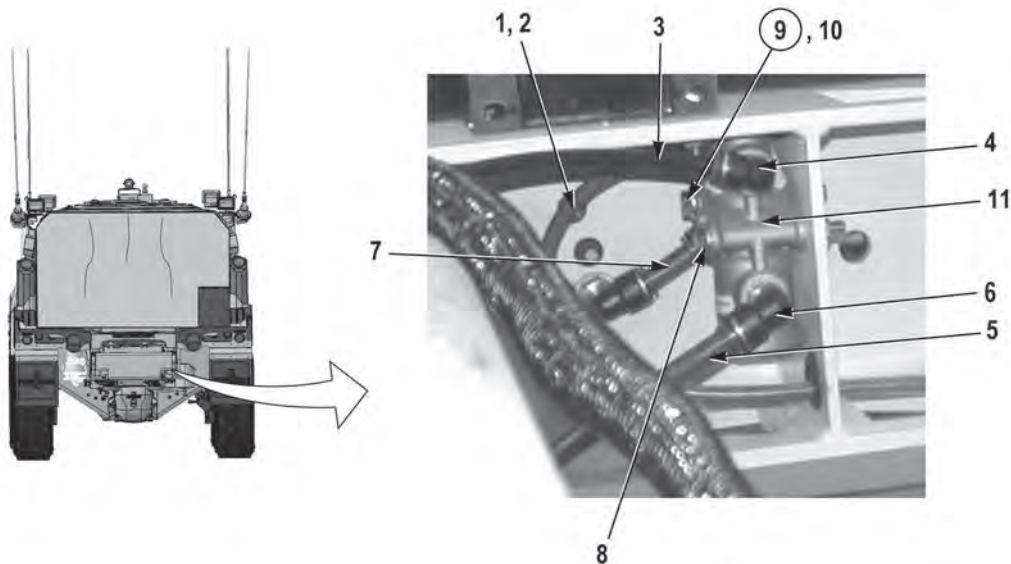
Install service gladhand (WP 0250)
 Remove and stow wheel chocks

REMOVAL**WARNING**

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal ensure proper installation.
 - Cap and plug air lines upon removal.
1. Remove air line (1) from fitting (2).
 2. Remove air line (3) from fitting (4).
 3. Remove air line (5) from fitting (6).
 4. Remove air line (7) from fitting (8).



- Remove two locknuts (9), screws (10), and tractor protection valve (11) from vehicle. Discard locknuts (9).

NOTE

Note position of fittings prior to removal to ensure proper installation.

- Remove four fittings (2, 4, 6, and 8) from tractor protection valve (11).

END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

- Apply sealing compound, Loctite 592, to threads of four fittings (8, 6, 4, and 2).

NOTE

Install fittings as noted prior to removal.

- Install fittings (8, 6, 4, and 2) on tractor protection valve (11).
- Install tractor protection valve (11) on vehicle with two screws (10) and new locknuts (9).
- Install air line (7) on fitting (8).
- Install air line (5) on fitting (6).

6. Install air line (3) or fitting (4).
7. Install air line (1) on fitting (2).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

5TH SEAT REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 5th Seat In Folded Position (TM 9-2355-335-10)
 Rear Capsule Doors Open (TM 9-2355-335-10)

Personnel Required

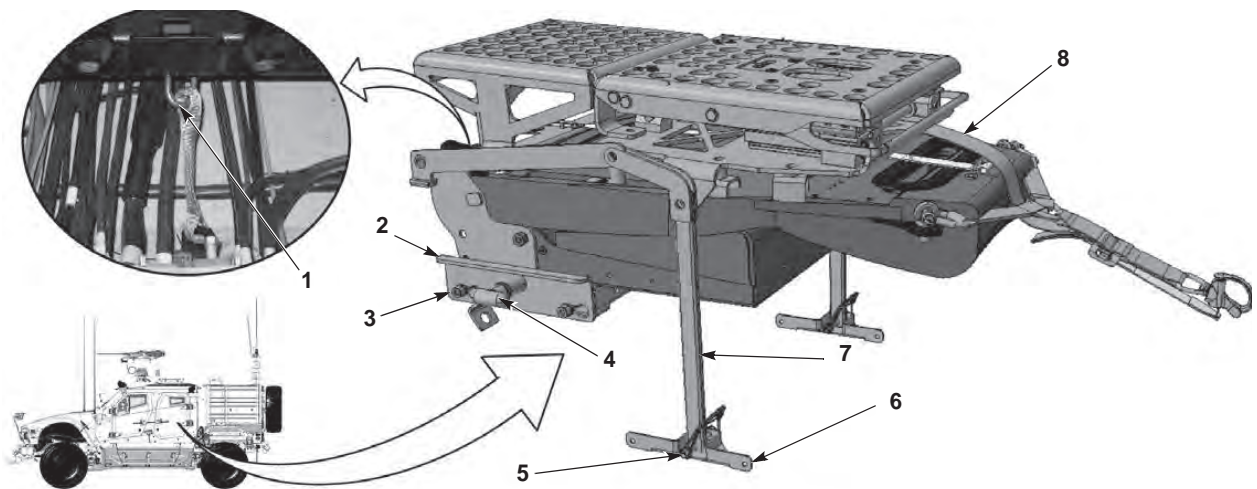
Two

Follow-On Maintenance

Close Capsule Doors (TM 9-2355-335-10)
 Raise 5th Seat (TM 9-2355-335-10)
 Remove and Stow Wheel Chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
 Lifting Device

REMOVAL

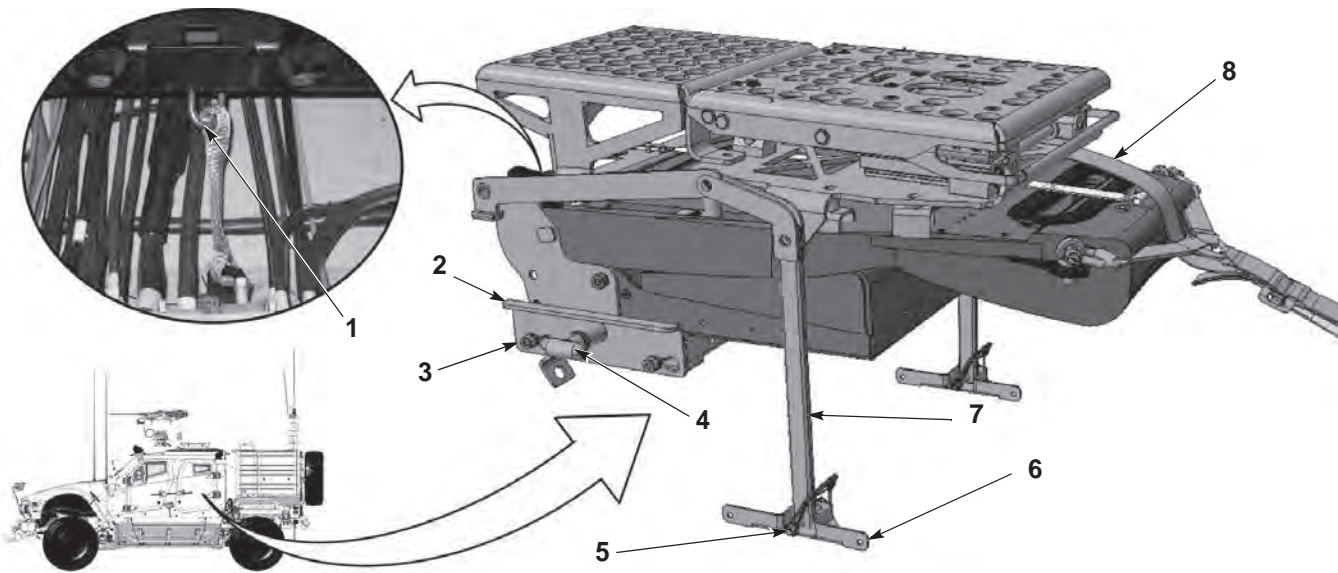
1. Disconnect D-ring (1) from rear of 5th seat (8).
2. Remove pin (5) from vertical support (7) and floor mounting bracket (6).
3. Pull T-handle (4), move bracket (2) towards rear of vehicle and remove from bracket pins (3).
4. Repeat steps 2 and 3 for driver side mounting hardware.

WARNING

5th seat weighs 80 lbs (37 kg). Do not attempt to remove 5th seat from vehicle without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

5. With the aid of an assistant, remove 5th seat (8) through capsule doors onto cargo deck.
6. Attach lifting device to 5th seat (8) and remove from vehicle.

END OF TASK

INSTALLATION**WARNING**

5th seat weighs 80 lbs (37 kg). Do not attempt to remove 5th seat from vehicle without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

Rear passenger and rear driver seat must be aligned in order to fit slide bracket in alignment holes.

1. With the aid of an assistant and lifting device, move 5th seat (8) onto cargo deck.
2. With the aid of an assistant move 5th seat (8) into capsule through capsule doors.
3. Pull T-handle (4), install bracket (2) onto bracket pins (3) and slide bracket (2) forward.
4. Position 5th seat so holes in vertical support (7) align with holes in floor mounting bracket (6).
5. Install pin (5) through holes in vertical support (7) and floor mounting bracket (6).
6. Repeat steps 3–5 to install driver side mounting hardware.
7. Install D-ring (1) to 5th seat (8).
8. Perform Follow-On Maintenance.

END OF TASK

END OF WORK PACKAGE

AUXILIARY MIRROR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood raised (if removing mirror arm pivot brackets)

Tools and Special Tools

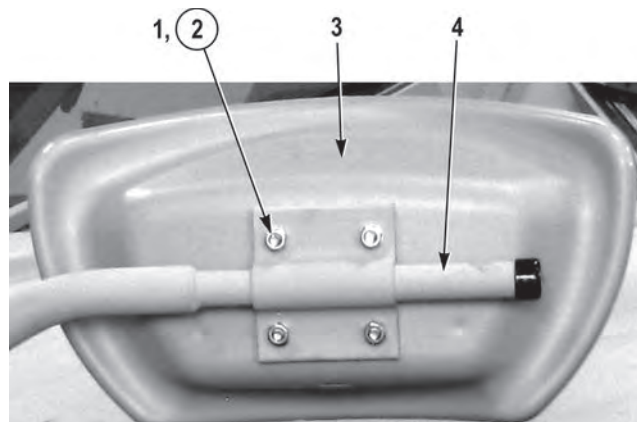
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 0 to 300 in-lb

Materials/Parts

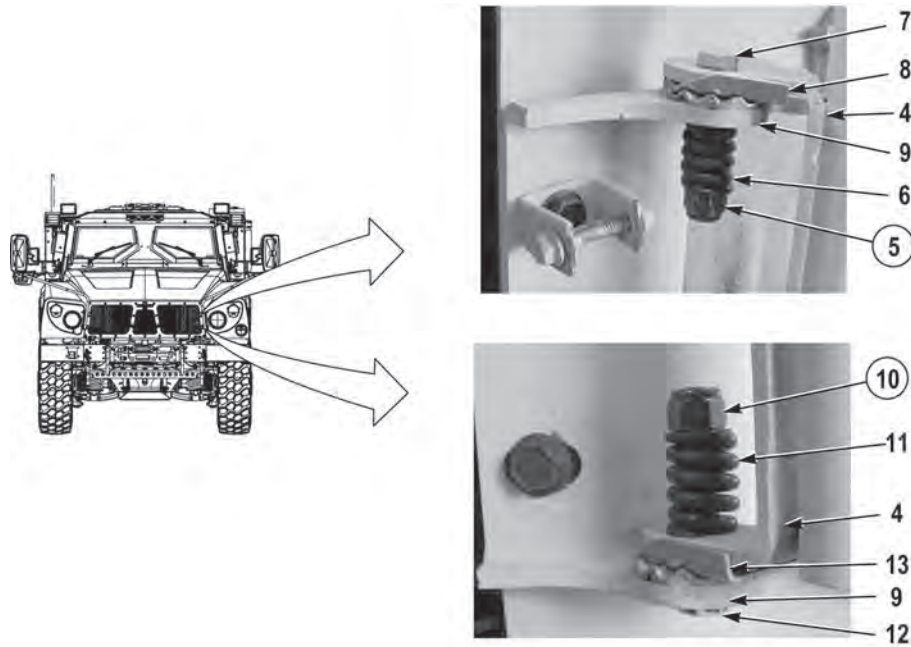
Lockwasher (4) (Item 2)
Locknut (Item 5)
Locknut (Item 10)
Locknut (Item 14)
Locknut (2) (Item 17)
Locknut (Item 20)
Locknut (2) (Item 22)

Follow-On Maintenance

Remove and stow wheel chocks

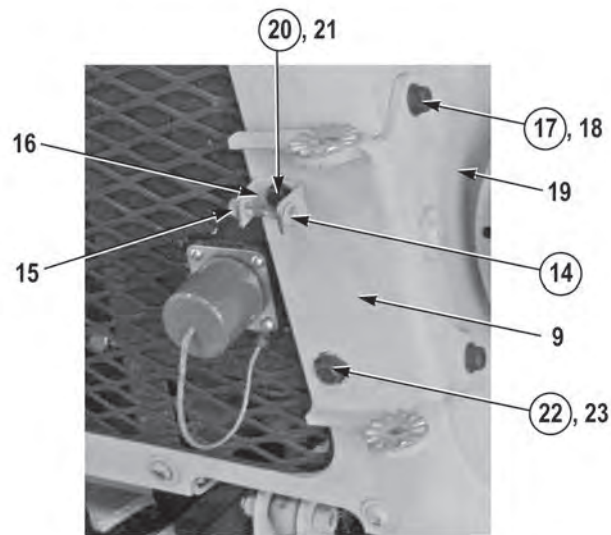
REMOVAL**NOTE**

- Driver side and passenger side auxiliary mirror is removed the same way. Driver side auxiliary mirror shown.
 - Note position of mirror prior to removal to ensure proper installation.
1. Remove four nuts (1), lockwashers (2), and auxiliary mirror (3) from mirror tube mount (4). Discard lockwashers (2).



NOTE

- Perform Steps (2) and (3) if mirror tube mount needs to be replaced.
 - Note position of mounting hardware prior to removal to ensure proper installation.
 - Spring tension will be removed as locknut is loosened.
2. Remove locknut (5), spring (6), screw (7), and coined bracket (8) from mirror tube mount (4) and mirror arm pivot bracket (9). Discard locknut (5).
 3. Remove locknut (10), spring (11), screw (12), coined bracket (13), and mirror tube mount (4) from mirror arm pivot bracket (9). Discard locknut (10).

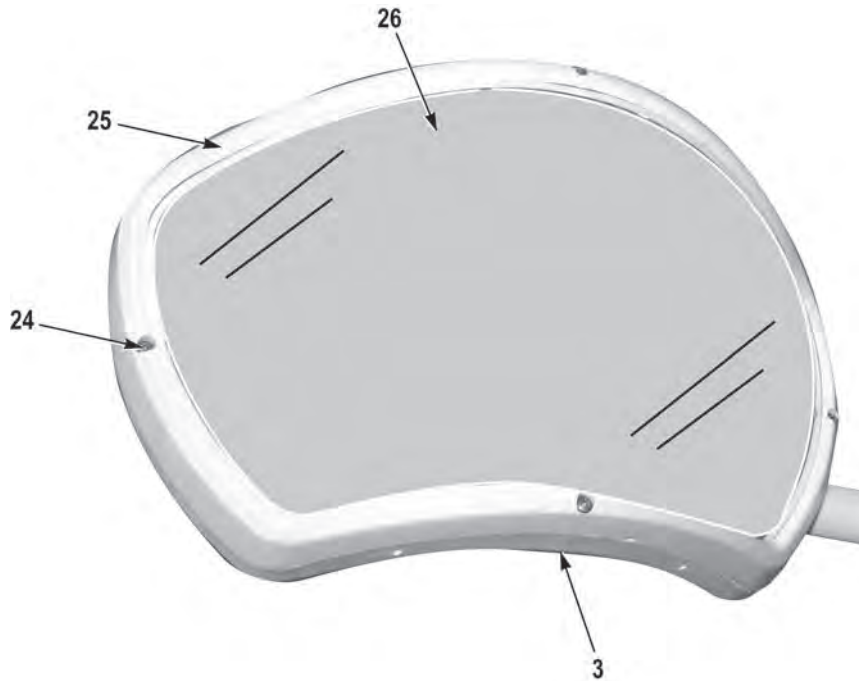


CAUTION

Take care when removing brackets from hood. Hood will no longer be secured if removing both brackets. Failure to comply may result in damage to equipment.

NOTE

- Perform Steps (4) through (6) if mirror arm pivot bracket needs to be replaced.
 - An assistant may be required to remove hardware in Steps (4) through (7).
4. Remove locknut (14) and screw (15) from bracket (16). Discard locknut (14).
 5. Remove two locknuts (17), and screws (18) from hood (19) and mirror arm pivot bracket (9). Discard locknuts (17).
 6. Remove locknut (20), screw (24), and bracket (16) from hood (19) and mirror arm pivot bracket (9). Discard locknut (20).
 7. Remove locknut (22), screw (23), and mirror arm pivot bracket (9) from hood (19). Discard locknut (22).



8. Remove four screws (24), bezel (25), and mirror (26) from auxiliary mirror (3).

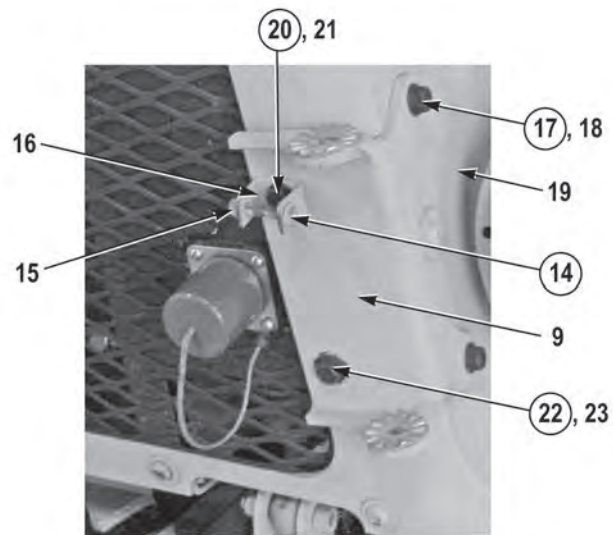
END OF TASK

INSTALLATION

NOTE

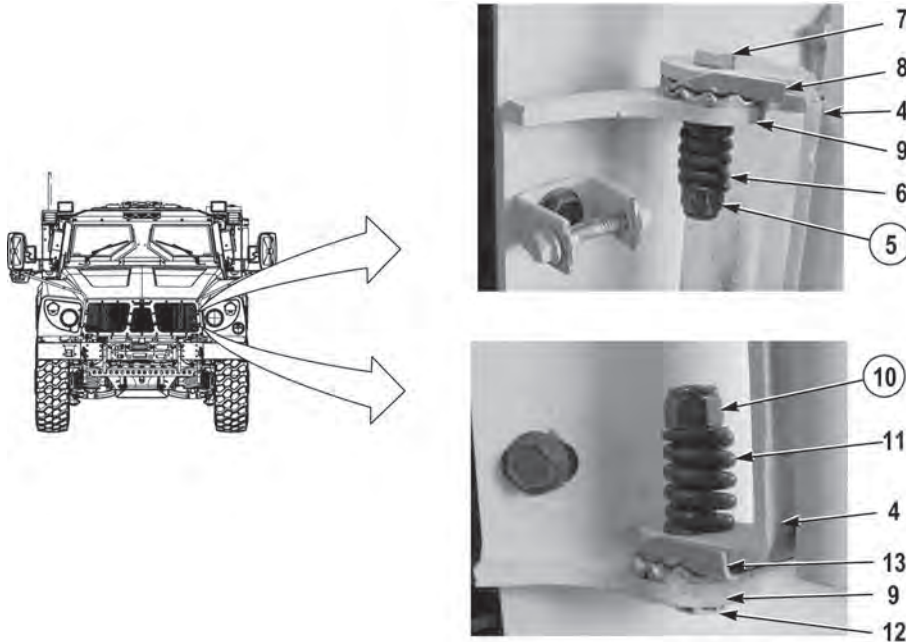
Driver side and passenger side auxiliary mirror is installed the same way. Driver side shown.

1. Install mirror (26) and bezel (25) on auxiliary mirror (3) with four screws (24).



NOTE

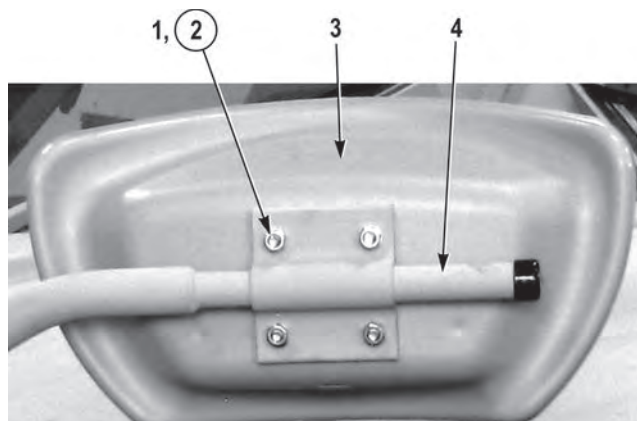
- Perform Steps (1) through (3) if mirror arm pivot bracket was removed.
 - Install mounting hardware as noted prior to removal.
 - An assistant may be required to aid in installation of hardware in Steps (2) through (4).
2. Install mirror arm pivot bracket (9) on hood (19) with new locknut (22), and screw (23).
 3. Install bracket (16) and secure mirror arm pivot bracket (9) to hood (19) with locknut (20), and screw (21).
 4. Secure mirror arm pivot bracket (9) on hood (19) with two new locknuts (17), and screws (18).
 5. Install screw (15) and new locknut (14) on bracket (16).



NOTE

Perform Steps (4) and (5) if mirror mount tube was removed.

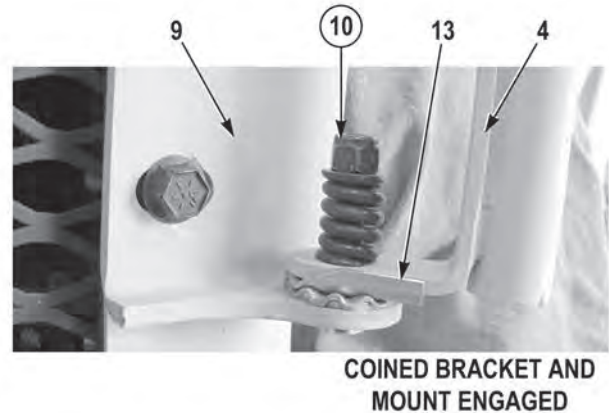
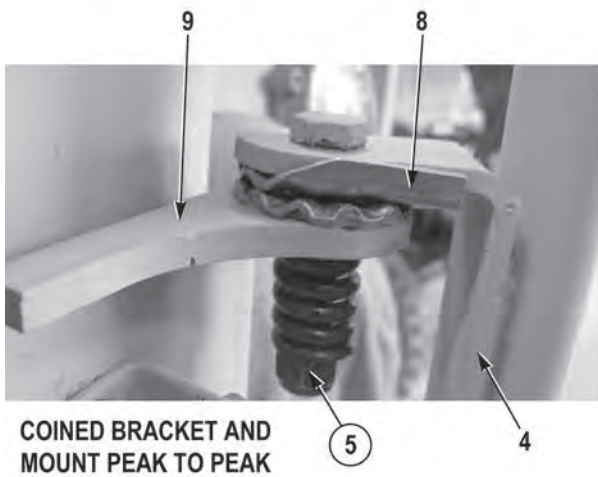
- 6. Install coiled bracket (13), mirror tube mount (4), and spring (11) on mirror arm pivot bracket (9) with screw (12), and new locknut (10). Do not tighten locknut.
- 7. Position coiled bracket (8), mirror tube mount (4), and spring (6) on mirror arm pivot bracket (9) and secure mirror tube mount (4) to mirror arm pivot bracket (9) with screw (7) and new locknut (5). Do not tighten locknut.



NOTE

Install mirror as noted prior to removal.

- 8. Install auxiliary mirror (3) on mirror tube mount (4) with four new lockwashers (2) and nuts (1).



NOTE

Driver side and passenger side auxiliary mirror is adjusted the same way. Driver side shown.

9. Adjust mirror tube mount (4) so that coined bracket (8) and (13) and mirror arm pivot bracket (9) are set peak to peak.
10. Tighten locknut (10) and (5) to 120 lb-in (14 N•m).
11. Loosen locknut (10) and (5) 1/4 turn.
12. Adjust mirror tube mount (4) so that coined bracket (8) and (13) and mirror arm pivot bracket (9) are fully engaged and positioned.
13. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

B-PILLAR HANDLE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Materials/Parts

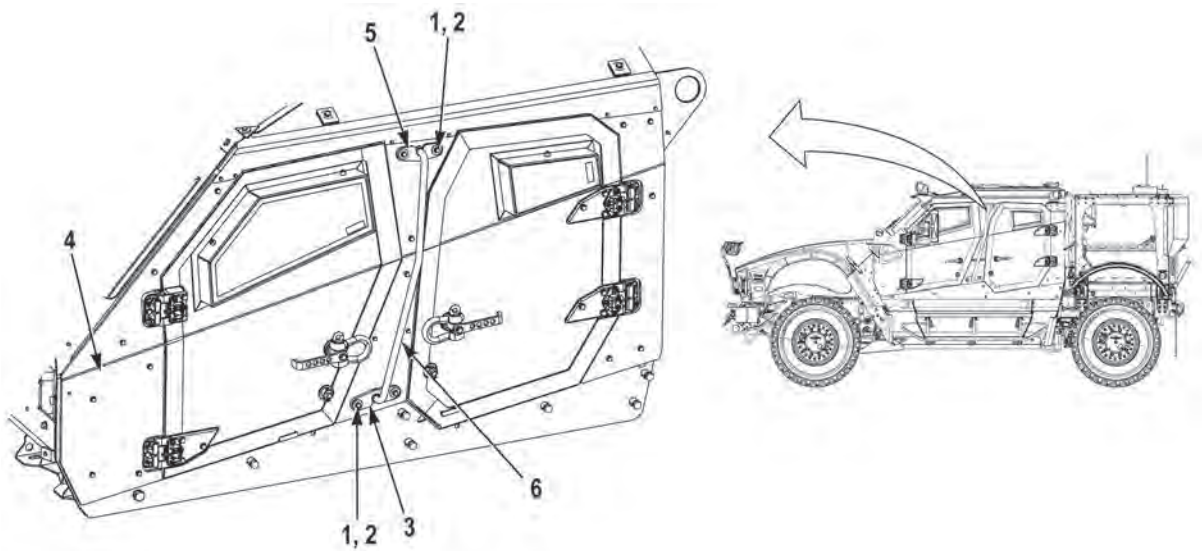
Compound, Sealing, Loctite 242

Follow-On Maintenance

Remove and stow wheel chocks

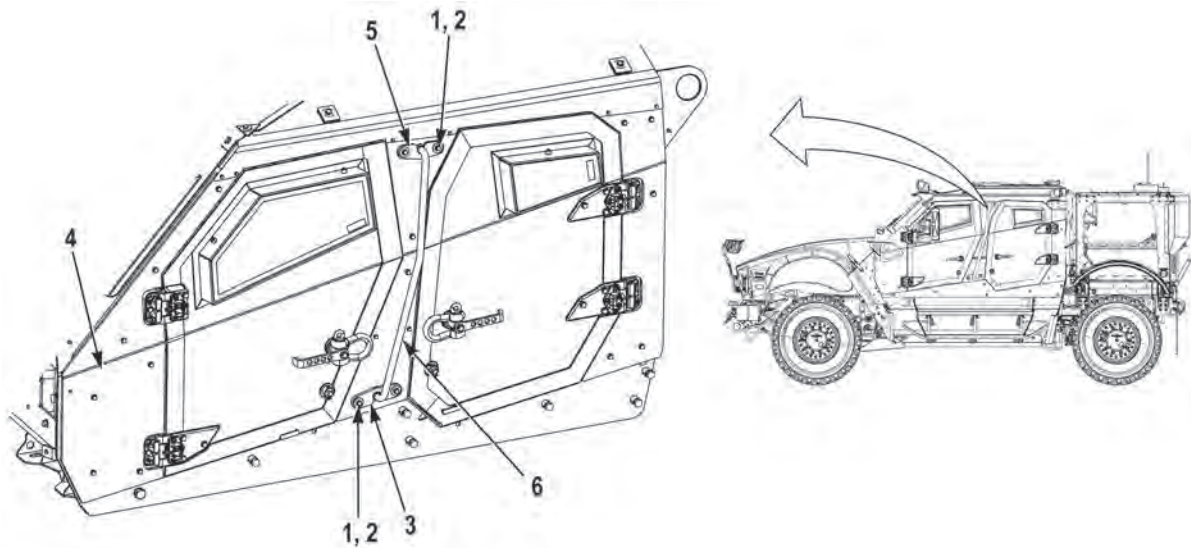
Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL

1. Remove two screws (1), washers (2), and lower mounting plate (3) from capsule (4).
2. Loosen two screws (1) in upper mounting plate (5).
3. Remove handle (6) from upper mounting plate (5).
4. Remove two screws (1), washers (2), and upper mounting plate (5) from capsule (4).

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 242, to threads of four screws (1).
2. Install two screws (1), washers (2), and upper mounting plate (5) on capsule (4). Do not tighten screws (1).
3. Install handle (6) on upper mounting plate (5).
4. Install handle (6) and lower mounting plate (3) on capsule (4) with two washers (2) and screws (1).
5. Tighten screws (1) on upper mounting plate (5).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

CAPSULE DOOR REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Batteries disconnected (M1240/M1240A1)
 (WP 0186)
 Batteries disconnected (M1245) (WP 0187)
 Mirror assembly removed (WP 0160)

Tools and Special Tools

Strap, 20 ft
 Lifting Device
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

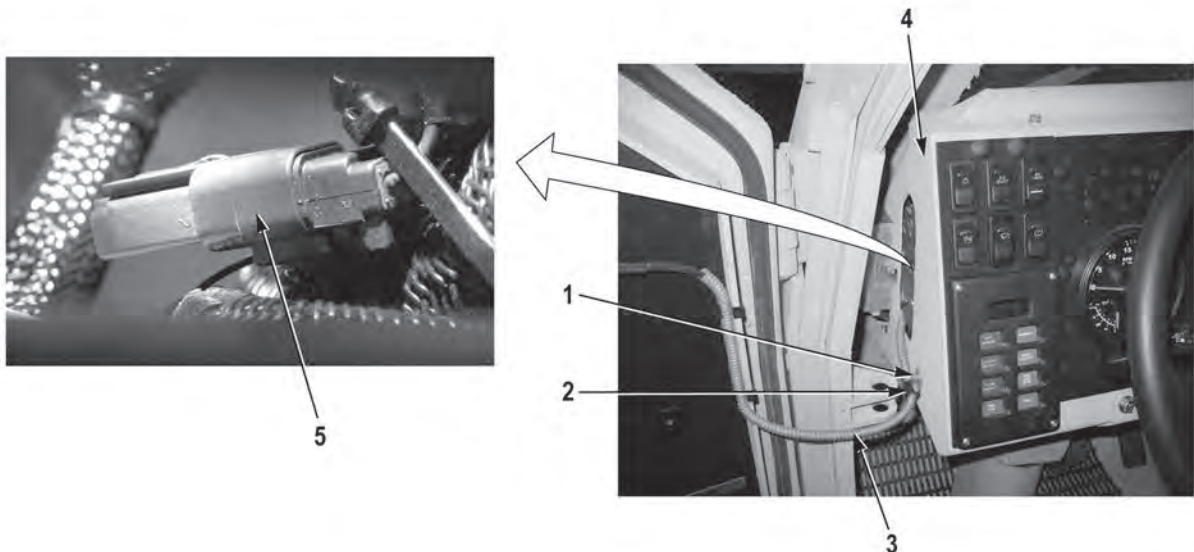
Compound, Sealing, Loctite 242

Personnel Required

Two

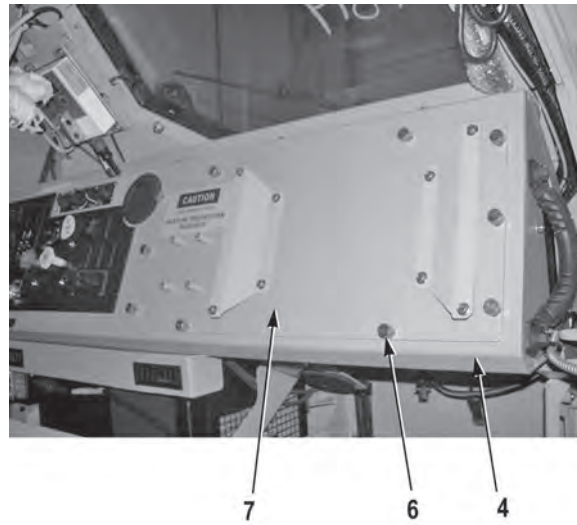
Follow-On Maintenance

Install mirror assembly (WP 0160)
 Connect batteries (M1240/M1240A1) (WP 0186)
 Connect batteries (M1245) (WP 0187)
 Remove and stow wheel chocks

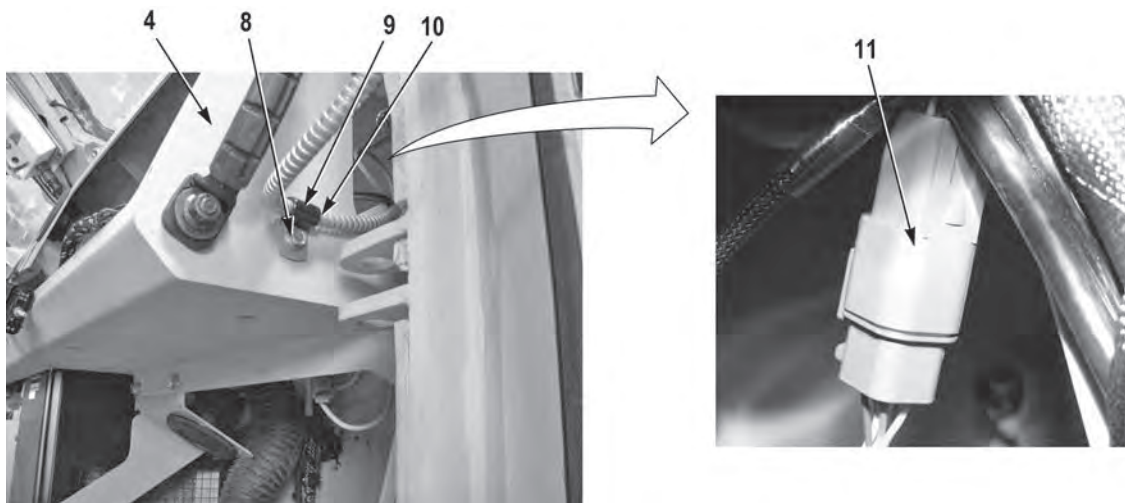
FRONT CAPSULE DOOR REMOVAL**NOTE**

- Perform Steps (1) through (2) for driver side.
- Perform Steps (3) through (5) for passenger side.

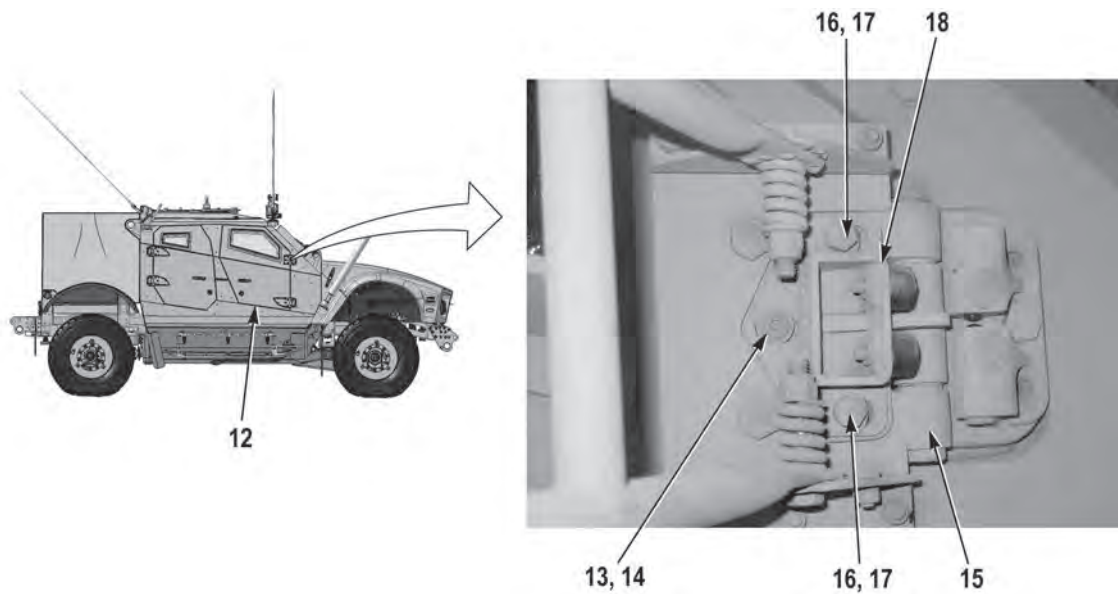
1. Remove screw (1), cushion clip (2), and wire (3) from dash (4).
2. Disconnect connector (5).



3. Remove ten screws (6) and dash circuit breaker cover (7) from dash (4).



4. Remove screw (8), cushion clip (9), and wire (10) from dash (4).
5. Disconnect connector (11).



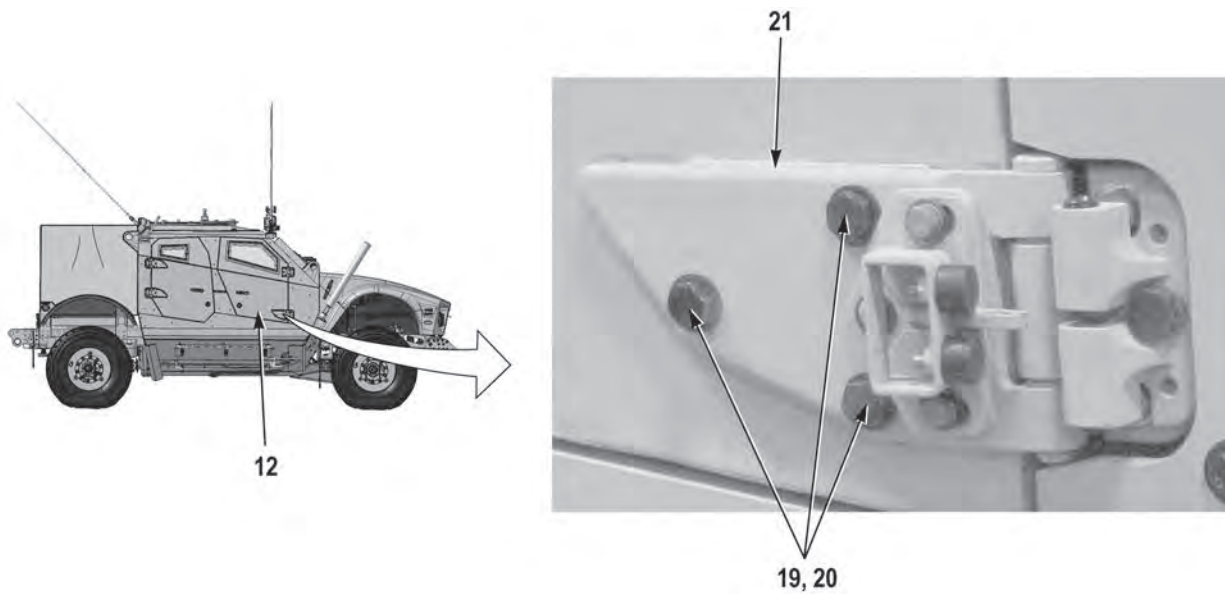
WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

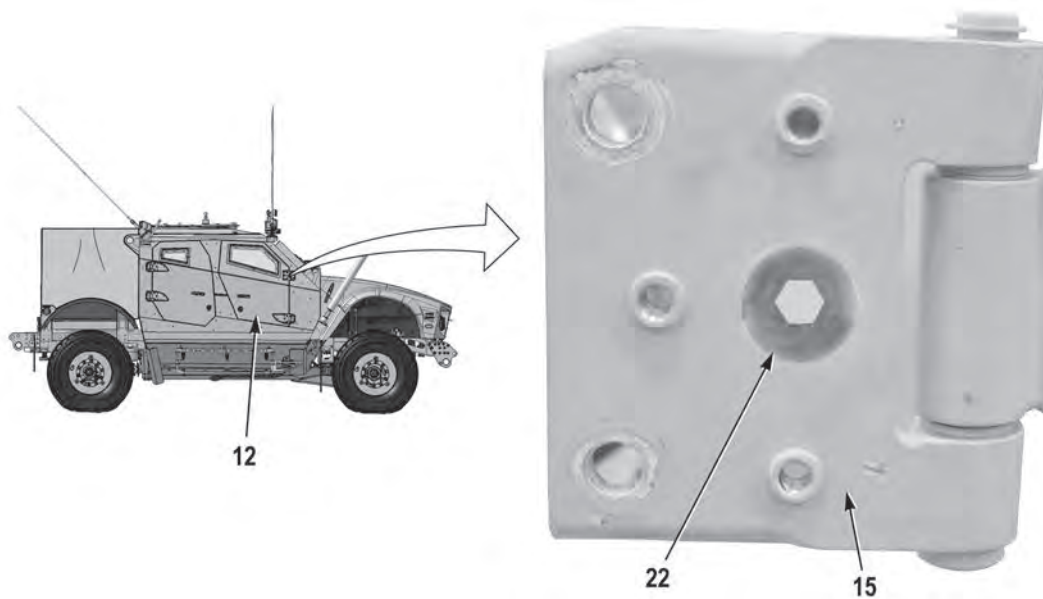
NOTE

Front driver and passenger side doors are removed the same way. Passenger side door shown.

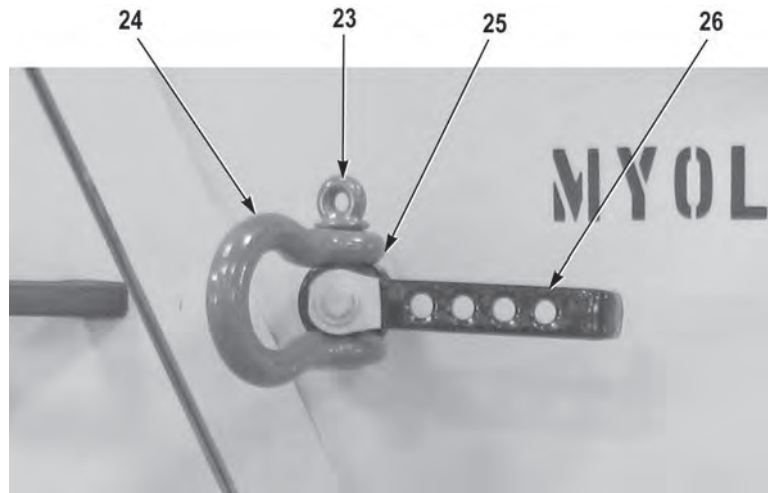
6. Attach a lifting device to support weight of capsule door (12).
7. Remove screw (13) and washer (14) from top hinge (15).
8. Remove two screws (16), washers (17), and capsule door stop bracket (18) from top hinge (15).



9. Remove three screws (19) and washers (20) from bottom hinge (21) and capsule door (12).



10. Remove screw (22) from top hinge (15) and capsule door (12).
11. With the aid of an assistant and lifting device, remove capsule door (12) from vehicle.



NOTE

- Perform Step (12) for M1240A1, M1245, or vehicles equipped with under body improvement.
- Perform Step (12) if shackle needs to be removed.

12. Remove pin (23), shackle (24), and rubber washer (25) from door handle (26).

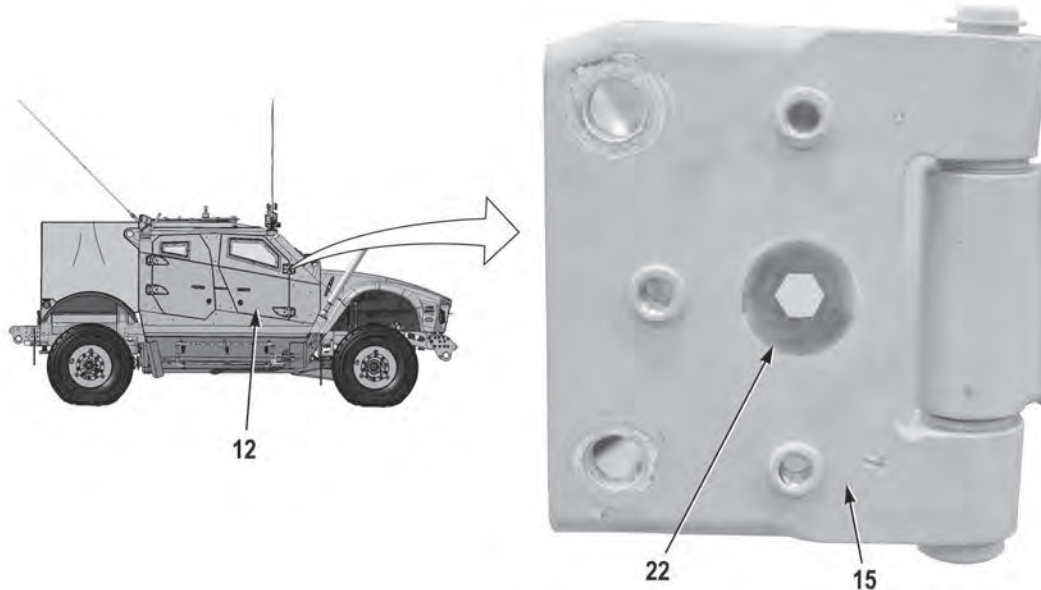
END OF TASK

FRONT CAPSULE DOOR INSTALLATION

NOTE

- Perform Step (1) for M1240A1, M1245, or vehicles equipped with under body improvement.
- Perform Step (1) if shackle was removed.

1. Install rubber washer (25) and shackle (24) on door handle (26) with pin (23).



WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

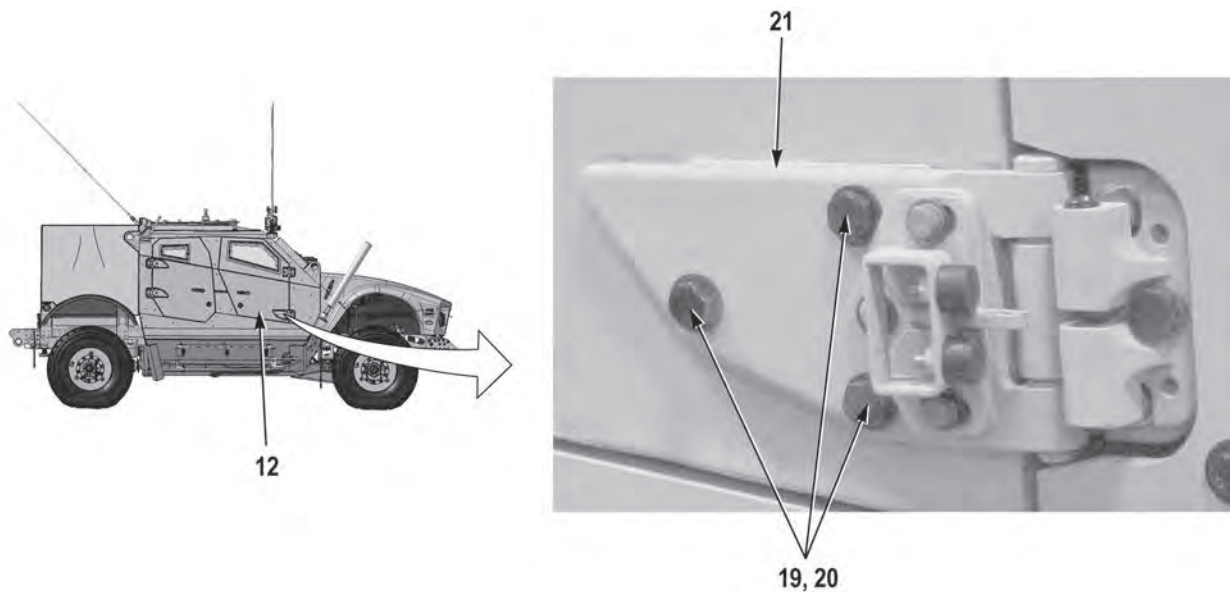
Front driver side and passenger side capsule doors are installed the same way. Passenger side capsule door shown.

2. Attach lifting device to capsule door (12).
3. With the aid of an assistant and lifting device, align screw holes in top hinge (15) with screw holes in capsule door (12).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

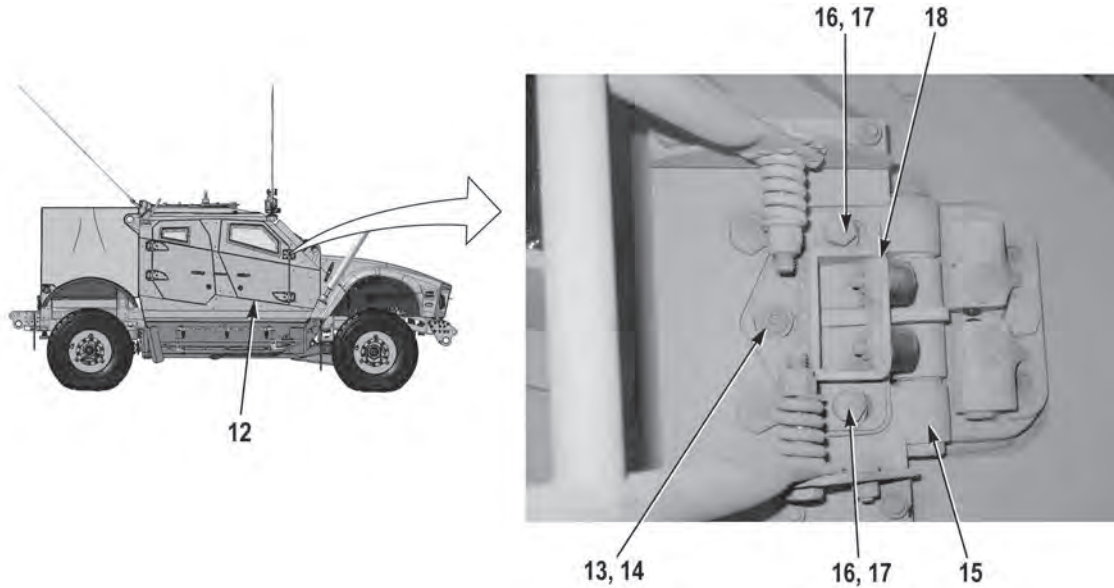
4. Apply sealing compound, Loctite 242, to threads of screw (22).
5. Install screw (22) in top hinge (15) and capsule door (12).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

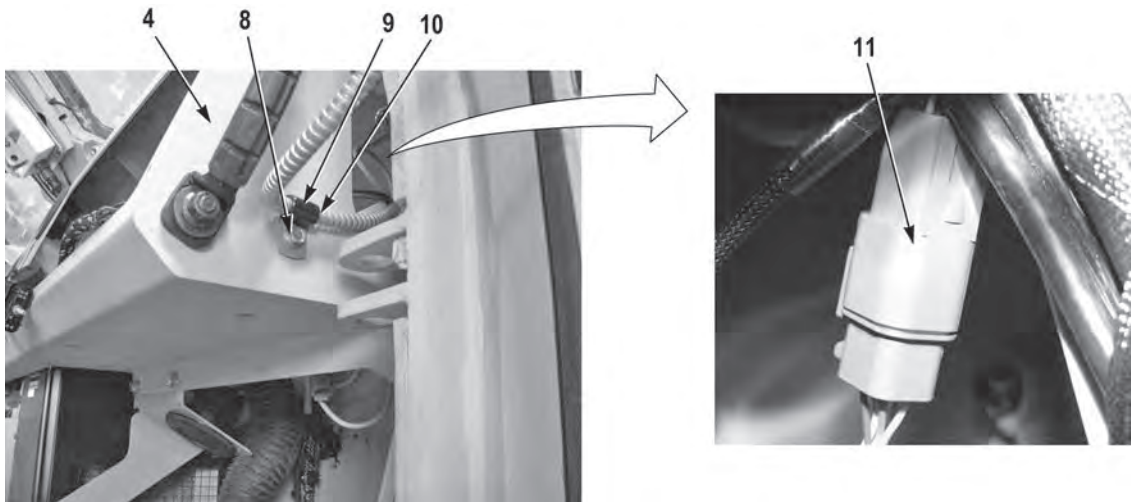
6. Apply sealing compound, Loctite 242 to threads of three screws (19).
7. With the aid of an assistant and lifting device, align screw holes in bottom hinge (21) with screw holes in capsule door (12) and install three screws (19) and washers (20).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

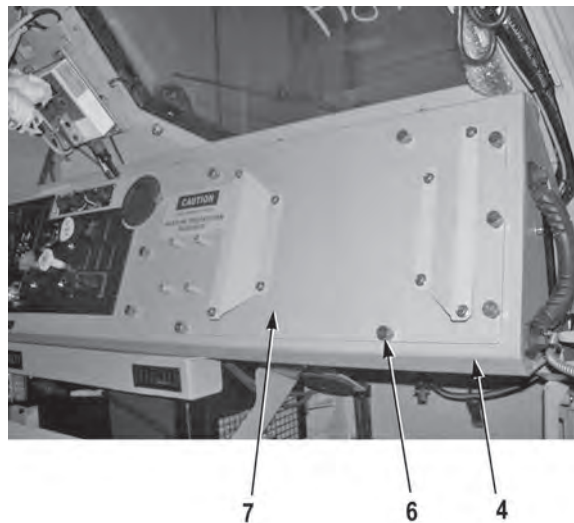
8. Apply sealing compound, Loctite 242, to the threads of three screws (16 and 13).
9. Install capsule door stop bracket (18) with two screws (16) and washers (17).
10. Install screw (13) and washer (14) in door stop bracket (18) and top hinge (15).
11. Remove lifting device from capsule door (12).

**NOTE**

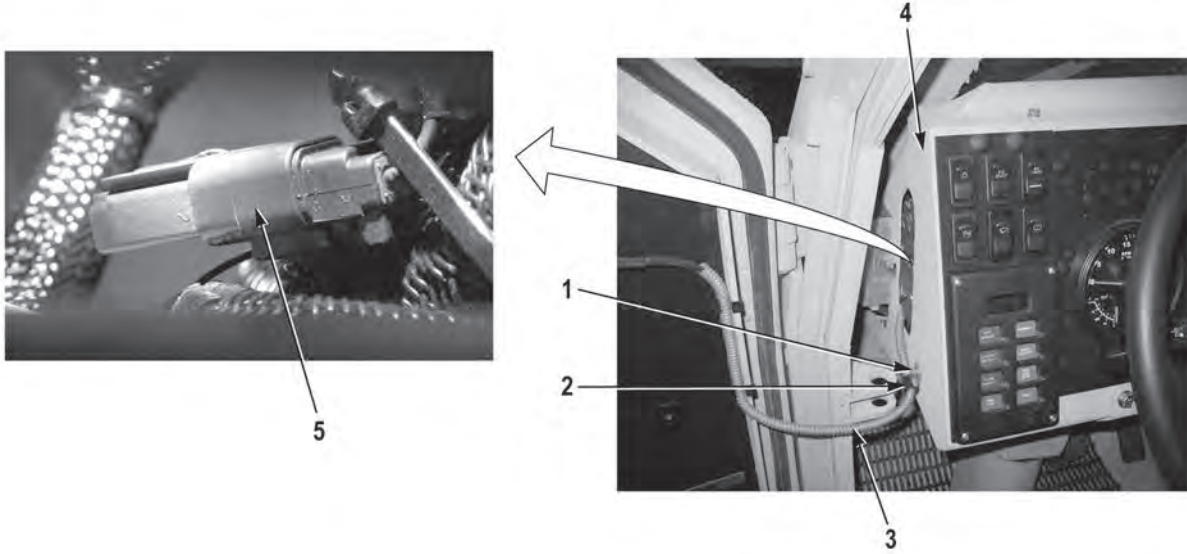
- Perform Steps (12) through (14) for passenger side capsule door.
- Perform Steps (15) and (16) for driver side capsule door.

12. Connect connector (11).

13. Install wire (10) and cushion clip (9) on dash (4) with screw (8).



14. Install dash circuit breaker cover (7) on dash (4) with ten screws (6).

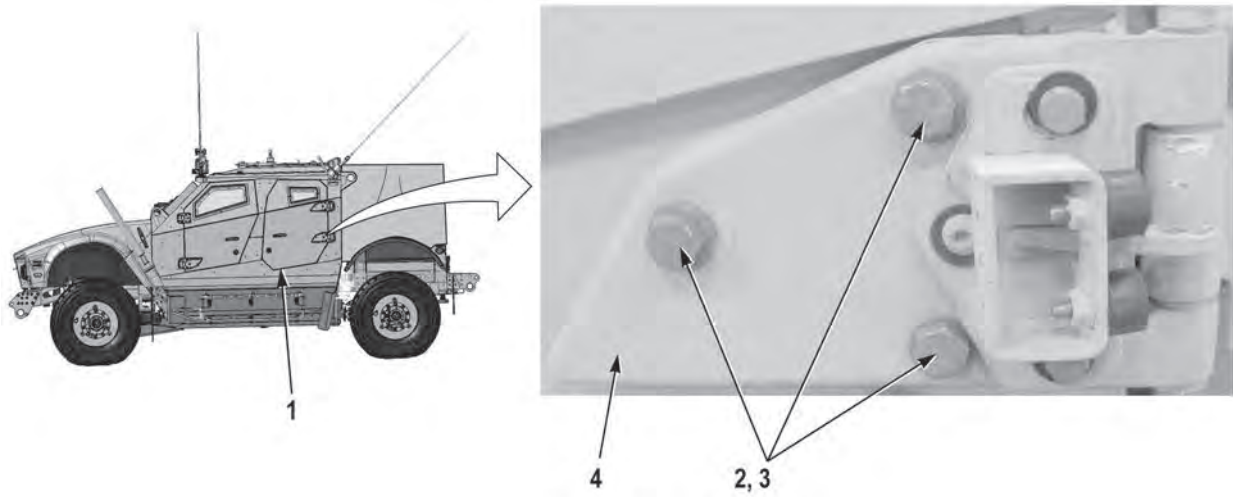


15. Connect connector (5).

16. Install wire (3) and cushion clip (2) on dash (4) with screw (1).

END OF TASK

REAR CAPSULE DOOR REMOVAL

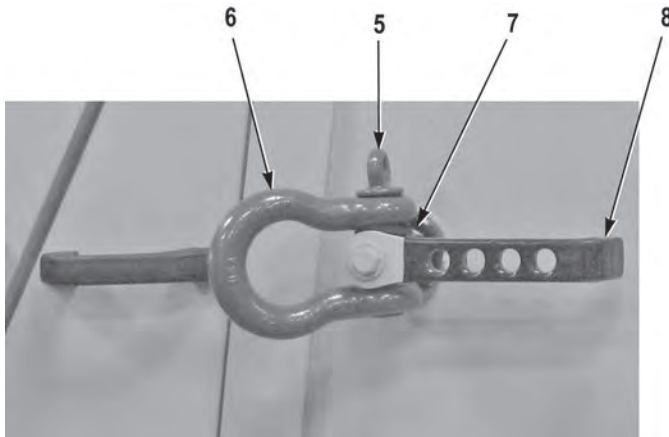


WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Rear driver side and passenger side capsule doors are removed the same way. Driver side capsule door shown.
 - Both hinges are removed the same way. Bottom hinge shown.
1. Open capsule door (1) and attach lifting device to support weight of capsule door (1).
 2. Remove three screws (2) and washers (3) from hinge (4) and capsule door (1).
 3. Repeat Step (2) for top hinge.

**NOTE**

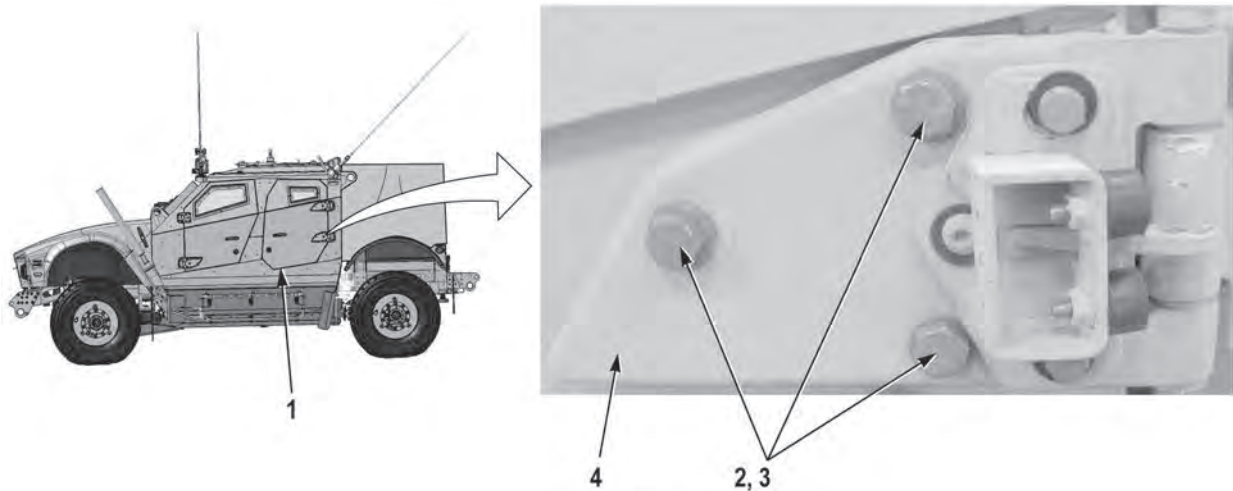
- Perform Step (4) for M1240A1, M1245, or vehicle equipped with underbody improvement.
- Perform Step (4) if shackle needs to be removed.

4. Remove pin (5), shackle (6), and rubber washer (7) from door handle (8).

END OF TASK**REAR CAPSULE DOOR INSTALLATION****NOTE**

- Perform Step (1) for M1240A1, M1245, or vehicle equipped with underbody improvement.
- Perform Step (1) if shackle was removed.

1. Install rubber washer (7) and shackle (6) on door handle (8) with pin (5).



WARNING

Capsule doors weigh 276 to 298 lbs (125 to 135 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

NOTE

- Rear driver side and passenger side capsule doors are installed the same way. Driver side capsule door shown.
 - Both hinges are installed the same way. Bottom hinge shown.
2. Attach lifting device to support weight of capsule door (1).
 3. With the aid of an assistant and lifting device, align screw holes in bottom hinge (4) with screw holes in capsule door (1).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealing compound, Loctite 242, to threads of three screws (2).
5. Install three screws (2) and washers (3) in bottom hinge (4) and capsule door (1).
6. Repeat Steps (3) through (5) for top hinge.
7. Remove lifting device from capsule door (1).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CAPSULE STEP REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Materials/Parts

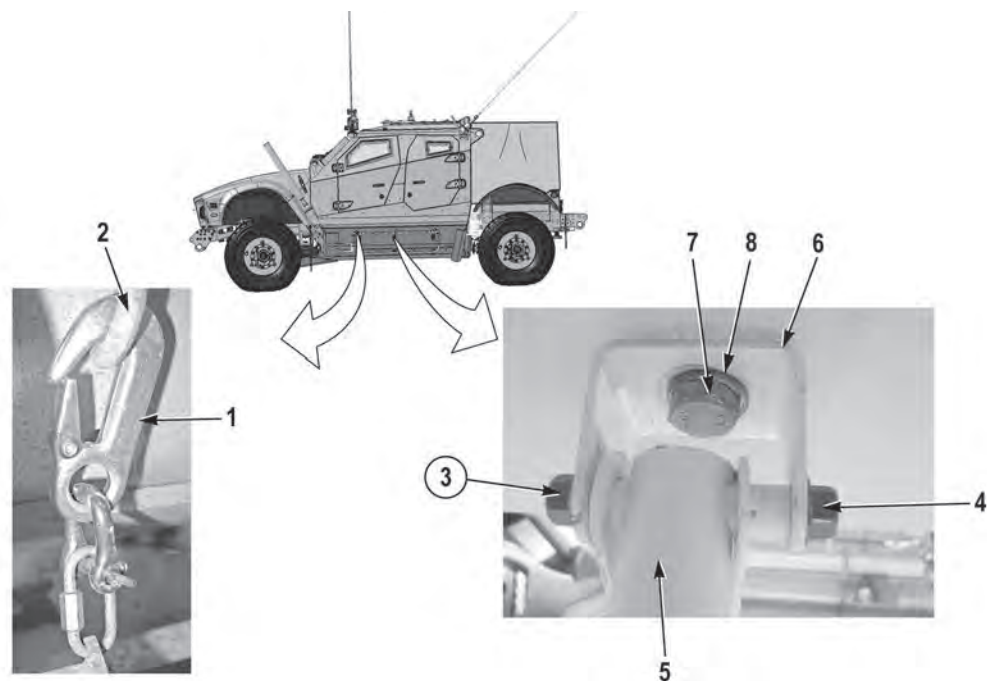
Locknut (3) (Item 3)
 Compound, Sealing, Loctite 242

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

Driver side steps and passenger side steps are removed the same way. Driver side steps shown.

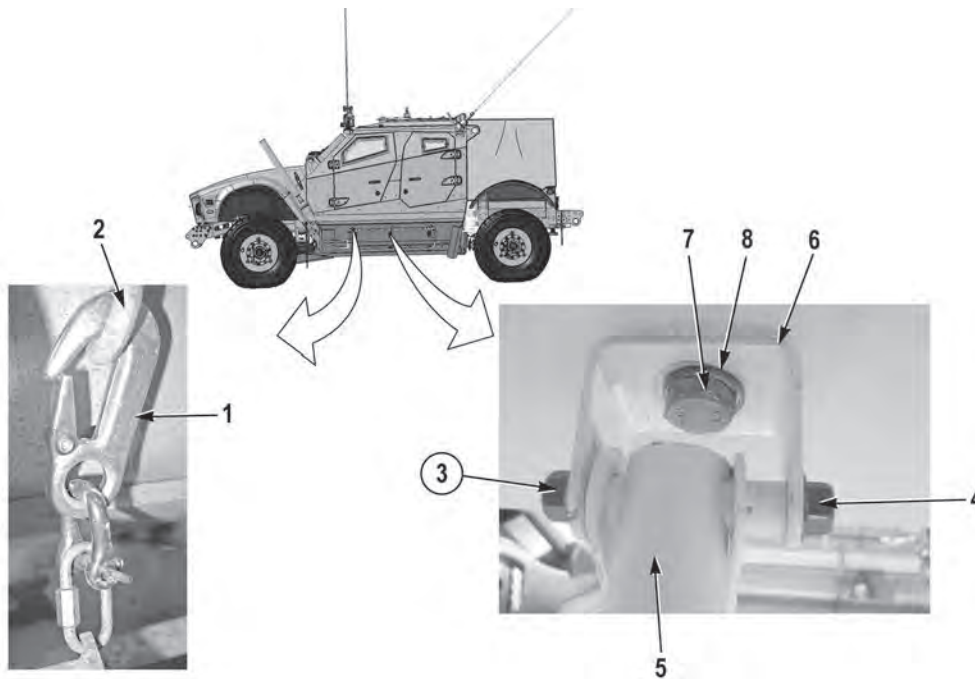
1. Remove two support chains (1) from brackets (2).
2. Remove three locknuts (3), screws (4), and step assembly (5) from three brackets (6). Discard locknuts (3).

NOTE

- Perform Step (3) if replacing brackets.
- Note position of brackets prior to removal to ensure proper installation.

3. Remove three screws (7), washers (8), and brackets (6) from vehicle.

END OF TASK

INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Driver side steps and passenger side steps are installed the same way. Driver side steps shown.
- Perform Steps (1) and (2) if bracket was removed.

1. Apply sealing compound, Loctite 242, to threads of three screws (7).
2. Install three brackets (6) on vehicle with three washers (8) and screws (7).
3. Install step assembly (5) on three brackets (6) with screws (4) and new locknuts (3).
4. Lift step assembly (5) and attach two support chains (1) to brackets (2).
5. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

CAPSULE STEP REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Materials/Parts

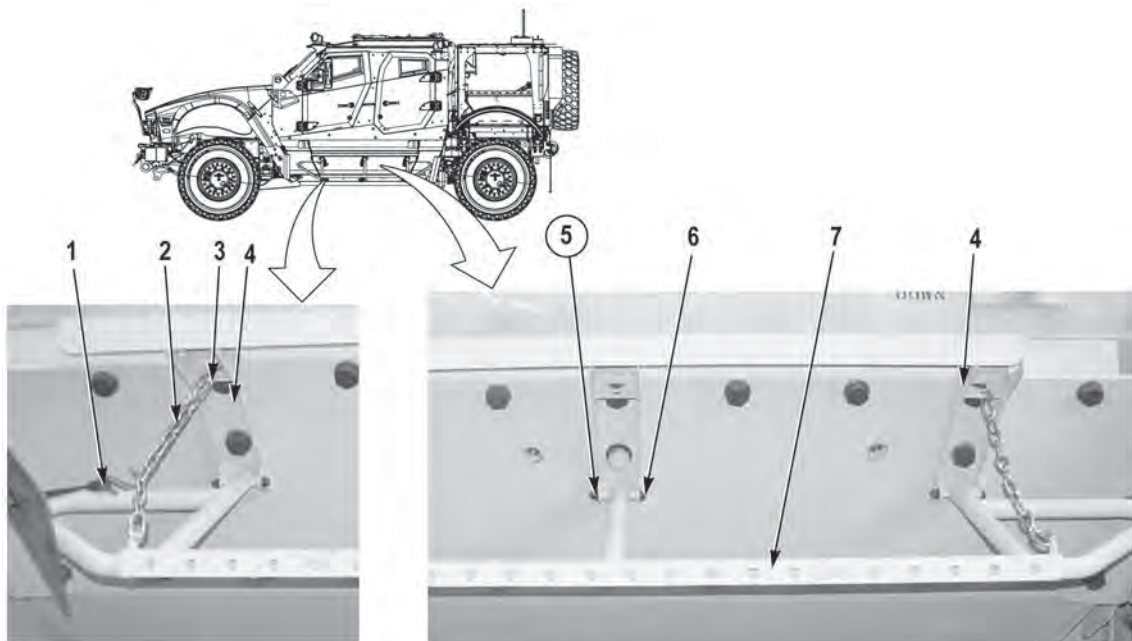
Locknut (3) (Item 5)
 Locknut (3) (Item 8)
 Compound Sealing, Loctite 242

Tools and Special Tools

Bar, Breaker 3/4 in. Dr.
 Bar, Extension 5", 3/4 in. Dr.
 Socket, 36 mm, 3/4 in. Dr.
 Socket, 1-7/16 in., 3/4 in. Dr.
 Tool Kit, General Mechanic's: Automotive

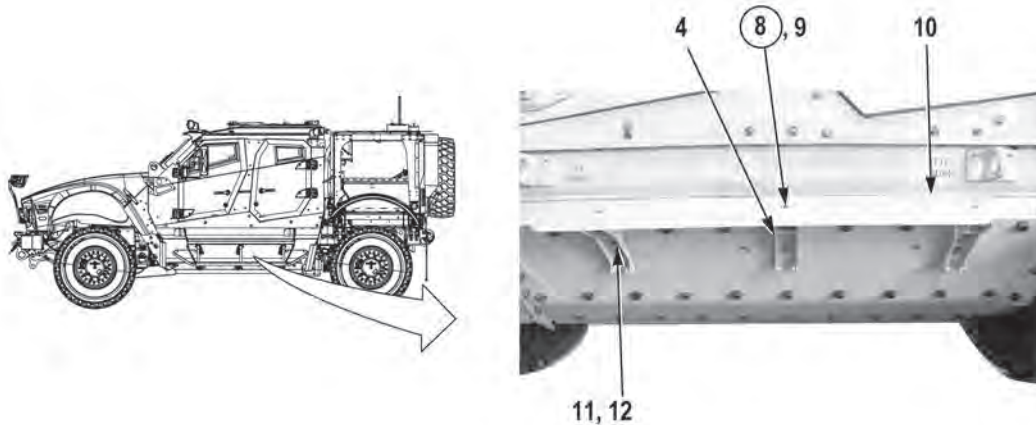
Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

Driver side and passenger side capsule steps are removed the same way. Driver side shown.

1. Remove front mud flap tie down (1) from lower step support chain (2).
2. Remove two quick links (3) from mounting brackets (4).
3. Remove three locknuts (5), screws (6), and lower step (7) from three mounting brackets (4). Discard locknuts (5).

**NOTE**

Perform Step (4) if upper step needs to be removed.

4. Remove three locknuts (8), screws (9), and upper step (10) from three mounting brackets (4). Discard locknuts (8).

NOTE

Perform Step (5) if mounting brackets need to be removed.

5. Remove six screws (11), washers (12), and three mounting brackets (4) from vehicle.

END OF TASK**INSTALLATION****WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

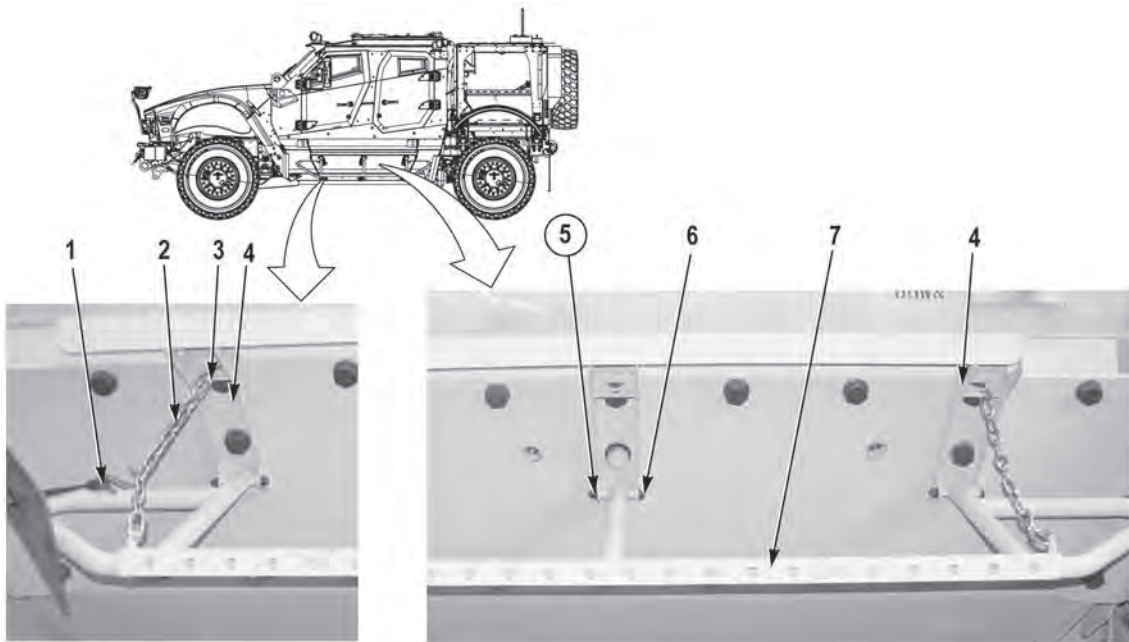
NOTE

- Driver side and passenger side capsule steps are installed the same way. Driver side shown.
 - Perform Steps (1) and (2) if mounting brackets were removed.
1. Apply sealing compound, Loctite 242, to six screws (11).
 2. Install three mounting brackets (4) on vehicle with six washers (12) and screws (11). Do not tighten screws (11).

NOTE

Perform Steps (3) and (4) if upper step was removed.

3. Install upper step (10) on three mounting brackets (4) with three screws (9) and new locknuts (8).
4. Tighten screws (11).



5. Install lower step (7) on three mounting brackets (4) with three screws (6) and new locknuts (5).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

6. Apply sealing compound, Loctite 242 to two quick links (3).
7. Install two quick links (3) on mounting brackets (4).
8. Install front mud flap tie down (1) on lower step support chain (2).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CAPSULE WINDOW REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

Lifting Device
Tool Kit, General Mechanic's: Automotive
Wrench, Torque 20 to 100 ft-lb

Materials/Parts

Locknut (11) (Item 18) (front window)
Locknut (8) (Item 6) (rear window)

Materials/Parts (continued)

Compound, Sealing, Sikaflex 221
Tags, Identification
Ties, Cable

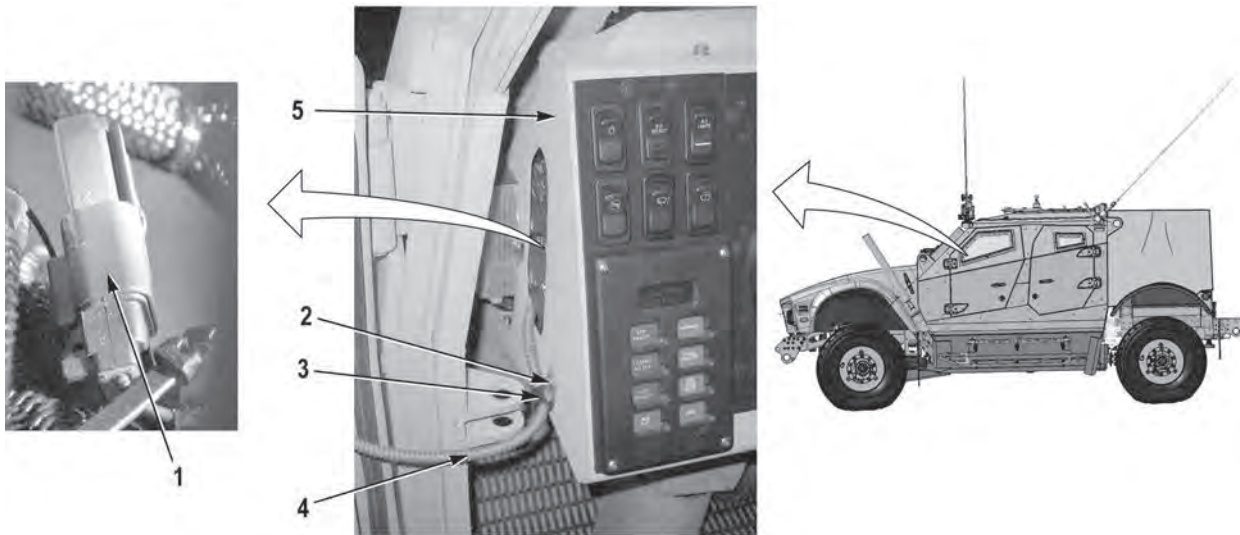
Personnel Required

Two

Follow-On Maintenance

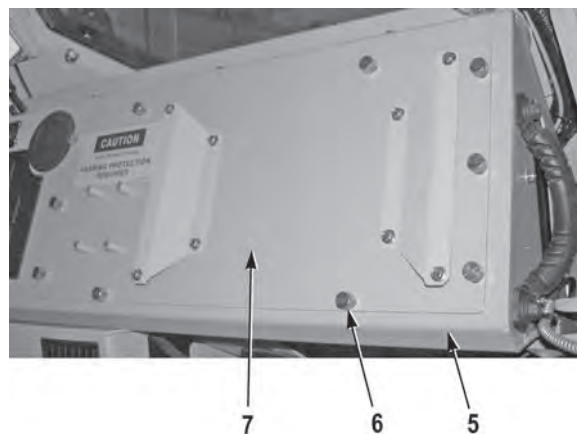
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

FRONT WINDOW REMOVAL

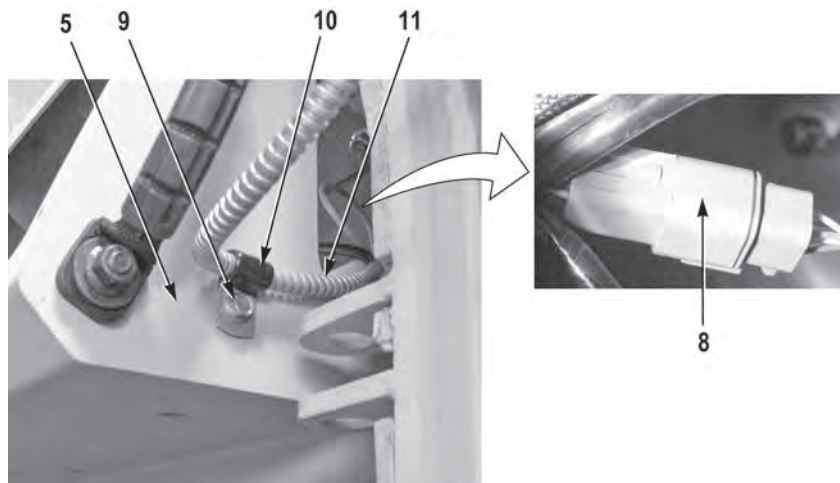
**NOTE**

- Perform Steps (1) and (2) if front driver side window needs to be removed.
- Perform Steps (3) through (5) if front passenger side window needs to be removed.
- Tag and mark connectors prior to removal to ensure proper installation.
- Remove cable ties as required.

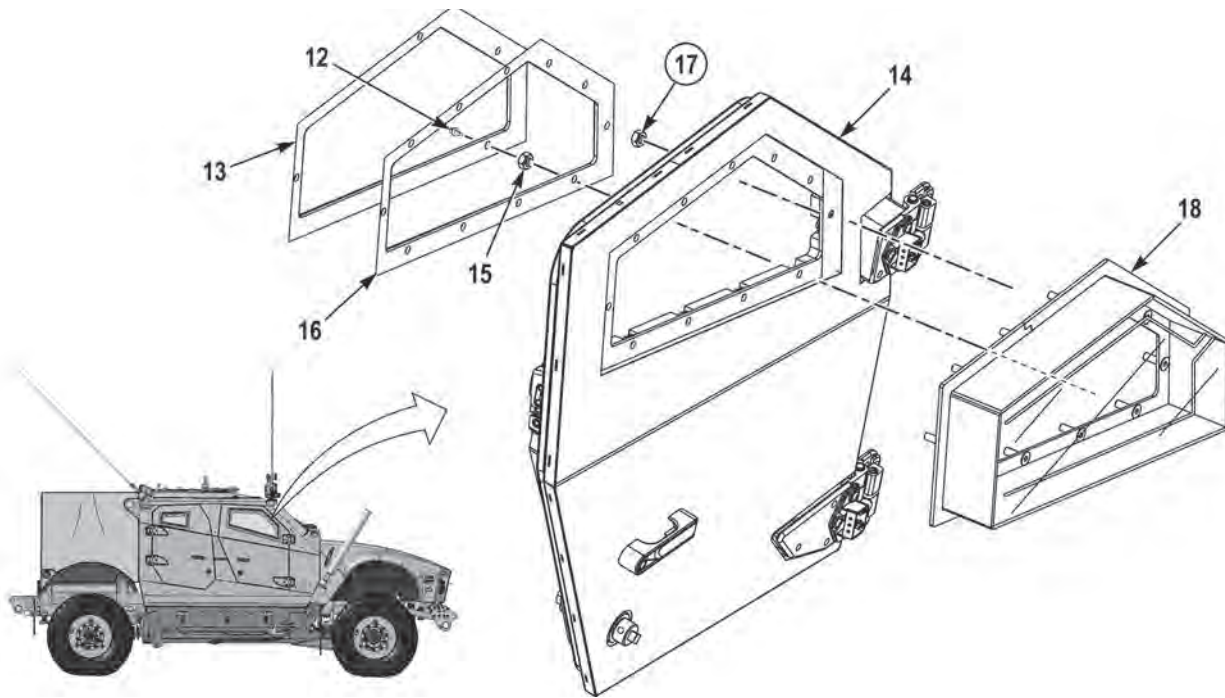
1. Disconnect connector (1).
2. Remove screw (2), cushion clip (3), and deicer wire (4) from dash (5).



3. Remove ten screws (6) and dash circuit breaker cover (7) from dash (5).

**NOTE**

- Tag and mark connectors prior to removal to ensure proper installation.
 - Remove cable ties as required.
4. Disconnect connector (8).
 5. Remove screw (9), cushion clip (10), and deicer wire (11) from dash (5).



NOTE

- Remove deicer wire from door S-clips as required.
- All windows are removed the same way. Passenger side shown.
- Front window has eleven studs with five retaining nuts and rear has eight studs with four retaining nuts.

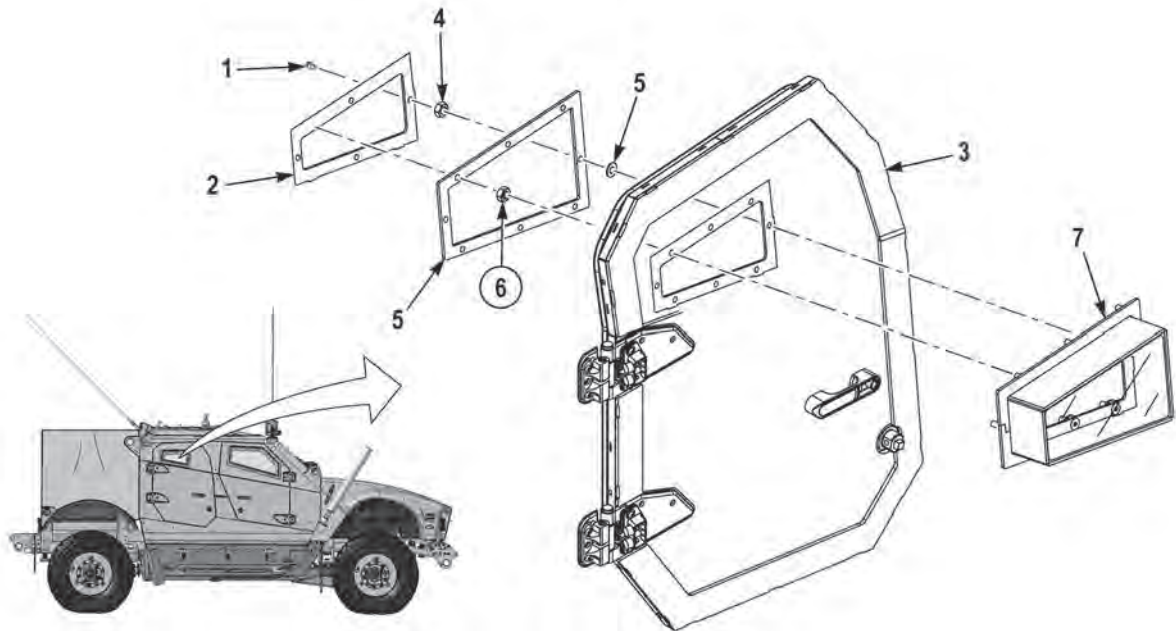
6. Remove caps (12) and window frame cover (13) from front door (14).
7. Remove nuts (15) and window retaining bracket (16) from front door (14).

WARNING

Front windows weigh 122 lbs (55 kg). Do not attempt to lift or move front windows without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

8. With the aid of an assistant and a lifting device, remove eleven locknuts (17) and front window (18) from front door (14). Discard locknuts (17).

END OF TASK

REAR WINDOW REMOVAL

1. Remove four caps (1) and window frame cover (2) from rear door (3).
2. Remove four nuts (4) and window retaining bracket (5) from rear door (3).

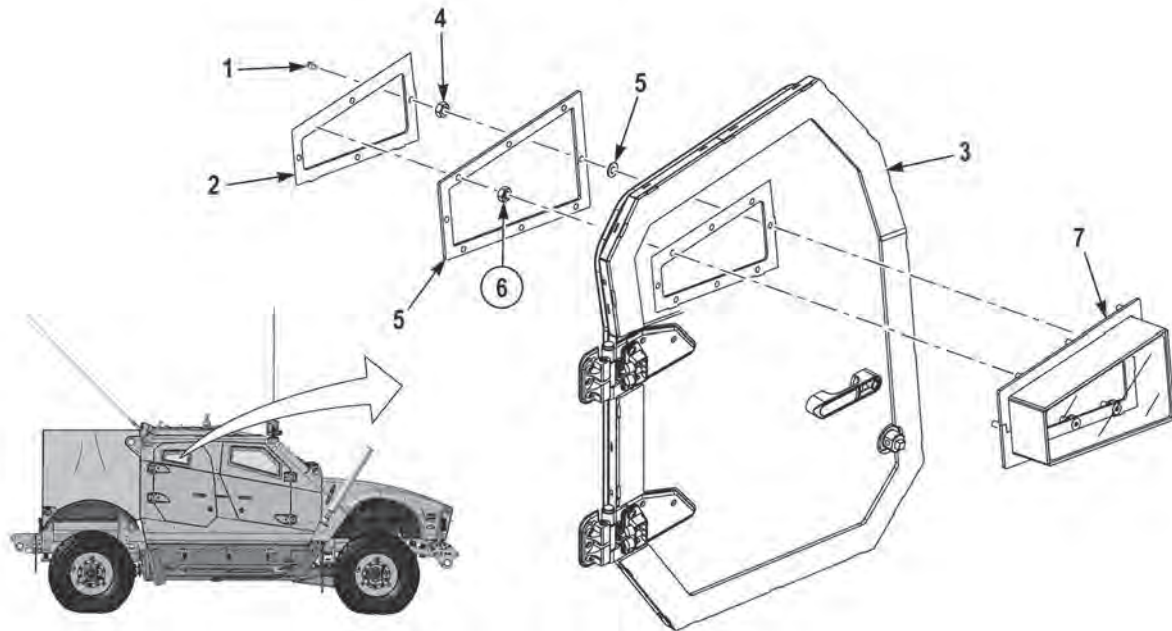
WARNING

Rear windows weigh 46 lbs (21 kg). Do not attempt to lift or move rear windows without the aid of an assistant. Failure to comply may result in injury or death to personnel.

3. With the aid of an assistant, remove eight locknuts (6) and window (7) from rear door (3). Discard locknuts (6).

END OF TASK

REAR WINDOW INSTALLATION



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Sikaflex 221, to window mating area on the rear door (3).

WARNING

Rear windows weigh 46 lbs (21 kg). Do not attempt to lift or move rear window without the aid of an assistant. Failure to comply may result in injury or death to personnel.

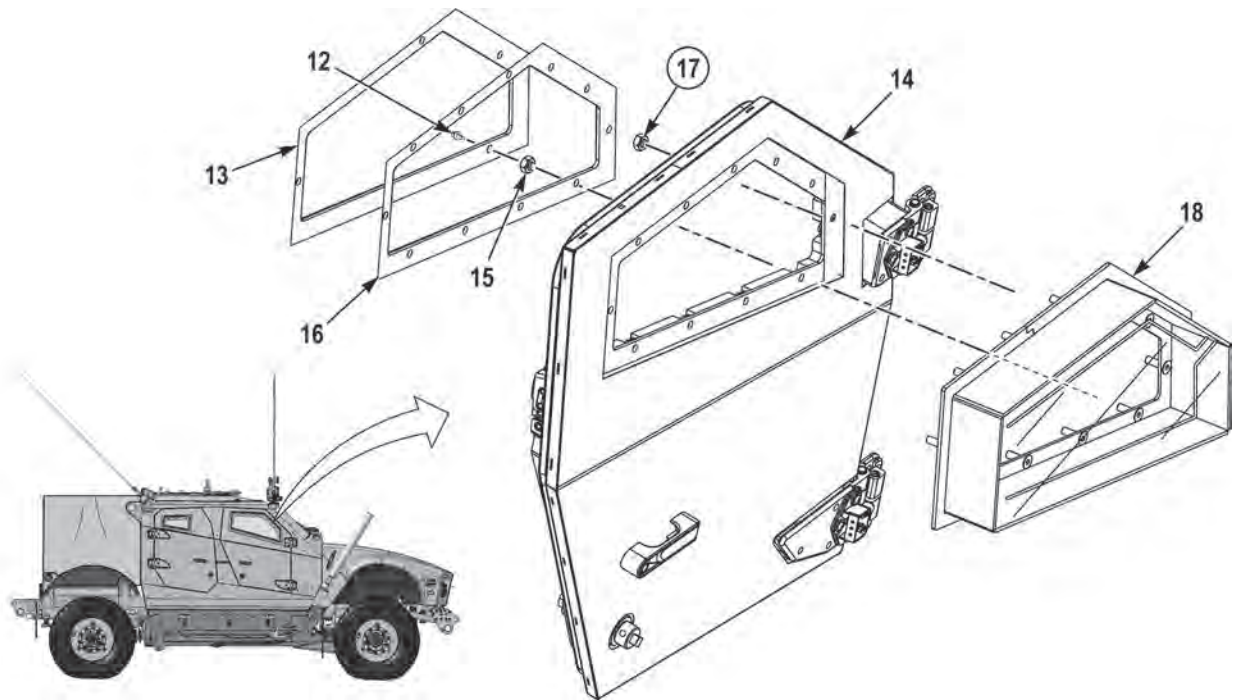
NOTE

All rear windows are installed the same way. Passenger side shown.

2. With the aid of an assistant, install window (7) on rear door (3) with eight new locknuts (6). Tighten locknuts (6) to 60 to 65 lb-ft (81.3 to 88.1 N•m).
3. Install window retaining bracket (5) on rear door (3) with four nuts (4).
4. Install window frame cover (2) and four caps (1) on rear door (3).

END OF TASK

FRONT WINDOW INSTALLATION

**WARNING**

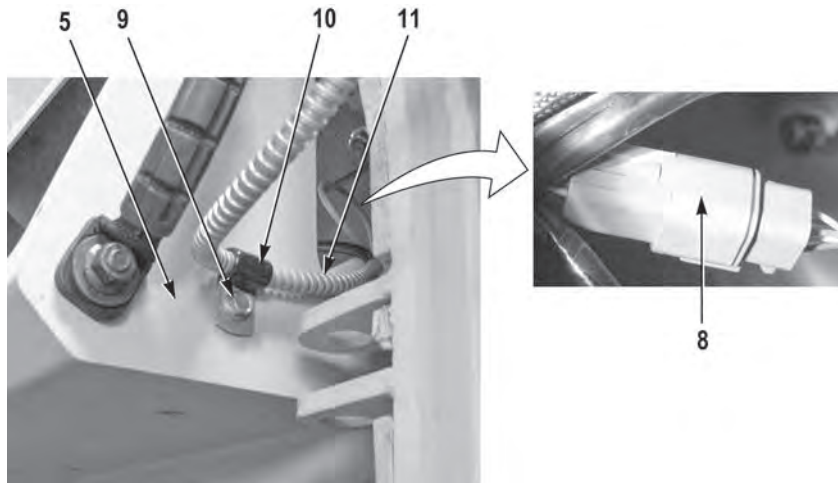
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Sikaflex 221, to window mating area on front door (14).

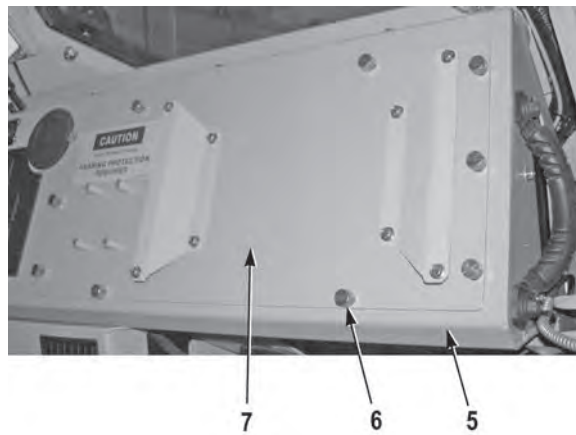
WARNING

Front windows weigh 122 lbs (55 kg). Do not attempt to lift or move window without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

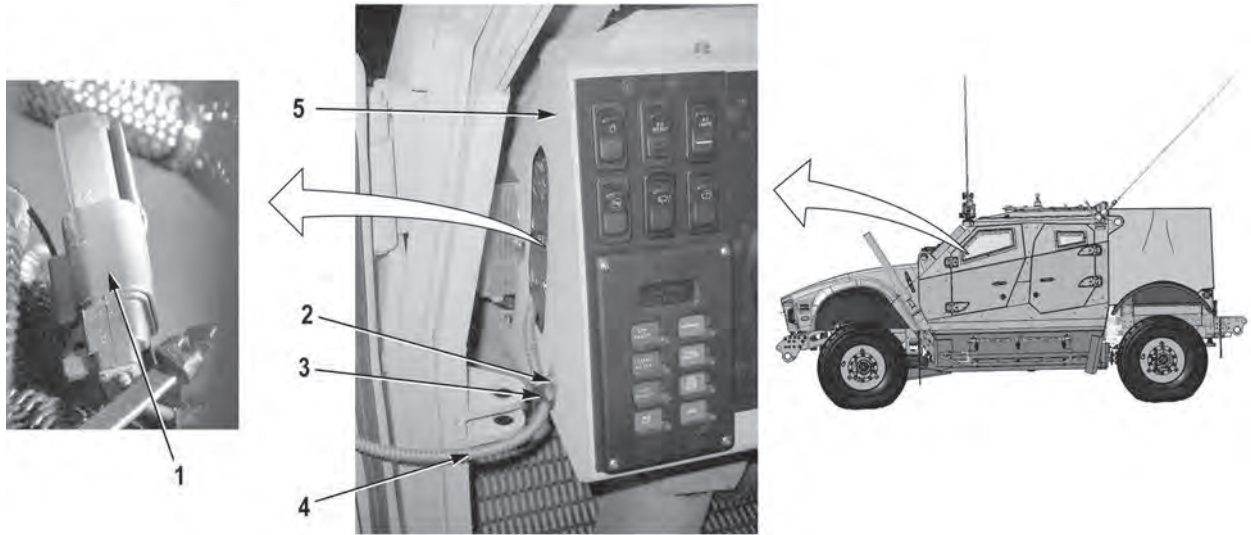
2. With the aid of an assistant and lifting device, install window (18) on front door (14) with eleven new locknuts (17). Tighten locknuts (17) to 60 to 65 lb-ft (81.3 to 88.1 N•m).
3. Install retaining bracket (16) on front door (14) with five nuts (15).
4. Install window frame cover (13) and five caps (12) on front door (14).



5. Install cushion clip (10) and deicer wire (11) on dash (5) with screw (9).
6. Connect connector (8).



7. Install dash circuit breaker cover (7) on dash (5) with ten screws (6).



8. Install cushion clip (3) and deicer wire (4) on dash (5) with screw (2).
9. Connect connector (1).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CAPSULE WINDSHIELD REPLACEMENT (M1240/M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Dash removed (WP 0151)
Fire suppression system control removed (WP 0064)
Windshield wiper arm removed (WP 0044)

Tools and Special Tools

Eye bolt (2) (Item 3)
Lifting Device
Tool Kit, General Mechanic's: Automotive

Materials/Parts

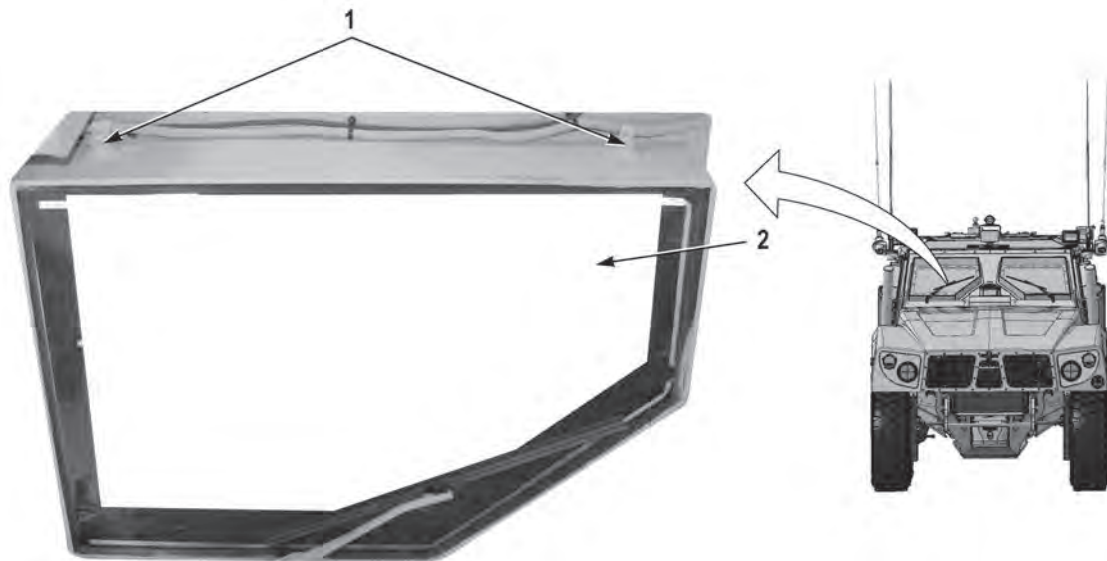
Locknut (12) (Item 5)
Compound, Sealing, Sikaflex 221
Lubricant, Connector, Nyogel 760G
Tags, Identification

Personnel Required

Two

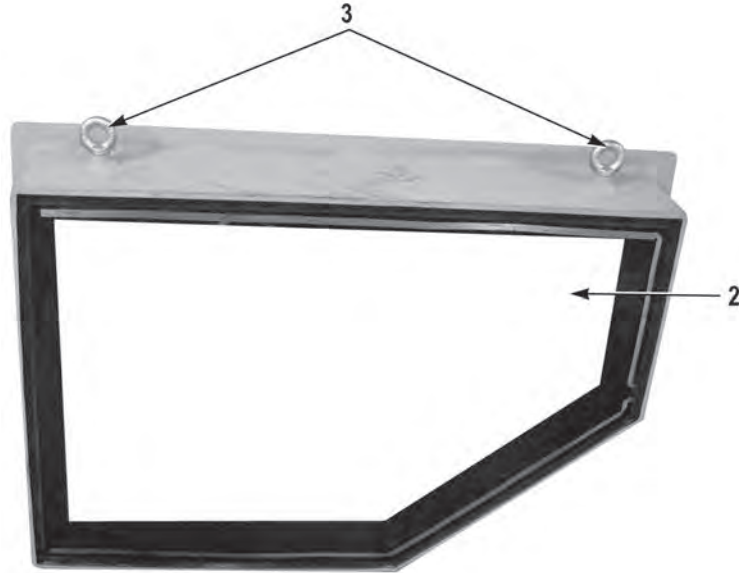
Follow-On Maintenance

Install windshield wiper arm (WP 0044)
Install fire suppression system control (WP 0064)
Install dash (WP 0151)
Remove and stow wheel chocks

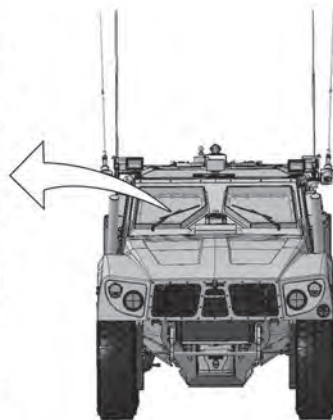
REMOVAL**NOTE**

Remove cushion clips as required.

1. Remove two screws (1) from windshield (2).



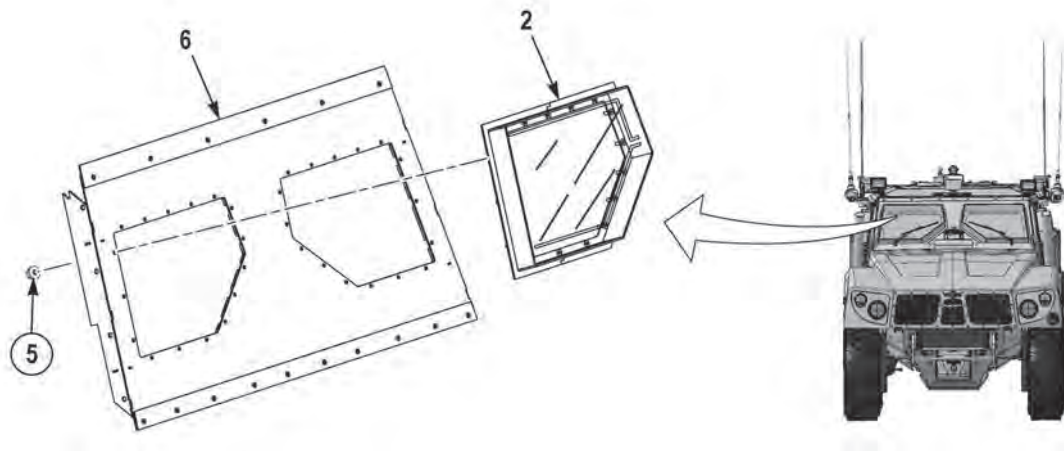
2. Insert two eye bolts (3) in capsule windshield (2).



NOTE

- Driver side and passenger side capsule windshields are removed the same way. Passenger side shown.
- Tag and mark wires to ensure proper installation.

3. Disconnect two connectors (4).



- Remove 12 locknuts (5) from capsule (6) and capsule windshield (2). Discard locknuts (5).

WARNING

Capsule windshields weigh 210 lbs (95 kg). Do not attempt to lift or move capsule windshield without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

- With the aid of an assistant and a lifting device, remove capsule windshield (2) from capsule (6).

END OF TASK

INSTALLATION

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

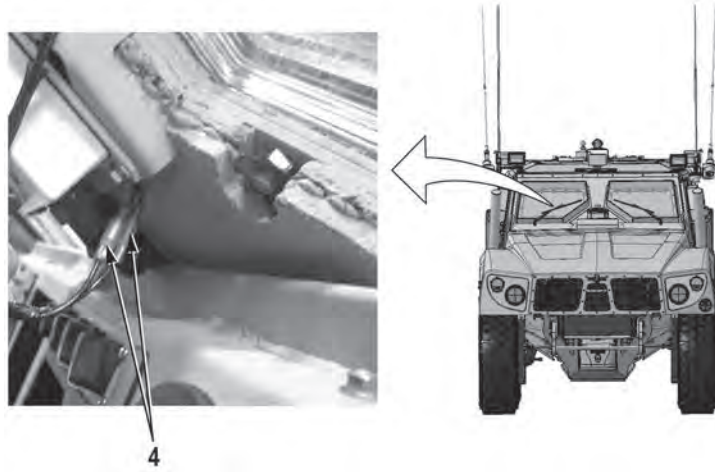
Driver side and passenger side capsule windshields are installed the same way. Passenger side shown.

- Apply sealing compound, Sikaflex 221, to capsule windshield (2) mating area on capsule (6).

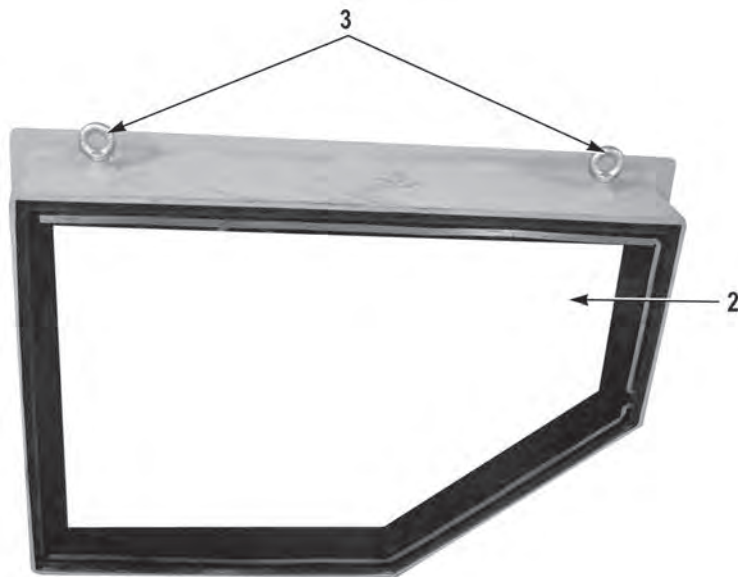
WARNING

Capsule windshields weigh 210 lbs (95 kg). Do not attempt to lift or move capsule windshield without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

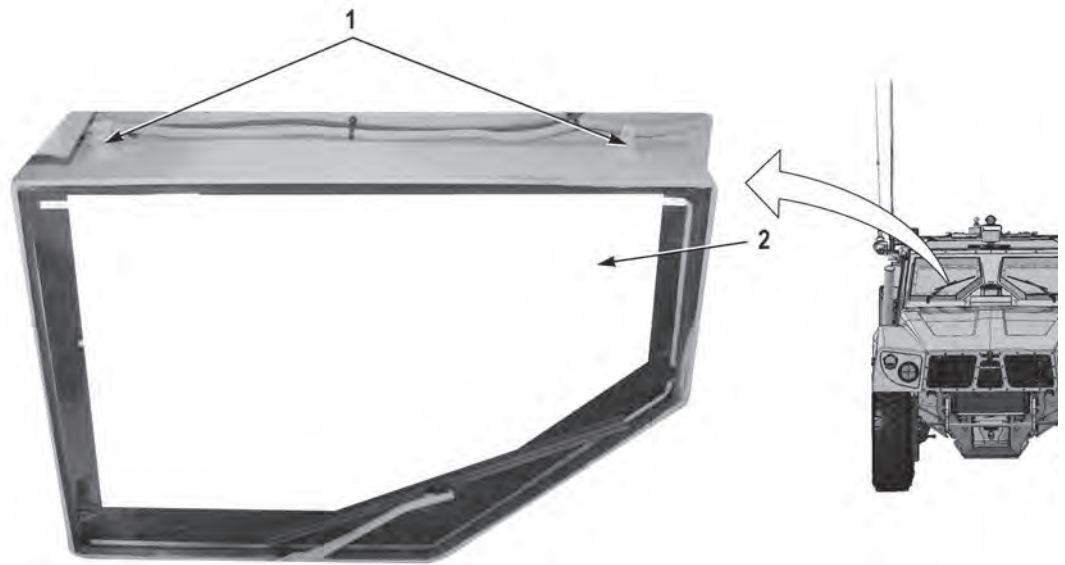
- With the aid of an assistant and a lifting device, install capsule windshield (2) on capsule (6) with 12 new locknuts (5).



3. Connect two connectors (4).



4. Remove two eye bolts (3) from capsule windshield (2).

**NOTE**

Install cushion clips as required.

5. Install two screws (1) in capsule windshield (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CHECK-6 CONTROL BOXES REPLACEMENT

Preconditions

- Park vehicle
- Engine OFF
- Wheels chocked
- Batteries disconnected (M1240/M1240A1)
(WP 0186)
- Batteries disconnected (M1245) (WP 0187)

Materials/Parts

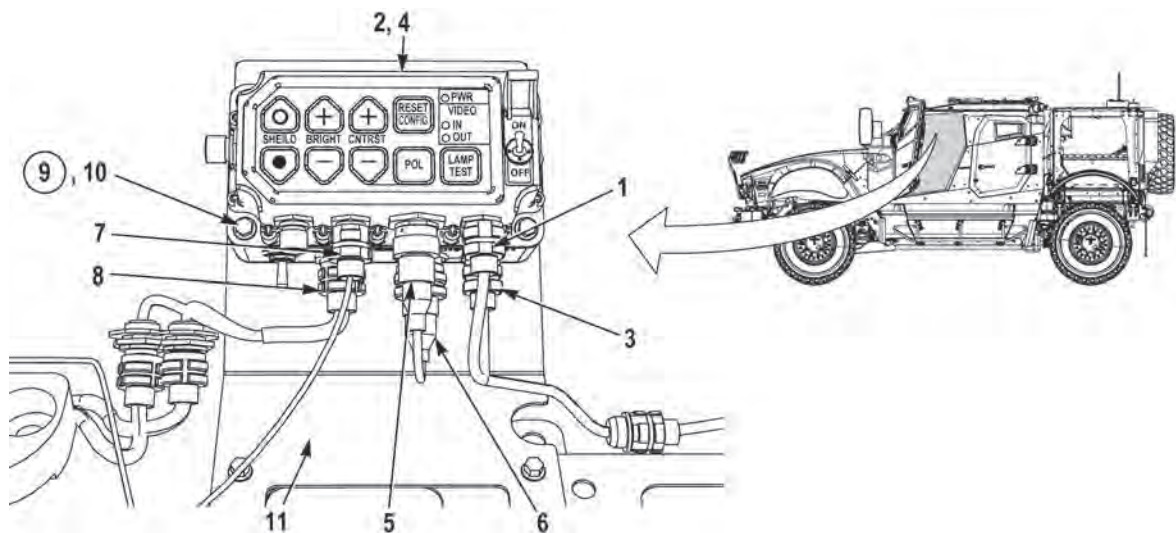
- Locknut (4) (Item 9)
- Tags, Identification

Follow-On Maintenance

- Connect batteries (M1240/M1240A1) (WP 0186)
- Connect batteries (M1245) (WP 0187)
- Remove and stow wheel chocks

Tools and Special Tools

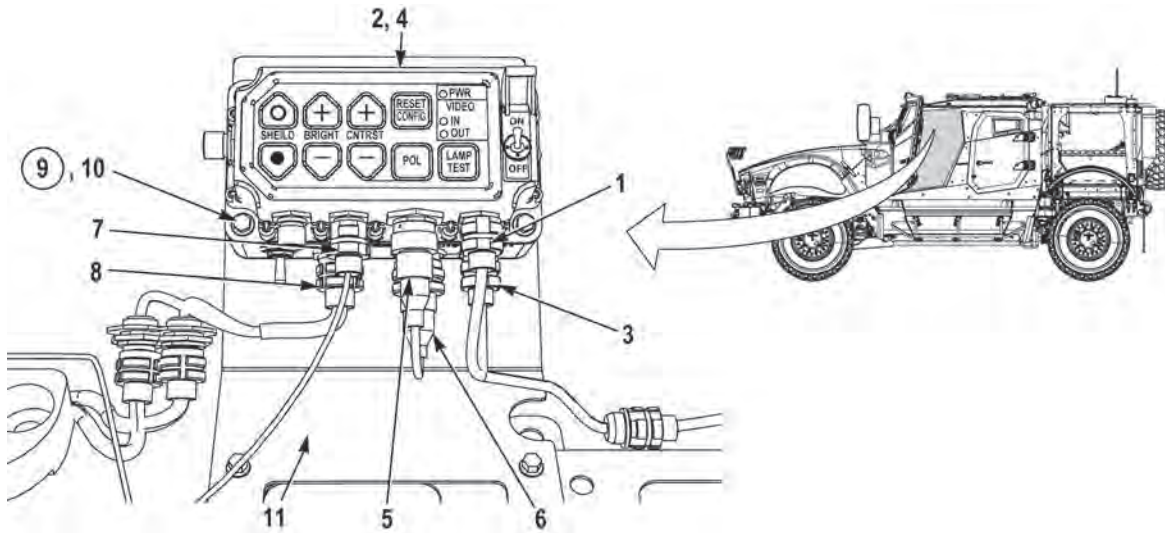
- Tool Kit, General Mechanic's: Automotive
-

REMOVAL**NOTE**

Tag and mark connectors prior to removal to ensure proper installation.

1. Disconnect connector (1) from camera control box (2).
2. Disconnect connector (3) from advanced control box (4).
3. Disconnect connector (5) from camera control box (2).
4. Disconnect connector (6) from advanced control box (4).
5. Disconnect connector (7) from camera control box (2).
6. Disconnect connector (8) from advanced control box (4).
7. Remove four locknuts (9), screws (10), camera control box (2), and advanced control box (4) from bracket (11). Discard locknuts (9).

END OF TASK

INSTALLATION

1. Connect connector (8) to advance control box (4).
2. Connect connector (7) to camera control box (2).
3. Connect connector (6) to advance control box (4).
4. Connect connector (5) to camera control box (2).
5. Connect connector (3) to advance control box (4).
6. Connect connector (1) to camera control box (2).
7. Install advanced control box (4) and camera control box (2) on bracket (11) with four screws (10) and new locknuts (9).
8. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

DASH CONTROL REPLACEMENT, HVAC

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system dash panel removed (WP 0148)

Tools and Special Tools

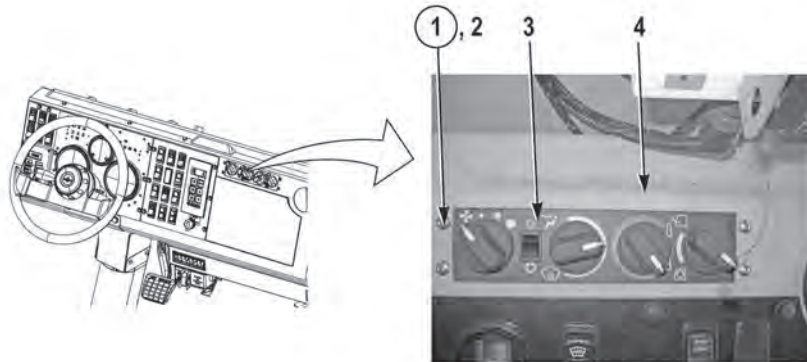
Tool Kit, General Mechanic's: Automotive

Materials/Parts

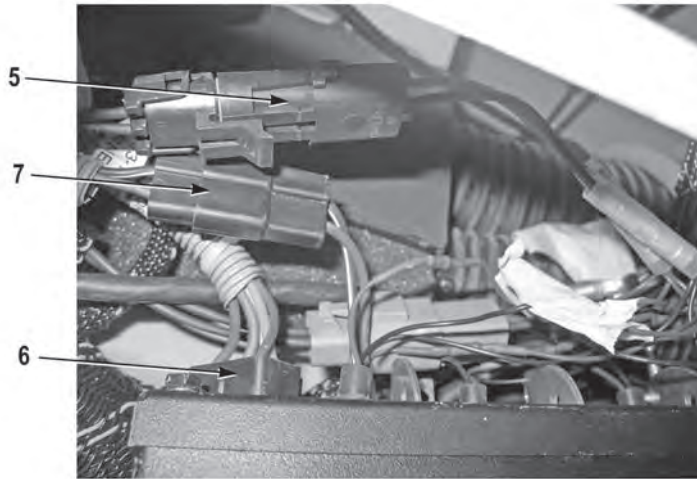
Locknut (4) (Item 1)
Tags, Identification

Follow-On Maintenance

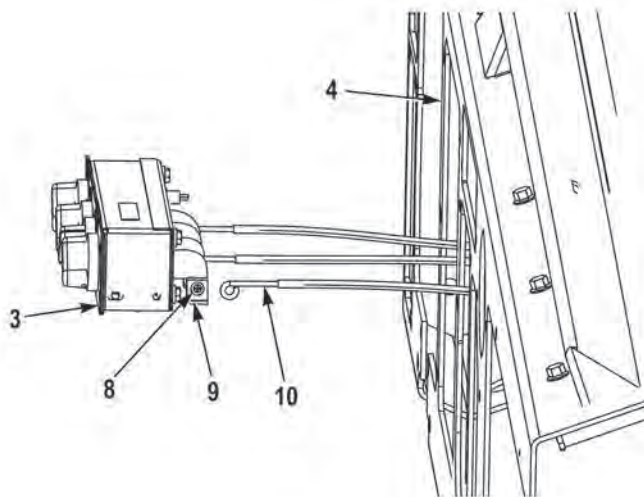
Install air system dash panel (WP 0148)
Remove and stow wheel chocks

REMOVAL

1. Remove four locknuts (1), screws (2), and move HVAC controller (3) away from dash (4). Discard locknuts (1).



2. Disconnect connector (5).
3. Disconnect connector (6).
4. Disconnect connector (7).



NOTE

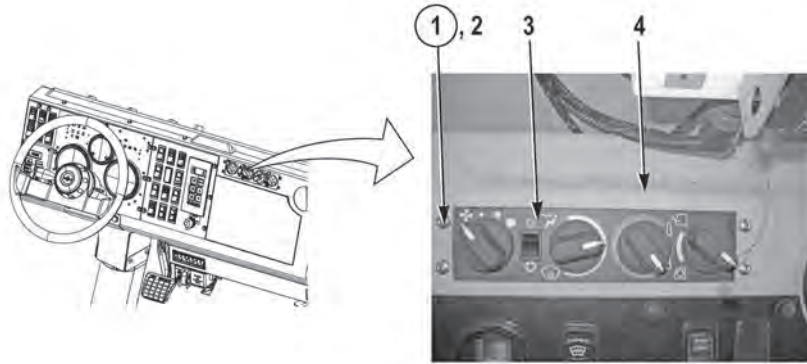
Tag and mark cables prior to removal to ensure proper installation.

5. Remove three screws (8), retaining clips (9), and cables (10) from HVAC controller (3), and remove HVAC controller (3) from dash (4).

END OF TASK

INSTALLATION

1. Install three cables (10) on HVAC controller (3) with three retaining clips (9) and screws (8).
2. Connect connector (7).
3. Connect connector (6).
4. Connect connector (5).



5. Install HVAC controller (3) on dash (4) with four screws (2) and new locknuts (1).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

DASH PANEL REPLACEMENT, AIR SYSTEM

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Air system drained

Materials/Parts

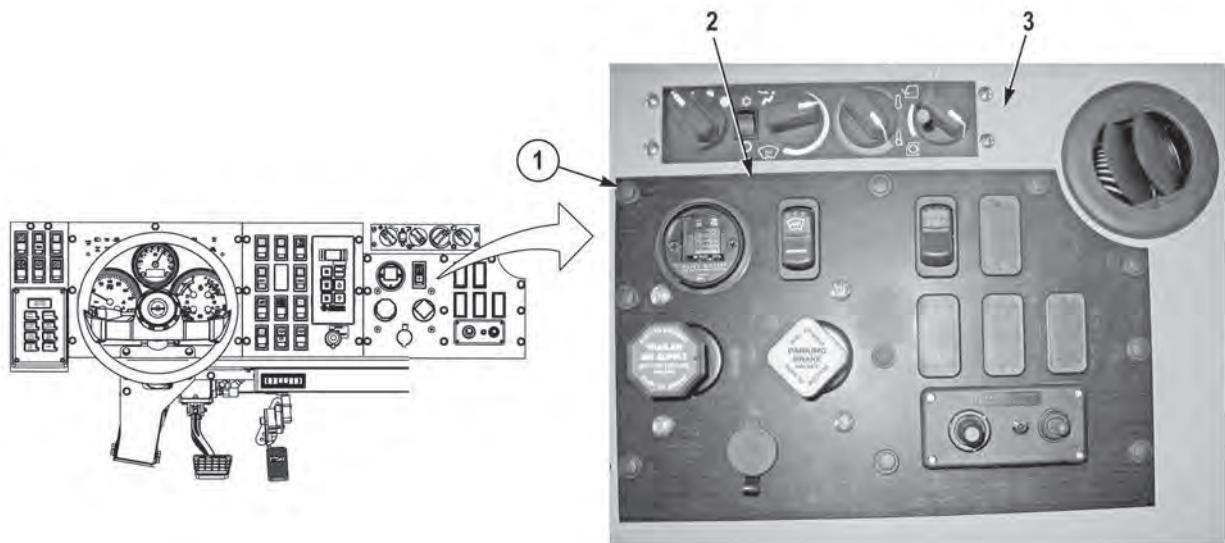
Fasteners, Pushpin (10) (Item 1)
Tags, Identification

Follow-On Maintenance

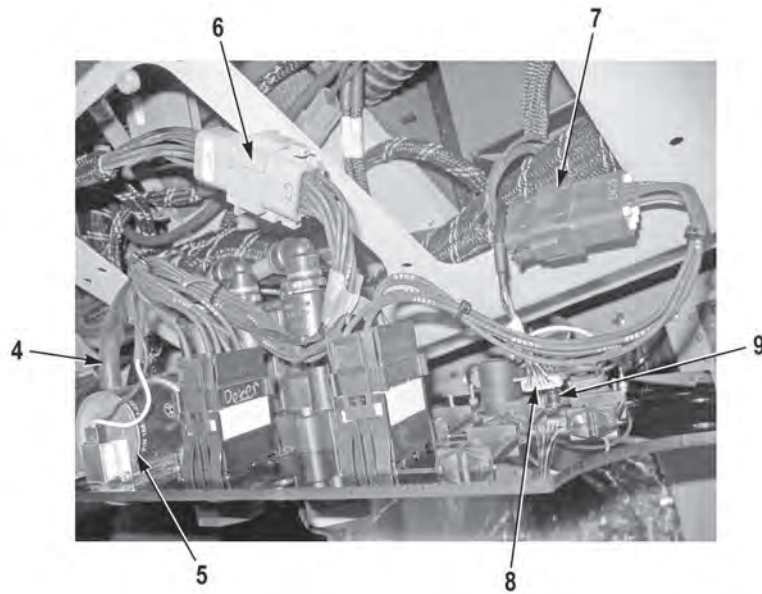
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL

1. Remove 10 pushpin fasteners (1) and move air system dash panel (2) away from dash (3). Discard pushpin fasteners (1).

**NOTE**

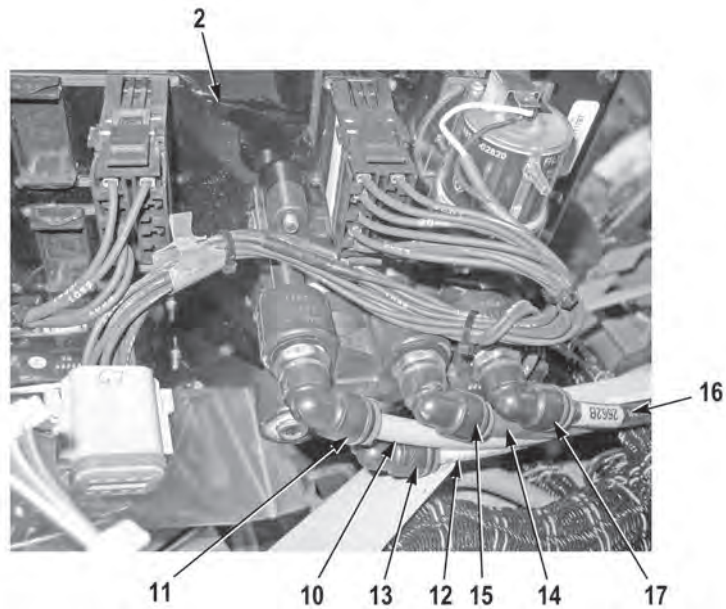
Tag and mark hoses prior to removal to ensure proper installation.

2. Remove hose (4) from air restriction gauge (5).

NOTE

Tag and mark connectors prior to removal to ensure proper installation.

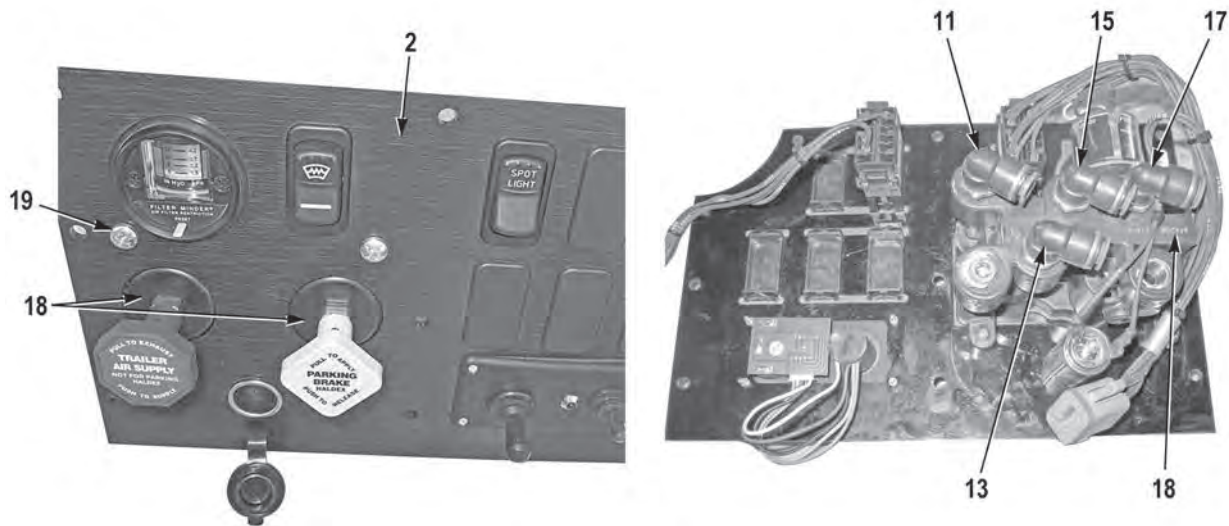
3. Disconnect connector (6).
4. Disconnect connector (7).
5. Disconnect connector (8) from spotlight controller (9).



NOTE

Tag and mark air lines prior to removal to ensure proper installation.

6. Remove air line (10) from fitting (11).
7. Remove air line (12) from fitting (13).
8. Remove air line (14) from fitting (15).
9. Remove air line (16) from fitting (17) and remove air system dash panel (2) from vehicle.



NOTE

Note position of fittings prior to removal to ensure proper installation.

10. Remove fitting (11) from brake valve assembly (18).
11. Remove fitting (13) from brake valve assembly (18).
12. Remove fitting (15) from brake valve assembly (18).
13. Remove fitting (17) from brake valve assembly (18).
14. Remove four screws (19) and brake valve assembly (18) from air system dash panel (2).

END OF TASK

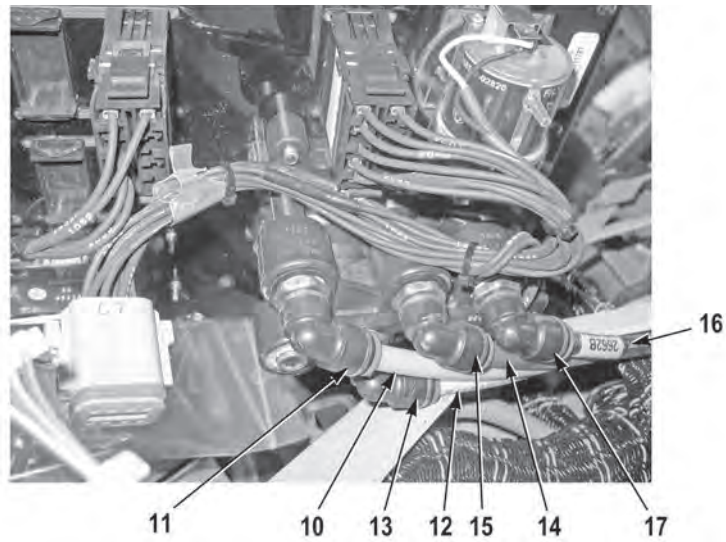
INSTALLATION

1. Install brake valve assembly (18) on air system dash panel (2) with four screws (19).

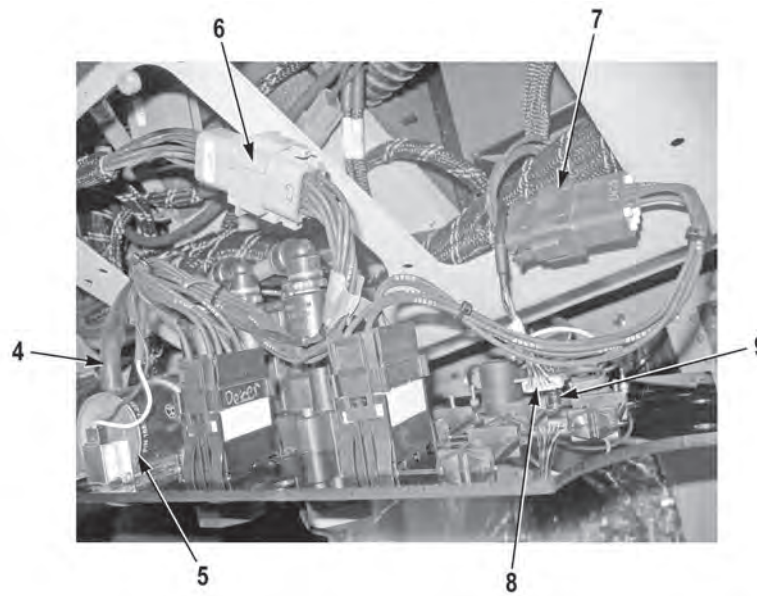
NOTE

Install fittings as noted prior to removal to ensure proper installation.

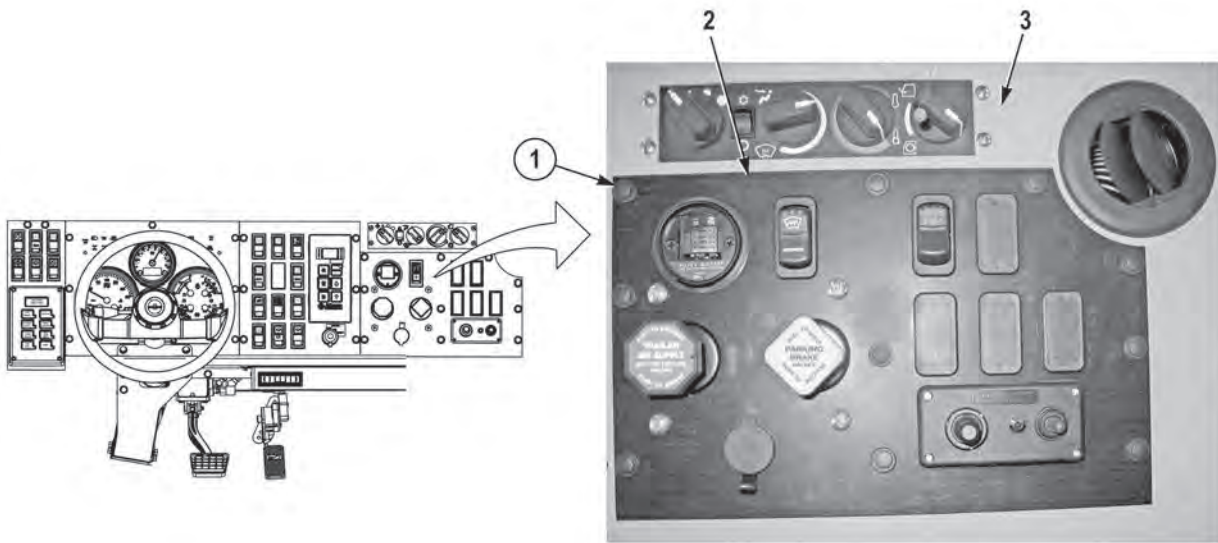
2. Install fitting (17) on brake valve assembly (18).
3. Install fitting (15) on brake valve assembly (18).
4. Install fitting (13) on brake valve assembly (18).
5. Install fitting (11) on brake valve assembly (18).



6. Install air line (16) on fitting (17).
7. Install air line (14) on fitting (15).
8. Install air line (12) on fitting (13).
9. Install air line (10) on fitting (11).



10. Connect connector (8) to spotlight controller (9).
11. Connect connector (7).
12. Connect connector (6).
13. Install hose (4) on air restriction gauge (5).



14. Install air system dash panel (2) on dash (3) with 10 new pushpin fasteners (1).

15. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DASH PANEL REPLACEMENT, INSTRUMENT PANEL

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Steering column removed (WP 0282)

Tools and Special Tools

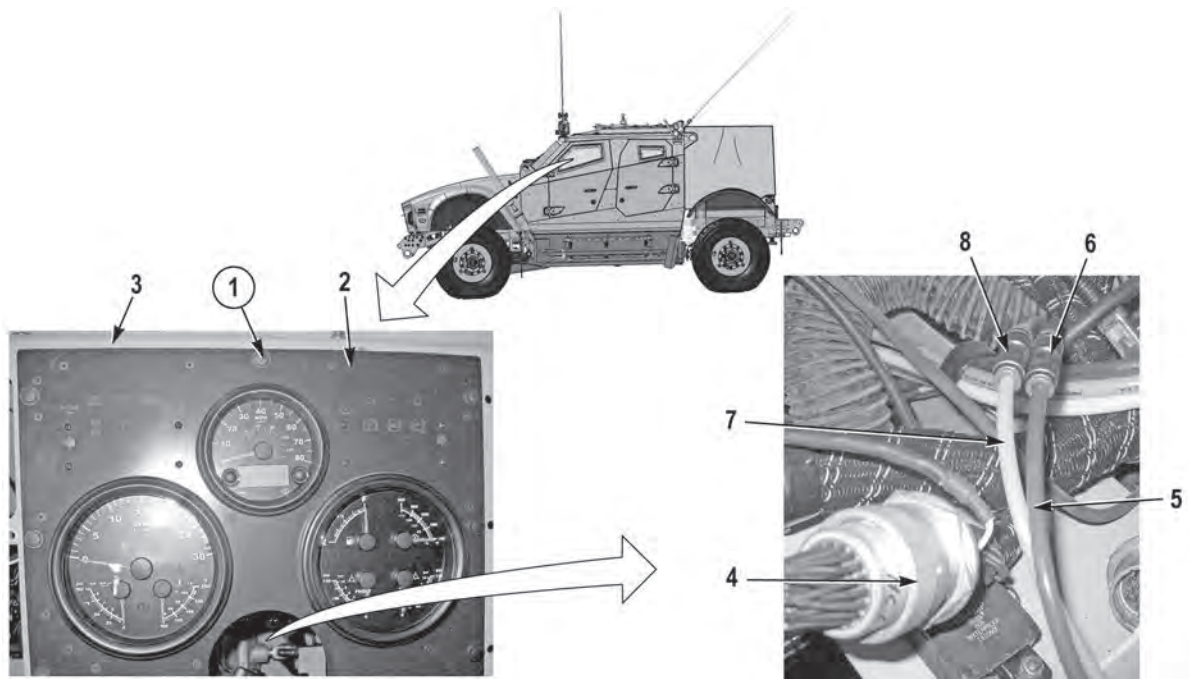
Cap and Plug Set
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Fasteners, Pushpin (9) (Item 1)
 Tags, Identification
 Ties, Identification

Follow-On Maintenance

Install steering column (WP 0282)
 Remove and stow wheel chocks

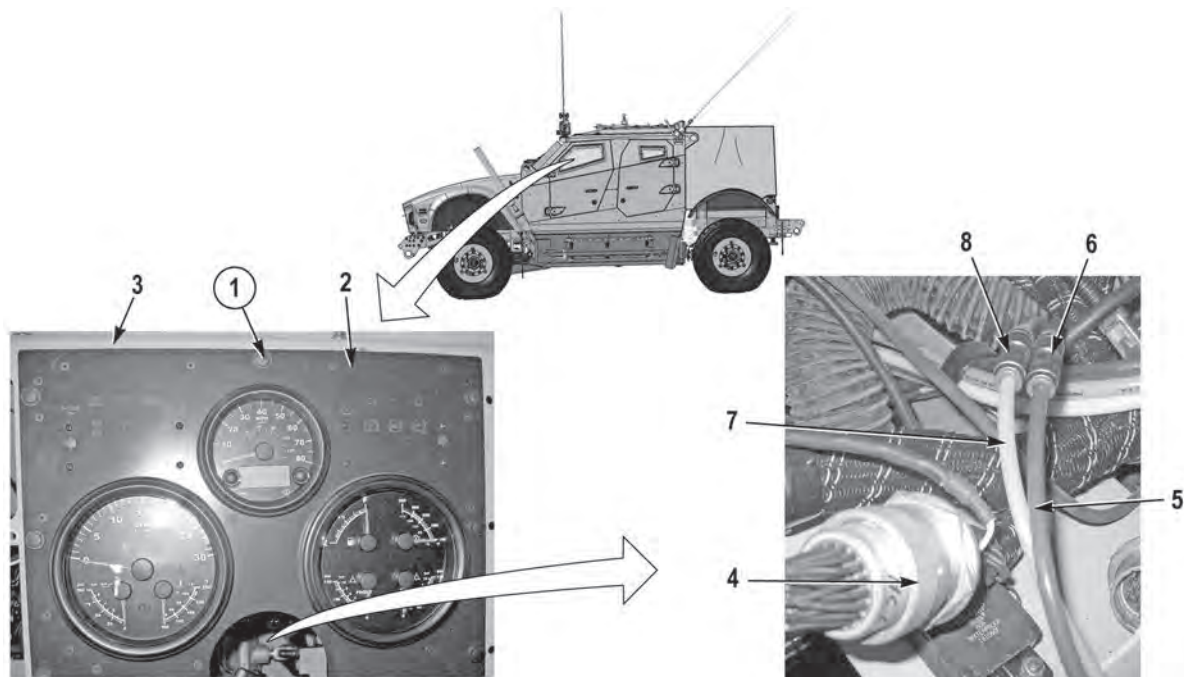
REMOVAL

1. Remove nine pushpin fasteners (1) from instrument panel (2) and dash (3). Discard pushpin fasteners (1).
2. Move instrument panel (2) away from dash (3).

NOTE

- Tag and mark connectors prior to removal to ensure proper installation.
- Remove cable ties as required.

3. Disconnect connector (4).



NOTE

- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

4. Remove air line (5) from fitting (6).
5. Remove air line (7) from fitting (8) and remove instrument panel (2) from dash (3).

END OF TASK

INSTALLATION

1. Connect air line (7) to fitting (8).
2. Connect air line (5) to fitting (6).
3. Connect connector (4) and install instrument panel (2) on dash (3) with nine new pushpin fasteners (1).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DASH PANEL REPLACEMENT, TRANSMISSION

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

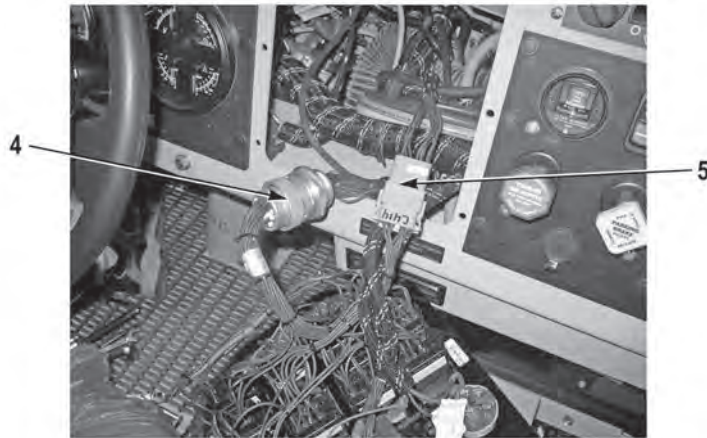
Fasteners, Pushpin (6) (Item 1)
Tags, Identification
Ties, Cable

Follow-On Maintenance

Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL

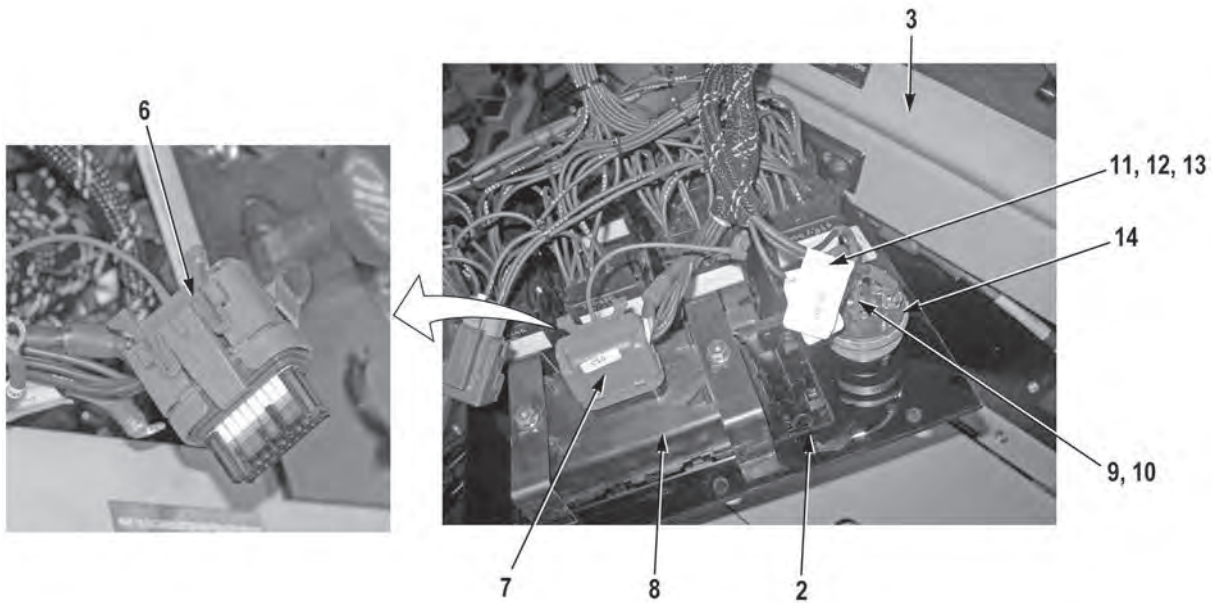
1. Remove six pushpin fasteners (1) from transmission dash panel (2) and move away from dash (3). Discard pushpin fasteners (1).



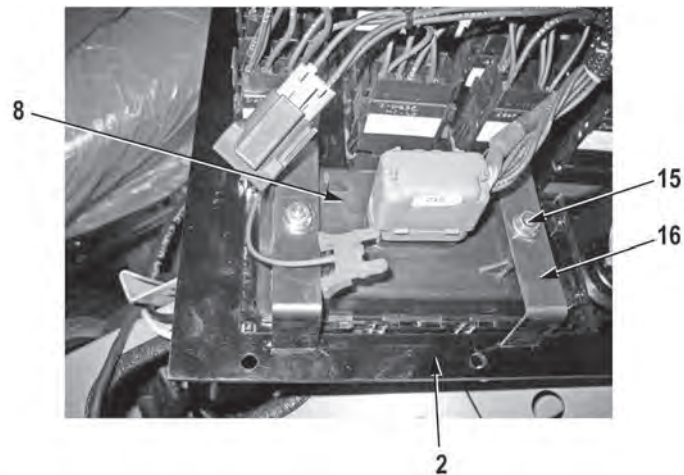
NOTE

Tag and mark connectors prior to removal to ensure proper installation.

2. Disconnect two connectors (4) and (5).



3. Remove locking tab (6) from connector (7) and remove connector (7) from transmission shift selector (8).
4. Remove three screws (9), holding clips (10), and wires (11, 12, and 13) from ignition switch (14) and remove transmission dash panel (2) from dash (3).



- Remove two nuts (15), brackets (16), and transmission shift selector (8) from transmission dash panel (2).

END OF TASK

INSTALLATION

- Install transmission shift selector (8) on transmission dash panel (2) with two brackets (16) and nuts (15).
- Install three wires (11, 12, and 13) on ignition switch (14) with holding clips (10) and screws (9).
- Install connector (7) on transmission shift selector (8) and install locking tab (6).
- Connect two connectors (5 and 4).



- Install transmission dash panel (2) on dash (3) with six new pushpin fasteners (1).
- Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

DASH REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Steering wheel removed (WP 0286)
 CTIS dash panel removed (WP 0168)
 Air pressure alarm removed (WP 0106)
 Transmission dash panel removed (WP 0150)
 Deice circuit breaker removed (WP 0197)
 Ignition relay removed (WP 0203)
 Steering column and bracket removed (WP 0282)
 Instrument dash panel removed (WP 0149)
 Air system dash panel removed (WP 0148)
 HVAC dash control removed (WP 0147)
 Fire suppression system chassis switch removed
 (WP 0062)
 Lower plenum removed (WP 0033)
 12-volt power converter removed (WP 0184)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 24)
 Locknut (Item 28)
 Locknut (Item 33)
 Lockwasher (Item 37)
 Locknut (3) (Item 43)
 Locknut (2) (Item 53)
 Locknut (2) (Item 56)
 Locknut (2) (Item 68)
 Locknut (2) (Item 70)
 Locknut (6) (Item 74)

Materials/Parts (Continued)

Locknut (2) (Item 76)
 Locknut (3) (Item 83)
 Locknut (3) (Item 90)
 Locknut (3) (Item 94)
 Locknut (4) (Item 100)
 Locknut (8) (Item 103)
 Gasket (Item 105)
 Grommet (106)
 Compound, Sealing, Loctite 242
 Tags, Identification
 Ties, Cable

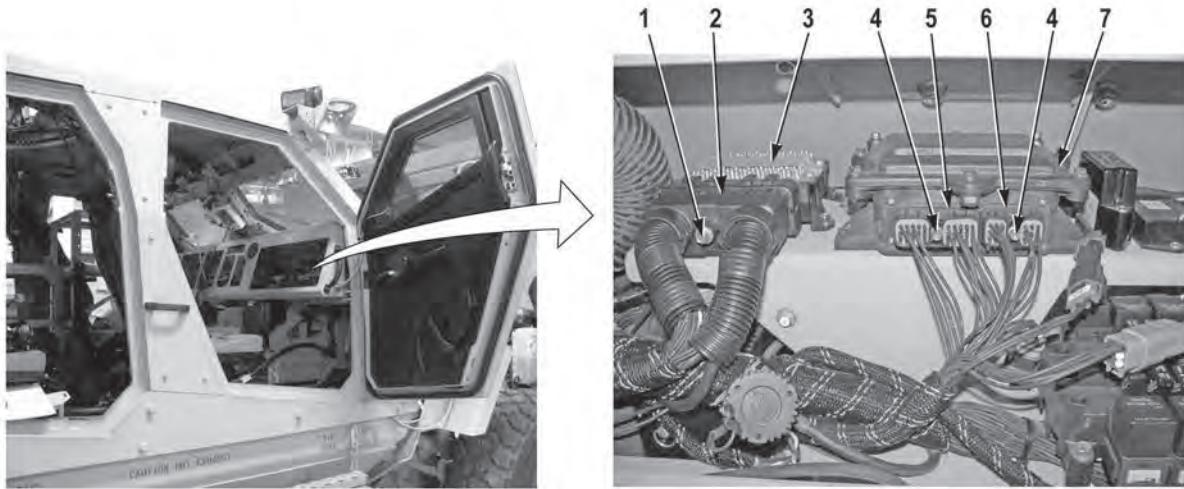
Personnel Required

Two

Follow-On Maintenance

Install 12-volt power converter (WP 0184)
 Install lower plenum (WP 0033)
 Install fire suppression system chassis switch
 (WP 0062)
 Install HVAC dash control (WP 0147)
 Install air system dash panel (WP 0148)
 Install instrument dash panel (WP 0149)
 Install steering column and bracket (WP 0282)
 Install ignition relay (WP 0203)
 Install deice circuit breaker (WP 0197)
 Install transmission dash panel (WP 0150)
 Install air pressure alarm (WP 0106)
 Install CTIS dash panel (WP 0168)
 Install steering wheel (WP 0286)
 Remove and stow wheel chocks

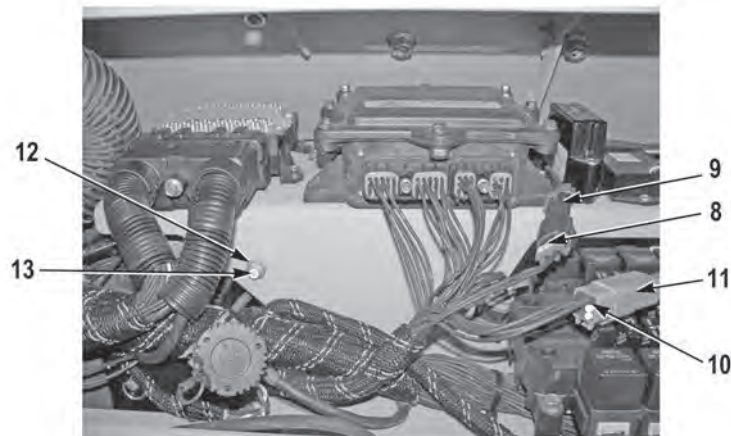
REMOVAL



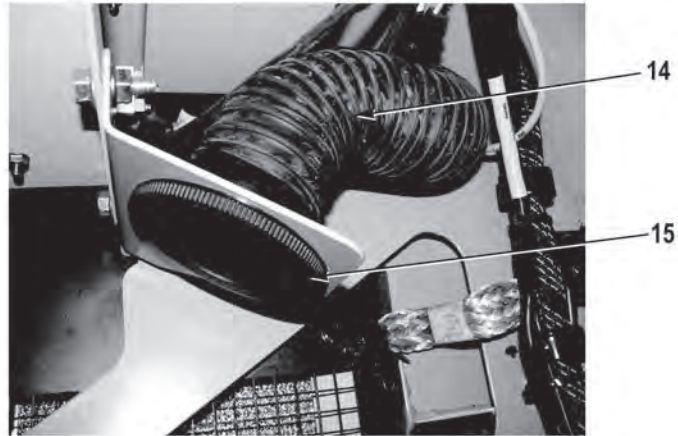
NOTE

- Tag and mark connectors and wires prior to removal to ensure proper installation.
- Remove cable ties as required.

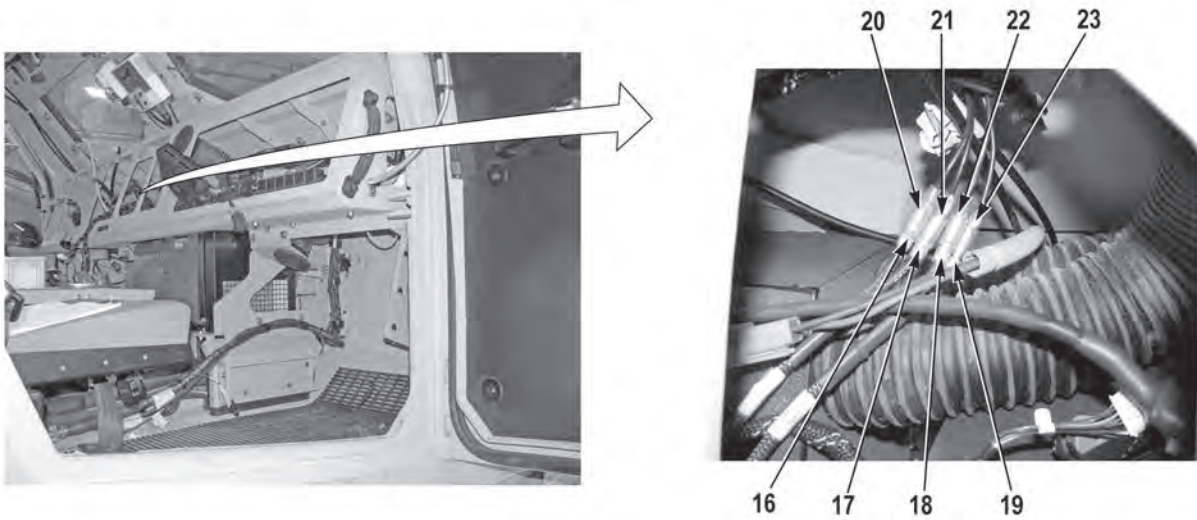
1. Loosen screw (1) and disconnect connector (2) from transmission control module (3).
2. Loosen two screws (4) and disconnect connectors (5 and 6) from transmission interface module (7).



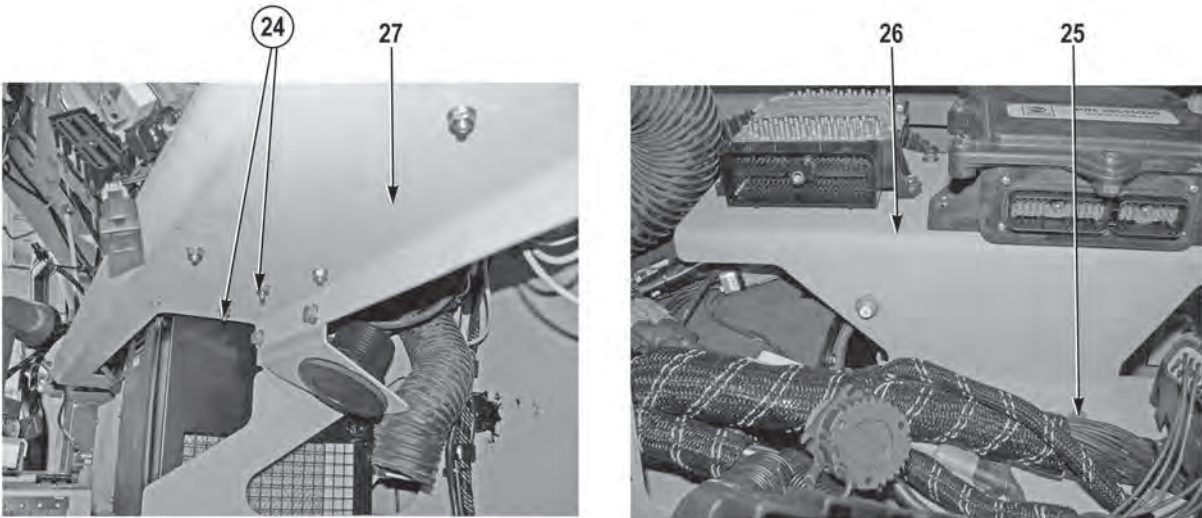
3. Disconnect connector (8) from flasher module connector (9).
4. Disconnect connector (10) from dimmer module connector (11).
5. Remove nut (12) from circuit breaker (13).



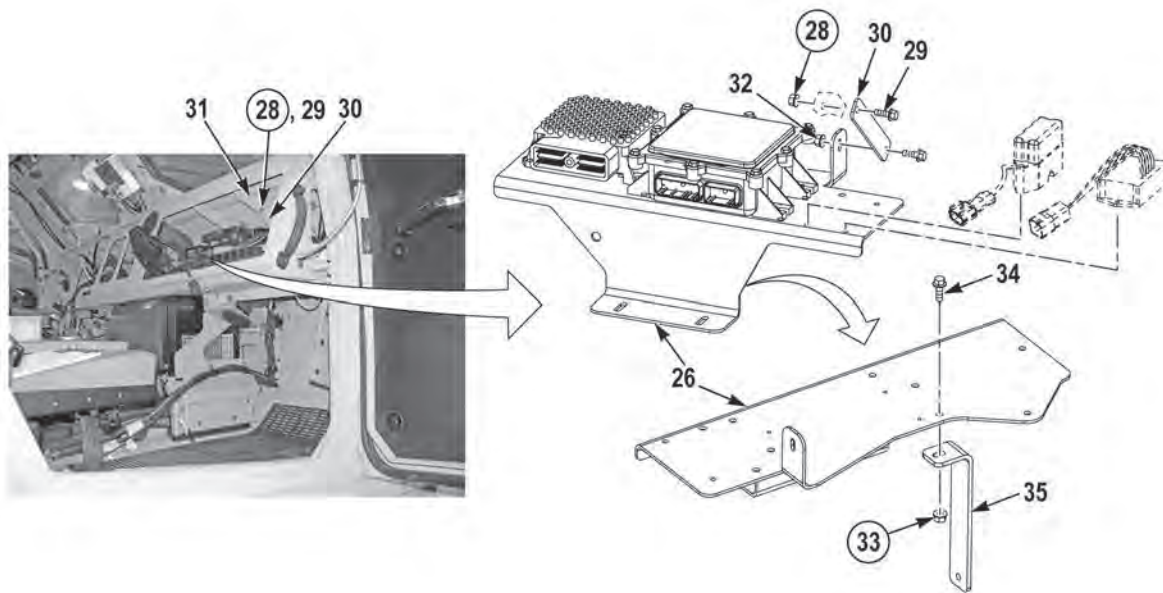
6. Remove lower passenger side vent hose (14) from louver (15).



7. Disconnect four wires (16, 17, 18, and 19) from front window heater connectors (20, 21, 22, and 23).



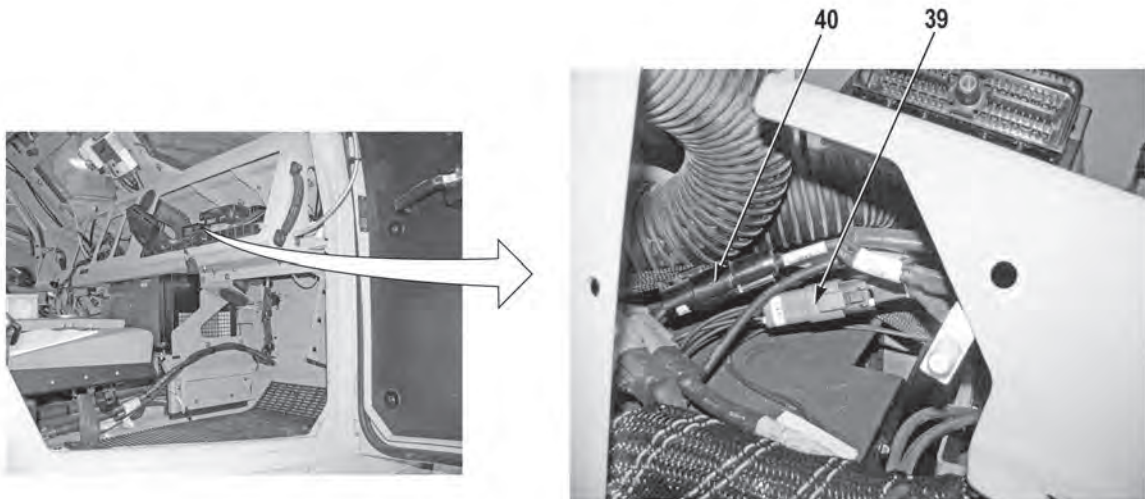
8. Remove two locknuts (24) and screws (25) from component bracket (26) and dash (27). Discard locknuts (24).



9. Remove locknut (28) and screw (29) from bracket (30) and upper dash support (31). Discard locknut (28).
10. Loosen locknut (32).
11. Remove locknut (33) and screw (34) from component bracket (26) and bracket (35). Discard locknut (33).



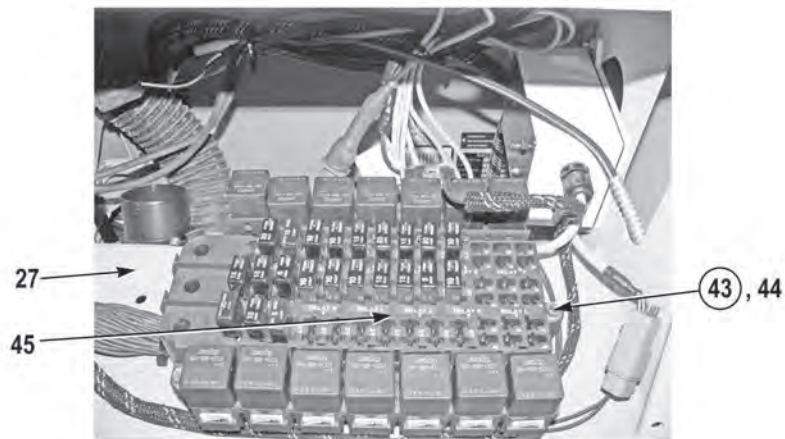
12. Move component bracket (26) away from dash (27) and remove circuit breaker (13) from component bracket (26).
13. Remove screw (36), lockwasher (37), and cable (38) from circuit breaker (13). Discard lockwasher (37).



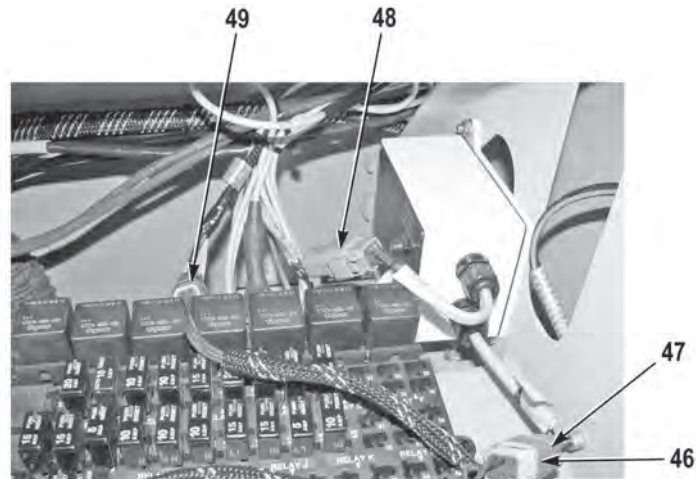
14. Disconnect connector (39).
15. Disconnect connector (40).



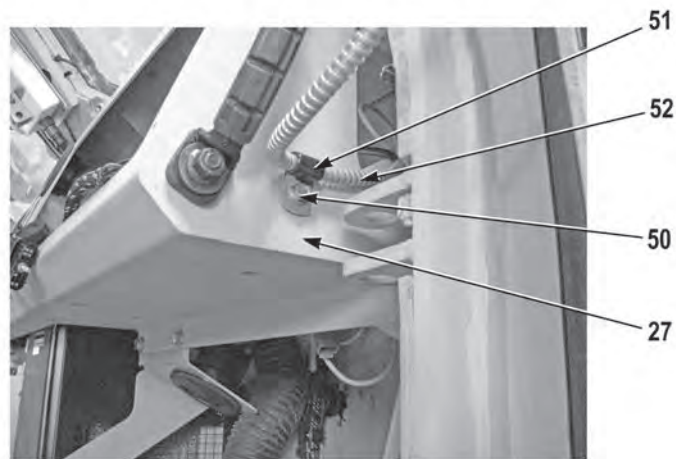
16. Disconnect connector (41) from passenger side door window heater connector (42).
17. Remove component bracket (26) from dash (27).



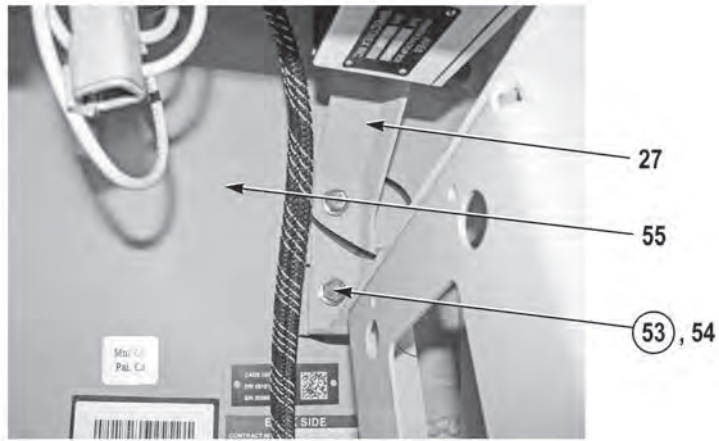
18. Remove three locknuts (43) and screws (44) from fuse/relay block (45) and dash (27). Discard locknuts (43).



19. Disconnect connector (46) fire suppression power module connector (47).
20. Disconnect connector (48).
21. Disconnect connector (49).



22. Remove screw (50), cushion clip (51), and passenger side door window heater harness (52) from dash (27).



23. Remove two locknuts (53) and screws (54) from passenger side dash (27) and firewall (55). Discard locknuts (53).



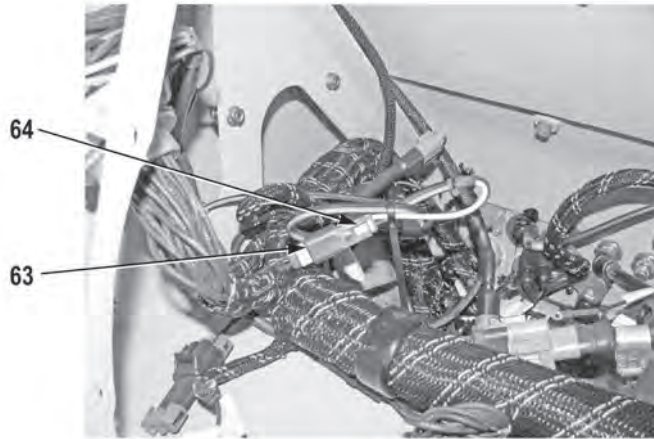
24. Remove two locknuts (56) and screws (57) from HVAC tray (58) and passenger side dash (27). Discard locknuts (56).



25. Remove upper passenger side vent hose (59) from louver (60).



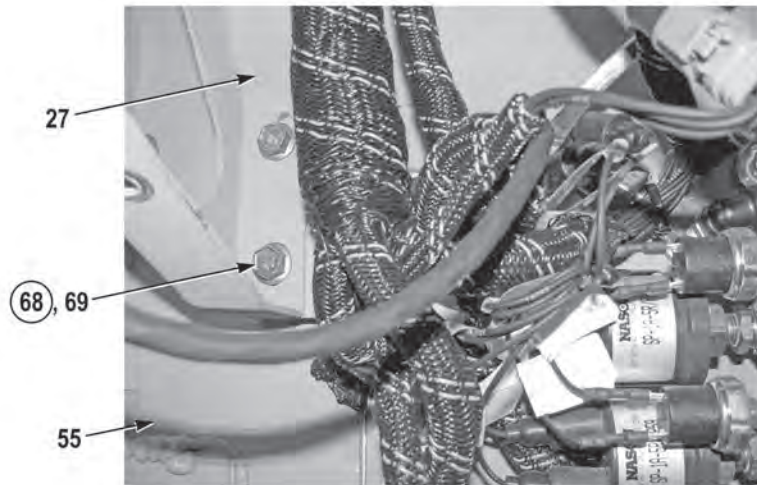
26. Remove lower driver side vent hose (61) from louver (62).



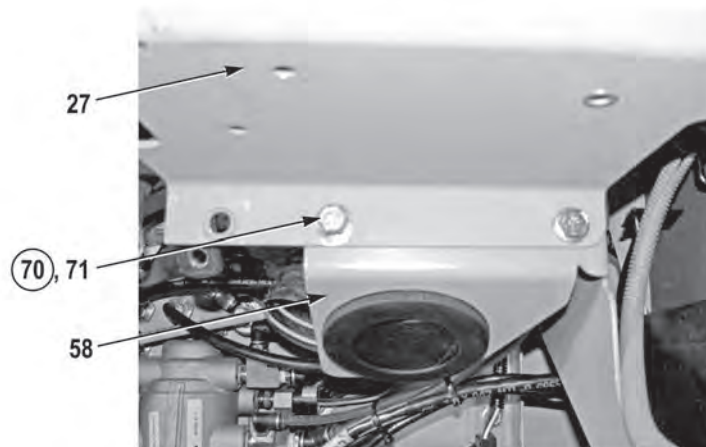
27. Disconnect connector (63) from driver side door window heater connector (64).



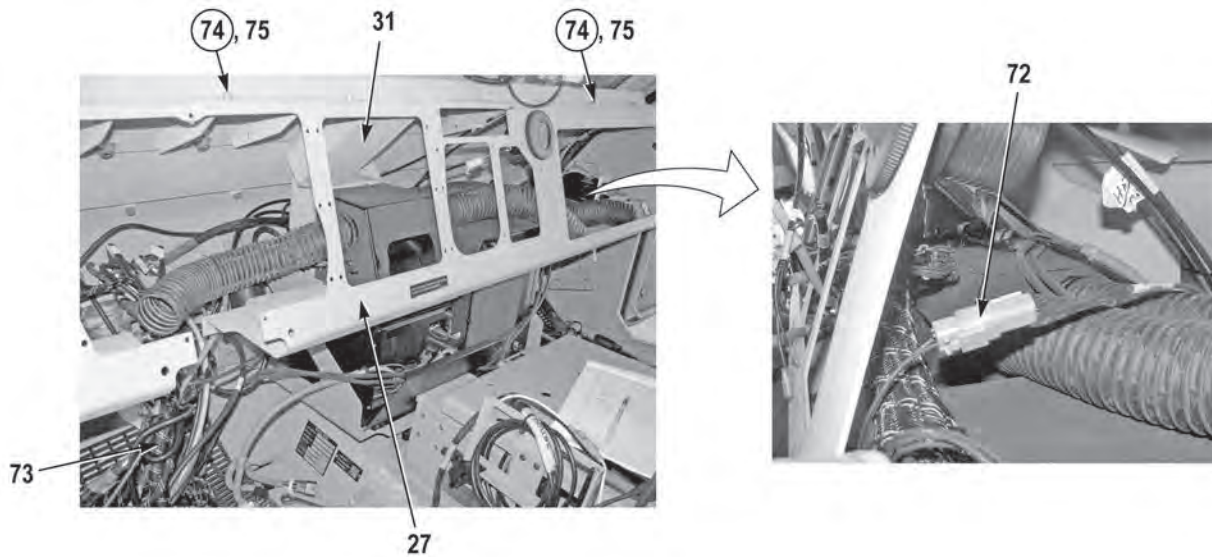
28. Remove screw (65), cushion clip (66), and door window heater harness (67) from driver side dash (27).



29. Remove two locknuts (68) and screws (69) from driver side dash (27) and firewall (55). Discard locknuts (68).



30. Remove two locknuts (70) and screws (71) from HVAC tray (58) and driver side dash (27). Discard locknuts (70).

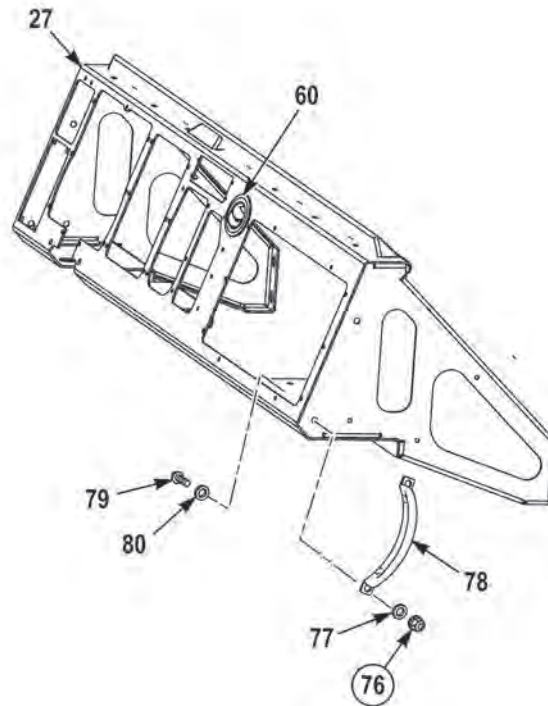


31. Disconnect connector (72).

NOTE

Note routing of dash harness prior to removal to ensure proper installation.

32. Move dash harness (73) away from dash (27) and lay aside on driver side.
33. With the aid of an assistant, remove six locknuts (74), screws (75), and dash (27) from upper dash support (31). Discard locknuts (74).

**NOTE**

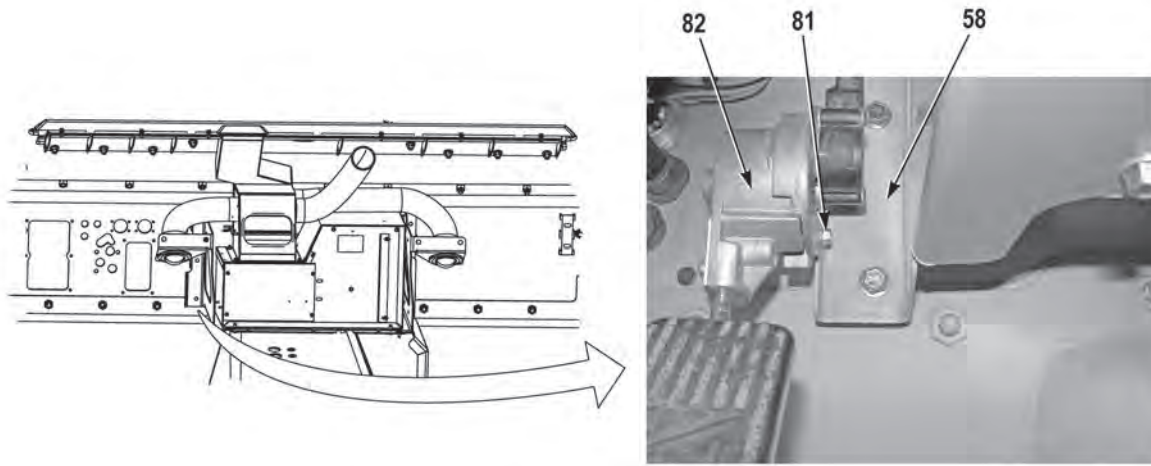
- Perform Step (34) if handles need to be removed.
- Handles are removed the same way. Passenger side shown.

34. Remove two locknuts (76), washers (77), handle (78), screws (79), and washers (80) from dash (27). Discard locknuts (76).

NOTE

- Perform Step (35) if louvers need to be removed.
- All louvers are removed the same.

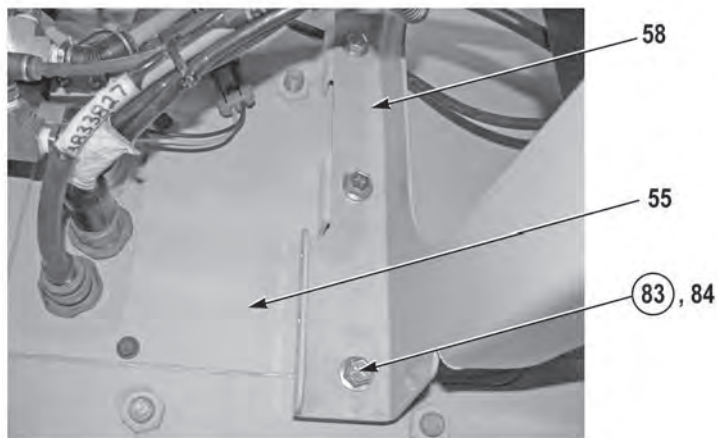
35. Remove louver (60) from dash (27).



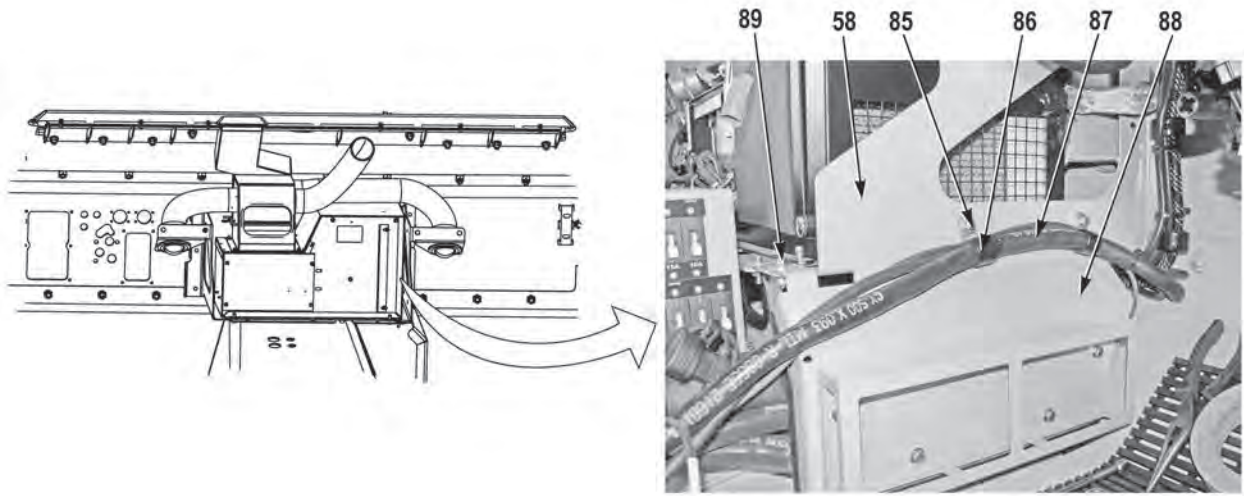
NOTE

- Perform Steps (36) through (45) if replacing upper dash support or front windows.
- HVAC tray mounting hardware must be removed and HVAC tray allowed to drop below its normal mounting position before defroster plenum and upper dash bracket can be removed.

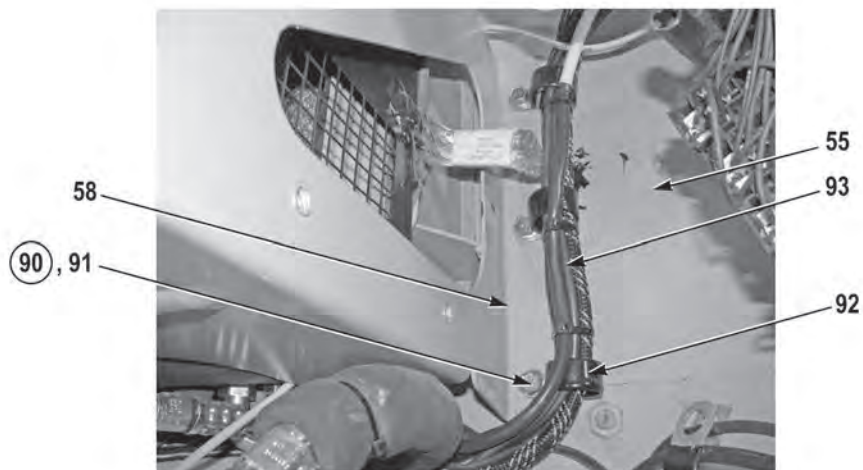
36. Remove two screws (81) and throttle control assembly (82) from HVAC tray (58).



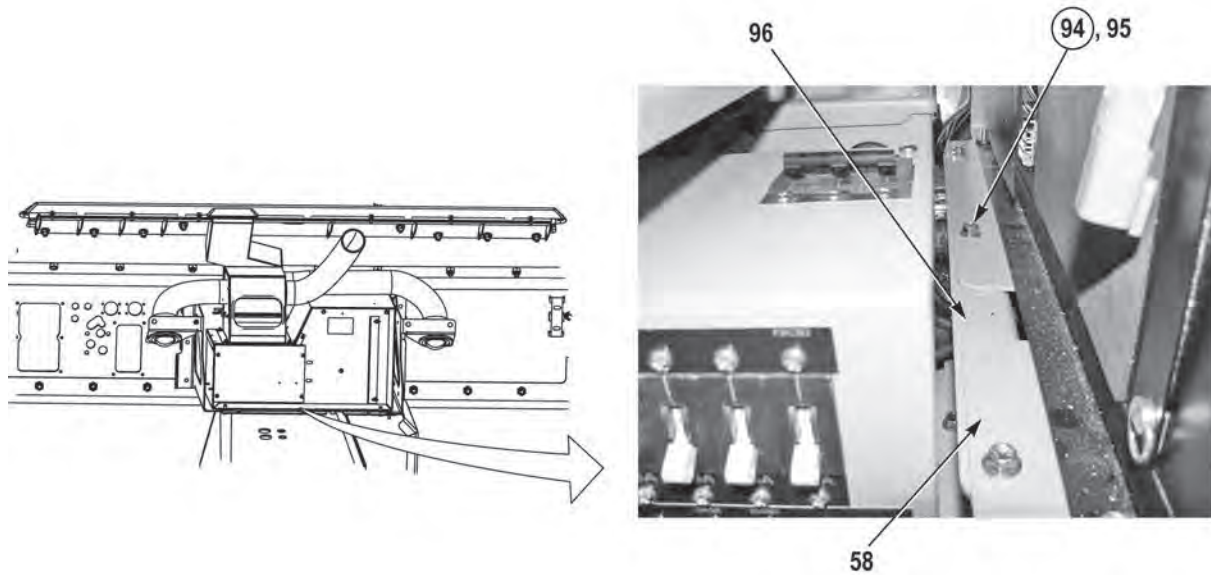
37. Remove three locknuts (83) and screws (84) from HVAC tray (58) and firewall (55). Discard locknuts (83).



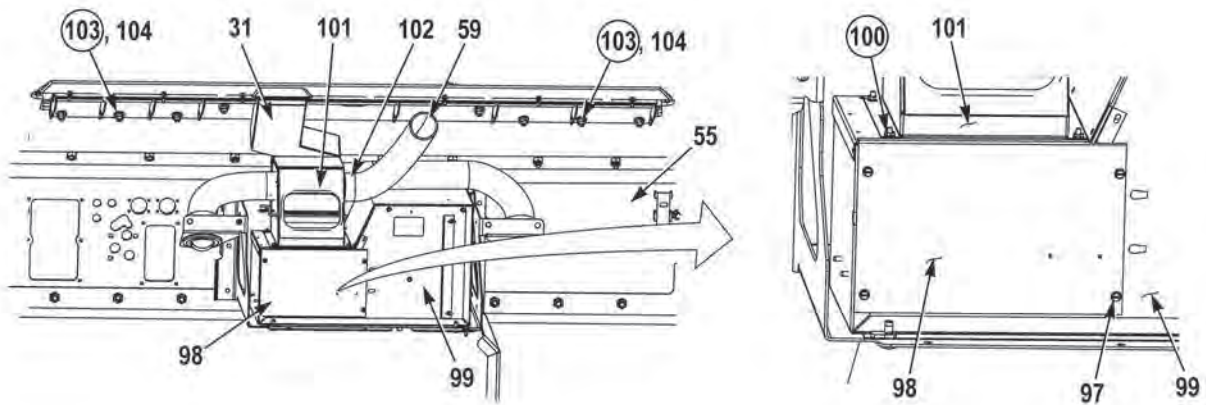
- 38. Remove two screws (85), cushion clips (86), and cable bundle (87) from cover (88).
- 39. Remove screw (89) and cover (88) from HVAC tray (58).



- 40. Remove three locknuts (90), screws (91), cushion clips (92), and cable bundle (93) from HVAC tray (58) and firewall (55). Discard locknuts (90).



41. Remove three locknuts (94) and screws (95) from HVAC tray (58) and bracket (96). Discard locknuts (94).



42. Remove four screws (97) and blower motor cover (98) from HVAC assembly (99).
43. Remove four locknuts (100) and defroster plenum (101) from HVAC assembly (99). Discard locknuts (100).

NOTE

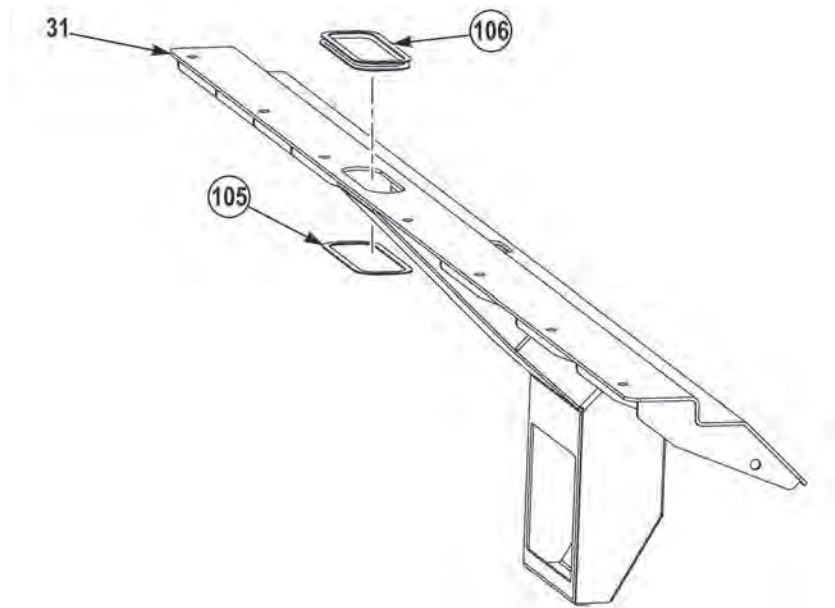
- Perform Step (44) if vent hoses need to be replaced.
- All vent hoses are removed the same way.

44. Remove cable tie (102) and vent hose (59) from defroster plenum (101). Discard cable tie (102).

NOTE

Spacers for front window studs may fall when upper dash support is removed. Ensure spacers are in position during installation.

45. Remove eight locknuts (103) and upper dash support (31) from firewall (55) and front window studs (104). Discard locknuts (103).

**NOTE**

Perform Steps (46) and (47) if gasket and grommet need to be removed.

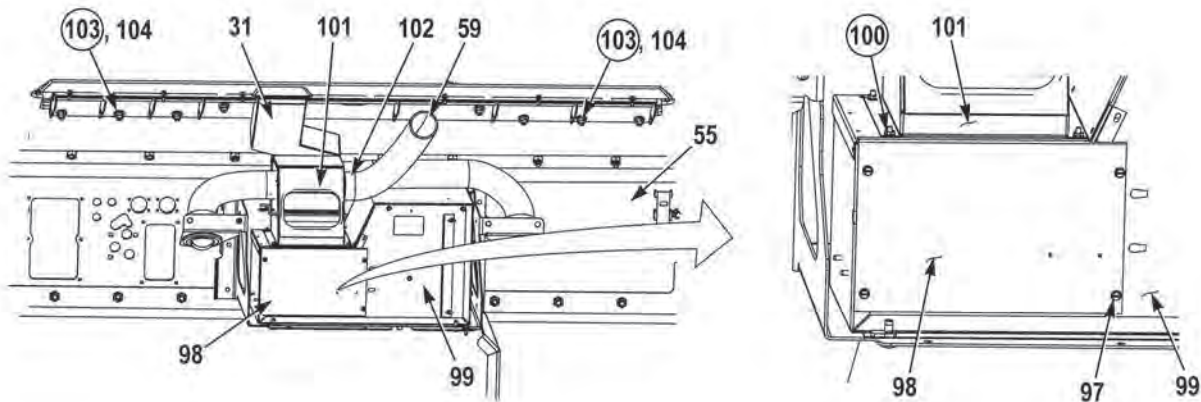
46. Remove gasket (105) from upper dash support (31). Discard gasket (105).

47. Remove grommet (106) from upper dash support (31). Discard grommet (106).

END OF TASK**INSTALLATION****NOTE**

Perform Steps (1) and (2) if gasket and grommet need to be installed.

1. Install grommet (106) on upper dash support (31).
2. Install gasket (105) on upper dash support (31).

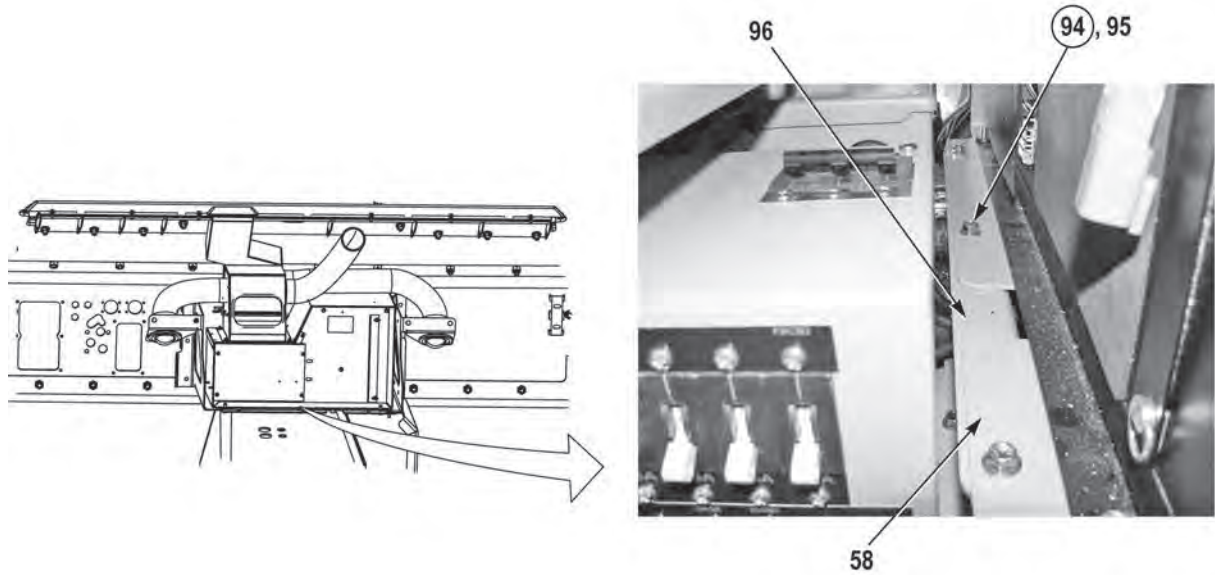


NOTE

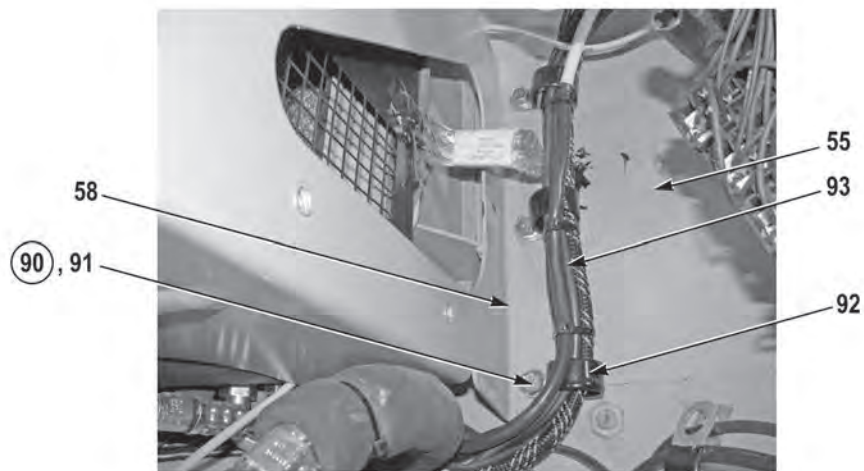
- Perform Steps (3) through (12) if upper dash support needs to be installed.
 - Ensure spacers are in position on window studs as noted prior to removal.
3. Install upper dash support (31) on firewall (55) and eight front window studs (104) with new locknuts (103).

NOTE

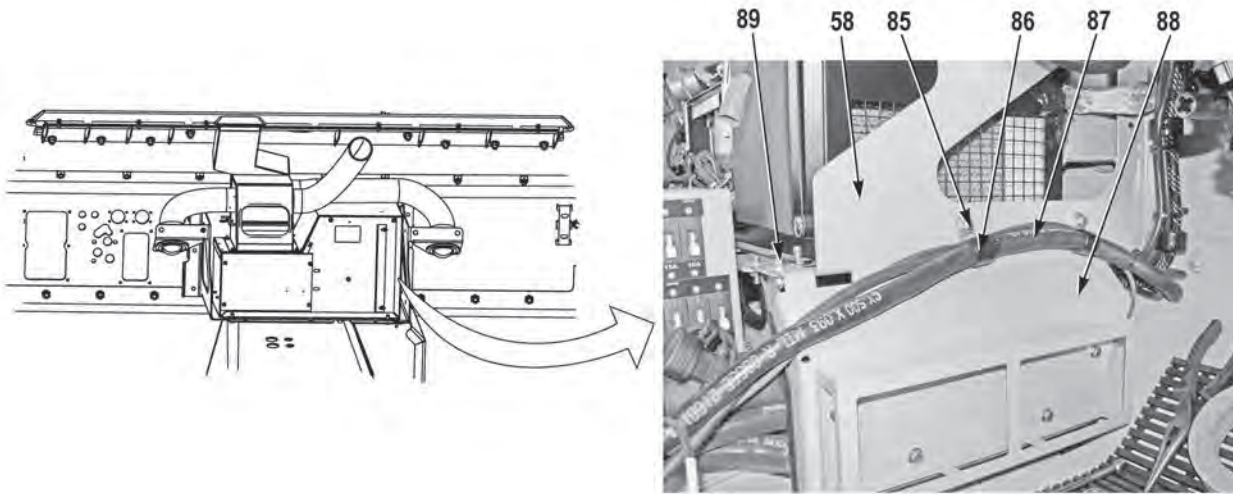
- Perform Step (4) if vent hoses need to be installed.
 - All vent hoses are installed the same way.
4. Install vent hose (59) on defroster plenum (101) with new cable tie (102).
 5. Install defroster plenum (101) on HVAC assembly (99) with four new locknuts (100).
 6. Install blower motor cover (98) on HVAC assembly (99) with four screws (97).



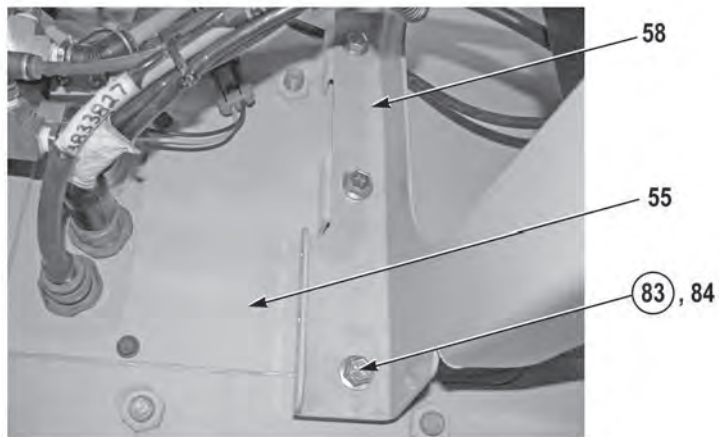
7. Install HVAC tray (58) on bracket (96) with three screws (95) and locknuts (94).



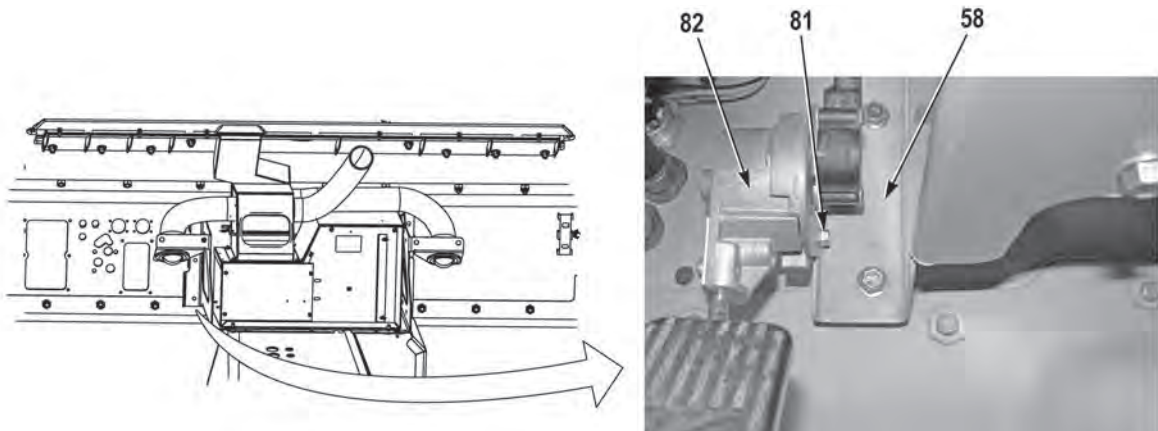
8. Install passenger side of HVAC tray (58) and cable bundle (93) on firewall (55) with three screws (91), cushion clips (92), and new locknuts (90).



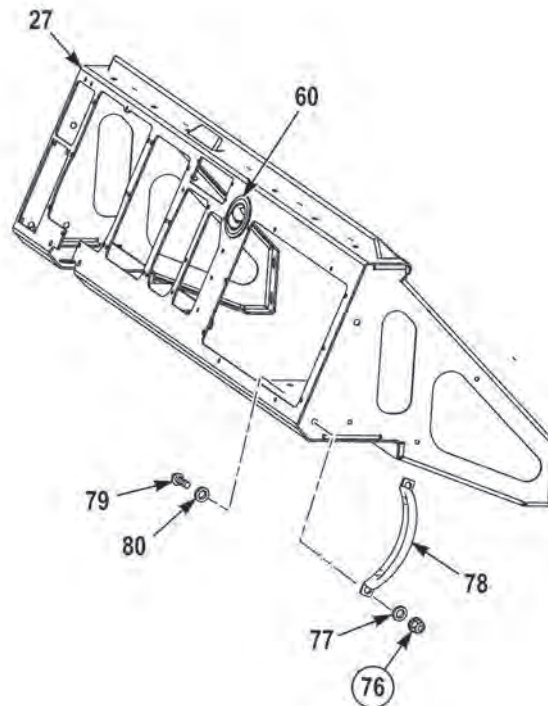
9. Install cover (88) on HVAC tray (58) with screw (89).
10. Install cable bundle (87) on cover (88) with two cushion clips (86) and screws (85).



11. Install driver side of HVAC tray (58) on firewall (55) with three screws (84) and new locknuts (83).



12. Install throttle control assembly (82) on HVAC tray (58) with two screws (81).



NOTE

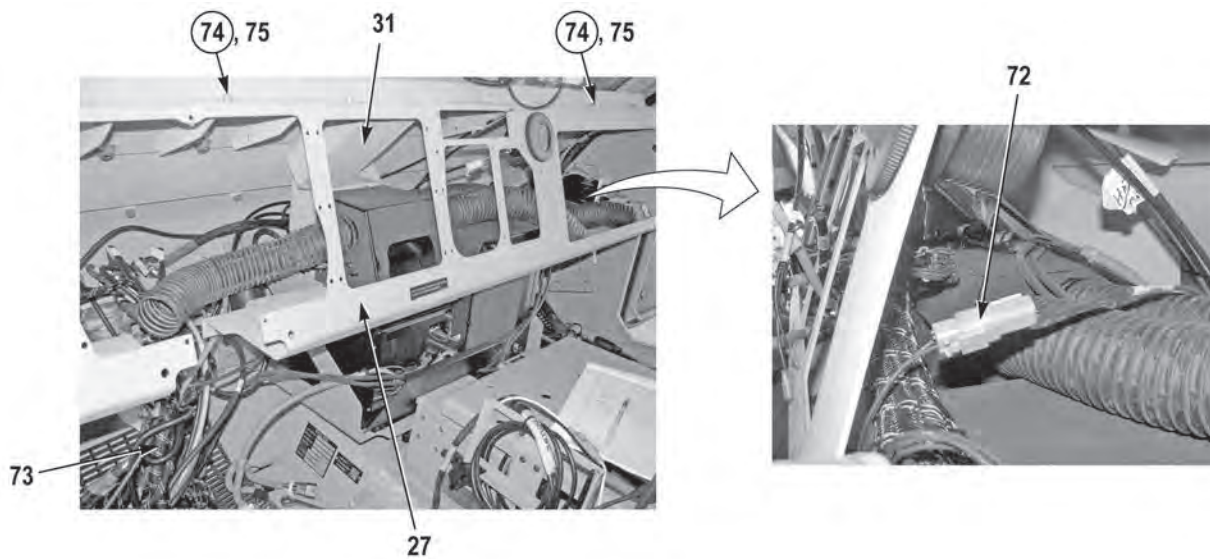
- Perform Step (13) if louvers need to be installed.
- All louvers are installed the same way.

13. Install louver (60) on dash (27).

NOTE

- Perform Step (14) if handles need to be installed.
- Handles are installed the same way. Passenger side shown.

14. Install handle (78) on dash (27) with two washers (80), screws (79), washers (77), and new locknuts (76).



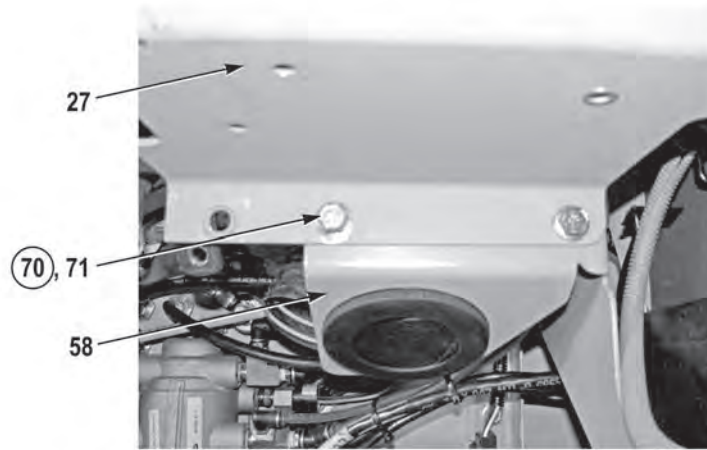
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

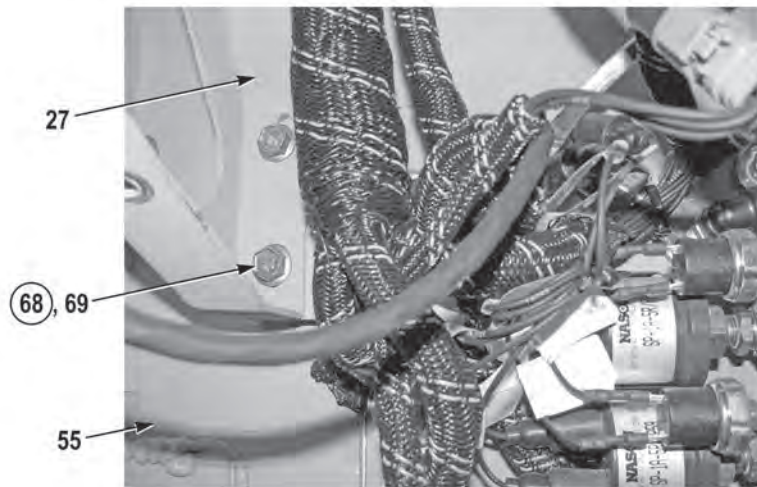
15. Apply sealing compound, Loctite 242, to threads of six screws (75) and with the aid of an assistant, install dash (27) on upper dash support (31) with six screws (75) and new locknuts (74).

NOTE

- Position harness as noted prior to removal.
 - Install cable ties as required.
16. Position harness (73) in dash (27).
 17. Connect connector (72).



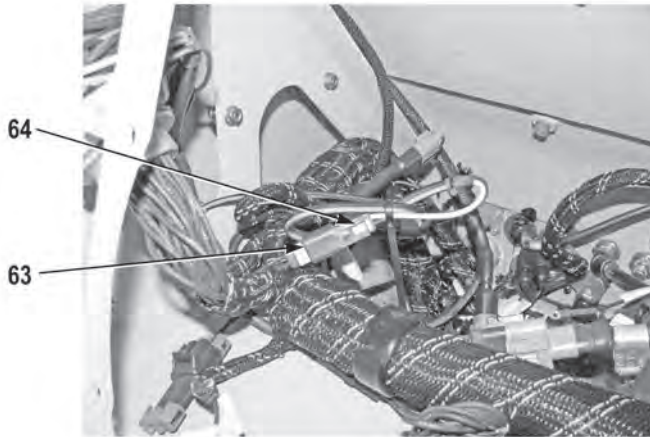
18. Secure driver side dash (27) to HVAC tray (58) with two screws (71) and new locknuts (70).



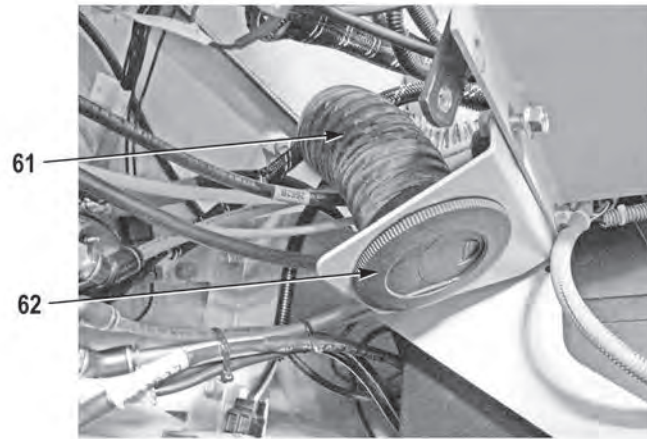
19. Secure driver side dash (27) to firewall (55) with two screws (69) and new locknuts (68).



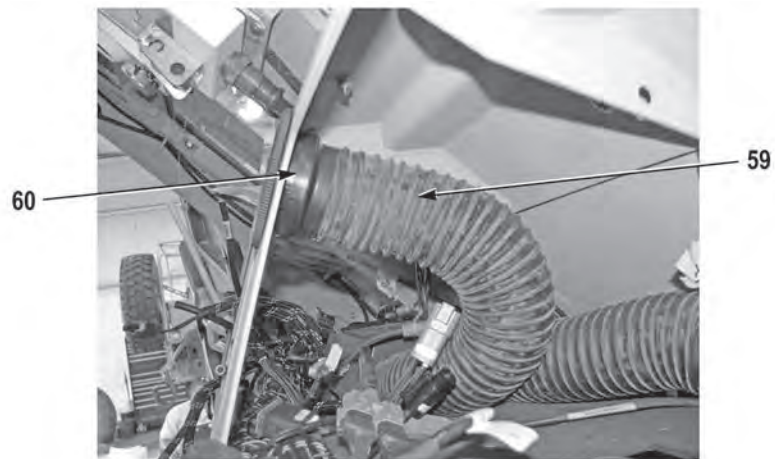
20. Install window heater harness (67) on driver side dash (27) with cushion clip (66) and screw (65).



21. Connect connector (63) to driver side door window heater harness connector (64).



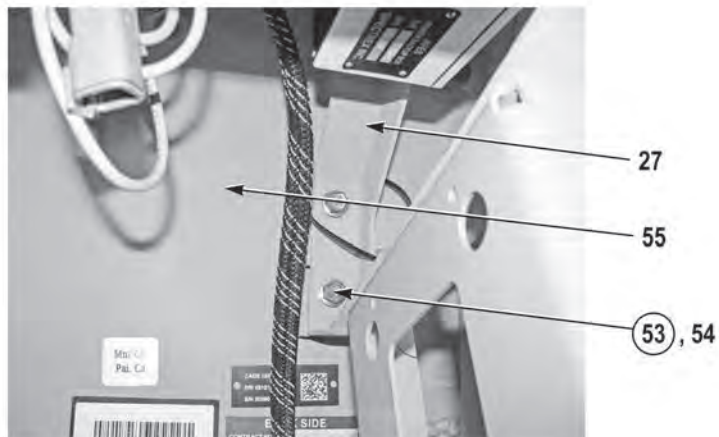
22. Install lower driver side vent hose (61) on louver (62).



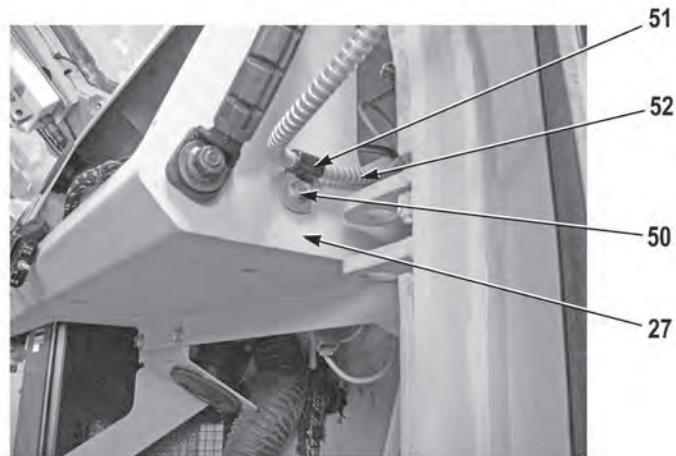
23. Install upper passenger side vent hose (59) on louver (60).



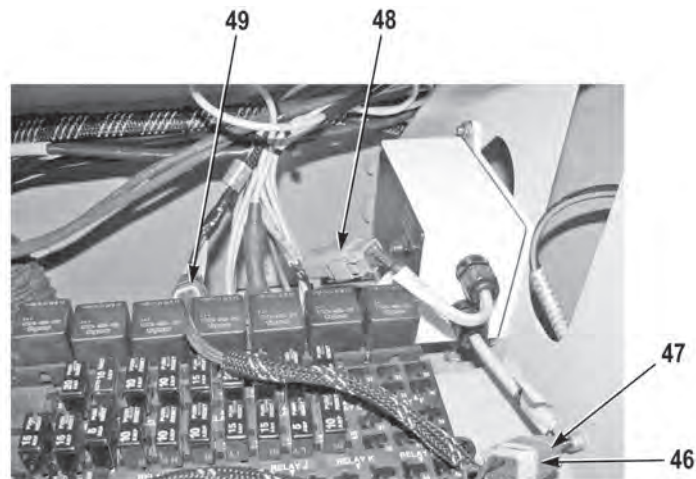
24. Secure passenger side dash (27) to HVAC tray (58) with two screws (57) and new locknuts (56).



25. Secure passenger side dash (27) to firewall (55) with two screws (54) and new locknuts (53).



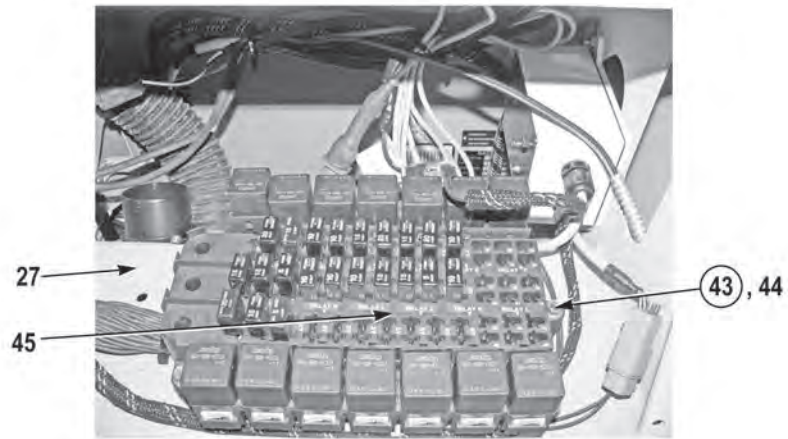
26. Install passenger side door window heater harness (52) on dash (27) with cushion clip (51) and screw (50).



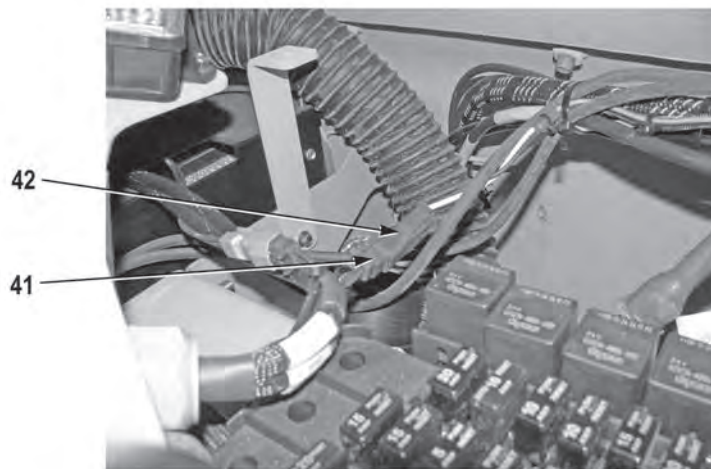
27. Connect connector (49).

28. Connect connector (48).

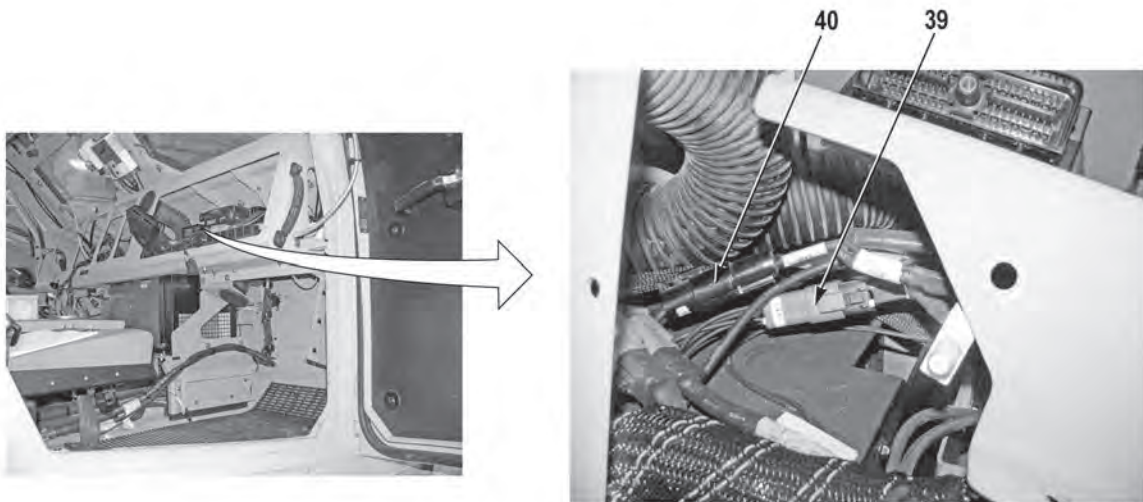
29. Connect connector (46) to fire suppression power module connector (47).



30. Install fuse/relay block (45) on dash (27) with three screws (44) and new locknuts (43).



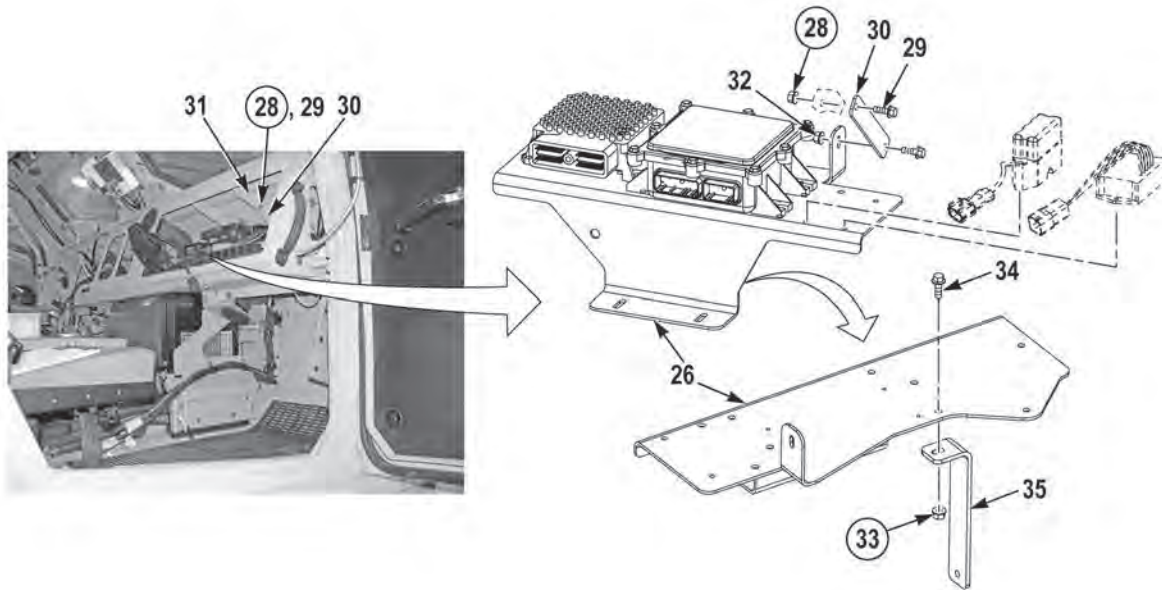
31. Connect connector (41) to passenger side door window heater connector (42).



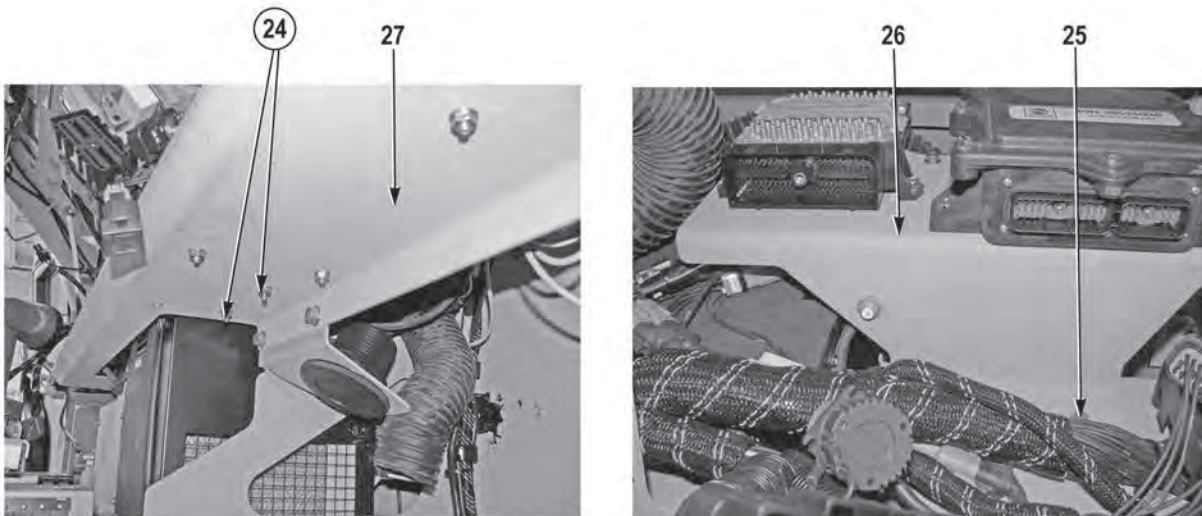
32. Connect connector (40).
33. Connect connector (39).



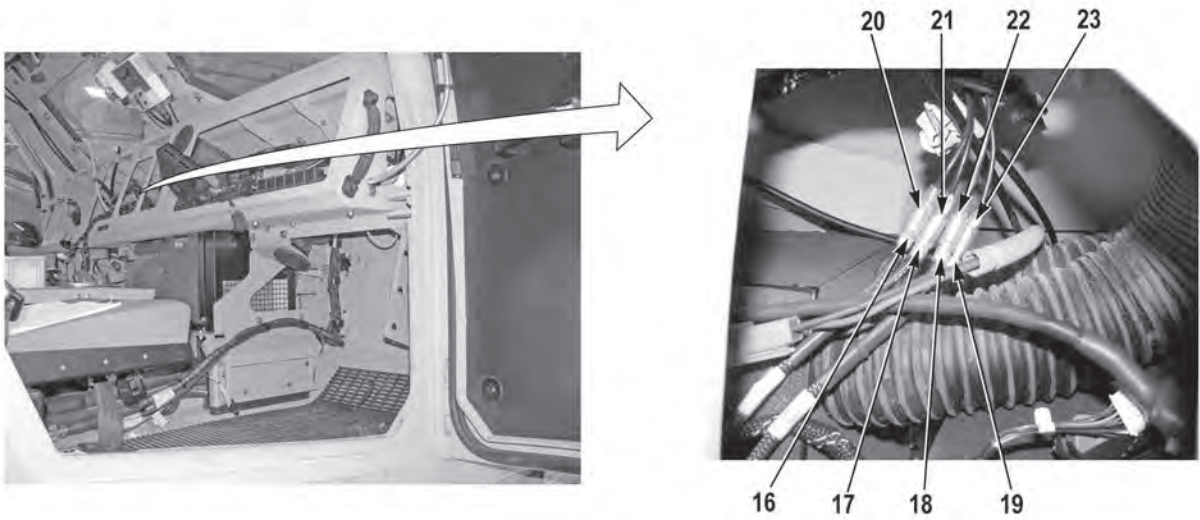
34. Position component bracket (26) close to dash (27).
35. Install cable (38) on circuit breaker (13) with new lockwasher (37) and screw (36).
36. Position circuit breaker (13) on component bracket (26) and place component bracket (26) in mounting position on dash (27).



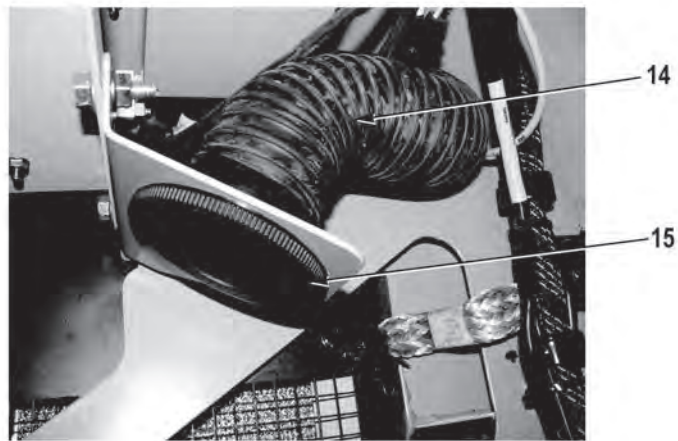
- 37. Install component bracket (26) on bracket (35) with screw (34) and new locknut (33).
- 38. Install bracket (30) on upper dash support (31) with screw (29) and new locknut (28).
- 39. Tighten locknut (32).



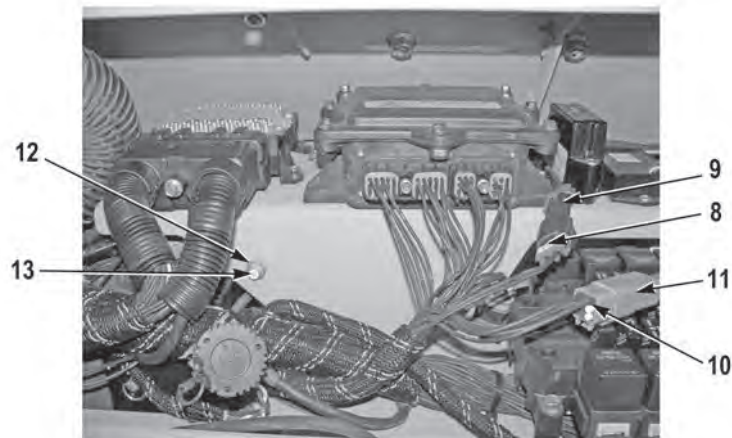
- 40. Secure component bracket (26) to dash (27) with two screws (25) and new locknuts (24).



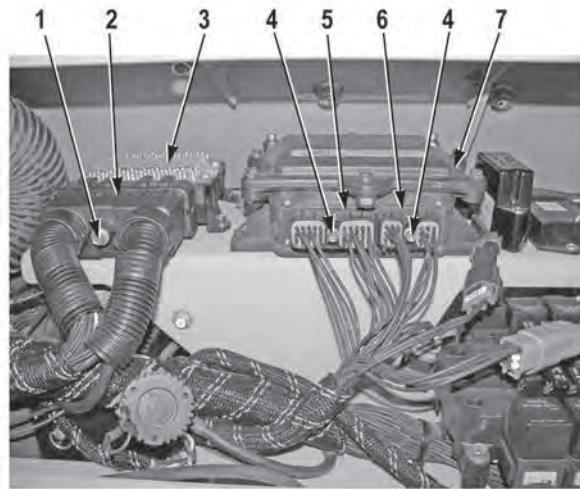
41. Connect four wires (16, 17, 18, and 19) to front window heater connectors (20, 21, 22, and 23).



42. Install lower passenger side vent hose (14) on louver (15).



43. Install nut (12) on circuit breaker (13).
44. Connect connector (10) to dimmer module connector (11).
45. Connect connector (8) to flasher module connector (9).



46. Connect two connectors (5 and 6) to transmission interface module (7) and tighten two screws (4).
47. Connect connector (2) to transmission control module (3) and tighten screw (1).
48. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FLOOR MAT REPLACEMENT

Preconditions

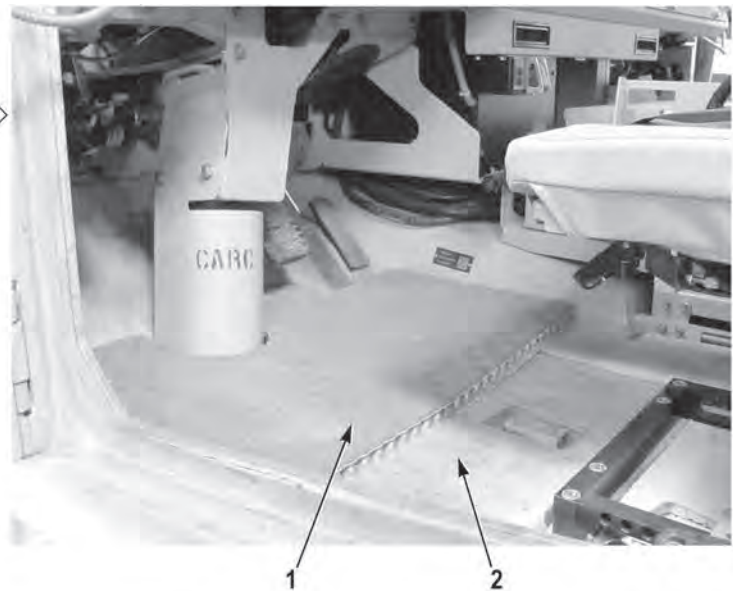
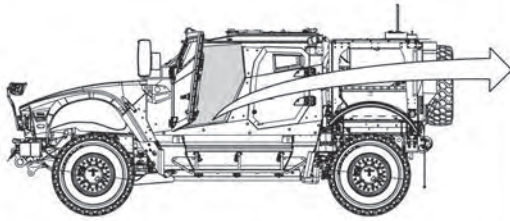
Park vehicle
Engine OFF
Wheels chocked

Follow-On Maintenance

Remove and stow wheel chocks

Tools and Special Tools

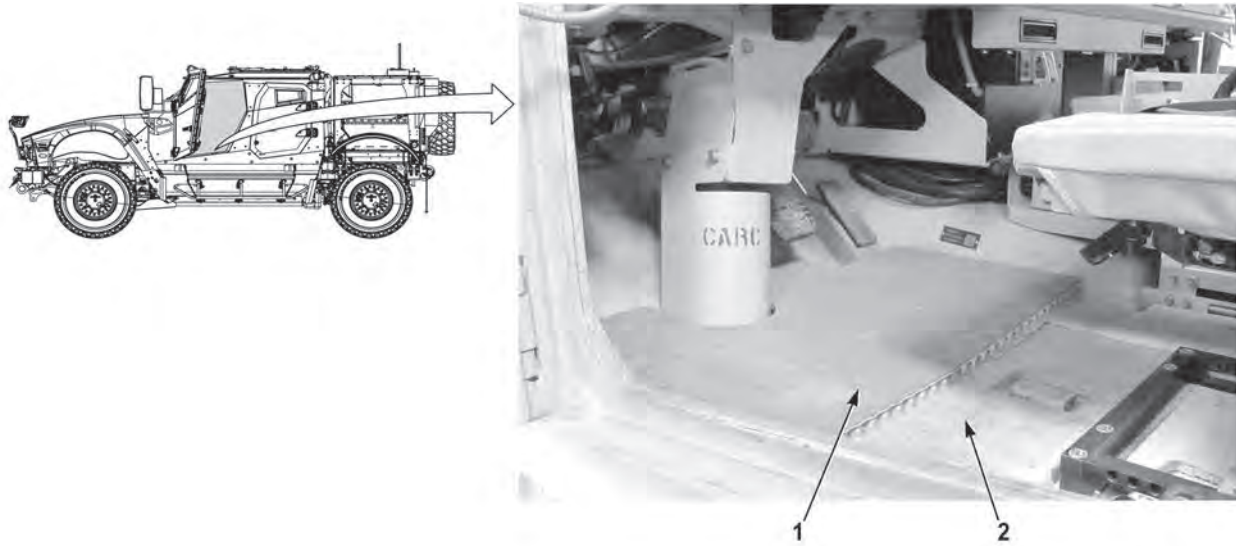
Tool Kit, General Mechanic's: Automotive

REMOVAL**NOTE**

- All floor mats are removed the same way. Driver side front floor mat shown.
- Note position and placement of floor mat prior to removal to ensure proper installation.

Remove floor mat (1) from capsule (2).

END OF TASK

INSTALLATION**NOTE**

- All floor mats are installed the same way. Driver side front floor mat shown.
- Install floor mat as noted prior to removal.

1. Install floor mat (1) on capsule floor (2).
2. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

GUNNER'S PLATFORM ADJUSTMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Personnel Required

Two

Follow-On Maintenance

Remove and stow wheel chocks

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

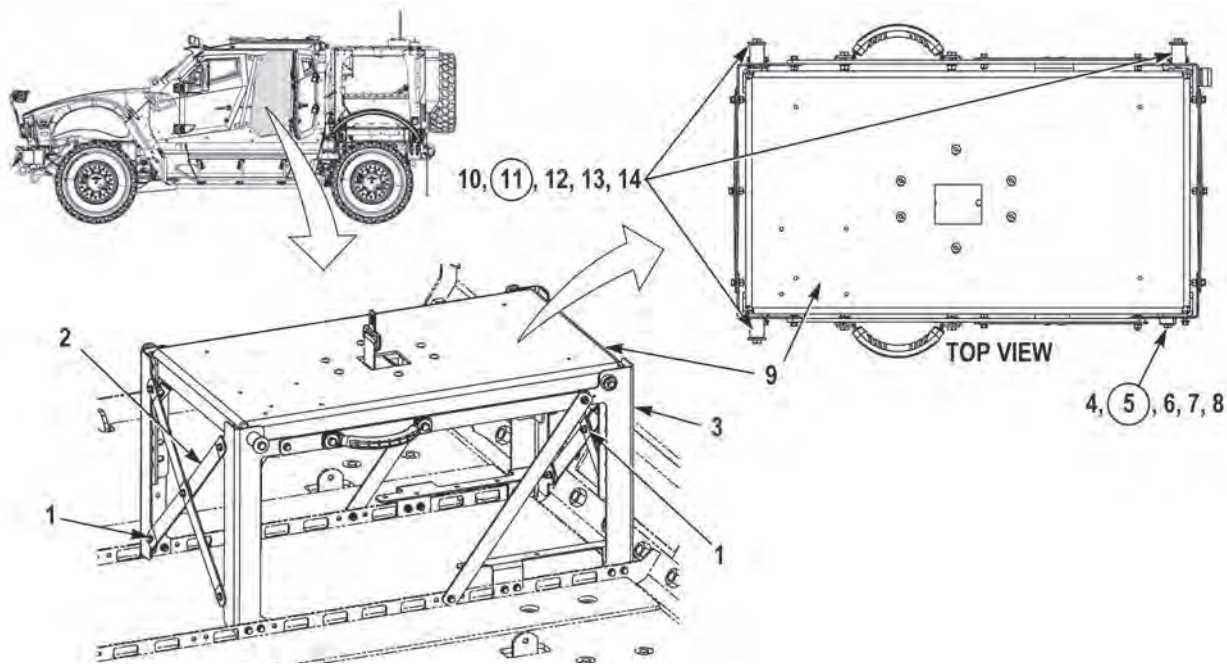
Lockwasher (Item 5)
Lockwasher (3) (Item 11)

ADJUSTMENT**WARNING**

Loosening of the crossbrace hardware is necessary to prevent binding of the gunner's platform while height adjustment is being made. Ensure crossbrace hardware is tight prior to using gunner's platform. Failure to comply may result in injury or death to personnel.

NOTE

Note position of mounting hardware prior to removal to ensure proper installation.



1. Loosen ten locknuts (1) on two crossbrace assemblies (2) and gunner's platform base (3).
2. Remove nut (4), lockwasher (5), washer (6), screw (7), and washer (8) from gunner's platform base (3) and gunner's platform (9). Discard lockwasher (5).
3. With the aid of an assistant, remove three nuts (10), lockwashers (11), washers (12), screws (13), and washers (14) from gunner's platform base (3) and gunner's platform (9). Discard lockwashers (11).

NOTE

Install mounting hardware as noted prior to removal.

4. With the aid of an assistant, raise or lower gunner's platform (9) to desired height and install gunner's platform (9) on gunner's platform base (3) with three washers (14), screws (13), washers (12), new lockwashers (11), and nuts (10).
5. Secure gunner's platform (9) on gunner's platform base (3) with washer (8), screw (7), washer (6), new lockwasher (5), and nut (4)

WARNING

Loosening of the crossbrace hardware is necessary to prevent binding of the gunner's platform while height adjustment is being made. Ensure crossbrace hardware is tight prior to using gunner's platform. Failure to comply may result in injury or death to personnel.

6. Secure two crossbrace assemblies (2) on gunner's platform base (3) by tightening ten locknuts (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

GUNNER'S PLATFORM MAT REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

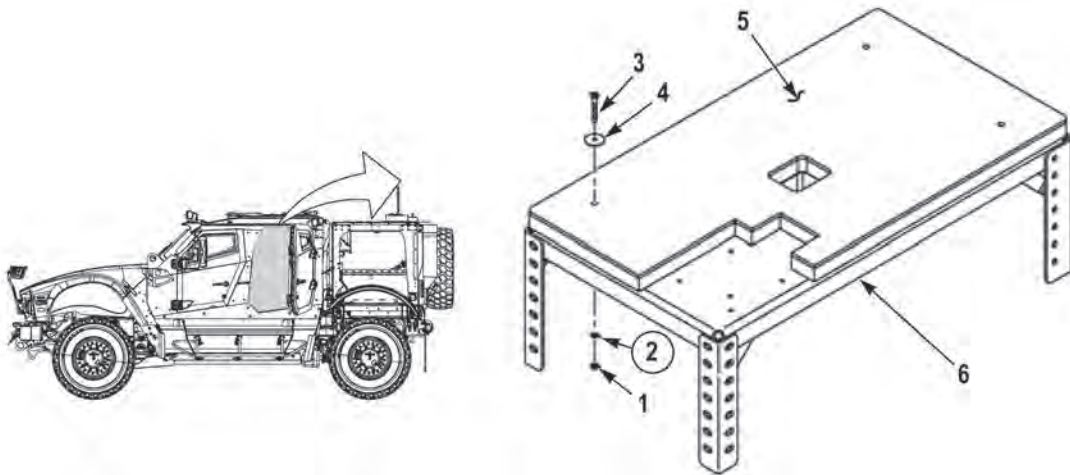
Tool Kit, General Mechanic's: Automotive

Materials/Parts

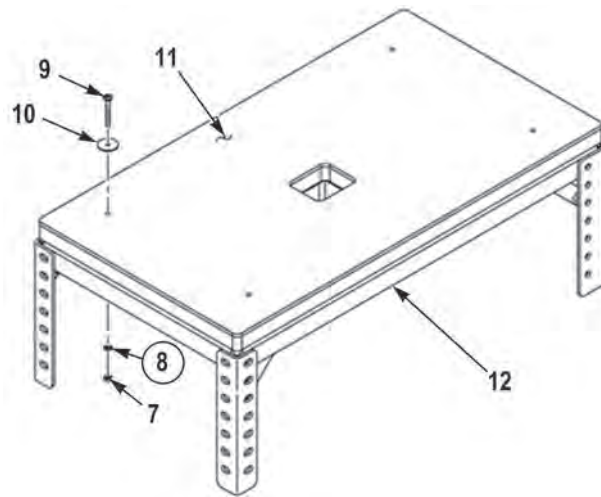
Lockwasher (3) (Item 2)
 Lockwasher (4) (Item 8)

Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

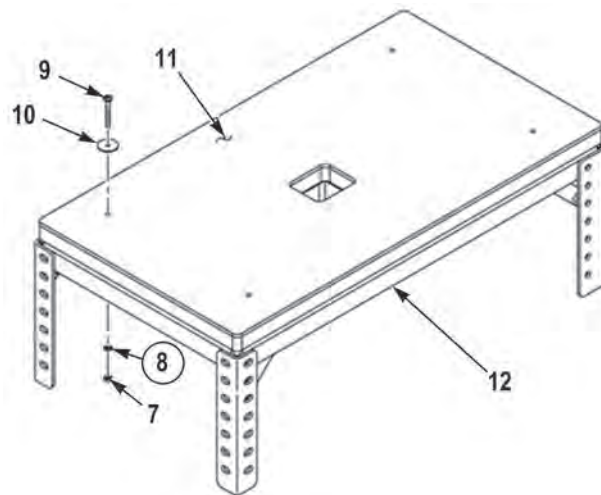
- Perform Step (1) if vehicle is equipped with Remote Weapons System.
 - Perform Step (2) if vehicle is not equipped with Remote Weapons System.
1. Remove three nuts (1), lockwashers (2), screws (3), washers (4), and gunner's platform mat (5) from gunner's platform (6). Discard lockwashers (2).



2. Remove four nuts (7), lockwashers (8), screws (9), washers (10), and gunner's platform mat (11) from gunner's platform (12). Discard lockwashers (8).

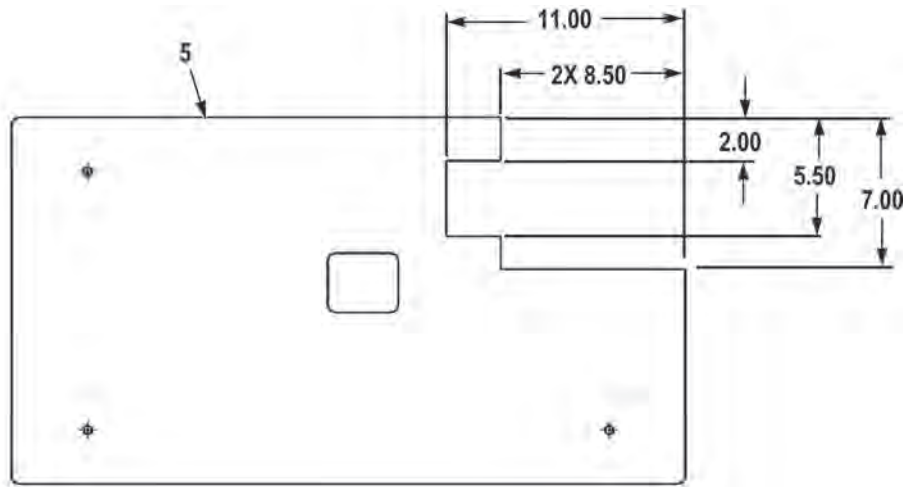
END OF TASK

INSTALLATION



NOTE

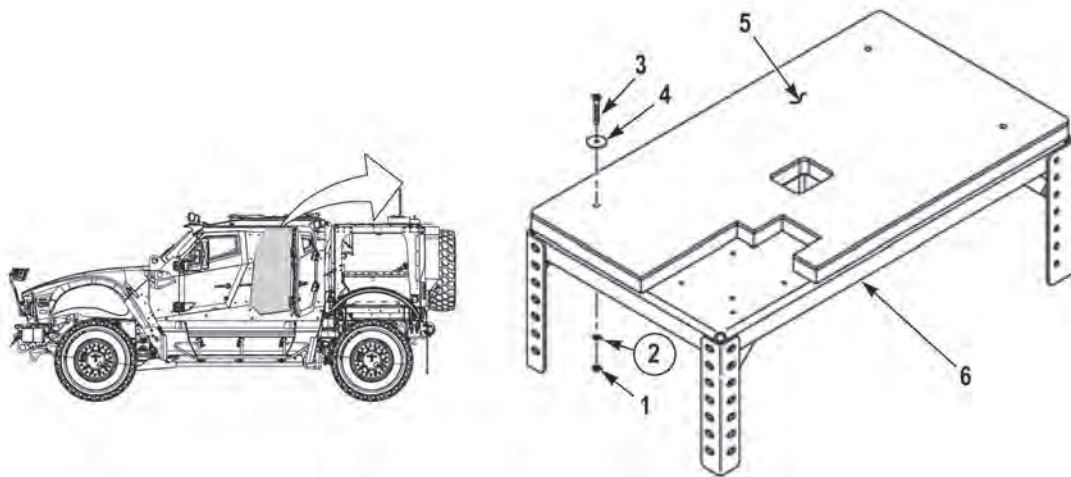
- Perform Step (1) if vehicle is not equipped with Remote Weapons System.
 - Perform Steps (2) and (3) if vehicle is equipped with Remote Weapons System.
1. Install gunner's platform mat (11) on gunner's platform (12) with four washers (10), screws (9), new lockwashers (8), and nuts (7).



CAUTION

Cutout for retractor is not centered on mat. Align cutout in mat with cutout in gunner's platform and check for proper positioning prior to cutting. Failure to comply may result in damage to equipment.

- Using a suitable cutting device, cut gunner's platform mat (5) as shown in figure above.



- Install gunner's platform mat (5) on gunner's platform (6) with three washers (4), screws (3), new lockwashers (2), and nuts (1).
- Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

GUNNER HARNESS RETRACTOR REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Gunner's platform mat removed (M1240A1)
 (WP 0154)

Tools and Special Tools

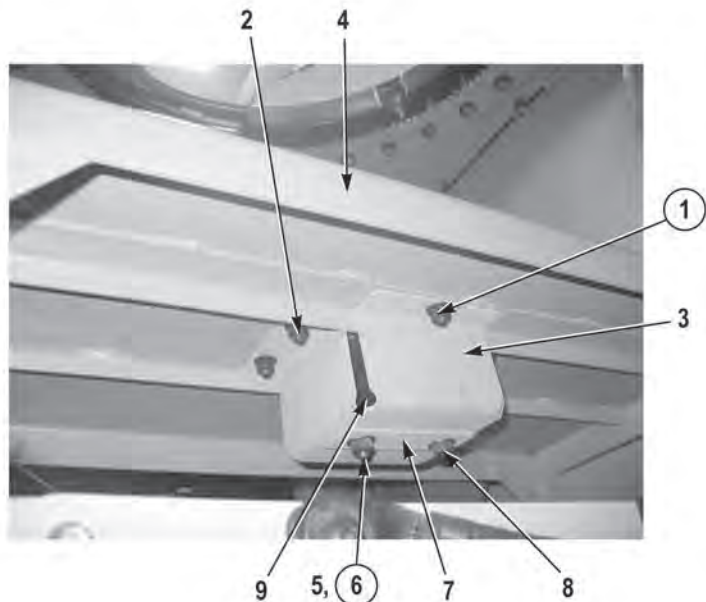
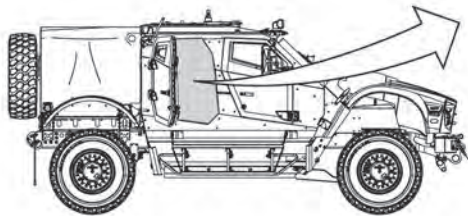
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (6) (Item 1)
 Locknut (2) (Item 5)
 Lockwasher (2) (Item 6)

Follow-On Maintenance

Install gunner's platform mat (M1240A1)
 (WP 0154)
 Remove and stow wheel chocks

REMOVAL

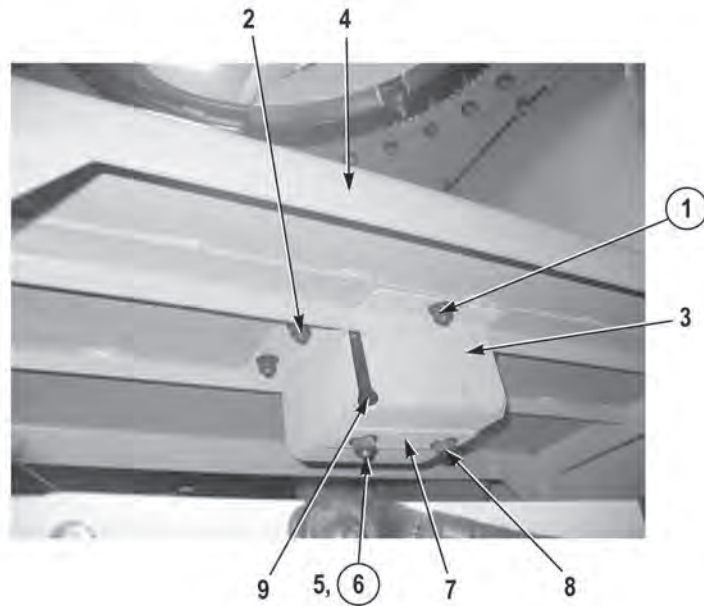
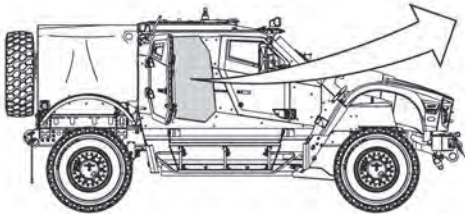
1. Remove six locknuts (1), screws (2), and retractor housing bracket (3) from gunner's platform (4). Discard locknuts (1).

NOTE

Note position of retractor prior to removal to ensure proper installation.

2. Remove two locknuts (5), lockwashers (6), reinforcement plate (7), screws (8), and retractor (9) from retractor housing bracket (3). Discard locknuts (5) and lockwashers (6).

END OF TASK

INSTALLATION**NOTE**

Install retractor as noted prior to removal.

1. Install reinforcement plate (7) and retractor (9) on retractor housing bracket (3) with two screws (8), new lockwashers (6), and new locknuts (5).
2. Install retractor housing bracket (3) on gunner's platform (4) with six screws (2) and new locknuts (1).
3. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HOOD AND GRILL REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 Batteries Disconnected (WP 0187)
 Driver Side Splash Guard Removed (WP 0028)
 Passenger Side Splash Guard Removed
 (WP 0034)
 Headlights Removed (WP 0202)
 Front Composite Lights Removed (WP 0201)
 Blackout Drive Lights Removed (WP 0192)
 Infrared (IR) Lights Removed (WP 0204)
 Front Fire Suppression Cylinder Removed
 (WP 0068)

Tools and Special Tools

Lifting Straps
 Shackles
 Tool Kit, General Mechanic's: Automotive
 Blind Fastener Installer
 Torque Wrench 0-100 lb-ft.

Materials/Parts

Locknut (4) (Item 8)
 Locknut (4) (Item 15)
 Locknut (4) (Item 18)
 Locknut (4) (Item 24)
 Locknut (4) (Item 30)
 Locknut (4) (Item 35)
 Locknut (4) (Item 41)
 Lockwasher (2) (Item 50)
 Locknut (8) (Item 53)
 Locknut (2) (Item 57)
 Locknut (8) (Item 60)

Materials/Parts (continued)

Locknut (4) (Item 63)
 Locknut (4) (Item 66)
 Locknut (20) (Item 69)
 Lockwasher (2) (Item 76)
 Lockwasher (2) (Item 80)
 Locknut (2) (Item 84)
 Insert (1) (Item 93)
 Locknut (2) (Item 94)
 Lockwasher (4) (Item 103)
 Locknut (2) (Item 109)
 Locknut (6) (Item 112)
 Tags, Identification
 Ties, Cable

Personnel Required

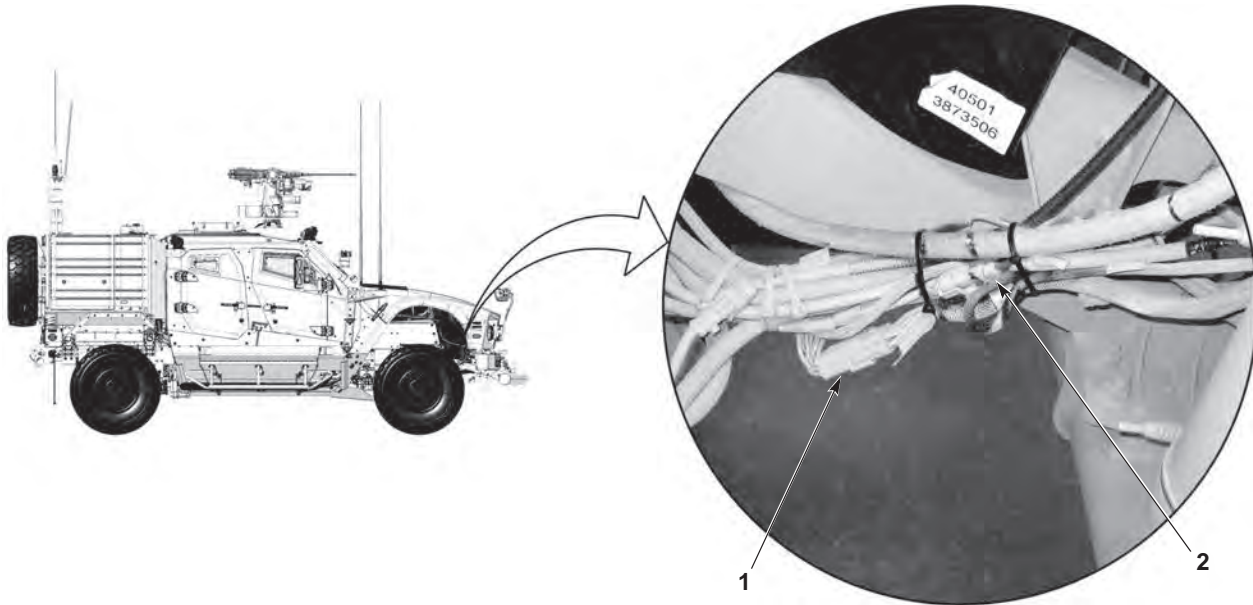
Two

Follow-On Maintenance

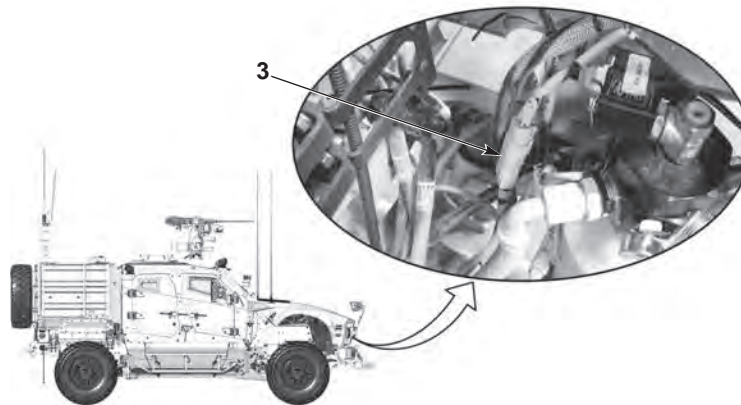
Install Front Fire Suppression Cylinder
 (WP 0068)
 Install Infrared (IR) Lights (WP 0204)
 Install Blackout Drive Lights (WP 0192)
 Install Front Composite Lights (WP 0201)
 Install Headlights (WP 0202)
 Install Passenger Side Splash Guard (WP 0034)
 Install Driver Side Splash Guard (WP 0028)
 Connect Batteries (WP 0187)
 Remove and Stow Wheel Chocks

REMOVAL**NOTE**

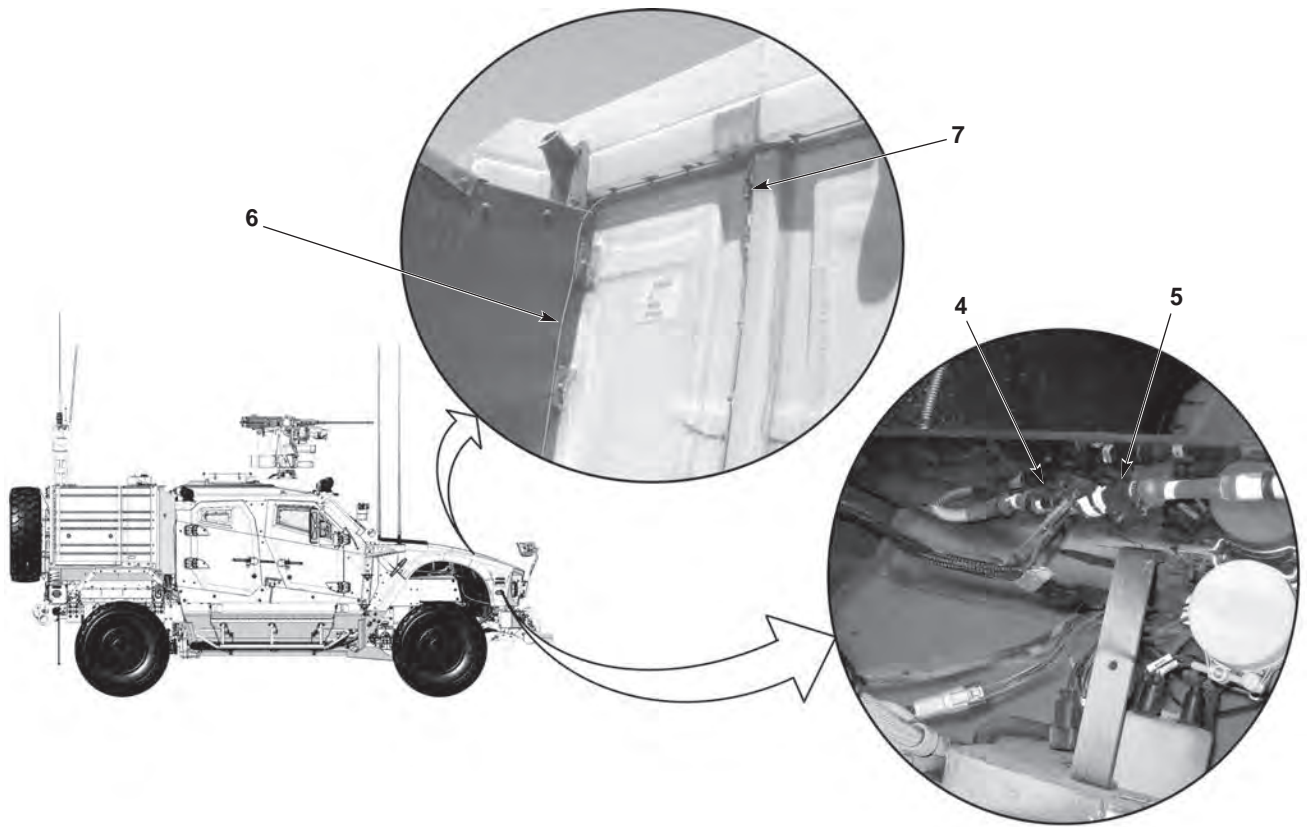
- Tag and mark connectors prior to removal to ensure proper installation. Remove cable ties as required.
- Remove cable ties and cushion clips as needed.



1. Disconnect C403 hood/lights connector (1) and fire suppression sensor connector (2).



2. Disconnect the fire suppression system connector (3).

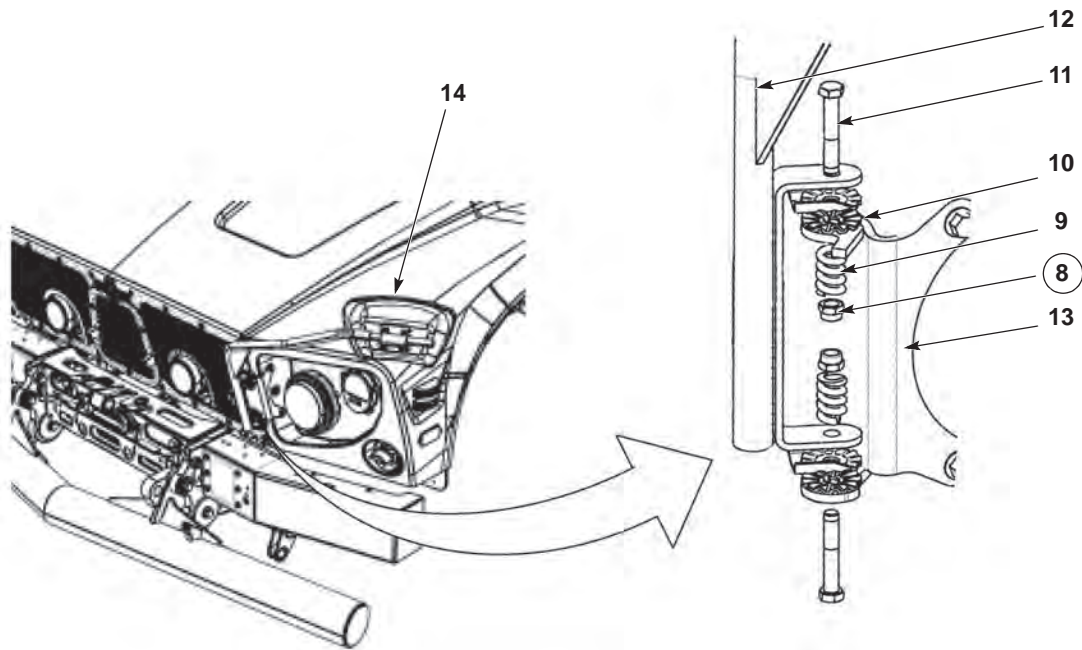
REMOVAL – CONTINUED

3. Disconnect connector LOC2 (4) and connector LOC3 (5).

NOTE

Note harness routing prior to removal.

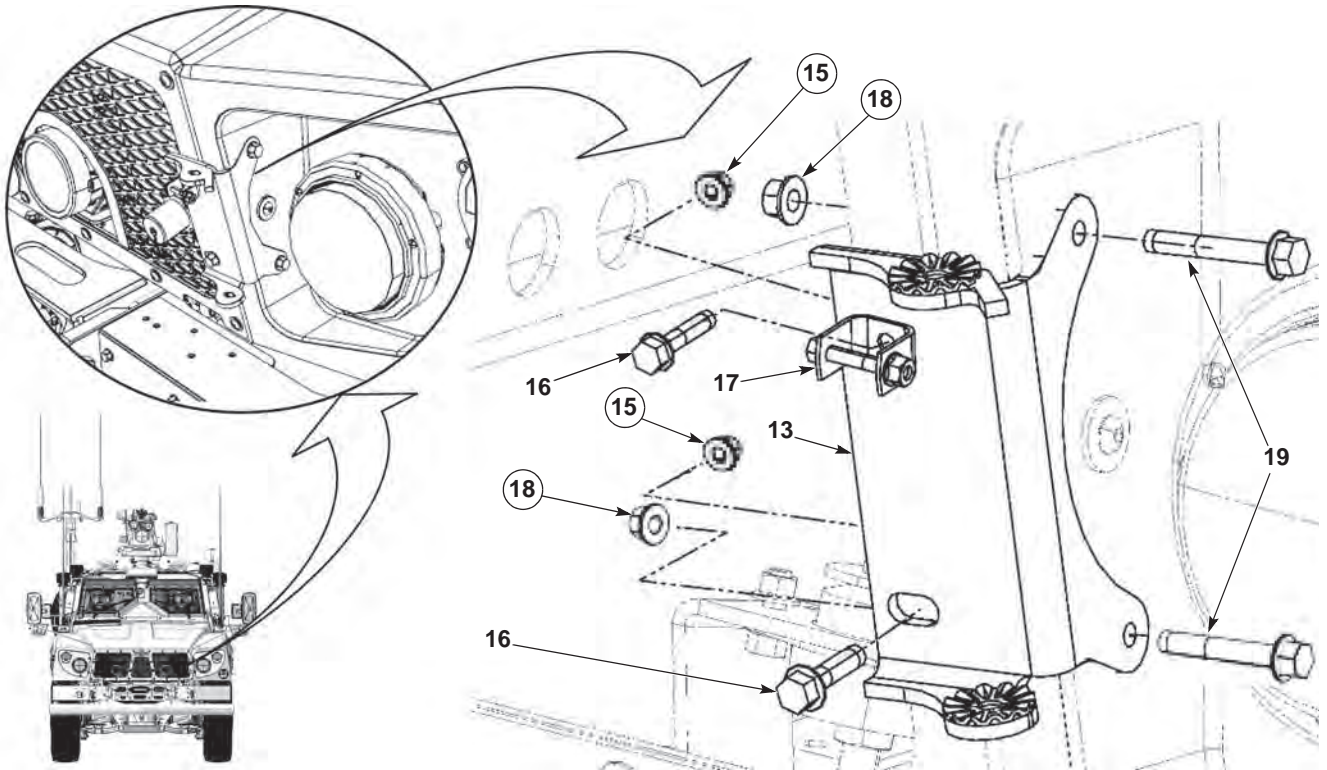
4. Remove harness (6) and sensor (7).

REMOVAL – CONTINUED**NOTE**

Note position of hardware prior to removal to ensure proper installation.

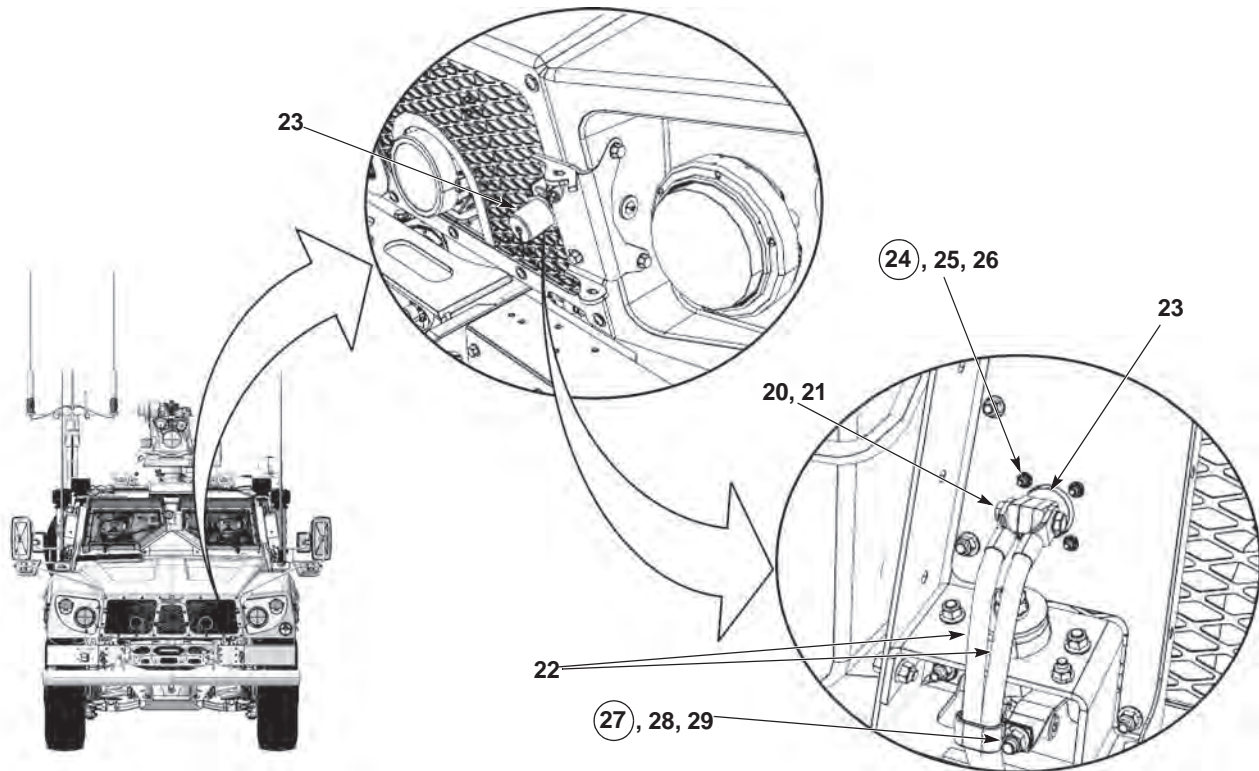
5. Remove two locknuts (8), two springs (9), two coiled brackets (10), and two screws (11), from pivot arm (12) and pivot arm bracket (11). Discard locknut (6).
6. Remove pivot arm (12) and mirror (14) from pivot arm bracket (13).
7. Repeat steps 5 and 6 for passenger side mirror.

REMOVAL – CONTINUED



8. Remove locknuts (15), screws (16), and hood latch bracket (17). Discard locknuts (15).
9. Remove locknuts (18), screws (19), and pivot arm bracket (13). Discard locknuts (18).
10. Repeat steps 8 and 9 for passenger side pivot arm bracket (13).

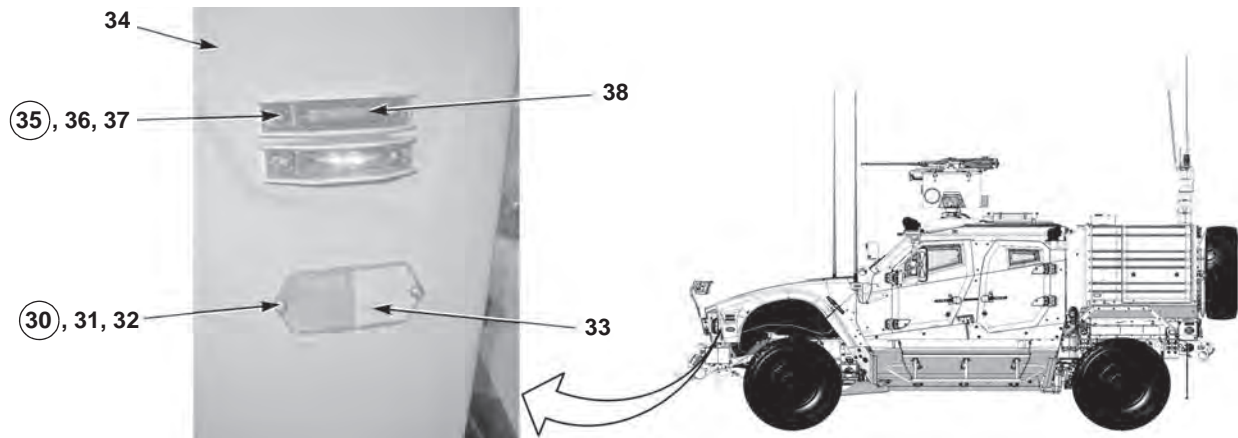
REMOVAL – CONTINUED

**NOTE**

- Remove cushion clips and cable ties as needed.
- Silicone coating will need to be removed prior to disconnecting slave receptacle.

11. Remove two screws (20), two washers (21), and wires (22) from slave receptacle (23).
12. Remove four locknuts (24), four washers (25), four screws (26), and slave receptacle (23). Discard locknuts (24).
13. Remove locknut (27), screw (28), and cushion clip (29). Discard locknut

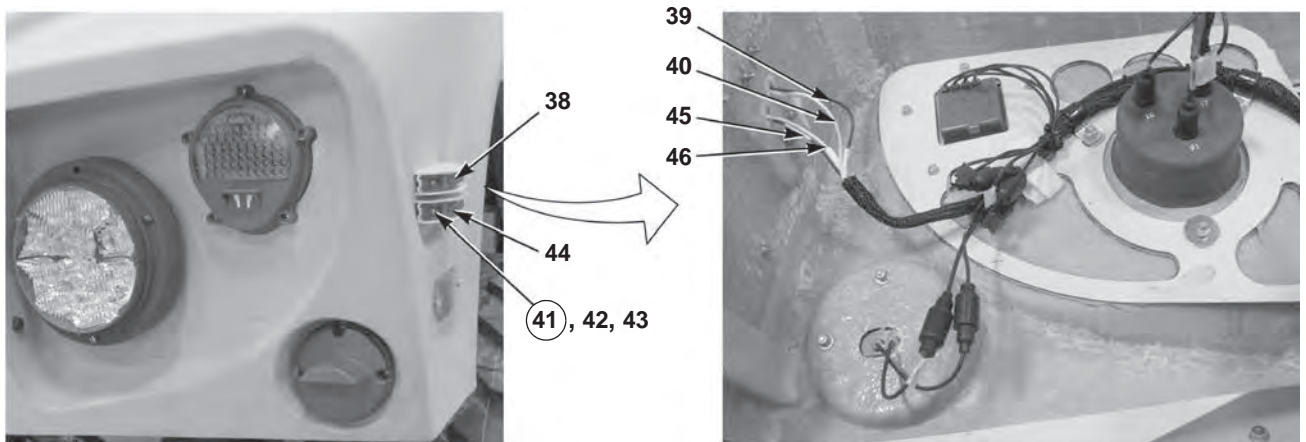
REMOVAL – CONTINUED



NOTE

- Driver side and passenger side marker lights and reflectors are removed the same way.
- Driver side shown.
- Reflector may be glued to hood.

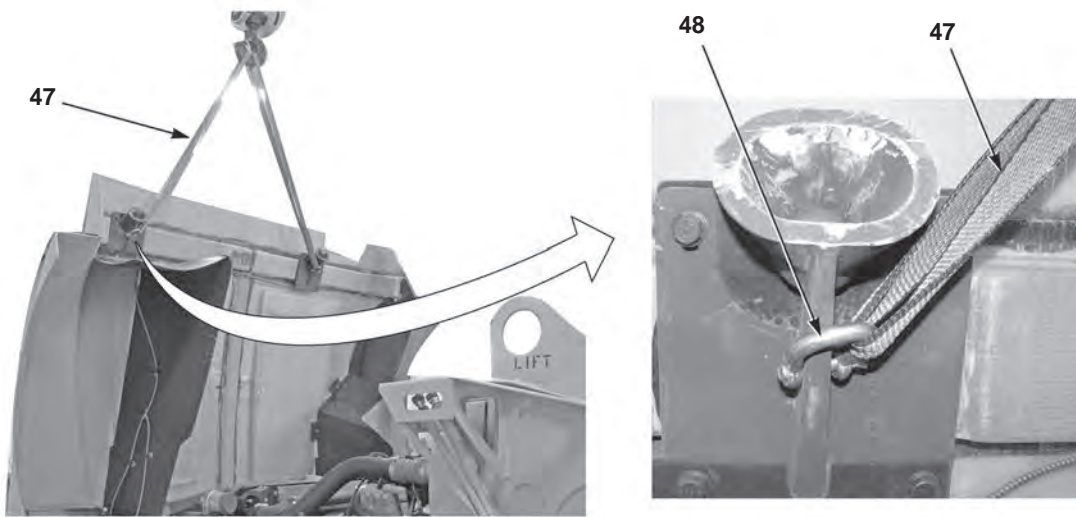
14. Remove two locknuts (30), washers (31), screws (32), and reflector (33) from hood (34). Discard locknuts (30).
15. Remove two locknuts (35), washers (36), screws (37), and move marker light (38) away from hood (34). Discard locknuts (35).



NOTE

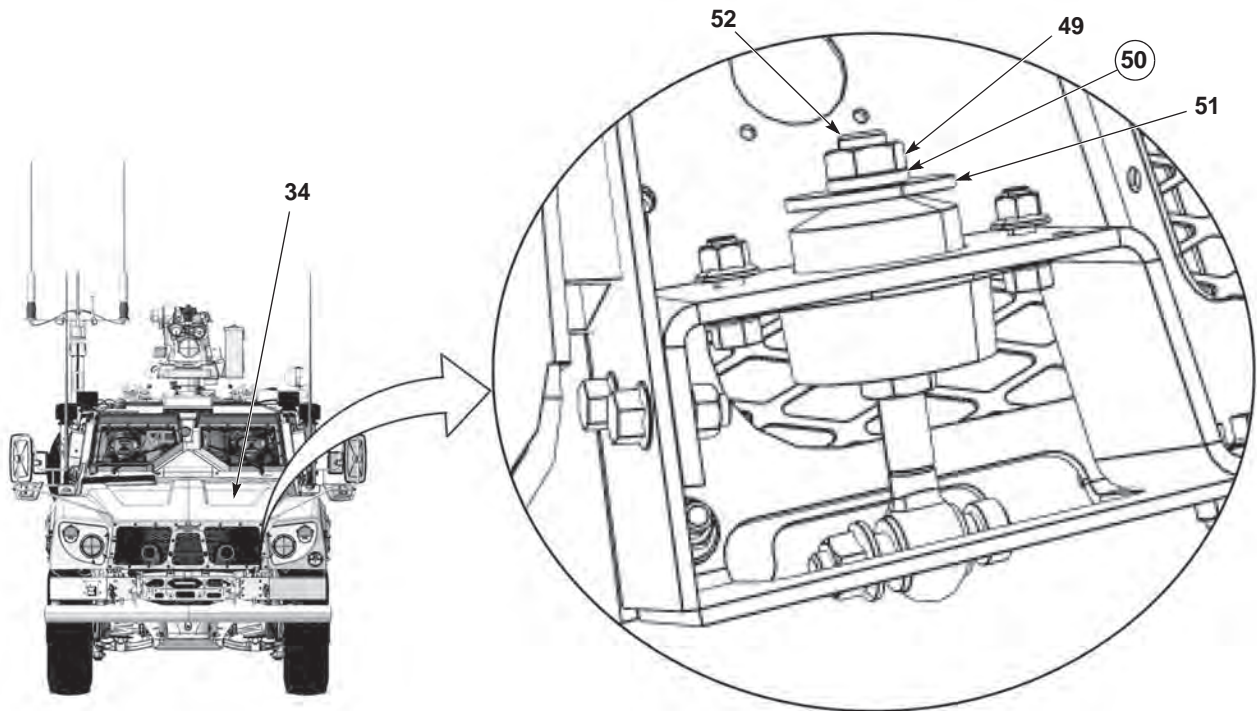
Tag wires prior to removal to ensure proper installation.

16. Disconnect wires (39 and 40) from marker light (38).
17. Remove two locknuts (41), washers (42), screws (43), and move marker light (44) away from hood (34). Discard locknuts (41).
18. Disconnect wires (45 and 46) from marker light (44).
19. Repeat steps 14–18 for passenger side reflectors and marker lights.

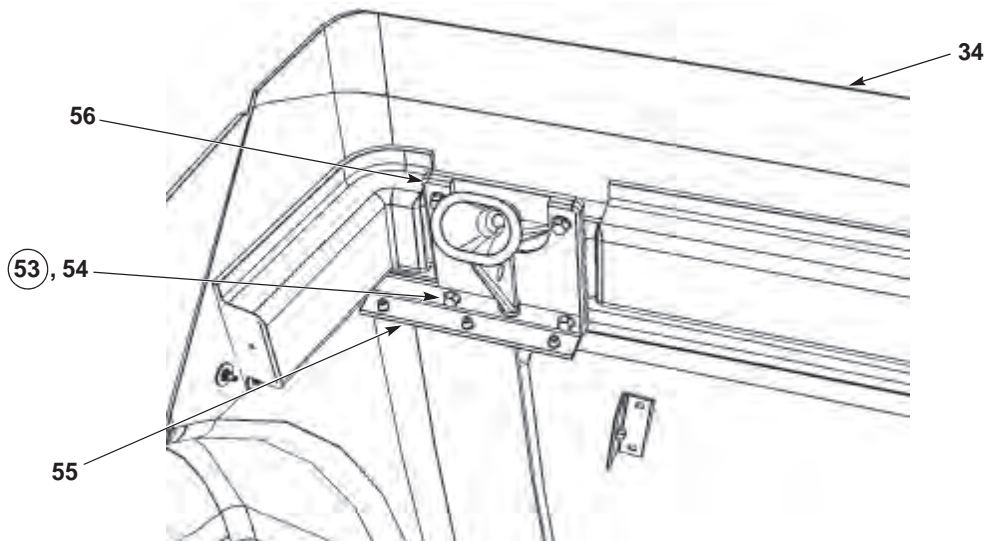
REMOVAL – CONTINUED**WARNING**

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

20. Attach lifting device (47) and shackles (48) as shown.

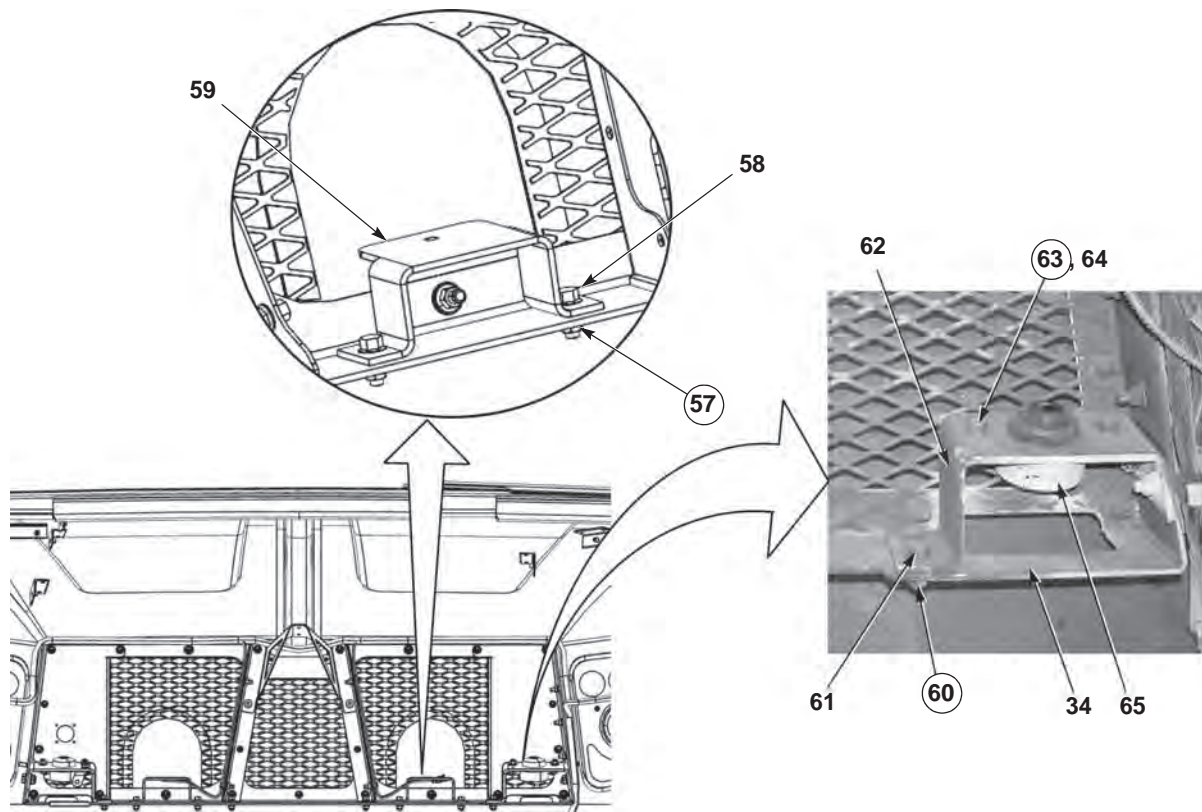
REMOVAL – CONTINUED**NOTE**

- Ensure dummy couplings are removed from hood supports prior to removing hood.
 - Note position of nuts prior to removal to ensure proper installation.
 - Passenger and driver side hood supports are removed the same way. Passenger side shown.
 - For easier installation, mark hood adjustment location on rod end prior to removal.
21. With the aid of an assistant and lifting device, remove nut (49), lockwasher (50), washer (51), from rod ends (52). Discard lockwasher (50).
 22. Repeat step 21 for passenger side.
 23. Remove hood (34) and set aside.

REMOVAL – CONTINUED

24. On driver side, remove four locknuts (53), four screws (54), bracket (55), and hood receptacle (56) from hood (34). Discard locknuts (53).
25. On passenger side, remove four locknuts (53), four screws (54), and hood receptacle (56) from hood (34). Discard locknuts (53).

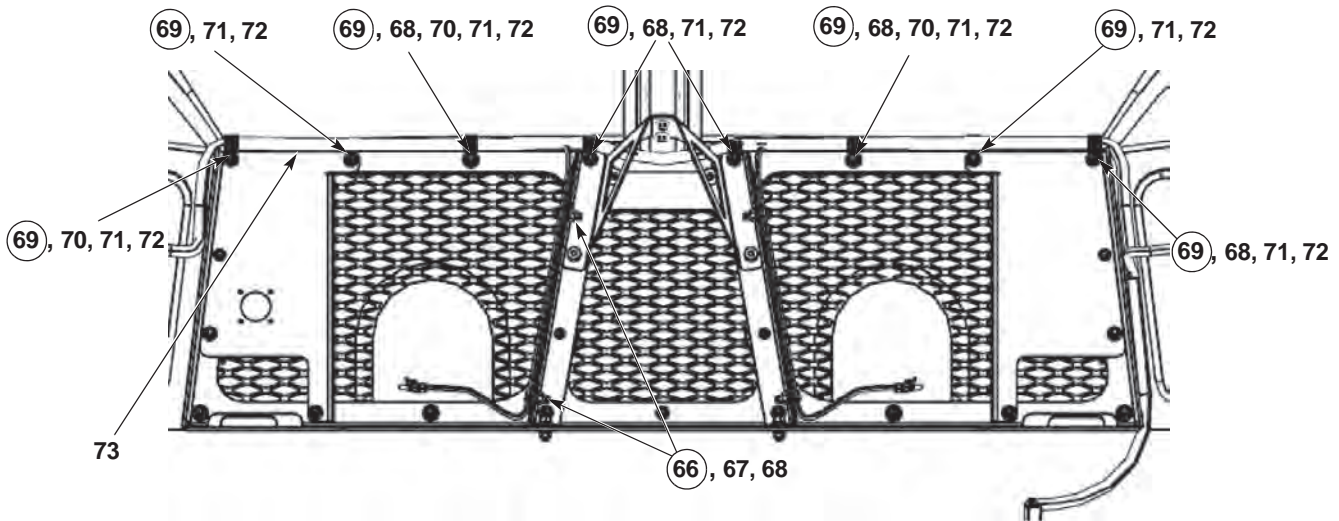
REMOVAL – CONTINUED

**NOTE**

If replacing hood mounts and IR lights, perform steps 26–29.

26. Remove two locknuts (57), two screws (58) and IR light bracket (59). Discard locknuts (57).
27. Remove four locknuts (60), four screws (61), and hood mount bracket (62) from hood (34). Discard locknuts (60).
28. Remove two locknuts (63), two screws (64), and rubber mount (65) from hood mount bracket (62). Discard locknuts (63).
29. Repeat steps 26–28 to remove passenger side hood and IR light mounting brackets (59 and 62).

REMOVAL – CONTINUED

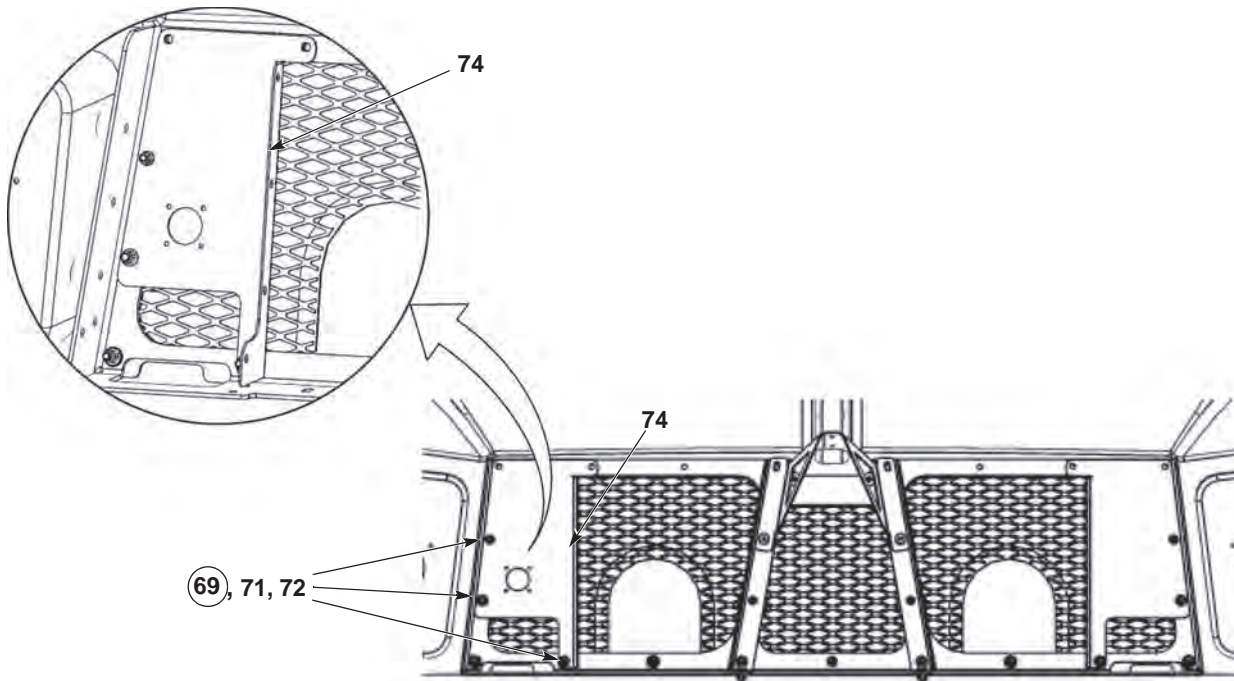


30. Remove four locknuts (66), four screws (67) and four cushion clips (68). Discard locknuts (66).

NOTE

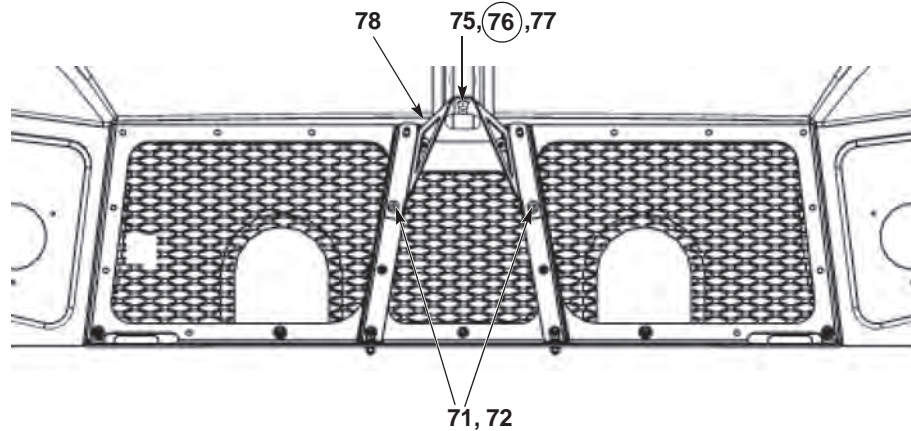
Note routing of harness prior to removal to ensure proper installation.

31. Remove eight locknuts (69), six cushion clips (68), two washers (70), eight washers (71), eight screws (72) and harness (73). Discard locknuts (69).

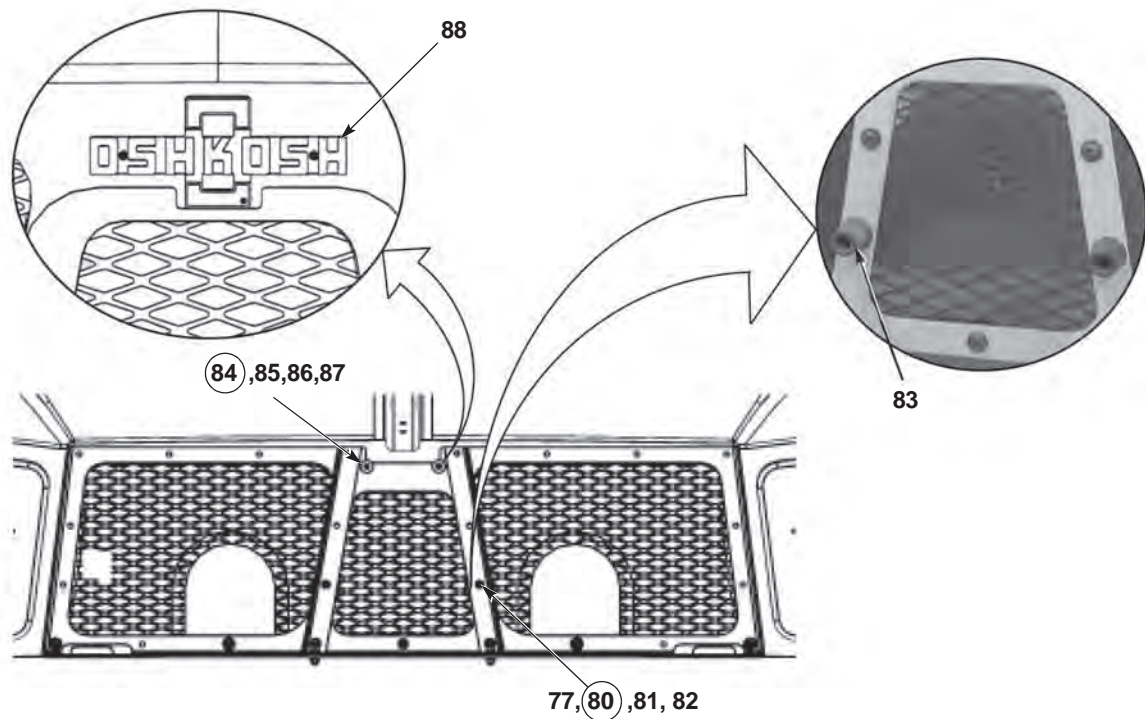


32. Remove three locknuts (69), washers (71), screws (72), and bracket (73). Discard locknuts (69).
33. Repeat step 32 to remove passenger side bracket (74).

REMOVAL – CONTINUED

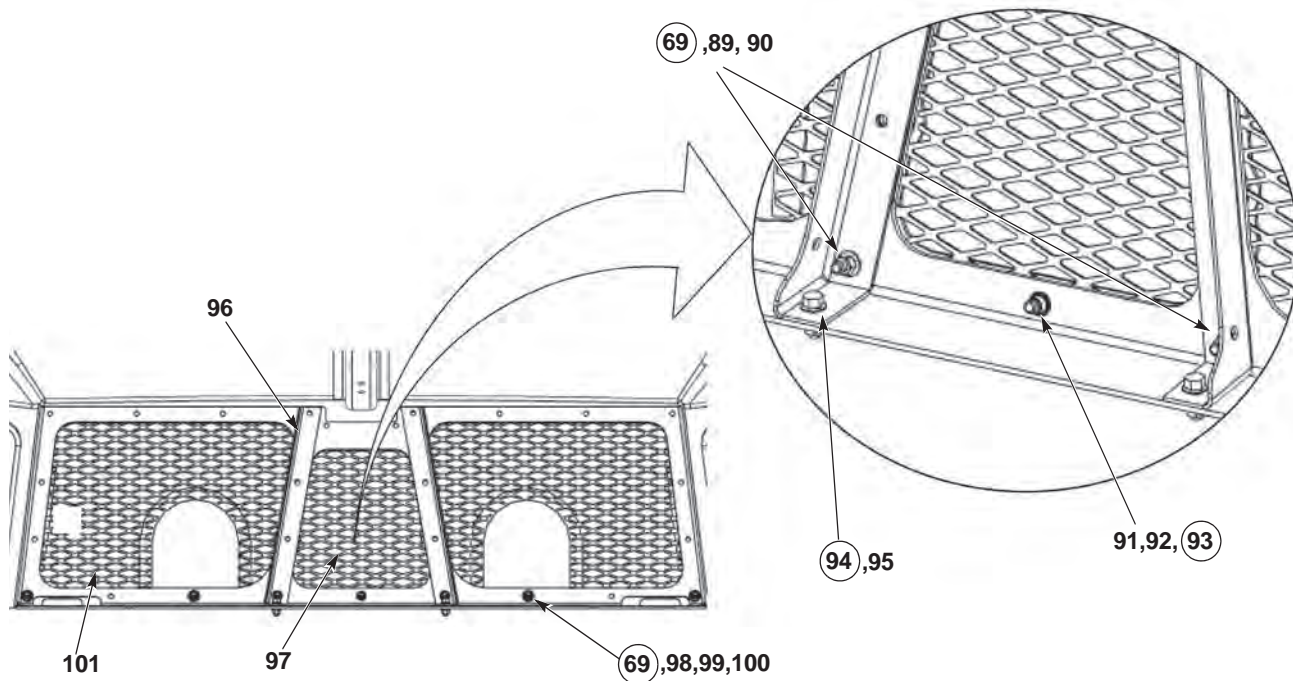


34. Remove two screws (75), two lockwashers (76), and two washers (77). Discard lockwashers (76).
35. Remove two screws (72), two washers (71), and two brackets (78).



36. Remove two nuts (79), two lockwashers (80), two washers (81), two screws (82), and two rubber stoppers (83). Discard lockwashers (80).
37. Remove two locknuts (84), two washers (85), two washers (86), two screws (87), and nameplate (88). Discard locknuts (84).

REMOVAL – CONTINUED



38. Remove two locknuts (69), two washers (89), and two screws (90). Discard locknuts (69).

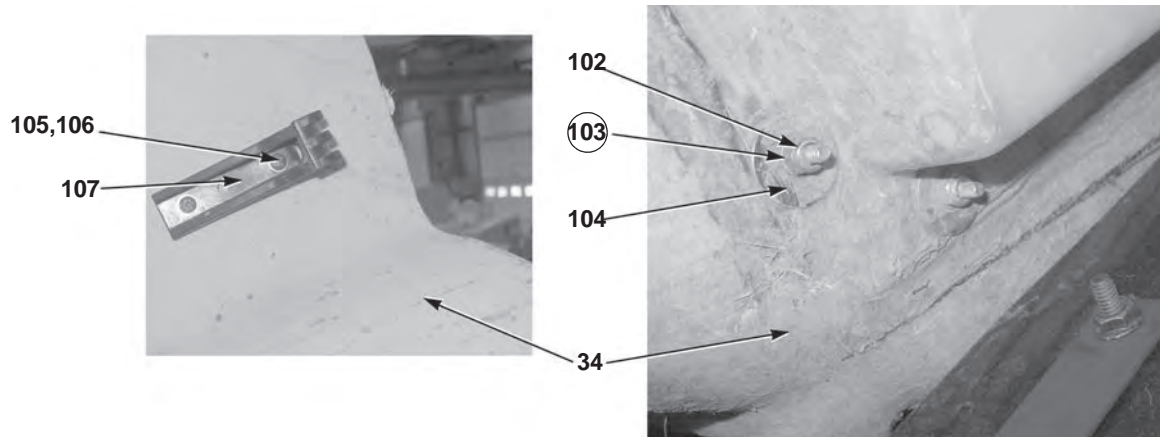
39. Remove screw (91), washer (92), and insert (93).

NOTE

Note position of brackets prior to removal to ensure proper installation.

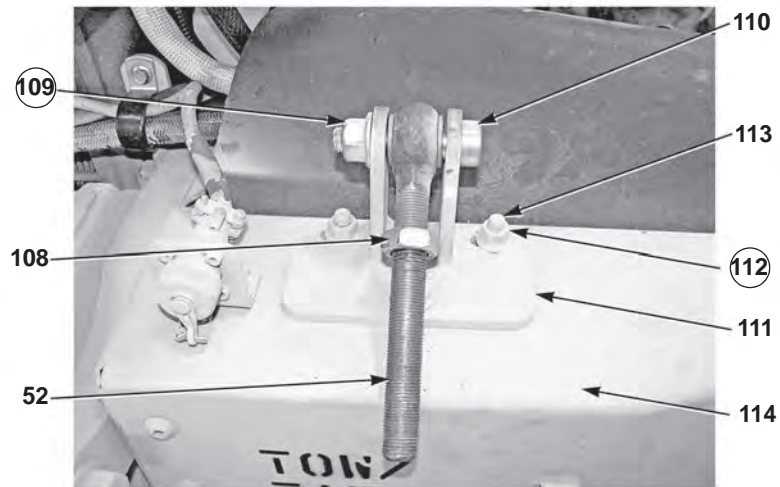
40. Remove two locknuts (94), two screws (95), two brackets (96), and center grille section (97). Discard locknuts (94).

41. Remove four locknuts (69), four washers (98), four washers (99), four screws (100), and outer grille section (101). Discard locknuts (69).

REMOVAL – CONTINUED**NOTE**

Driver side and passenger side latches are removed the same way.

42. Remove two nuts (102), lockwashers (103), washers (104), screws (105), washers (106), and hood latch (107) from hood (34). Discard lockwashers (103).
43. Repeat step 42 for passenger side hood latch (107).

REMOVAL – CONTINUED**NOTE**

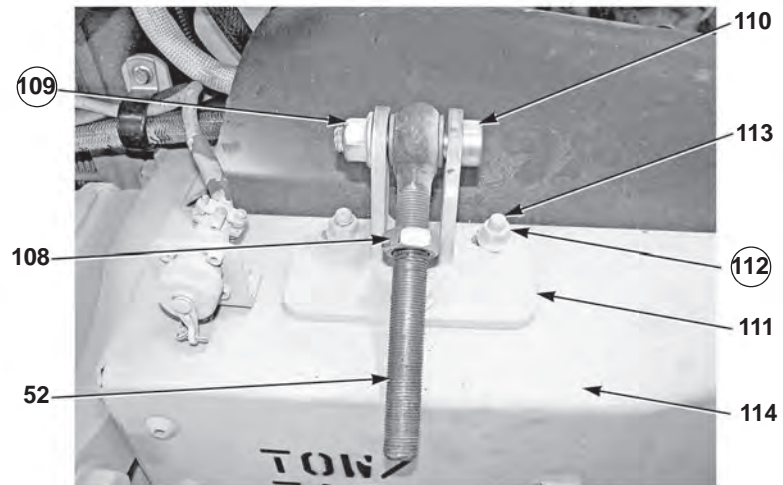
- Perform steps 44–46 if hood mount assemblies must be removed.
- Driver side and passenger side hood mount assemblies are removed the same way.
- Driver side shown.
- Match mark hood mount brackets prior to removal to ensure proper installation.
- Note position of jam nut prior to removal to ensure proper installation.

44. Remove jam nut (108) from rod end (52).

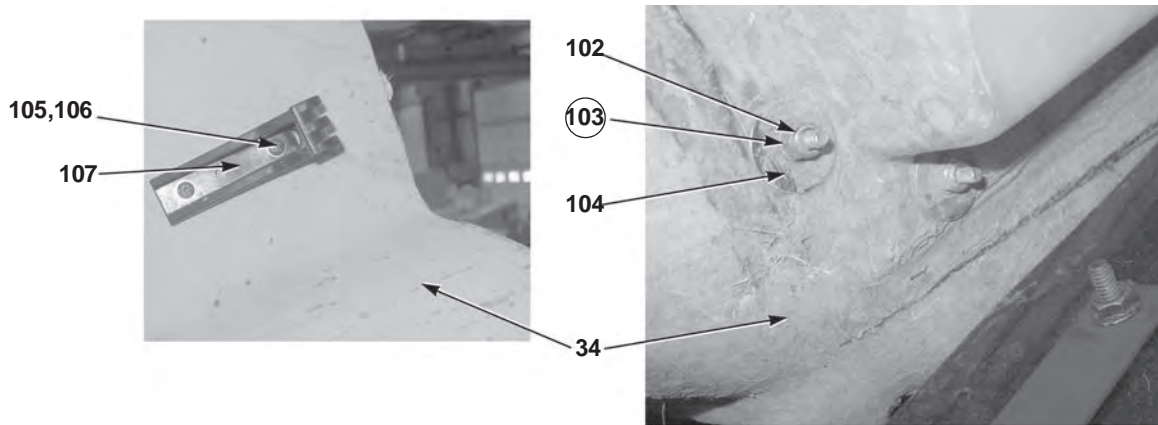
45. Remove locknut (109), screw (110), and rod end (52) from hood mount bracket (111). Discard locknut (109).

46. Remove three locknuts (112), screws (113), and hood mount bracket (111) from bumper (114). Discard locknuts (112).

END OF TASK

INSTALLATION**NOTE**

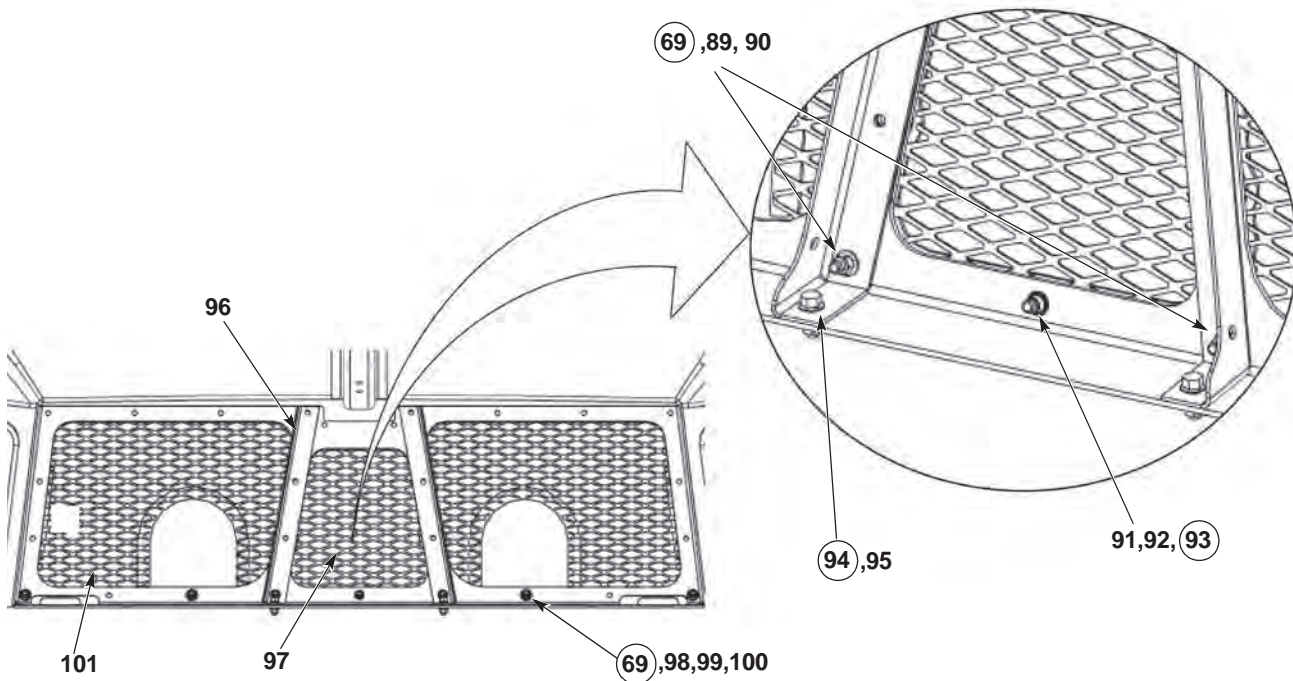
- Perform steps 1–3 if hood mount assemblies were removed.
 - Driver side and passenger side hood mount assemblies are installed the same way.
 - Driver side shown.
1. Install hood mount bracket (111) on bumper (114) using three screws (113) and three new locknuts (112).
 2. Install rod end (52) on hood mount bracket (111) using screw (110) and new locknut (109).
 3. Install jam nut (108) on rod end (52).



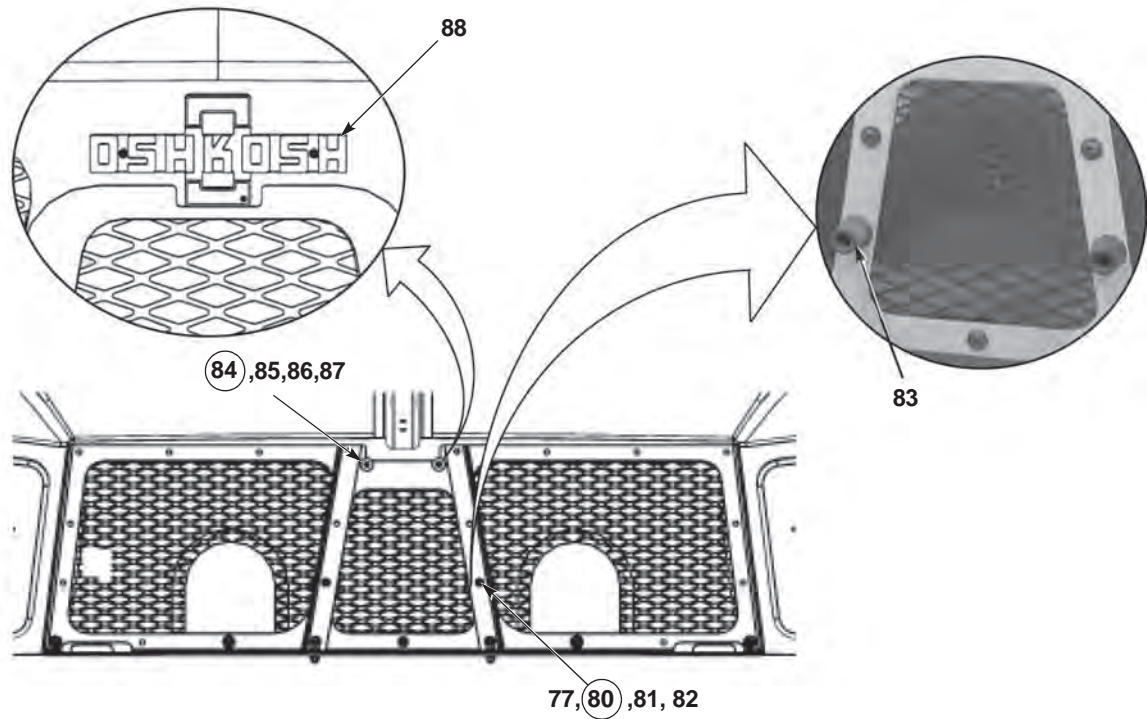
NOTE

Driver side and passenger side latches are installed the same way.

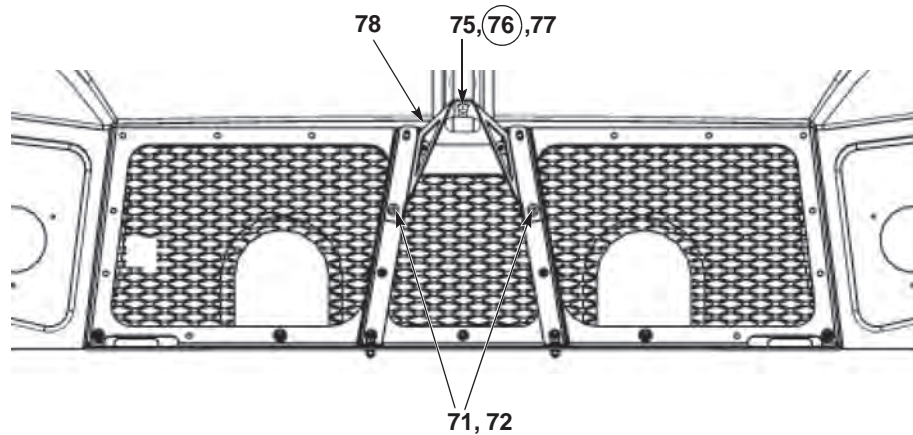
4. Install hood latch (107) to hood (34) using washers (106), screws (105), washers (104), new lockwashers (103), and nuts (102).
5. Repeat step 4 for passenger side hood latch (107).



6. Install outer grille section (101) using four screws (100), four washers (99), four washers (98), and four new locknuts (69).
7. Install center grille section (97) and two brackets (96), using two screws (95) and two new locknuts (94).
8. Install new insert (93), washer (92), and screw (91).
9. Install two screws (90), two washers (89), and two locknuts (69).

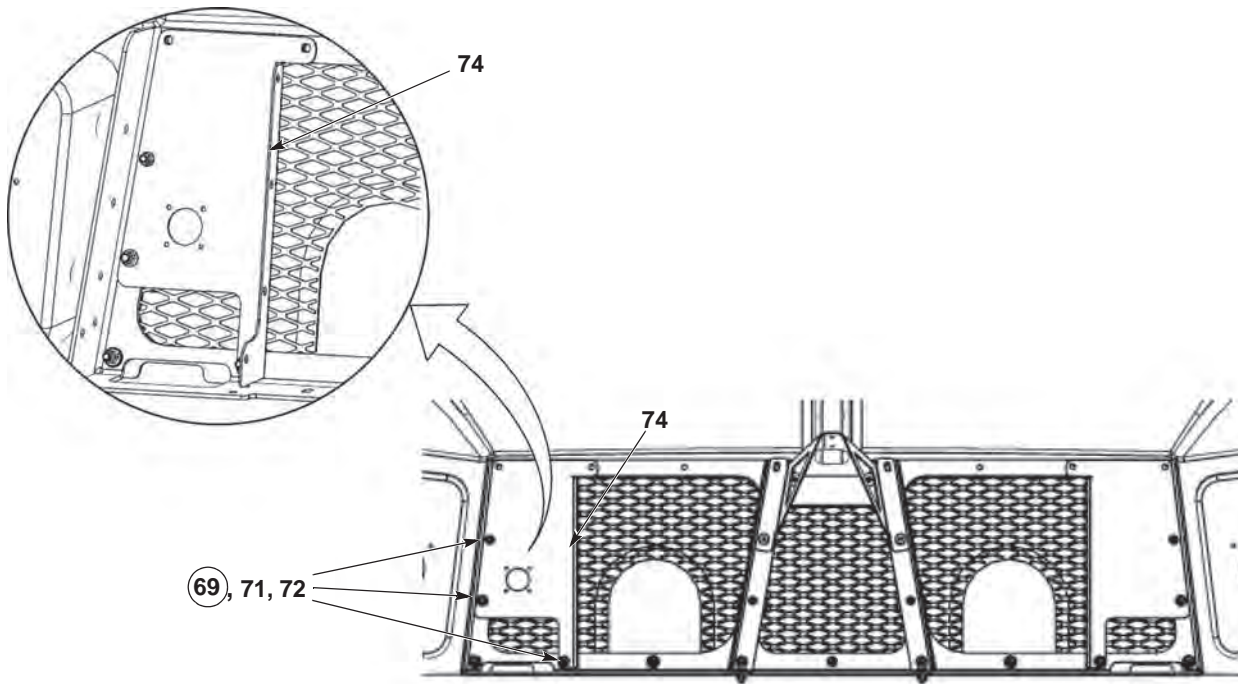


10. Install nameplate (88) using two screws (87), two washers (86), two washers (85), and two new locknuts (84).
11. Install two rubber stoppers (83) using two screws (82), two washers (81), two lockwashers (80), and two nuts (79).

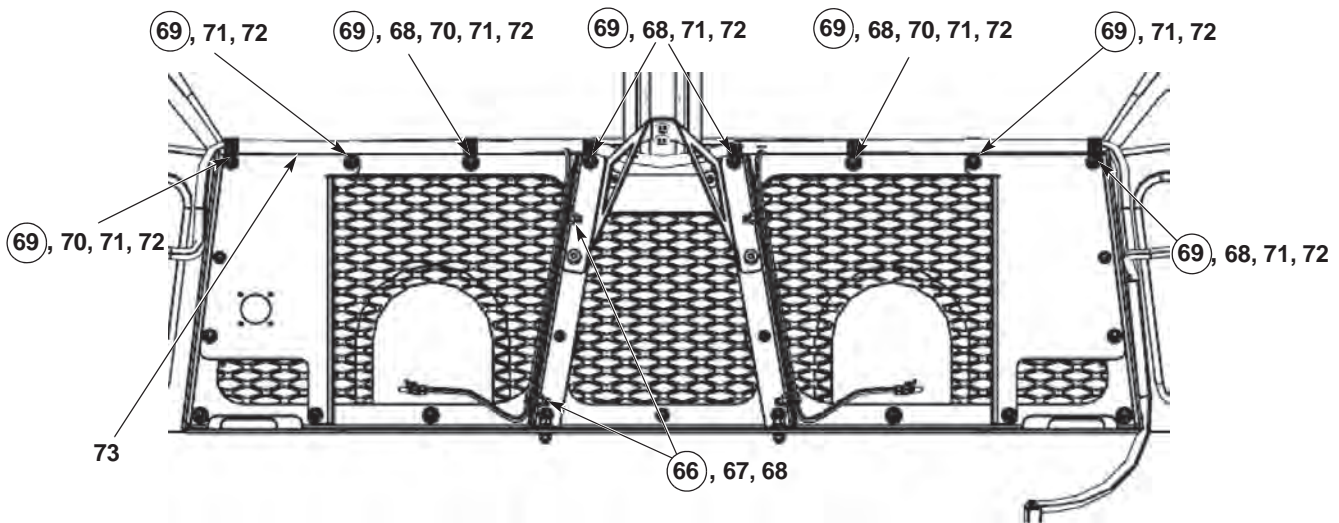


12. Install two brackets (78) using two washers (71) and two screws (72).
13. Install two washers (77), two new lockwashers (76), and two screws (75).

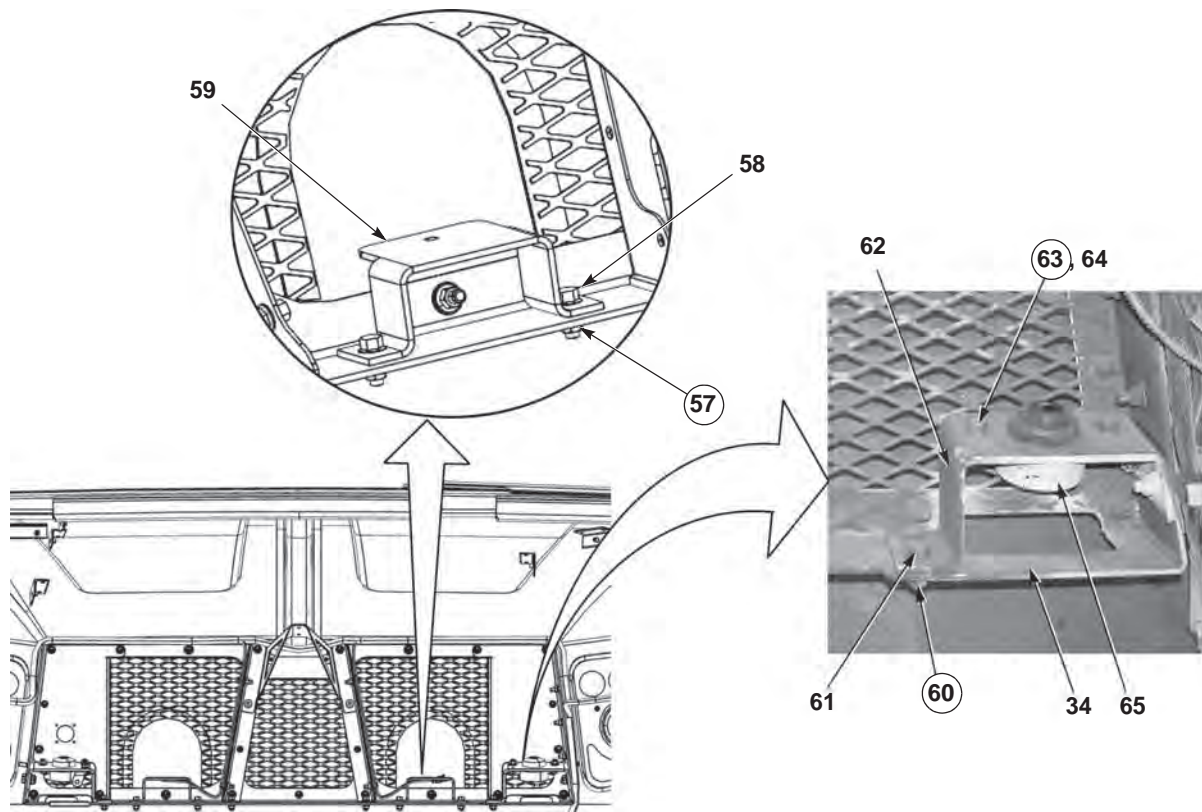
INSTALLATION – CONTINUED



14. Install bracket (74) using three screws (72), three washers (71), and three new locknuts (70).
15. Repeat step 14 to install passenger side bracket (74).



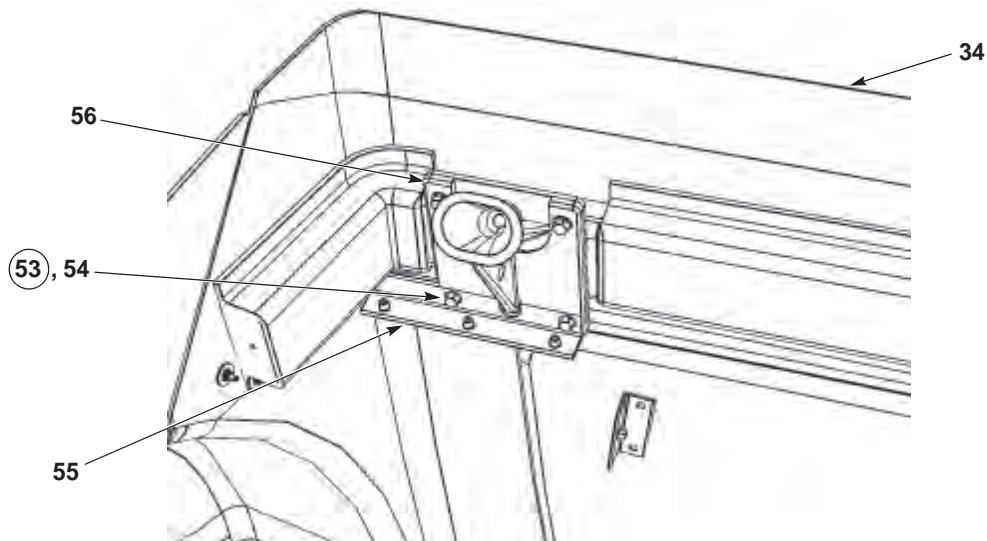
16. Install harness (73) as noted during removal, using eight screws (72), eight washers (71), two washers (70), six cushion clips (68), and eight locknuts (69).
17. Install four cushion clips (68) around harness using four screws (67), and four new locknuts (66).

INSTALLATION – CONTINUED**NOTE**

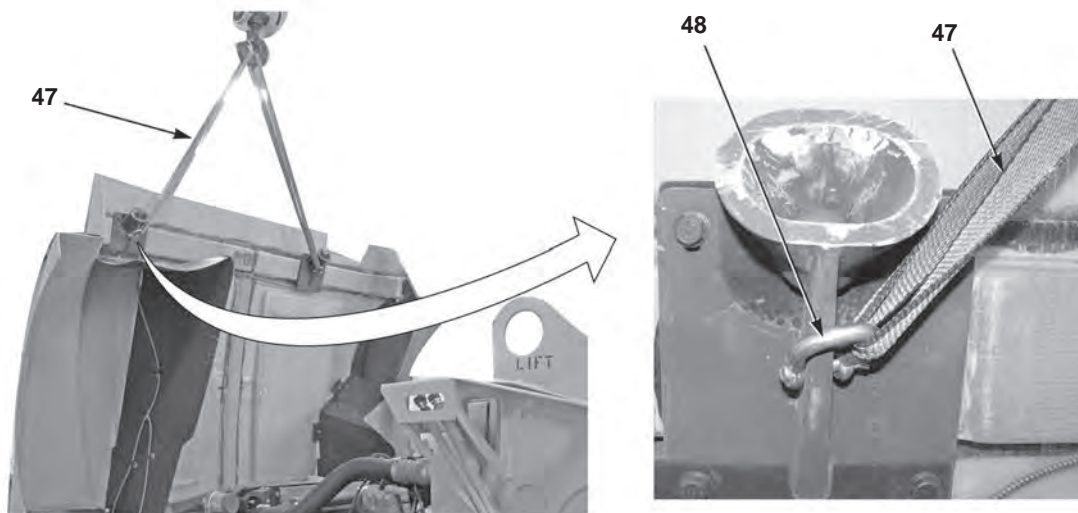
If installing hood mounts and IR lights, perform steps 18–20.

18. Install rubber mount (65) to hood mounting bracket (62) using two screws (64), and two new locknuts (63).
19. Install hood mounting bracket (62) to hood (34) using four screws (61) and four new locknuts (60).
20. Install IR light bracket (59) using two screws (58) and two new locknuts (57).

INSTALLATION – CONTINUED

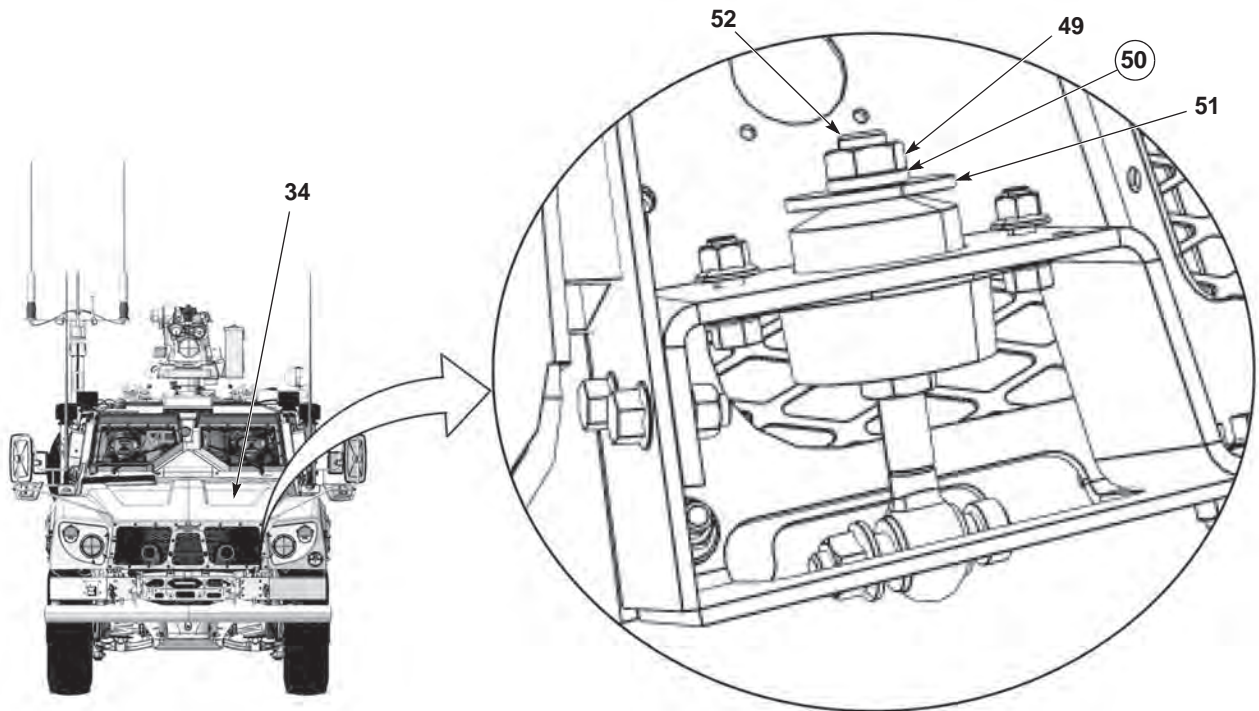


21. Install driver side hood receptacle (56) and bracket (55) to hood (34) using four screws (54) and four new locknuts (53).
22. Install passenger side hood receptacle (56) to hood (34) using four screws (54) and four new locknuts (53).

**WARNING**

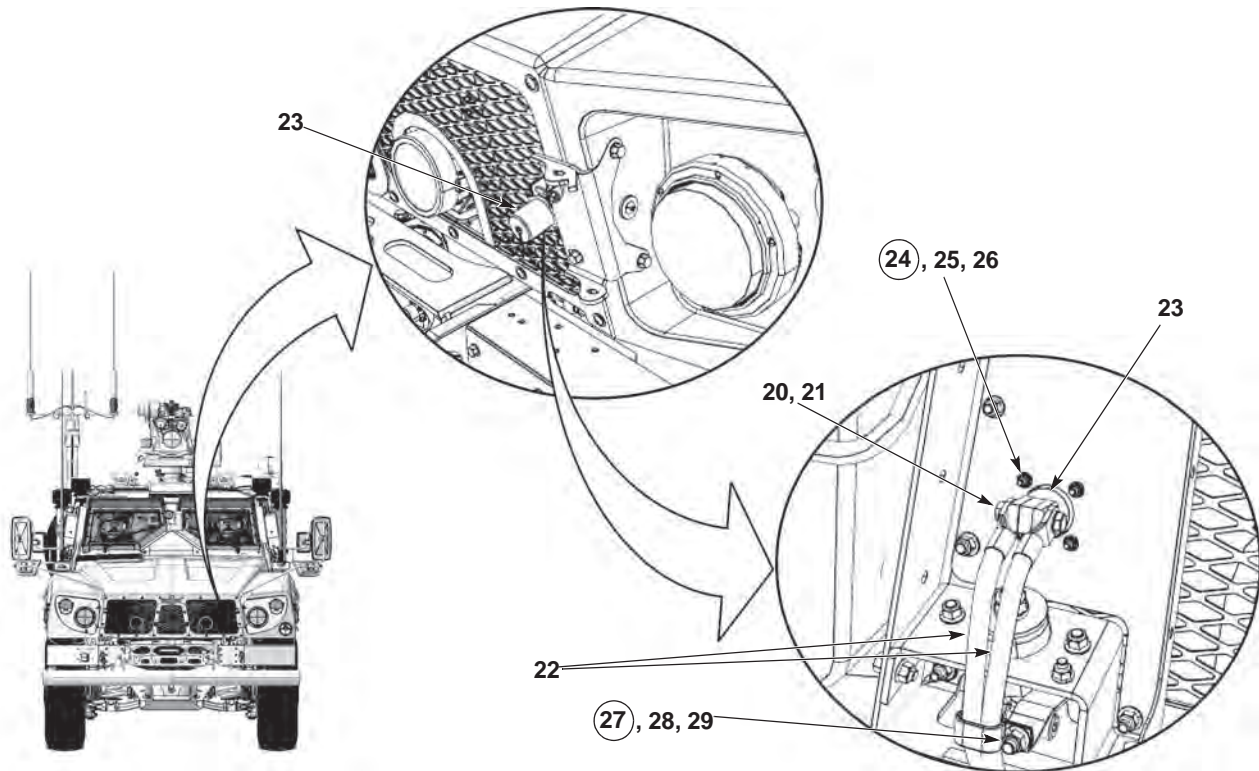
Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

23. Attach lifting device (47) and shackles (48) to hood as shown.

INSTALLATION – CONTINUED

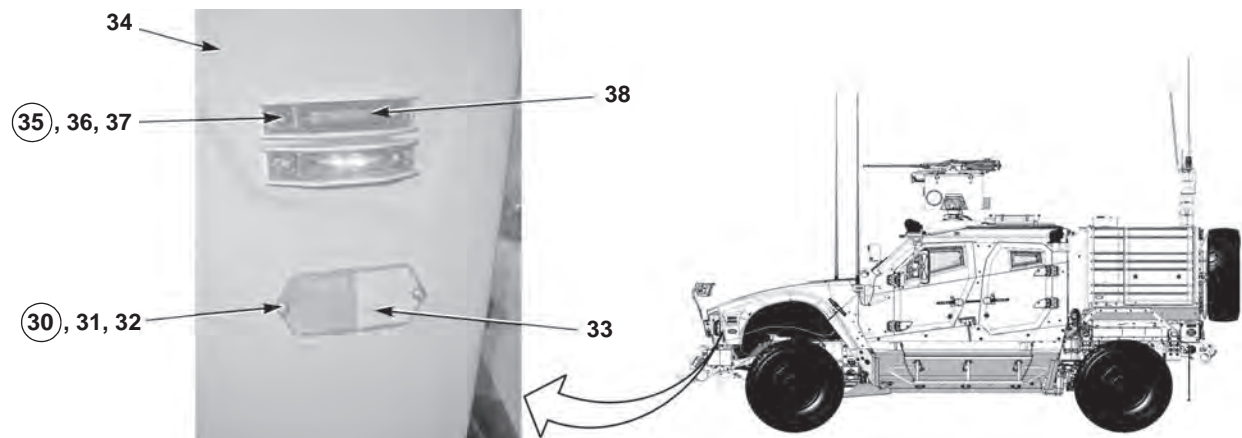
24. With the aid of an assistant and lifting device, install hood (34) onto rod end (52) using washer (51), new lockwasher (50), and nut (49).
25. Torque nut (49) to 80 lb-ft.
26. Repeat steps 24 and 25 for passenger side.

INSTALLATION – CONTINUED

**NOTE**

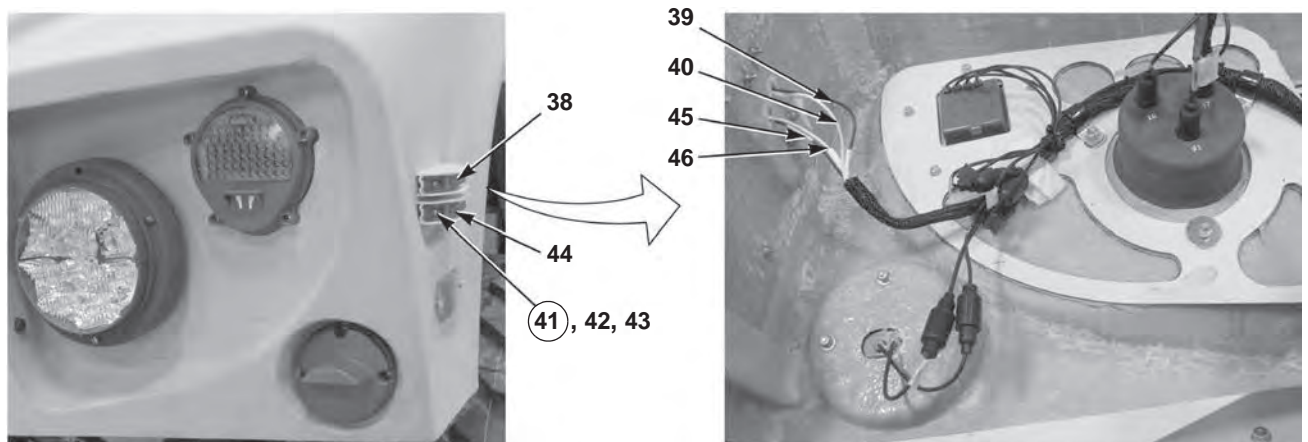
Install cable ties and cushion clips as noted in removal.

27. Install cushion clip (29) on wires (22) using screw (28) and new locknut (27).
28. Install slave receptacle (23) using four screws (26), four washers (25), and four new locknuts (24).
29. Connect wires (22) to slave receptacle using two washers (21) and two screws (20).
30. Apply silicone coating to slave receptacle (23).

INSTALLATION – CONTINUED**NOTE**

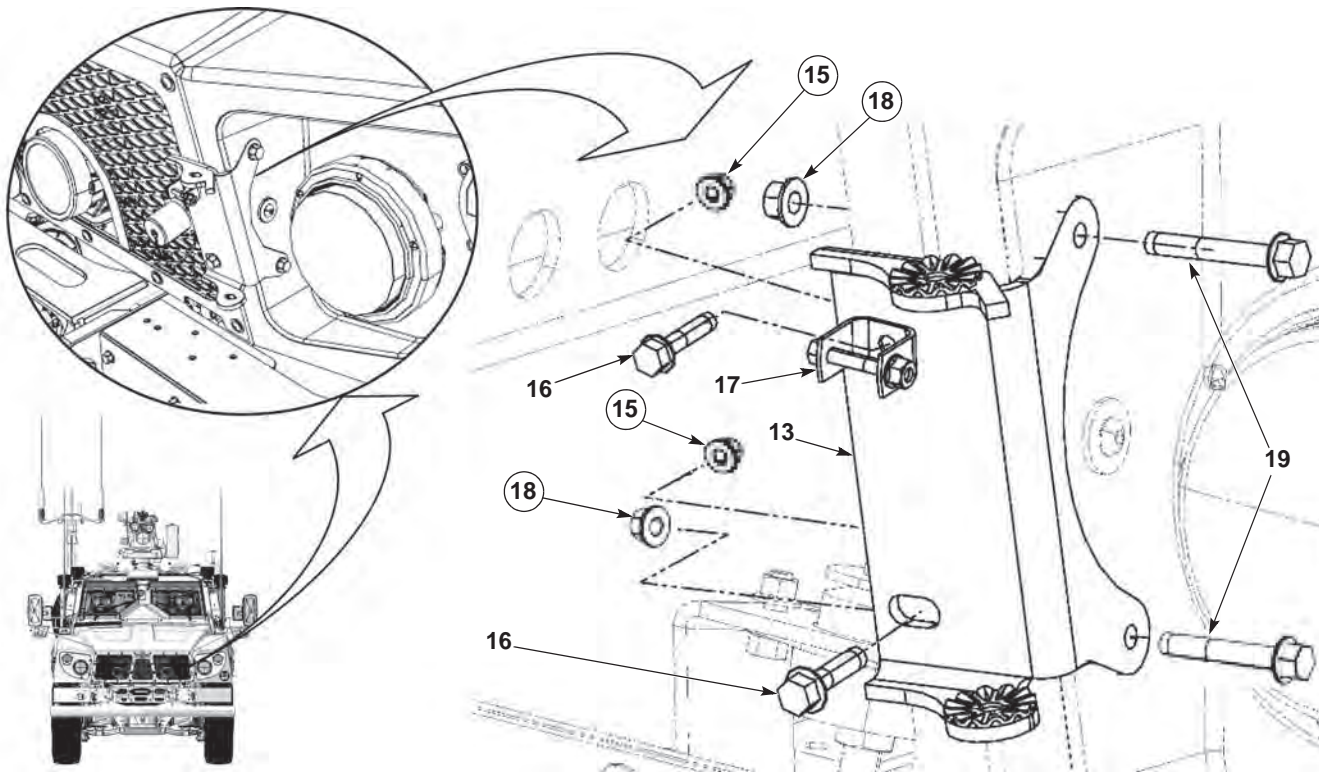
Driver side marker lights and reflectors are installed the same way. Driver side shown.

31. Install marker light (38) to hood (34) using two screws (37), two washers (36), and two new locknuts (35).
32. Install reflector (33) to hood (34) using two screws (32), two washers (31), and two new locknuts (30).

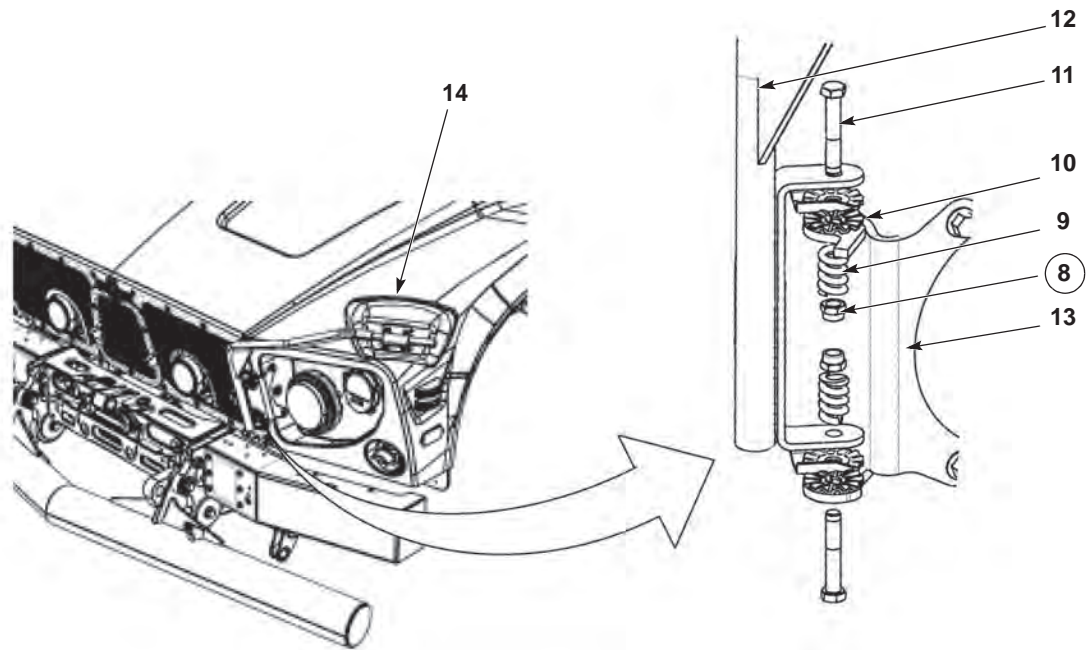


33. Install marker light (44) using two screws (43), two washers (42), and two new locknuts (41).
34. Connect wires (39 and 40) to marker light (38).
35. Connect wires (45 and 46) to marker light (44).
36. Repeat steps 31–35 for passenger side reflectors and marker lights.

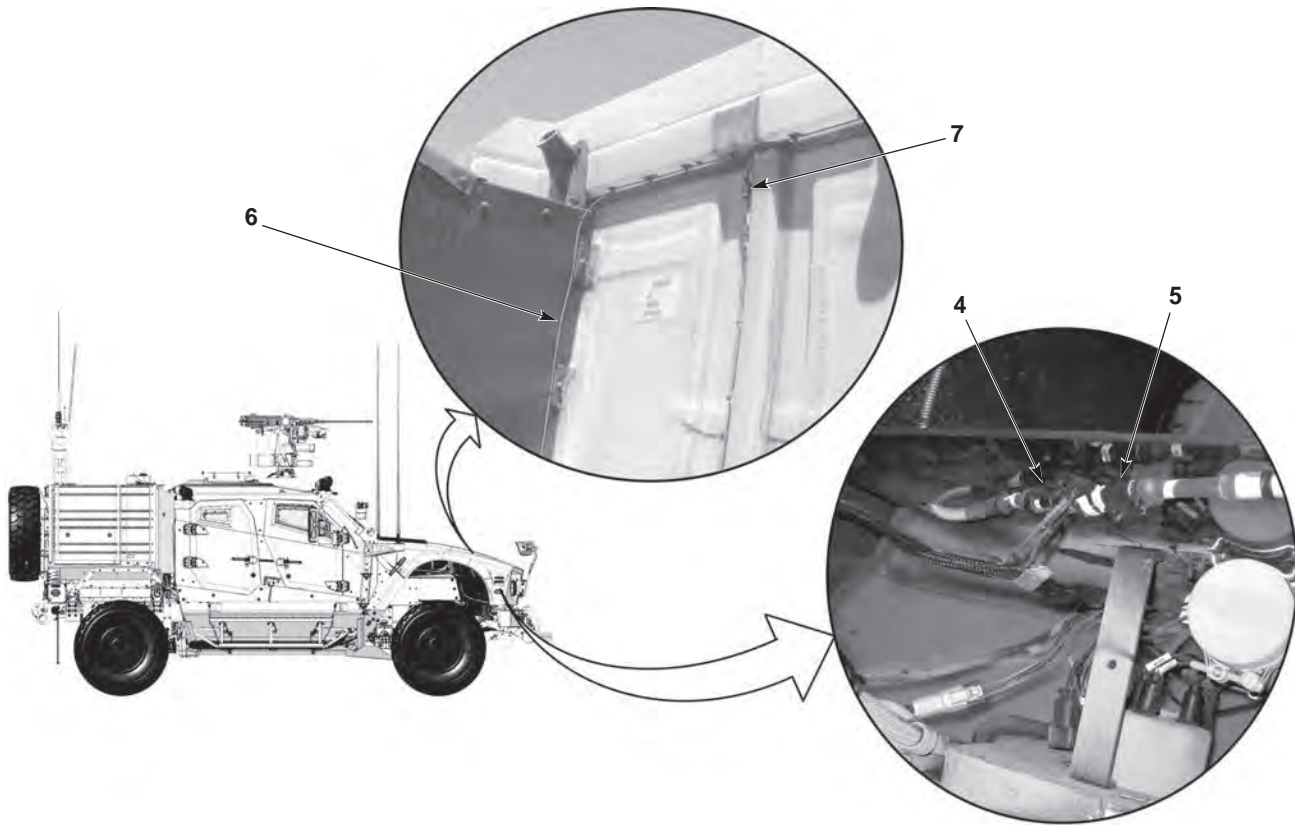
INSTALLATION – CONTINUED



37. Install pivot arm bracket (13) using two screws (19) and two new locknuts (18).
38. Position hood latch bracket (17). Install two screws (16) and two new locknuts (15).
39. Repeat steps 37 and 38 for passenger side pivot arm bracket (13).

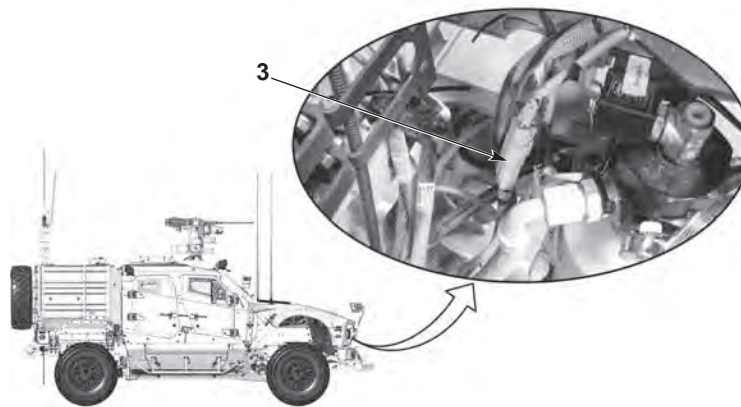
INSTALLATION – CONTINUED

40. Install pivot arm (12) and mirror (14) to pivot arm bracket using two screws (11), two coiled brackets (10), two springs (9), and two new locknuts (8).
41. Repeat step 40 for passenger side mirror (14).

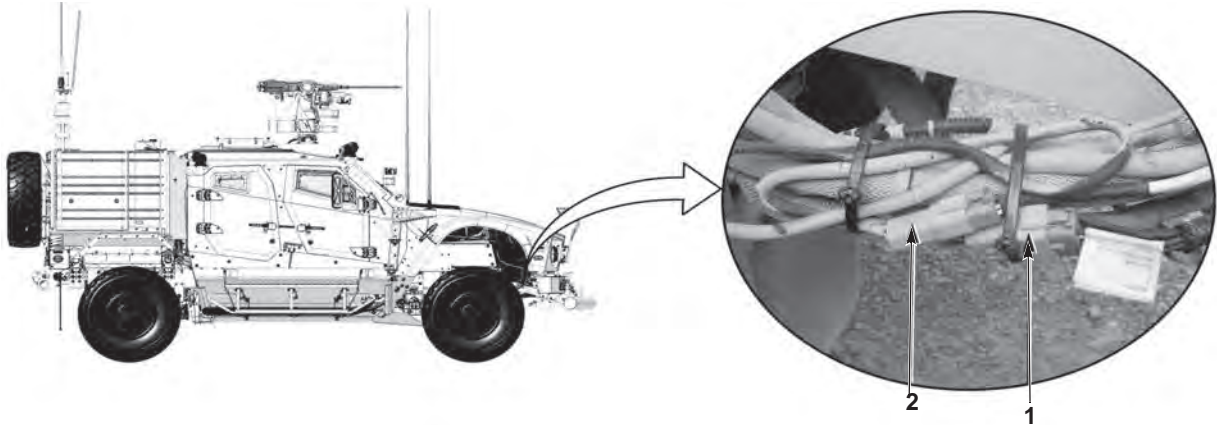
INSTALLATION – CONTINUED**NOTE**

Use cable ties to secure loose wires.

42. Install sensor (7) and route harness (6) as noted.
43. Connect connector LOC2 (4) and connector LOC3 (5).



44. Connect fire suppression system connector (3).

INSTALLATION – CONTINUED**NOTE**

Use cable ties to secure loose wires.

45. Connect C403 hood/lights connector (1) and fire suppression sensor connector (2).
46. Perform all Follow-On Maintenance Tasks.

END OF TASK

END OF WORK PACKAGE

HOOD REPLACEMENT (AFES LINEAR WIRE DETECTION)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
NATO slave receptacle removed (WP 0206)

Tools and Special Tools

Lifting Device
Strap, Nylon
Shackle Qty. 2
Tool Kit, General Mechanic's: Automotive
Wrench, Torque 0 to 30 in-lb

Materials/Parts

Locknut (Item 5)
Locknut (Item 11)
Locknut (Item 15)
Lockwasher (2) (Item 20)
Locknut (8) (Item 24 and 28)
Locknut (12) (Item 31, 35, and 41)
Locknut (8) (Item 47)
Lockwasher (2) (Item 56)
Locknut (2) (Item 58)
Lockwasher (2) (Item 64)
Locknut (4) (Item 68)
Locknut (2) (Item 72)

Materials/Parts (continued)

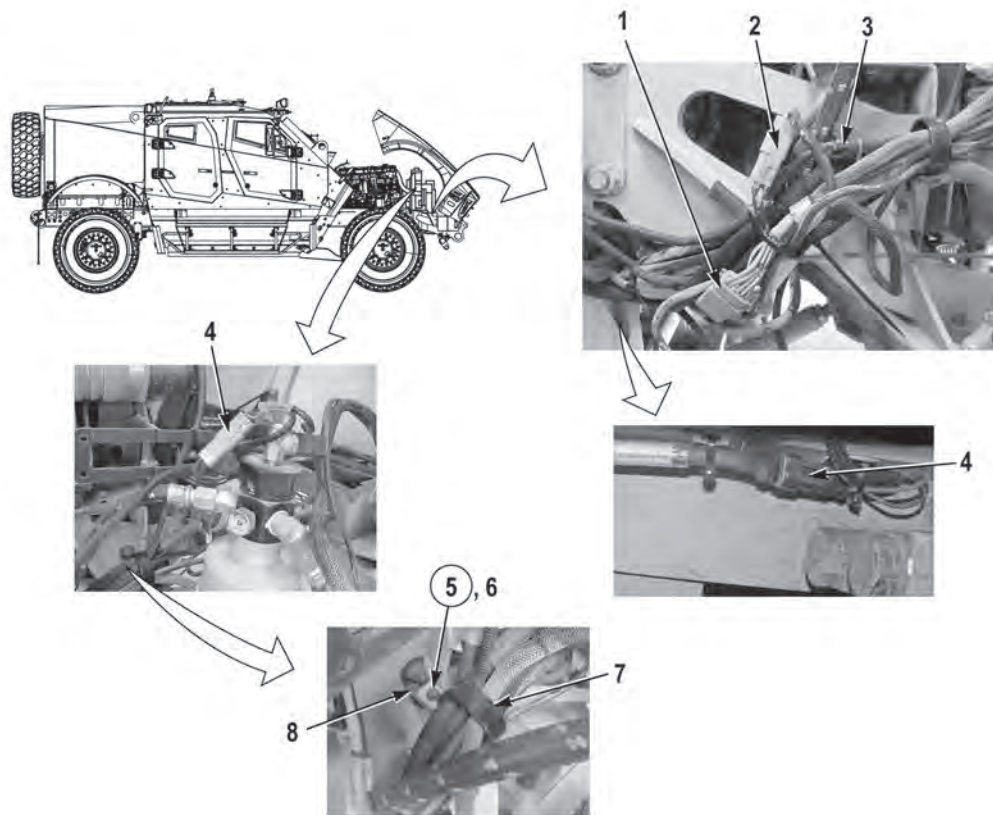
Locknut (4) (Item 75)
Locknut (Item 78)
Locknut (2) (Item 80)
Locknut (2) (Item 83)
Locknut (2) (Item 86)
Locknut (2) (Item 88)
Locknut (2) (Item 91)
Locknut (5) (Item 96)
Locknut (2) (Item 101)
Locknut (2) (Item 105)
Locknut (4) (Item 110)
Locknut (2) (Item 115)
Grease, Automotive and Artillery
Tags, Identification
Ties, Cable

Personnel Required

Two

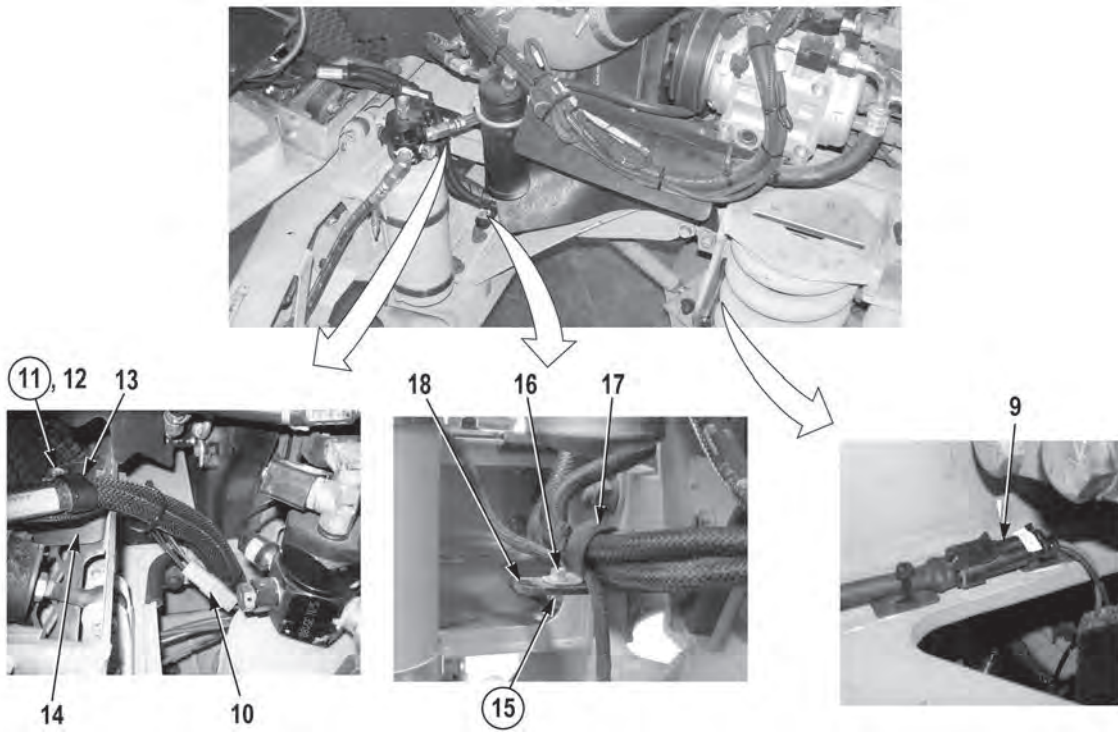
Follow-On Maintenance

Install NATO slave receptacle (WP 0206)
Remove and stow wheel chocks

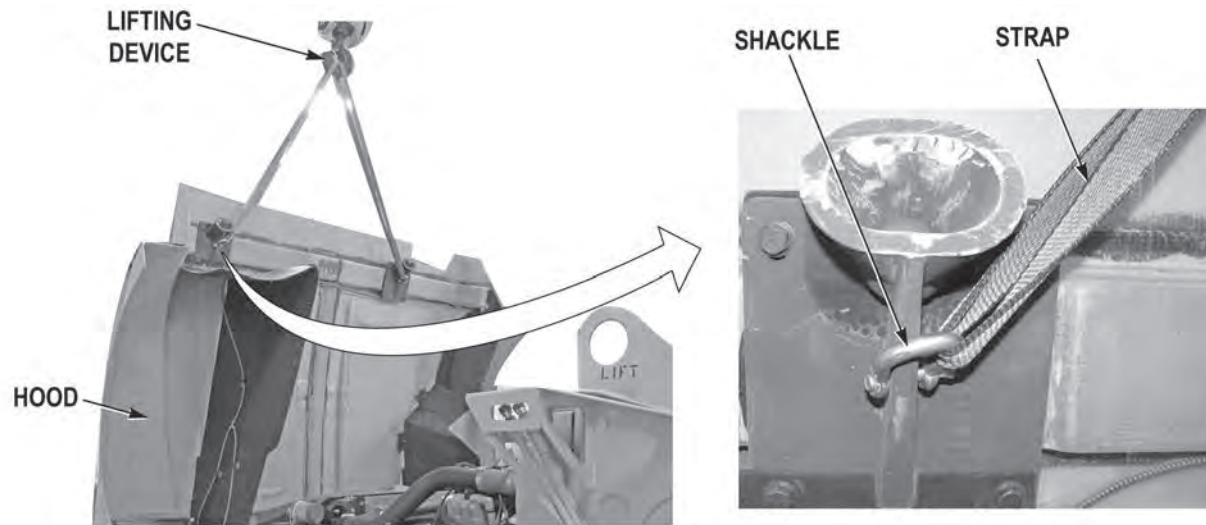
REMOVAL**NOTE**

- Tag and mark connectors prior to removal to ensure proper installation.
- Remove cable ties as required.

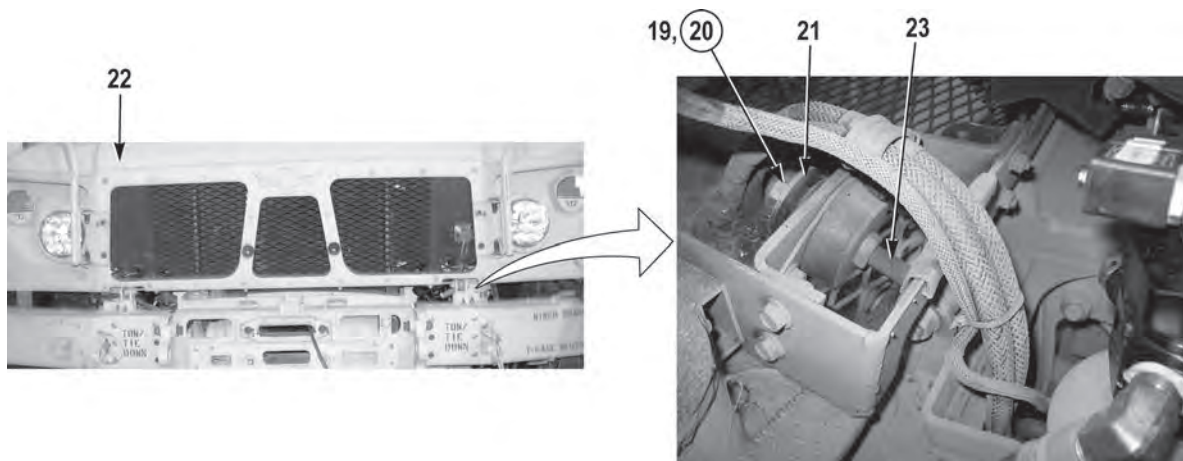
1. Disconnect connector (1).
2. Disconnect connector (2).
3. Disconnect connector (3).
4. Disconnect connector (4).
5. Remove locknut (5), screw (6), and cushion clip (7) from standoff bracket (8). Discard locknut (5).



6. Disconnect connector (9).
7. Disconnect connector (10).
8. Remove locknut (11), screw (12), and cushion clip (13) from standoff bracket (14). Discard locknut (11).
9. Remove locknut (15), screw (16), and cushion clip (17) from standoff bracket (18). Discard locknut (15).



10. Install two shackles and strap on hood.



WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

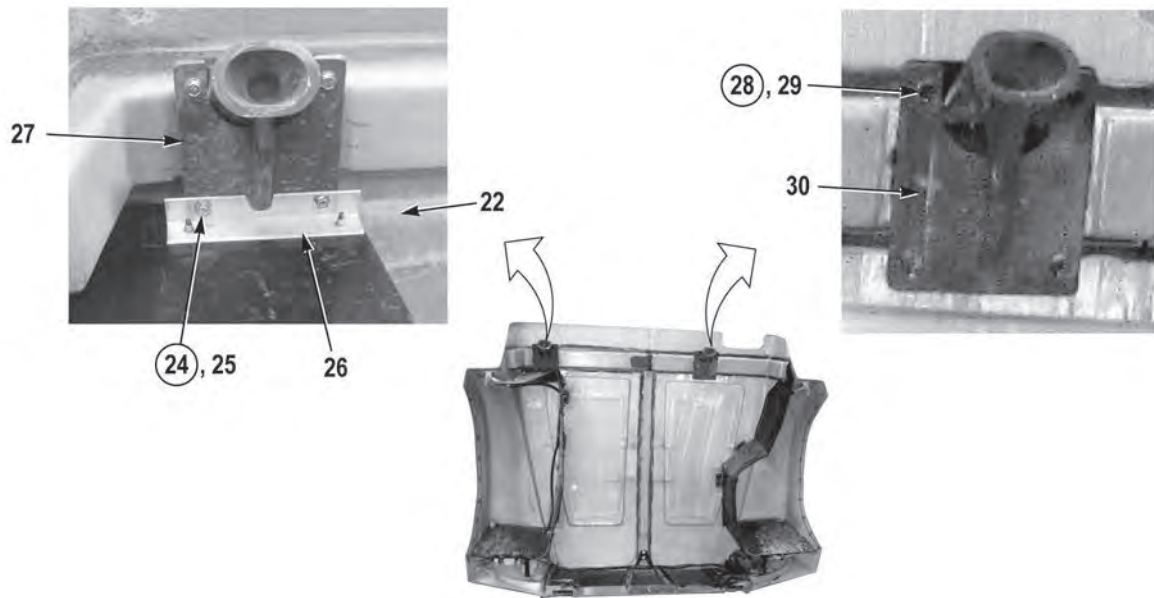
CAUTION

Ensure all connectors and wiring are free before lifting hood from vehicle. Failure to comply may result in damage to equipment.

NOTE

Note position of washers prior to removal to ensure proper installation.

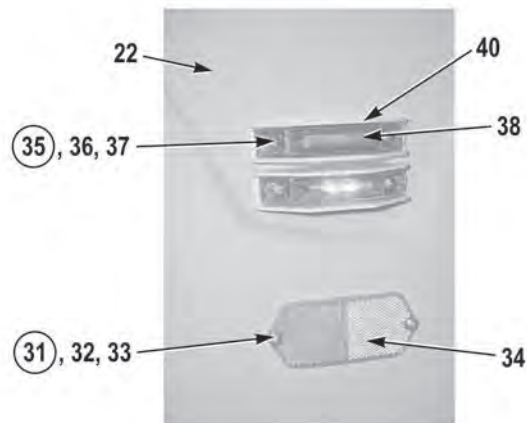
11. With the aid of an assistant and lifting device, remove two nuts (19), lockwashers (20), washers (21), and hood (22) from two rod ends (23). Discard lockwashers (20).



NOTE

Perform Steps (12) through (17) if hood needs to be replaced.

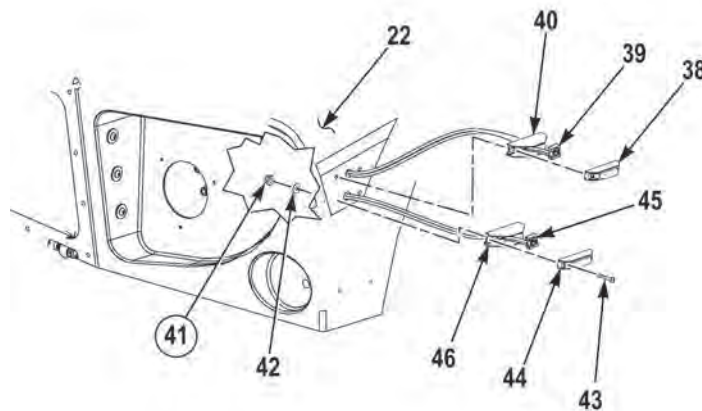
12. Remove driver side splash guard (WP 0029).
13. Remove passenger side splash guard (WP 0035).
14. Remove headlights (WP 0202).
15. Remove front composite lights (WP 0201).
16. Remove blackout drive light (WP 0192).
17. Remove auxiliary mirrors and brackets (WP 0139).
18. Remove four locknuts (24), screws (25), bracket (26), and hood receptacle (27) from hood (22). Discard locknuts (24).
19. Remove four locknuts (28), screws (29), and hood receptacle (30) from hood (22). Discard locknuts (28).



NOTE

Driver side and passenger side reflectors and marker lights are removed the same way. Driver side shown.

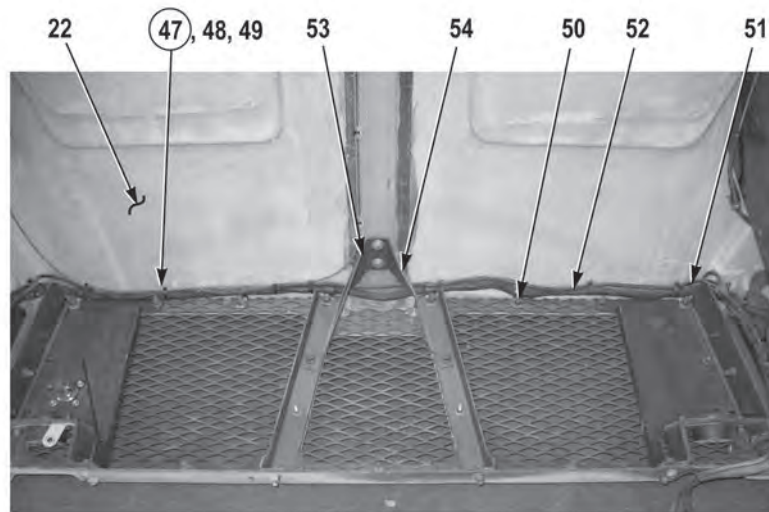
20. Remove two locknuts (31), washers (32), screws (33), and reflector (34) from hood (22). Discard locknuts (31).
21. Remove two locknuts (35), washers (36), screws (37), and move marker light (38) away from hood (22). Discard locknuts (35).



NOTE

Note position of connector prior to removal to ensure proper installation.

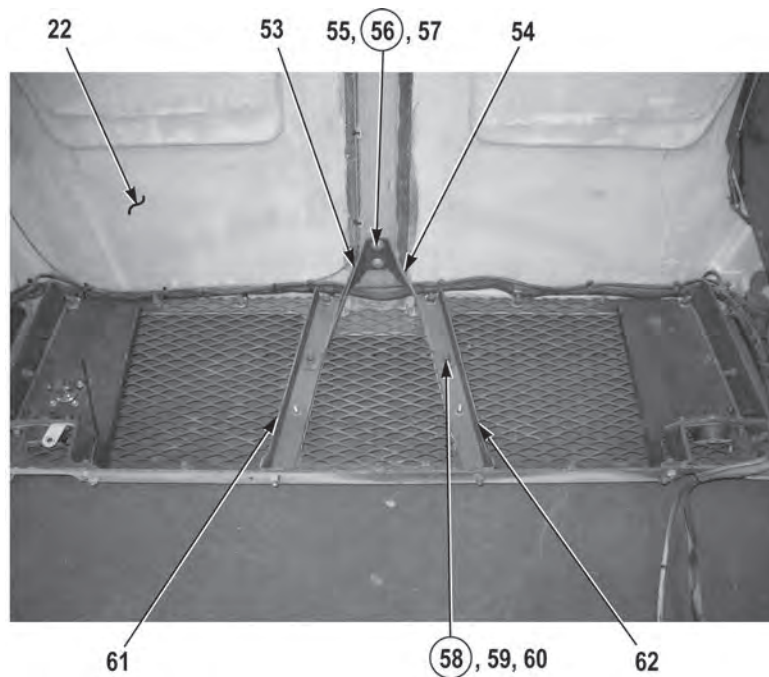
22. Disconnect connector (39) from marker light (38) and remove marker light shield (40) for hood (22).
23. Remove two locknuts (41), washers (42), screws (43), and move marker light (44) away from hood (22). Discard locknuts (41).
24. Disconnect connector (45) from marker light (44) and remove marker light shield (46) from hood (22).
25. Repeat Steps (22) through (24) to remove passenger side reflectors and marker lights.



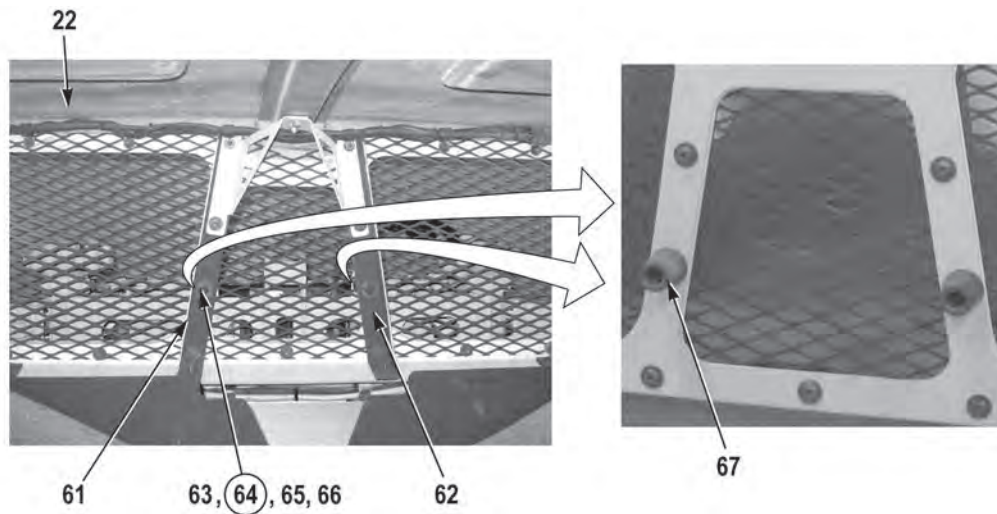
NOTE

Note position and placement of mounting hardware prior to removal to ensure proper installation.

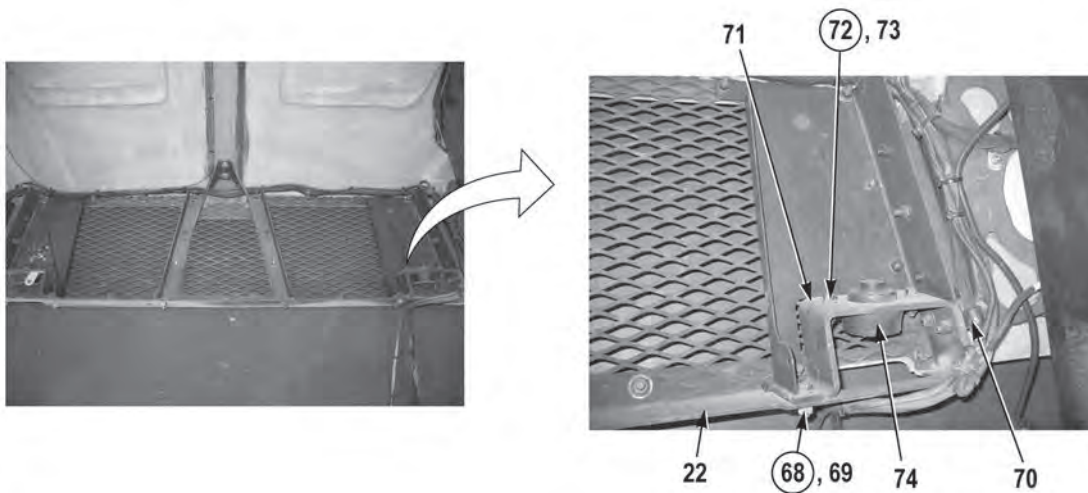
26. Remove eight locknuts (47), washers (48), screws (49), two washers (50), six cushion clips (51), and wire harness (52) from hood (22), bracket (53), and bracket (54). Discard locknuts (47).



27. Remove two screws (55), lockwashers (56), and washers (57) from bracket (53), bracket (54), and hood (22). Discard lockwashers (56).
28. Remove two locknuts (58), screws (59), washers (60), bracket (53), and bracket (54) from hood (22), bracket (61), and bracket (62). Discard locknuts (58).



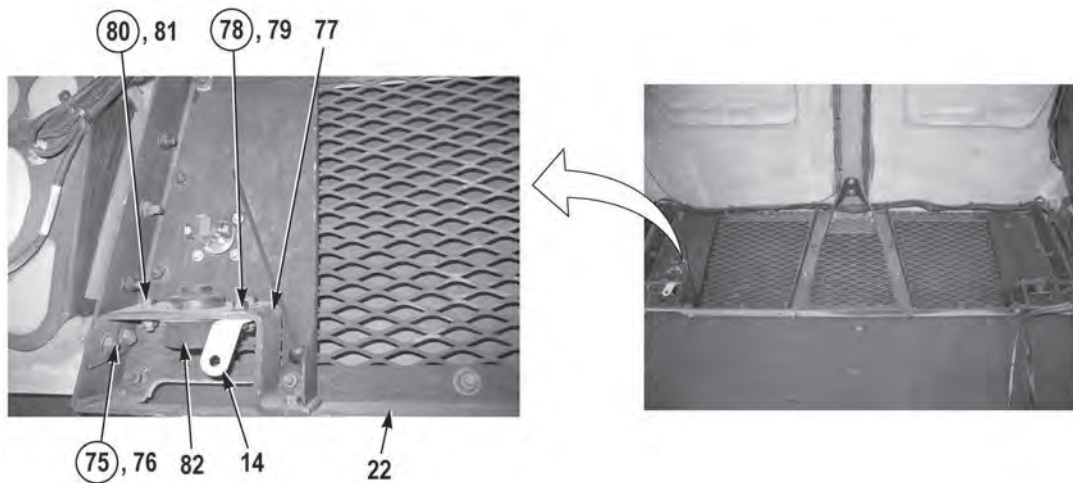
29. Remove two nuts (63), lockwashers (64), screws (65), washers (66), and rubber stoppers (67) from hood (22), bracket (61), and bracket (62). Discard lockwashers (64).



NOTE

Remove cable ties as required.

30. Remove four locknuts (68), screws (69), cushion clip (70), and bracket (71) from hood (22). Discard locknuts (68).
31. Remove two locknuts (72), screws (73), and rubber mount (74) from bracket (71). Discard locknuts (72).

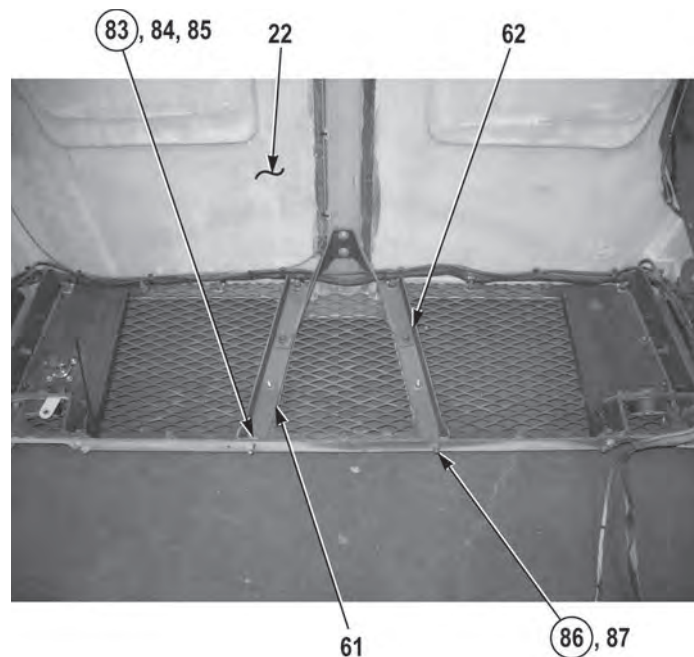


32. Remove four locknuts (75), screws (76), and bracket (77) from hood (22). Discard locknuts (75).

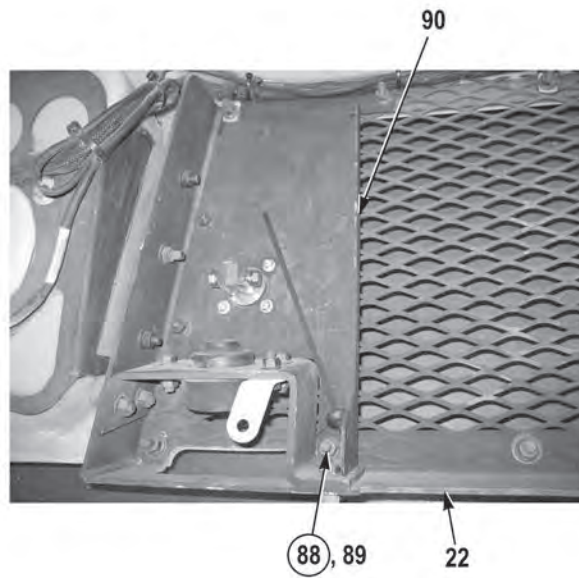
NOTE

Note position of standoff bracket prior to removal to ensure proper installation.

33. Remove locknut (78), screw (79), and standoff bracket (14) from bracket (77). Discard locknut (78).
34. Remove two locknuts (80), screws (81), and rubber mount (82) from bracket (77). Discard locknuts (80).



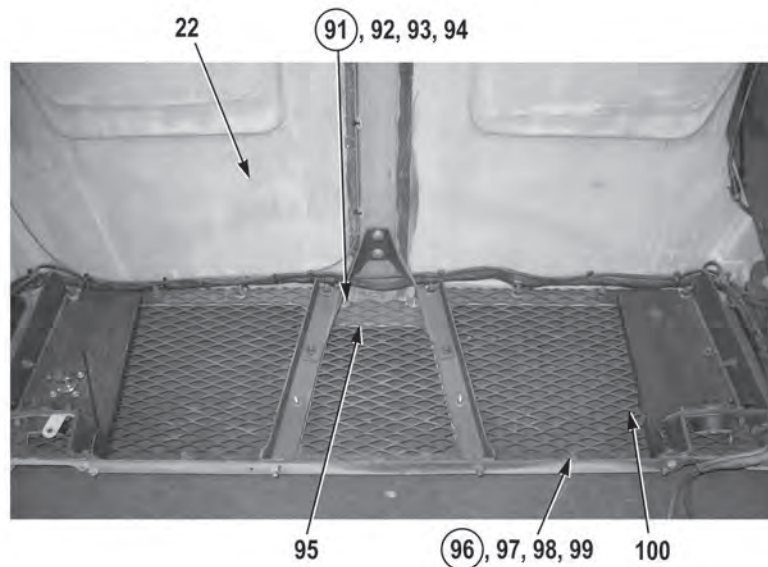
35. Remove two locknuts (83), washers (84), and screws (85) from hood (22), bracket (61), and bracket (62). Discard locknuts (83).
36. Remove two locknuts (86), screws (87), bracket (61), and bracket (62) from hood (22). Discard locknuts (86).



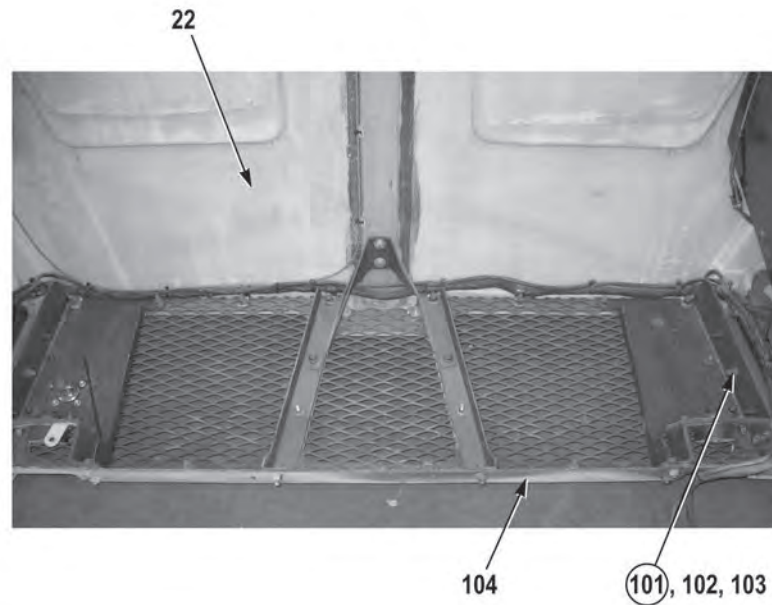
NOTE

Driver side and passenger side panels are removed the same way. Driver side shown.

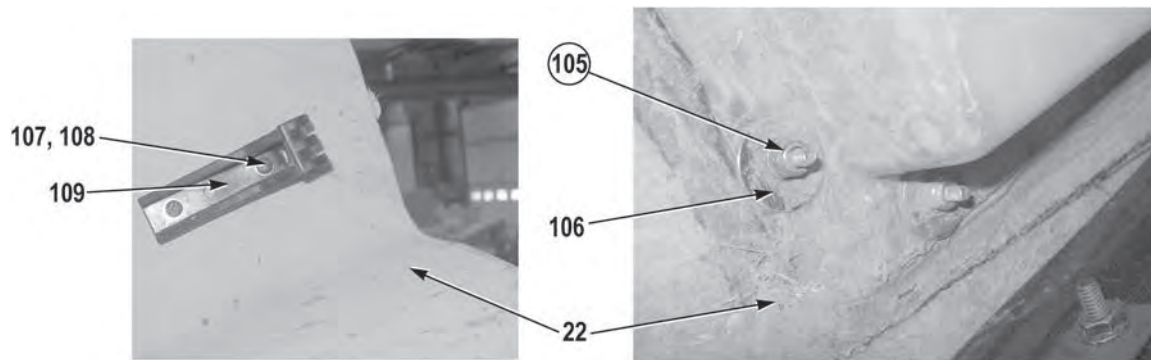
37. Remove locknut (88), screw (89), and panel (90) from hood (22). Discard locknut (88).
38. Repeat Step (37) to remove passenger side panel.



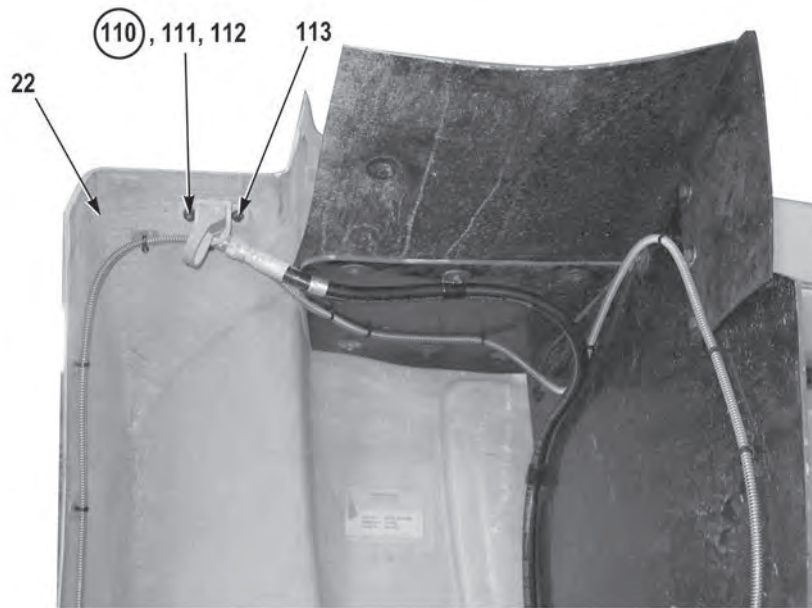
39. Remove two locknuts (91), screws (92), washers (93), washers (94), and nameplate (95) from hood (22). Discard locknuts (91).
40. Remove five locknuts (96), screws (97), washers (98), washers (99), and grill (100) from hood (22). Discard locknuts (96).



41. Remove two locknuts (101), screws (102), washers (103), and frame (104) from hood (22). Discard locknuts (101).



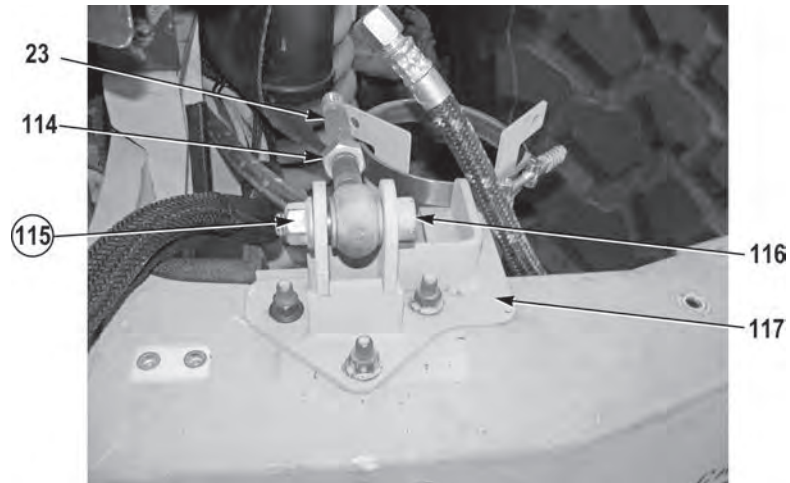
42. Remove two locknuts (105), washers (106), screws (107), washers (108), and bracket (109) from hood (22). Discard locknuts (105).



NOTE

Driver side and passenger side nozzle brackets are removed the same way. Driver side shown.

43. Remove two locknuts (110), washers (111), screws (112), and nozzle bracket (113) from hood (22). Discard locknuts (110).
44. Repeat Step (43) for passenger side nozzle bracket.



NOTE

- Perform Steps (45) through (47) if rod ends need to be removed.
- Driver side and passenger side rod ends are removed the same way. Driver side shown.
- Note position of jam nut prior to removal to ensure proper installation.

45. Remove jam nut (114) from rod end (23).

46. Remove locknut (115), screw (116), and rod end (23) from hood mount bracket (117). Discard locknut (115).

47. Repeat Steps (45) and (46) for passenger side rod ends.

END OF TASK

INSTALLATION

NOTE

- Perform Steps (1) through (3) if rod ends were removed.
- Driver side and passenger side rod ends are installed the same way. Driver side shown.

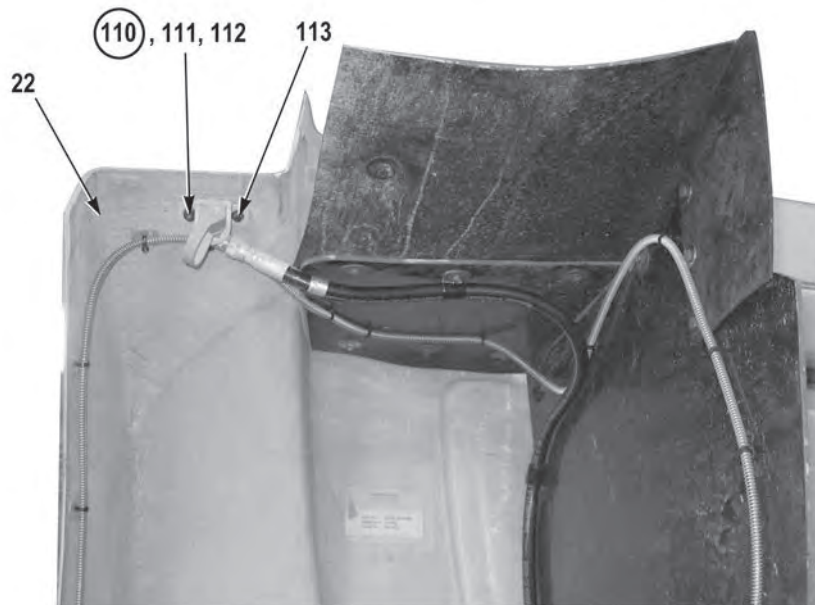
1. Apply grease to screw (116) and install rod end (23) on hood mount bracket (117) with screw (116) and new locknut (115).

NOTE

Install jam nut as noted prior to removal.

2. Install jam nut (114) on rod end (23).

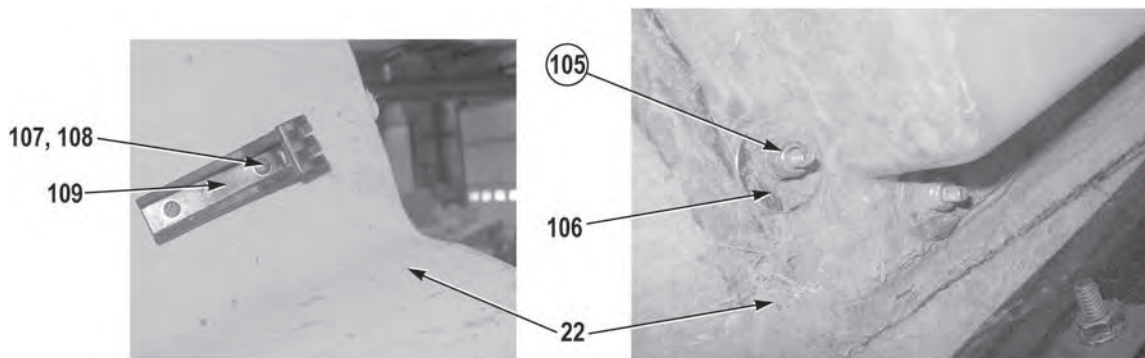
3. Repeat Steps (1) and (2) for passenger side rod end.



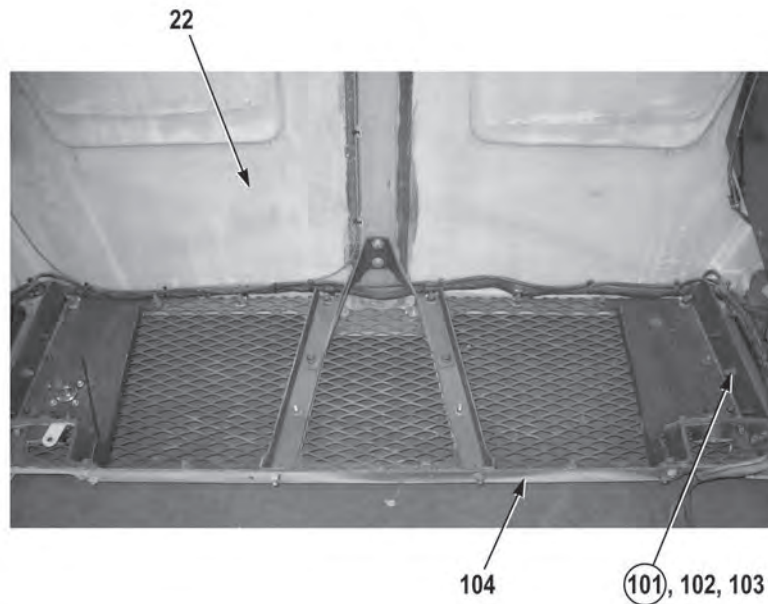
NOTE

Driver side and passenger side nozzle brackets are installed the same way. Driver side shown.

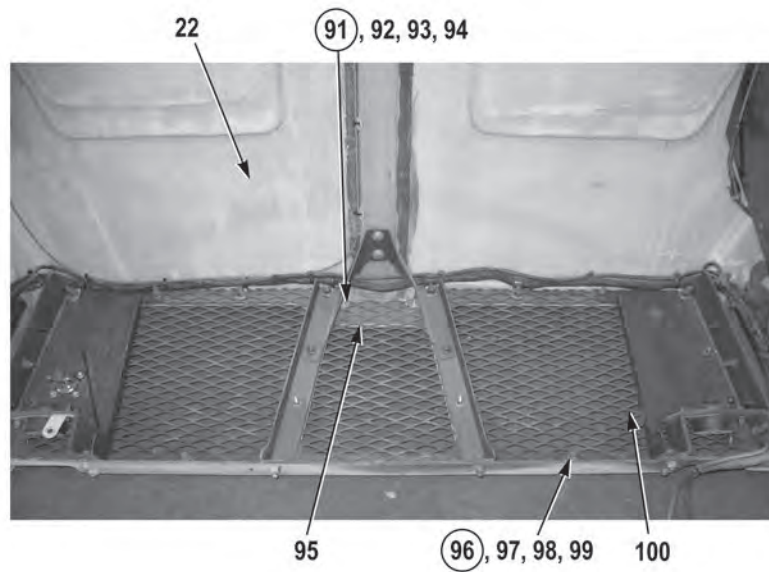
4. Install nozzle bracket (113) on hood (22) with two screws (112), washers (111), and new locknuts (110).
5. Repeat Step (4) from passenger side nozzle bracket.



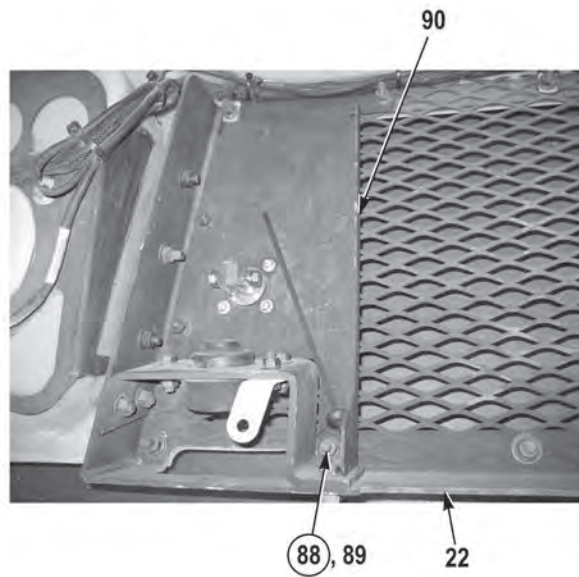
6. Install bracket (109) on hood (22) with two washers (108), screws (107), washers (106), and new locknuts (105).



7. Install frame (104) on hood (22) with two washers (103), screws (102), and two new locknuts (101).



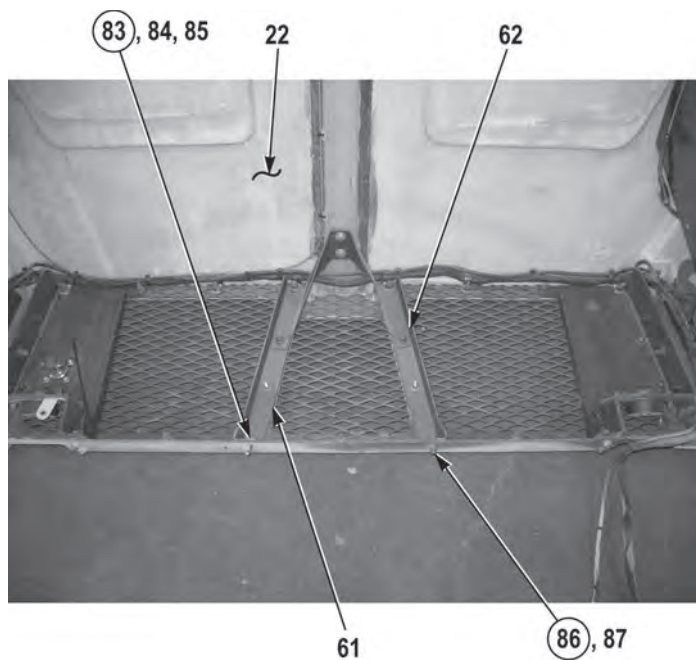
8. Install grill (100) on hood (22) with five washers (99), washers (98), screws (97), and new locknuts (96).
9. Install nameplate (95) on hood (22) with two washers (94), washers (93), screws (92), and new locknuts (91).



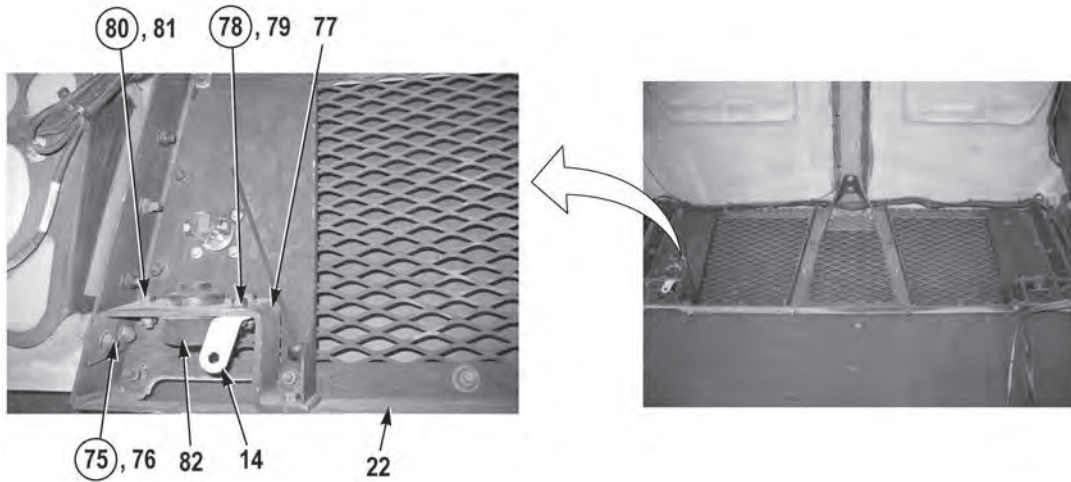
NOTE

Driver side and passenger side panels are installed the same way. Driver side shown.

10. Install panel (90) on hood (22) with screw (89) and new locknut (88).
11. Repeat Step (10) for passenger side panel.



12. Install bracket (62) and bracket (61) on hood (22) with two screws (87) and new locknuts (86).
13. Secure bracket (62) and bracket (61) on hood (22) with two screws (85), washers (84), and new locknuts (83).

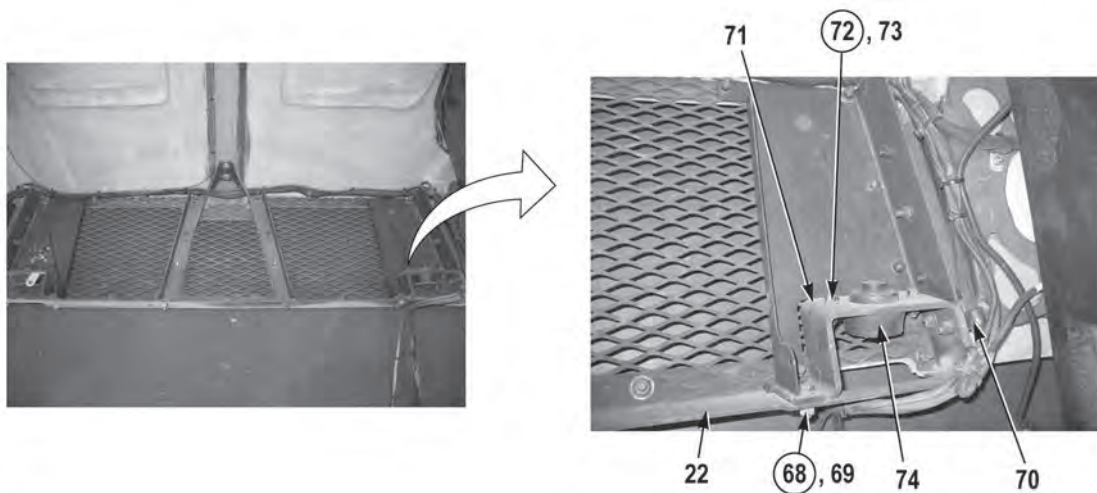


14. Install rubber mount (82) on bracket (77) with two screws (81) and new locknuts (80).

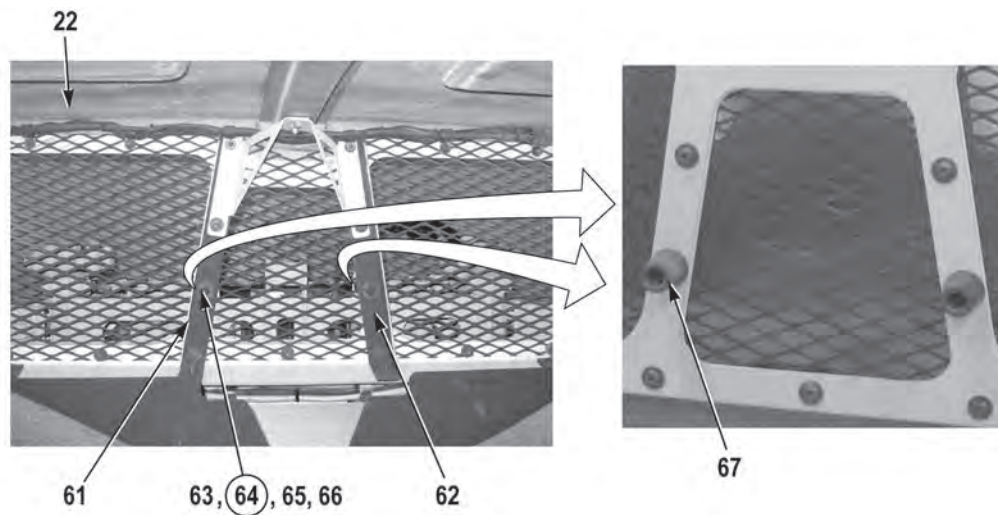
NOTE

Install standoff bracket as noted prior to removal.

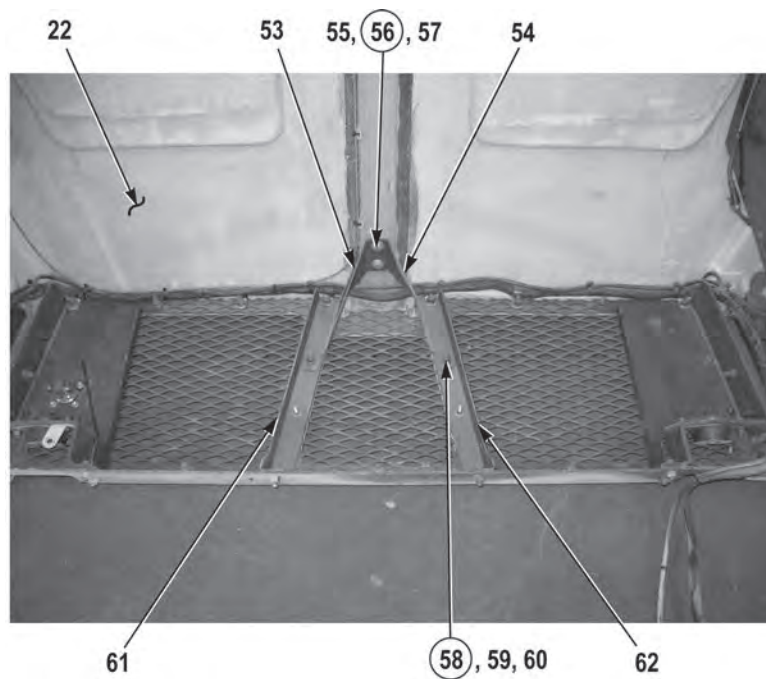
15. Install standoff bracket (14) on bracket (77) with screw (79) and new locknut (80).
16. Install bracket (77) on hood (22) with four screws (76) and new locknuts (75).



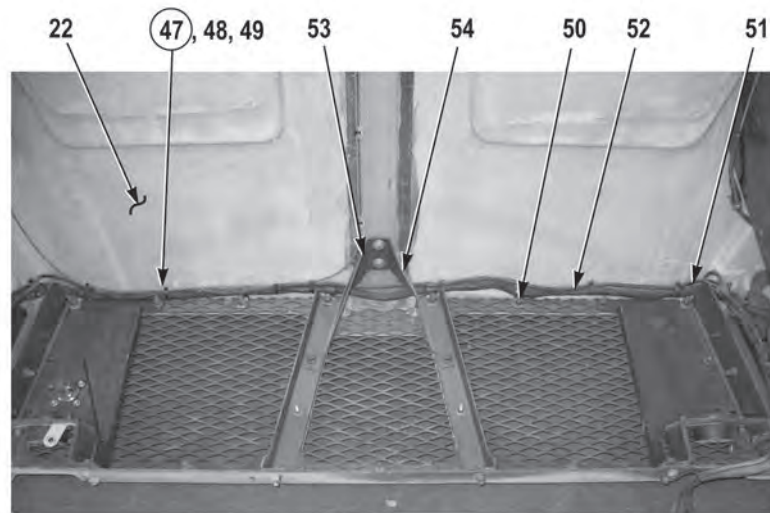
17. Install rubber mount (74) on bracket (71) with two screws (73) and new locknuts (72).
18. Install bracket (71) and cushion clip (70) on hood (22) with four screws (69) and new locknuts (68).



19. Install two rubber stoppers (67) on bracket (62), bracket (61), and hood (22) with two washers (66), screws (65), new lockwashers (64), and nuts (63).



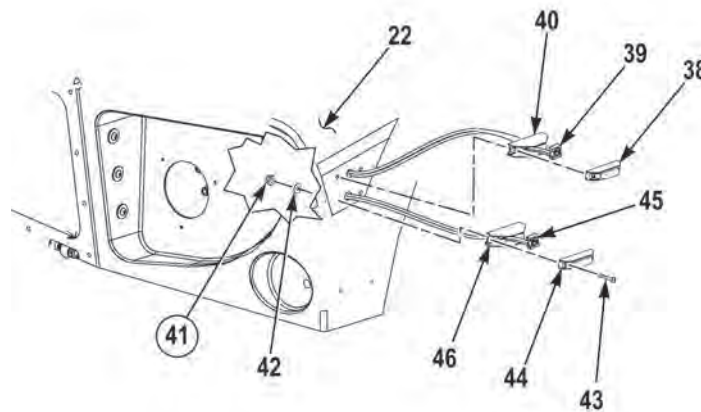
20. Install bracket (54) and bracket (53) on bracket (62), bracket (61), and hood (22) with two washers (60), screws (59), and new locknuts (58).
21. Secure bracket (54) and bracket (53) on hood (22) with two washers (57), new lockwashers (56), and screws (55).



NOTE

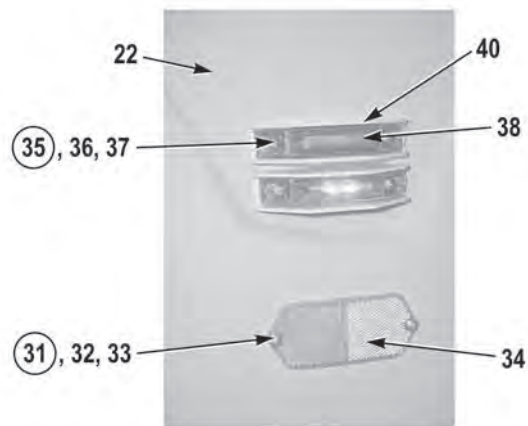
Install mounting hardware as noted prior to removal.

22. Install wire harness (52) on bracket (54), bracket (53), and hood (22) with six cushion clips (51), two washers (50), eight screws (49), washers (48), and new locknuts (47).

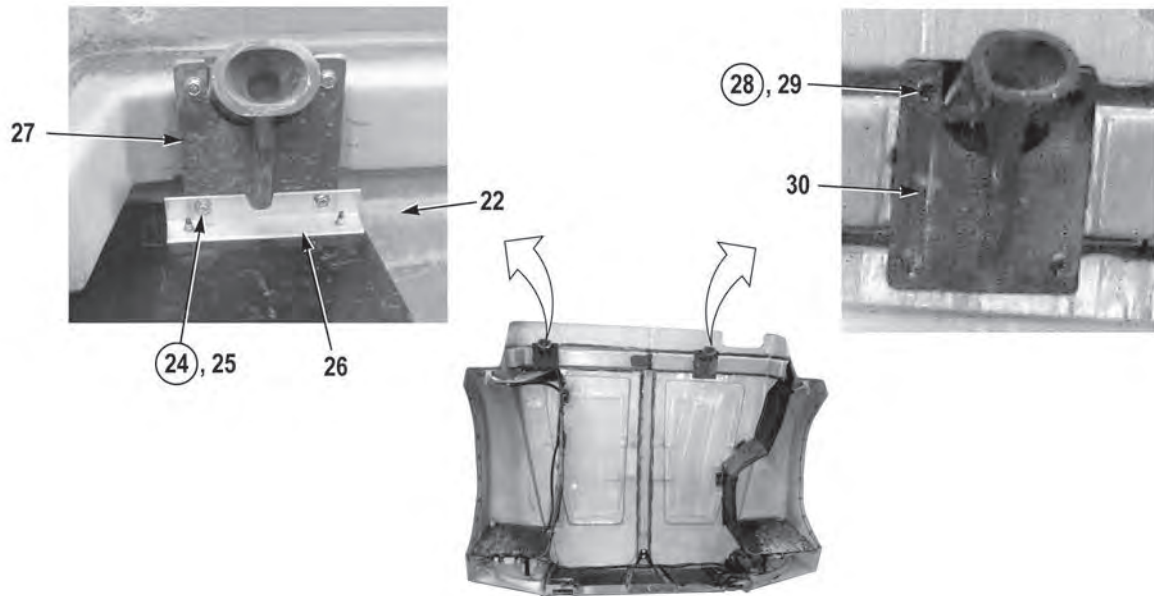


NOTE

- Driver side and passenger side marker lights and reflectors are installed the same way. Driver side shown.
 - Install connectors as noted prior to removal.
23. Install connector (45) through marker light shield (46) and connect connector (45) on marker light (44).
 24. Install marker light shield (46) and marker light (44) on hood (22) with two screws (43), washers (42), and new locknuts (41).
 25. Install connector (39) through marker light shield (40) and connect connector (39) on marker light (38).



26. Install marker light shield (40) and marker light (38) on hood (22) with two screws (37), washers (36), and new locknuts (35).
27. Install reflector (34) on hood (22) with two screws (33), washers (32), and new locknuts (31). Tighten locknuts to 6 lb-in (0.68 N•m).
28. Repeat Steps (23) through (27) for passenger side marker lights and reflector.

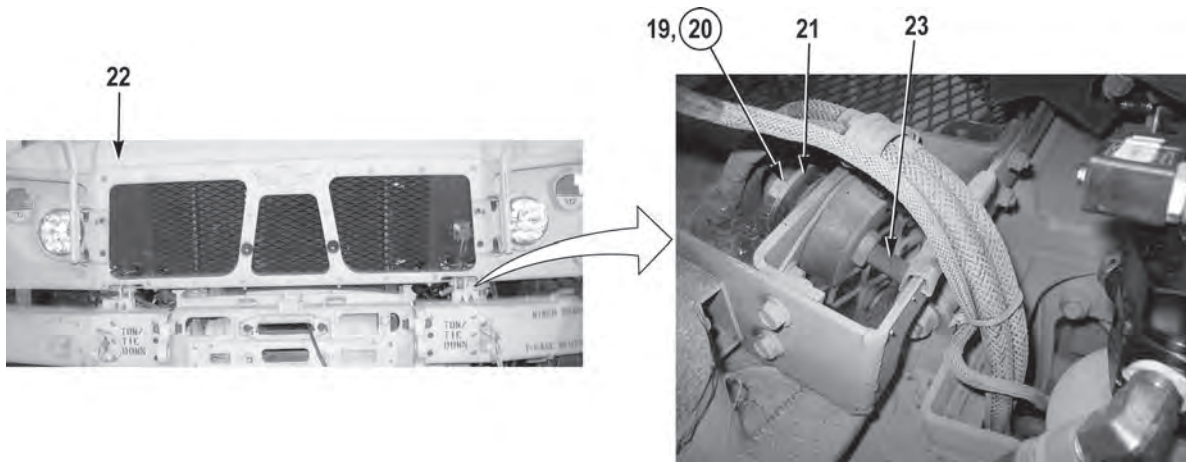


29. Install hood receptacle (30) on hood (22) with four screws (29) and new locknuts (28).
30. Install hood receptacle (27) and bracket (26) on hood (22) with four screws (25) and new locknuts (24).

NOTE

Perform Steps (31) through (36) if hood was replaced.

31. Install auxiliary mirrors and brackets (WP 0139).
32. Install blackout drive light (WP 0192).
33. Install front composite lights (WP 0201).
34. Install headlights (WP 0202).
35. Install passenger side splash guard (WP 0035).
36. Install driver side splash guard (WP 0029).



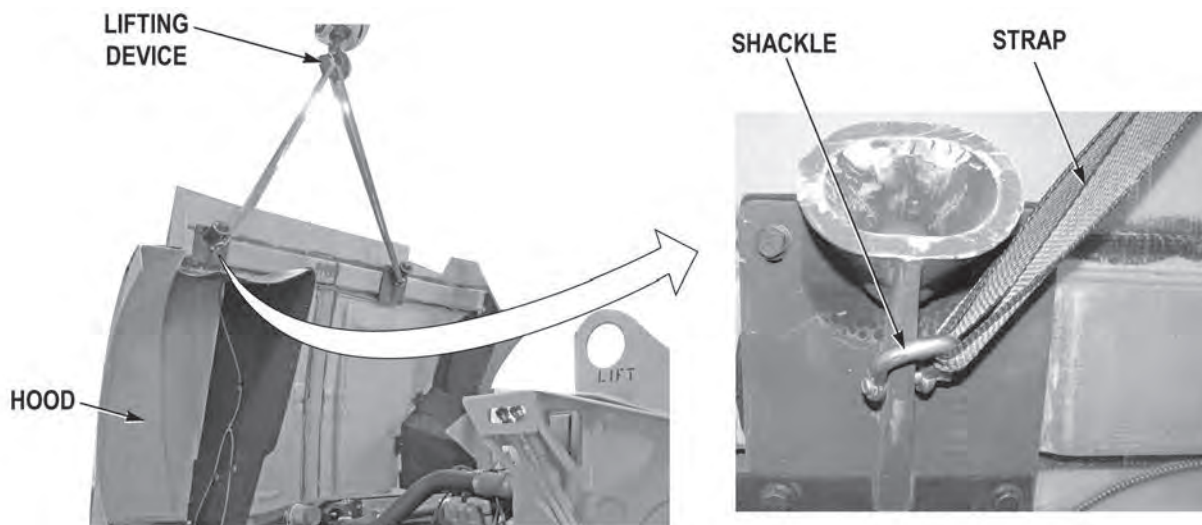
WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

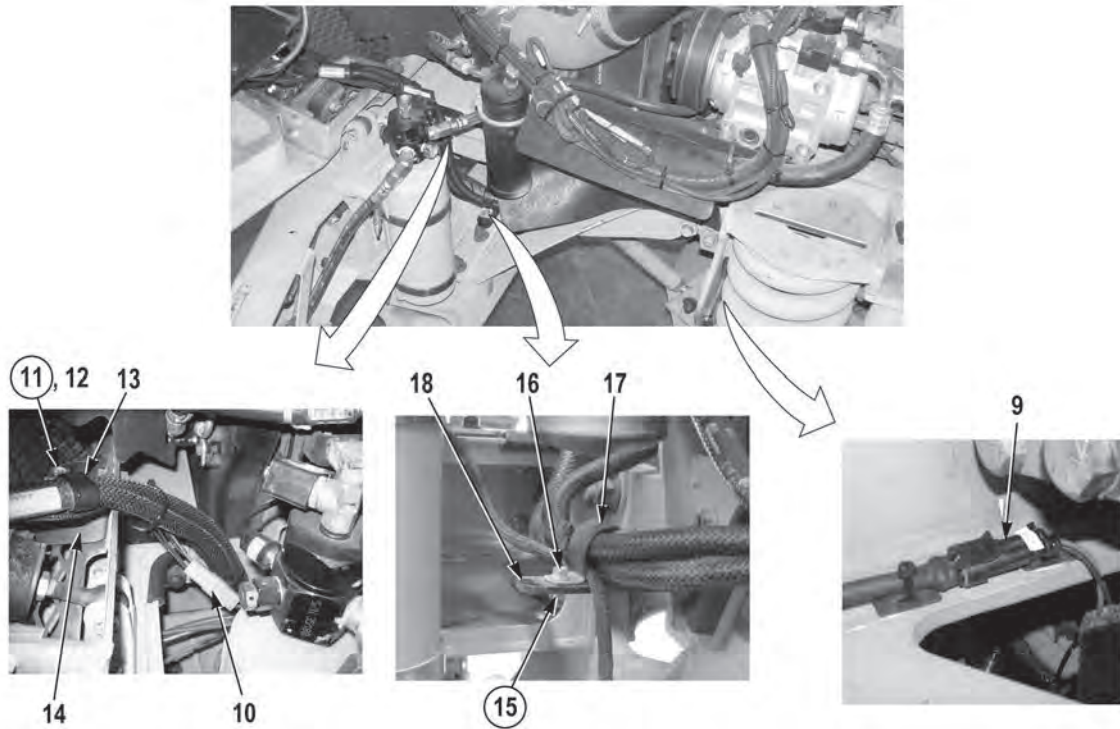
NOTE

Install washers as noted prior to removal.

37. With the aid of an assistant and lifting device, install hood (22) on two rod ends (23) with two washers (21), new lockwashers (20), and nuts (19).

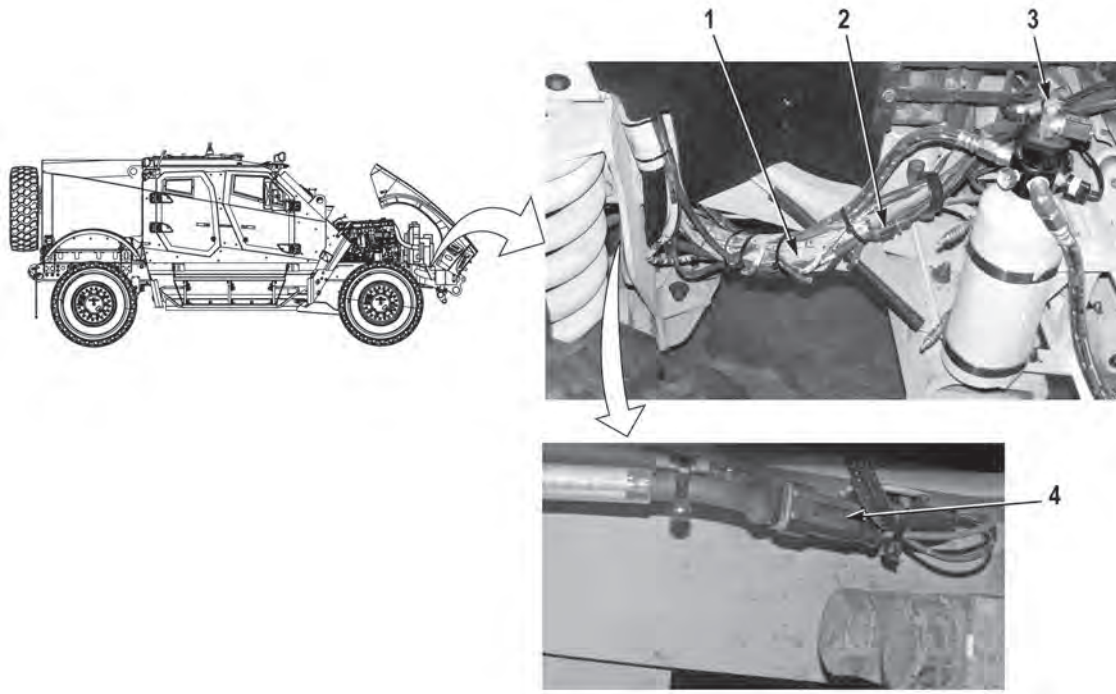


38. Remove two shackles and strap from hood.

**NOTE**

Install cable ties as required.

39. Install cushion clip (17) on standoff bracket (18) with screw (16) and new locknut (15).
40. Install cushion clip (13) on standoff bracket (14) with screw (12) and new locknut (11).
41. Connect connector (10).
42. Connect connector (9).



43. Install cushion clip (7) on standoff bracket (8) with screw (6) and new locknut (5).
44. Connect connector (4).
45. Connect connector (3).
46. Connect connector (2).
47. Connect connector (1).
48. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HOOD REPLACEMENT (AFES NITROGEN DETECTION)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Driver side splash guard removed (WP 0028)
 Passenger side splash guard removed
 (WP 0034)
 Headlights removed (WP 0202)
 Front composite lights removed (WP 0201)
 Blackout drive lights removed (WP 0192)

Tools and Special Tools

Lifting Straps
 Shackles
 Socket, Deep Well, 15/16 in.
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 4)
 Locknut (8) (Item 8)
 Locknut (4) (Item 12)
 Locknut (4) (Item 16)
 Locknut (4) (Item 22)
 Lockwasher (8) (Item 29)
 Lockwasher (2) (Item 38)
 Locknut (2) (Item 43)

Materials/Parts (continued)

Locknut (4) (Item 48)
 Lockwasher (2) (Item 51)
 Lockwasher (2) (Item 55)
 Locknut (2) (Item 59)
 Lockwasher (9) (Item 62)
 Locknut (2) (Item 67)
 Lockwasher (6) (Item 71)
 Lockwasher (4) (Item 76)
 Locknut (2) (Item 82)
 Locknut (6) (Item 85)
 Tags, Identification
 Ties, Cable

Personnel Required

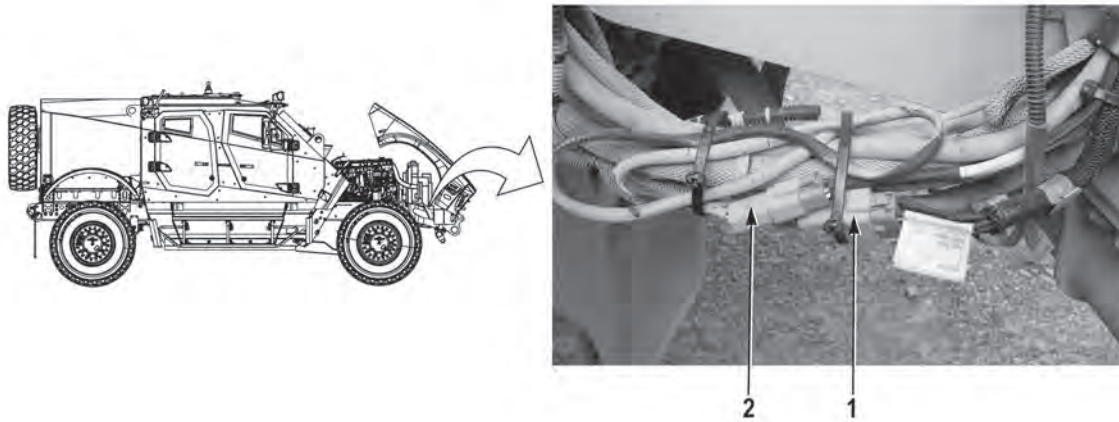
Two

Follow-On Maintenance

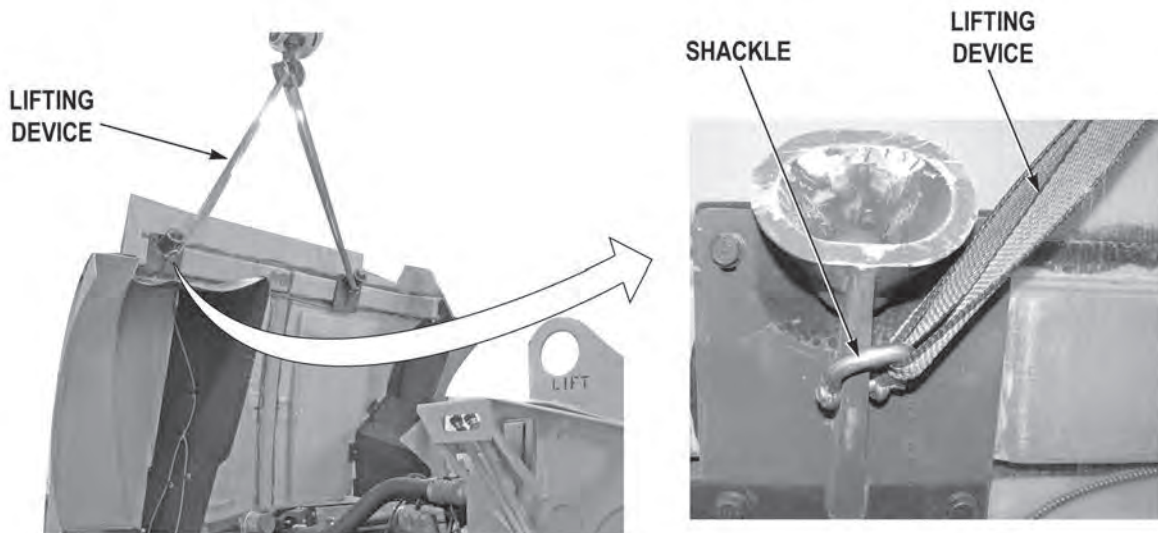
Install blackout drive lights (WP 0192)
 Install front composite lights (WP 0201)
 Install headlights (WP 0202)
 Install driver side splash guard (WP 0028)
 Install passenger side splash guard (WP 0034)
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Tag and mark connectors prior to removal to ensure proper installation.
- Remove cable ties as required.



1. Disconnect connector (1).
2. Disconnect connector (2).

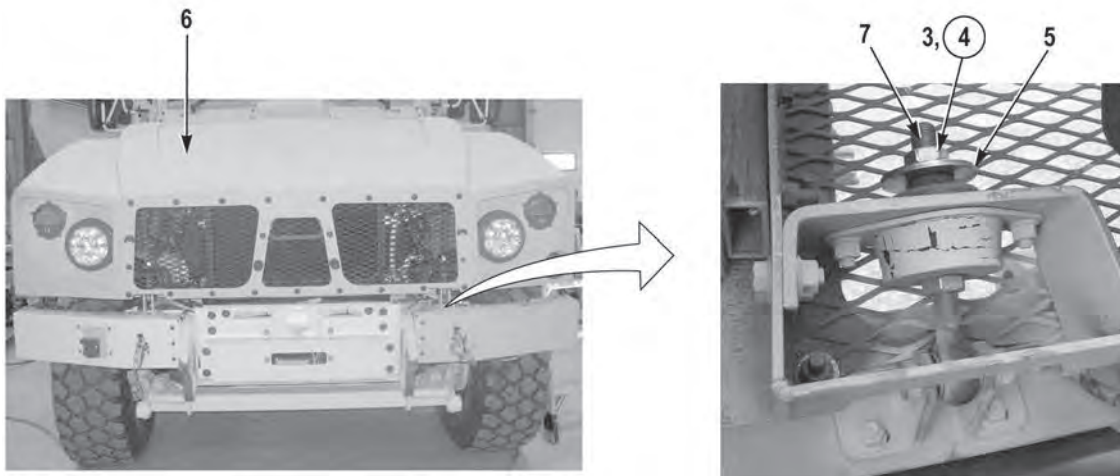


WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

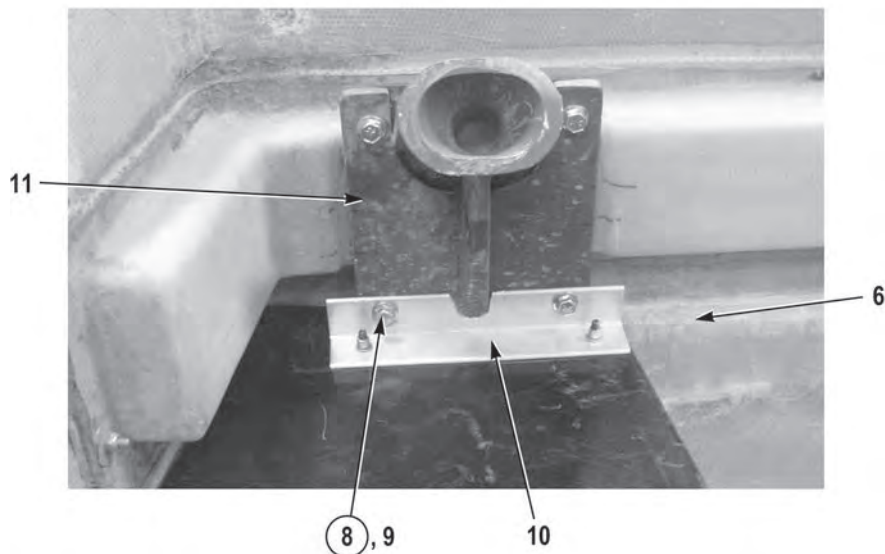
NOTE

Note position of washers prior to removal to ensure proper installation.

**NOTE**

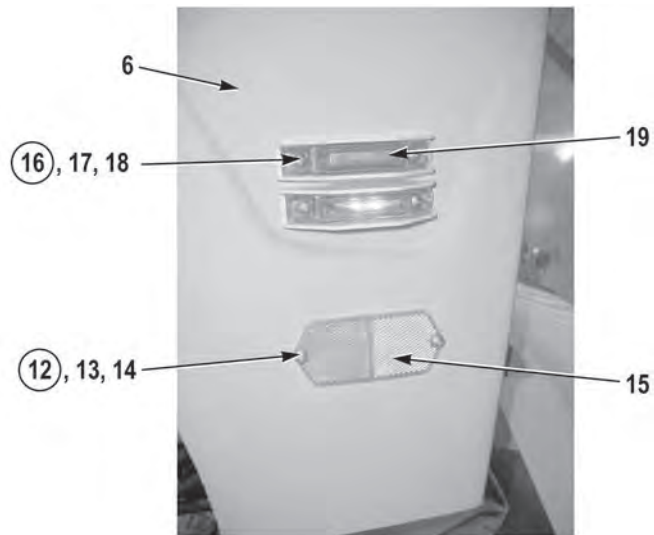
Ensure dummy couplings are removed from hood supports prior to removing hood.

3. With the aid of an assistant and lifting device, remove two nuts (3), lockwashers (4), washers (5), and hood (6) from rod ends (7). Discard lockwashers (4).

**NOTE**

Driver side and passenger side receptacles are removed the same way. Driver side shown.

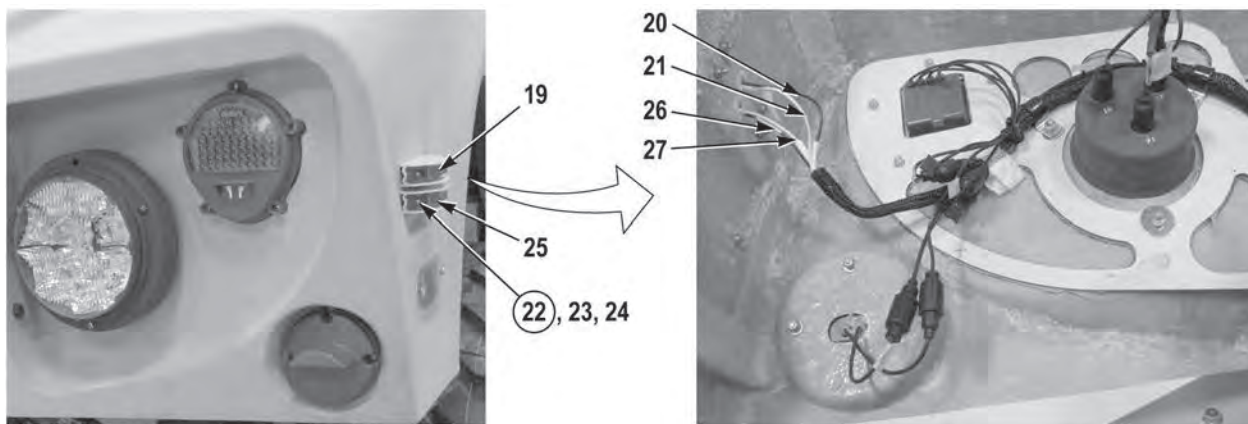
4. Remove four locknuts (8), screws (9), bracket (10), and hood receptacle (11) from hood (6). Discard locknuts (8).



NOTE

Driver side and passenger side marker lights and reflectors are removed the same way. Passenger side shown.

5. Remove two locknuts (12), washers (13), screws (14), and reflector (15) from hood (6). Discard locknuts (12).
6. Remove two locknuts (16), washers (17), screws (18), and move marker light (19) away from hood (6). Discard locknuts (16).

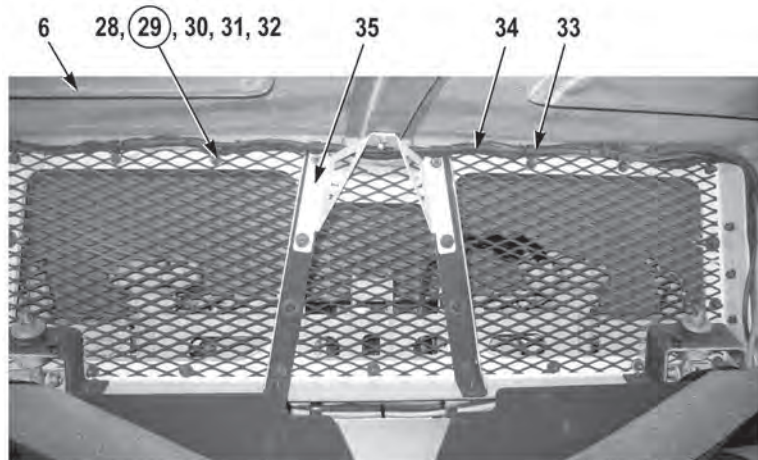


NOTE

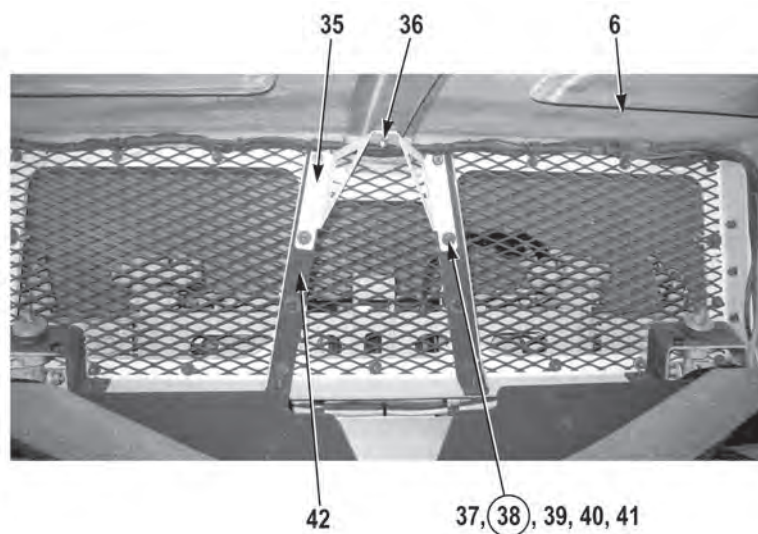
Tag and mark wires prior to removal to ensure proper installation.

7. Disconnect wire (20) from marker light (19).

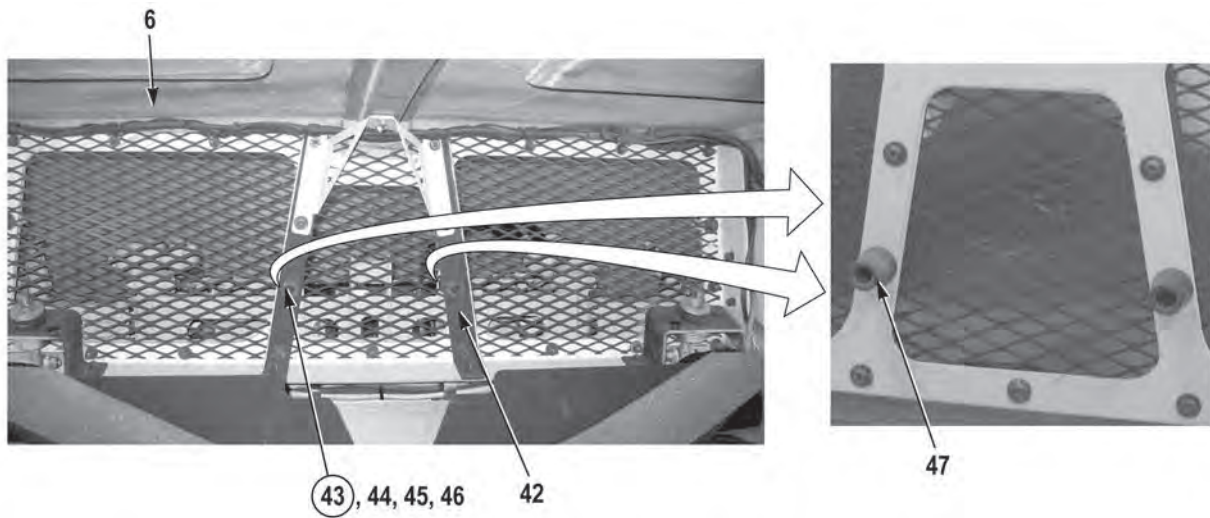
8. Disconnect wire (21) from marker light (19).
9. Remove two locknuts (22), washers (23), screws (24), and move marker light (25) away from hood (6). Discard locknuts (22).
10. Disconnect wire (26) from marker light (25).
11. Disconnect wire (27) from marker light (25).
12. Repeat Steps (6) through (12) for passenger side.



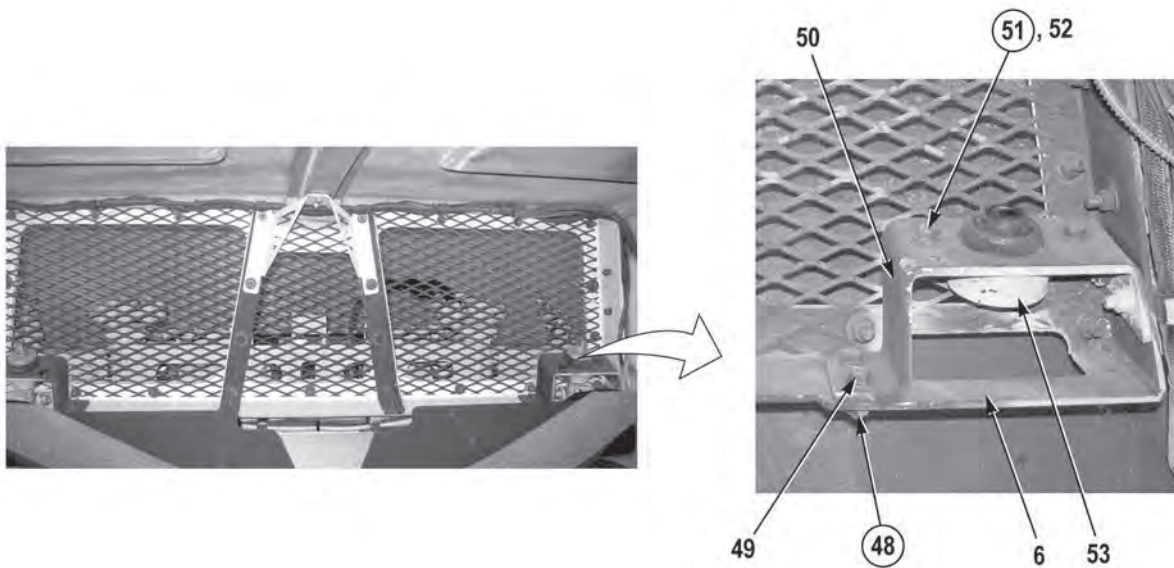
13. Remove eight nuts (28), lockwashers (29), washers (30), screws (31), washers (32), cushion clips (33), and wire harness (34) from hood (6) and bracket (35). Discard lockwashers (29).



14. Remove two screws (36) from bracket (35) and hood (6).
15. Remove two nuts (37), lockwashers (38), washers (39), screws (40), washers (41), and bracket (35) from hood (6) and brackets (42). Discard lockwashers (38).



16. Remove two locknuts (43), washers (44), screws (45), washers (46), and two rubber stoppers (47) from hood (6) and brackets (42). Discard locknuts (43).



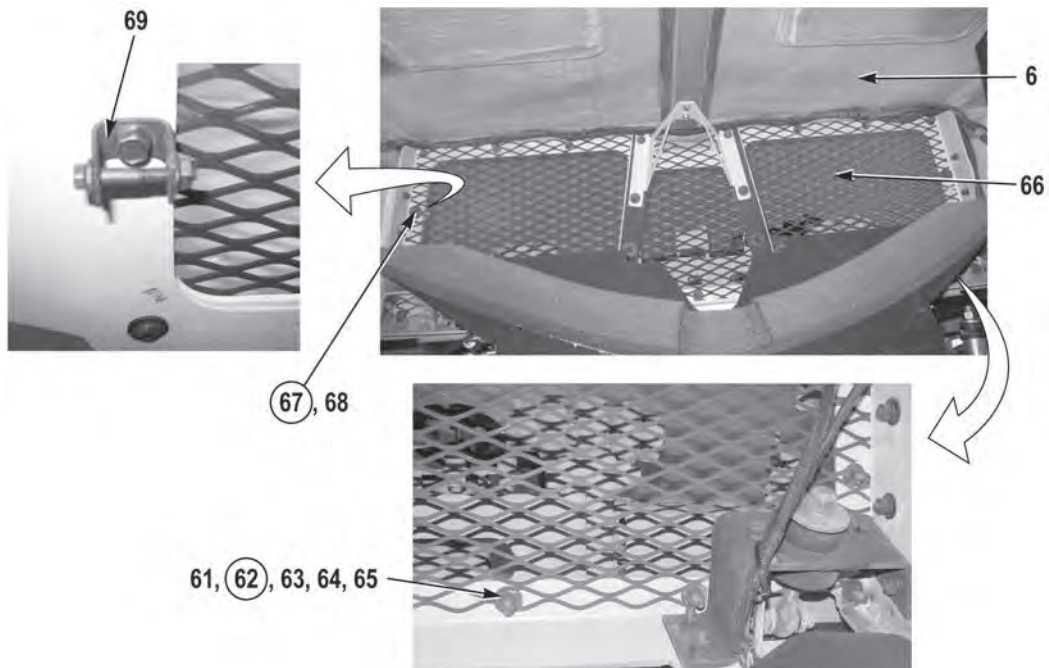
NOTE

- Driver side and passenger side brackets are removed the same way. Passenger side shown.
- Remove cable ties as required.

17. Remove four locknuts (48), screws (49), and bracket (50) from hood (6). Discard locknuts (48).
18. Remove two locknuts (51), screws (52), and rubber mount (53) from bracket (50). Discard locknuts (51).



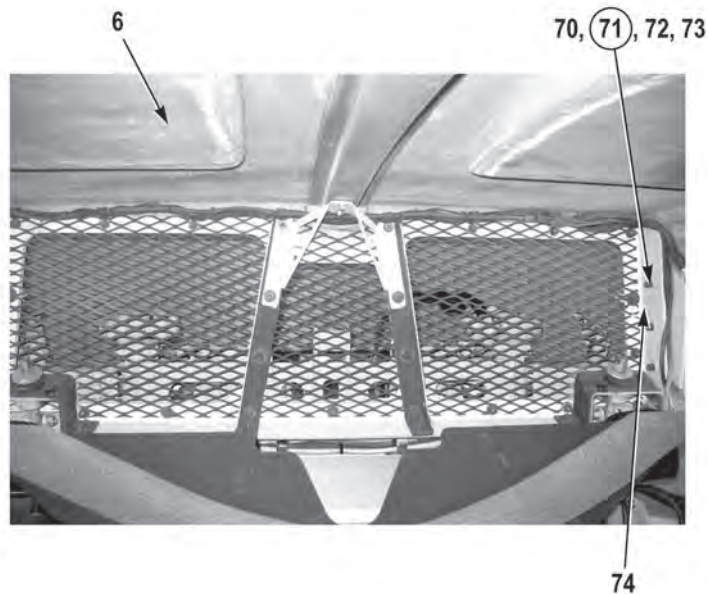
19. Remove two nuts (54), lockwashers (55), washers (56), screws (57), and washers (58) from hood (6) and bracket (42). Discard lockwashers (55).
20. Remove two locknuts (59), screws (60), and brackets (42) from hood (6). Discard locknuts (59).



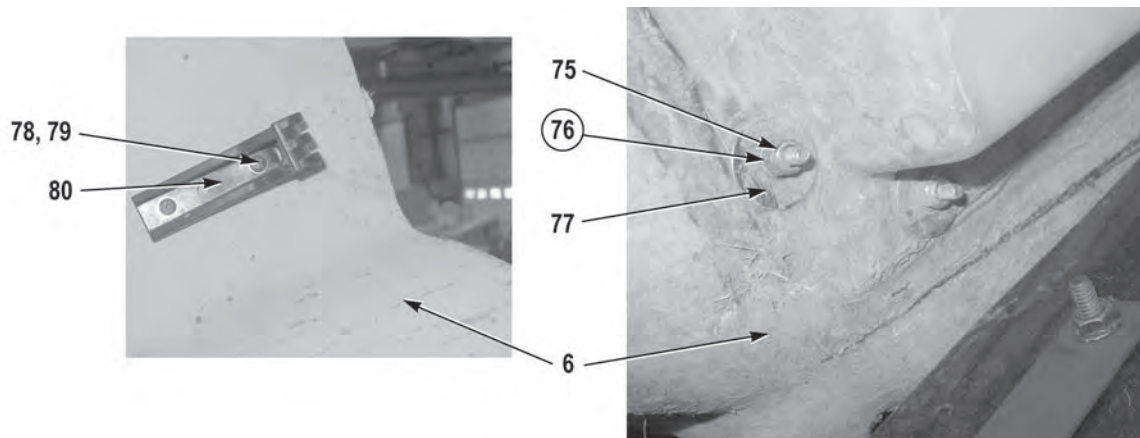
NOTE

Note position of brackets prior to removal to ensure proper installation.

21. Remove nine nuts (61), lockwashers (62), washers (63), screws (64), and washers (65) from grill (66) and hood (6). Discard lockwashers (62).
22. Remove two locknuts (67), screws (68), brackets (69), and grill (66) from hood (6). Discard locknuts (67).



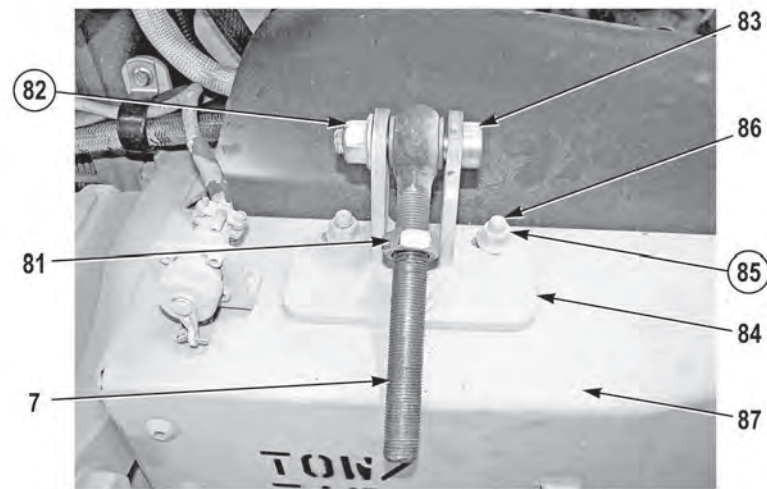
23. Remove six nuts (70), lockwashers (71), screws (72), washers (73), and two spacers (74) from hood (6). Discard lockwashers (71).



24. Remove four nuts (75), lockwashers (76), washers (77), screws (78), washers (79), and two hood latches (80) from hood (6). Discard lockwashers (76).

NOTE

- Perform Steps (25) through (27) if removing hood mount assemblies.
- Driver side and passenger side hood mount assemblies are removed the same way. Driver side shown.
- Match mark hood mount brackets prior to removal to ensure proper installation.
- Note position of jam nut prior to removal to ensure proper installation.



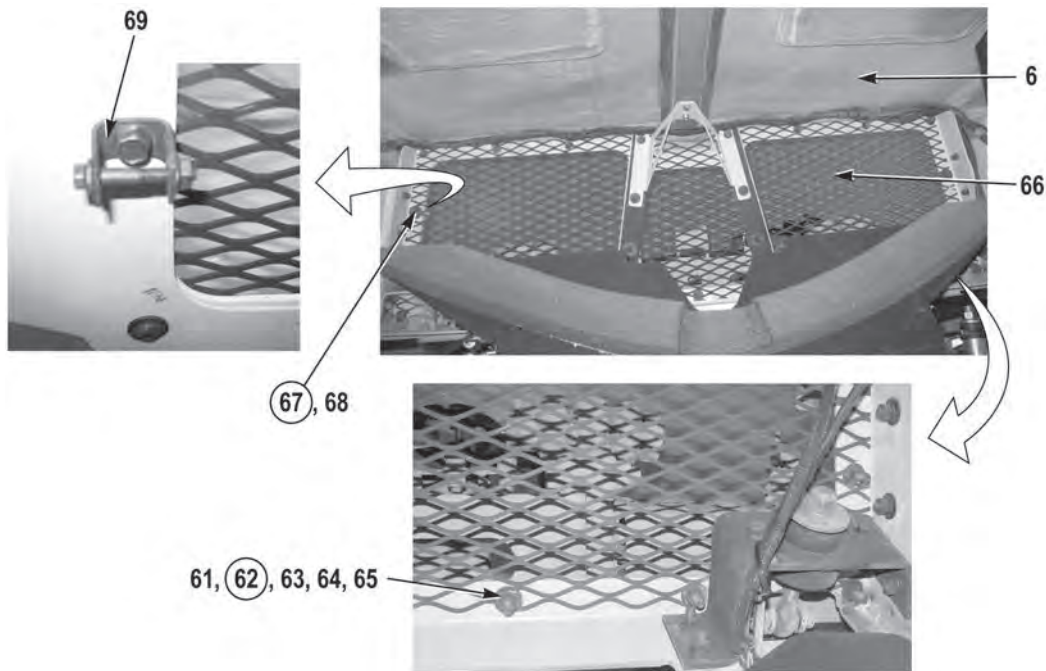
25. Remove jam nut (81) from rod end (7).
26. Remove locknut (82), screw (83), and rod end (7) from hood mount bracket (84). Discard locknut (82).
27. Remove three locknuts (85), screws (86), and hood mount bracket (84) from bumper (87). Discard locknuts (85).

END OF TASK

INSTALLATION

NOTE

- Perform Steps (1) through (3) if hood mount assemblies were removed.
 - Driver side and passenger side hood mount assemblies are installed the same way. Driver side shown.
 - Install hood mount brackets as noted prior to removal.
1. Install hood mount bracket (84) on bumper (87) with three screws (86) and two new locknuts (85).
 2. Install rod end (7) on hood mount bracket (84) with screw (83) and new locknut (82).
 3. Install jam nut (81) on rod end (7).
 4. Install two hood latches (80) on hood (6) with four washers (79), screws (78), washers (77), new lockwashers (76), and nuts (75).
 5. Install two spacers (74) on hood (6) with six washers (73), screws (72), new lockwashers (71), and nuts (70).



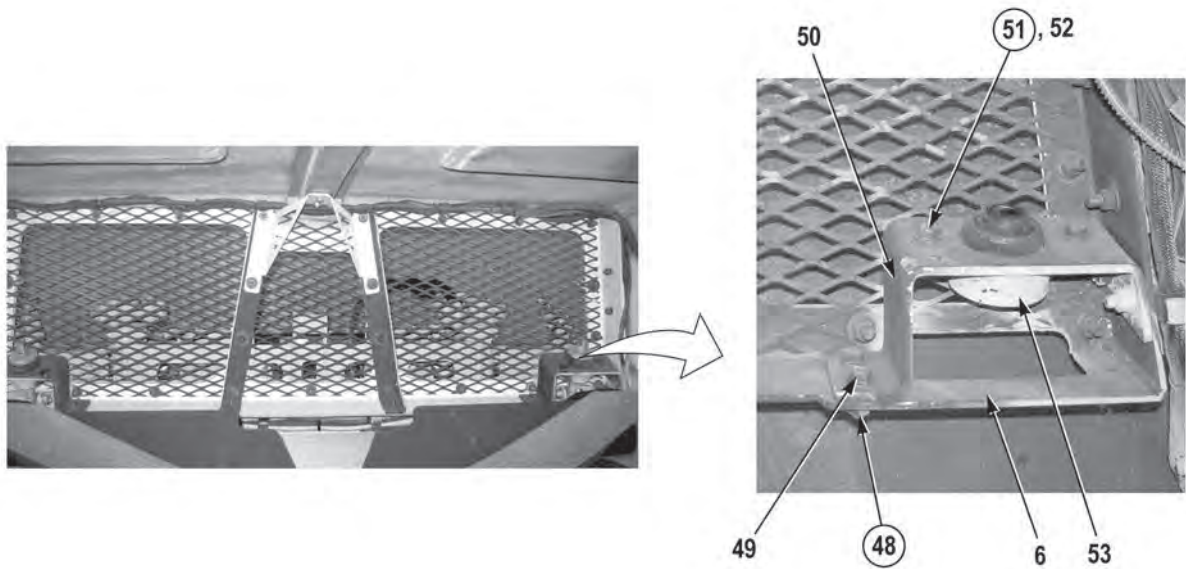
NOTE

Install brackets as noted prior to removal.

6. Install grill (66) and two brackets (69) on hood (6) with two screws (68) and new locknuts (67).
7. Secure grill (66) on hood (6) with nine washers (65), screws (64), washers (63), new lockwashers (62), and nuts (61).



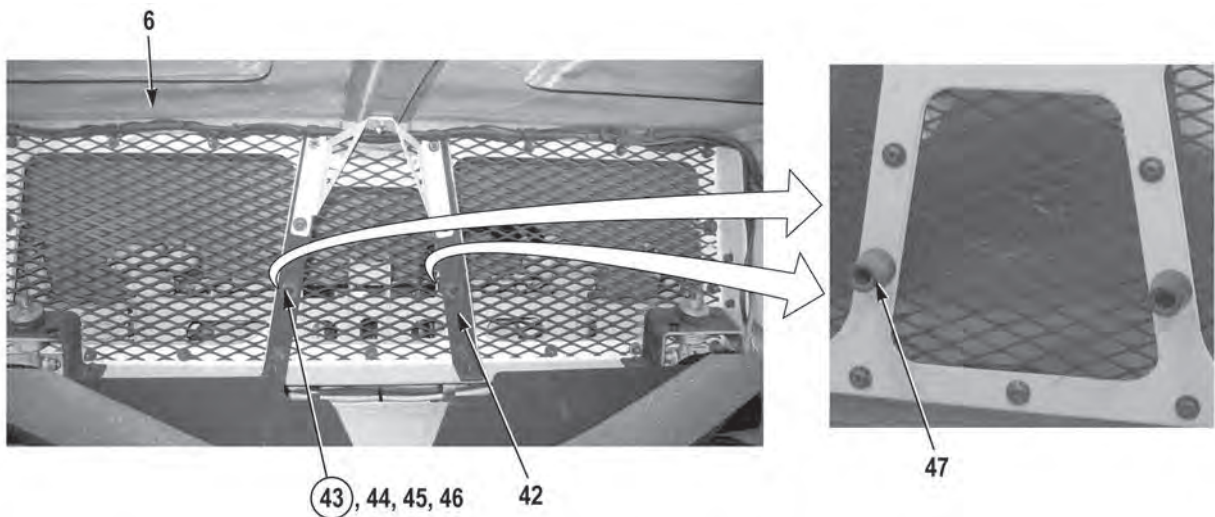
8. Install two brackets (42) on hood (6) with two screws (60) and new locknuts (59).
9. Install two washers (58), screws (57), washers (56), new lockwashers (55), and nuts (54) on brackets (42) and hood (6).



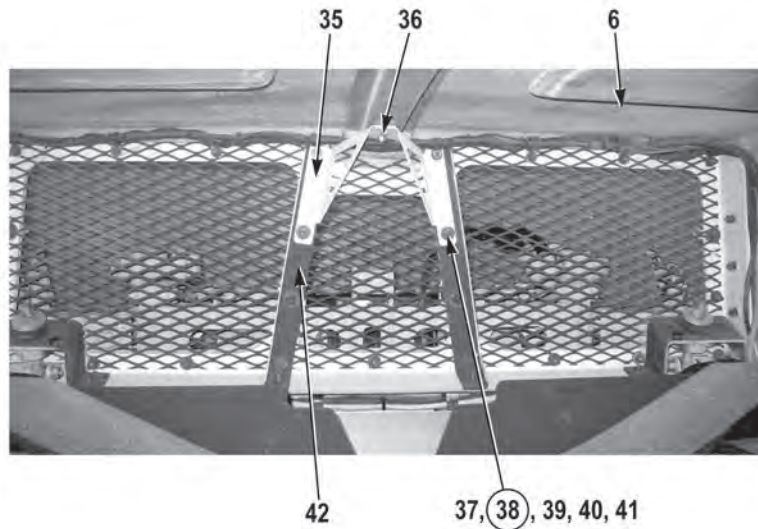
NOTE

- Driver side and passenger side brackets are installed the same way. Passenger side shown.
- Install cable ties as required.

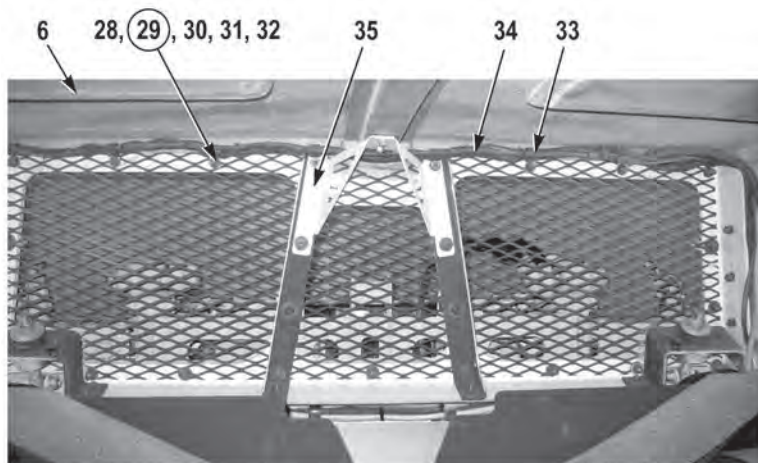
10. Install rubber mount (53) on bracket (50) with two screws (52) and new locknuts (51).
11. Install bracket (50) on hood (6) with four screws (49) and new locknuts (48).



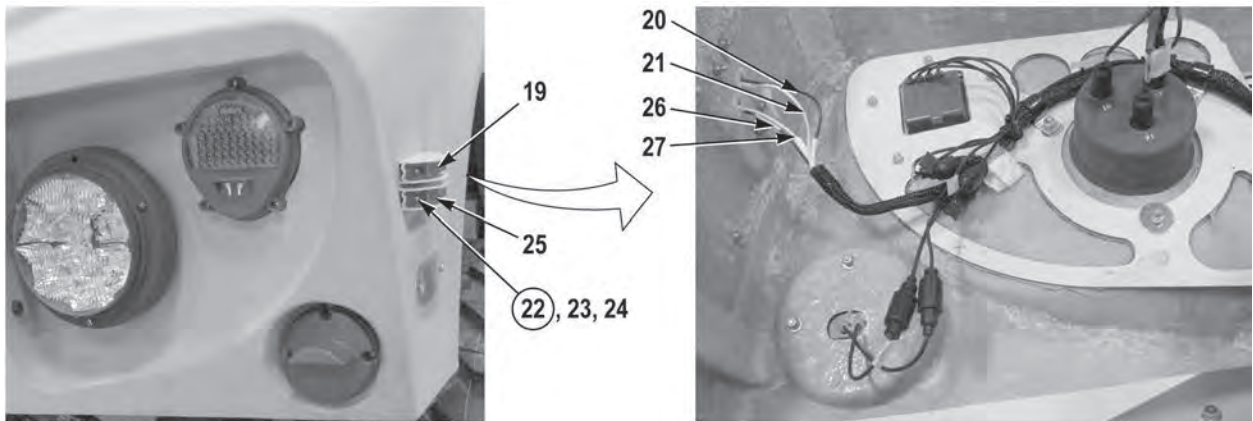
12. Install two rubber stoppers (47) on hood (6) and brackets (42) with four washers (46), screws (45), washers (44), and new locknuts (43).



13. Install bracket (35) on hood (6) with two washers (41), screws (40), washers (39), new lockwashers (38), and nuts (37).
14. Install two screws (36) on bracket (35) and hood (6).



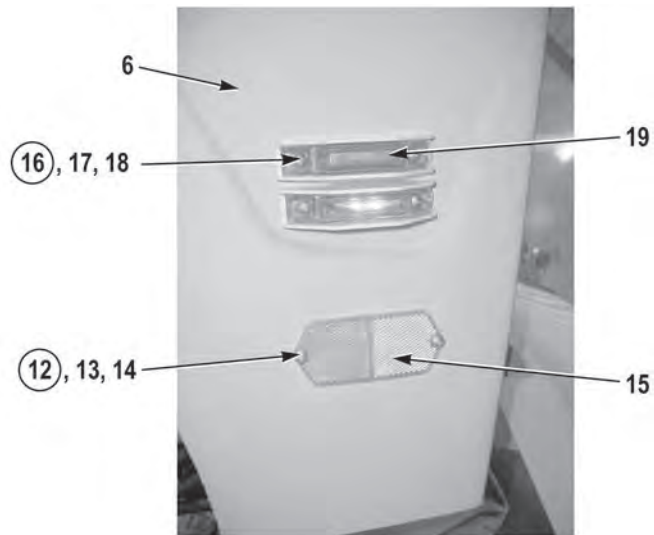
15. Install wire harness (34) and eight cushion clips (33) on hood (6) with eight washers (32), screws (31), washers (30), new lockwashers (29) and nuts (28).



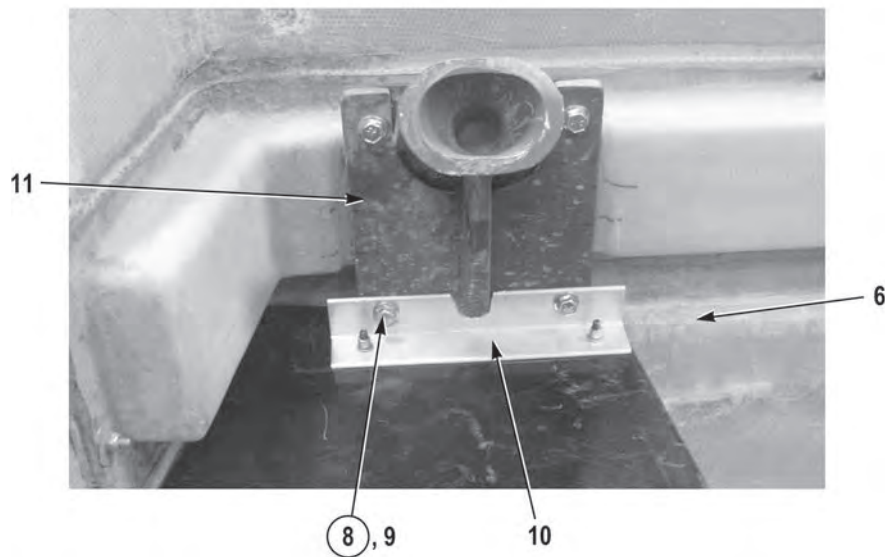
NOTE

- Driver side and passenger side reflectors and lights are installed the same way. Driver side down.
- Install wires as noted prior to removal.

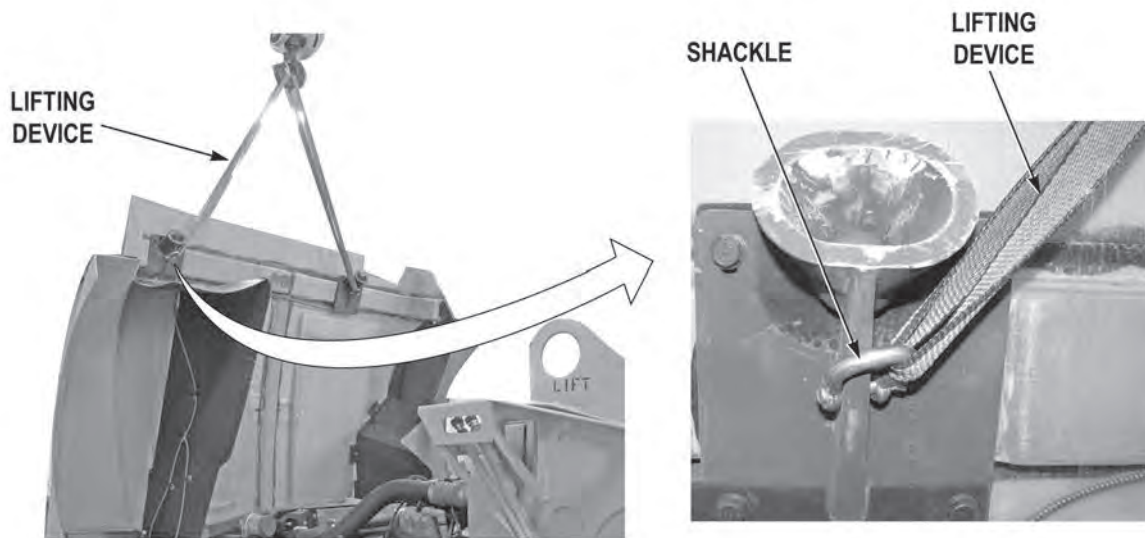
16. Connect wire (27) to marker light (25).
17. Connect wire (26) to marker light (25).
18. Install marker light (25) on hood (6) with two screws (24), washers (23), and new locknuts (22).
19. Connect wire (21) to marker light (19).
20. Connect wire (20) to marker light (19).



21. Install marker light (19) on hood (6) with two screws (18), washers (17), and new locknuts (16).
22. Install reflector (15) on hood (6) with two screws (14), washers (13), and new locknuts (12).

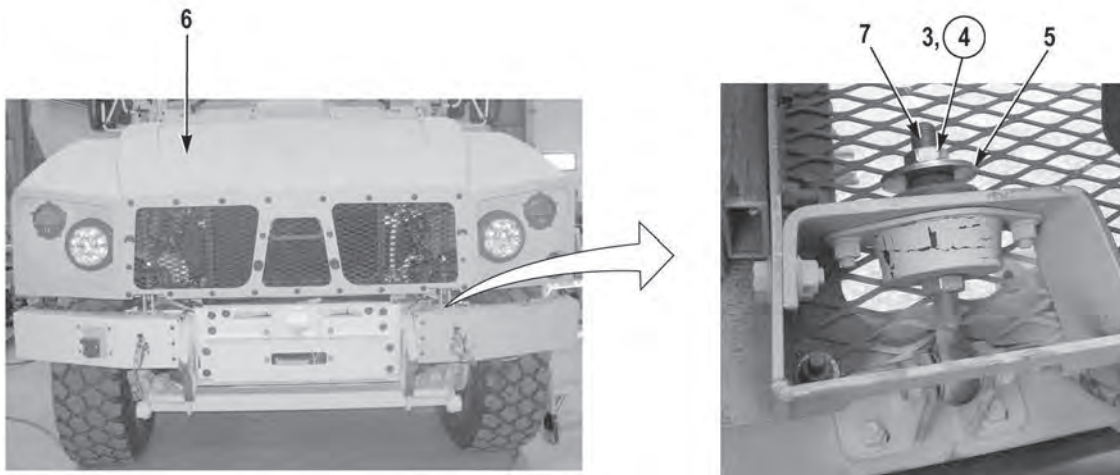


23. Install hood receptacle (11) and bracket (10) on hood (6) with four screws (9) and new locknuts (8).

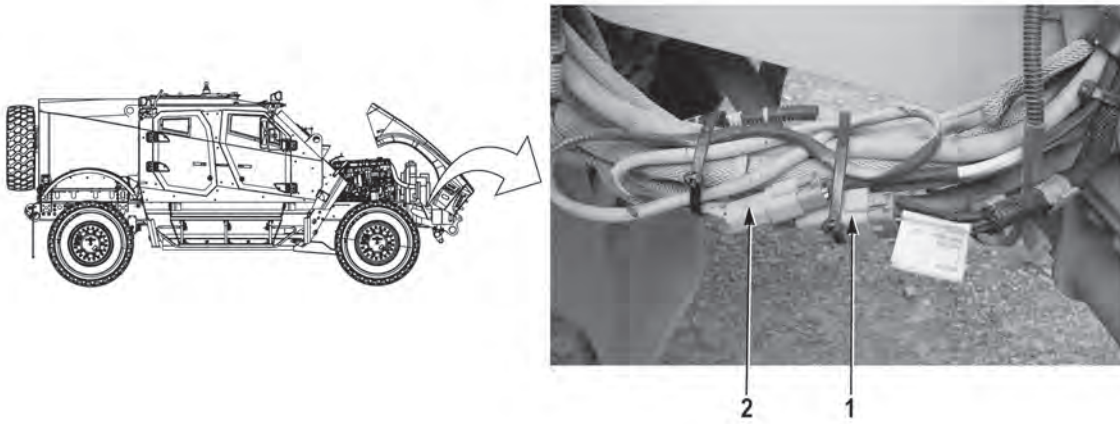


WARNING

Hood assembly weighs 158 lbs (72 kg). Do not lift or move hood without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.



24. With the aid of an assistant and lifting device, install hood (6) on two rod ends (7) with washer (5), new lockwasher (4), and nut (3).



25. Connect connector (2).

26. Connect connector (1).

27. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

HOOD LATCH REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured

Materials/Parts

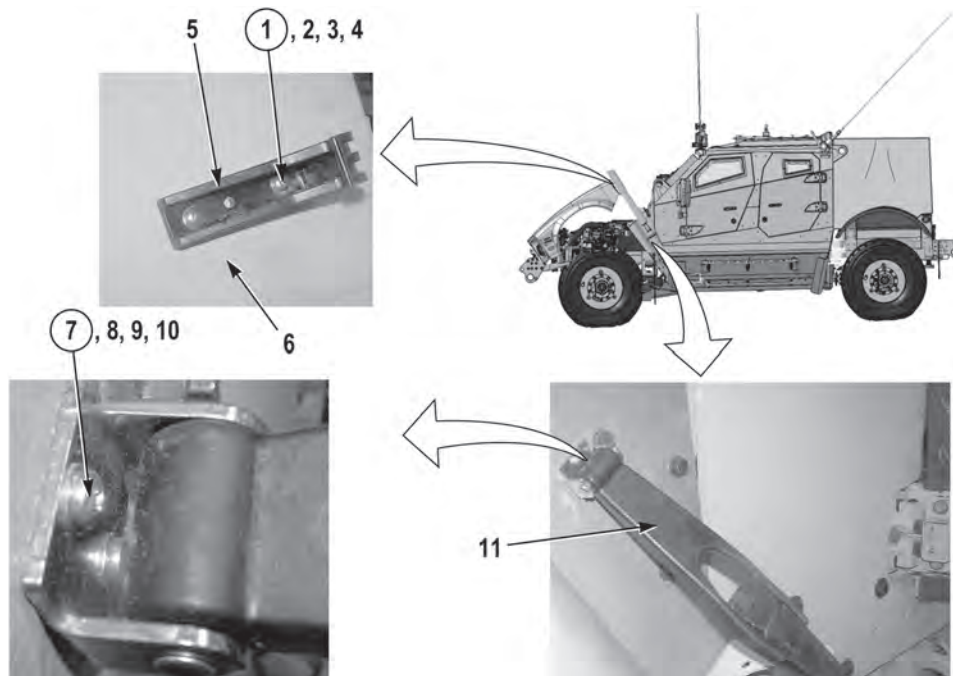
Locknut (4) (Item 1 and 7)
 Compound, Corrosion Preventive, Ultra Tef-Gel
 05SA2

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

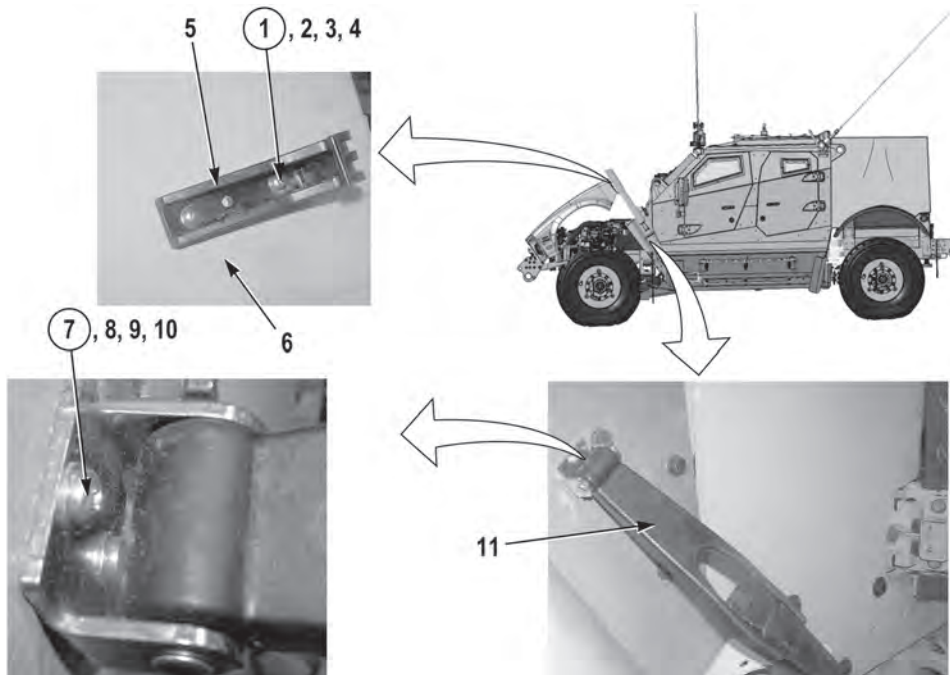
Close hood and secure
 Remove and stow wheel chocks

REMOVAL**NOTE**

Driver side and passenger side hood latches are removed the same way. Driver side shown.

1. Remove two locknuts (1), washers (2 and 3), screws (4), and bracket (5) from hood (6). Discard locknuts (1).
2. Remove two locknuts (7), washers (8 and 9), screws (10), and latch (11) from vehicle. Discard locknuts (7).
3. Repeat Steps (1) and (2) to remove passenger side hood latch.

END OF TASK

INSTALLATION**WARNING**

Anti-corrosion compound is toxic. Use only in well-ventilated area. Use NIOSH/MSHA-approved respirator with dual organic vapor/mist and particulate cartridge. Do not get in eyes; wear chemical safety goggles and full face shield when using. Avoid contact with skin and wear rubber or plastic, solvent-resistant gloves. In case of contact, remove contaminated clothing and immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention. If swallowed, do not induce vomiting; contact a physician immediately. Failure to comply may result in injury or death to personnel.

1. Apply corrosion preventive compound, Ultra Tef-Gel 05SA2, to four screws (4 and 10), latch (11), and bracket (5).

CAUTION

Do not overtighten locknuts. Failure to comply may result in damage to hood.

2. Install latch (11) on vehicle with two screws (10), washers (9 and 8), and new locknuts (7).
3. Install bracket (5) on hood (6) with two screws (4), washers (3 and 2), and new locknuts (1).
4. Repeat Steps (1) through (3) to install passenger side hood latch.
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

MIRROR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Materials/Parts

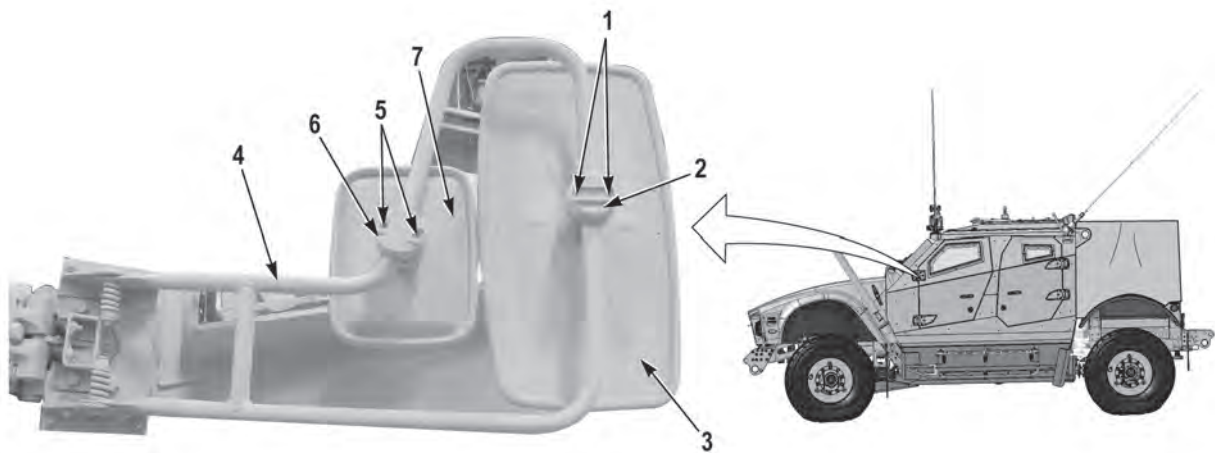
Lockwasher (2) (Item 9)
Locknut (6) (Item 11)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

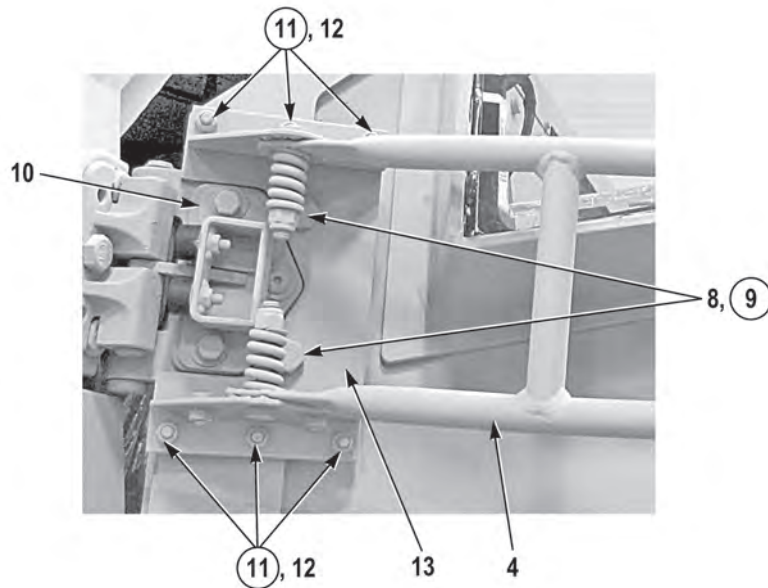
Follow-On Maintenance

Remove and stow wheel chocks

REMOVAL**NOTE**

- Both sides are removed the same way. Driver side shown.
- Note position of mirrors prior to removal to ensure proper installation.

1. Remove two screws (1), cap (2), and side view mirror (3) from mirror bracket (4).
2. Remove two screws (5), cap (6), and spotter mirror (7) from mirror bracket (4).



NOTE

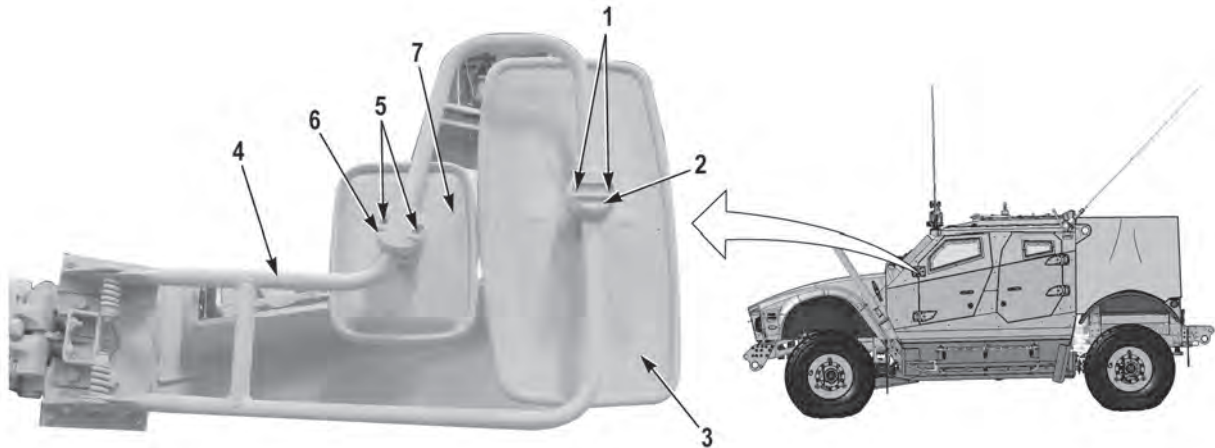
- Perform Steps (3) and (4) only if mirror bracket needs to be removed.
 - Note position of mirror bracket prior to removal to ensure proper installation.
3. Remove two screws (8), lockwashers (9), and mirror bracket (4) from door mount (10). Discard lockwashers (9).
 4. Remove six locknuts (11), screws (12), and mirror bracket (4) from mirror mounting plate (13). Discard locknuts (11).

END OF TASK

INSTALLATION

NOTE

- Both sides are installed the same way. Driver side shown.
 - Install mirror bracket as noted during removal.
 - Perform Steps (1) and (2) only if mirror bracket was removed.
1. Install mirror mounting plate (13) on mirror bracket (4) with six screws (12) and new locknuts (11).
 2. Install mirror bracket (4) on door mount (10) with two screws (8) and new lockwashers (9).

**NOTE**

Install mirrors as noted prior to removal.

3. Install spotter mirror (7) on mirror bracket (4) with cap (6) and two screws (5).
4. Install side view mirror (3) on mirror bracket (4) with cap (2) and two screws (1).
5. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

REAR CAPSULE DOORS REPLACEMENT (M1245)

Preconditions

Park Vehicle
 Engine OFF
 Wheels Chocked
 5th Seat In Folded Position (TM 9-2355-355-10)

Materials/Parts

Compound, Sealing, Loctite 242
 Locknut (8) (Item 13)
 Lockwasher (4) (Item 15)
 Lockwasher (4) (Item 22)

Tools and Special Tools

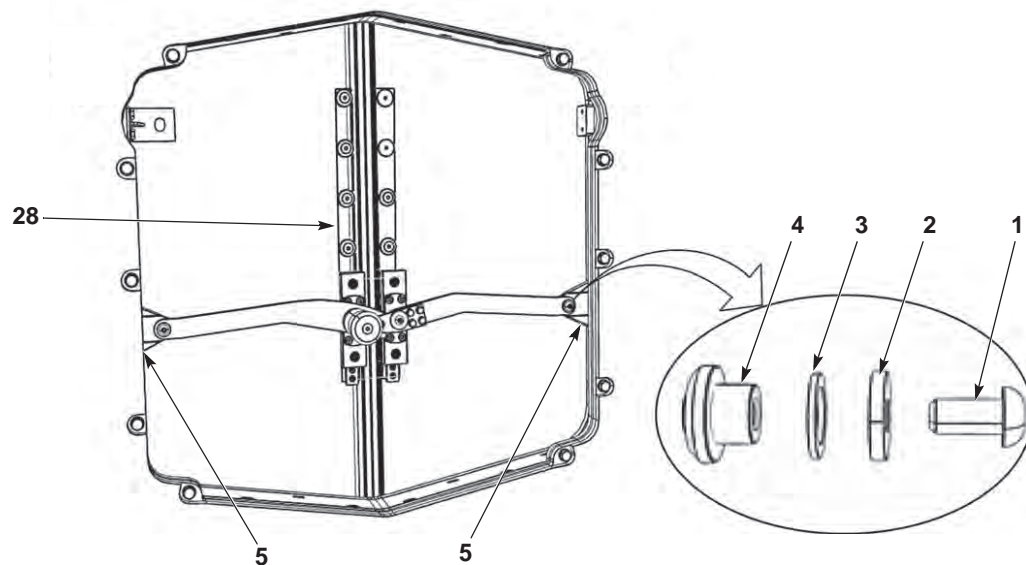
Strap, 20 ft
 Lifting Device
 Tool Kit, General Mechanic's: Automotive
 T40 Torx Bit

Personnel Required

Two

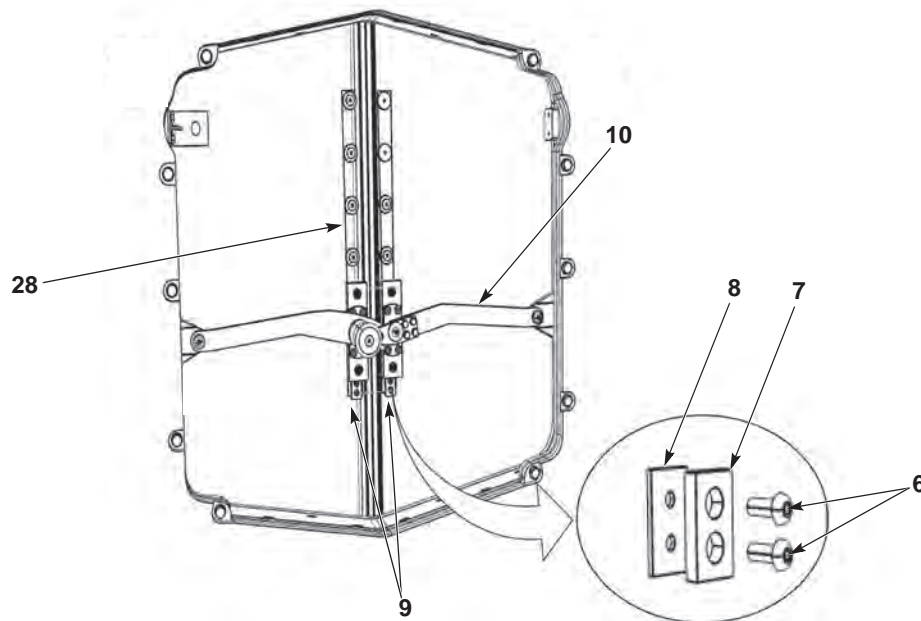
Follow-On Maintenance

Remove and Stow Wheel Chocks

REMOVAL**WARNING**

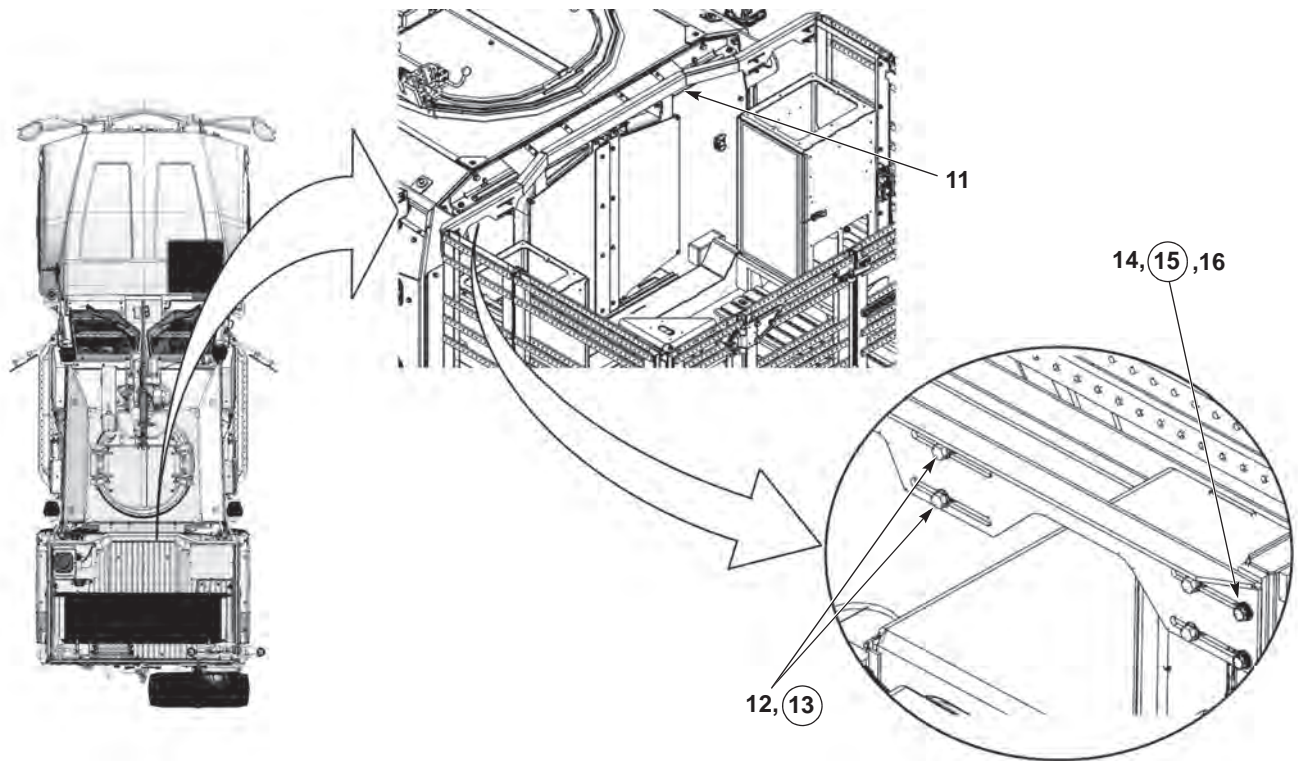
Disconnecting the rear capsule door hardware allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

1. Remove screw (1), nylon washer (2), washer (3), and grommet (4) from each side of the rear capsule door frame (5).

REMOVAL – CONTINUED**WARNING**

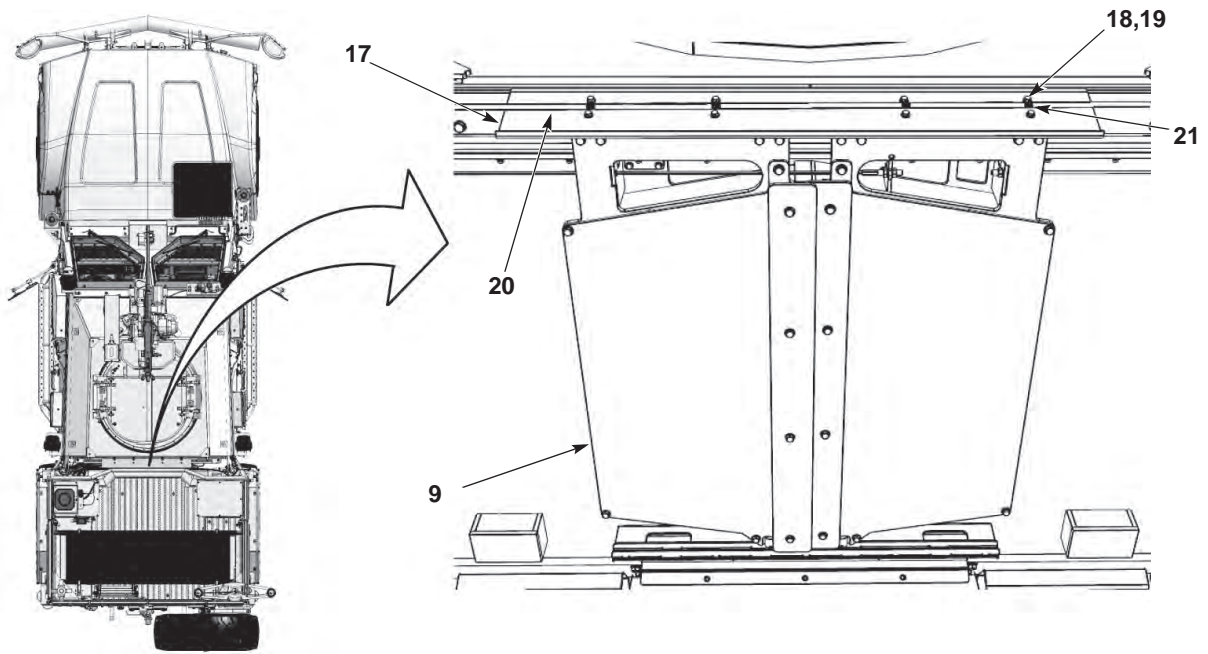
Removing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.

2. Remove two screws (6), stop block (7) and backing plate (8) from both sides of rear capsule door (9).
3. Slide door latch assembly (10) off tracks (28) and remove.

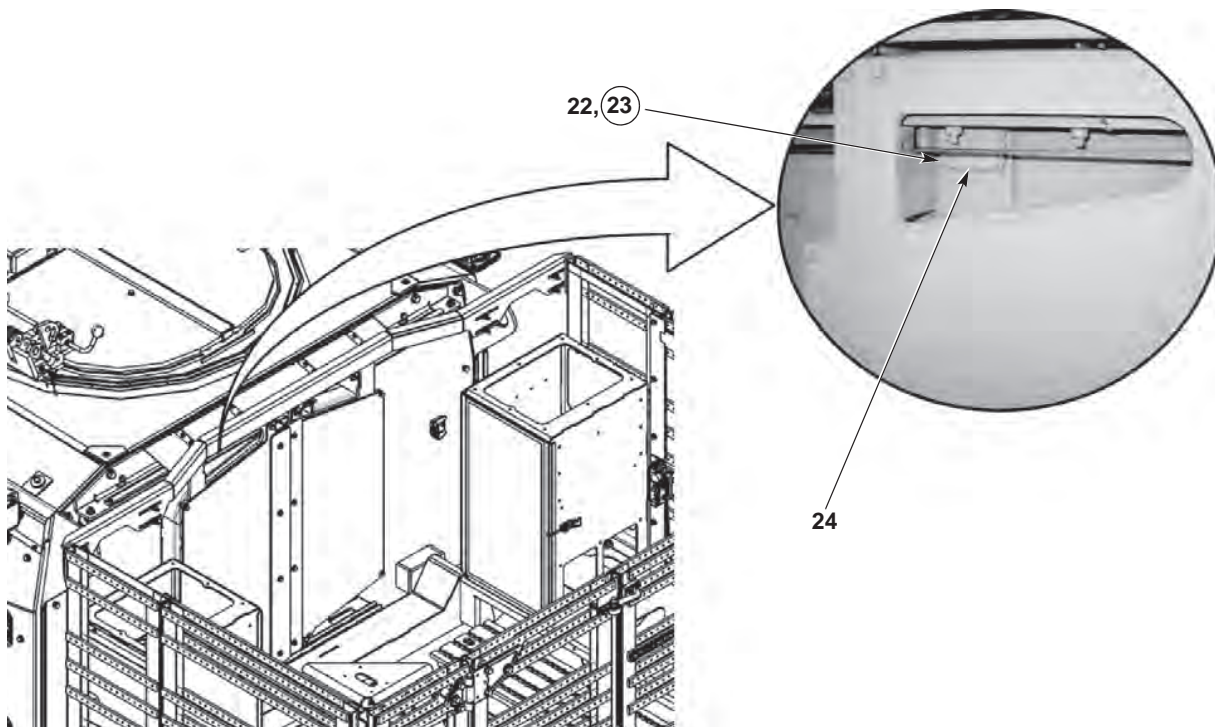
REMOVAL – CONTINUED

4. Remove four screws (12) and four locknuts (13) from driver and passenger side. Discard locknuts (13).
5. With aid of an assistant, support cargo deck cross member (11).
6. Remove two screws (14), two lockwashers (15) and two washers (16) from driver and passenger side. Discard lockwashers (15).
7. With aid of an assistant, remove cargo cross member (11).

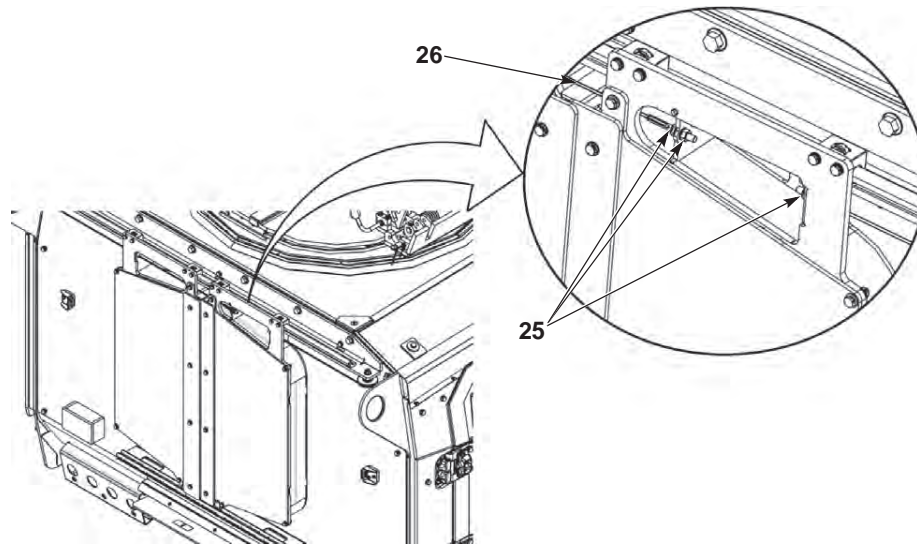
REMOVAL – CONTINUED



8. Remove eight screws (18), eight washers (19) and four clips (21).
9. Remove rain gutter (17).
10. Move wire harness (20) aside.

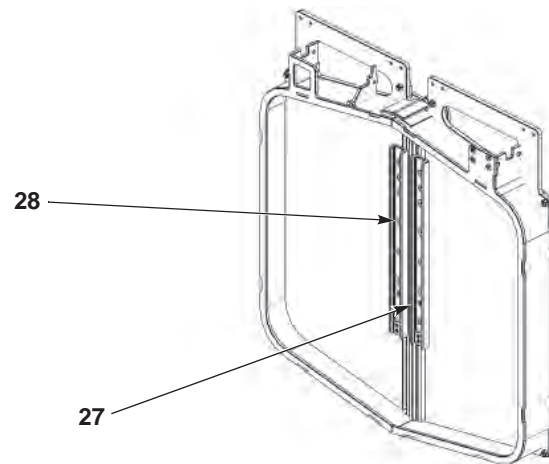


11. Remove four screws (22), lockwashers (23), and bracket (24). Discard lockwashers.

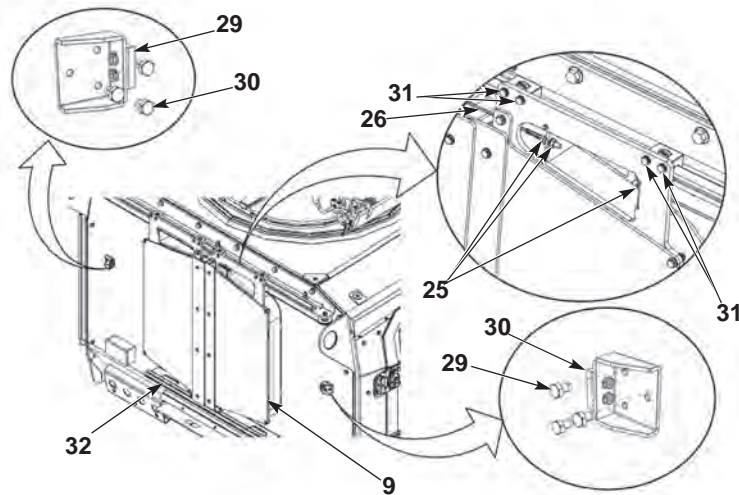
REMOVAL – CONTINUED**NOTE**

Note cable routing prior to removal.

12. Remove three nuts (25) and remove cable (26).



13. Remove eight screws (28) and door latch assembly tracks (27).

REMOVAL – CONTINUED**WARNING**

Capsule doors weigh 280 lbs (127 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.

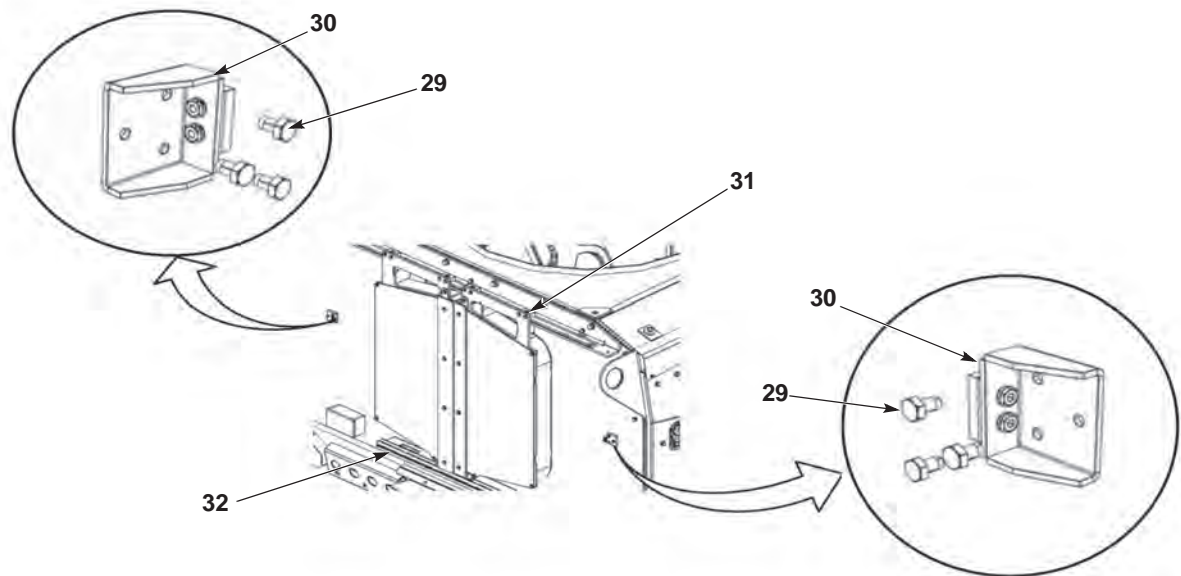
NOTE

- Perform steps 15, 16 and 17 if only replacing driver side capsule door.
- Perform steps 14, 18 and 19 if only replacing passenger side capsule door.

14. Remove three screws (29) and passenger side door bump stop (30).
15. Remove three screws (29) and driver side door bump stop (30).
16. Attach lifting strap to driver side capsule door.
17. With the aid of an assistant and lifting device, remove four screws (31) and slide driver side capsule door until lower slider disengages from lower slide rail (32).
18. Attach lifting strap to passenger side capsule door.
19. With the aid of an assistant and lifting device, remove four screws (31) and slide passenger side capsule door until lower slider disengages from lower slide rail (32).

END OF TASK

INSTALLATION

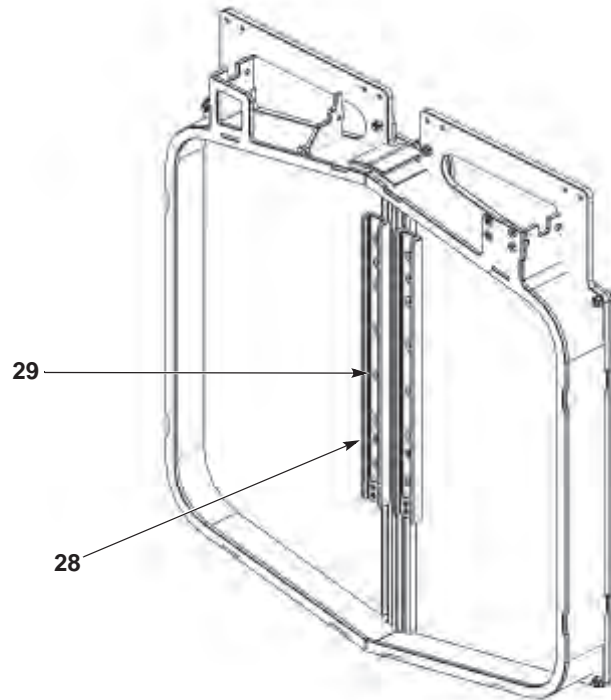


WARNING

- **Capsule doors weigh 280 lbs (127 kg). Do not attempt to lift or move capsule doors without the aid of an assistant and lifting device. Failure to comply may result in injury or death to personnel.**
- **Installing rear capsule door locking assembly allows the doors to move freely. Keep hands away from pinch point areas of the rear capsule door assembly, hands and fingers could get crushed or pinched. Failure to comply may result in injury to personnel.**

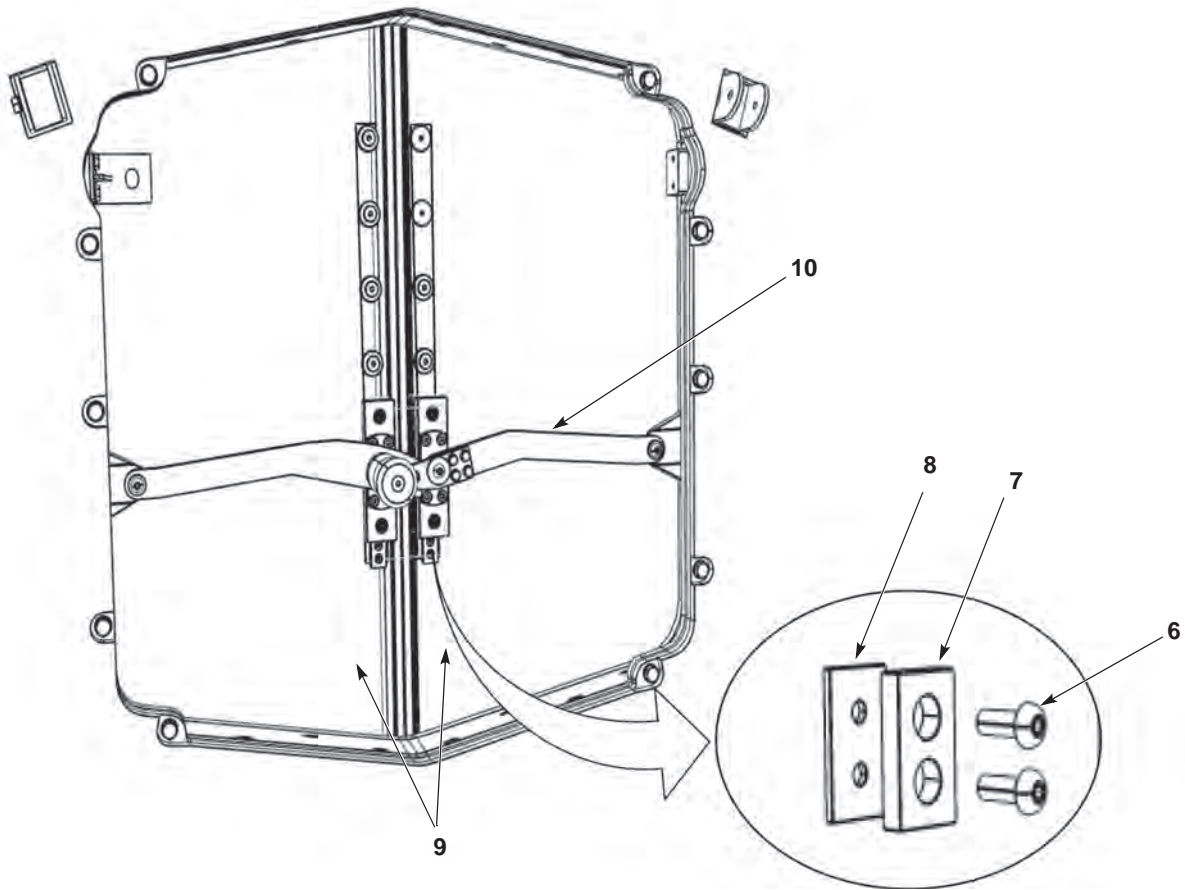
NOTE

- Perform steps 1, 2 and 3 if installing only passenger side capsule door.
 - Perform steps 4, 5 and 6 if installing only driver side capsule door.
1. Attach lifting strap to passenger side capsule door.
 2. With the aid of an assistant and lifting device, slide passenger side capsule door into rail (32) and install four screws (32).
 3. Install passenger side door bump stop (30) with three screws (29).
 4. Attach lifting strap to driver side capsule door.
 5. With the aid of an assistant and lifting device, slide driver side capsule door into rail (32) and install four screws (31).
 6. Install driver side door bump stop (30) with three screws (29).

INSTALLATION – CONTINUED

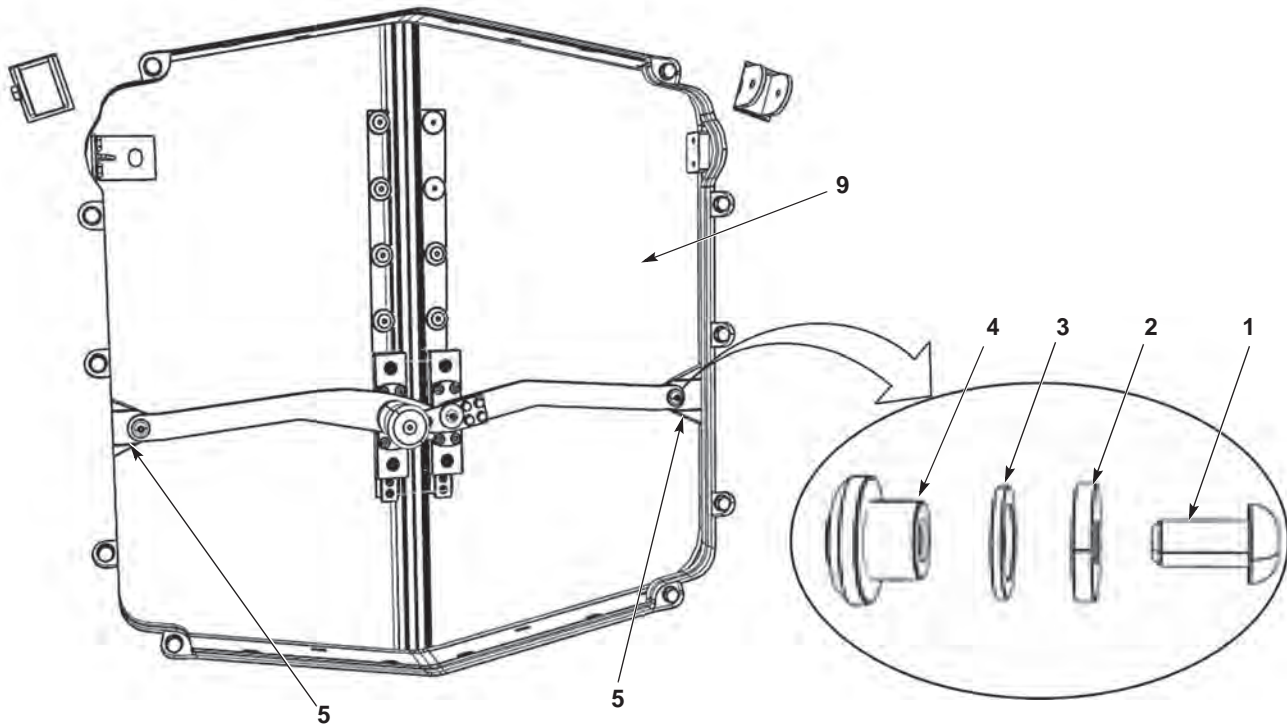
7. Install door latch assembly tracks (28) and eight screws (29).

INSTALLATION – CONTINUED

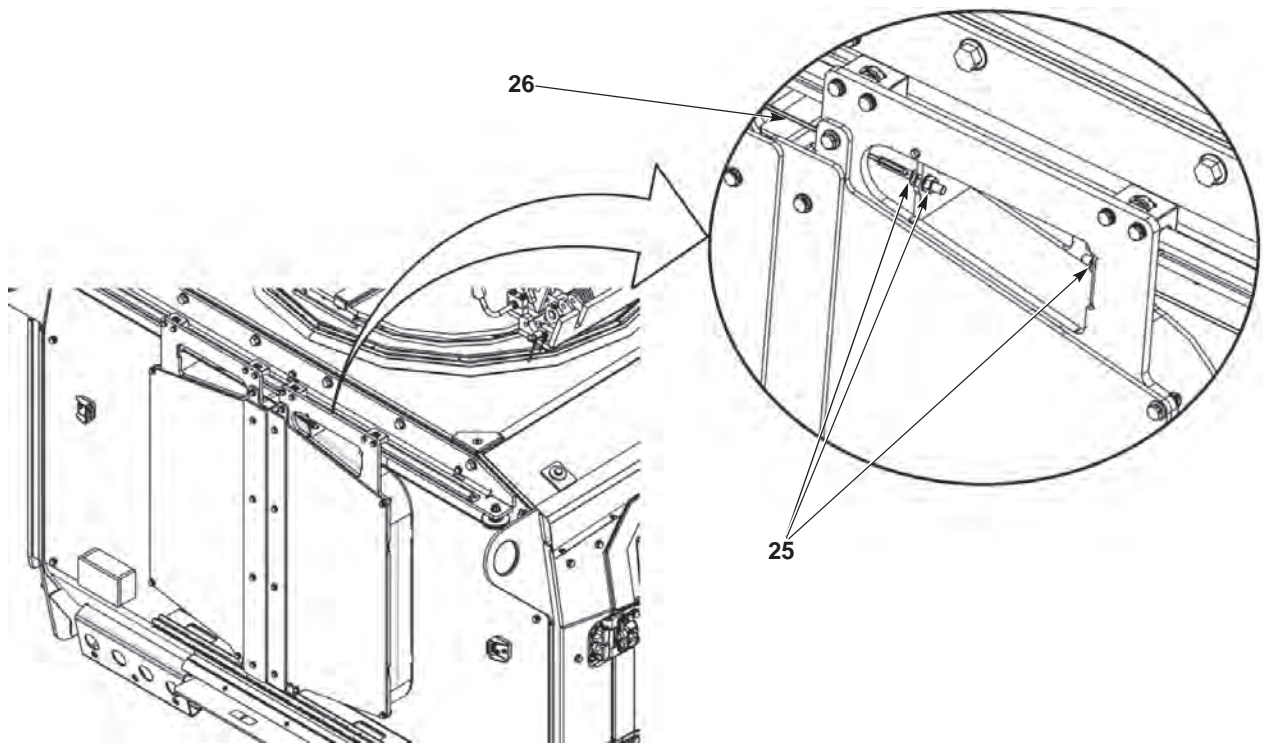


8. Slide door latch assembly (10) onto tracks (28).
9. Install backing plate (8), stop block (7), and two screws (6), onto both sides of rear capsule door.

INSTALLATION – CONTINUED

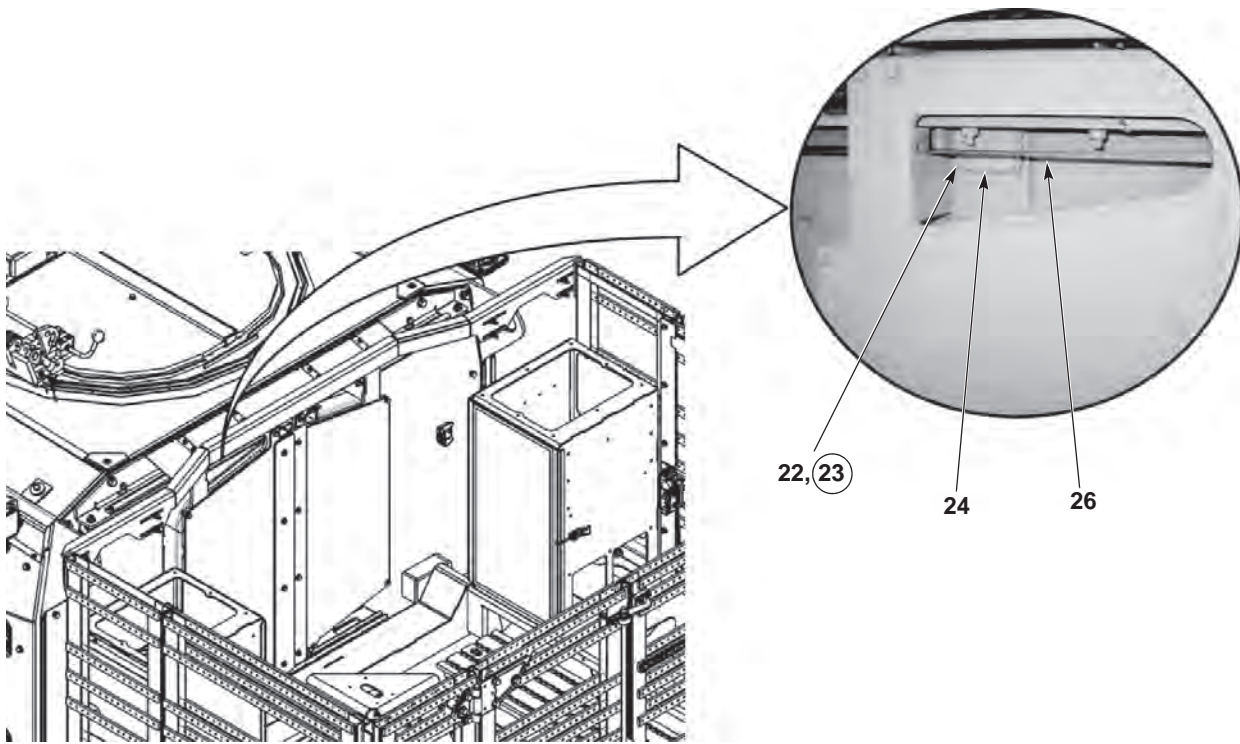


10. Install grommet (4), washer (3), nylon washer (2), and screw (1) onto each side of rear capsule door frame (5).
11. Close and latch capsule doors (9).

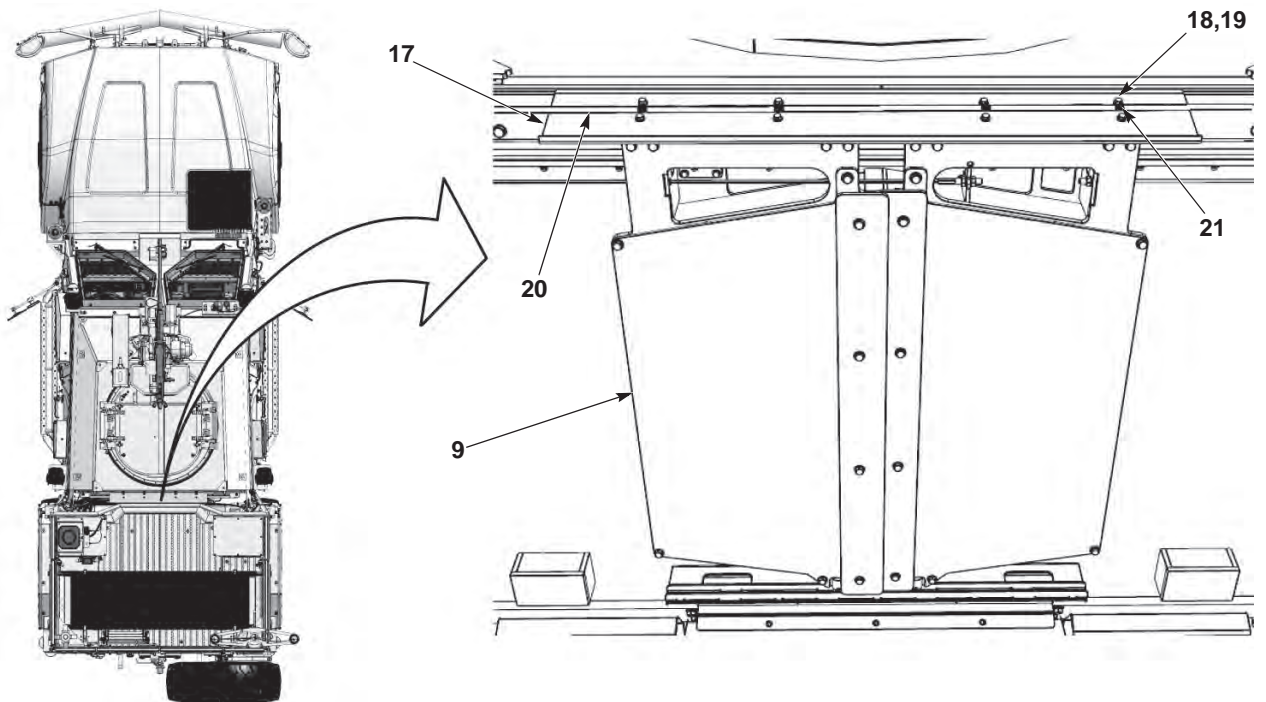
INSTALLATION – CONTINUED**NOTE**

Install cable as noted prior to removal.

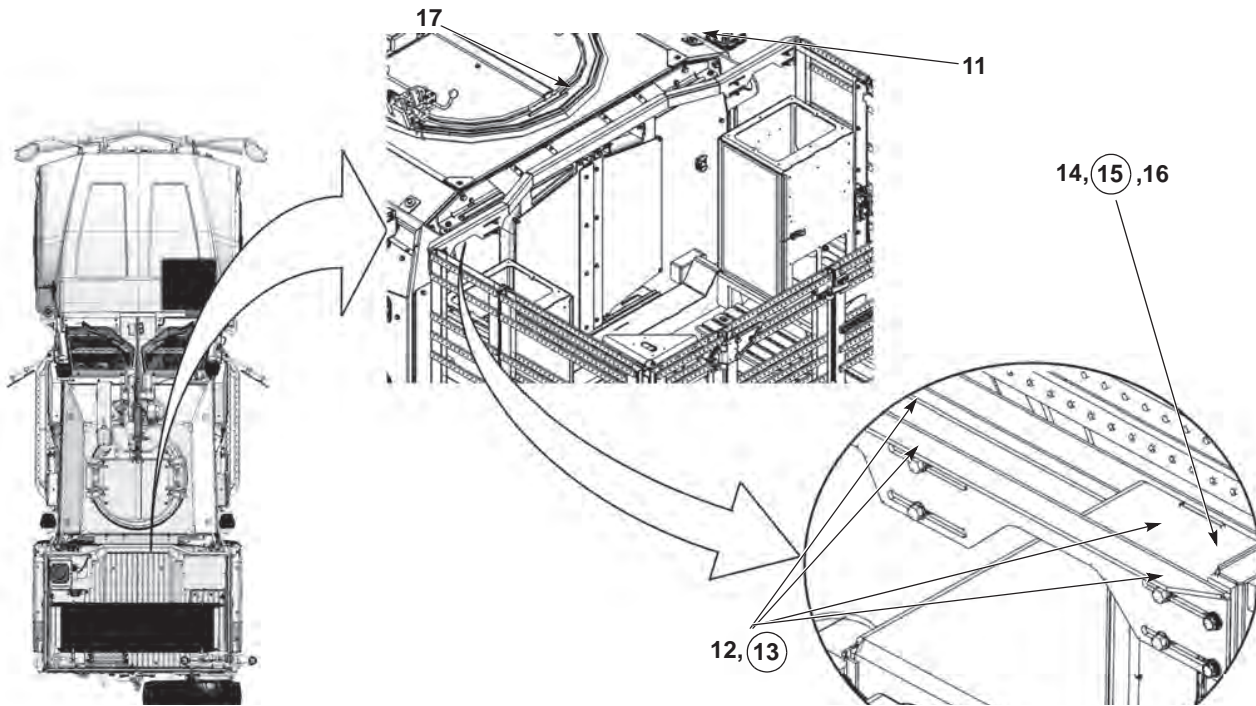
12. Install cable (26) in capsule doors. Tighten nuts (25) and adjust cable until slack has been removed.

INSTALLATION – CONTINUED

13. Position bracket (24) so cable (26) is between capsule door and bracket (24).
14. Apply Loctite threadlocker to screws (22).
15. Install new lockwashers (23) and screws (22).

INSTALLATION – CONTINUED

16. Route wire harness (20) through clips (21).
17. Install rain gutter (17) and clips (21), using eight washers (19) and eight screws (18).

INSTALLATION – CONTINUED

18. With the aid of an assistant, position cargo deck cross member (11) in front of GFE cabinets.
19. Install four screws (12) and four new locknuts (13) on driver side and passenger side.
20. Install two screws (14), new lockwashers (15), and washers (16) on driver side and passenger side.
21. Perform all Follow-On Maintenance Tasks.

END OF TASK**END OF WORK PACKAGE**

SEAT REPLACEMENT (M1240/M1245)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Materials/Parts

None

Personnel Required

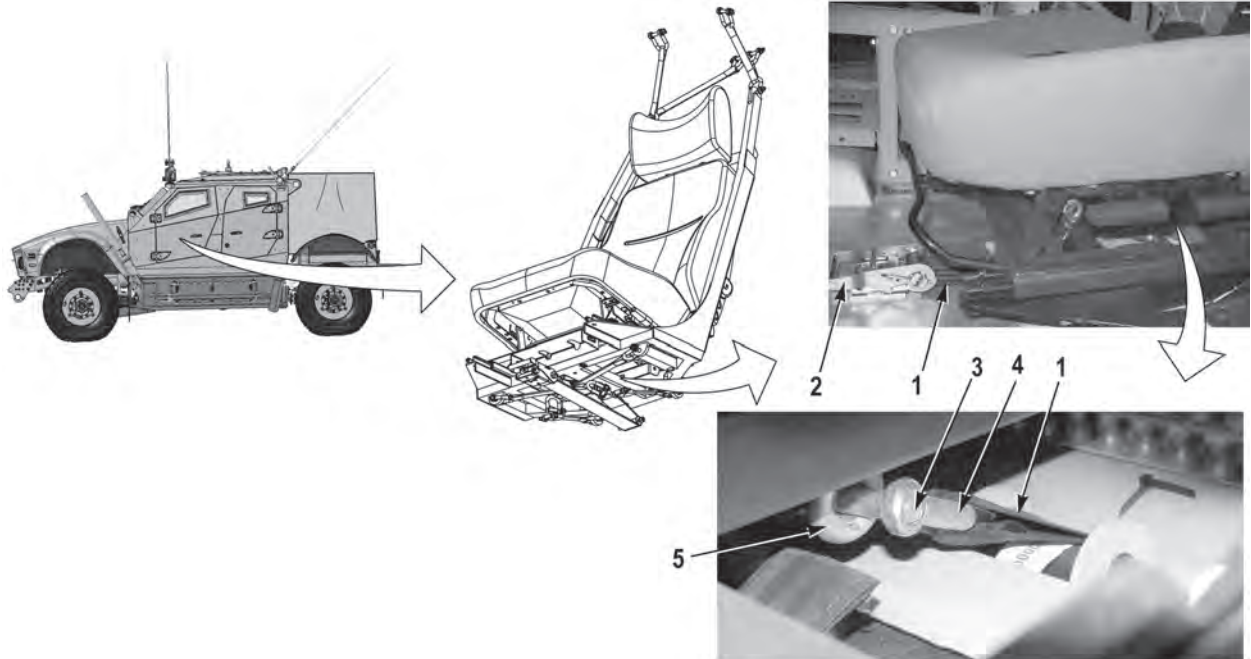
Two

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Follow-On Maintenance

Remove and stow wheel chocks

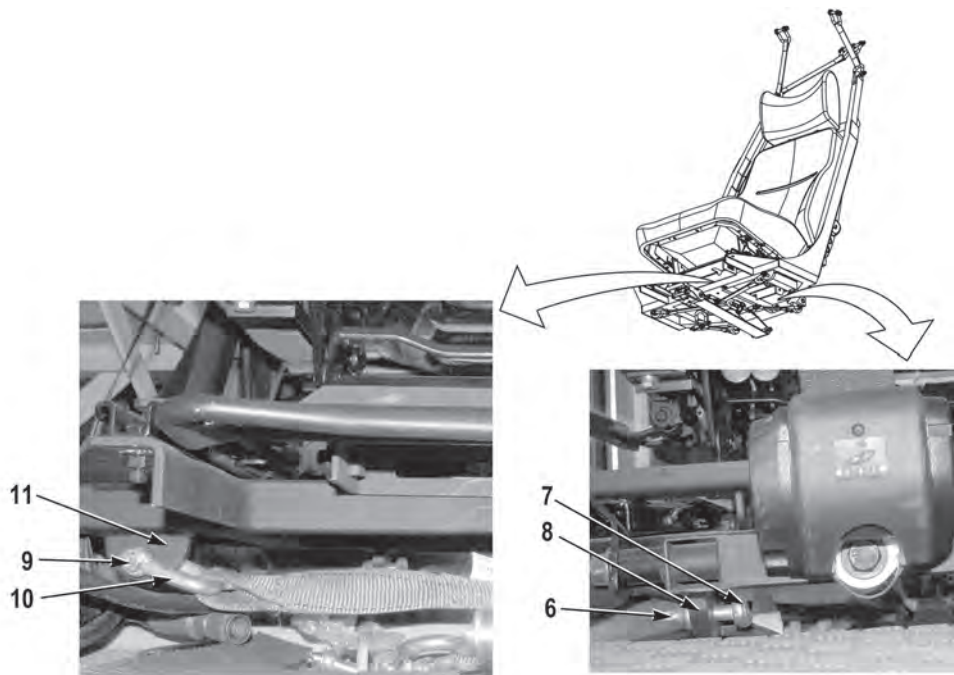
DRIVER SEAT REMOVAL

1. Loosen strap (1) with ratchet (2).

NOTE

Note position of straps prior to removal to ensure proper installation.

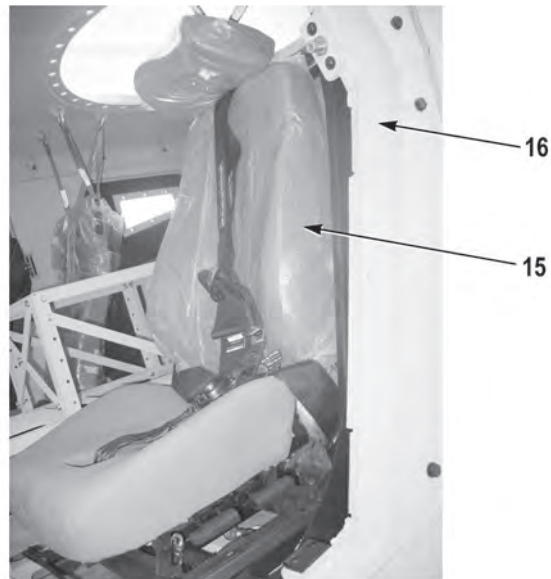
2. Remove pin (3), shackle (4), and strap (1) from anchor bracket (5).



3. Remove two pins (6) and shackles (7) from seat anchor brackets (8).
4. Remove two pins (9) and shackles (10) from seat anchor bracket (11).



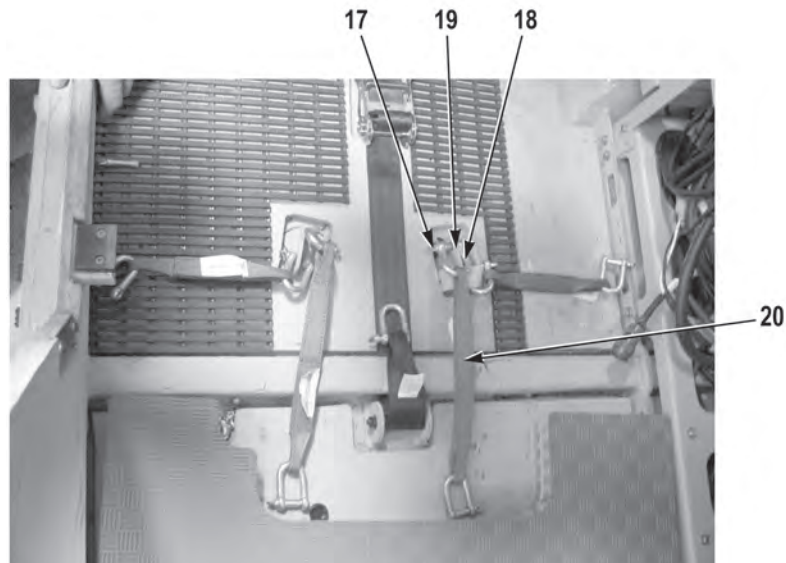
5. Remove two pins (12) and shackles (13) from seat brackets (14).



NOTE

Note position of seat prior to removal to ensure proper installation.

6. With the aid of an assistant, remove driver seat (15) from capsule (16).

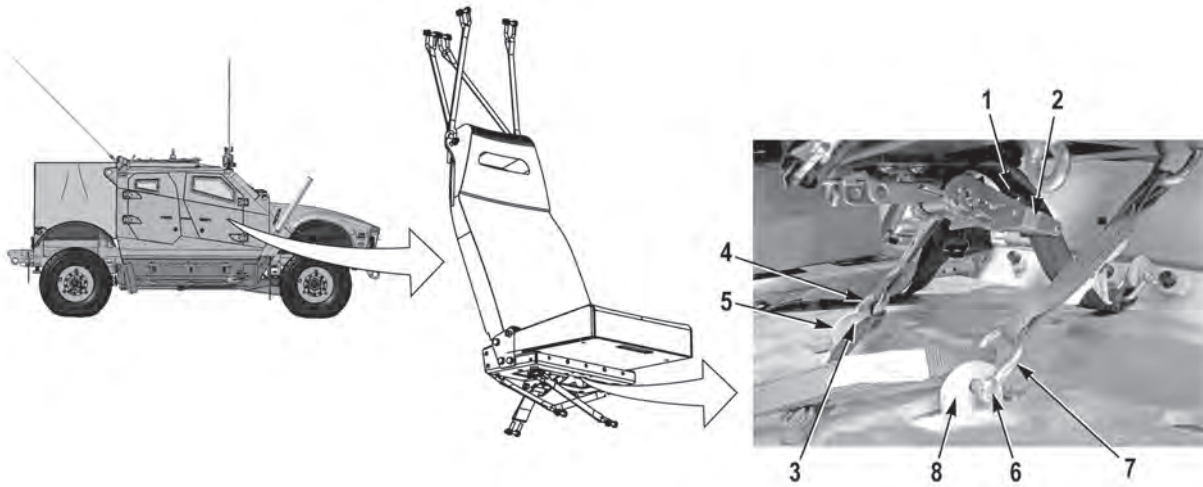


NOTE

- Perform Steps (7) and (8) if seat straps must be replaced.
- All seat straps are removed the same way. Bottom seat strap shown.

7. Remove pin (17) and shackle (18) from bracket (19).
8. Remove shackle (18) from strap (20).

END OF TASK

PASSENGER SEAT REMOVAL**NOTE**

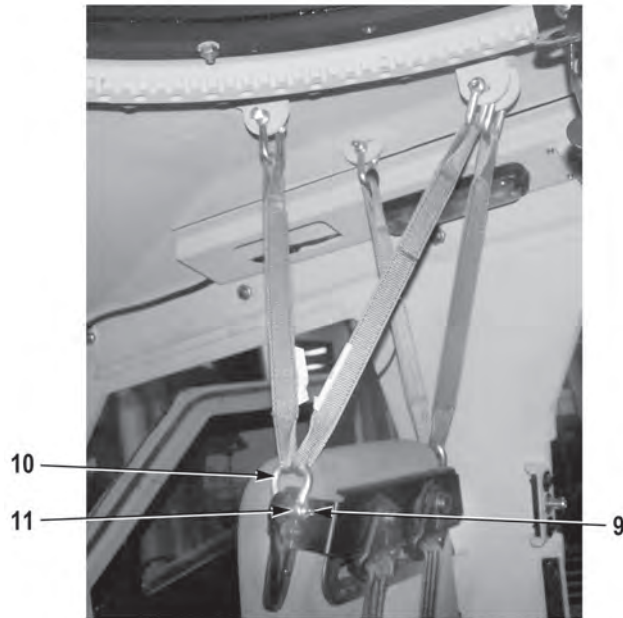
Note position of straps prior to removal to ensure proper installation.

1. Loosen strap (1) with ratchet (2).
2. Remove pin (3), shackle (4), and strap (1) from seat bracket (5).

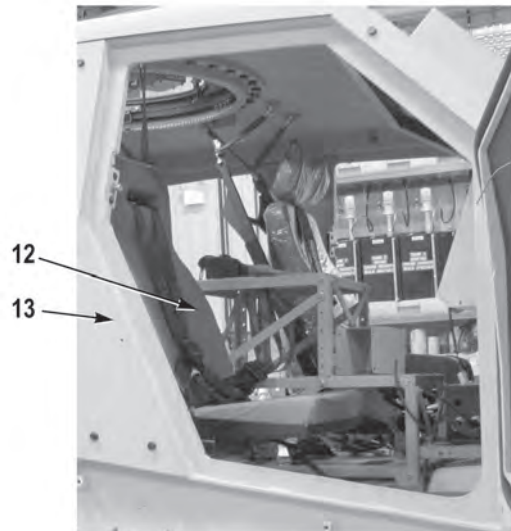
NOTE

Both sides of passenger rear seats are removed the same way. Passenger side shown.

3. Remove two pins (6) and shackles (7) from seat brackets (8).



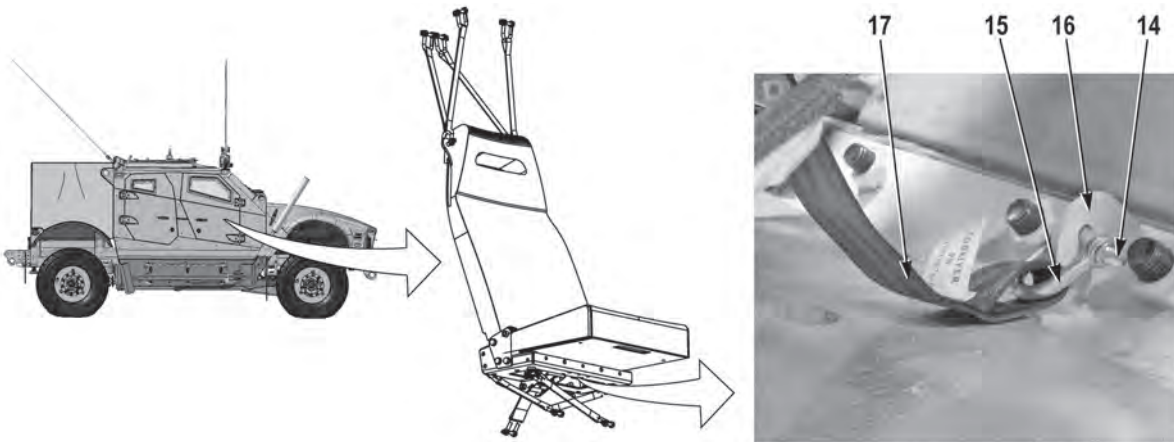
4. Remove two pins (9) and shackles (10) from seat brackets (11).



NOTE

Note position of seat prior to removal to ensure proper installation.

5. With the aid of an assistant, remove front passenger seat (12) from capsule (13).



NOTE

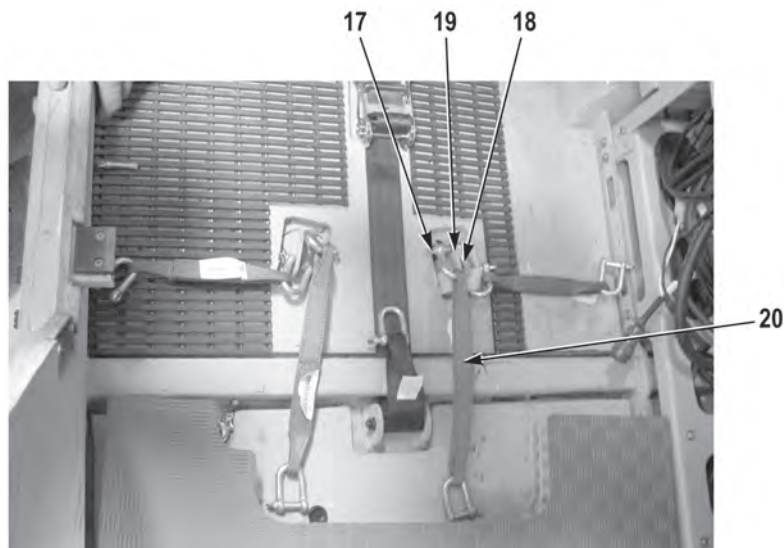
- Perform Steps (6) and (7) if seat straps must be replaced.
- All seat straps are removed the same way. Bottom seat strap shown.

6. Remove pin (14) and shackle (15) from bracket (16).

7. Remove shackle (15) from strap (17).

END OF TASK

DRIVERS SEAT INSTALLATION

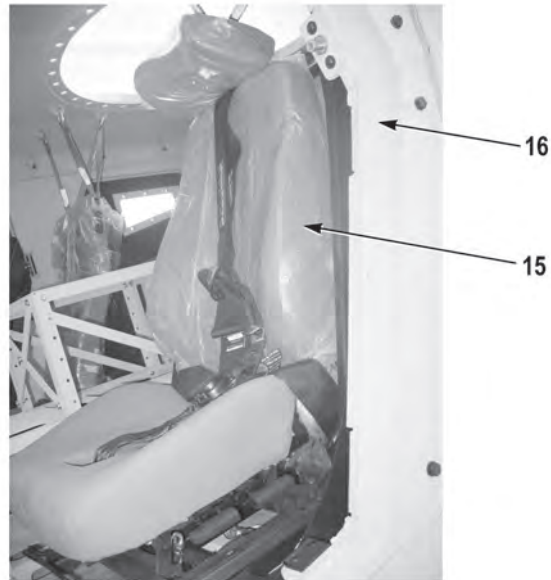


NOTE

- If seat straps were removed, perform Steps (1) and (2).
- All seat straps are installed the same way. Bottom seat strap shown.

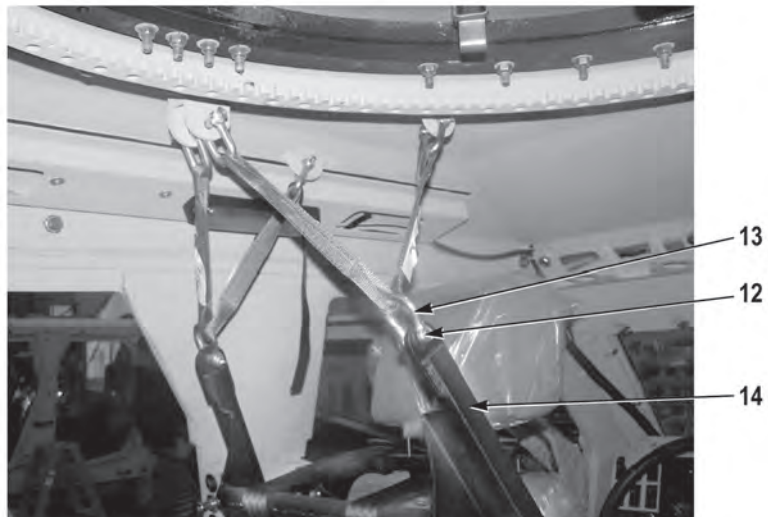
1. Install shackle (17) on strap (19).

2. Install shackle (17) on bracket (18) with pin (20)

**NOTE**

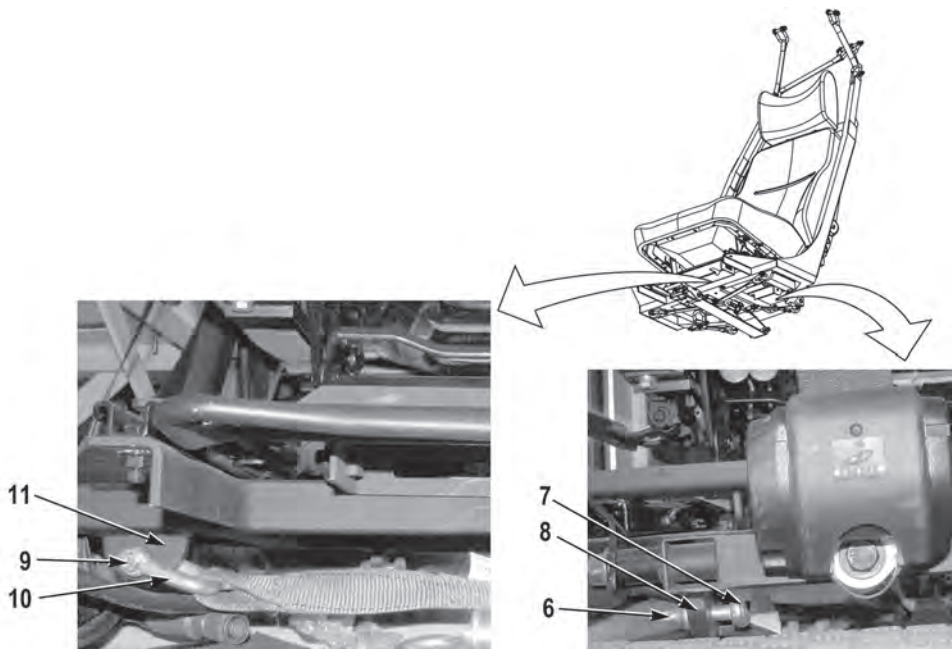
Install seat as noted prior to removal.

3. With the aid of an assistant, position driver seat (15) in capsule (16).

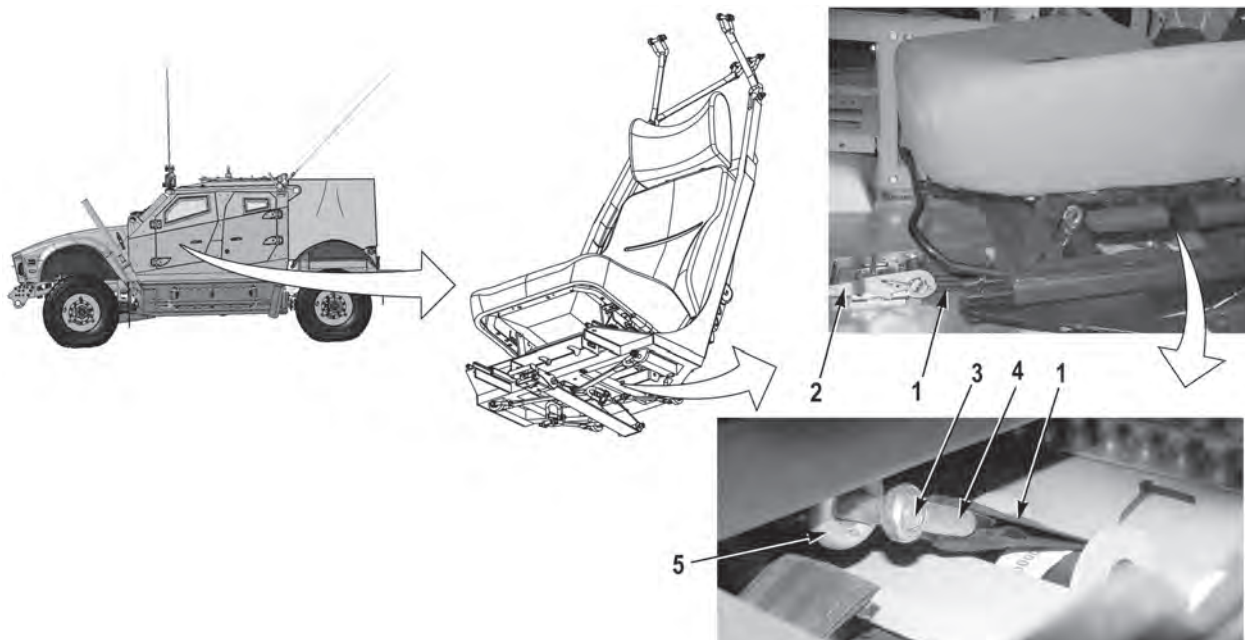
**NOTE**

Install straps as noted prior to removal.

4. Install two shackles (13) on seat brackets (14) with pins (12).



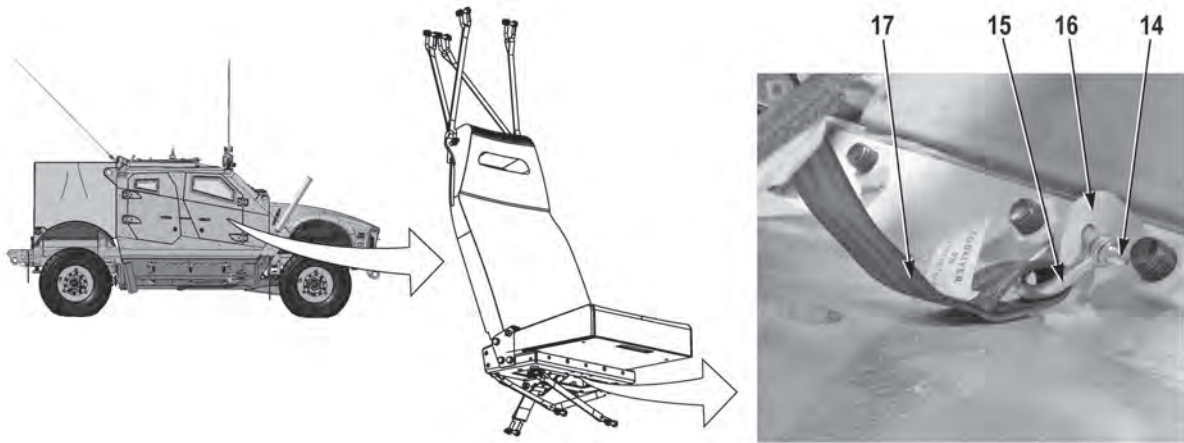
5. Install two shackles (11) on seat anchor bracket (10) with pins (9).
6. Install two shackles (8) on anchor brackets (7) with pins (6).



7. Install strap (1) on anchor bracket (5) with shackle (4) and pin (3).
8. Tighten strap (1) with ratchet (2).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

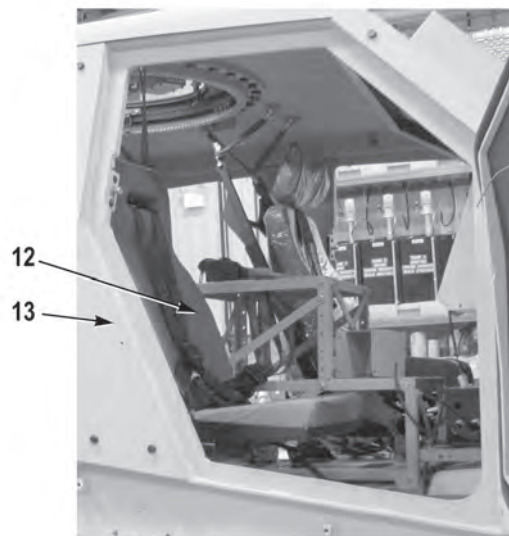
PASSENGER SEAT INSTALLATION



NOTE

- If straps were removed, perform Steps (1) and (2).
- All straps are installed the same way. Bottom strap shown.

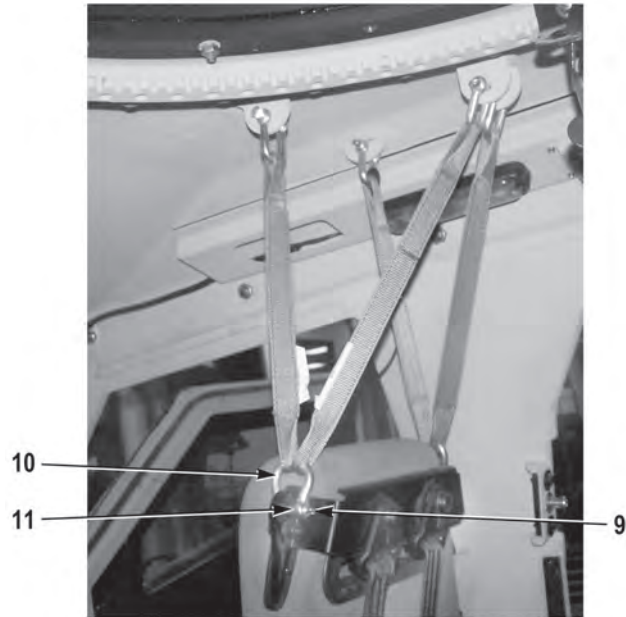
1. Install shackle (15) on strap (17).
2. Install shackle (15) on bracket (16) with pin (14).



NOTE

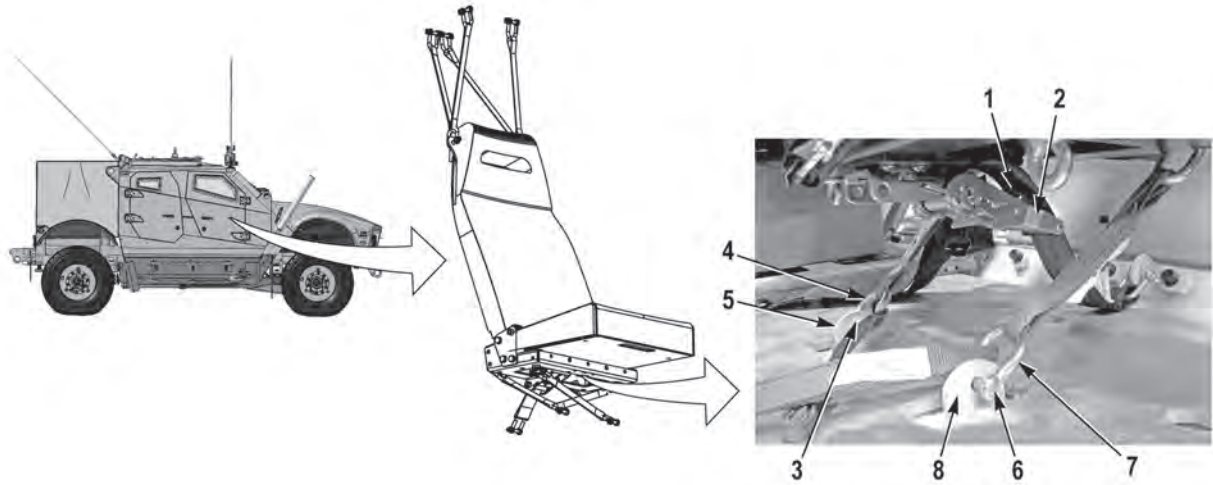
Install seat as noted prior to removal.

3. With the aid of an assistant, position front passenger seat (12) in capsule (13).

**NOTE**

Install straps as noted prior to removal.

4. Install two shackles (10) on seat brackets (11) with pins (9).



NOTE

Both sides of passenger seats are removed the same way. Passenger side of rear passenger seat shown.

5. Install two shackles (7) on seat brackets (8) with pins (6).
6. Install strap (1) on seat bracket (5) with shackle (4) and pin (3).
7. Tighten strap (1) with ratchet (2).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SEAT REPLACEMENT (M1240A1)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Floor mat(s) removed (as required) (WP 0152)
Rear wheel well deflector panel removed (if removing rear seat) (WP 0058)

Tools and Special Tools

Adapter 1/2 in. to 3/8 in.
Bar, Breaker, 3/4 in. Dr.
Bit, Hex, 10 mm, 3/8 in. Dr.
Crowfoot Attachment Socket Wrench
3/8 in. Dr., 13 mm
Lifting Device
Socket, 30 mm, 3/4 in. Dr.
Straps, Nylon, 60 in. (2)
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 50 to 250 ft-lb
Wrench, Torque, 75 ft-lb

Materials/Parts

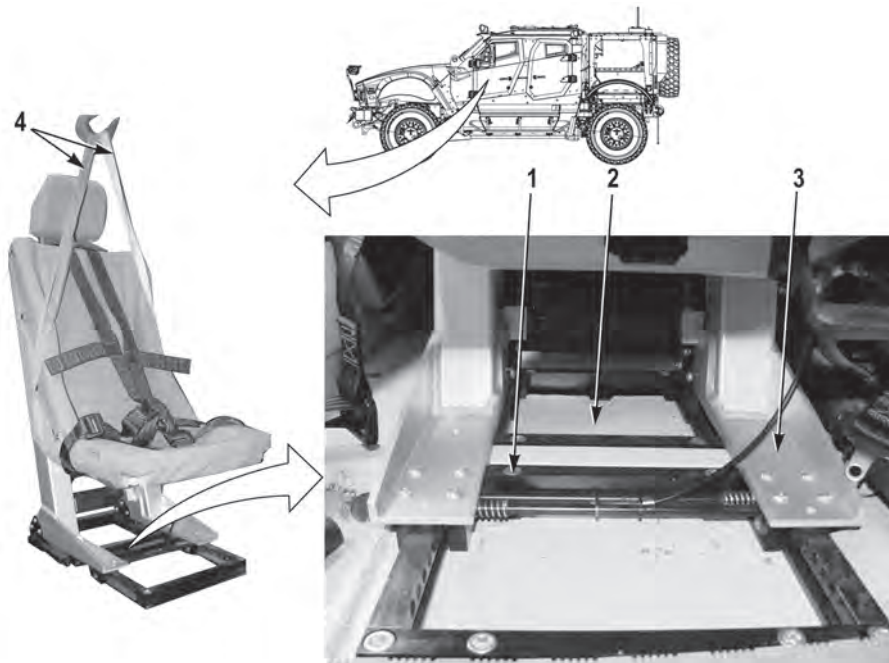
Locknut (2) (Item 10)
Locknut (Item 16)
Compound, Sealing, Loctite 242

Personnel Required

Two

Follow-On Maintenance

Install floor mat(s) (as required) (WP 0152)
Install rear wheel well deflector panel
(if removing rear seat) (WP 0058)
Remove and stow wheel chocks

FRONT SEAT REMOVAL**WARNING**

Front seat weighs 112 lbs (51 kg). Do not attempt to move seat without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

NOTE

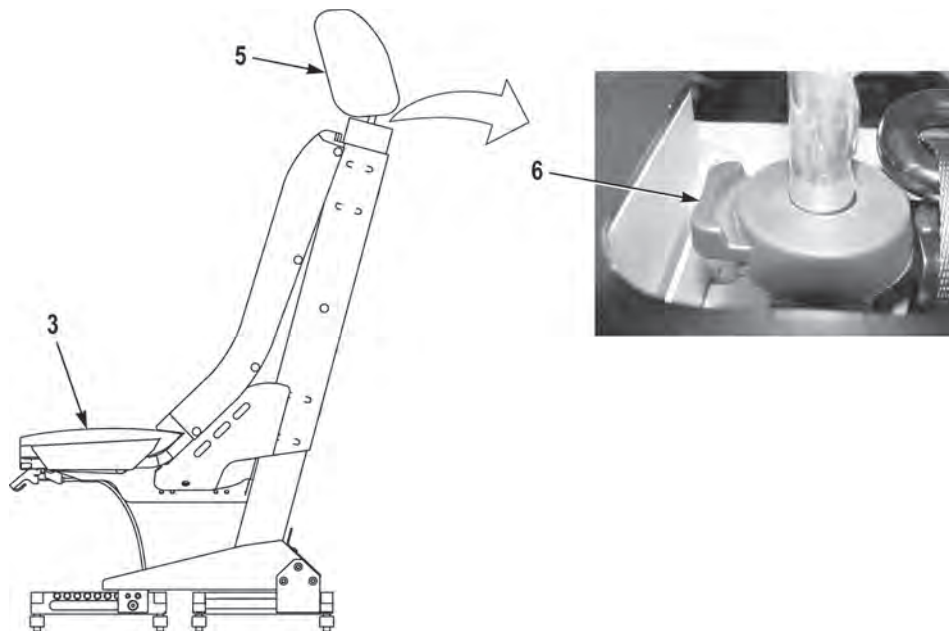
Driver side and passenger side front seats are removed the same way. Driver side shown.

1. Remove eight screws (1) from capsule floor (2) and front seat (3).

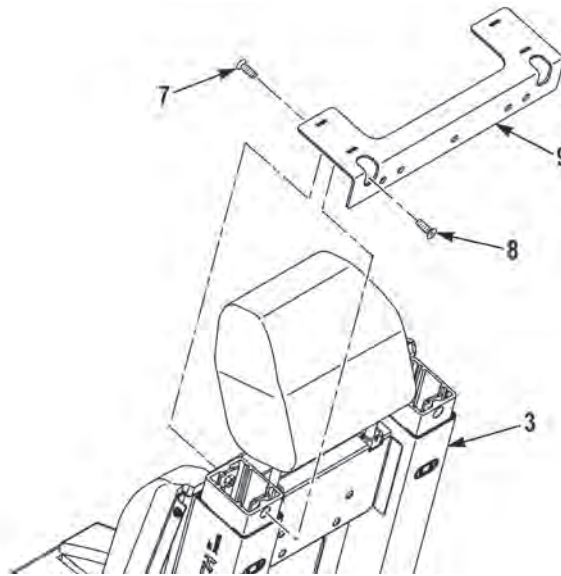
NOTE

- Some vehicles may have shim(s) between seat and capsule floor.
- If shim(s) are present, note location, quantity, and thickness of shim(s) upon removal to ensure proper re-installation of seat. Retain shim(s) for re-installation.
- Driver seat is removed from vehicle through driver side rear door.

2. With the aid of an assistant, lifting device, and two straps (4) remove front seat (3) from vehicle.

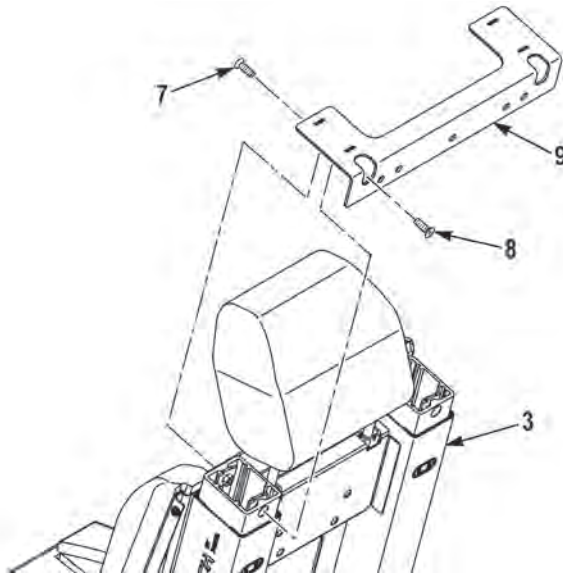


3. To remove headrest (5), push tab (6) and pull headrest (5) up from front seat (3).



4. Remove two screws (7), screws (8), and bracket (9) from front seat (3).

END OF TASK

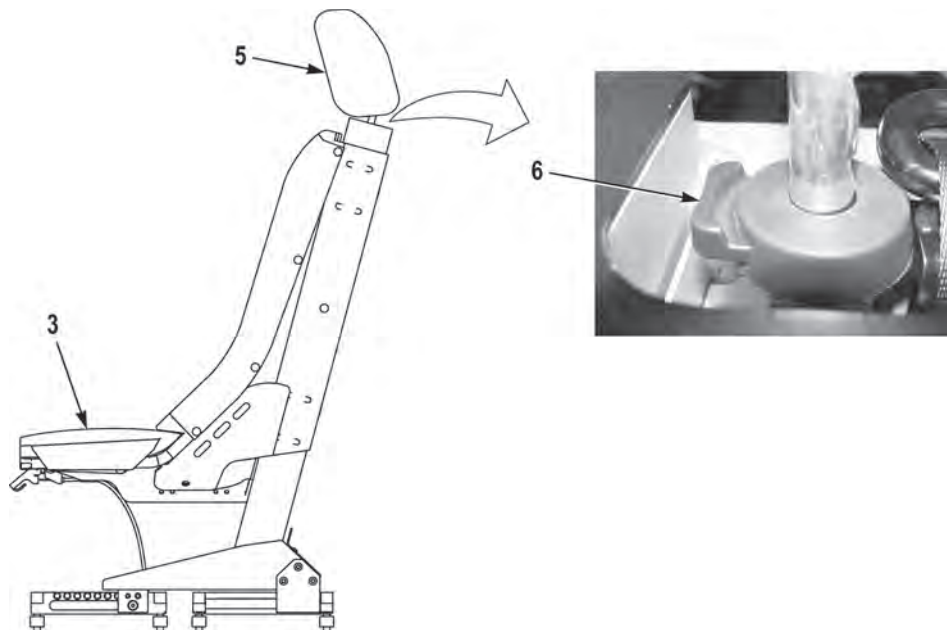
FRONT SEAT INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

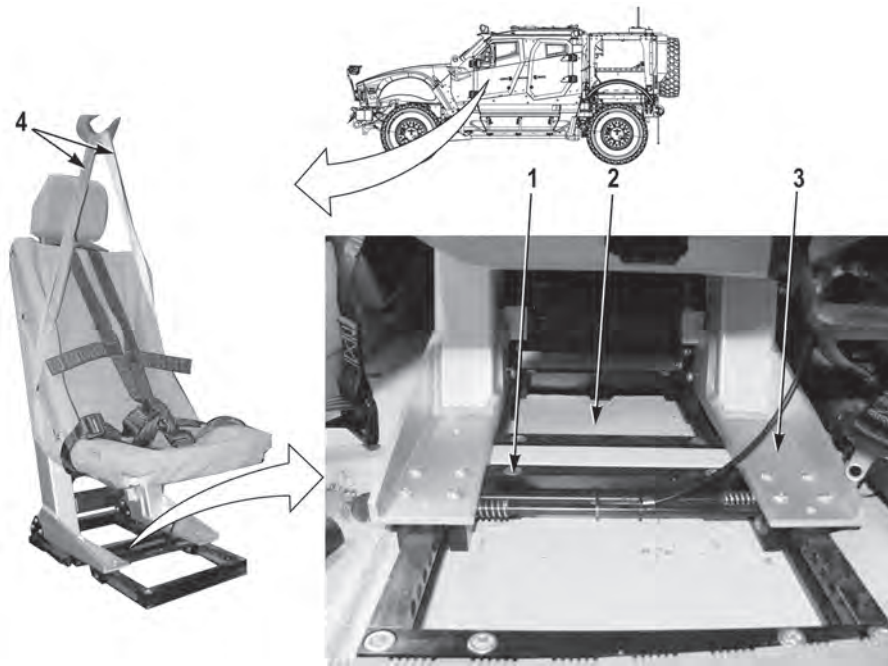
Driver side and passenger side front seats are installed the same way. Driver side shown.

1. Apply sealing compound, Loctite 242, to threads of two screws (8) and screws (7).
2. Install bracket (9) on front seat (3) with two screws (7) and screws (8). Tighten two screws (7) to 20 lb-ft (27 N•m).
3. Tighten two screws (8) to 20 lb-ft (27 N•m).

**WARNING**

Front seat weighs 112 lbs (51 kg). Do not attempt to move seat without the aid of an assistant and a suitable lifting device. Failure to comply may result in injury or death to personnel.

4. If removed, install headrest (5) on seat (3) and adjust as required.



NOTE

Driver side seat is positioned in vehicle through driver side rear door.

5. With the aid of an assistant, lifting device, and two straps (4) position front seat (3) on capsule floor (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

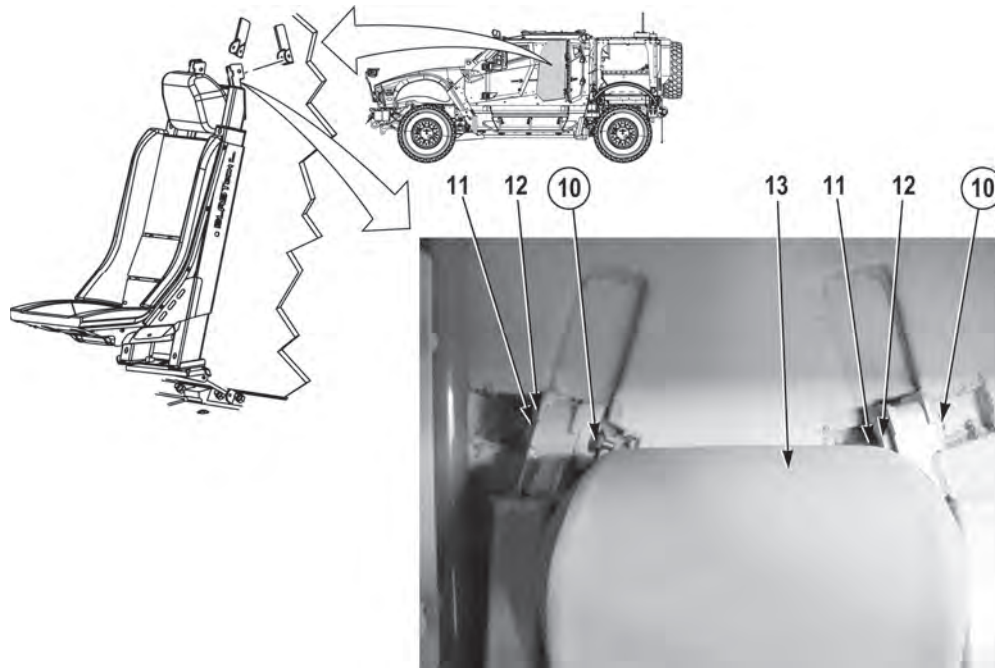
CAUTION

Use care when installing screws into threaded blocks for front seat. If a threaded block is loosened, removal of belly armor is required to properly secure the seat.

NOTE

- If shim(s) were previously present between seat and capsule floor, install shim(s) as was noted during removal.
 - Seat must be installed flat. If bottom frame is bent or twisted, seat may not operate properly.
 - Once seat is installed, check operation IAW TM 9-2355-335-10.
6. Apply sealing compound, Loctite 242, to eight screws (1), and install front seat (3) on capsule floor (2) with eight screws (1). Tighten screws to 82 lb-ft (111 N•m).

END OF TASK

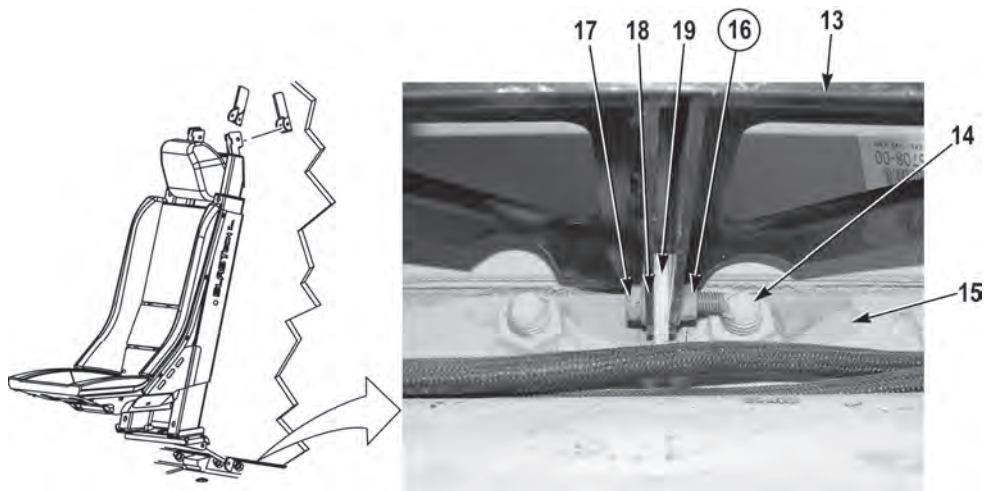
REAR SEAT REMOVAL**WARNING**

Once top screws are removed from rear seat mount, the seat will pivot forward. Do not sit in seat after screws are removed. Failure to comply may result in injury or death to personnel.

NOTE

Driver side and passenger side rear seats are removed the same way. Driver side shown.

1. Remove two locknuts (10) and screws (11) from hull brackets (12) and rear seat (13). Discard locknuts (10).
2. Pivot rear seat (13) forward.

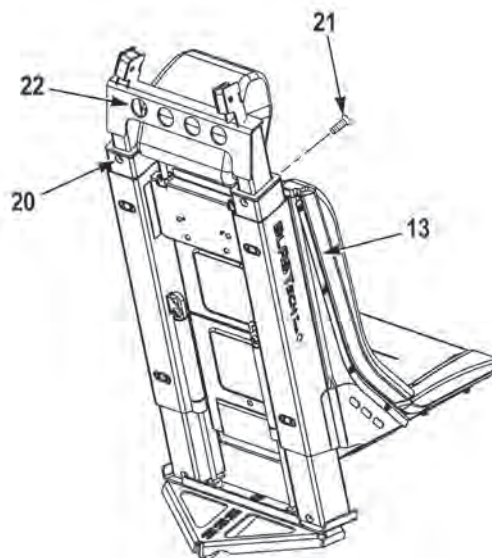


3. Remove two screws (14) from capsule (15).
4. Remove locknut (16) and screw (17) from lower seat mount (18) and hull bracket (19). Discard locknut (16).

WARNING

Rear seat weighs 83 lbs (38 kg). Do not attempt to move seat without the aid of an assistant and suitable lifting device. Failure to comply may result in injury or death to personnel.

5. With the aid of an assistant and suitable lifting device, remove rear seat (13) from vehicle.



6. Remove two screws (20), screws (21), and bracket (22) from rear seat (13).

END OF TASK

REAR SEAT INSTALLATION**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

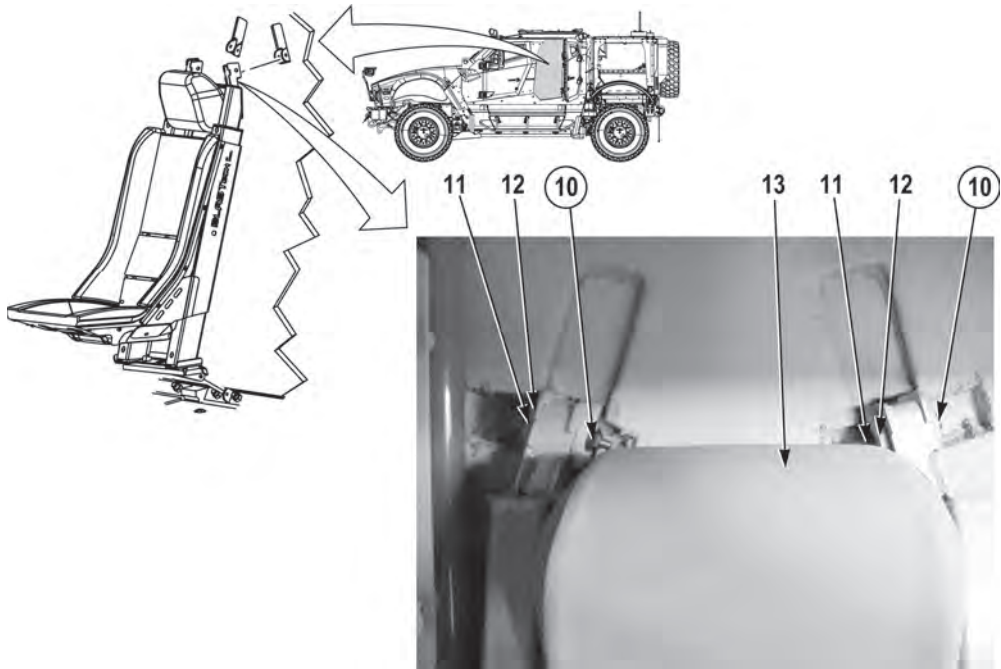
Driver side and passenger side rear seats are installed the same way. Driver side shown.

1. Apply sealing compound, Loctite 242, to threads of two screws (21) and screws (20).
2. Install bracket (22) on rear seat (13) with two screws (21) and screws (20). Tighten two screws (21) to 20 lb-ft (27 N•m).
3. Tighten two screws (20) to 20 lb-ft (27 N•m).

WARNING

Rear seat weighs 83 lbs (38 kg). Do not attempt to move seat without the aid of an assistant and suitable lifting device. Failure to comply may result in injury or death to personnel.

4. With the aid of an assistant and suitable lifting device, position rear seat (13) on capsule floor.
5. Install lower seat mount (18) on hull bracket (19) with screw (17) and new locknut (16). Tighten locknut (16) to 40 lb-ft (27 N•m).
6. Install two screws (14) on capsule (15).
7. Pivot rear seat (13) back.



8. Install rear seat (13) on two hull brackets (12) with screws (11) and new locknuts (10). Tighten locknuts (10) to 20 lb-ft (54 N•m).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SEATBELT REPLACEMENT, DRIVER (M1240/M1245)

Preconditions

Park vehicle
Engine OFF
Wheels chocked

Tools and Special Tools

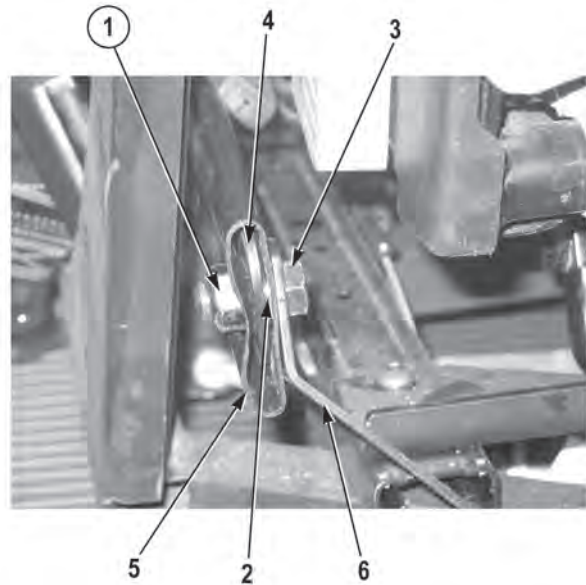
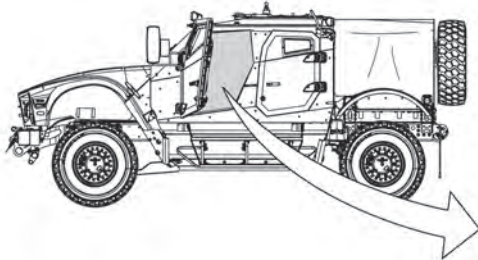
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 75 ft-lb

Materials/Parts

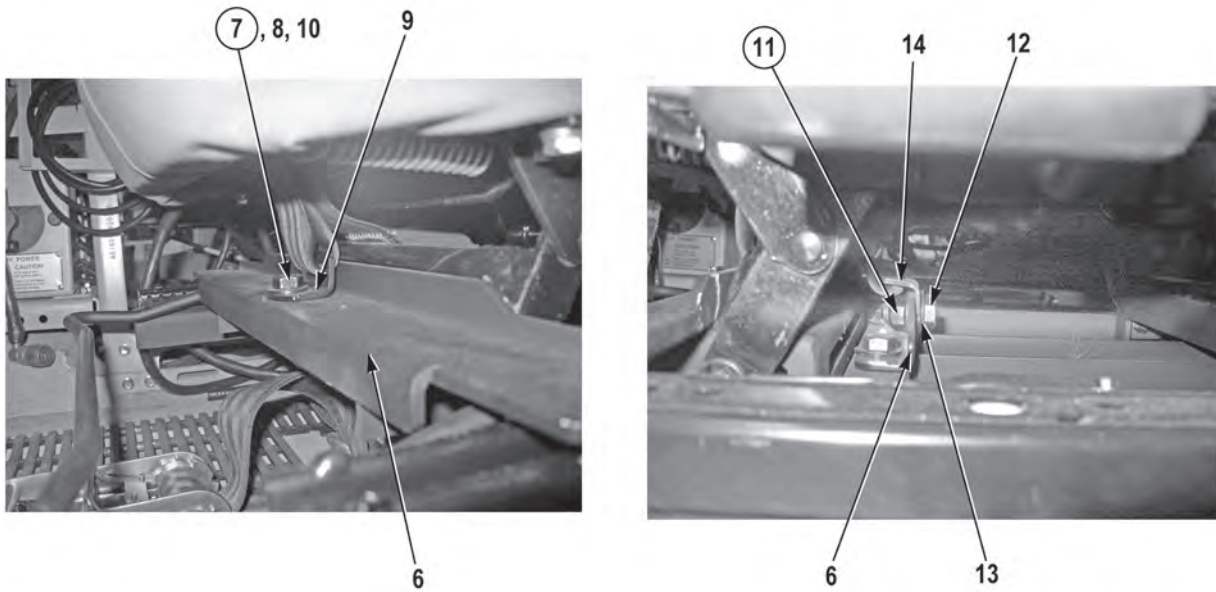
Locknut (2) (Item 1)
Locknut (Item 7)
Locknut (Item 11)
Locknut (2) (Item 16)
Self Tapping Screws (3) (Item 22)

Follow-On Maintenance

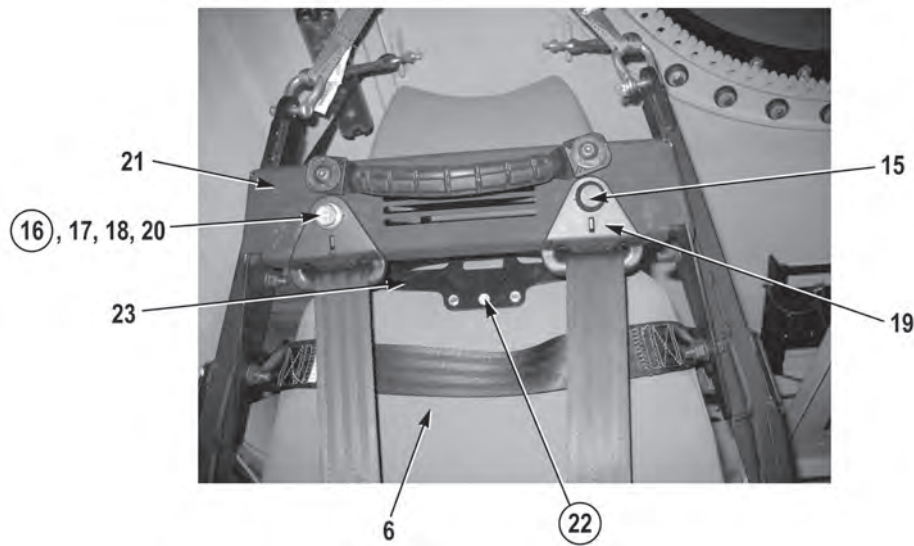
Remove and stow wheel chocks

REMOVAL

1. Remove locknut (1), washer (2), screw (3), seatbelt (4), and plastic sheath (5) from seat assembly (6). Discard locknut (1).
2. Repeat Step (1) for bottom right seatbelt.



3. Remove locknut (7), screw (8), seatbelt (9), and washer (10) from seat assembly (6). Discard locknut (7).
4. Remove locknut (11), screw (12), washer (13), and seatbelt (14) from seat assembly (6). Discard locknut (11).



NOTE

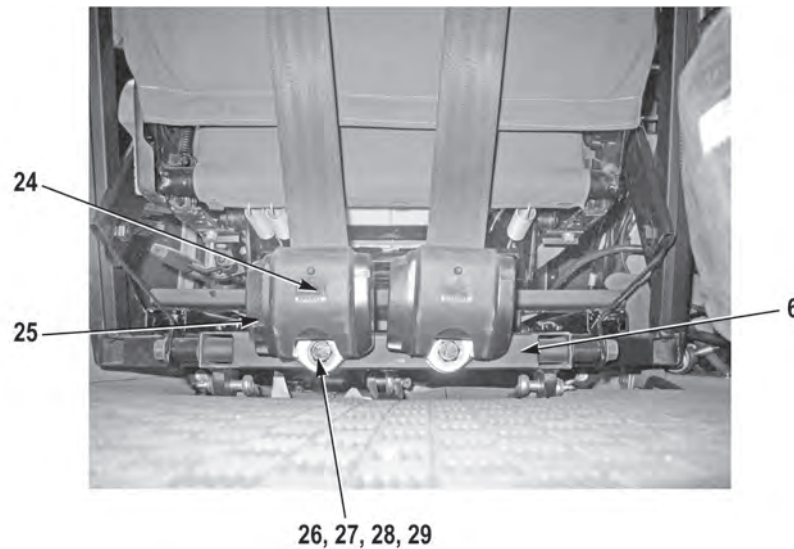
Top left and top right seatbelts removed together.

5. Remove two rubber screw caps (15) from screws (17).

CAUTION

Clamp belt above retractor prior to removal to prevent belt from retracting completely. Failure to comply may result in damage to equipment.

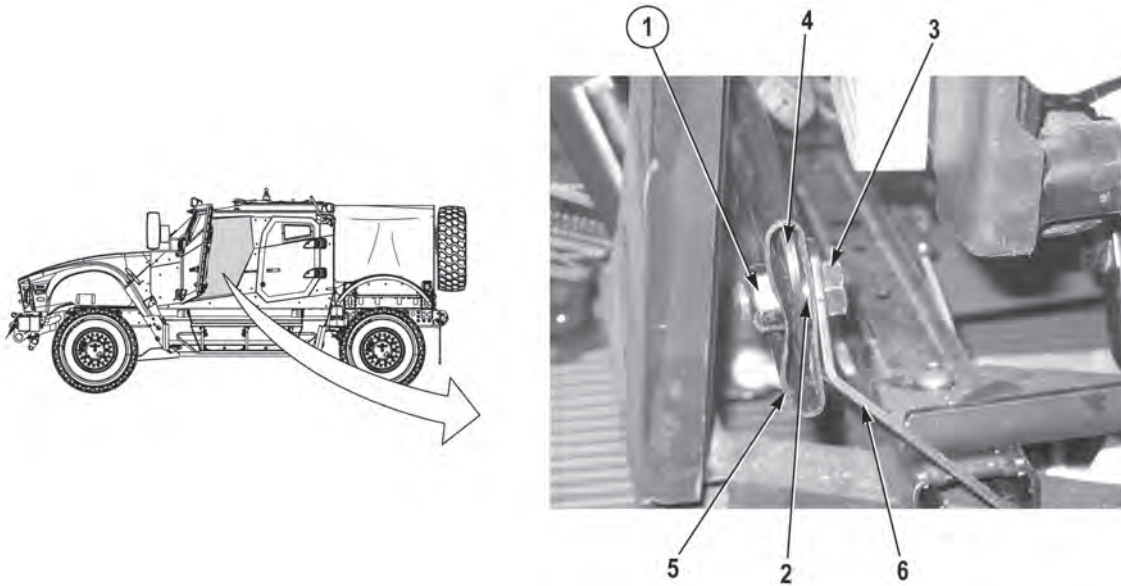
6. Remove two locknuts (16), screws (17), washers (18), seatbelt guides (19), and washers (20) from seat support (21). Discard locknuts (16).
7. Remove three self tapping screws (22) and seatbelt alignment bracket (23) from seat assembly (6). Discard self tapping screws (22).



8. Remove two seatbelt retractor covers (24) from seatbelt retractors (25).
9. Remove two screws (26), washers (27), seatbelt retractors (25), spacers (28), and washers (29) from seat assembly (6).

END OF TASK**INSTALLATION**

1. Install both seatbelt retractors (24) to seat assembly (6) with two washers (29), spacers (28), washers (27), and screws (26). Tighten to 35 lb-ft (47 N•m).
2. Install both seatbelt retractor covers (24) on seatbelt retractors (25).
3. Install seatbelt alignment bracket (23) to seat assembly (6) with three new self tapping screws (22).
4. Install seatbelt guides (19) on seat support (21) with two washers (20), washers (18), screws (17), and new locknuts (16). Tighten to 35 lb-ft (47 N•m).
5. Install two rubber screw caps (15) on screws (17).
6. Install seatbelt (14) on seat assembly (6) with washer (13), screw (12), and new locknut (11). Tighten to 35 lb-ft (47 N•m).
7. Install seatbelt (9) on seat assembly (6) with washer (10), screw (8), and locknut (7). Tighten to 35 lb-ft (47 N•m).



8. Install seatbelt (4) and plastic sheath (5) on seat assembly (6) with screw (3), washer (2), and new locknut (1). Tighten to 35 lb-ft (47 N•m).
9. Repeat Step (8) for bottom right seatbelt.
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SEATBELT REPLACEMENT, PASSENGER (M1240/M1245)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked

Tools and Special Tools

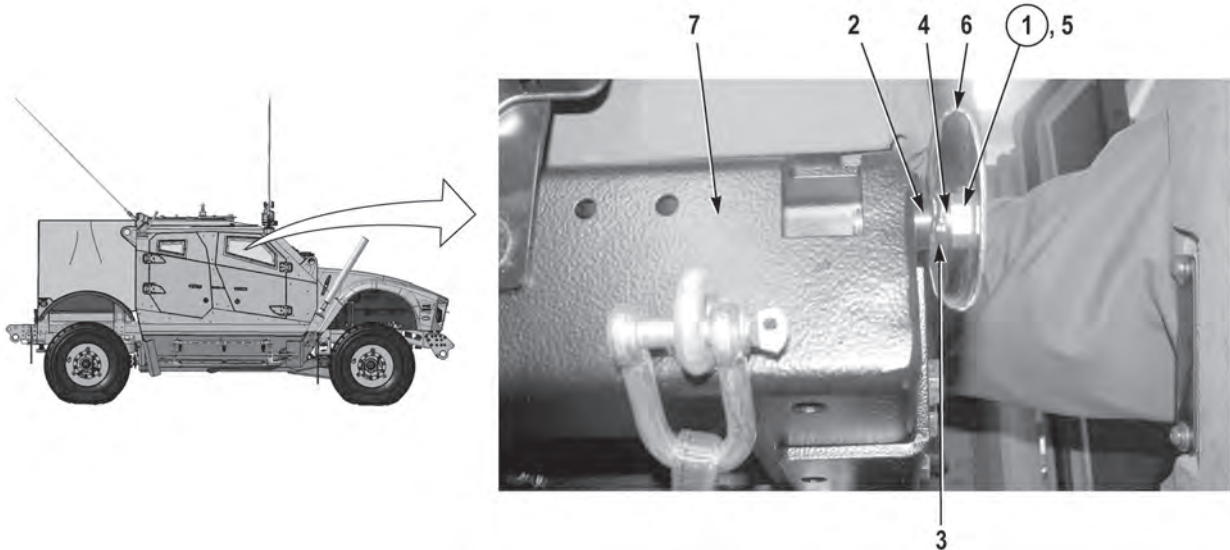
Tool Kit, General Mechanic's: Automotive
 Wrench, Torque, 75 ft-lb

Materials/Parts

Locknut (2) (Item 1)
 Locknut ((Item 11)
 Locknut (2) (Item 16)
 Locknut (2) (Item 18)
 Locknut (2) (Item 23)

Follow-On Maintenance

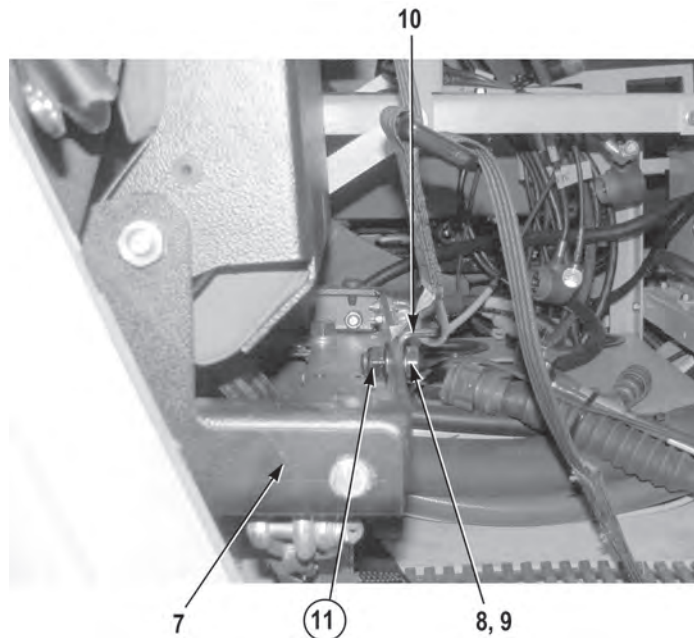
Remove and stow wheel chocks

REMOVAL**CAUTION**

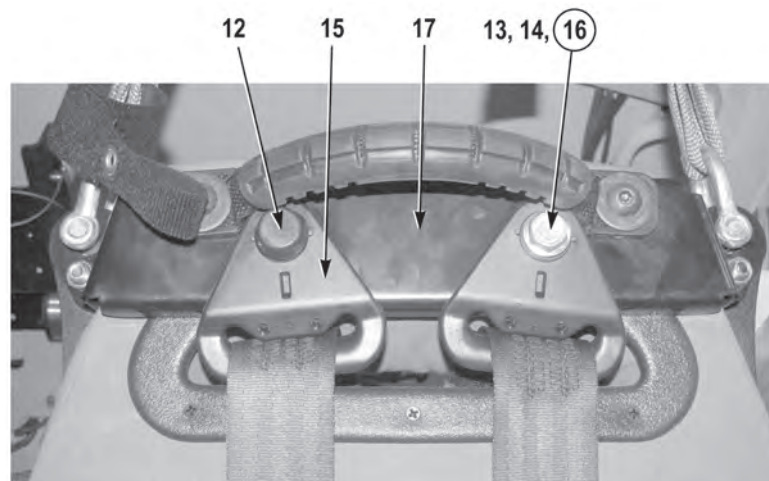
Clamp belt above retractor prior to removal to prevent belt from retracting completely. Failure to comply may result in damage to equipment.

NOTE

- If removing bottom left or bottom right seatbelts, perform Step (1).
 - If removing bottom center seatbelt, perform Step (2).
 - If removing top left and top right seatbelts from back of seat, perform Steps (3) and (4).
 - If removing both seatbelts from back of seat, perform Steps (5) through (7).
1. Remove locknut (1), spacer (2), seatbelt (3), washer (4), screw (5), and plastic sheath (6) from seat assembly (7). Discard locknut (1).



2. Remove screw (8), washer (9), seatbelt (10) and locknut (11) from seat assembly (7). Discard locknut (11).



NOTE

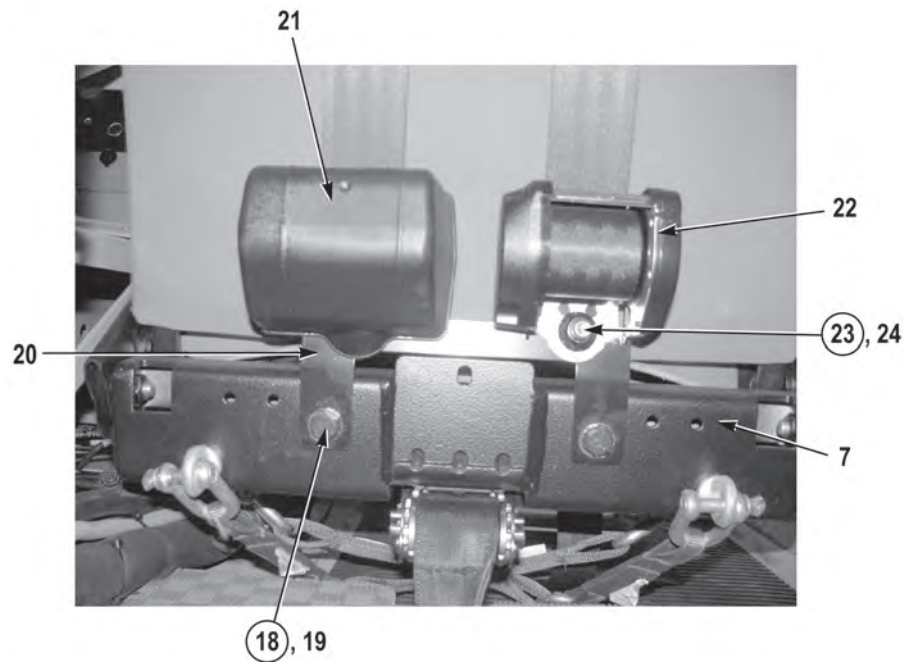
Top left and top right seatbelts removed together.

3. Remove two rubber screw caps (12) from screws (13).

CAUTION

Clamp belt above retractor prior to removal to prevent belt from retracting completely. Failure to comply may result in damage to equipment.

4. Remove two screws (13), washers (14), seatbelt guides (15), and locknuts (16) from seat support (17). Discard locknuts (16).



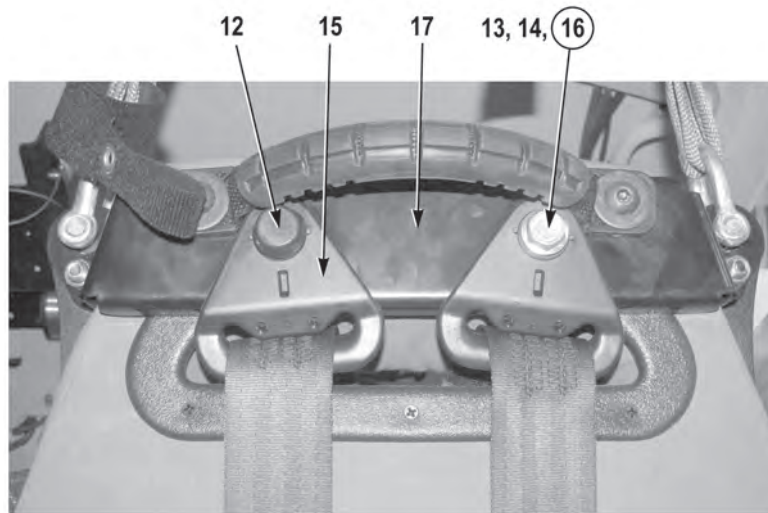
5. Remove two locknuts (18), screws (19), and seat assembly bracket (20) from seat assembly (7). Discard locknuts (18).
6. Remove two seatbelt retractor covers (21) from both seatbelt retractors (22).
7. Remove two locknuts (23), screws (24), and retractors (22) and from seat assembly bracket (20). Discard locknuts (23).

END OF TASK

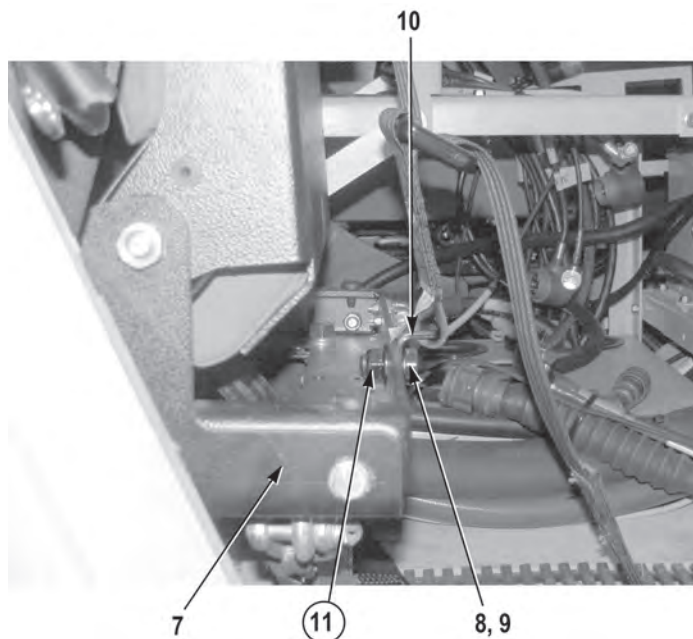
INSTALLATION

NOTE

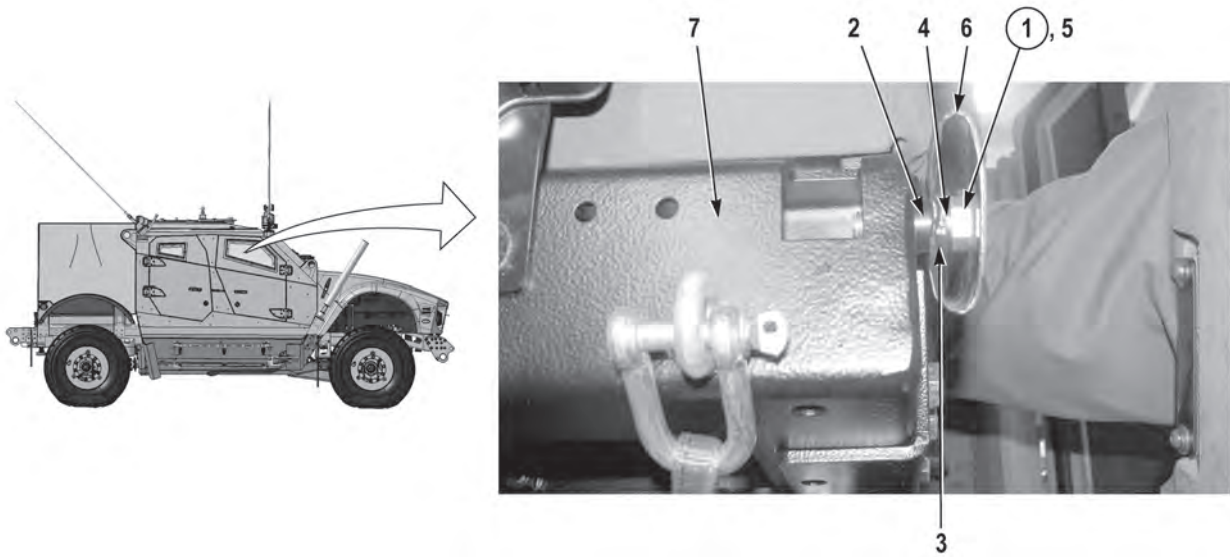
- If installing bottom seatbelts on back of seat, preform Steps (1) through (3).
 - If installing top left and top right seatbelts from back of seat, perform Steps (4) and (5).
 - If installing bottom center seatbelt, perform Step (6).
 - If installing bottom left or bottom right seatbelts, perform Steps (7) and (8).
 - Bottom left and bottom right seatbelts installed the same way.
1. Install two retractors (22) on seat assembly bracket (20) with two screws (24) and new locknuts (23). Torque to 25 to 40 lb-ft (34 to 54 N•m).
 2. Install two seatbelt retractor covers (21) on both seatbelt retractors (22).
 3. Install seat assembly bracket (20) on seat assembly (7) with two screws (19) and new locknuts (18). Torque to 25 to 40 lb-ft (34 to 54 N•m).



4. Install both seatbelt guides (15) on seat support (17) with washers (14), screws (13), and new locknuts (16). Torque to 25 to 40 lb-ft (34 to 54 N•m).
5. Install two rubber screw caps (12) on screws (13).



6. Install seatbelt (10) on seat assembly (7) with washer (9), screw (8) and new locknut (11). Torque to 25 to 40 lb-ft (34 to 54 N•m).



7. Install seatbelt (3) on seat assembly (7) with plastic sheath (6), screw (5), washer (4), spacer (2), and new locknut (1). Torque to 25 to 40 lb-ft (34 to 54 N•m).
8. Repeat Step (7) for bottom left seatbelt.
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SEATBELT REPLACEMENT (M1240A1)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Rear seat removed (if replacing rear seat seatbelts) (WP 0163)

Tools and Special Tools

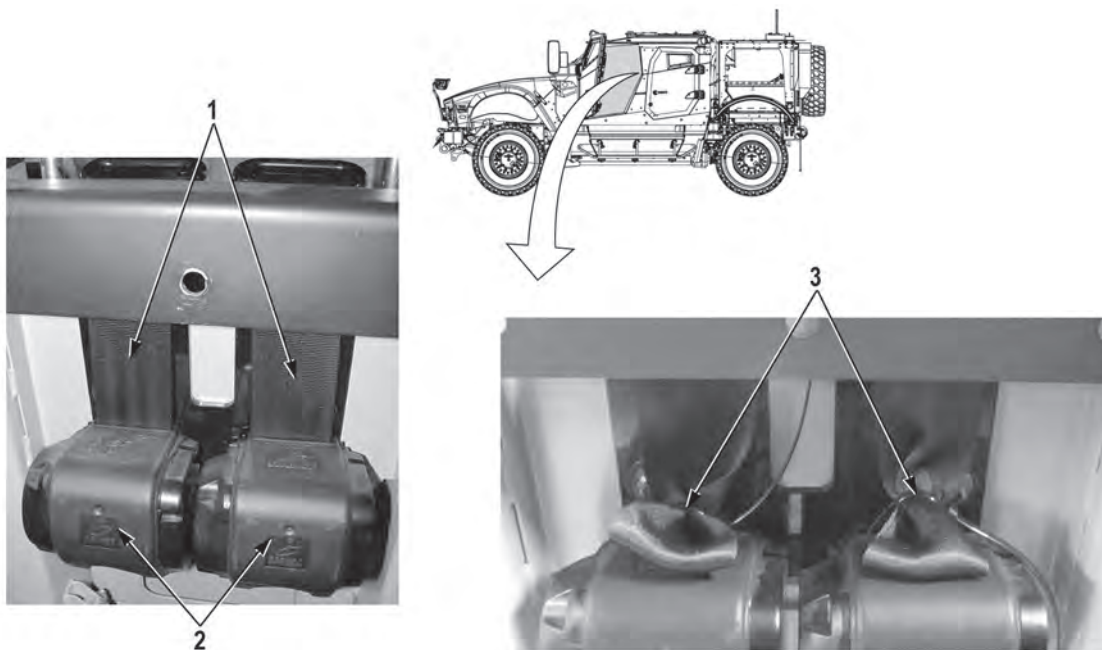
Tool Kit, General Mechanic's: Automotive
 Torx Bit, T-50
 Wrench, Torque, 15 to 75 ft-lb

Materials/Parts

Locknut (2) (Item 16)
 Locknut (2) (Item 20)
 Ties, Cable

Follow-On Maintenance

Install rear seat (if rear seat seatbelts were removed) (WP 0163)
 Remove and stow wheel chocks

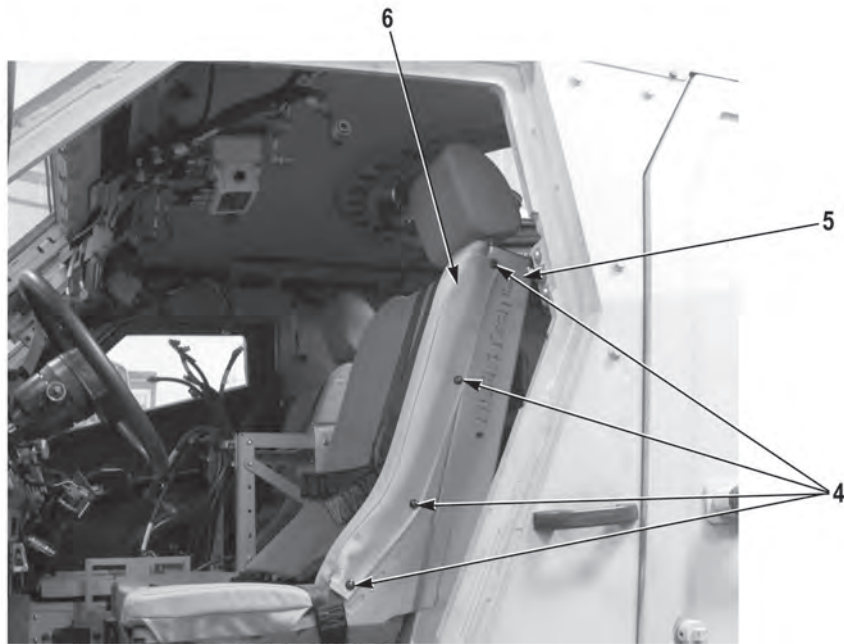
REMOVAL**CAUTION**

Ensure retractor straps are secured prior to removing retractors. Failure to comply may result in damage to equipment.

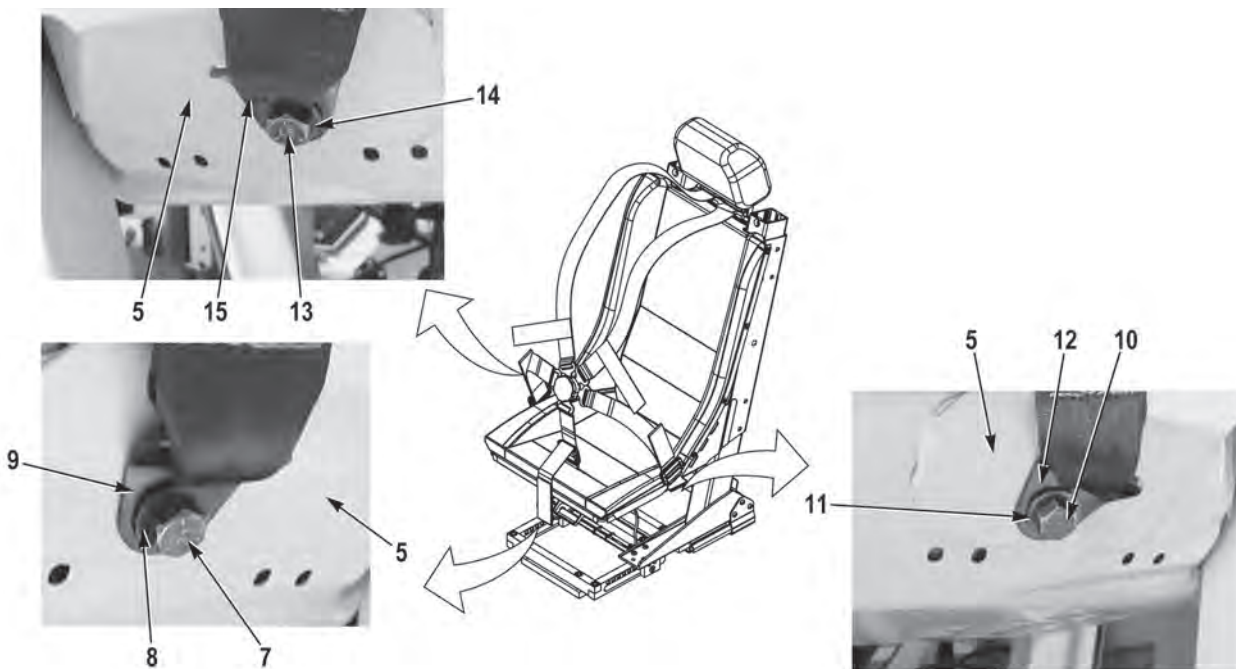
NOTE

All seatbelts are removed the same way. Front driver side shown.

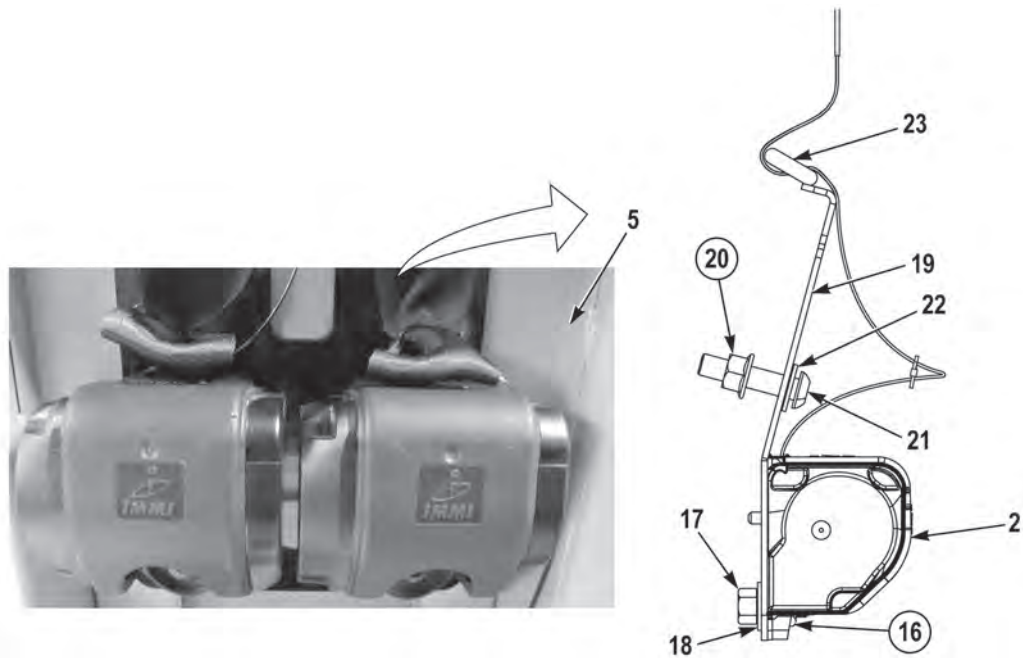
1. Grasp shoulder belt (1) approximately 4 in. (10 cm) above retractor (2) and double shoulder belt (1) over on itself.
2. Install cable tie (3) on folded shoulder belt (1).
3. Repeat Steps (1) and (2) for other shoulder belt (1).



4. Unfasten eight snaps (4) from seat (5) and remove seatback cushion (6) from seat (5).



5. Remove screw (7), washer (8), and lower seatbelt mount (9) from seat (5).
6. Remove screw (10), washer (11), and driver side hip belt mount (12) from seat (5).
7. Remove screw (13), washer (14), and passenger side hip belt mount (15) from seat (5).



8. Remove locknut (16), retractor (2), screw (17), and washer (18) from upper seatbelt mount (19). Discard locknut (16).
9. Repeat Step (8) for other retractor.

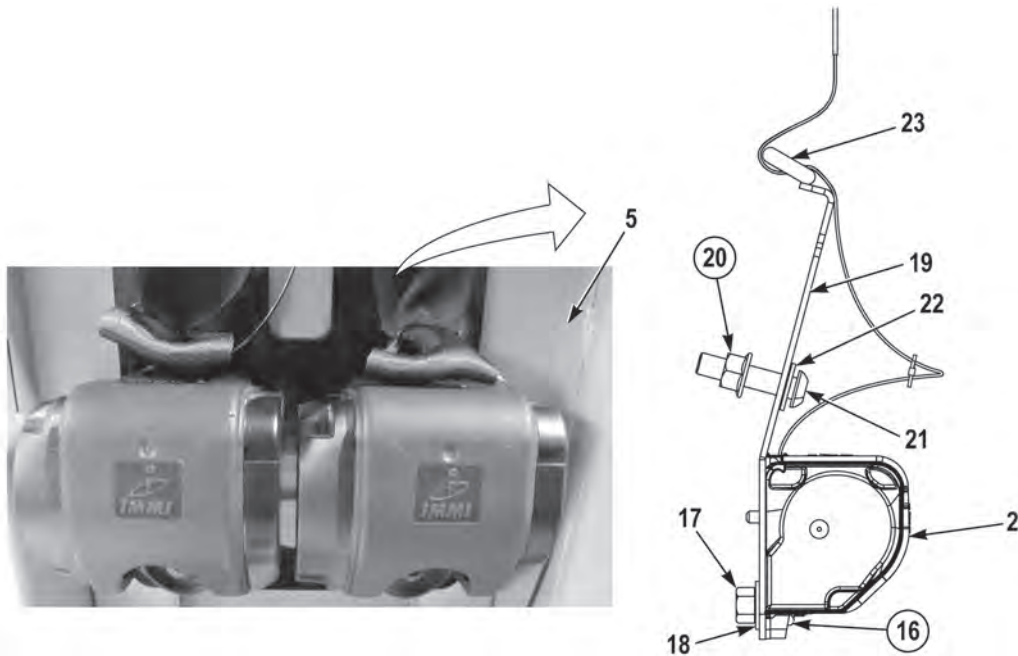
NOTE

Perform Step (9) if upper seatbelt mount needs to be removed.

10. Remove two locknuts (20), screws (21), washers (22), and upper seatbelt mount (19) from seat (5). Discard locknuts (20).
11. Remove shoulder belt (1) from seatbelt mount loop (23).

END OF TASK

INSTALLATION



NOTE

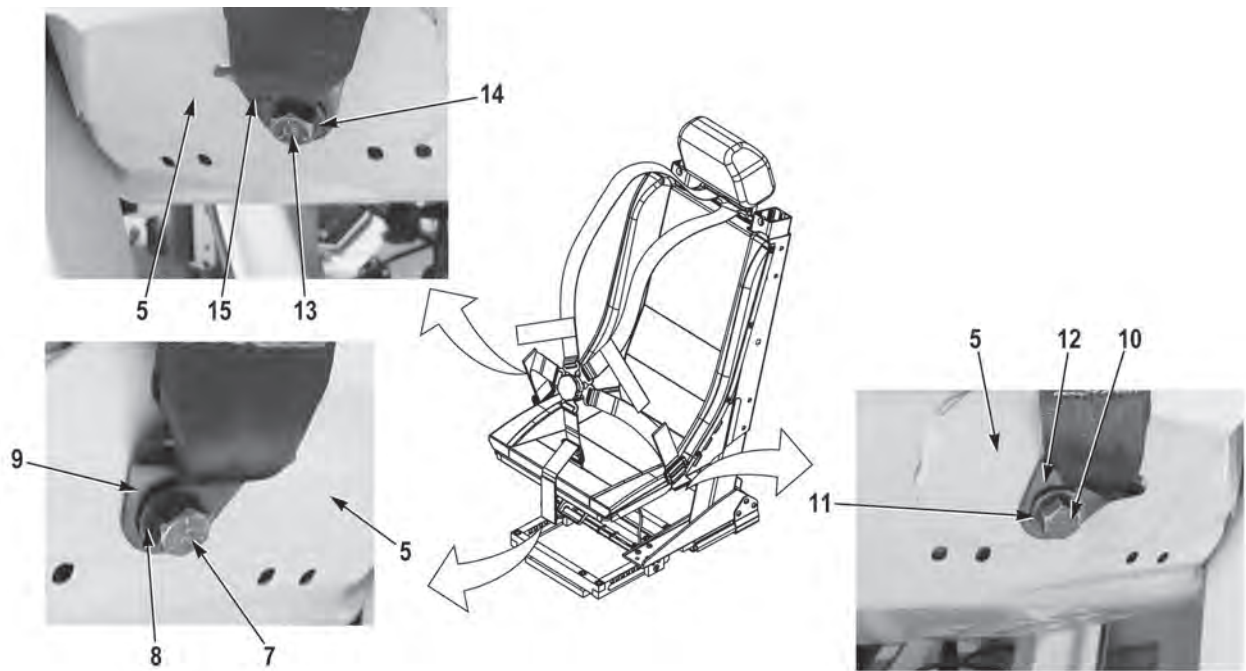
All seatbelts are installed the same way. Front driver side shown.

1. Install shoulder belt (1) on seatbelt mount loop (23).

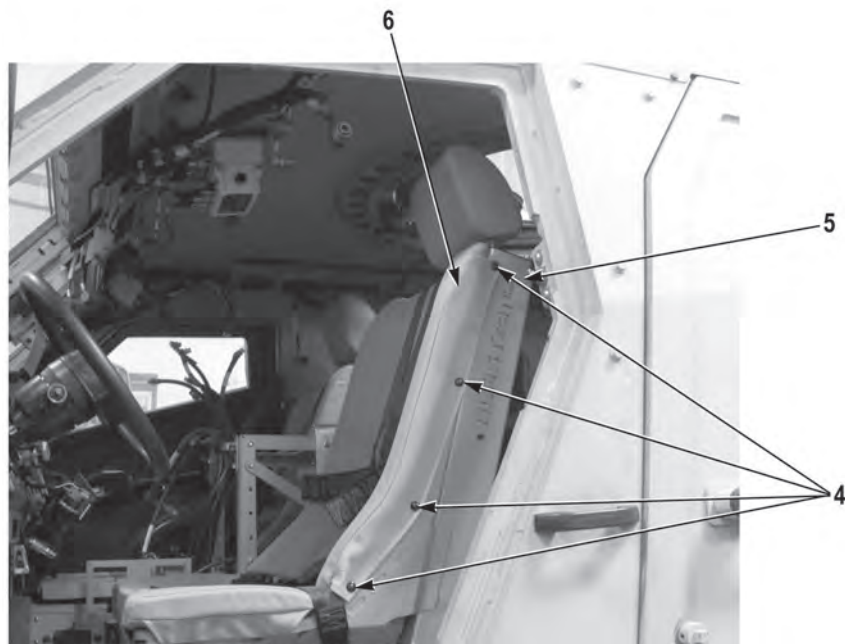
NOTE

Perform Step (2) if upper seatbelt mount was removed.

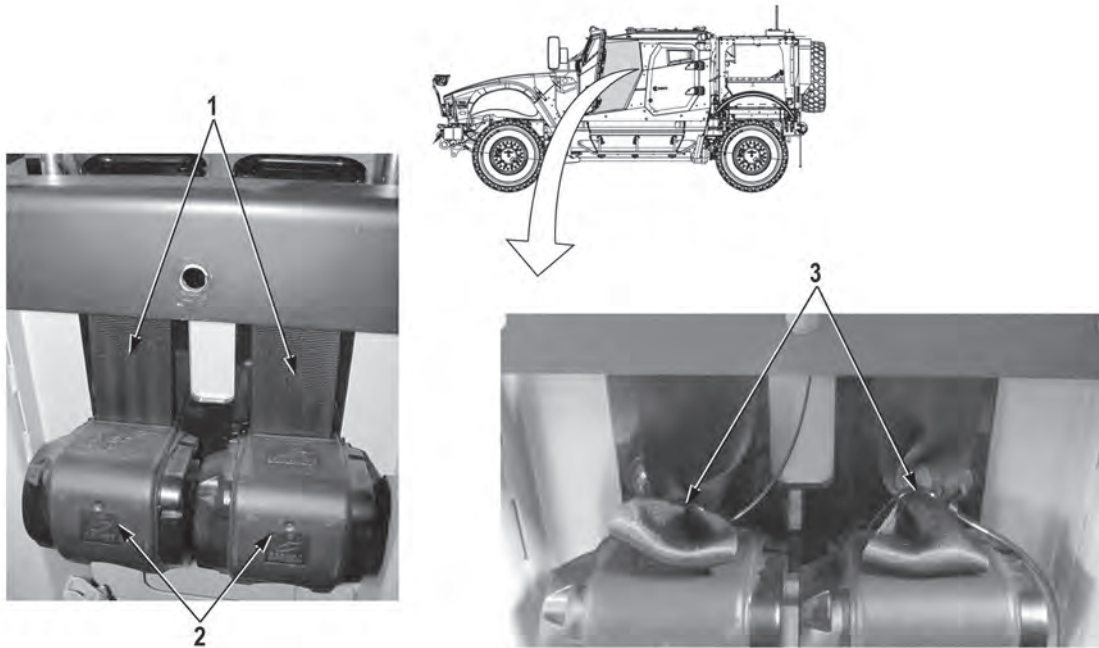
2. Install upper seatbelt mount (19) on seat (5) with two washers (22), screws (21), and new locknuts (20). Tighten locknuts to 25 to 40 lb-ft (34 to 54 N•m).
3. Install retractor (2) on upper seatbelt mount (19) with washer (18), screw (17), and new locknut (16). Tighten locknut to 25 to 40 lb-ft (34 to 54 N•m).
4. Repeat Step (3) for other retractor.



5. Install passenger side hip belt mount (15) on seat (5) with washer (14) and screw (13). Tighten screw to 25 to 40 lb-ft (34 to 54 N•m).
6. Install driver side hip belt mount (12) on seat (5) with washer (11) and screw (10). Tighten screw to 25 to 40 lb-ft (34 to 54 N•m).
7. Install lower seatbelt mount (9) on seat (5) with washer (8) and screw (7). Tighten screw to 25 to 40 lb-ft (34 to 54 N•m).



8. Install seatback cushion (6) on seat (5) and secure with eight snaps (4).

**WARNING**

Cable ties must be removed from shoulder belts or shoulder belts will not function properly. Failure to comply may result in injury or death to personnel.

9. Remove cable tie (3) from shoulder belt (1) above retractor (2).
10. Repeat Step (8) for other shoulder belt (1).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SPOTLIGHT BRACKET REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Front spotlight clearance lights removed
 (WP 0196)
 Spotlights removed (WP 0213)

Tools and Special Tools

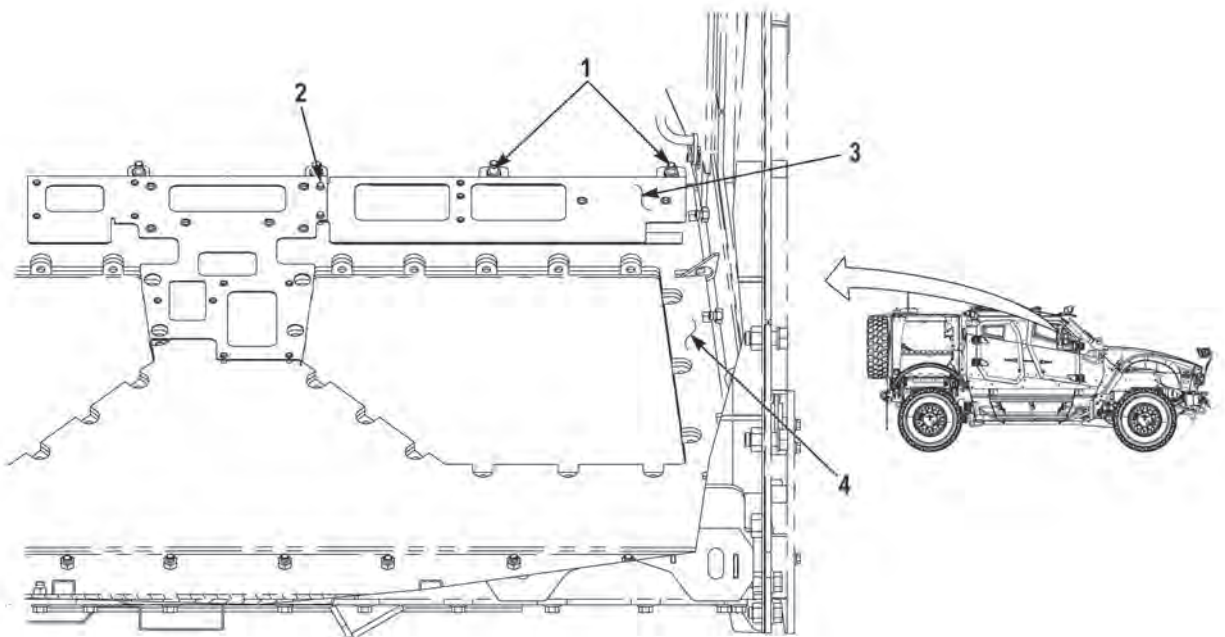
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Cable Ties, Plastic
 Compound, Sealing, Loctite 242
 Compound, Sealing, Sika 221

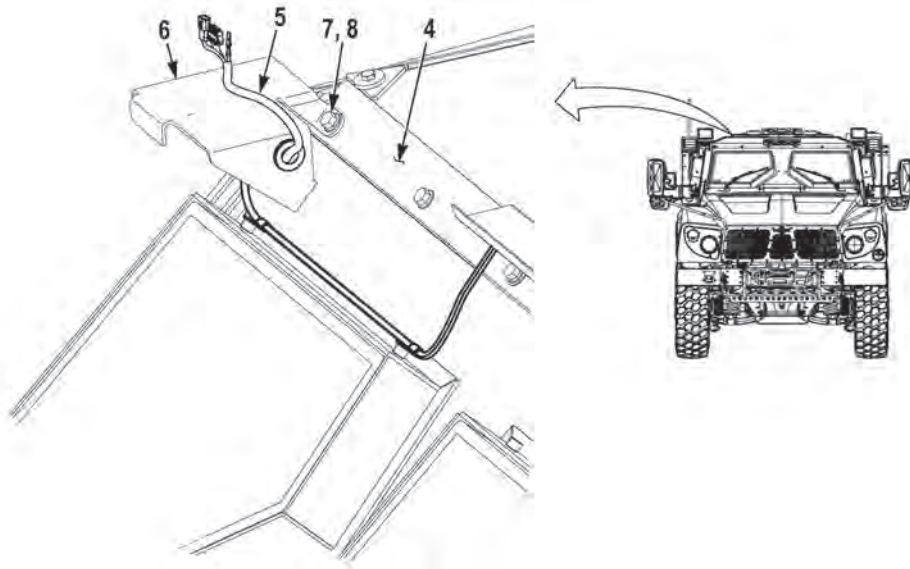
Follow-On Maintenance

Install spotlights (WP 0213)
 Install front spotlight clearance lights (WP 0196)
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Perform Step (1) if removing passenger side front spotlight bracket.
- Velcro/duel lock is also holding headliner bracket on capsule.
- Note routing of GFE cables and remove cable ties as required.
- Perform Steps (2) through (5) if removing front spotlight bracket.
- Perform Step (6) if removing rear spotlight bracket.

1. Remove two nuts (1), two screws (2), and headliner bracket (3) from capsule (4).



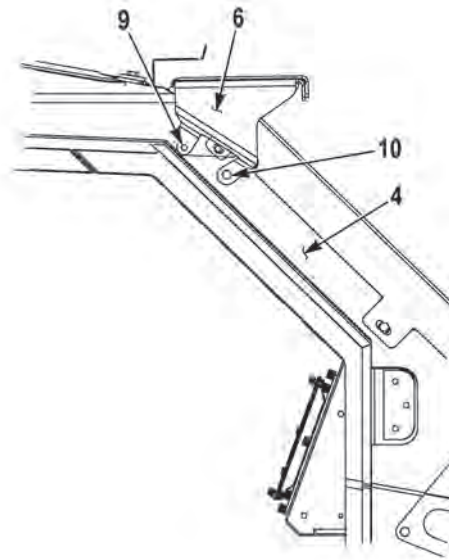
NOTE

- Both front spotlight brackets are removed the same way. Passenger side shown.
 - Note position and routing of wire harness prior to removal to ensure proper installation.
2. Remove spotlight wire harness (5) from spotlight bracket (6).

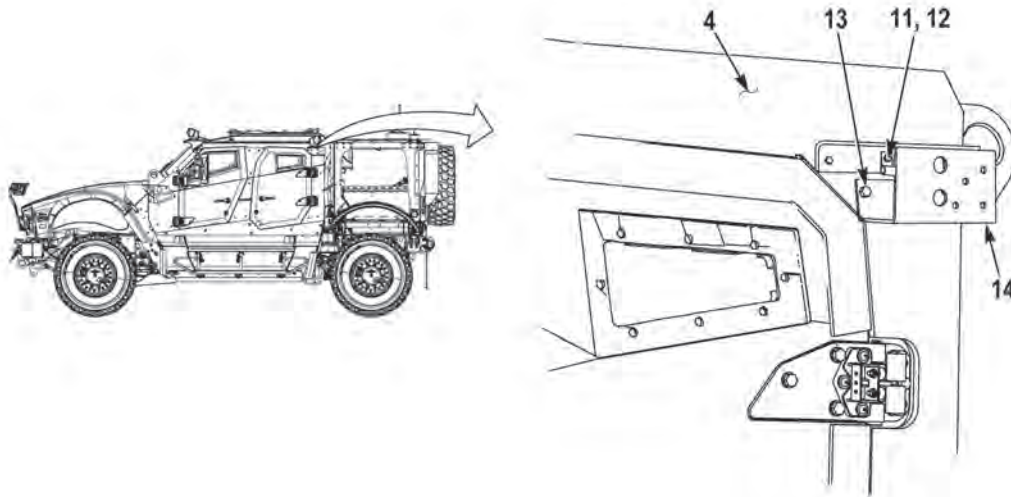
CAUTION

Vehicle armor is threaded; do not attempt to force screw out. Screw must be turned out. Failure to comply may result in damage to equipment.

3. Remove nut (7) and screw (8) from capsule (4) and spotlight bracket (6).



4. Remove screw (9) from capsule (4) and spotlight bracket (6).
5. Remove screw (10) and spotlight bracket (6) from capsule (4).



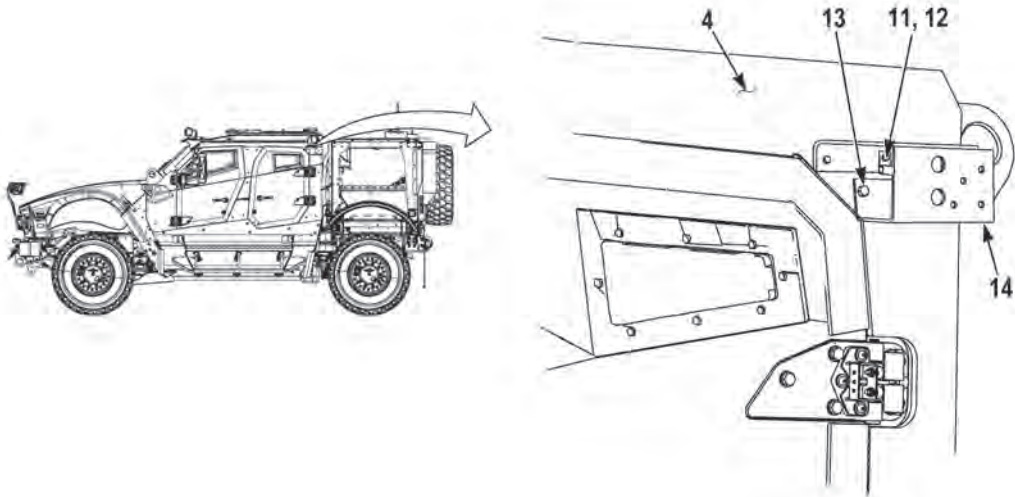
NOTE

- Both rear spotlight brackets are removed the same way. Driver side shown.
- Note position and routing of wire harness and cushion clip prior to removal to ensure proper installation.

6. Remove two screws (11), cushion clip (12), two screws (13), and rear spotlight bracket (14) from capsule (4).

END OF TASK

INSTALLATION

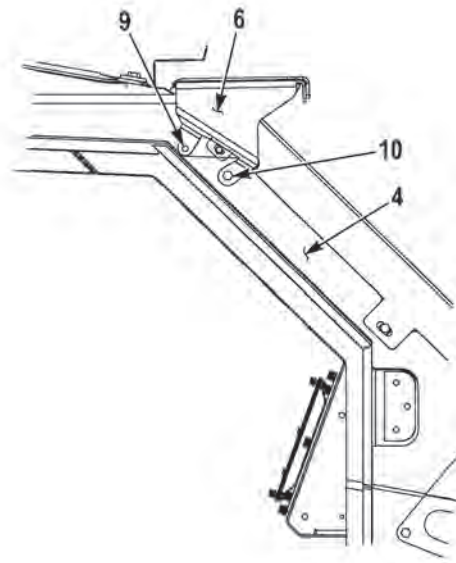


WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

- Perform Step (1) if rear spotlight bracket was removed.
 - Perform Steps (2) through (5) if front spotlight bracket was removed.
 - Both rear spotlight brackets are installed the same way. Driver side shown.
 - Position cushion clip and wire harness as noted prior to removal.
1. Apply sealing compound, Loctite 242, to threads of two screws (13), screws (11), and install rear spotlight bracket (14) on capsule (4) with two screws (13), cushion clip (12), and two screws (11).



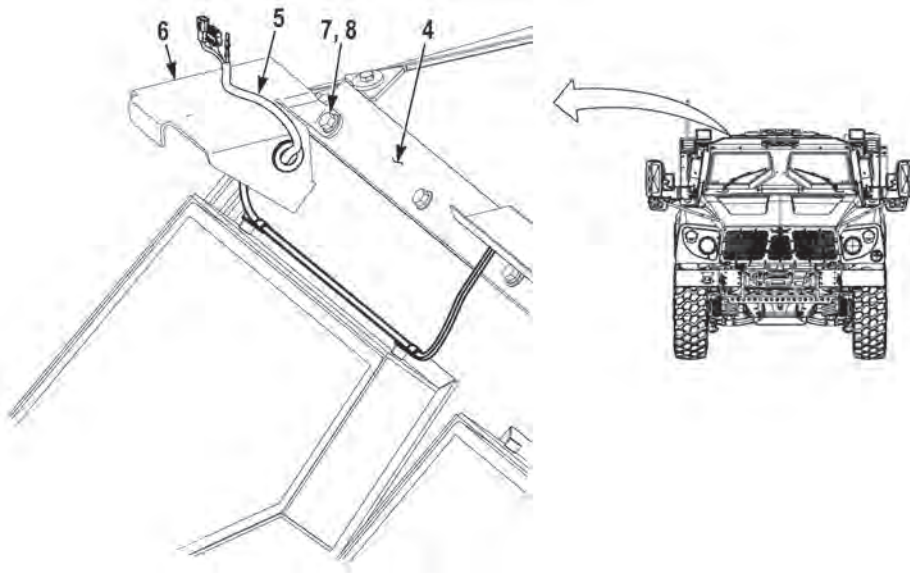
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Both front spotlight brackets are installed the same way. Passenger side shown.

2. Apply sealing compound, Loctite 242, to threads of screw (10) and install spotlight bracket (6) on capsule (4) with screw (10).
3. Apply sealing compound, Loctite 242, to threads of screw (9) and secure spotlight bracket (6) on capsule (4) with screw (9).

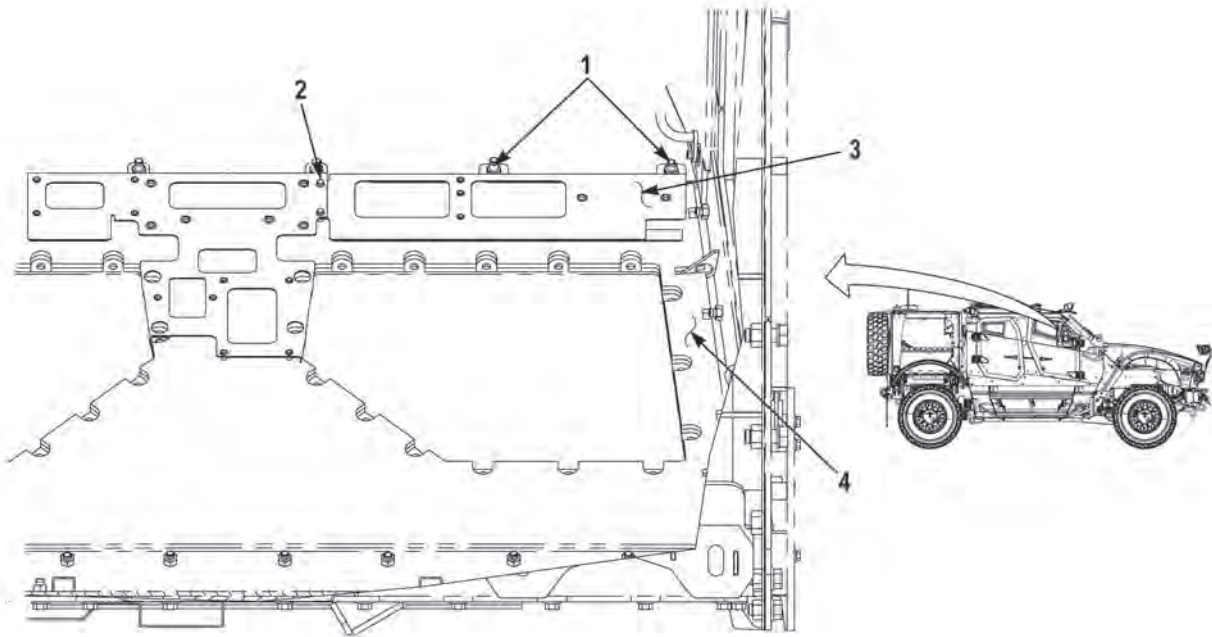


4. Apply sealing compound, Loctite 242, to threads of screw (8) and sealing compound Sika 221 to underside of screwhead (8) and secure spotlight bracket (6) on capsule (4) with screw (8) and nut (7).

NOTE

Position wire harness as noted prior to removal.

5. Install spotlight wire harness (5) on spotlight bracket (6).

**NOTE**

- Perform Step (6) if passenger side front spotlight bracket was removed.
- Route GFE cables as noted prior to removal and install cable ties as required.

6. Install headliner bracket (3) on capsule (4) with three nuts (1) and two screws (2).
7. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

DASH PANEL REPLACEMENT, CTIS

Preconditions

- Park vehicle
- Engine OFF
- Wheels chocked
- Batteries disconnected (M1240/M1240A1) (WP 0186)
- Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

- Tool Kit, General Mechanic's: Automotive

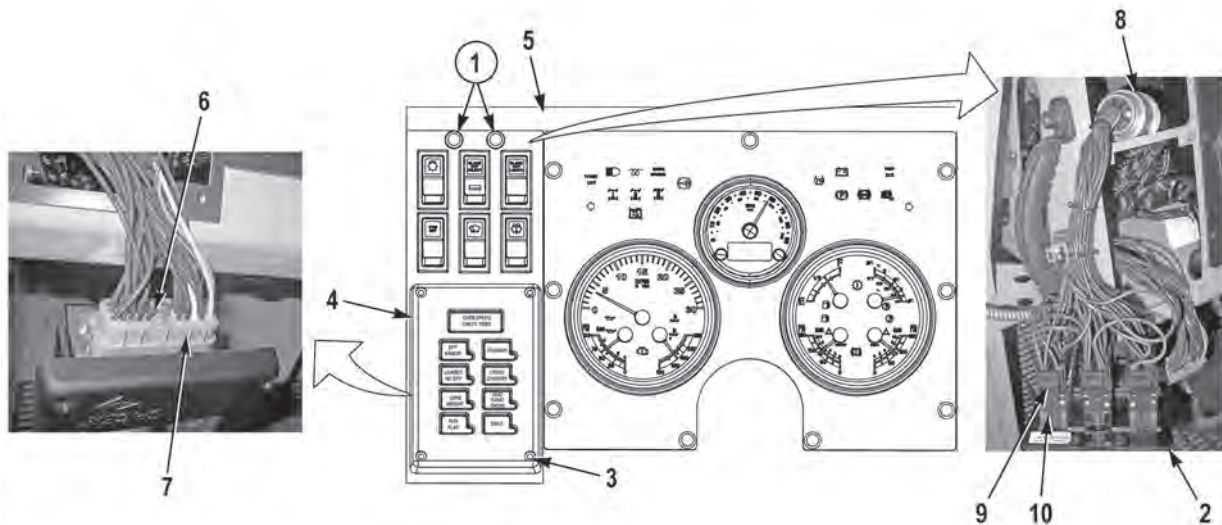
Materials/Parts

- Fastener, Pushpin (2) (Item 1)
- Tags, Identification

Follow-On Maintenance

- Connect batteries (M1240/M1240A1) (WP 0186)
- Connect batteries (M1245) (WP 0187)
- Remove and stow wheel chocks

REMOVAL

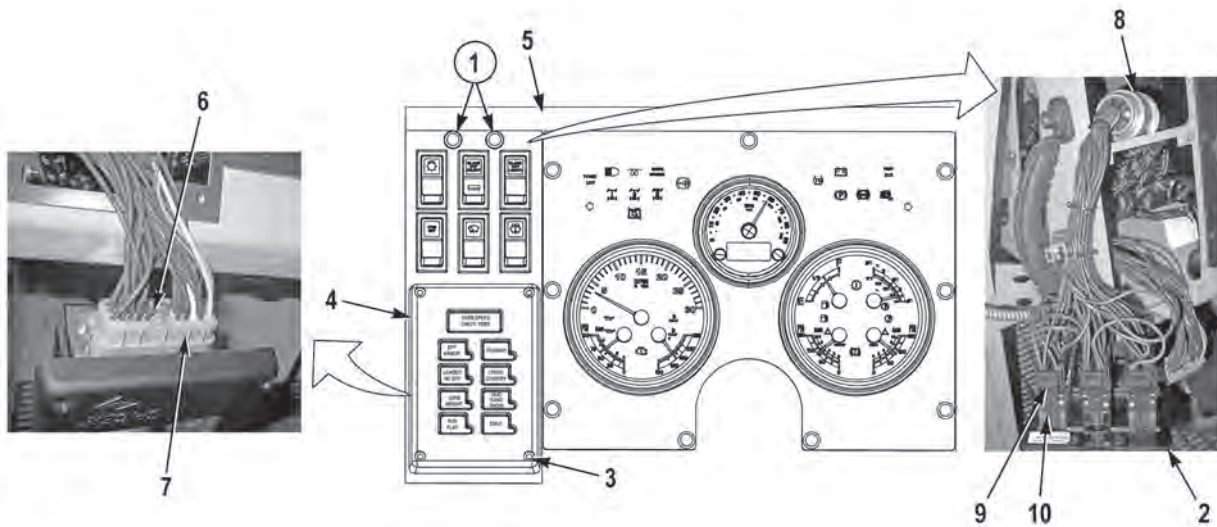


1. Remove two pushpin fasteners (1) from CTIS dash panel (2). Discard pushpin fasteners (1).

CAUTION

CTIS controller and CTIS dash panel must be kept together during removal until CTIS controller connector is removed. Failure to comply may result in damage to equipment.

2. Remove four screws (3) from CTIS controller (4).
3. Move CTIS controller (4) and CTIS dash panel (2) away from dash (5).

**NOTE**

Tag and mark connectors prior to removal to ensure proper installation.

4. Loosen screw (6) and remove connector (7) from CTIS controller (4).
5. Separate CTIS controller (4) from CTIS dash panel (2).
6. Disconnect connector (8) and remove CTIS dash panel (2) from dash (5).

NOTE

- All switches are removed the same way.
- Perform Steps (7) and (8) if switches need to be removed.

7. Disconnect connector (9) from switch (10).
8. Remove switch (10) from CTIS dash panel (2).

END OF TASK

INSTALLATION**NOTE**

- All switches are installed the same way.
 - Perform Steps (1) and (2) if switches were removed.
1. Install switch (10) on CTIS dash panel (2).
 2. Connect connector (9) to switch (10).
 3. Connect connector (8).

CAUTION

CTIS controller and CTIS dash panel must be kept together before CTIS controller connector is connected and during installation in dash. Failure to comply may result in damage to equipment.

4. Position CTIS controller (4) on CTIS dash panel (2).
5. Install connector (7) on CTIS controller (4) and tighten screw (6).
6. Install CTIS controller (4) and CTIS dash panel (2) on dash (5) with four screws (3).
7. Secure CTIS dash panel (2) on dash (5) with two new pushpin fasteners (1).
8. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

CTIS MANIFOLD REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Driver side belly deflector removed
(M1240/M1245) (WP 0049)
Driver side belly deflector removed (M1240A1)
(WP 0056)
Air system drained
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (4) (Item 14)
Cap and Plug Set

Materials/Parts (continued)

Compound, Sealing, Loctite 592
Tags, Identification
Tape, Insulator
Ties, Cable

Follow-On Maintenance

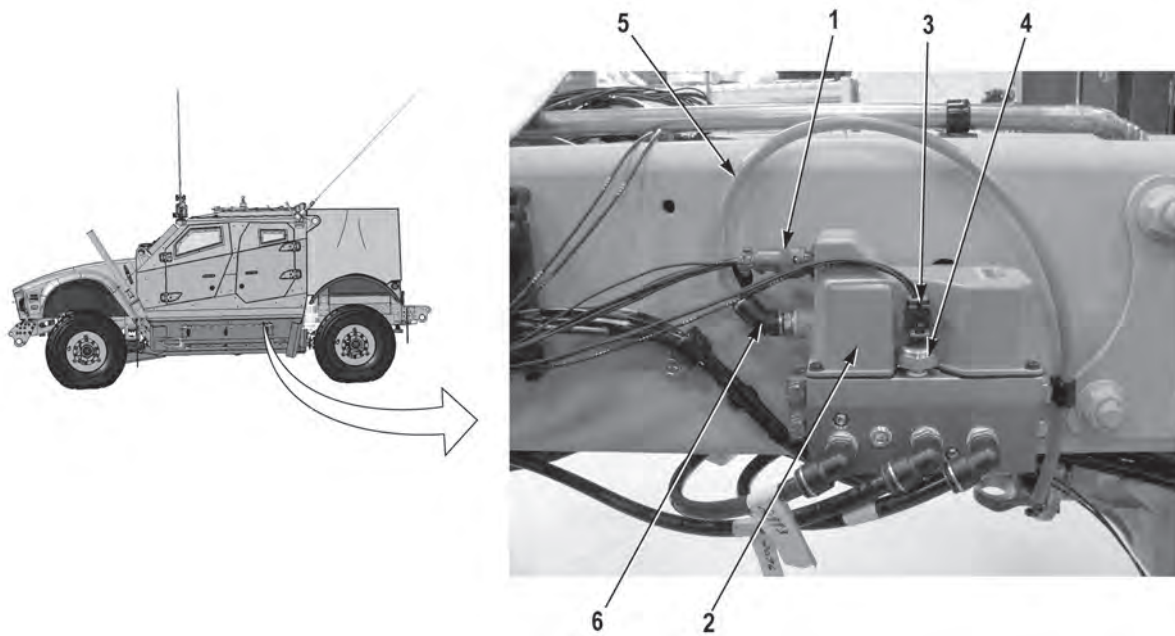
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Install driver side belly deflector (M1240/M1245)
(WP 0049)
Install driver side belly deflector (M1240A1)
(WP 0056)
Remove and stow wheel chocks

REMOVAL**WARNING**

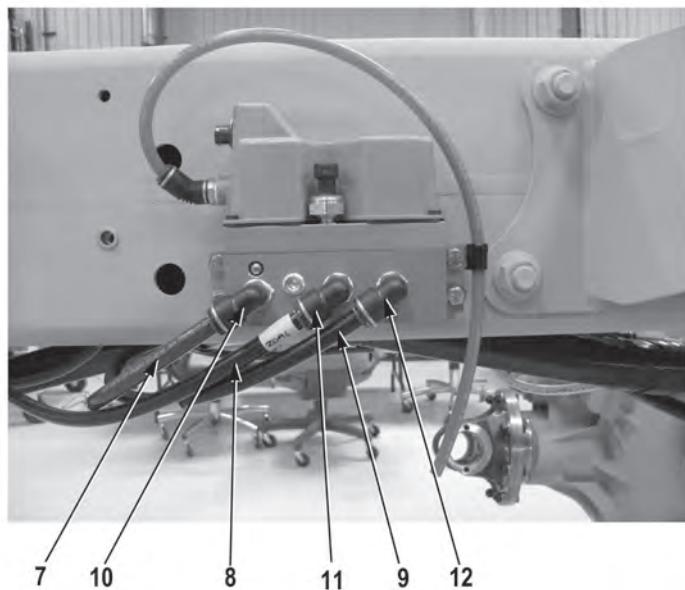
- **Ensure air system is drained prior to working on air system components. Failure to comply may result in injury or death to personnel.**
- **Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.**

NOTE

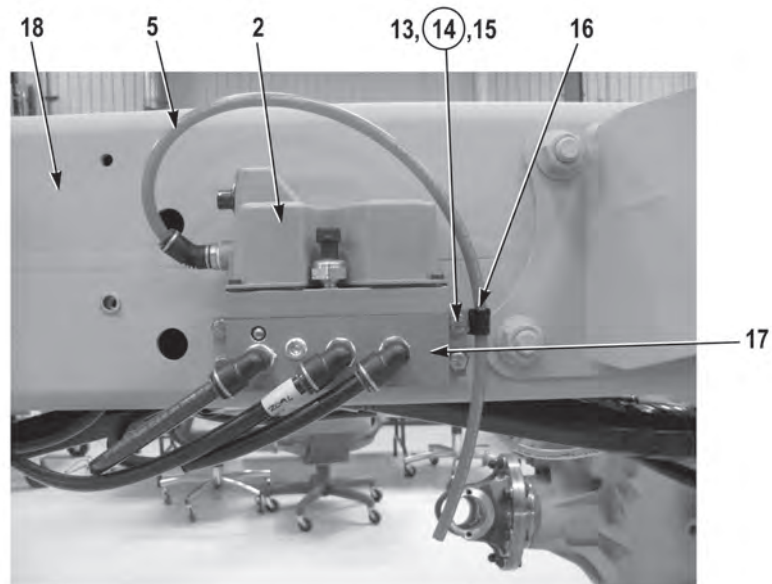
- Tag and mark air lines and fittings prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.
- Remove cable ties as required.



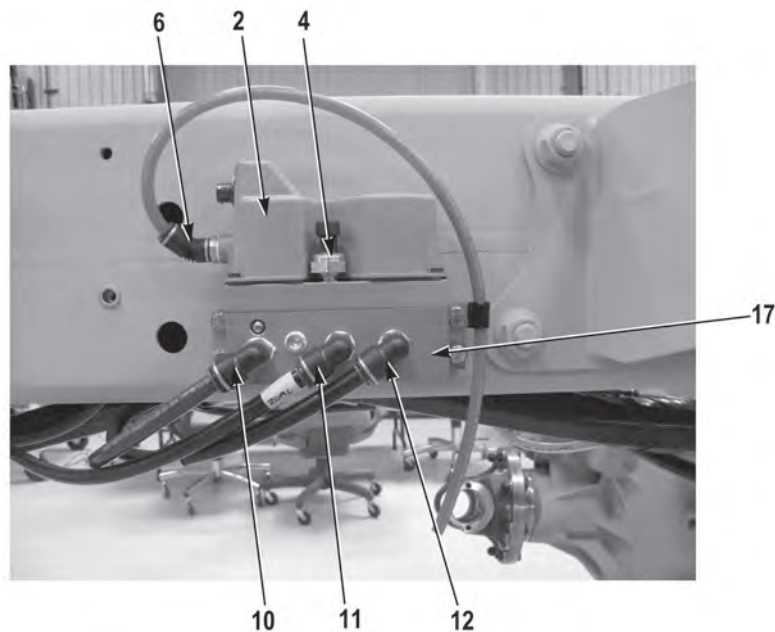
1. Disconnect connector (1) from cover (2).
2. Disconnect connector (3) from transducer (4).
3. Remove air line (5) from fitting (6).



4. Remove three air lines (7, 8, and 9) from three fittings (10, 11, and 12).



5. Remove screw (13), lockwasher (14), washer (15), cushion clip (16), and air line (5) from manifold (17). Discard lockwasher (14).
6. Remove three screws (13), lockwashers (14), washers (15), and manifold (17) from frame rail (18). Discard lockwashers (14).



NOTE

Note position of fittings prior to removal to ensure proper installation.

7. Remove fitting (6) from cover (2).
8. Remove transducer (4) from manifold (17).
9. Remove three fittings (10, 11, and 12) from manifold (17).

END OF TASK

INSTALLATION

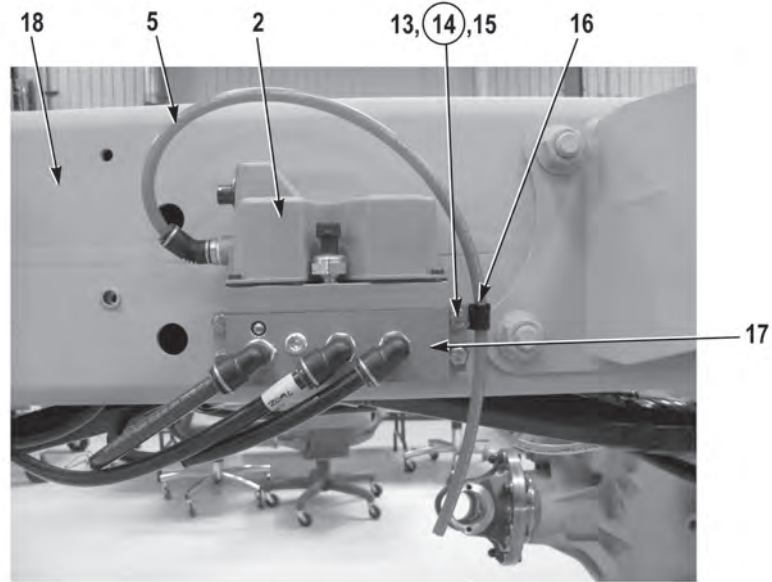
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

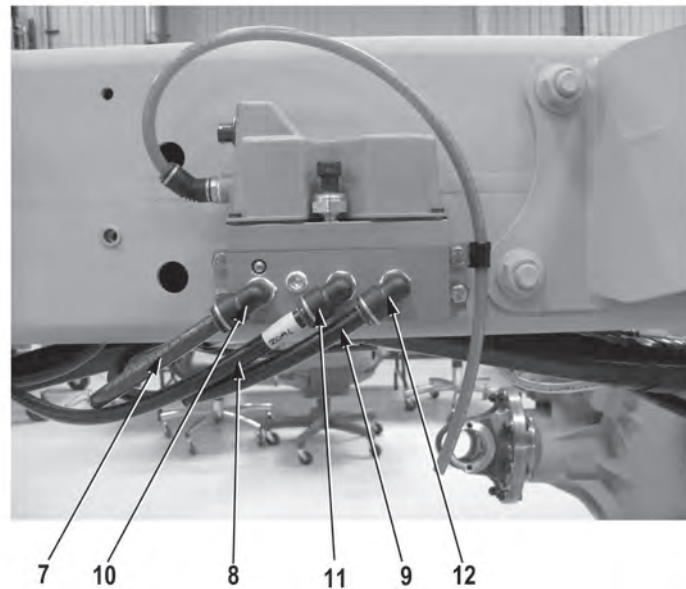
NOTE

Install fittings as noted prior to removal.

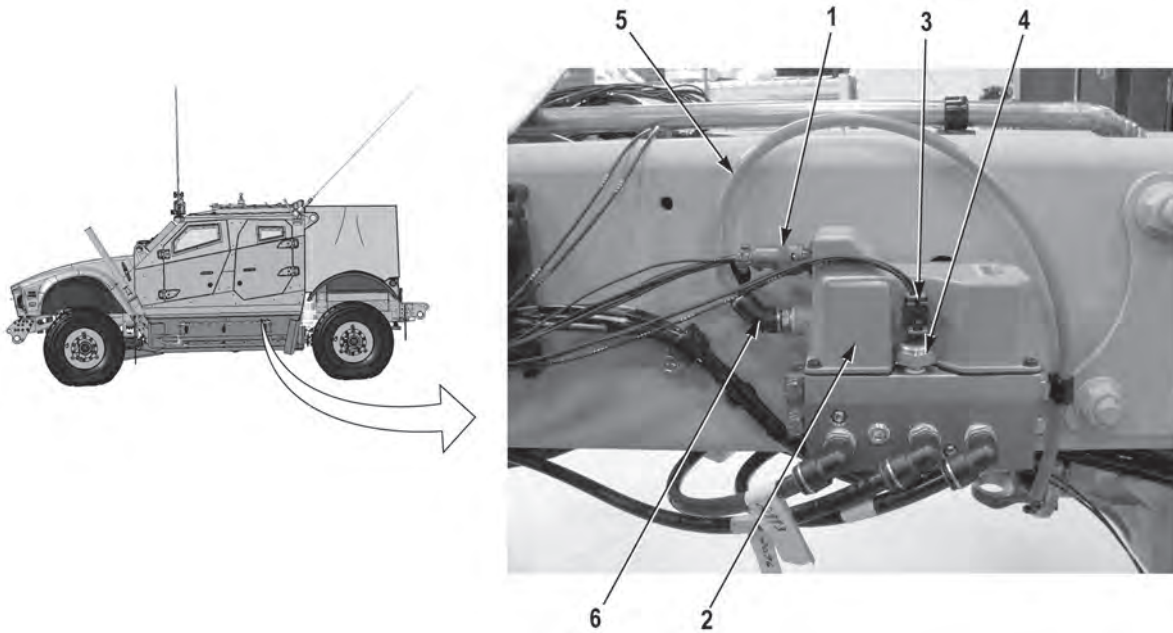
1. Apply sealing compound, Loctite 592, to threads of three fittings (10, 11, and 12) and install three fittings (10, 11, and 12) on manifold (17).
2. Apply sealing compound, Loctite 592, to threads of transducer (4) and install transducer (4) on manifold (17).
3. Apply sealing compound, Loctite 592, to threads of fitting (6) and install fitting (6) on cover (2).



4. Apply insulator tape to mating surface of manifold (17) and install manifold (17) on frame rail (18) with three washers (15), new lockwashers (14), and screws (13).
5. Install cushion clip (16) and air line (5) on manifold (17) with washer (15), new lockwasher (14), and screw (13).



6. Install three air lines (7, 8, and 9) on three fittings (10, 11, and 12).



7. Install air line (5) on fitting (6).

NOTE

Install cable ties as required.

8. Connect connector (3) to transducer (4).
9. Connect connector (1) to cover (2).
10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CTIS QUICK RELEASE VALVE REPLACEMENT AXLE NO. 1

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air system drained
 Propeller shaft removed (WP 0090)

Tools and Special Tools

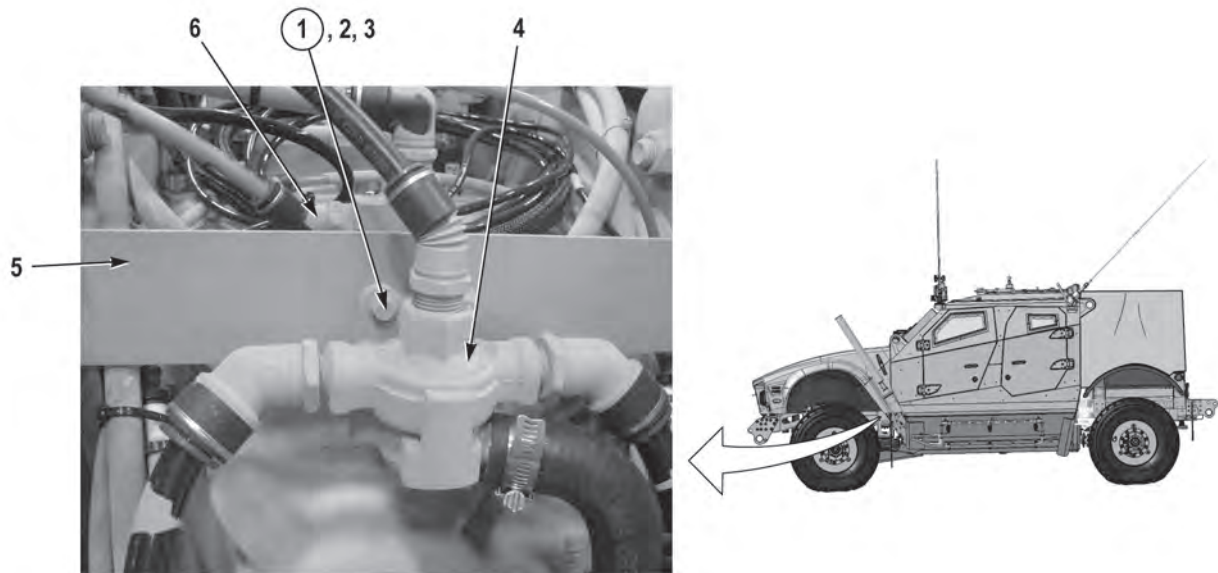
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 1)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

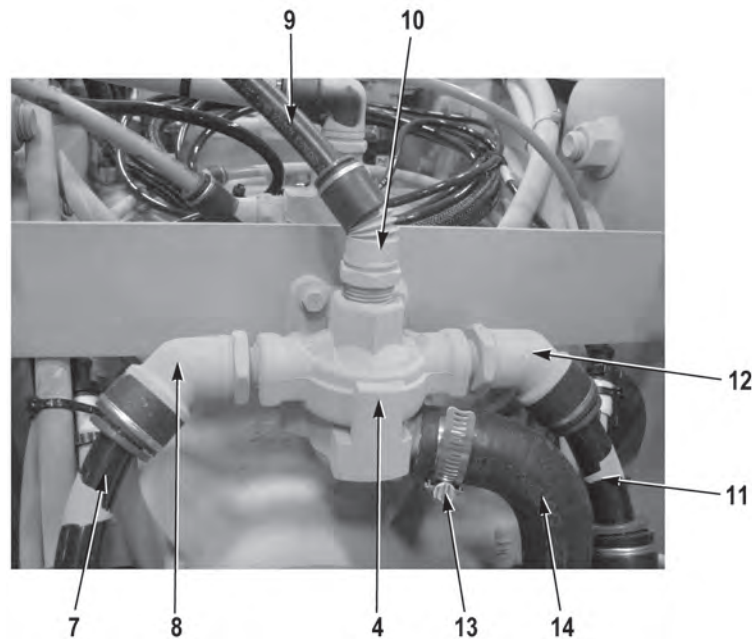
Follow-On Maintenance

Install propeller shaft (WP 0090)
 Remove and stow wheel chocks

REMOVAL**NOTE**

Remove cushion clips as necessary.

1. Remove two locknuts (1), screws (2), washers (3), and CTIS quick release valve (4) from bracket (5) and quick release valve (6). Discard locknuts (1).



WARNING

Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Tag and mark air lines prior to removal to ensure proper installation.
- Cap and plug air lines and fittings upon removal.

2. Remove air line (7) from fitting (8).
3. Remove air line (9) from fitting (10).
4. Remove air line (11) from fitting (12).
5. Loosen clamp (13) from hose (14).
6. Remove hose (14) from CTIS quick release valve (4).

NOTE

Note position of fittings prior to removal to ensure proper installation.

7. Remove three fittings (8, 10, and 12) from CTIS quick release valve (4).

END OF TASK

INSTALLATION**WARNING**

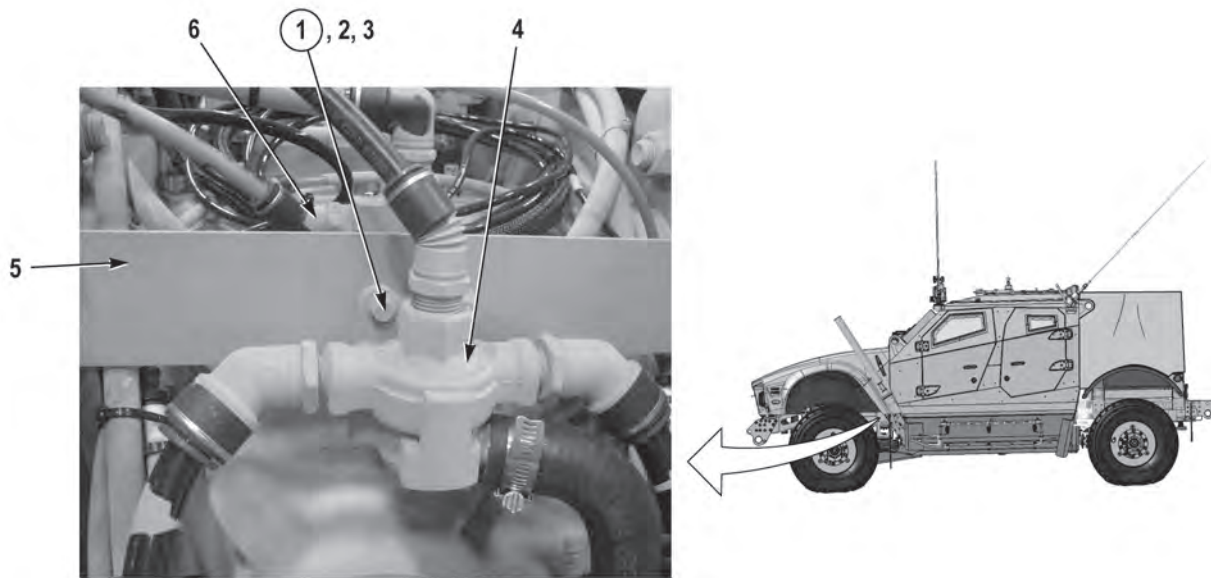
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of three fittings (12, 10, and 8).

NOTE

Install fittings as noted prior to removal.

2. Install three fittings (12, 10, and 8) on CTIS quick release valve (4).
3. Install hose (14) on CTIS quick release valve (4) with clamp (13).
4. Tighten clamp (13).
5. Install air line (11) on fitting (12).
6. Install air line (9) on fitting (10).
7. Install air line (7) on fitting (8).

**NOTE**

Install cushion clips as noted prior to removal.

8. Install CTIS quick release valve (4) on bracket (5) and quick release valve (6) with two washers (3), screws (2) and new locknuts (1).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CTIS QUICK RELEASE VALVE REPLACEMENT AXLE NO. 2

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Air system drained
Automatic traction control (ATC) valve removed
(WP 0119)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (2) (Item 12)
Cap and Plug Set
Compound, Sealing, Loctite 592
Tags, Identification
Ties, Cable

Follow-On Maintenance

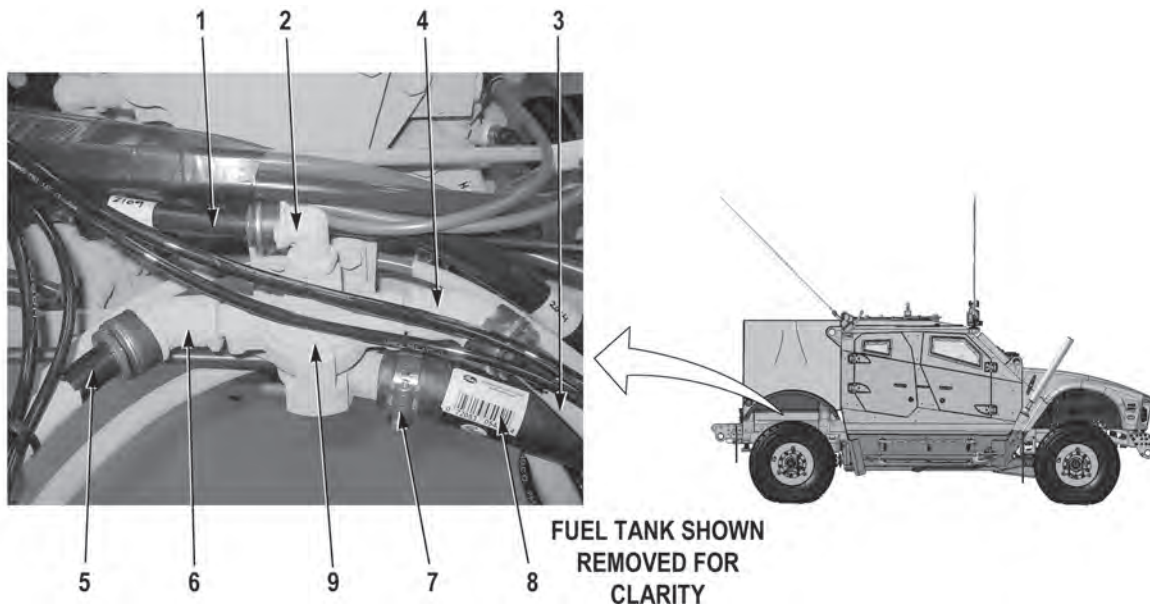
Install automatic traction control (ATC) valve
(WP 0119)
Remove and stow wheel chocks

REMOVAL**WARNING**

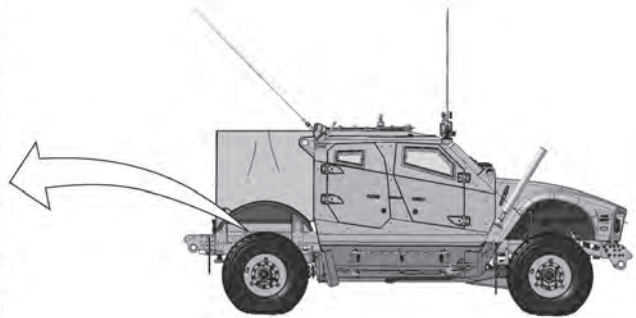
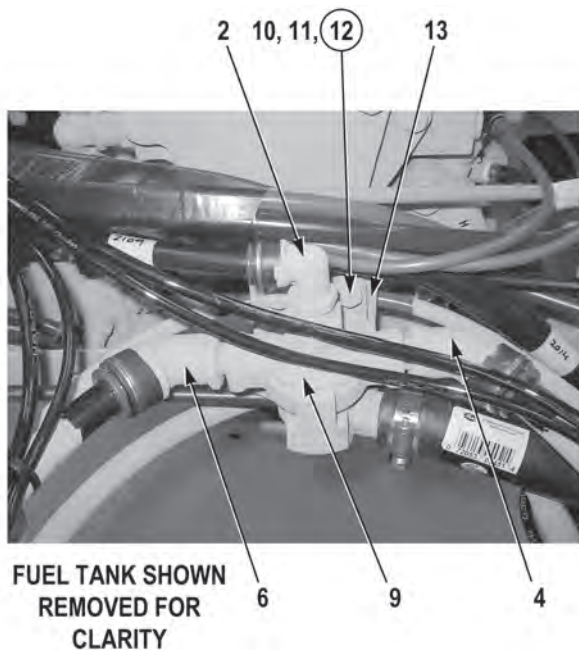
Air lines under pressure will move violently when removed. Ensure air system is drained prior to removing air lines. Failure to comply may result in injury or death to personnel.

NOTE

- Additional air lines and connectors will need to be removed to access mounting bolts.
- Tag and mark connections prior to removal to ensure proper installation.
- Tag and mark air lines prior to removal to ensure proper installation.
- Remove cable ties as required.



1. Remove air line (1) from fitting (2).
2. Remove air line (3) from fitting (4).
3. Remove air line (5) from fitting (6).
4. Loosen clamp (7) from hose (8).
5. Remove hose (8) from CTIS quick release valve (9).



6. Remove two fittings (4 and 6) from CTIS quick release valve (9).
7. Remove two screws (10), washers (11), locknuts (12), and CTIS quick release valve (9) from bracket (13). Discard locknuts (12).
8. Remove fitting (2) from CTIS quick release valve (9).

END OF TASK

INSTALLATION

WARNING

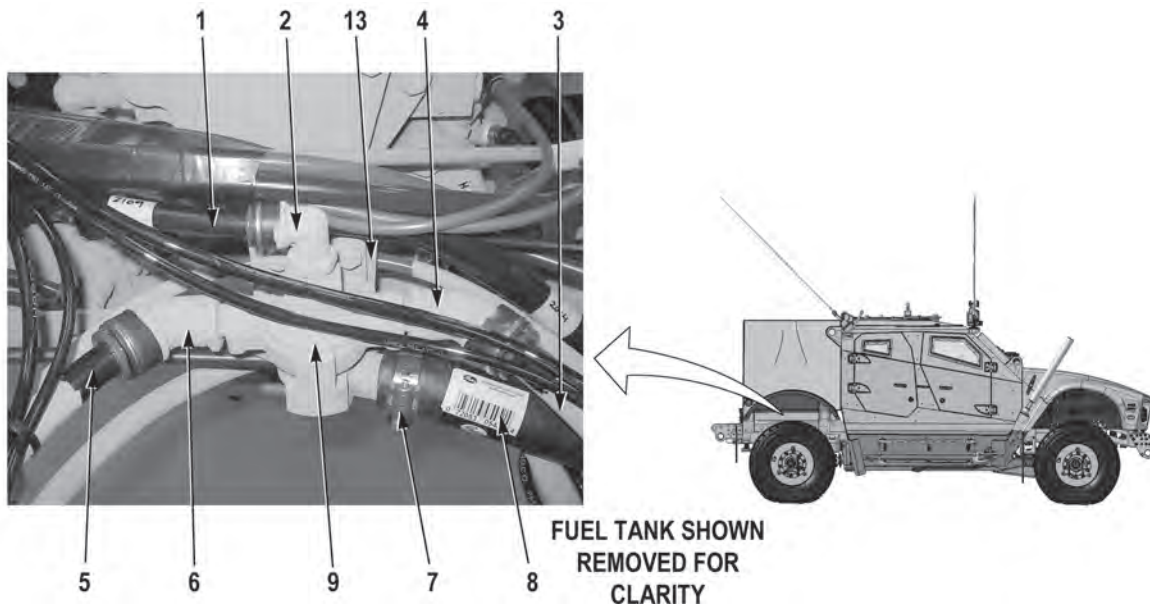
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

1. Apply sealing compound, Loctite 592, to threads of three fittings (2, 4, and 6).

NOTE

Install fittings/connectors as noted prior to removal.

2. Install fitting (2) on CTIS quick release valve (9).
3. Install CTIS quick release valve (9) on vehicle and bracket (13) with two new locknuts (12), washers (11), and screws (10).
4. Install two fittings (4 and 6) on CTIS quick release valve (9).



5. Install hose (8) on CTIS quick release valve (9).
6. Tighten clamp (7) on hose (8).
7. Install air line (5) on fitting (6).
8. Install air line (3) on fitting (4).
9. Install air line (1) on fitting (2).

NOTE

- Install cable ties as required.
- Install any fittings and connectors that were disconnected prior to removal.

10. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

CHARGE AIR COOLER REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Air conditioner condenser removed (WP 0021)
 Radiator and transmission oil cooler removed
 (WP 0180)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Materials/Parts

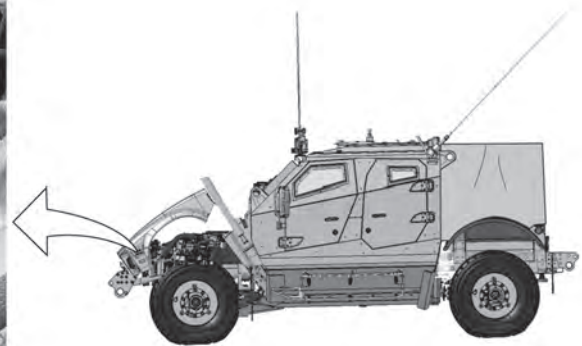
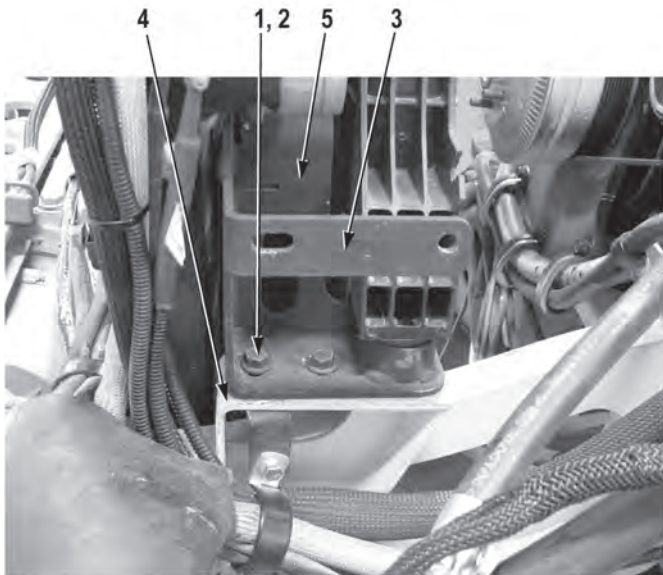
None

Personnel Required

Two

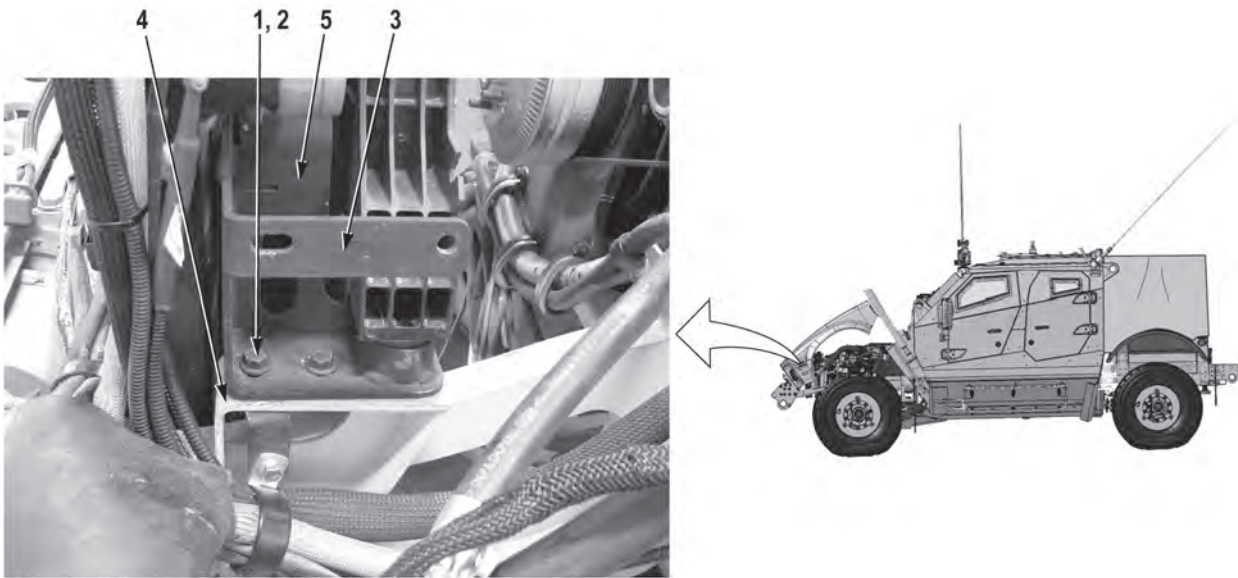
Follow-On Maintenance

Install radiator and transmission oil cooler
 (WP 0180)
 Install air conditioner condenser (WP 0021)
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Loosen, but do not remove, the four screws and locknuts holding the cooling system supports to the frame to ensure enough clearance for the charge air cooler removal.
- Both cooling system supports are loosened the same way. Driver side shown.

1. Loosen four screws (1) and locknuts (2) on two cooling system supports (3) and frame (4).



CAUTION

Charge air cooler is cumbersome. It should be removed with the aid of an assistant. Failure to comply may result in damage to equipment.

NOTE

Note position of charge air cooler guides on coolant system supports prior to removal to ensure proper installation.

2. With the aid of an assistant remove charge air cooler (5) from vehicle.

END OF TASK

INSTALLATION

CAUTION

Charge air cooler is cumbersome. It should be installed with the aid of an assistant. Failure to comply may result in damage to equipment.

NOTE

Install charge air cooler guides on cooling system supports as noted prior to removal.

1. With the aid of an assistant, install charge air cooler (5) on two cooling system supports (3).
2. Perform Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

COOLANT RESERVOIR REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (**WP 0186**)
Cooling system drained (**WP 0176**)

Tools and Special Tools

Pan, Drain
Tool Kit, General Mechanic's: Automotive

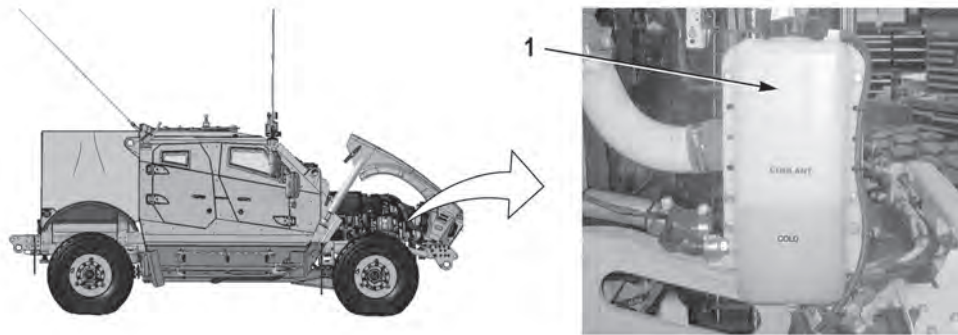
Materials/Parts

Locknut (6) (Item 6)
Cap and Plug Set
Compound, Sealing, Loctite 567
Tags, Identification
Ties, Cable

Follow-On Maintenance

Fill cooling system (**WP 0176**)
Connect batteries (**WP 0186**)
Remove and stow wheel chocks

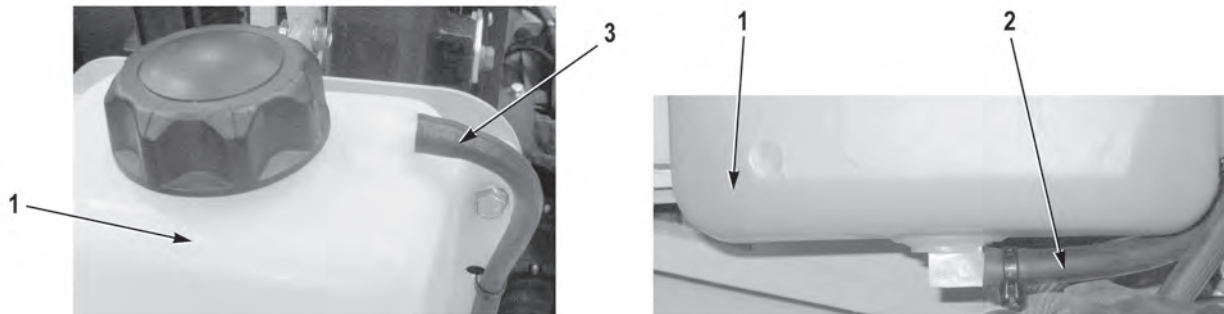
REMOVAL



WARNING

During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.

1. Position suitable drain pan under coolant reservoir (1).

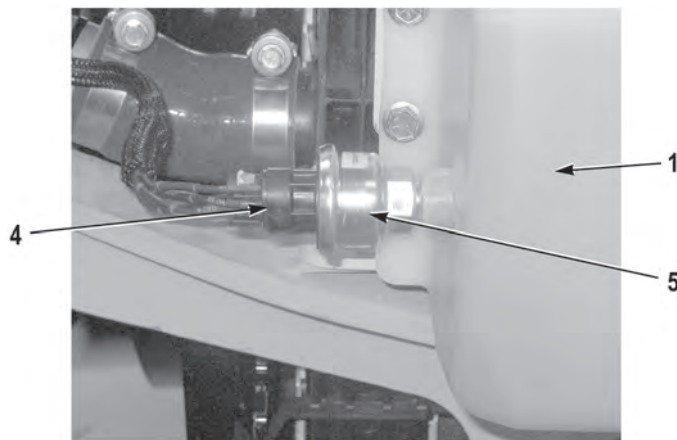


WARNING

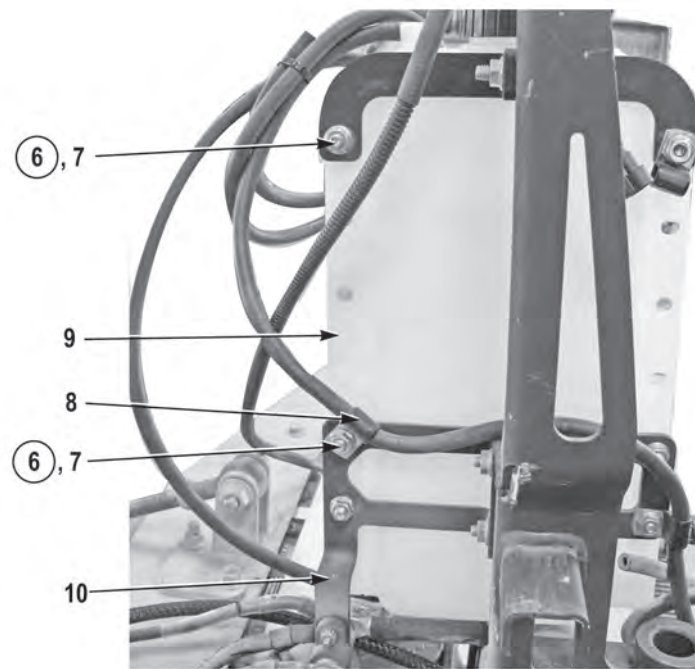
Coolant may splash during hose removal. Ensure personnel wear protective goggles. Failure to comply may result in injury to personnel.

NOTE

- Tag and mark hoses prior to removal to ensure proper installation.
 - Cap and plug hoses upon removal.
 - Remove cable ties as required.
2. Remove hose (2) from bottom of coolant reservoir (1).
 3. Remove hose (3) from top of coolant reservoir (1).



4. Disconnect connector (4) from coolant level switch (5).
5. Remove coolant level switch (5) from coolant reservoir (1).



NOTE

Note position of cushion clips prior to removal to ensure proper installation.

6. Remove six locknuts (6), screws (7), three cushion clips (8), and coolant reservoir (9) from bracket (10). Discard locknuts (6).

END OF TASK

INSTALLATION

NOTE

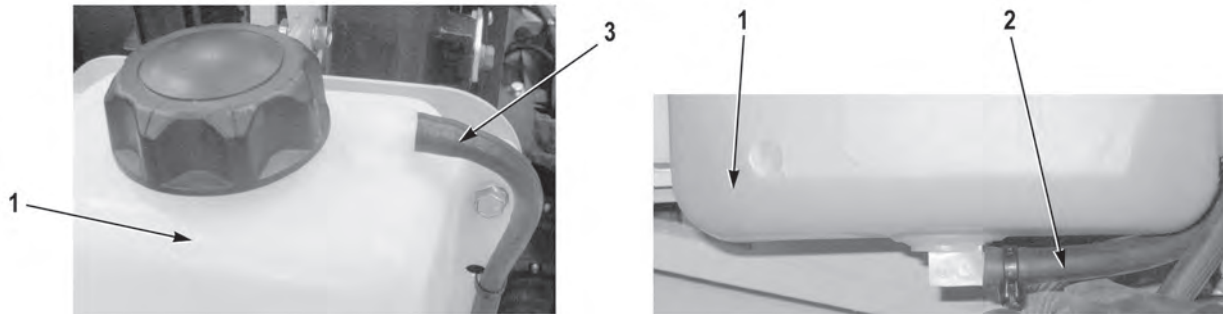
Install cushion clips as noted prior to removal.

1. Install coolant reservoir (9) and three cushion clips (8) on bracket (10) with six screws (7), and new locknuts (6).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

2. Apply sealing compound, Loctite 592, to threads of coolant level switch (5).
3. Install coolant level switch (5) on coolant reservoir (1).
4. Connect connector (4) to coolant level switch (5).

**NOTE**

Install cable ties as required.

5. Install hose (3) on top of coolant reservoir (1).
6. Install hose (2) on bottom of coolant reservoir (1).
7. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

COOLING SHROUD REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured
 Radiator baffles removed (if equipped) (WP 0181)

Materials/Parts

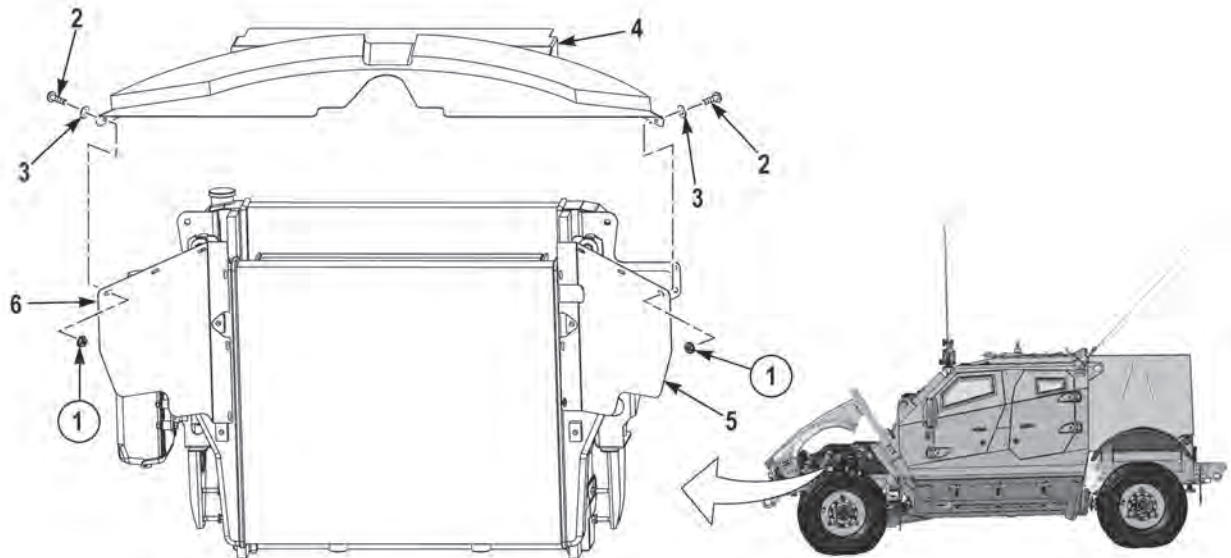
Locknut (12) (Item 1, 7, and 10)

Follow-On Maintenance

Install radiator baffles (if equipped) (WP 0181)
 Close hood and secure
 Remove and stow wheel chocks

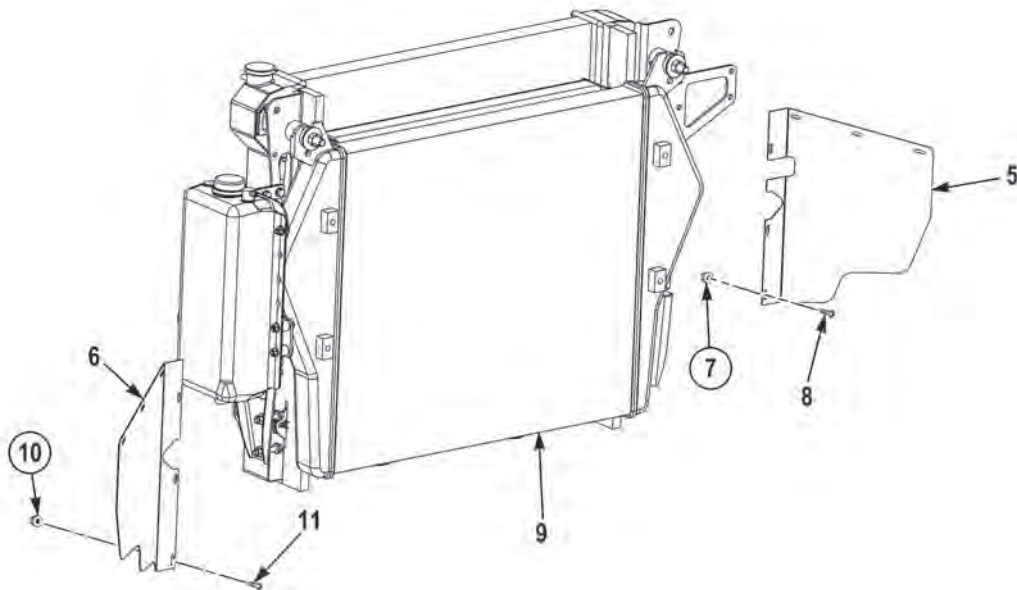
Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

REMOVAL**WARNING**

During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.

1. Remove four locknuts (1), screws (2), washers (3), and top cooling shroud (4) from side cooling shrouds (5 and 6). Discard locknuts (1).

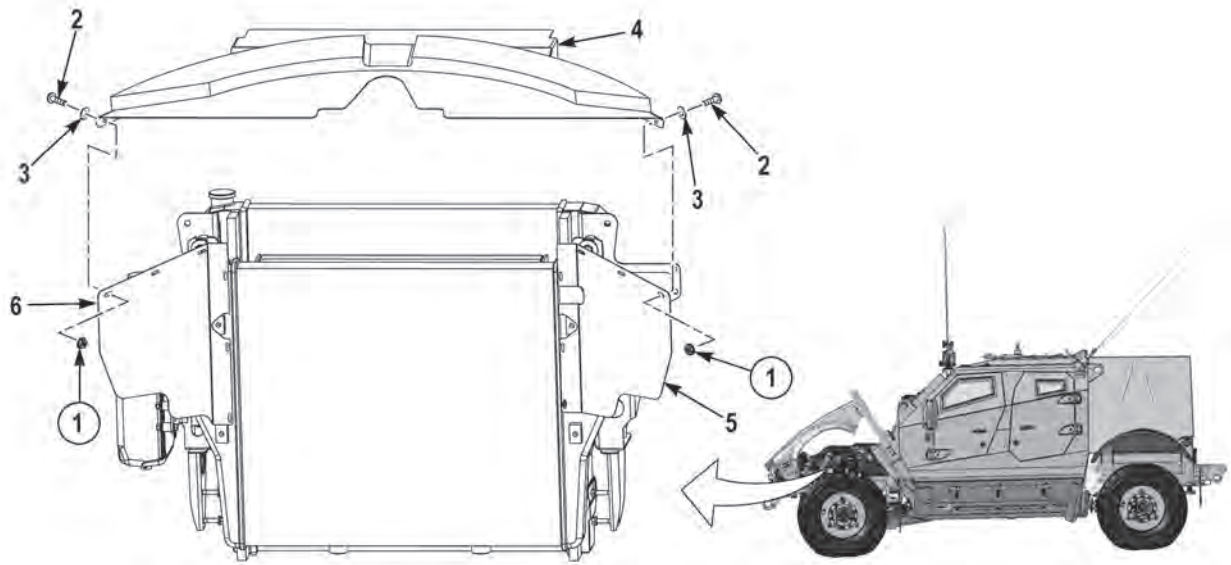


2. Remove four locknuts (7), screws (8), and driver side cooling shroud (5) from condenser (9). Discard locknuts (6).
3. Remove four locknuts (10), screws (11), and passenger side cooling shroud (6) from condenser (9). Discard locknuts (10).

END OF TASK

INSTALLATION

1. Install passenger side cooling shroud (6) on condenser (9) with four screws (11) and new locknuts (10).
2. Install driver side cooling shroud (5) on condenser (9) with four screws (8) and new locknuts (7).



3. Install top cooling shroud (4) on side cooling shrouds (6 and 5) with four washers (3), screws (2), and new locknuts (1).
4. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

COOLING SYSTEM ASSEMBLY AND SUPPORTS REMOVAL/INSTALLATION

Preconditions

System refrigerant evacuated (WP 0024)
Coolant reservoir removed (if equipped)
(WP 0173)
Fan and fan shroud removed (WP 0179)
Transmission drained (WP 0232)
Air intake hoses removed (M1240/M1245)
(WP 0260)
Air intake hoses removed (M1240A1) (WP 0261)

Tools and Special Tools

Lifting Device, Minimum Capacity 500 lbs
(227 kg)
Pan, Drain
Shackles Qty: 2
Strap, Nylon
Tool Kit, General Mechanic's: Automotive
Wrench, Torque, 0 to 300 in-lb
Wrench, 1 5/8 in.

Materials/Parts

Cap and Plug Set
Lubricating Oil, Engine

Materials/Parts (Continued)

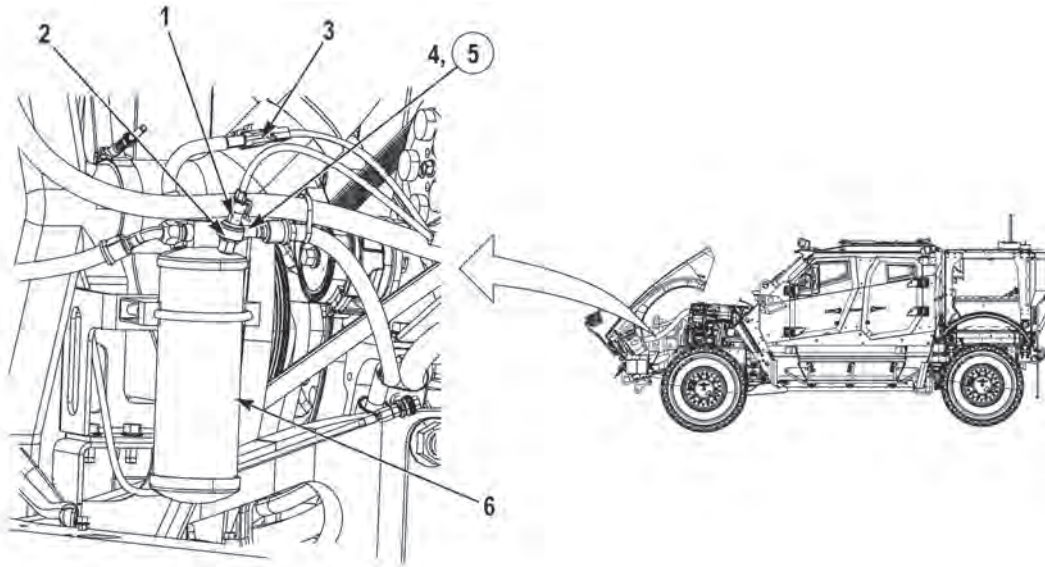
Refrigeration Oil, Type P.A.G.
Sealant, RTV
Tags, Identification
Ties, Cable
O-ring (Item 5)
O-ring (Item 8)
Locknut (2) (Items 17, 23)
O-ring (2) (Items 28, 31)
Locknut (8) (Items 36, 40)

Personnel Required:

Maintainer (2)

Follow-On Maintenance

Install air intake hoses (M1240/M1245)
(WP 0260)
Install air intake hoses (M1240A1) (WP 0261)
Install coolant reservoir (if equipped) (WP 0173)
Install fan and fan shroud (WP 0179)
Fill transmission (WP 0232)
Charge system refrigerant (WP 0024)

REMOVAL**NOTE**

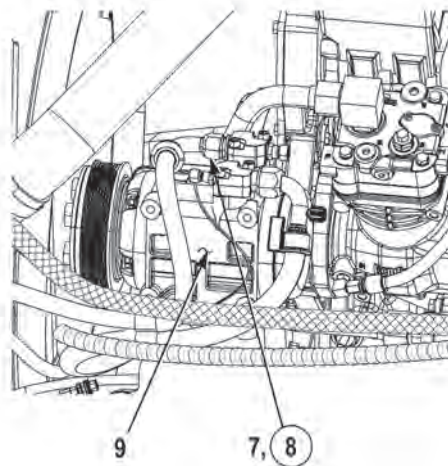
Tag and mark wires and connectors prior to removal to ensure proper installation.

1. Disconnect connector (1) from air conditioner binary switch (2).
2. Disconnect connector (3).

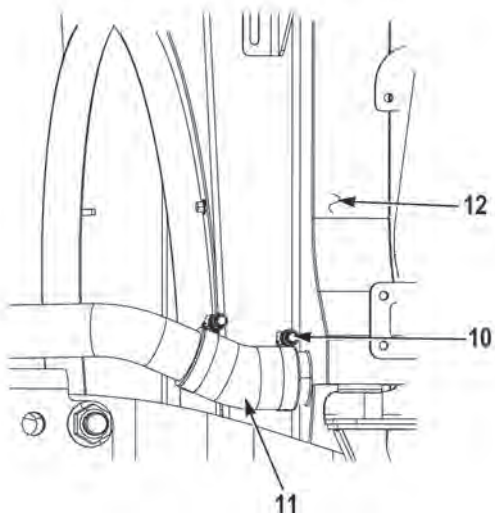
NOTE

- Remove cable ties as required.
- Cap and plug hoses and fittings upon removal.

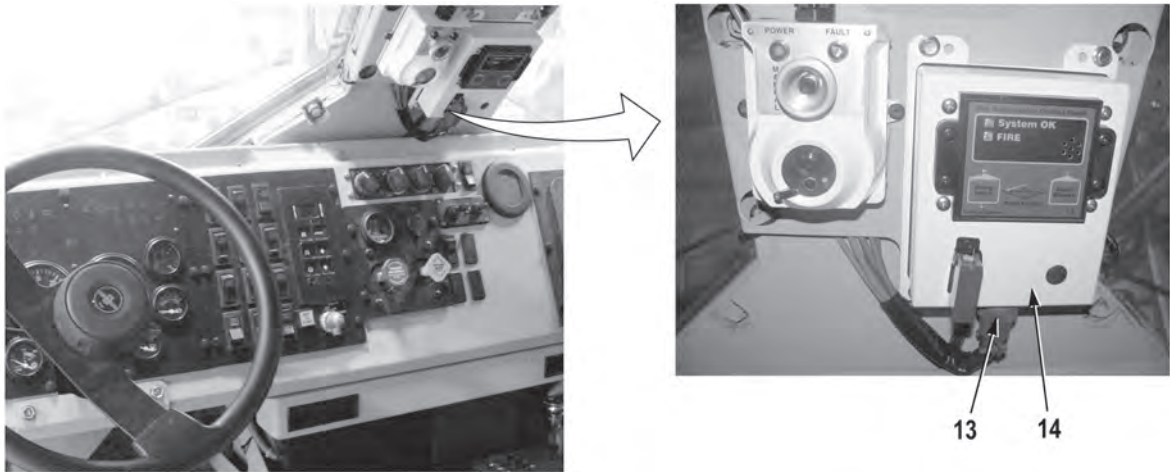
3. Remove hose (4) and O-ring (5) from receiver/dryer (6). Discard O-ring (5).



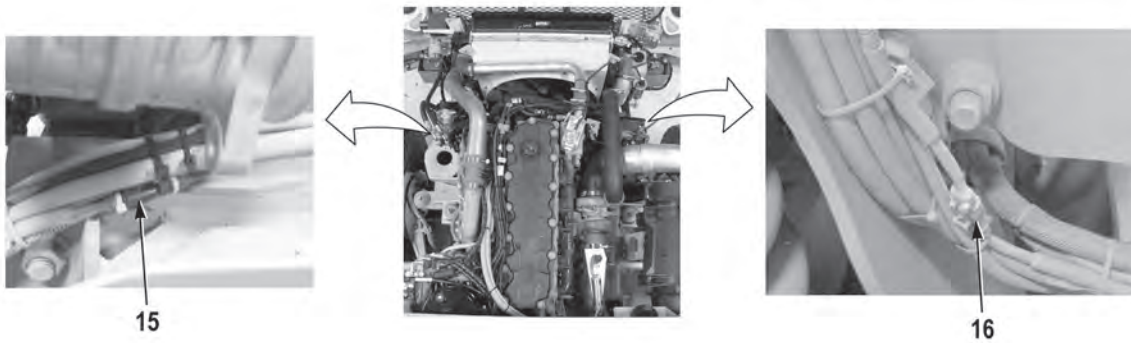
4. Remove hose (7) and O-ring (8) from A/C compressor (9). Discard O-ring (8).



5. Loosen clamp (10) and remove hose (11) from radiator (12).



6. Disconnect connector (13) from fire suppression control panel (14).

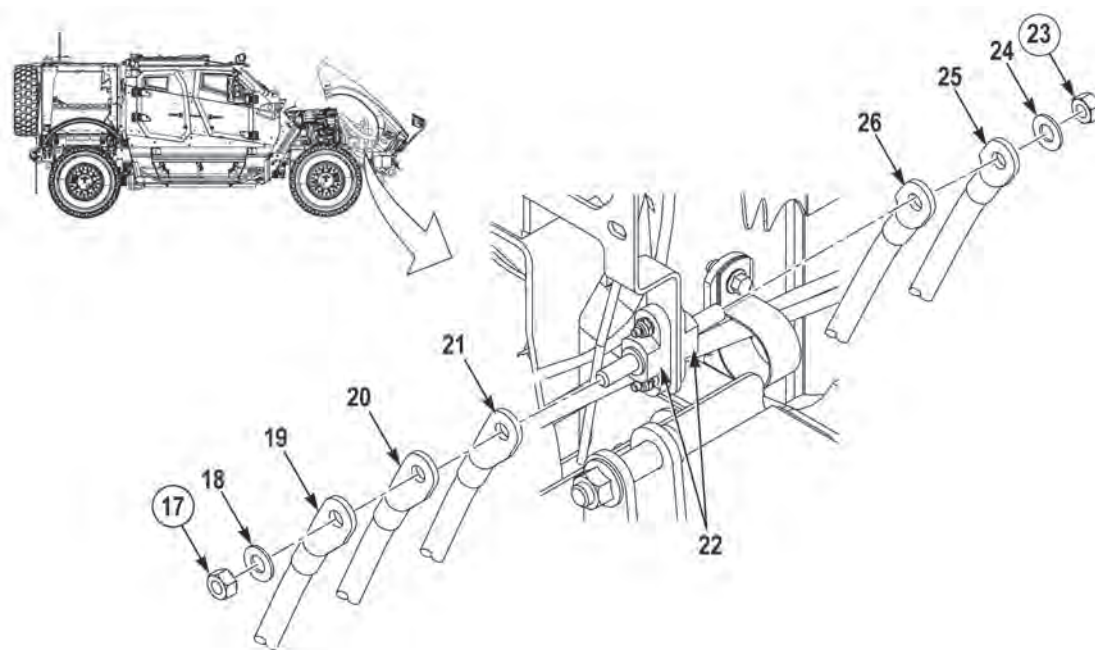


NOTE

- Yellow cable ties identify connectors to aerosol generator.
- Green cable ties identify connectors to aerosol generator sensors and linear sensor wire.
- Remove cable ties as required.
- Tag and mark wire connectors prior to removal to ensure proper installation.

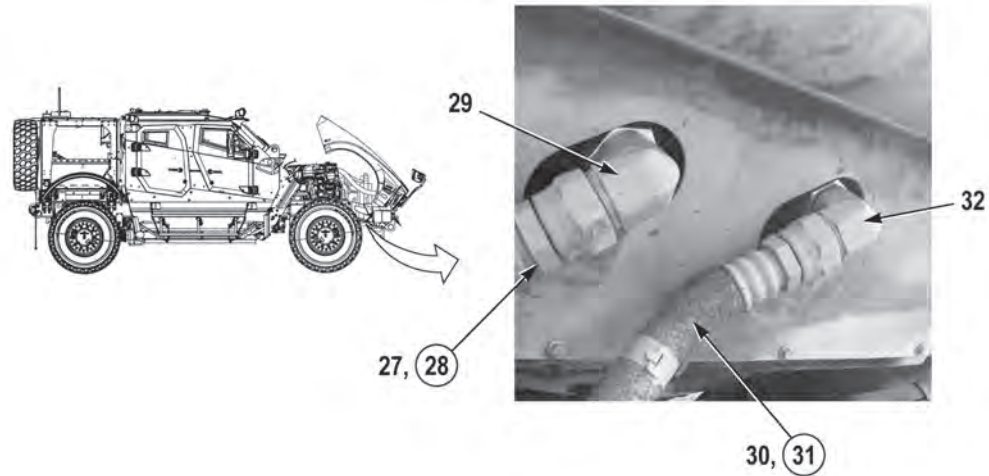
7. Disconnect connector (15).

8. Disconnect connector (16).



9. Remove locknut (17), washer (18), negative winch cable (19), cable (20), and cable (21) from junction block (22). Discard locknut (17).

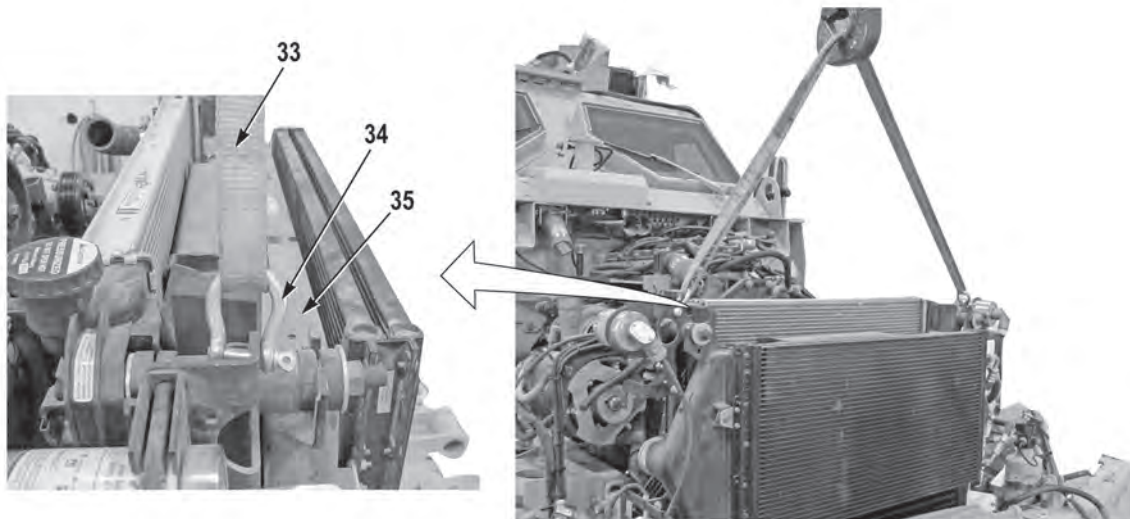
10. Remove locknut (23), washer (24), positive winch cable (25), and cable (26) from junction block (22). Discard locknut (23).



NOTE

Cap and plug hoses and fittings upon removal.

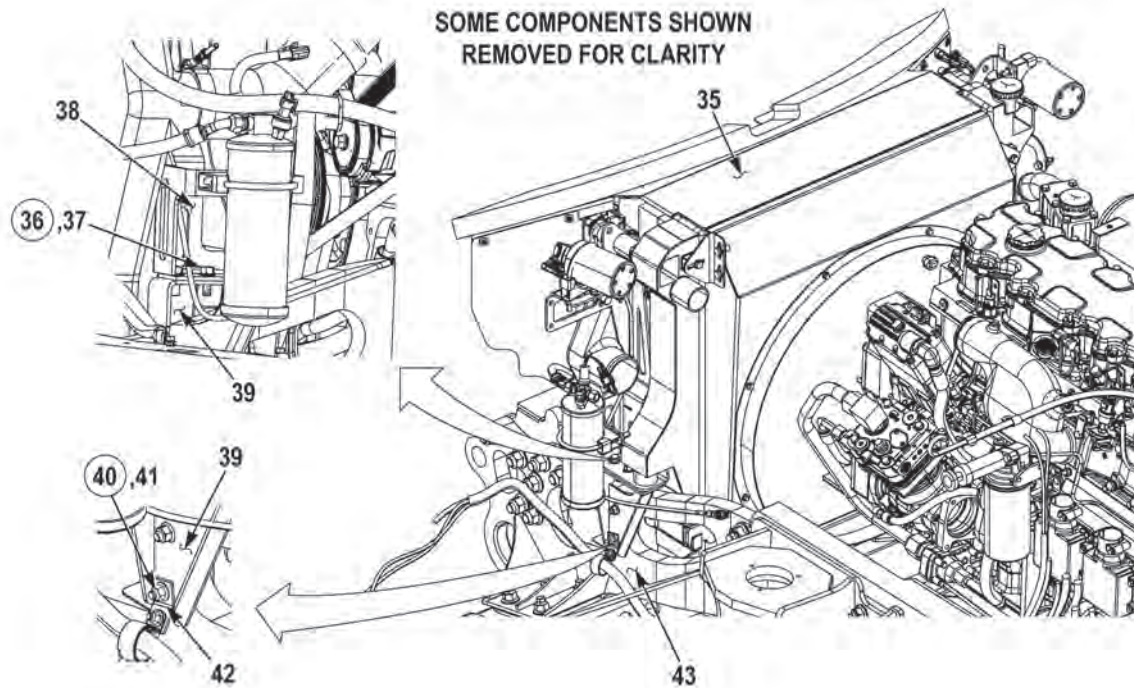
11. Remove hose (27) and O-ring (28) from fitting (29). Discard O-ring (28).
12. Remove hose (30) and O-ring (31) from fitting (32). Discard O-ring (31).



WARNING

Cooling system assembly weighs approximately 400 lbs (182 kg). Do not attempt to lift or move cooling system assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

13. Install nylon strap (33), two shackles (34), and lifting device on cooling system assembly (35) as shown.



14. Remove two locknuts (36) and screws (37) from cooling support (38) and cooling support bracket (39). Discard locknuts (36).
15. Repeat Step (14) for passenger side cooling support.
16. With the aid of an assistant and a lifting device (33), remove cooling system assembly (35) from cooling support brackets (39) and vehicle.
17. Remove lifting device, nylon strap (33), and two shackles (34) from cooling system assembly (35).

NOTE

- Perform Steps (18) and (19) if removing cooling support brackets.
- Driver side and passenger side cooling brackets are removed the same way. Driver side shown.

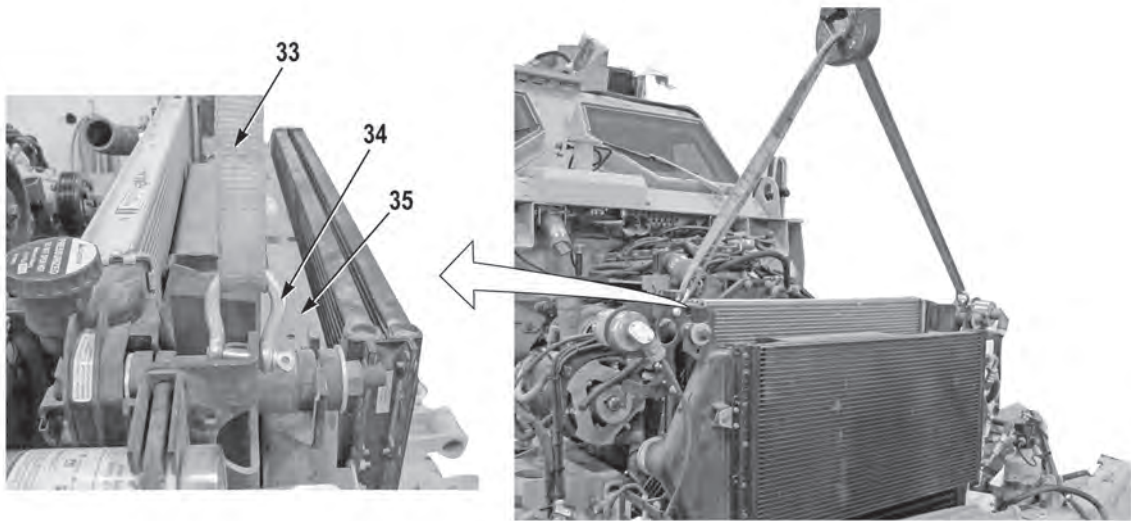
18. Remove two locknuts (40), screws (41), standoff bracket (42), and cooling support bracket (39) from frame extension (43). Discard locknuts (40).
19. Repeat Step (19) for passenger side cooling support bracket.

END OF TASK

INSTALLATION

NOTE

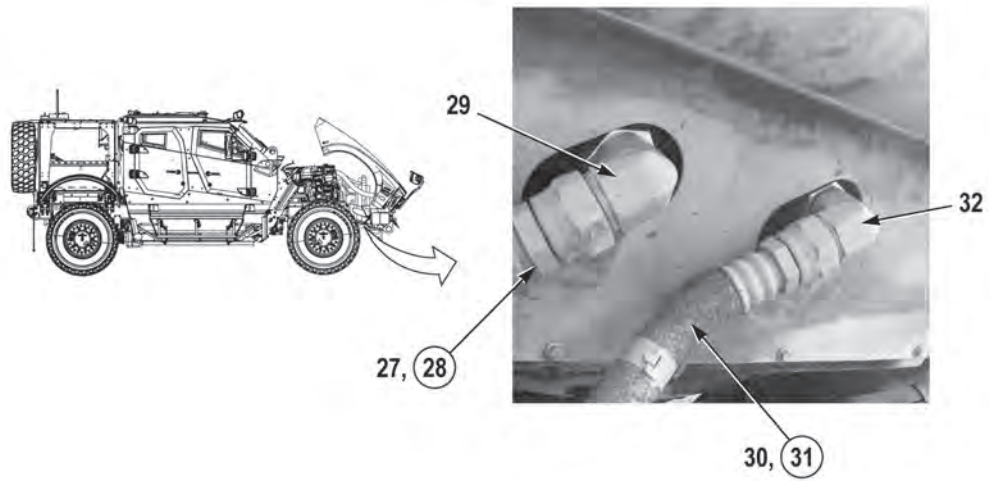
- Perform Steps (1) and (2) if cooling support brackets were removed.
 - Driver side and passenger side cooling support brackets are installed the same way. Driver side shown.
1. Install cooling support bracket (39) and standoff bracket (42) on frame extension (43) with two screws (41) and new locknuts (40).
 2. Repeat Step (1) for passenger side cooling support.



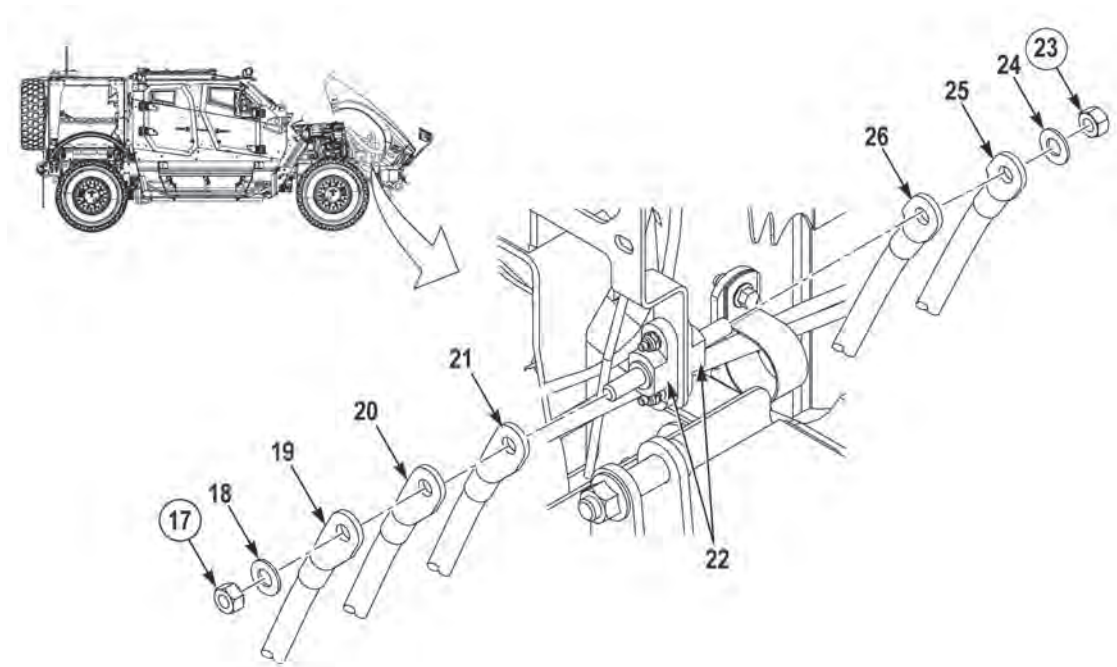
WARNING

Cooling system assembly weighs approximately 400 lbs (182 kg). Do not attempt to lift or move cooling system assembly without the aid of an assistant and a lifting device. Failure to comply may result in injury or death to personnel.

3. Install lifting device, nylon strap (33), and two shackles (34) on cooling system assembly (35) as shown.
4. With the aid of an assistant and a lifting device, position cooling system assembly (35) on vehicle and cooling support brackets (39).
5. Secure cooling support (38) on cooling support bracket (39) with two screws (37) and new locknuts (36).
6. Repeat Step (4) for passenger side cooling support.
7. Remove two shackles (34) and lifting device (33) from cooling system assembly (35).



8. Lightly lubricate new O-ring (31) with clean oil and install new O-ring (31) and hose (30) on fitting (32).
9. Lightly lubricate new O-ring (28) with clean oil and install new O-ring (28) and hose (27) on fitting (29).

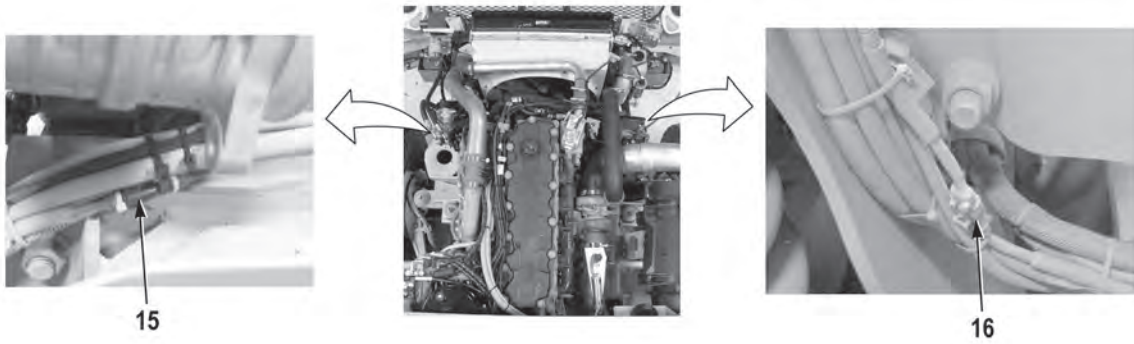


10. Install cable (26) and positive winch cable (25) on junction block (22) with washer (24) and new locknut (23).
11. Install cable (21), cable (20), and negative winch cable (19) on junction block (22) with washer (18) and new locknut (17).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

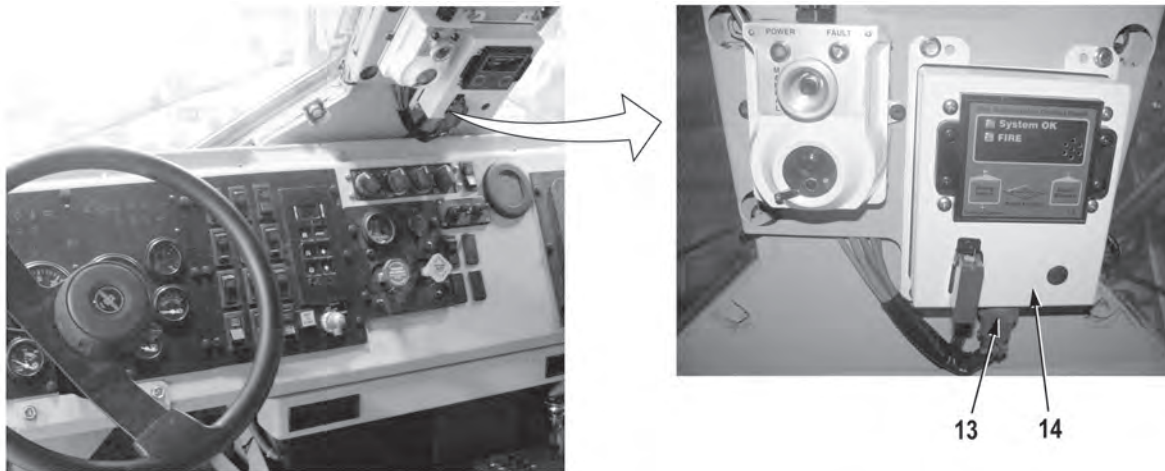
12. Apply RTV sealant to junction blocks (22) and all exposed cable ends.



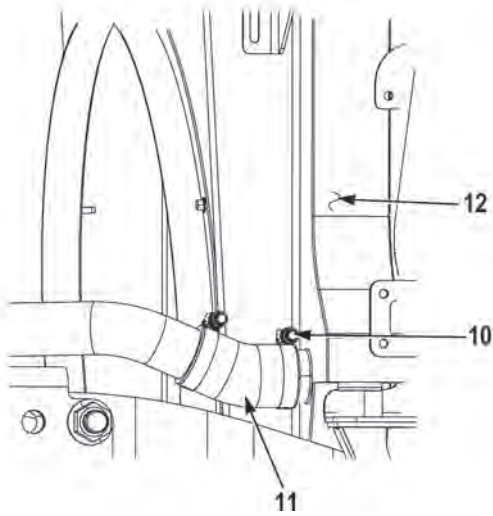
NOTE

Install cable ties as required.

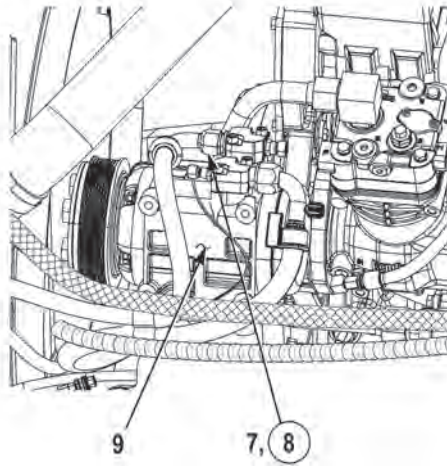
- 13. Connect connector (16).
- 14. Connect connector (15).



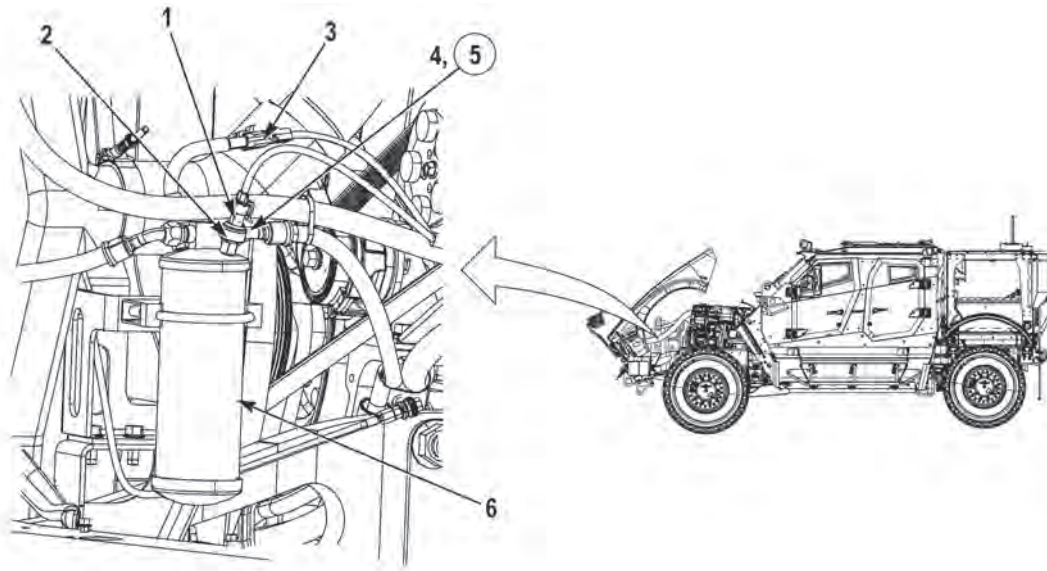
- 15. Connect connector (13) on fire suppression control panel (14).



16. Install hose (11) on radiator (12) with clamp (10). Tighten clamp (10) to 40 lb-in (5 N•m).



17. Lightly lubricate new O-ring (8) with clean P.A.G. oil and install new O-ring (8) and hose (7) on A/C compressor (9).



18. Lightly lubricate new O-ring (5) with clean P.A.G. oil and install new O-ring (5) and hose (4) on receiver/dryer (6).

NOTE

Install cable ties as required.

19. Connect connector (3).
20. Connect connector (1) to air conditioner binary switch (2).

CAUTION

Ensure engine is full of oil prior to starting engine. Failure to comply may result in damage to equipment.

21. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

COOLING SYSTEM DRAIN/FILL (RESERVOIR EQUIPPED)

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood opened and secure

Tools and Special Tools

Pan, Drain
Tool Kit, General Mechanic's: Automotive

Materials/Parts

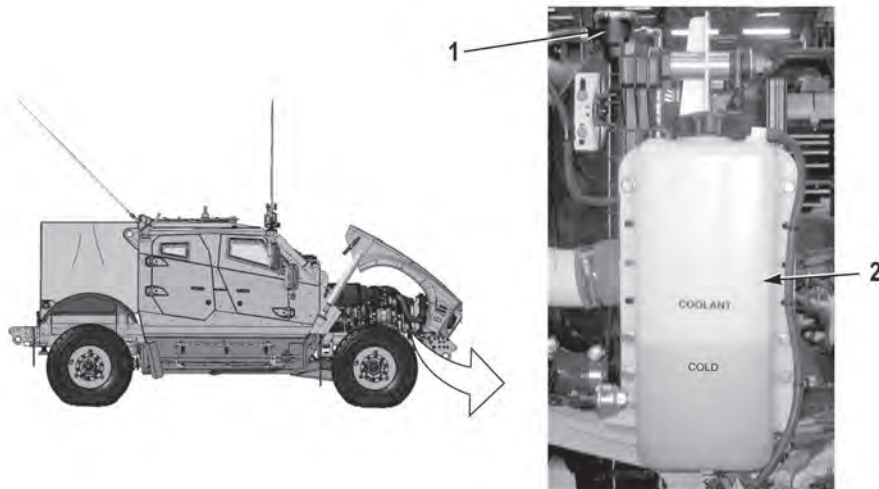
Antifreeze/Coolant
Ties, Cable

References

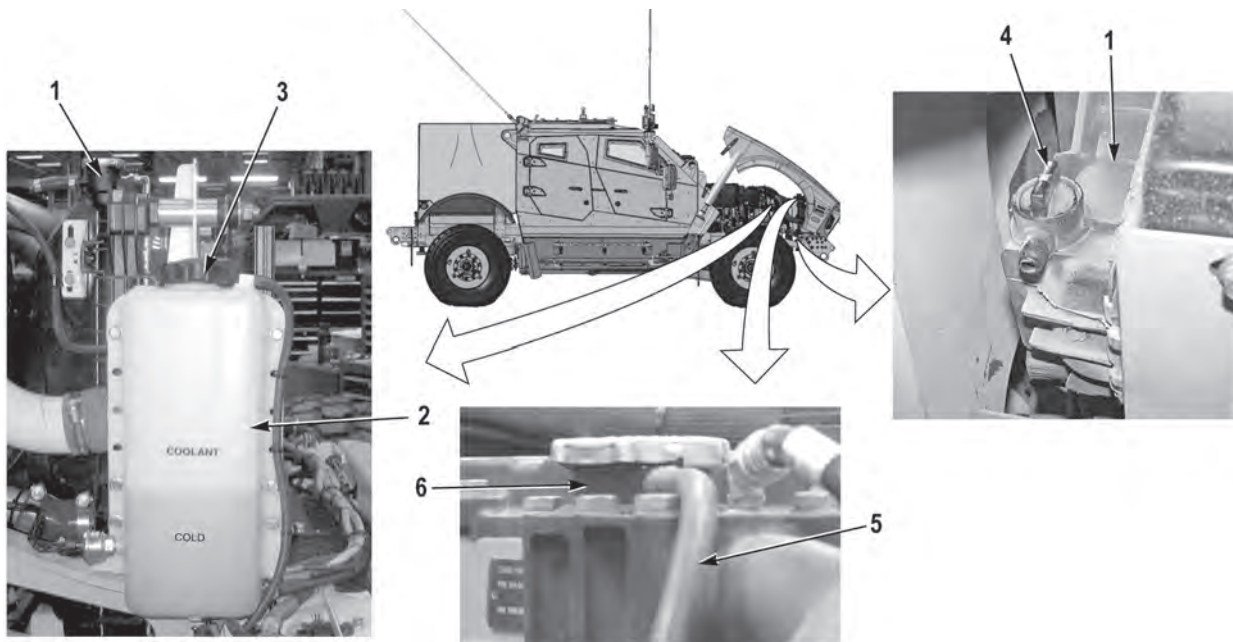
TM 9-2355-335-10

Follow-On Maintenance

Close hood and secure
Remove and stow wheel chocks

DRAIN

1. Position suitable drain pan under radiator (1) and coolant reservoir (2).



WARNING

- Turn cap on coolant reservoir bottle one half turn and stop prior to removing cap completely. Pressure must be relieved from coolant reservoir bottle prior to removal of cap or injury to personnel may occur.
- During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.

NOTE

Vehicle should be parked on level surface when performing this task.

2. Turn cap (3) on coolant reservoir (2) 1/2 turn to relieve pressure.
3. Remove cap (3) from coolant reservoir (2).
4. Open drain valve (4) 1/4 turn counterclockwise on radiator (1) and drain radiator (1) completely.
5. Close drain valve (4) 1/4 turn clockwise on radiator (1).

NOTE

Remove cable ties as required.

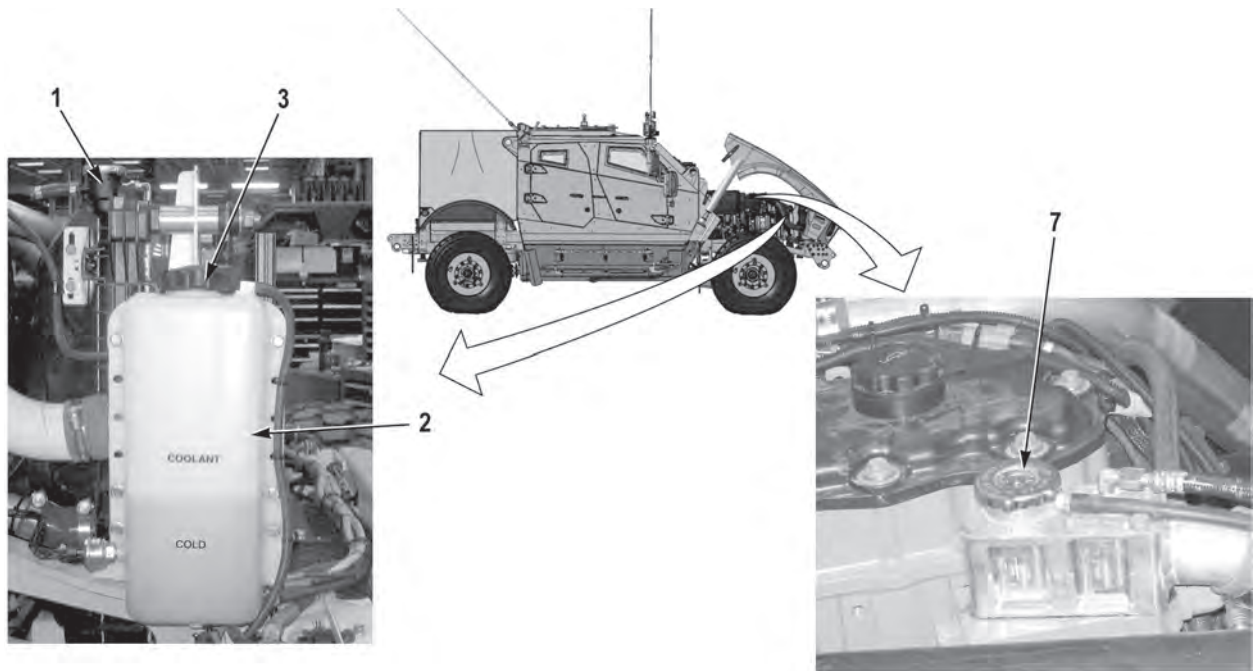
6. Remove hose (5) from coolant fill (6) and drain coolant reservoir (2) completely.

NOTE

Install cable ties as required.

7. Install hose (5) on coolant fill (6).

END OF TASK

FILL

1. Fill cooling system until full. Install cooling system fill cap (7).
2. Start engine and allow engine to idle for approximately 2 to 4 minutes.
3. Shut off engine.
4. Remove cap (3) from coolant reservoir (2) and fill coolant until level is at the COLD mark.
5. Install cap (3) on coolant reservoir (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

COOLING SYSTEM DRAIN/FILL (SURGE TANK EQUIPPED)

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Lower radiator baffle removed (if equipped)
 (WP 0181)

Tools and Special Tools

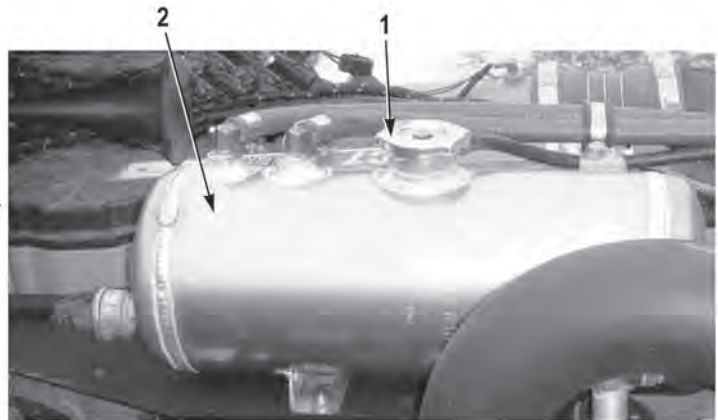
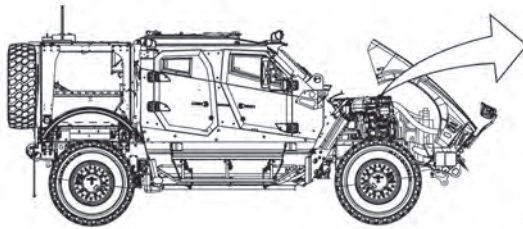
Pan, Drain, 5 gallon (2)
 Tool Kit, General Mechanic's: Automotive

Materials/Parts

Antifreeze/Coolant
 Rags, Wiping

Follow-On Maintenance

Install lower radiator baffle (if equipped)
 (WP 0181)
 Remove and stow wheel chocks

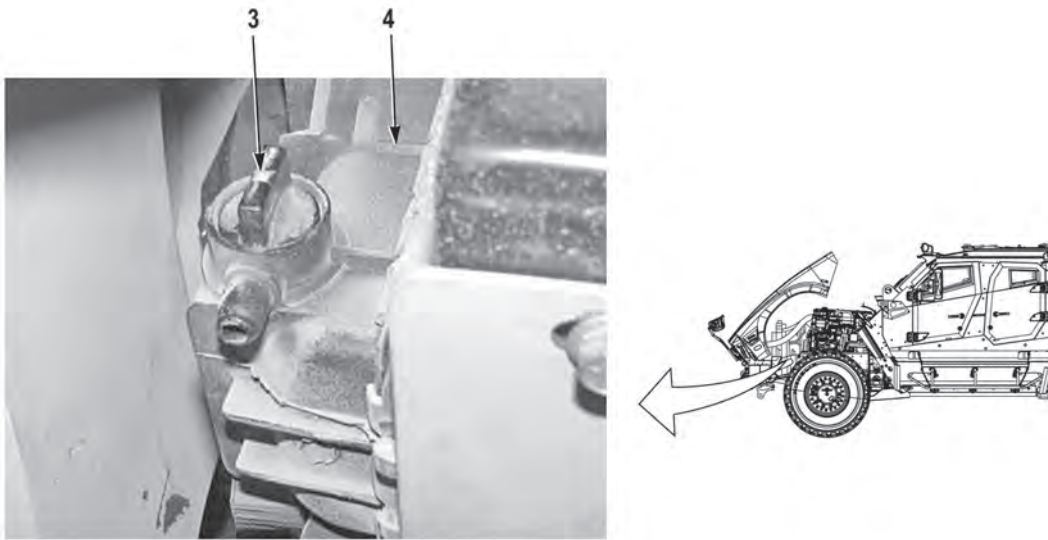
DRAIN**WARNING**

During normal vehicle operation, cooling system components can become very hot. Allow cooling system to cool prior to servicing. Wear face shield and use extreme care when removing surge tank cap. Sudden release of pressure can cause a steam flash. Slowly loosen surge tank cap to the first stop to relieve pressure before removing surge tank cap completely. Use a clean, thick waste cloth or like material to remove surge tank cap. Avoid using gloves. If hot coolant soaks through gloves, personnel could be burned. Failure to comply may result in injury or death to personnel.

NOTE

Vehicle should be parked on level surface when performing this task.

1. Slowly loosen surge tank cap (1) to first position and allow pressure to bleed off.
2. Allow surge tank cap (1) to remain at first position until all pressure is released.
3. Remove cap (1) from surge tank (2).

**NOTE**

- Cooling system capacity is approximately 31 qt. (29.3 L).
- Position drain pan under radiator drain valve.
- Alternate drain pans as required to keep drain pans from overflowing.

4. Loosen radiator drain valve (3) and drain radiator (4).

END OF TASK**FILL**

1. Tighten radiator drain valve (3) on radiator (4).

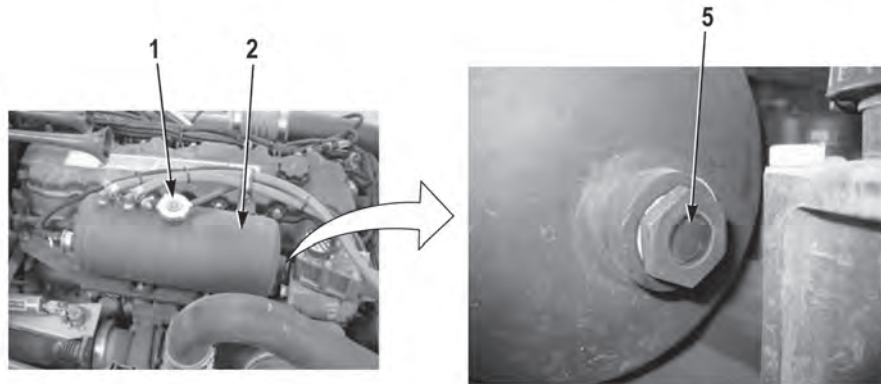
CAUTION

If coolant is being replaced, mix coolant into 50/50 mixture of coolant and distilled water. Do not have more than 60% coolant in mixture. Failure to comply may result in damage to equipment.

NOTE

Cooling system capacity is approximately 31 qt (29.3 L).

2. Fill cooling system at surge tank (2).



3. Add coolant until sight glass (5) is full.
4. Install surge tank cap (1) on surge tank (2).
5. Start engine and allow to idle for approximately 2 to 4 minutes.

WARNING

During normal vehicle operation, cooling system components can become very hot. Allow cooling system to cool prior to servicing. Wear face shield and use extreme care when removing surge tank cap. Sudden release of pressure can cause a steam flash. Slowly loosen surge tank cap to the first stop to relieve pressure before removing surge tank cap completely. Use a clean, thick waste cloth or like material to remove surge tank cap. Avoid using gloves. If hot coolant soaks through gloves, personnel could be burned. Failure to comply may result in injury or death to personnel.

6. Remove surge tank cap (1) from surge tank (2).
7. Add coolant to surge tank (2) and fill as required.
8. Install surge tank cap (1) on surge tank (2).
9. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

FAN CLUTCH REPLACEMENT

Preconditions

Park vehicle
 Hood opened and secure
 Engine OFF
 Wheels chocked
 Air system drained
 Fan removed (WP 0179)
 Air conditioner drive belt removed (WP 0220)
 Charge air cooler inlet tube and hoses removed (M1240/M1245) (WP 0260)
 Charger air cooler inlet tube and hoses removed (M1240A1) (WP 0261)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive

Personnel

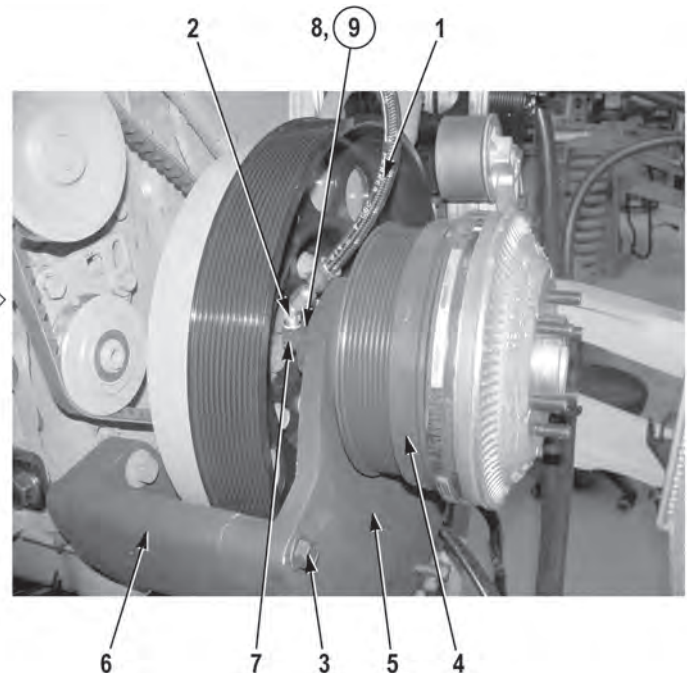
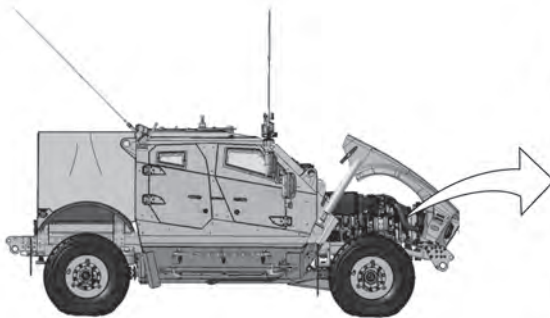
Two

Materials/Parts

Lockwasher (Item 9)
 Cap and Plug Set
 Compound, Sealing, Loctite 592
 Tags, Identification

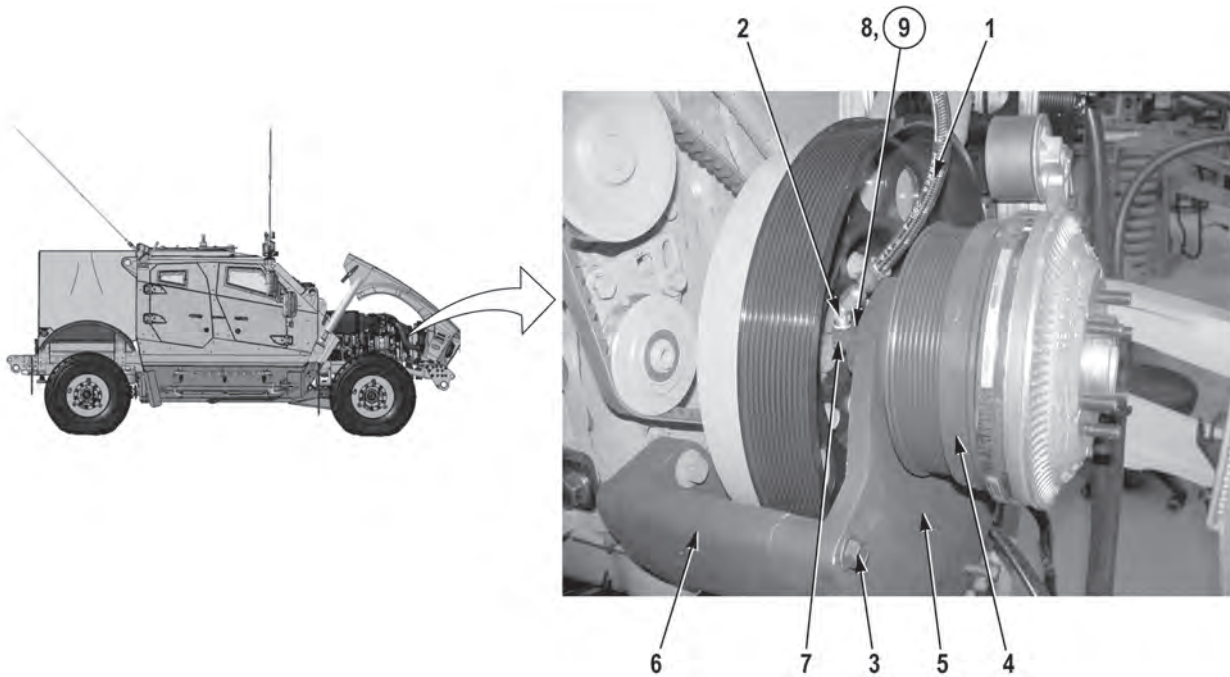
Follow-On Maintenance

Install charge air cooler inlet tube and hoses (M1240A1) (WP 0261)
 Install charge air cooler inlet tube and hoses (M1240/M1245) (WP 0260)
 Install air conditioner drive belt (WP 0220)
 Install fan (WP 0179)
 Close hood and secure
 Remove and stow wheel chocks

REMOVAL**NOTE**

- Tag and mark hoses and fittings prior to removal to ensure proper installation.
- Cap and plug hoses and fittings upon removal.

1. Remove hose (1) from fitting (2).

**NOTE**

Remove cushion clips as required.

2. With the aid of an assistant, remove five screws (3), fan clutch (4), and mounting bracket (5) from front engine support (6).

NOTE

Note position of fittings prior to removal to ensure proper installation.

3. Remove fitting (2) from fitting (7).
4. Remove fitting (7) from fan clutch (4).
5. Remove nut (8), lockwasher (9), and fan clutch (4) from mounting bracket (5). Discard lockwasher (9).

END OF TASK

INSTALLATION

1. Install fan clutch (4) on mounting bracket (5) with new lockwasher (9) and nut (8).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

2. Apply sealing compound, Loctite 592, to threads of fitting (7) and install fitting (7) on fan clutch (4).
3. Apply sealing compound, Loctite 592, to threads of fitting (2) and install fitting (2) on fitting (7).

NOTE

Install cushion clips as required.

4. With the aid of an assistant, install fan clutch (4) and mounting bracket (5) on front engine support (6) with five screws (3).
5. Install hose (1) on fitting (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

FAN AND FAN SHROUD REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood removed (AFES Nitrogen Detection)
(WP 0158)
Hood removed (AFES Linear Wire Detection)
(WP 0157)
Hood removed (M1245) (WP 0156)
Radiator drained (Reservoir equipped) (WP 0176)
Radiator drained (Surge tank equipped)
(WP 0177)
Radiator baffles removed (as required)
(WP 0181)
Cooling shroud removed (WP 0174)

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive
Wrench, Torque 300 in-lb
Wrench, Torque 75 lb-ft

Materials/Parts

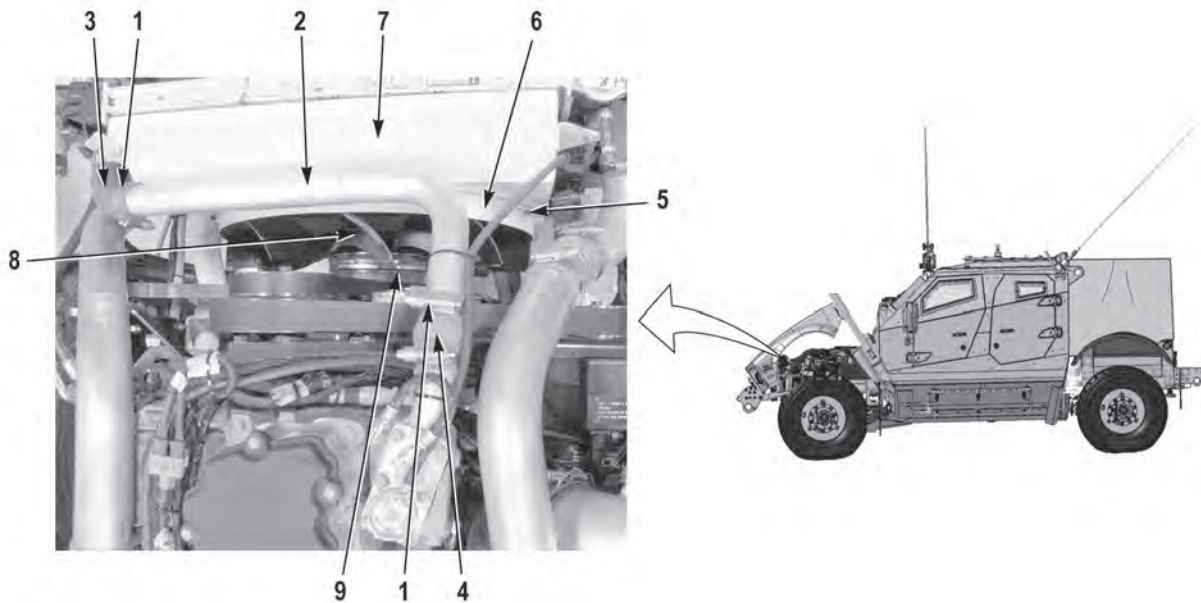
Lockwashers (6) (Item 11)
Ties, Cable

Personnel Required

Two

Follow-On Maintenance

Install cooling shroud (WP 0174)
Install radiator baffles (as required) (WP 0181)
Fill radiator (Reservoir equipped) (WP 0176)
Fill radiator (Surge tank equipped) (WP 0177)
Install hood (M1245) (WP 0156)
Install hood (AFES Nitrogen Detection)
(WP 0158)
Install hood (AFES Linear Wire Detection)
(WP 0157)
Remove and stow wheel chocks

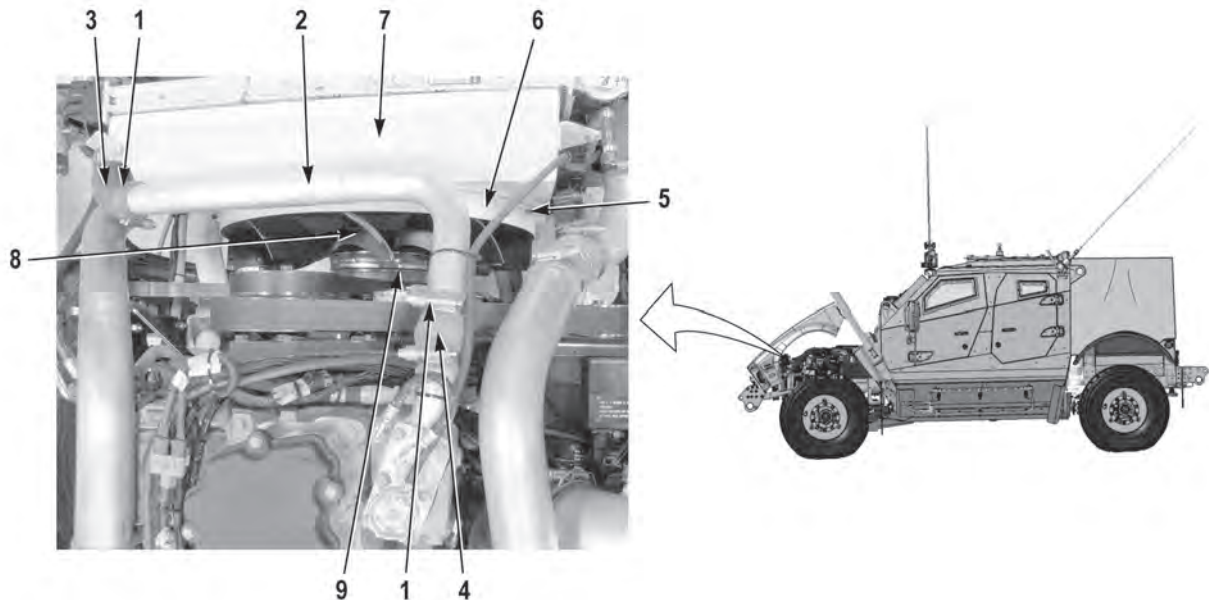
REMOVAL**WARNING**

Engine components become hot during normal operation. Allow engine to cool completely prior to performing this task. Failure to comply may result in injury or death to personnel.

NOTE

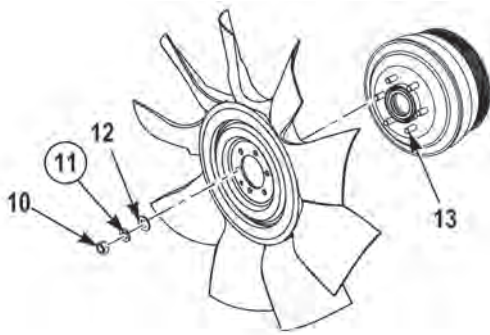
Remove cable ties as required.

1. Loosen two clamps (1) and remove coolant tube (2) from two hoses (3 and 4).

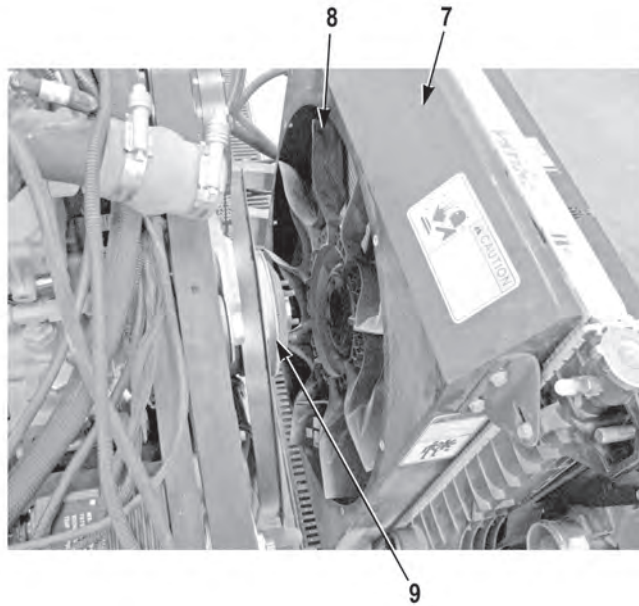


NOTE

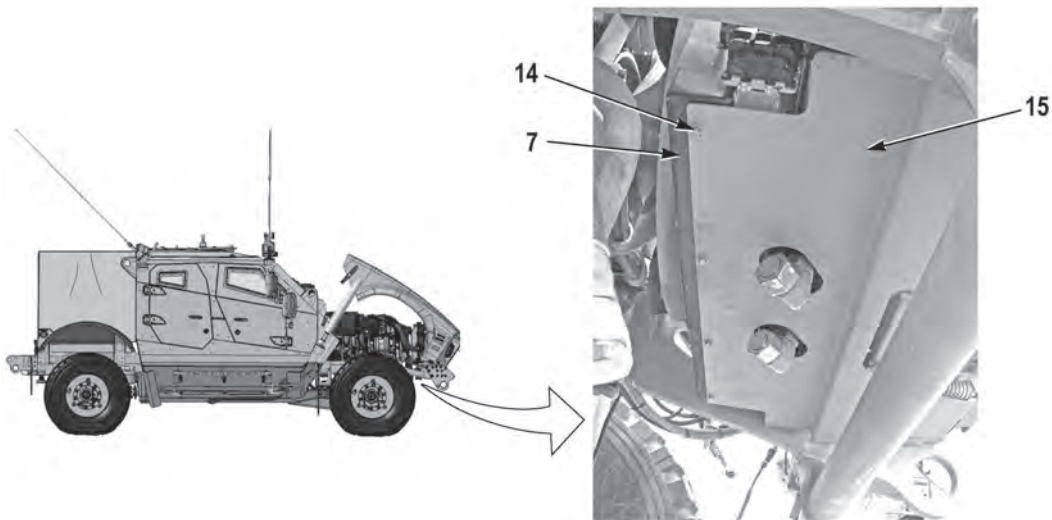
- Fan and fan shroud housing are removed from the vehicle in the same Step.
 - Shroud ring should be resting on fan clutch assembly until fan and shroud housing have been removed.
2. Remove eight screws (5) and shroud ring (6) from shroud housing (7). Move shroud ring (6) rearward over fan (8) and rest on the fan clutch assembly (9).



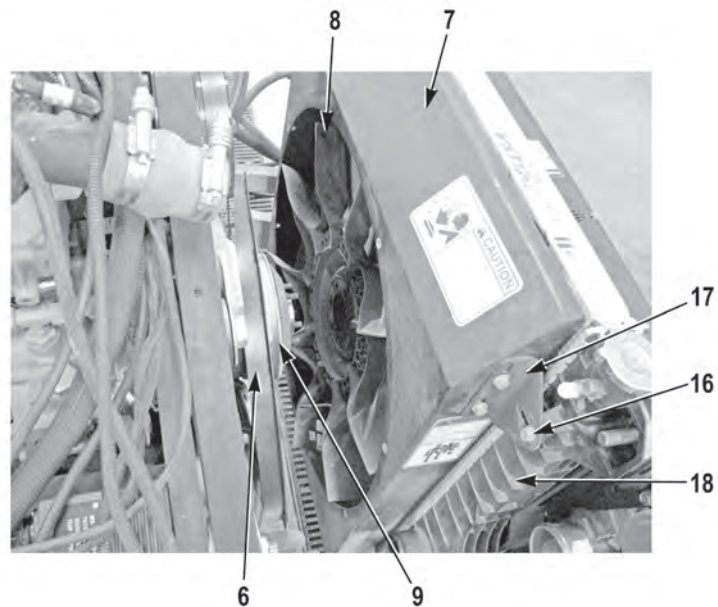
3. Remove six nuts (10), lockwashers (11) and washers (12) from studs (13). Discard lockwashers (11).



- Slide fan (8) forward from fan clutch assembly (9) and rest inside shroud housing (7).



- Remove four screws (14) from plate (15) and shroud housing (7).



NOTE

Both fan shroud housing brackets are removed the same way. Passenger side shown.

6. Remove two screws (16) from shroud housing bracket (17) and radiator (18).

CAUTION

Fan shroud housing and fan are difficult to remove. Remove with the aid of an assistant and use care not to damage radiator. Failure to comply may result in damage to equipment.

NOTE

Note position of bottom shroud housing tabs on radiator guides prior to removal to ensure proper installation.

7. With the aid of an assistant, remove fan (8), and shroud housing (7) from vehicle.
8. Remove shroud ring (6) from fan clutch assembly (9) and vehicle.

END OF TASK

INSTALLATION**CAUTION**

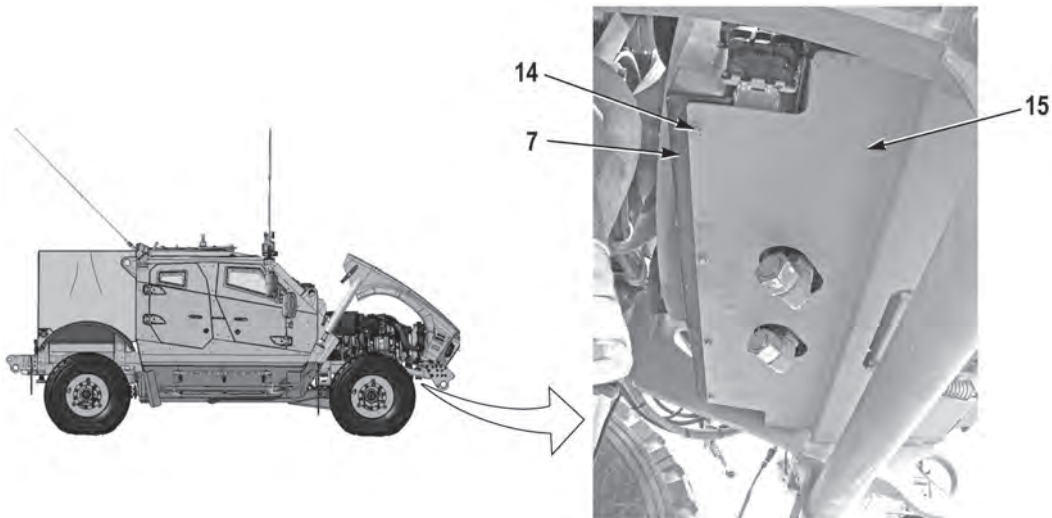
Fan shroud housing and fan are difficult to install. Use care not to damage radiator. Install with the aid of an assistant. Failure to comply may result in damage to equipment.

1. Position shroud ring (6) on fan clutch assembly (9).

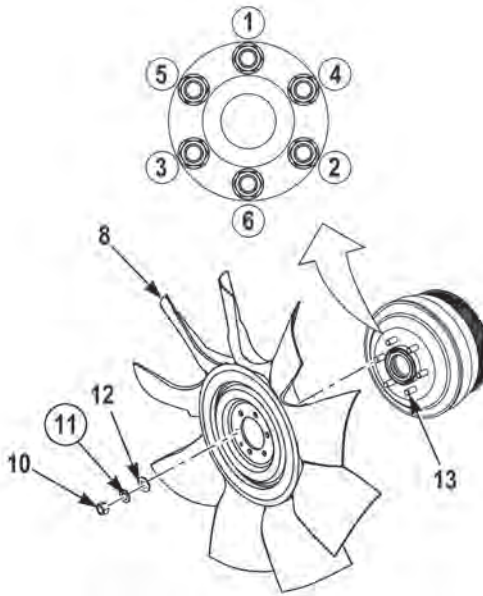
NOTE

Install bottom shroud housing tabs on radiator guides as noted prior to removal.

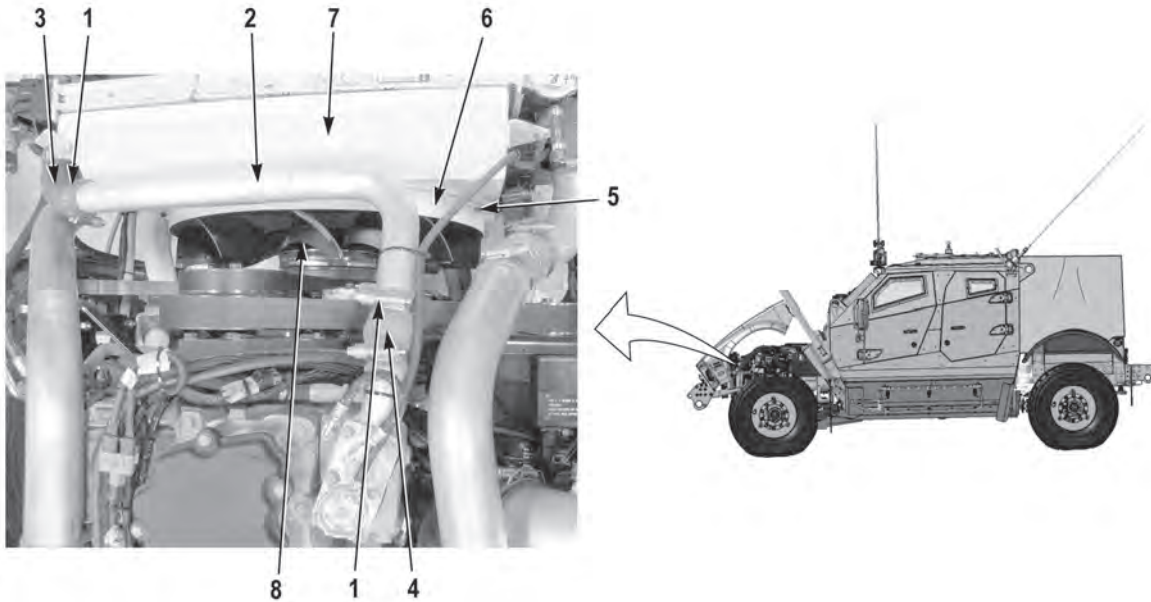
2. With the aid of an assistant, lower shroud housing (7) and fan (8) into position behind radiator (18).
3. Install shroud housing bracket (17) on radiator (18) with two screws (16).



4. Secure plate (15) on shroud housing (7) with four screws (14).



5. Install fan (8) on studs (13) and fan clutch assembly (9) with six washers (12), new lockwashers (11) and nuts (10). Tighten nuts to 25 lb-ft (34 N•m) as shown.
6. Install shroud ring (6) on shroud housing (7) with eight screws (5).



NOTE

Install cable ties as required.

7. Install coolant tube (2) on two hoses (4 and 3) and tighten two clamps (1) to 90 to 100 lb-in (5.65 to 14.13 N•m).
8. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

RADIATOR AND TRANSMISSION OIL COOLER REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Hood removed (AFES Nitrogen Detection)
(WP 0158)
Hood removed (AFES Linear Wire Detection)
(WP 0157)
Hood removed (M1245) (WP 0156)
Radiator drained (Reservoir Equipped)
(WP 0176)
Radiator drained (Surge Tank Equipped)
(WP 0177)
Transmission drained (WP 0232)
Air intake hoses removed (M1240/M1245)
(WP 0260)
Air intake hoses removed (M1240A1) (WP 0261)
Fan and fan shroud removed (WP 0179)

Tools and Special Tools

Cap and Plug set
Pan, Drain
Socket, Deep Well, 7/8 in.
Tool Kit, General Mechanic's: Automotive
Wrench, Combination, 1-5/8 in.

Materials/Parts

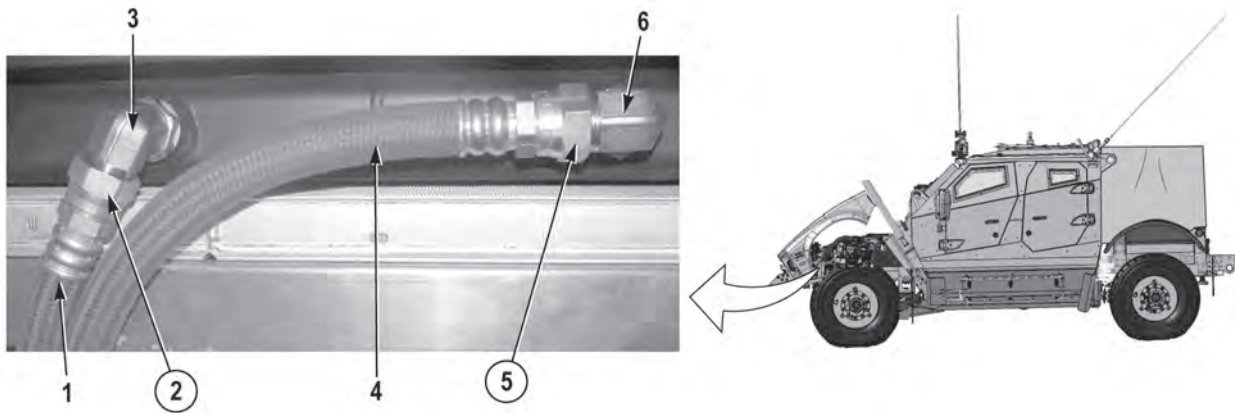
O-ring (Item 2)
O-ring (Item 5)
U-nut (2) (Item 22)
O-ring (Item 23)
O-ring (Item 24)
Lubricating Oil, Engine
Tags, Identification
Ties, Cable

Personnel Required

Two

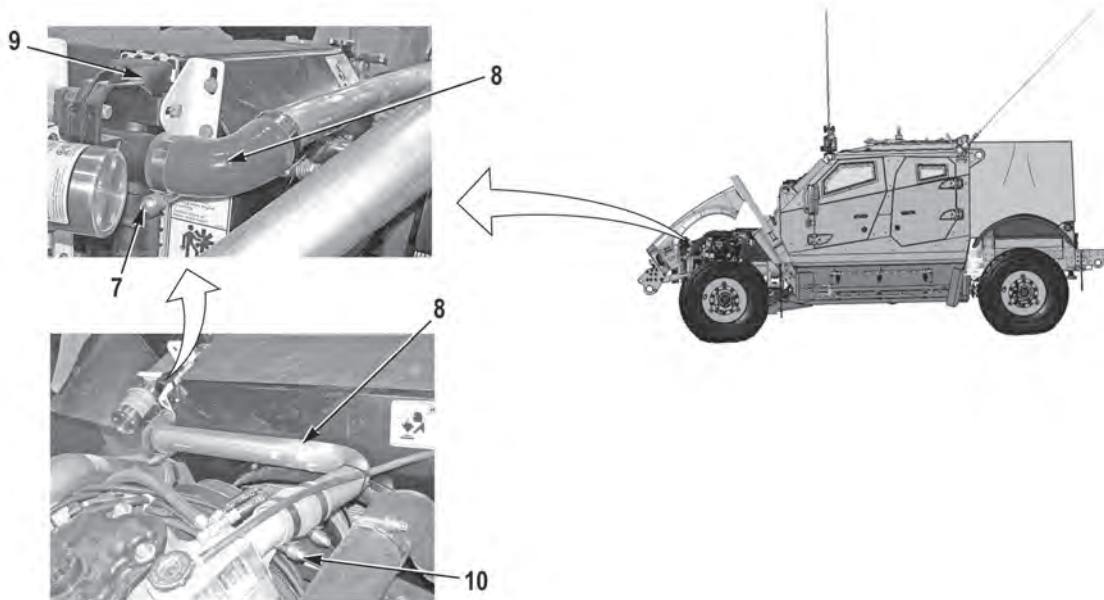
Follow-On Maintenance

Install fan and fan shroud (WP 0179)
Install air intake hoses (M1240/M1245)
(WP 0260)
Install air intake hoses (M1240A1) (WP 0261)
Fill transmission (WP 0232)
Fill radiator (Reservoir Equipped) (WP 0176)
Fill radiator (Surge Tank Equipped) (WP 0177)
Install hood (AFES Nitrogen Detection)
(WP 0158)
Install hood (AFES Linear Wire Detection)
(WP 0157)
Install hood (M1245) (WP 0156)
Remove and stow wheel chocks

REMOVAL**NOTE**

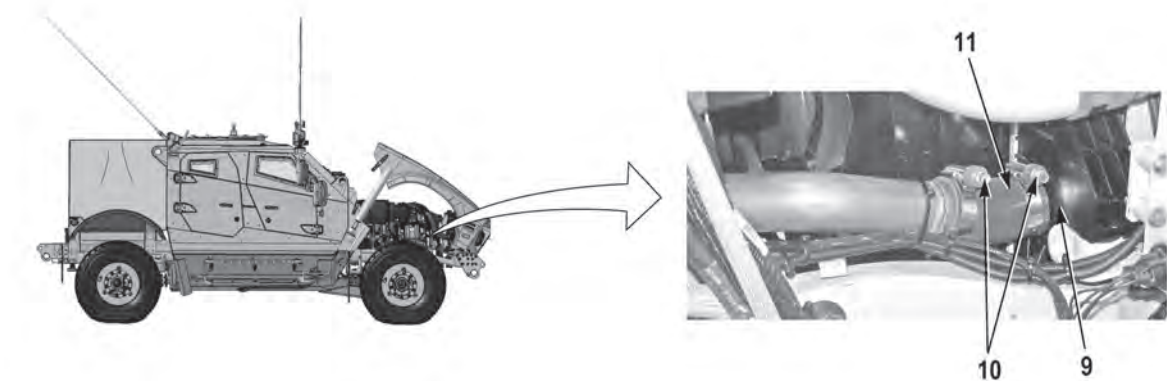
- Tag and mark hoses prior to removal to ensure proper installation.
- Cap and plug hoses upon removal.
- Oil may leak from hoses. Position a suitable drain pan under hoses to catch excess oil.

1. Remove hose (1) and O-ring (2) from fitting (3). Discard O-ring (2).
2. Remove hose (4) and O-ring (5) from fitting (6). Discard O-ring (5).

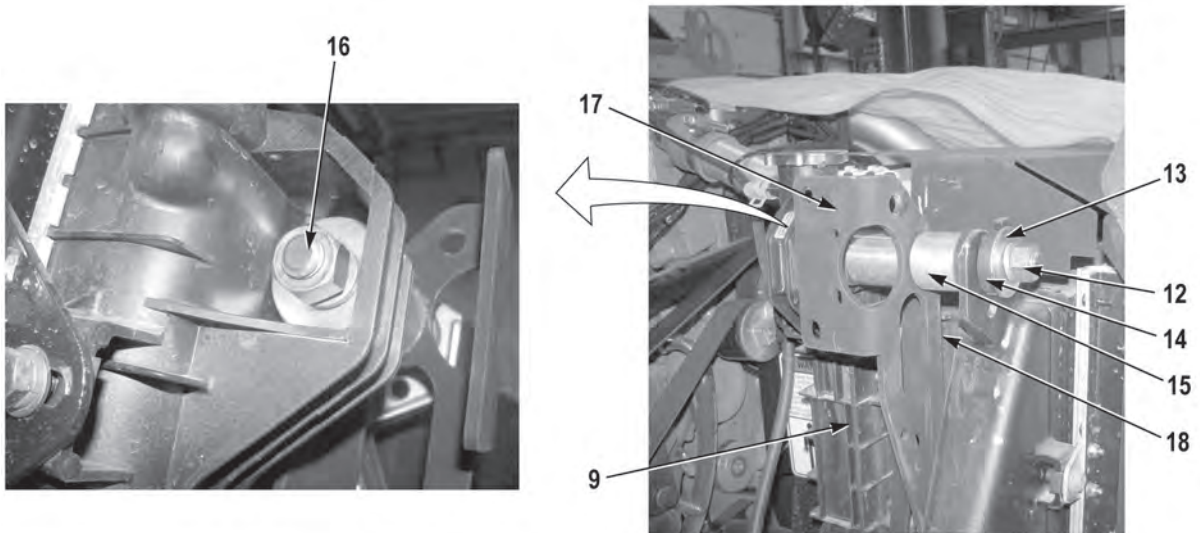
**NOTE**

Note position of coolant tubes prior to removal to ensure proper installation.

3. Loosen clamp (7) and remove coolant tube (8) from radiator (9).



4. Loosen two clamps (10) and remove coolant tube assembly (11) from radiator (9).



NOTE

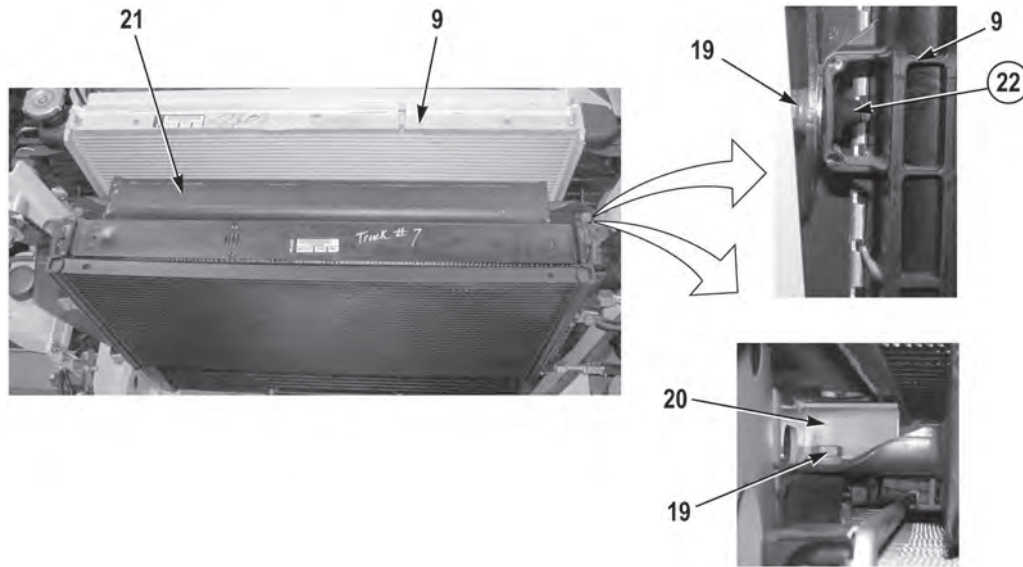
Note position of spacers prior to removal to ensure proper installation.

5. Remove two nuts (12), washers (13), two spacers (14 and 15), and stud (16) from bracket (17) and radiator (9).

WARNING

Radiator and transmission oil cooler weigh 65 lbs (29 kg). Do not lift or move radiator and transmission oil cooler without the aid of an assistant. Failure to comply may result in injury or death to personnel.

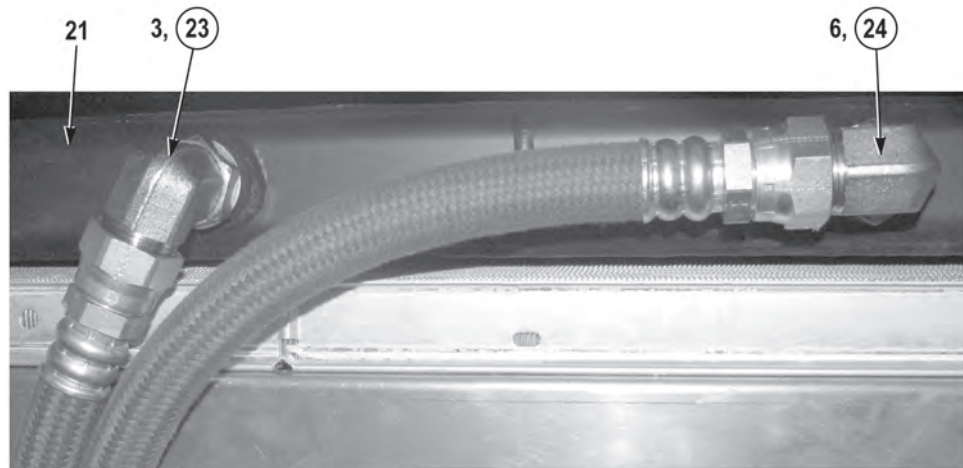
6. With the aid of an assistant, remove radiator (9) and transmission oil cooler (18) from vehicle.



NOTE

Perform Steps (7) and (8) if removing transmission oil cooler from radiator.

7. Remove four screws (19), bracket (20), and transmission oil cooler (21) from two U-nuts (22) and radiator (9).
8. Remove two U-nuts (22) from radiator (9). Discard U-nuts (22).



NOTE

- Perform Steps (10) and (11) if fittings are to be removed from the bottom of the transmission oil cooler.
- Note position of fittings prior to removal to ensure proper installation.

9. Remove fitting (3) and O-ring (23) from transmission oil cooler (21). Discard O-ring (23).

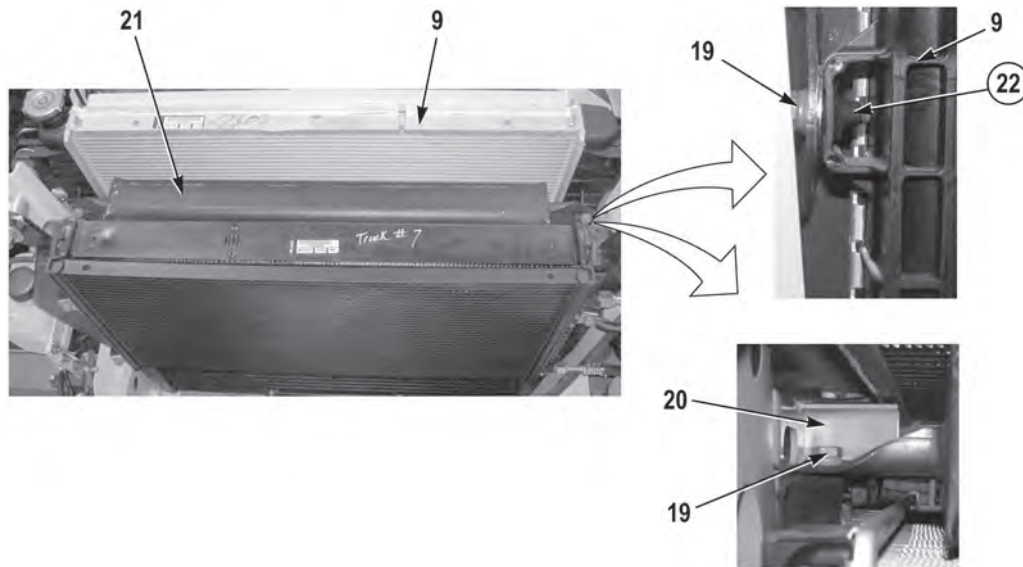
10. Remove fitting (6) and O-ring (24) from transmission oil cooler (21). Discard O-ring (24).

END OF TASK

INSTALLATION

NOTE

- Perform Steps (1) and (2) if fittings were removed from the transmission oil cooler.
 - Perform Steps (3) and (4) if transmission oil cooler was removed from radiator.
 - Install fittings as noted prior to removal.
1. Lightly lubricate new O-ring (24) with clean oil and install O-ring (24) and fitting (6) on transmission oil cooler (21).
 2. Lightly lubricate new O-ring (23) with clean oil and install O-ring (23) and fitting (3) on transmission oil cooler (21).

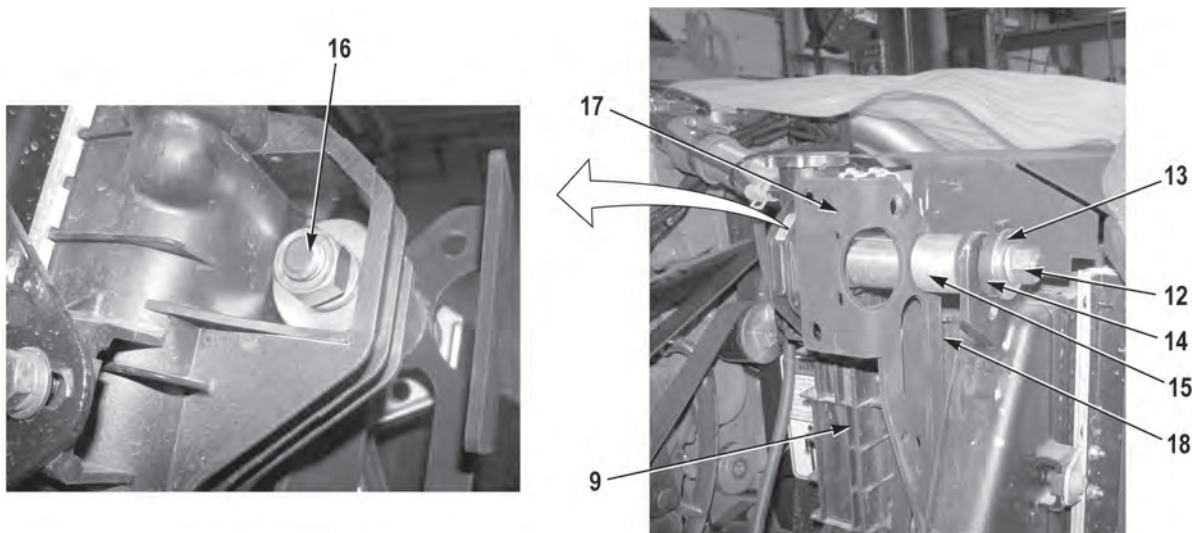


3. Install two new U-nuts (22) on radiator (9).
4. Install transmission oil cooler (21) and bracket (20) on radiator with four screws (19).

WARNING

Radiator and transmission oil cooler weigh 65 lbs (29 kg). Do not lift or move radiator and transmission oil cooler without the aid of an assistant. Failure to comply may result in injury or death to personnel.

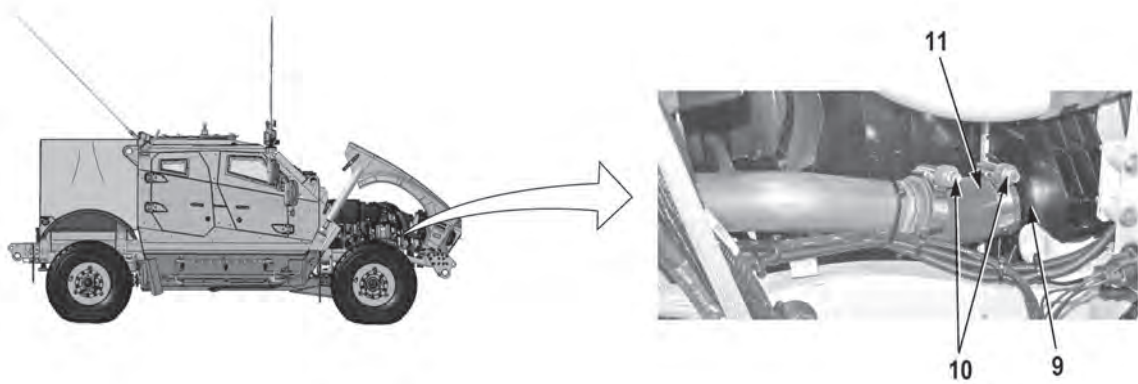
5. With the aid of an assistant, install radiator (9) and transmission oil cooler (18) on vehicle.



NOTE

Install spacers as noted prior to removal.

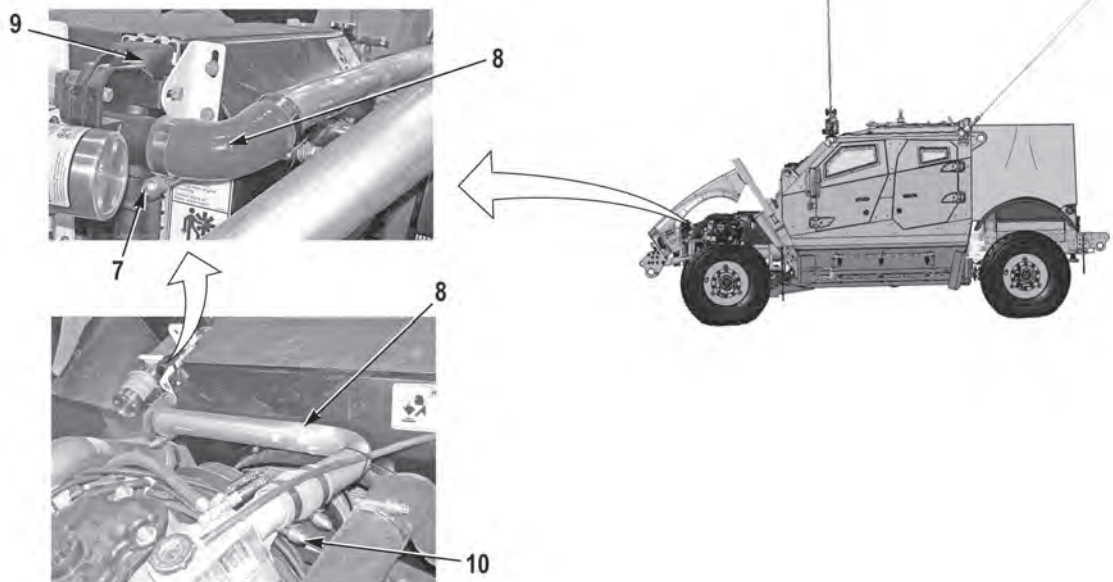
6. Secure radiator (9) to bracket (17) with stud (16), two spacers (14 and 15), two washers (13), and nuts (12).



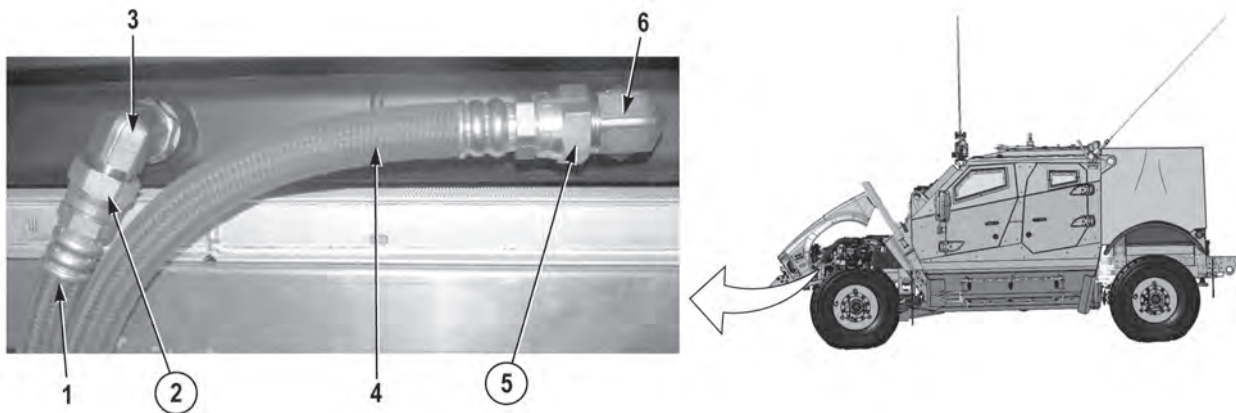
NOTE

Install coolant tube as noted prior to removal.

7. Install coolant tube assembly (11) on radiator (9) and tighten two clamps (10) to 50 to 125 lb-in. (5.7 to 14.1 N•m).



8. Install coolant tube (8) on radiator (9) and tighten two clamps (7).



9. Lightly lubricate new O-ring (5) with clean oil and install O-ring (5) and hose (4) on fitting (6).
10. Lightly lubricate new O-ring (2) with clean oil and install O-ring (2) and hose (1) on fitting (3).
11. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

RADIATOR BAFFLE REPLACEMENT

Preconditions

Park vehicle
 Engine OFF
 Wheels chocked
 Hood opened and secured (as required)

Tools and Special Tools

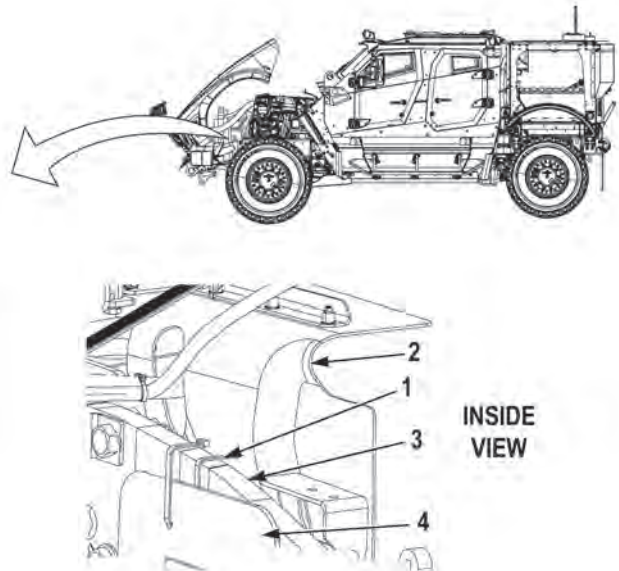
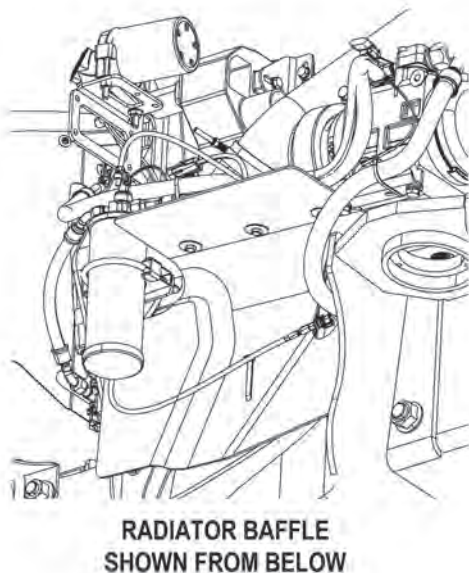
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Lockwasher (2) (Item 9)
 Locknut (4) (Item 21, 25, and 28)
 Locknut (2) (Item 39)
 Ties, Cable

Follow-On Maintenance

Close and secure hood (as required)
 Remove and stow wheel chocks

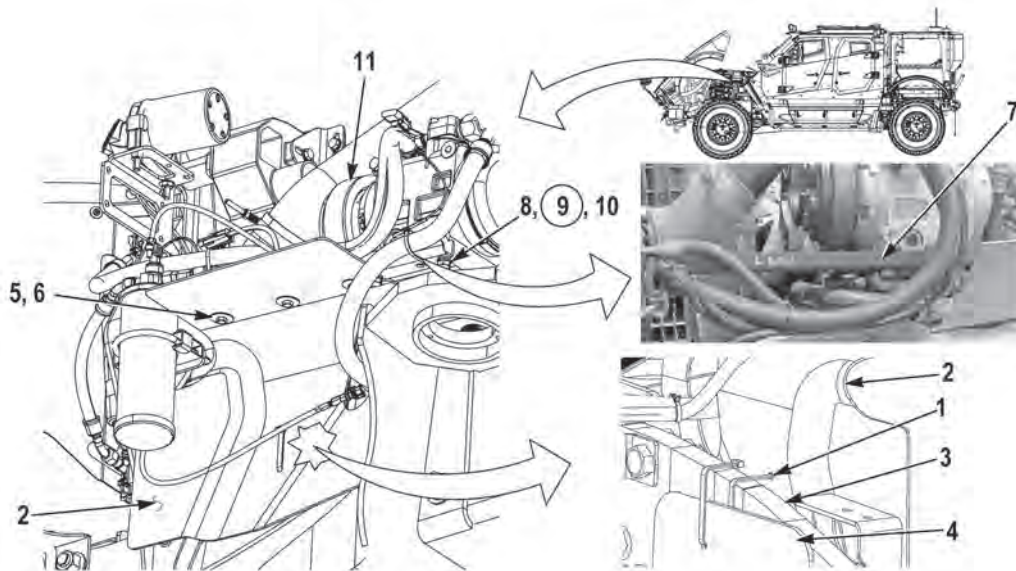
DRIVER SIDE RADIATOR BAFFLE REMOVAL**WARNING**

Engine components become hot during normal operation. Allow engine to cool completely prior to performing this task. Failure to comply may result in injury or death to personnel.

NOTE

Note position of cable tie and radiator baffles prior to removal to ensure proper installation.

1. Remove cable tie (1) from driver side radiator baffle (2), driver side frame extension (3), and lower radiator baffle (4).



NOTE

Note position of driver side radiator baffle prior to removal to ensure proper installation.

2. Remove three screws (5), washers (6), and driver side radiator baffle (2) from baffle bracket (7).
3. Remove two screws (8), lockwashers (9), washers (10), and baffle bracket (7) from compressor (11). Discard lockwashers (9).

END OF TASK

DRIVER SIDE RADIATOR BAFFLE INSTALLATION

1. Install baffle bracket (7) on compressor (11) with two washers (10), new lockwashers (9), and screws (8).

CAUTION

HVAC hose needs at least one inch (2.54 cm) clearance from drive belt. Failure to comply may result in damage to equipment.

NOTE

Install driver side radiator baffle as noted prior to removal.

2. Install driver side radiator baffle (2) on baffle bracket (7) with three washers (6) and screws (5).

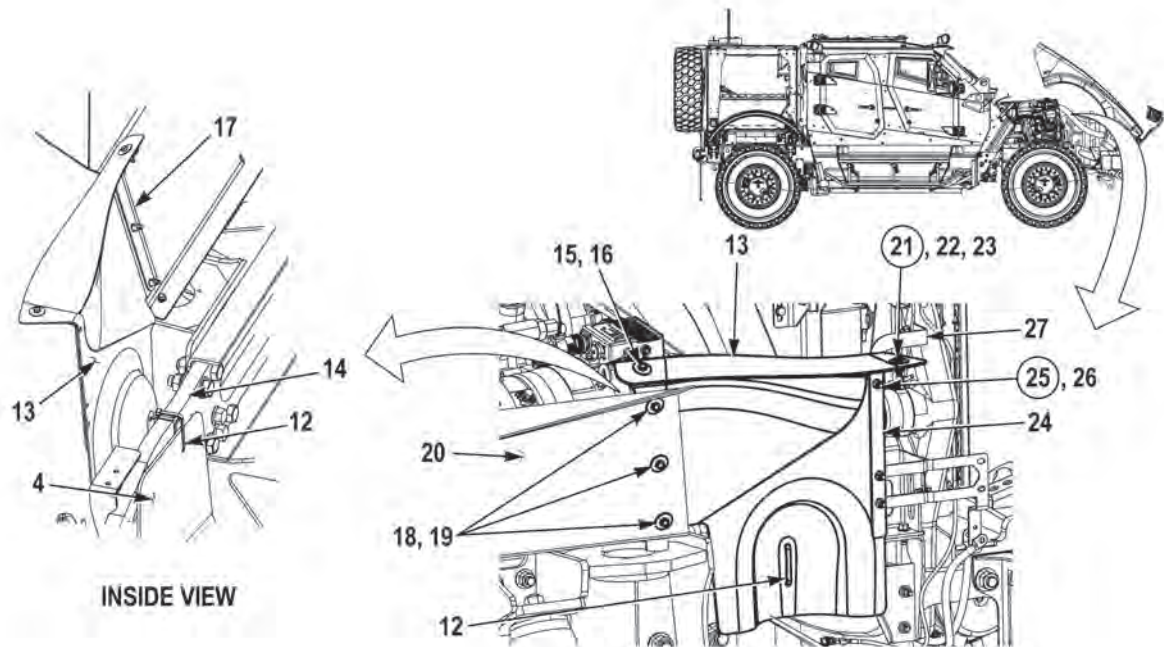
NOTE

Install cable tie and radiator baffles as noted prior to removal.

3. Secure driver side radiator baffle (2) on lower radiator baffle (4) and driver side frame extension (3) with cable tie (1).
4. Perform all Follow-On Maintenance tasks.

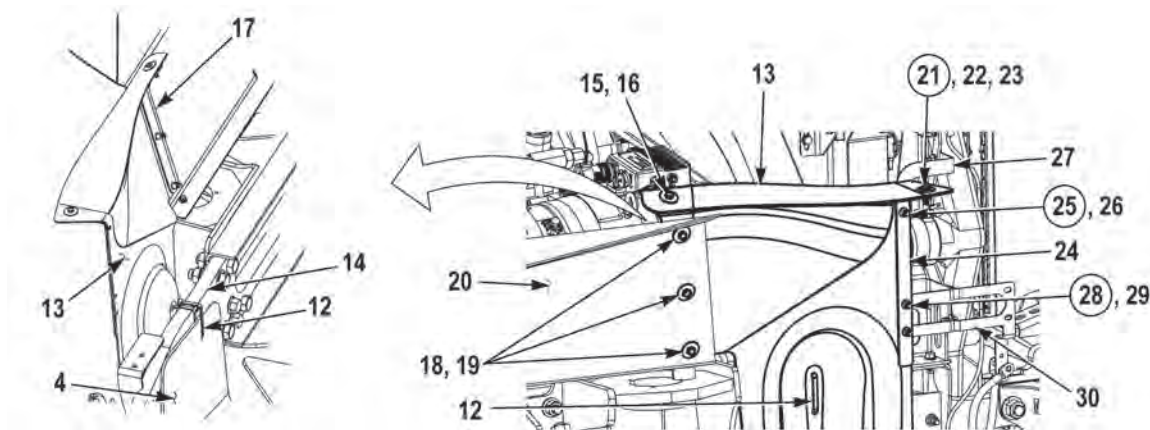
END OF TASK

PASSENGER SIDE RADIATOR BAFFLE REMOVAL

**NOTE**

Note position of cable tie and radiator baffles prior to removal to ensure proper installation.

1. Remove cable tie (12) from passenger side radiator baffle (13), passenger side frame extension (14), and lower radiator baffle (4).
2. Remove screw (15) and washer (16) from passenger side radiator baffle (13) and baffle bracket (17).
3. Remove three screws (18), washers (19), and baffle bracket (17) from passenger side engine panel (20) and passenger side radiator baffle (13).
4. Remove locknut (21), screw (22), and washer (23) from passenger side radiator baffle (13) and baffle bracket (24). Discard locknut (21).
5. Remove locknut (25) and screw (26) from upper mounting bracket (27), baffle bracket (24), and passenger side radiator baffle (13). Discard locknut (25).

**NOTE**

Note position of passenger side radiator baffle prior to removal to ensure proper installation.

6. Remove two locknuts (28), screws (29), baffle bracket (24), and passenger side radiator baffle (13) from lower mounting bracket (30) and upper mounting bracket (27). Discard locknuts (28).

END OF TASK**PASSENGER SIDE RADIATOR BAFFLE INSTALLATION****NOTE**

Install passenger side radiator baffle as noted prior to removal.

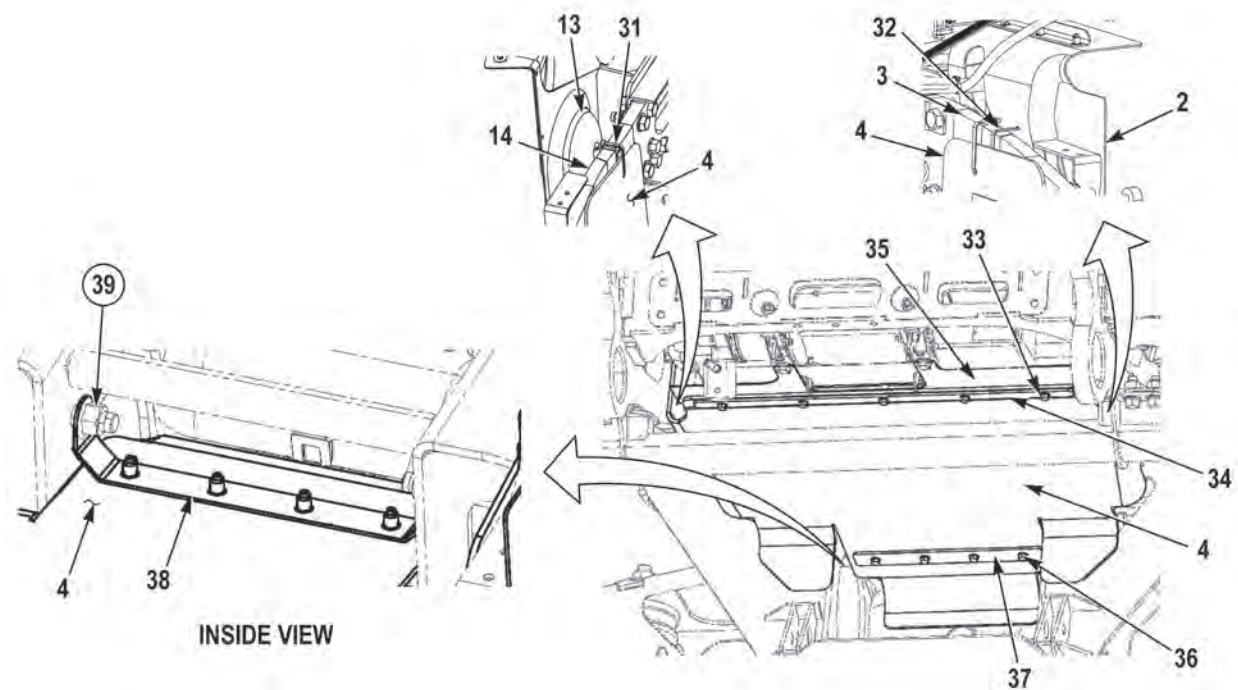
1. Install passenger side radiator baffle (13) and baffle bracket (24) on upper mounting bracket (27) and lower mounting bracket (30) with two screws (29) and new locknuts (28).
2. Secure passenger side radiator baffle (13) and baffle bracket (24) on upper mounting bracket (27) with screw (26) and new locknut (25).
3. Secure passenger side radiator baffle (13) on baffle bracket (24) with washer (23), screw (22), and new locknut (21).
4. Install baffle bracket (17) on passenger side engine panel (20) and passenger side radiator baffle (13) with three washers (19) and screws (18).
5. Secure baffle bracket (17) on passenger side radiator baffle (13) with washer (16) and screw (15).

NOTE

Install cable tie and radiator baffles as noted prior to removal.

6. Secure passenger side radiator baffle (13) on lower radiator baffle (4) and passenger side frame extension (14) with cable tie (12).

END OF TASK

LOWER RADIATOR BAFFLE REMOVAL**NOTE**

Note position of cable ties and radiator baffles prior to removal to ensure proper installation.

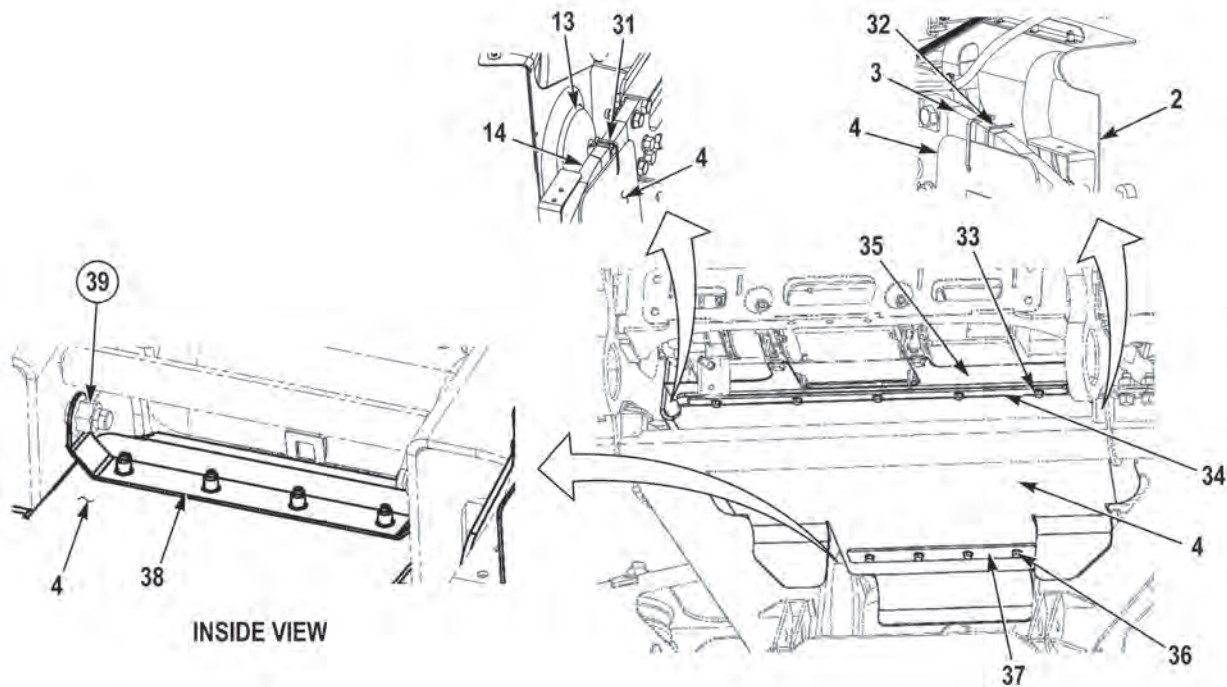
1. Remove cable tie (31) from lower radiator baffle (4), passenger side frame extension (14), and passenger side radiator baffle (13).
2. Remove cable tie (32) from lower radiator baffle (4), driver side frame extension (3), and driver side radiator baffle (2).
3. Remove five screws (33) and bar clamp (34) from cooling baffle (35).

NOTE

Note position of lower radiator baffle prior to removal to ensure proper installation.

4. Remove four screws (36), bar clamp (37), and lower radiator baffle (4) from bracket (38).
5. Remove two locknuts (39) and bracket (38) from vehicle. Discard locknuts (39).

END OF TASK

LOWER RADIATOR BAFFLE INSTALLATION

1. Install bracket (38) on vehicle with two new locknuts (39).

NOTE

Install lower radiator baffle as noted prior to removal.

2. Install lower radiator baffle (4) on bracket (38) with bar clamp (37) and four screws (36).
3. Secure lower radiator baffle (4) on cooling baffle (35) with bar clamp (34) and five screws (33).

NOTE

Install cable ties and radiator baffles as noted prior to removal.

4. Secure lower radiator baffle (4) on driver side radiator baffle (2) and driver side frame extension (3) with cable tie (32).
5. Secure lower radiator baffle (4) on passenger side radiator baffle (13) and passenger side frame extension (14) with cable tie (31).
6. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

SURGE TANK REPLACEMENT

Preconditions

Park vehicle
Engine OFF
Wheels chocked
Batteries disconnected (M1240/M1240A1)
(WP 0186)
Batteries disconnected (M1245) (WP 0187)
Cooling system drained (WP 0177)

Tools and Special Tools

Pan, Drain
Tool Kit, General Mechanic's: Automotive

Materials/Parts

Locknut (Item 4)
Lockwasher (4) (Item 21)

Material/Parts (continued)

Locknut (Item 24)
Lockwasher (4) (Item 29)
Lockwasher (Item 31)
Cap and Plug Set
Compound, Sealing, Loctite 567
Sealant, RTV
Tags, Identification
Ties, Cable

Follow-On Maintenance

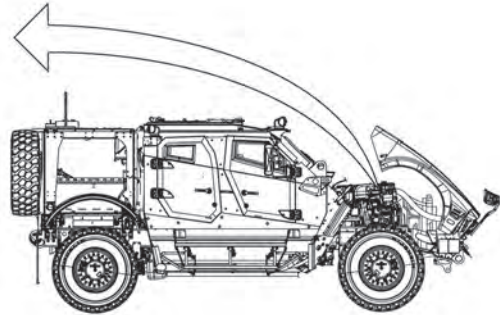
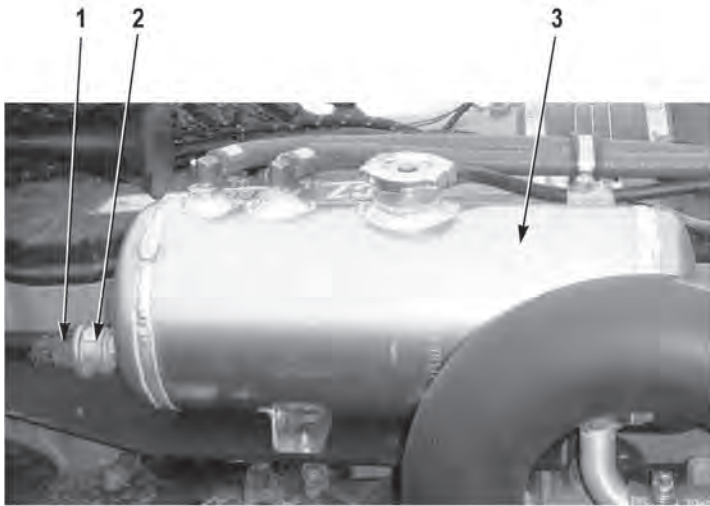
Fill cooling system (WP 0177)
Connect batteries (M1240/M1240A1) (WP 0186)
Connect batteries (M1245) (WP 0187)
Remove and stow wheel chocks

REMOVAL**WARNING**

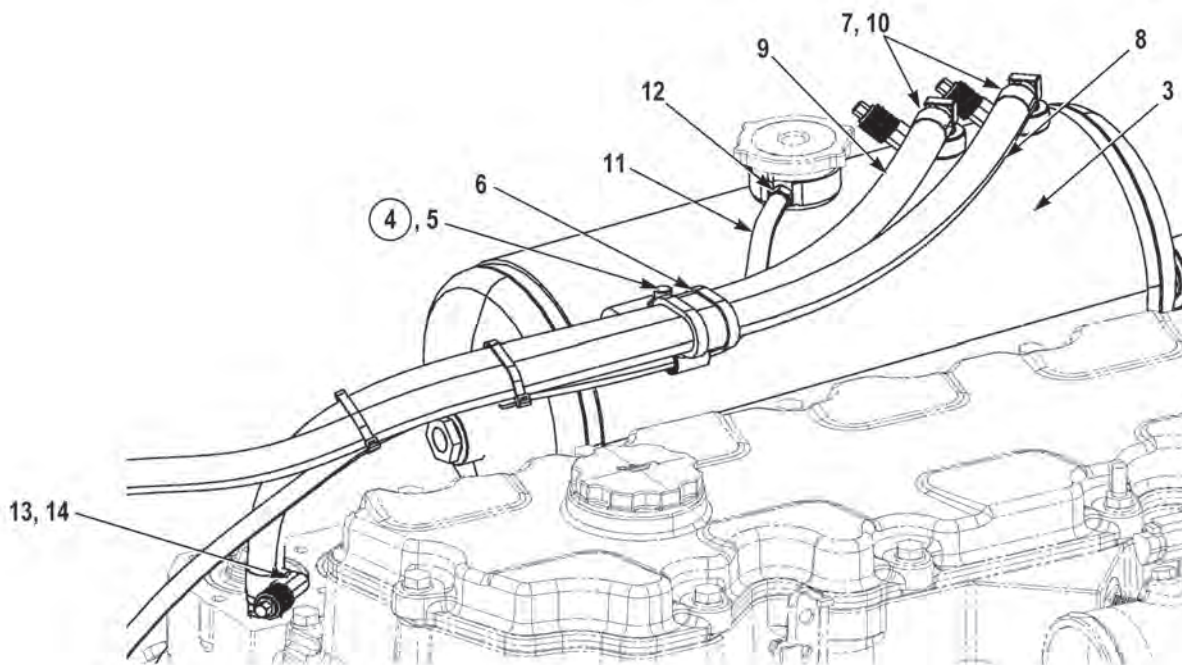
- **Engine components become hot during normal operation. Allow engine to cool completely prior to performing this task. Failure to comply may result in injury or death to personnel.**
- **Coolant may splash during hose removal. Ensure personnel wear protective goggles. Failure to comply may result in injury to personnel.**

NOTE

- Tag and mark hoses prior to removal to ensure proper installation.
- Note position of fittings prior to removal to ensure proper installation.
- Cap and plug hoses and fittings upon removal.



1. Disconnect connector (1) from coolant level sensor (2).
2. Remove coolant level sensor (2) from surge tank (3).

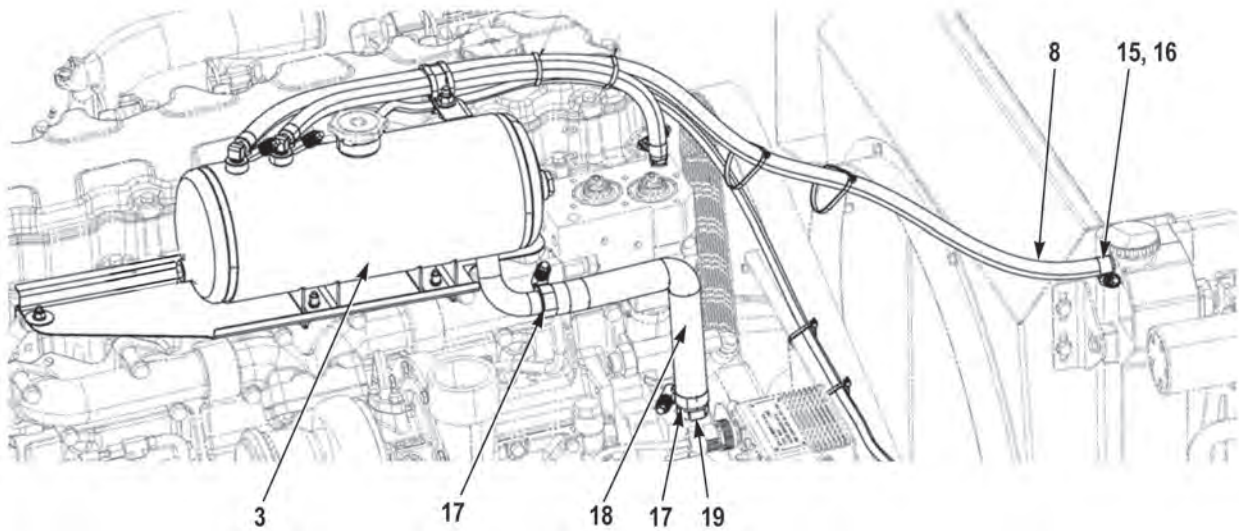


3. Remove locknut (4), screw (5), and cushion clip (6) from surge tank (3). Discard locknut (4).

NOTE

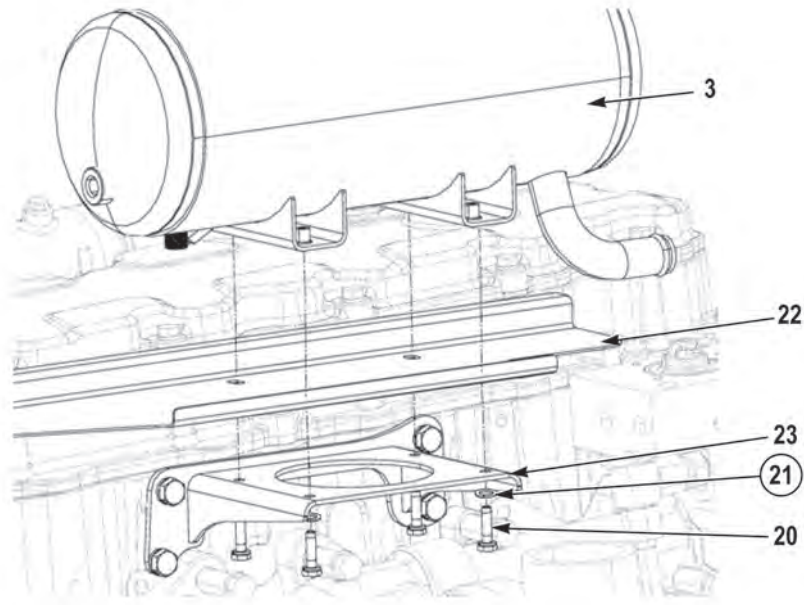
- Note routing of hoses prior to removal to ensure proper installation.
- Position drain pan under hoses being removed.
- Remove cable ties as required.

4. Loosen two clamps (7) and remove hose (8) and hose (9) from two fittings (10).
5. Remove hose (11) from fitting (12).
6. Loosen clamp (13) and remove hose (9) from fitting (14).

**NOTE**

Coolant fill manifold removed for clarity.

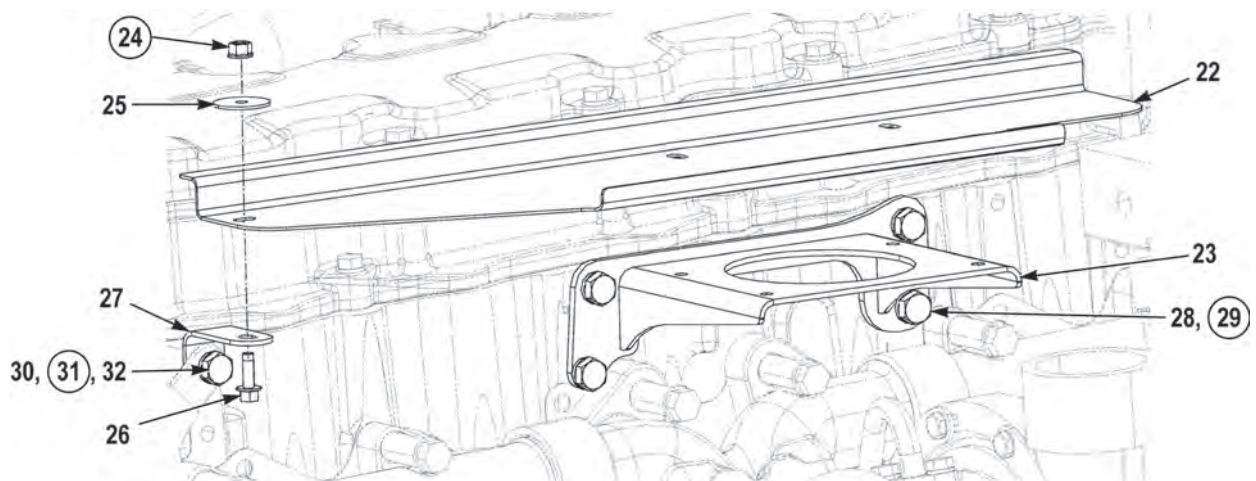
7. Loosen clamp (15) and remove hose (8) from fitting (16).
8. Loosen two clamps (17) and remove hose (18) from surge tank (3) and fitting (19).



NOTE

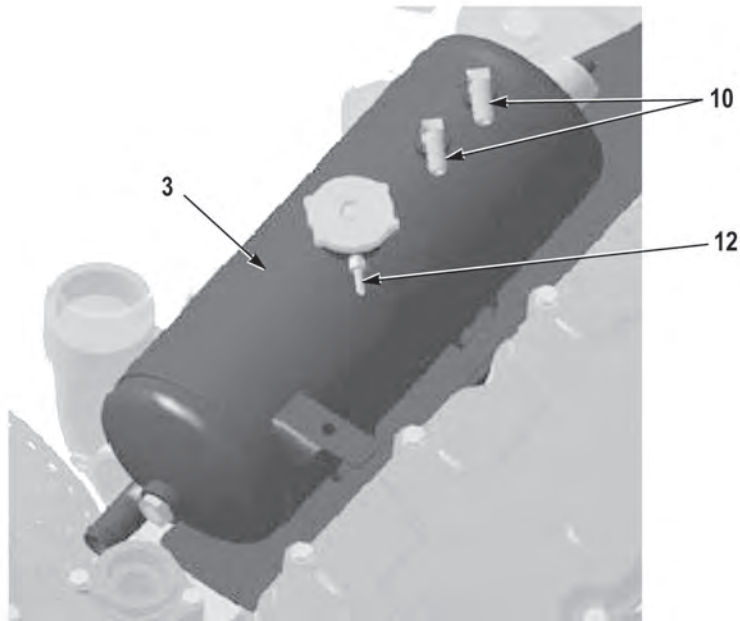
Note position of surge tank on heat shield and bracket prior to removal to ensure proper installation.

9. Remove four screws (20), lockwashers (21), and surge tank (3) from surge tank heat shield (22) and surge tank bracket (23). Discard lockwashers (21).



NOTE

- Perform Steps (10) and (11) if surge tank heat shield or surge tank bracket needs to be removed.
 - Note position of mounting brackets prior to removal to ensure proper installation.
10. Remove locknut (24), washer (25), screw (26), and surge tank heat shield (22) from heat shield bracket (27) and surge tank bracket (23). Discard locknut (24).
 11. Remove four screws (28), lockwashers (29), and surge tank bracket (23) from vehicle. Discard lockwashers (29).
 12. Remove screw (30), lockwasher (31), washer (32), and heat shield bracket (27) from vehicle. Discard lockwasher (31).



NOTE

Note position of fittings prior to removal to ensure proper installation.

13. Remove two fittings (10) and fitting (12) from surge tank (3).

END OF TASK

INSTALLATION

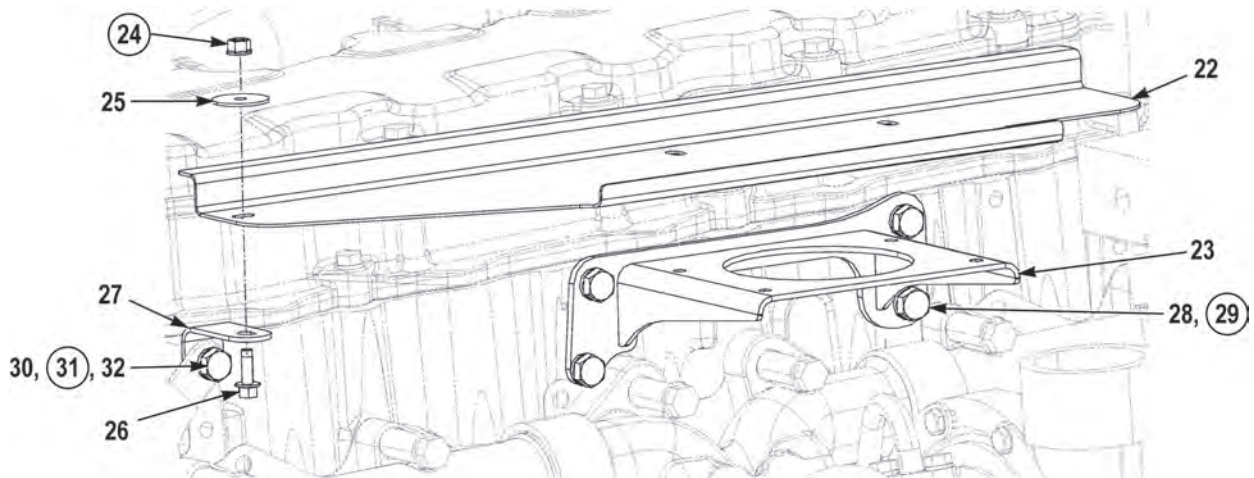
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

NOTE

Install fittings as noted prior to removal.

1. Apply sealing compound, Loctite 567 to threads of fitting (12) and install fitting (12) on surge tank (3).
2. Apply sealing compound, Loctite 567 to threads of two fittings (10) and install fittings (10) on surge tank (3).



3. Install heat shield bracket (27) on vehicle with washer (32), new lockwasher (31), and screw (30).

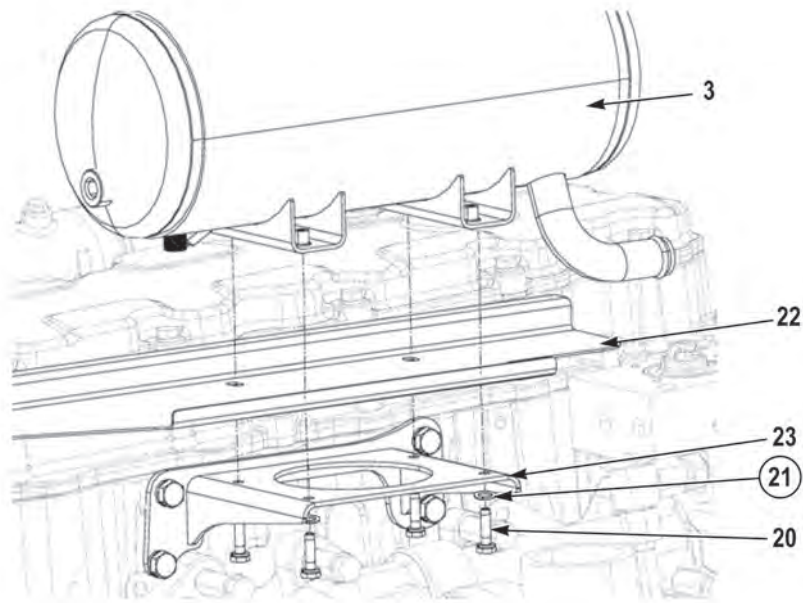
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

4. Apply sealant, RTV to screw (30), lockwasher (31), and washer (32).

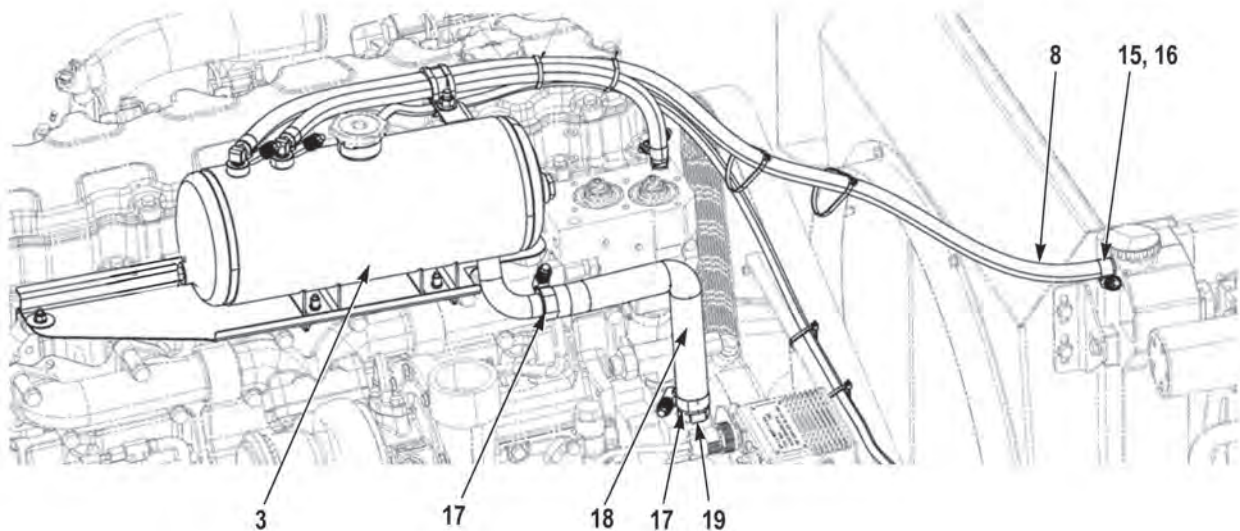
NOTE

- Perform Steps (5) and (6) if surge tank bracket or surge tank heat shield was removed.
 - Install mounting brackets as noted prior to removal.
5. Install surge tank bracket (27) on vehicle with four new lockwashers (29) and screws (28).
 6. Install surge tank heat shield (22) on heat shield bracket (27) with screw (26), washer (25), and new locknut (24).

**NOTE**

Install surge tank on heat shield and bracket as noted prior to removal.

7. Install surge tank (3) on surge tank heat shield (22) and surge tank bracket (23) with four new lockwashers (21) and screws (20).

**NOTE**

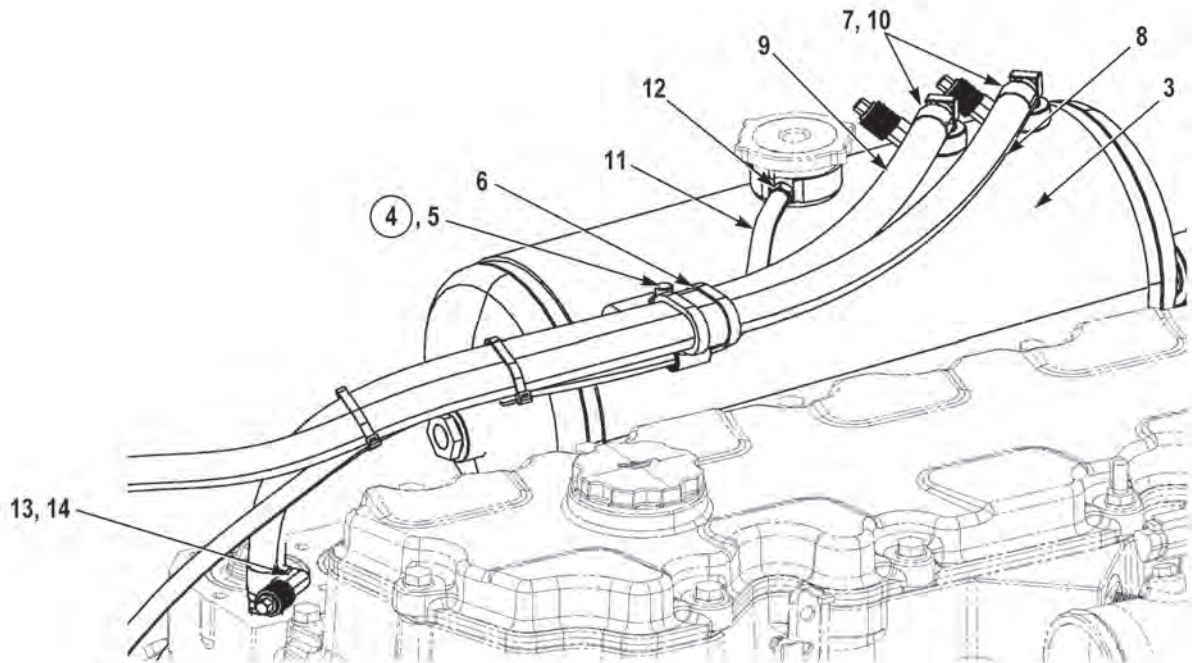
- Route hoses as noted prior to removal.
- Coolant fill manifold is shown removed for clarity.

8. Install hose (18) on fitting (19) and surge tank (3) with two clamps (17).

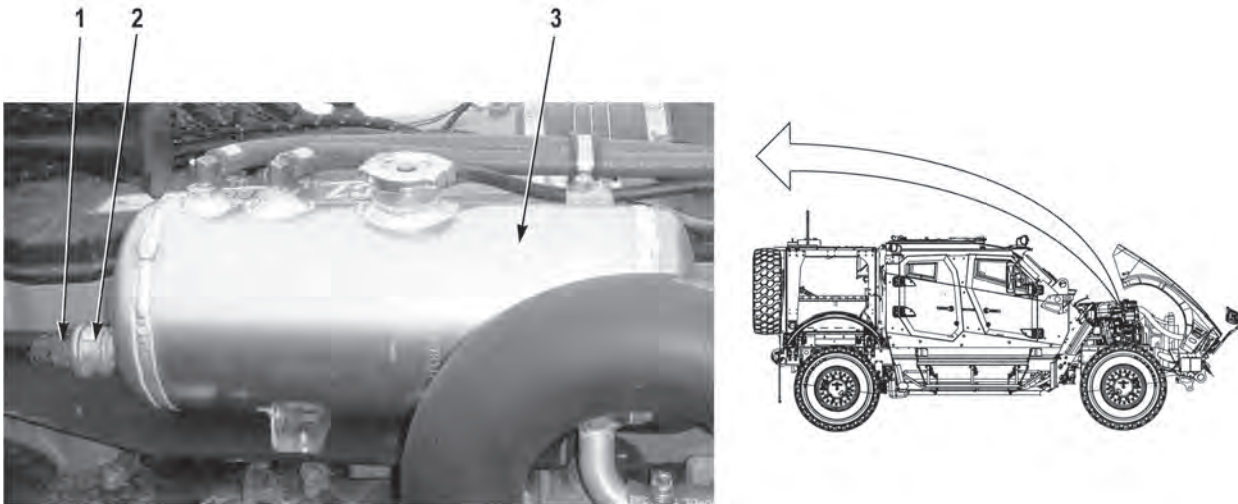
NOTE

Install cable ties and cushion clips as required.

9. Install hose (8) on fitting (16) with clamp (15).



10. Install hose (9) on fitting (14) with clamp (13).
11. Install hose (11) on fitting (12).
12. Install hose (9) and hose (8) on two fittings (10) with two clamps (7).
13. Secure hoses (8, 9, and 12) on surge tank (3) with cushion clip (6), screw (5), and new locknut (4).

**WARNING**

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water. Failure to comply may result in injury or death to personnel.

14. Apply sealing compound, Loctite 567 to threads of coolant level sensor (2).
15. Install coolant level sensor (2) on surge tank (3).
16. Connect connector (1) to coolant level sensor (2).
17. Perform all Follow-On Maintenance tasks.

END OF TASK

END OF WORK PACKAGE

THERMOSTAT REPLACEMENT

Preconditions

- Park vehicle
- Engine OFF
- Wheels chocked
- Cooling system drained (Reservoir Equipped)
(WP 0176)
- Cooling system drained (Surge Tank Equipped)
(WP 0177)

Tools and Special Tools

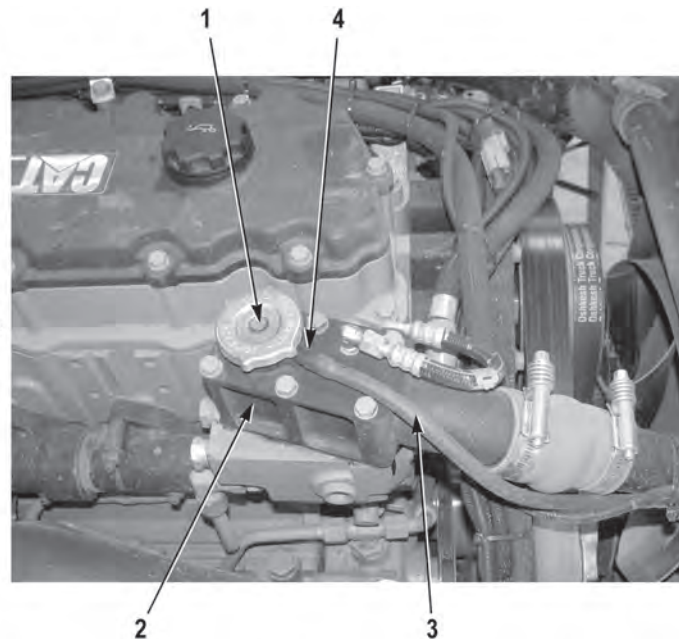
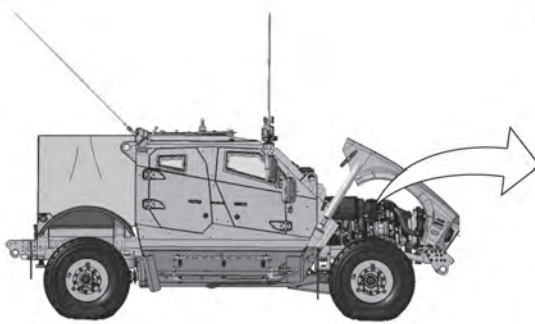
Tool Kit, General Mechanic's: Automotive

Materials/Parts

- Gasket (Item 9)
- Ties, Cable

Follow-On Maintenance

- Fill cooling system (Reservoir Equipped)
(WP 0177)
 - Fill cooling system (Surge Tank Equipped)
(WP 0176)
 - Remove and stow wheel chocks
-

REMOVAL**WARNING**

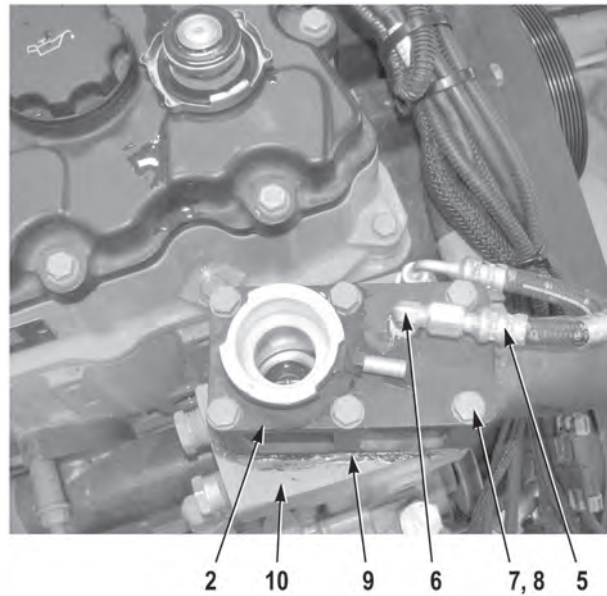
- During normal vehicle operation, cooling system can become very hot. Allow cooling system to cool prior to servicing cooling system. Failure to comply may result in injury or death to personnel.
- Coolant may splash during hose removal. Ensure personnel wear protective goggles. Failure to comply may result in injury to personnel.

1. Remove cap (1) from thermostat outlet weldment (2).

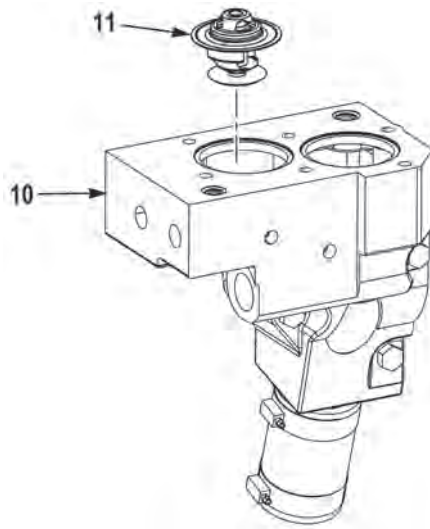
NOTE

Remove cable ties as required.

2. Remove hose (3) from fitting (4).



3. Remove hose (5) from fitting (6).
4. Remove six screws (7), washers (8), thermostat outlet weldment (2), and gasket (9) from thermostat housing (10). Discard gasket (9).



CAUTION

Remove remaining gasket remnants from top surface of thermostat housing and bottom surface of thermostat outlet weldment. Prepare both surfaces for new gasket. Failure to comply may result in damage to equipment.

5. Remove two thermostats (11) from thermostat housing (10).

END OF TASK

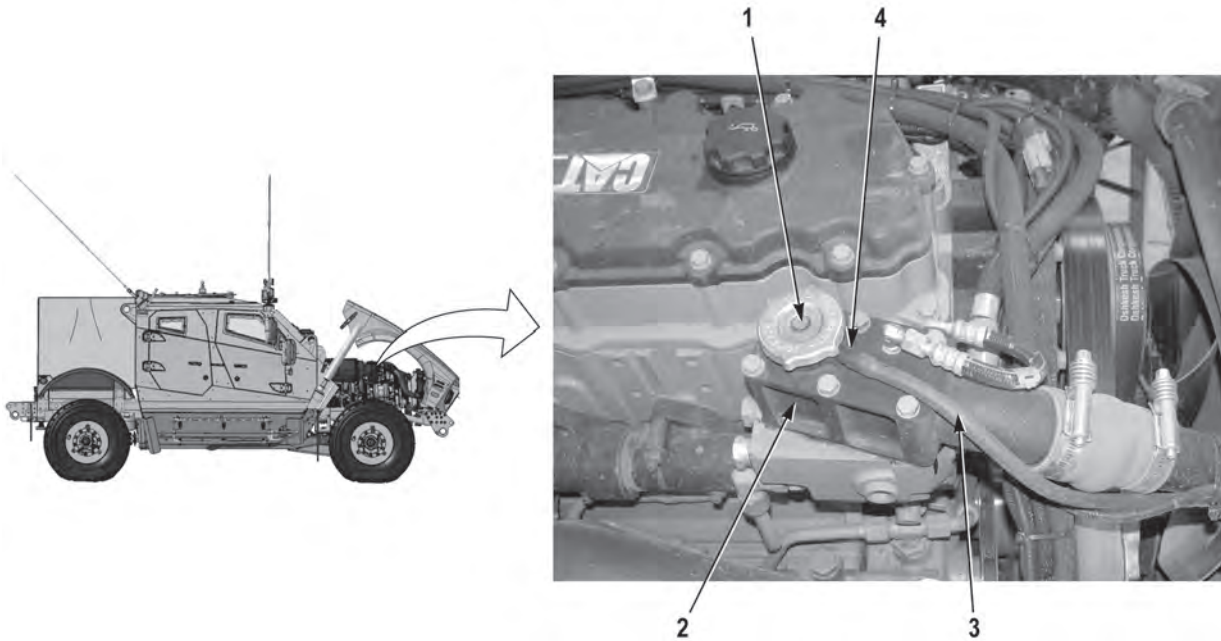
INSTALLATION

1. Install two thermostats (11) in thermostat housing (10).
2. Install thermostat outer weldment (2) and new gasket (9) on thermostat housing (10) with six washers (8) and screws (7).

NOTE

Install cable ties as noted prior to removal.

3. Install hose (5) on fitting (6).



4. Install hose (3) on fitting (4).
5. Install cap (1) on thermostat outlet weldment (2).
6. Perform all Follow-On Maintenance tasks.

END OF TASK**END OF WORK PACKAGE**

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS					Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).		DATE <i>Date you filled out this form.</i>
For use of this form, see AR 25-30; the proponent agency is OAASA.							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000					FROM (Activity and location) (Include ZIP Code) <i>Your mailing address</i>		
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER <i>TM Number</i>					DATE <i>Date of the TM</i>	TITLE <i>Title of the TM</i>	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
	0007-3					<i>Figure 2, Item 9 should show a lockwasher. Currently shows a flat washer.</i>	
	0018-2					<i>Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be change to (12).</i>	
<h1>SAMPLE</h1>							
TYPED NAME, GRADE OR TITLE <i>Your Name</i>					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>		SIGNATURE <i>Your Signature</i>

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i> <i>Your Address</i>	DATE <i>Date you filled out this form</i>
---	--	---

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER <i>TM Number</i>	DATE <i>Date of the TM</i>	TITLE <i>Title of the TM</i>
--	-------------------------------	---------------------------------

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

PART III – REMARKS *(Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE <i>Your Name</i>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>	SIGNATURE <i>Your Signature</i>
--	--	------------------------------------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-2355-335-23-1						DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code)	DATE
--	--	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TM 9-2355-335-23-1	DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
---	--------------------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-2355-335-23-1						DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code)	DATE
--	--	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TM 9-2355-335-23-1	DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
---	--------------------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-2355-335-23-1						DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code)	DATE
--	--	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TM 9-2355-335-23-1	DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
---	--------------------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 9-2355-335-23-1						DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS, MS 727 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code)	DATE
--	--	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TM 9-2355-335-23-1	DATE 28 February 2013	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
---	--------------------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

--

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW
*Administrative Assistant to the
Secretary of the Army*

1300302

RAYMOND T. ODIERNO
*General, United States Army
Chief of Staff*

By Order of the Secretary of the Air Force:

JANET C. WOLFENBARGER
*General, United States Air Force
Commander, AFMC*

MARK A. WELSH, III
*General, United States Air Force
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 386816 requirements for TM 9-2355-335-23-1.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter=10 Millimeters=0.01 Meters=0.3937 Inches
 1 Meter=100 Centimeters=1000 Millimeters=39.37 Inches
 1 Kilometer=1000 Meters=0.621 Miles

WEIGHTS

1 Gram=0.001 Kilograms=1000 Milligrams=0.035 Ounces
 1 Kilogram=1000 Grams=2.2 Lb
 1 Metric Ton=1000 Kilograms=1 Megagram=1.1 Short Tons

LIQUID MEASURE

1 Milliliter=0.001 Liters=0.0338 Fluid Ounces
 1 Liter=1000 Milliliters=33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter=100 Sq Millimeters=0.155 Sq Inches
 1 Sq Meter=10,000 Sq Centimeters=10.76 Sq Feet
 1 Sq Kilometer=1,000,000 Sq Meters=0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter=1000 Cu Millimeters=0.06 Cu Inches
 1 Cu Meter=1,000,000 Cu Centimeters=35.31 Cu Feet

TEMPERATURE

$5/9 (F - 32) = C$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 C + 32 = F$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches.....	Centimeters.....	2.540
Feet.....	Meters.....	0.305
Yards.....	Meters.....	0.914
Miles.....	Kilometers.....	1.609
Square Inches.....	Square Centimeters.....	6.451
Square Feet.....	Square Meters.....	0.093
Square Yards.....	Square Meters.....	0.836
Square Miles.....	Square Kilometers.....	2.590
Acres.....	Square Hectometers.....	0.405
Cubic Feet.....	Cubic Meters.....	0.028
Cubic Yards.....	Cubic Meters.....	0.765
Fluid Ounces.....	Milliliters.....	29.573
Pints.....	Liters.....	0.473
Quarts.....	Liters.....	0.946
Gallons.....	Liters.....	3.785
Ounces.....	Grams.....	28.349
Pounds.....	Kilograms.....	0.454
Short Tons.....	Metric Tons.....	0.907
Pound-Feet.....	Newton-Meters.....	1.356
Pounds/Sq Inch.....	Kilopascals.....	6.895
Miles per Gallon.....	Kilometers per Liter.....	0.425
Miles per Hour.....	Kilometers per Hour.....	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters.....	Inches.....	0.394
Meters.....	Feet.....	3.280
Meters.....	Yards.....	1.094
Kilometers.....	Miles.....	0.621
Sq Centimeters.....	Square Inches.....	0.155
Square Meters.....	Square Feet.....	10.764
Square Meters.....	Square Yards.....	1.196
Square Kilometers.....	Square Miles.....	0.386
Sq Hectometers.....	Acres.....	2.471
Cubic Meters.....	Cubic Feet.....	35.315
Cubic Meters.....	Cubic Yards.....	1.308
Milliliters.....	Fluid Ounces.....	0.034
Liters.....	Pints.....	2.113
Liters.....	Quarts.....	1.057
Liters.....	Gallons.....	0.264
Grams.....	Ounces.....	0.035
Kilograms.....	Pounds.....	2.205
Metric Tons.....	Short Tons.....	1.102
Newton-Meters.....	Pound-Feet.....	0.738
Kilopascals.....	Pounds per Sq Inch.....	0.145
Km per Liter.....	Miles per Gallon.....	2.354
Km per Hour.....	Miles per Hour.....	0.621



