

ARMY * TM 9-2355-106-10
AIR FORCE TO 36A12-1C-2400-1

TECHNICAL MANUAL
OPERATOR'S MANUAL
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP)
M1224
(NSN 2355-01-553-4634) (EIC 1XF)
M1224A1
(NSN 2355-01-561-0281) (EIC 1XM)

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE

09 APRIL 2012

WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.

First Aid

First aid is the emergency care given to the sick, injured, or wounded before being treated by medical personnel. First aid data can be found in FM 4-25.11. This manual contains procedures for all types of casualties and the measures described are for use by all service members. Service members may be able to save a life, prevent permanent disability, or reduce long periods of hospitalization by knowing WHAT to do, WHAT NOT to do, and WHEN to seek medical assistance.

WARNING SUMMARY – (Continued)

EXPLANATION OF GENERAL SAFETY ICONS



EAR PROTECTION – headphones over ears shows that noise level will harm ears.



ELECTRICAL – electrical wire to arm with electricity symbol running through body shows that shock hazard is present.



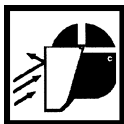
ELECTRICAL – electrical wire to hand with electricity symbol running through body shows that shock hazard is present.



EYE PROTECTION – person with goggles shows that the material will injure the eyes.



FLYING PARTICLES – arrows bouncing off face shows that particles flying through air will harm face.



FLYING PARTICLES – arrows bouncing off face with face shield shows that particles flying through the air will harm face.



HEAVY OBJECT – human figure stooping over heavy object shows physical injury potential from improper lifting technique.

WARNING SUMMARY – (Continued)



HEAVY PARTS – foot with heavy object on top shows that heavy parts can crush and harm.



HEAVY PARTS – heavy object on human figure shows that heavy parts present a danger to life or limb.



HEAVY PARTS – heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.



HOT AREA – hand over object radiating heat shows that part is hot and can burn.



MOVING PARTS – human figure with an arm caught between gears shows that the moving parts of the equipment present a danger to life or limb.



MOVING PARTS – hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



MOVING PARTS – hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb.



SHARP OBJECT – pointed object in hand shows that a sharp object presents a danger to life or limb.



SLICK FLOOR – wavy line on floor with legs prone shows that slick floor presents a danger for falling.

WARNING SUMMARY – (Continued)**GENERAL SAFETY WARNINGS****WARNING****GENERAL WARNING**

Before performing any maintenance procedure, ensure vehicle is parked on level surface, engine is off, parking brake is applied, transmission is in NEUTRAL (N), and wheels are chocked. Wear eye protection and stay clear of rotating parts and hot surfaces. Make sure all electrical tools are grounded. Use extreme caution when working under vehicle. Use hydraulic jack to raise vehicle, and place jack stands under frame rails to support axle. Keep first-aid and fire-control equipment available during all operation and maintenance procedures. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING**AIR DRAIN VALVES**

Air drain valves are under pressure. Wear protective goggles and do not place face in front of air drain valves while draining air reservoirs. Open air drain valves slowly to release air pressure gradually. Failure to comply may result in serious injury or death to personnel.

WARNING**AIR LINES**

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

Let air pressure build in both tanks to 100 psi (689 kPa) before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.

Do not operate vehicle with air pressure system loss. Vehicle has reduced or no braking capability and may not stop. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)**WARNING****BATTERIES**

Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Battery acid must not contact eyes, skin, or clothing. If battery acid contacts eyes or skin, flush area with large amounts of water for 15 minutes and seek immediate medical care. If swallowed, do not induce vomiting. 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 serious injury or death to personnel.

Disconnect battery ground cable or power source prior to working on electrical components. If electrical shock occurs, administer first aid and seek medical assistance immediately. Failure to comply may result in serious injury or death to personnel.

When reconnecting the batteries, always connect the negative terminals last to avoid arcing or sparking that may cause an explosion.

Turn main power switch off prior to performing maintenance on battery or electrical system. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion. Do not allow tools to contact battery box or other battery terminals when removing or installing terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING**BRAKES (ALSO SEE HAZARDOUS MATERIALS WARNINGS)**

Never coast downhill. Service brakes alone should not be used to control speed on major downgrades. Failure to comply may result in injury or death to personnel.

Check air brake system with vehicle on a firm level surface and clear of all personnel, buildings, and equipment. Failure to comply may result in damage to equipment or serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING



CAB DOOR WINCH STRAPS

Cab doors must be secured in the open position by using heavy duty winch straps to prevent accidental closure during vehicle maintenance. Failure to comply may result in serious injury or death to personnel.

WARNING



COMPRESSED AIR

Do not use compressed air exceeding 30 psi (207 kPa) for cleaning purposes. Use only with effective chip-guarding and personal protective equipment, including goggles or face shield and gloves. Failure to comply could result in serious injury or death to personnel.

WARNING



COOLING SYSTEM/RADIATOR

Cooling system components become pressurized and extremely hot during normal operation. To prevent serious injury from hot coolant or scalding steam, use the following safety procedure when removing radiator cap, surge tank cap, or deaeration cap:

- Allow engine to cool for 15 minutes.
- Wrap a thick cloth around cap to be removed.
- Loosen cap slowly one-quarter to one-half turn counterclockwise, and pause to allow pressure to release.
- Continue to turn cap counterclockwise to remove.

Ensure all personnel stay clear of radiator while engine is running. Air in radiator will be released, which may cause hot coolant to spray out. Failure to comply may result in serious injury to personnel.

Wear safety goggles and work gloves while servicing cooling system. Label all connections and reference areas before removing parts. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING



DOORS

The doors are heavy. Ensure that no one is standing directly behind the door before opening and closing it. Ensure that hands and feet are clear of the area before closing the door. Use caution when opening or closing the doors, especially when the vehicle is parked on an incline. Failure to comply may result in injury to personnel.

Caution should be used when opening and closing the side doors and rear ramp. Soldiers entering or exiting the vehicle should ensure that all body parts and gear are clear of the doors and ramps when closing. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING



DRIVING/OPERATING

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground Guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

When operating the vehicle in the transmission limp home mode, the operator must stay in vehicle and use only the service brakes to hold the vehicle in place. Failure to comply may result in injury or death to personnel.

The driver is responsible for the safety of personnel riding in vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of the vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

Personnel must utilize seat restraints, and each occupant must ensure that their seat restraint is properly fastened and adjusted. Failure to comply may result in serious injury to personnel.

Turn master power switch off prior to performing maintenance on battery or electrical system. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion. Do not allow tools to contact battery box or other battery terminals when removing or installing terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

To prevent falls from the sides, rear or top of the vehicle, personnel should always maintain three points of contact when climbing in, out, and on the vehicle. Use ladder during maintenance, as applicable. Failure to comply may result in injury to personnel.

Noise levels exceed 85-decibel limit. Exposure to constant, elevated noise levels could cause permanent hearing damage. Single hearing protection is required in and around operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result to injury to personnel.

Do not park vehicle on longitudinal slopes greater than 30 percent. Parking on grades in excess of 30 percent slope can lead to parking brake failure, resulting in vehicle rolling forward or backward, which could lead to an accident. Failure to comply may result in injury to personnel or damage to equipment.

Do not drive the vehicle farther than 15 miles or exceed speeds of 30 mph while operating on the run-flat inserts. Failure to comply may cause a tire fire/or loss of vehicle control, which may result in death or injury to personnel and damage to equipment.

Vehicle control is greatly reduced when driving the vehicle with a flat tire. Reduce vehicle speed and loading, especially when traveling on secondary roads, cross-country or in high traffic areas.

Do not exceed 20 mph (32 km/h) for the maximum speed when driving on sand, mud, or soft terrain. Failure to comply may result in loss of vehicle control which will result in injury to personnel and damage to equipment.

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Speeds must be reduced according to weather and road/terrain conditions. Approach slopes head-on and avoids side slopes whenever possible. Failure to comply may cause the vehicle to roll over, which may result in death or serious injury to personnel and damage to equipment.

Be sure seats are firmly engaged. Seats may shift forward and back due to seat mounting fasteners and tether straps loosening due to exposure to shock and vibration while driving. Failure to comply may result in serious injury.

Operations on steep longitudinal grades (in excess of 50 percent slope) can lead to axle damage, resulting in injury or death to personnel.

The seatbelts must be worn during driving operation. Avoid twisting the straps when putting the seatbelt on and be sure to remove slack. This will allow the harness to provide maximum protection in the event of an accident. Failure to comply may result in death or injury to personnel.

Do not exceed the rated payload of the vehicle. Failure to comply may result in overloading of axles and degradation of brakes, which could lead to an accident and seriously injure personnel.

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

Do not use steering wheel as hand grip to enter or exit vehicle cab. Use of steering wheel for hand grip may cause sudden violent jerking of vehicle. When entering or exiting cab, use three-point contact system. Failure to comply may result in injury or death to personnel.

In extreme temperature environments, follow work-rest schedules as well as the guidance of TBMED 507, Heat Stress Control and Heat Stress Management, and TB-MED 508, Prevention and Management of Cold Weather Injuries. Failure to comply may result in injury to personnel

WARNING SUMMARY – (Continued)

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

Vents and vent gates must be open and the ventilation system must be on the Fresh Air and Recycled Air settings, or Fresh Air, Recycled Air, and Conditioned Air settings. Operation with inadequate ventilation (ventilation system set improperly) could create an oxygen deficient atmosphere, which could lead to occupant incapacitation. Failure to comply could lead to serious injury to personnel.

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WARNING SUMMARY – (Continued)

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

Do not park vehicle on longitudinal slopes greater than 30 percent. Parking on grades in excess of 30 percent slope can lead to parking brake failure, resulting in vehicle rolling forward or backward, which could lead to an accident. Failure to comply may result in injury to personnel or damage to equipment.

WARNING



ELECTRICAL

Turn off ignition switch and main power switch before performing electrical system maintenance. Failure to comply may result in serious injury or death to personnel.

Disconnect negative ground cable from batteries before removing any electrical component. Failure to comply may result in serious injury or death to personnel.

Never attempt a voltage measurement with test probe lead in current jack (10A or 300mA). Failure to comply may result in serious injury to personnel.

Shut engine down before performing voltage checks for injector solenoids. When engine is running, injector circuits have high voltage and amperage. Failure to comply may result in serious injury to personnel.

Do not use a circuit breaker, fuse, or relay with higher amperage rating than listed for a particular application. Using higher amperage will overheat the electrical circuit, causing melted components and possible fire. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING

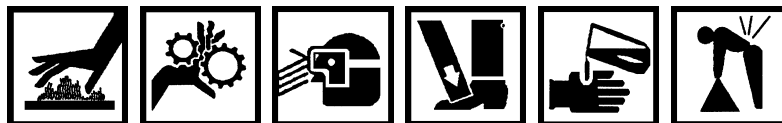


EMERGENCY HATCH

Emergency hatch door is extremely heavy. Use caution and keep arms, hands, and head clear of hatch when opening or closing. Ensure hatch door is properly secured in both the open or closed position. Do not operate vehicle with emergency roof hatch open. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING



ENGINE

Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.

Do not rotate diesel engine when priming with oil. This may cause engine to accidentally start. Failure to comply may result in serious injury or death to personnel.

Keep hands and clothing clear of moving parts in the engine compartment. Rotating parts can cause severe injury to personnel. Ensure that all guards are in place and do not wear loose clothing when conducting maintenance. Always check to ensure that the area is clear of personnel and obstructions before starting the engine. Failure to comply may result in injury to personnel.

WARNING



ETHER CANISTER

Ether canisters are pressurized and flammable. Keep away from flames and sparks. Do not incinerate or puncture canister. Do not expose to temperatures above 120°F (49°C). Do not store spare canister in vehicle cab. Failure to comply may result in serious injury or death to personnel.

WARNING



EXHAUST

Exhaust system components can be hot. Do not touch with bare hands or allow contact with other skin surface. Wear protective work gloves and long sleeves.

Do not use exhaust tailpipe as a step. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING



FAN BLADE

Do not attempt to restrict fan blade rotation during engine operation. Improper use of application or modification of fan drive or fan can damage fan drive. Do not operate vehicle with malfunctioning or damaged fan drive or fan blades. Failure to comply may result in damage to equipment and serious injury to personnel.

WARNING



FIRE SUPPRESSION SYSTEM

Before installing FSS extinguisher, verify correct part number is being installed. Check for visible damage to the canister, such as dents, cracked plastic, chips, or scratches where hoses connect. If damage is visible anywhere, do not use; contact your supervisor. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Prior to servicing FSS, make sure FSS power is off, master battery disconnect switch is off, unless otherwise instructed. If damage is visible, anywhere, do not use. Contact your supervisor. Failure to comply may result in discharging of system and serious injury or death to personnel.

Before handling extinguisher, make sure anti-recoil plug is installed in valve outlet port and mechanical lever lockpin is installed in lever lock holes. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Some fire suppression systems have a safety pin to install before disconnecting lines. Check to see if system uses a safety pin and install it before disconnecting lines. When disconnecting the extinguisher lines, use extreme caution. Do not disturb the pyrotechnic actuator and pressure switch; this will cause the extinguisher to discharge automatically. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not drop or strike FSS extinguisher. Extinguisher can discharge accidentally and chemical agent can escape through holes in side of ant-recoil plug. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not release extinguisher bottle band clamps unless anti-recoil plug is installed in valve outlet port and mechanical lever lockpin is installed in lever lock holes. Failure to comply may result in personal injury or death, or damage to equipment.

FSS extinguisher can move violently when discharging. Ensure extinguisher is properly secured during use. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Replace fire extinguisher immediately after use, even if only partly used. Confirm that replacement extinguisher is correct part number and chemical agent before installing. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY – (Continued)

Exposure to large quantities of dry chemical fire extinguisher in cab may result in temporary breathing difficulty during and immediately after discharge. If possible, discharge fire extinguisher from outside cab. Ventilate and wash cab thoroughly prior to reentry. If respiratory irritation or distress occurs, move victim to fresh air. Seek medical attention if irritation persists.

Chemical fire suppression agents are refrigerants and can freeze skin. Extinguisher will be extremely cold after discharging. Avoid contact with chemical agent and do not touch extinguisher after use. Failure to comply may result in serious personal injury.

Ensure that the optical fire sensors are kept clean. If the optical fire sensors are not kept clean, the AFES may not properly function in the event of a fire. Failure to comply may result in death or injury to personnel.

WARNING



FORDING WATER

Do not attempt to ford water deeper than 36 inches (91 cm), including wave height. Ensure bottom surface under water is firm. Reduce speed during fording. Unless absolutely necessary, do not stop while driving in the water. Ensure brakes are dry and operating correctly after fording before commencing normal driving. Failure to comply may result in injury to personnel and damage to equipment.

WARNING



FUEL

Radio transmission is prohibited 50 feet (15 meters) from other vehicles refueling. Ensure radios are powered OFF before conducting fueling operations or maintenance activities. Failure to comply may result in injury to personnel.

Clean up all fuel spills. Spills can create slip and fire hazards. Dispose of materials in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment.

WARNING

GUNNER

Gunner restraint harness must be worn at all times. Failure to comply may result in serious injury to personnel.

Make sure gunner platform support strap is not kinked, knotted, damaged, cut, or frayed before fastening to platform. If damaged, cut or frayed, see Field Maintenance for replacement. Have assistant hold platform at height adjustment holes so platform does not free fall. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING



GUNNER HATCH

Gunner sliding hatch can only be opened or closed when vehicle is stationary and on level surface. Do not attempt to open or close the hatch when vehicle is in motion. Make sure latch locks are secured into place in the open or closed positions before vehicle starts moving. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Ensure gunner hatch is completely locked in open position before moving vehicle with gunner in position. Use extreme caution when standing in gunner hatch while vehicle is in motion. Gunner should be holding onto weapon or other support to maintain stability at all times. Failure to comply may result in serious injury or death to personnel.

WARNING



HEATER

Do not operate personnel heater or vehicle engine in an enclosed area without adequate ventilation. The auxiliary diesel heater must be switched off before fuel tank on the vehicle is filled.

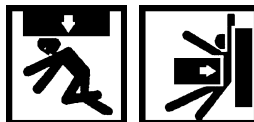
WARNING



HEAVY LIFTING

Prior to moving heavy components with lifting device, clear path of travel and clear personnel from area. Use extreme caution if lifting objects overhead or backing up. Stop and lower load as soon as possible. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING



HOOD

Hood is extremely heavy and requires two-person lift. Ensure there is adequate space in front of vehicle to open hood completely without pinning personnel between hood and another structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY – (Continued)**WARNING****JACKS**

Before lifting vehicle off ground, make sure it is parked on level surface. Set parking brake and chock wheels. Use hydraulic jack to lift vehicle. Do not use jack alone to support vehicle. Never work under or near a vehicle supported only by jack or lifting device. Use rated jack stands under frame rails to properly support vehicle. Do not support vehicle under front and rear axles. Use additional jack stands as necessary to support vehicle components during removal and installation procedures. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING**LITTER**

Keep personnel clear of litter-lift moving parts. Ensure litters and patients are properly secured and clear of rear door/ramp and all other obstacles during litter-lift movement. Failure to comply may result in serious injury or death to personnel.

Hold litter stub and connector plate up while removing or installing hex-head screws from bracket. If connector plate and stub fall and slide down stainless sliding rail, serious damage to parts may occur. Failure to comply may result in serious injury or death to personnel.

WARNING**OXYGEN MONITOR SENSOR**

If the oxygen monitor light is yellow or red, an unsafe level of oxygen has been detected in the area. Shut the vehicle down, and vacate and ventilate the crew compartment until the source of the problem is identified and the oxygen level returns to normal. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING**PARKING BRAKE**

Let air pressure build in both tanks to 100 psi (689 kPa) before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING

RADIO

Antenna emits radio frequency radiation. Do not touch active antenna and maintain proper standoff distances from active antenna as specified in radio equipment TMs. Failure to comply may result in injury or death to personnel.

WARNING



REAR CABIN DOOR/RAMP

Rear cabin door/ramp is heavy. Make sure door/ramp is secured so it will not move. Failure to comply may result in serious personal injury or death to personnel.

Ensure no one is behind vehicle when lowering rear door/ramp. Use extreme caution when using emergency rear door/ramp release, to ensure no one is struck by door as it falls open. Sound horn before lowering door/ramp. Keep arms and legs clear of rear door/ramp when closing. Do not operate rear door/ramp when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.

WARNING

STOWAGE/CARGO

Ensure that stowed items don't interfere with the AFES. Do not stow any items around the valve outlet port nozzles that may interfere with the proper operation of the AFES. Failure to comply may result in death or injury to personnel and damage to equipment.

Ensure that cargo is stowed and secured in accordance with the load plan. Do not block fire sensors, extinguisher nozzles, or egress paths. Failure to comply may result in injury to personnel and damage to equipment.

Heavy objects/loads, such as tool boxes, storage cabinets, and heavy parts must be carried on the floor with the weight distributed as equally as possible between left and right sides of the vehicle. Failure to comply decreases the stability of the vehicle and will increase the likelihood of a rollover.

Do not stow material under seats. Under-seat area is not designated for stowage, and improper use may lead to seat failure during a blast event. Failure to comply may result in death or injury to personnel.

Do not modify seats or seat attachments, or hang gear on seats. Failure to comply may lead to seat failure during a blast event resulting in death or injury to personnel.

WARNING SUMMARY – (Continued)

WARNING

TOWING

If brakes of disabled vehicle are inoperable, do not flat tow disabled vehicle. Request wrecker support. Do not move towing vehicle without assistance of ground guide. Ground guide must be visible to operator at all times. When using wrecker to tow a vehicle with nonfunctional brakes, use extreme caution and reduce speed accordingly. Ensure that all personnel are clear of vehicle before removing wheel chocks and starting to tow vehicle. The maximum speed limit on unpaved roads when towing is 15 mph (24 km/h). Terrain, weather, and other conditions may require reduced speeds. Avoid sharp turns. On paved roads, speeds may be increased to 25 mph (40 km/h) if conditions permit. Prior to disconnecting tow bar, ensure that vehicles are on level surface with wheels chocked. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Vehicles with catastrophic damage to the front axle and suspension may require the axle to be properly secured to the chassis for safe recovery of the vehicle. Never attach safety chains to axles or suspension components that are no longer physically attached to the vehicle. Never cross the safety chains. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Recovering vehicle from the rear should be performed only in emergency combat situations and with the commander's approval. The lack of rear lift tow provisions requires improvised rigging, which decreases vehicle stability. Decrease speeds and be extremely cautious. Failure to comply may result in damage to equipment or serious injury and death to personnel.

Do not put hands near pintle hook when aligning lunette eye with pintle hooks. Failure to comply may result in serious injury or death to personnel.

When towing, ensure that all personnel are clear of vehicle before removing the wheel chocks and starting vehicle towing. Personnel must not occupy vehicle being towed. Use reasonable speeds for road conditions and cautions when making turns. Prior to disconnecting tow bar, ensure that vehicles are on level surface and wheels are chocked. Failure to comply may result in injury or death to personnel.

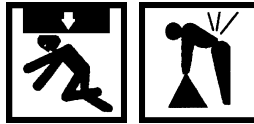
Do not position hands near the pintle hook while connecting or removing the tow bar. Ensure that the service brake lights, emergency flashers, turn signals, and service brakes on the towed vehicle operate in coordination with the towing vehicles. Failure to comply may result in serious injury or death to personnel.

The maximum speed limit when towing is 25 mph. Avoid sharp turns. If the service brakes are inoperable on the towed vehicle, do not flat-tow the vehicle. Ensure that the wheels of the towed vehicle are chocked before disconnecting the tow bar. Failure to comply may result in serious injury or death to personnel.

When performing like-vehicle towing operations, never proceed up or down grades greater than 20 percent.

WARNING SUMMARY – (Continued)

WARNING



TOWING EYES

Do not remove both rear towing eyes at the same time, Entire rear frame crossmember assembly will fall. Replace one towing eye at a time. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING



TRANSFER CASE

During normal vehicle operation, transfer case and oil cooler can become very hot. Allow transfer case and oil cooler to cool prior to servicing oil cooler. Wear safety goggles, work gloves, and protective clothing. Use extreme caution when opening drain valves and removing bolts. Failure to comply may result in serious injury to personnel.

WARNING



TRANSMISSION

Use care when working with hot transmission and fluid during maintenance procedures. Wear protective goggles, work gloves, and long sleeves to avoid injury. Avoid contact with hot transmission oil or sump when draining transmission oil. If transmission oil temperature is above 220°F (104°C), allow transmission oil to cool before removing dipstick. Failure to comply may result in serious injury or death to personnel.

WARNING



WHEELS/TIRES

Wheel and tire assemblies are heavy. Do not attempt to lift wheel and tire assemblies without assistance from crewmember. Wear safety goggles and work gloves. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Ensure vehicle is parked on hard, level surface before changing wheel and tire assembly. Soft or uneven ground may cause jack or jack stand to slip, resulting in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)**WARNING****WINCH OPERATIONS**

Do not use parts other than those specified for the system being serviced. Failure to comply may result in damage to equipment and serious injury or death to personnel.

During winching operations, all personnel must remain either inside the vehicle or outside a circled area with a radius that is twice the length of the extended winch wire rope when measured from both the winch and the load point. Failure to comply may result in death or injury to personnel.

Before removing winch cable from vehicle, check cable for damage such as frayed wires, binds, or kinks. If found, replace cable. Failure to comply may result in damage to equipment and serious injury or death to personnel.

When installing new cable, ensure cable is free of kinks, binds, and frayed wires before installing onto drum spool. Secure new cable to spool drum with screws. Always prestretch cable and respool under load before use. Tightly wound cable reduces chances of binding. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Cable is under tension when installed. Wear safety goggles and work gloves when handling. Do not wear loose clothing; it can get caught in cable as cable winds around spool drum. Failure to comply may result in serious injury or death to personnel.

When operating winch, ensure there are no objects in path of cable or vehicle. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Wear heavy, leather-palmed work gloves when handling cable. Never let moving cable slide through hands, even when wearing gloves. Cable can become frayed or contain broken wires. A broken wire could cut through gloves and injure hands. Failure to comply can result in serious injury to personnel.

To prevent accidental release, do not remove mechanical lever lockpin unless pull-cable fitting is attached. Failure to comply may result in damage to equipment and serious injury to personnel.

Keep a minimum of five wraps of cable on drum when using winch. Fewer wraps may cause cable to pull free of drum and release load. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

EXPLANATION OF HAZARDOUS MATERIALS ICONS



BIOLOGICAL – abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



CHEMICAL – drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



CRYOGENIC – hand in block of ice shows that the material is extremely cold and can injure human skin or tissue.



EXPLOSION – rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition or high pressure.



FIRE – flame shows that a material may ignite and cause burns.



POISON – skull and crossbones shows that a material is poisonous or is a danger to life.



VAPOR – human figure in a cloud shows that material vapors present a danger to life or health.

WARNING



ADHESIVES

Adhesive material can irritate skin and eyes. Read and follow manufacturer's instructions carefully. If adhesive contacts eyes, follow manufacturer's emergency procedures. Have eyes checked by a physician as soon as possible. Failure to comply may result in serious injury to personnel.

WARNING

WARNING SUMMARY – (Continued)**ANTI-SEIZE COMPOUND**

Anti-seize compound is flammable and toxic. Container may explode from excessive heat. Vapors can cause headache, dizziness, unconsciousness, corneal injury, and respiratory tract irritation. Use only in well-ventilated area. Use approved respirator with dual organic vapor/mist and particulate cartridge. 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 compound contacts eyes, flush eyes with large amounts of water for at least 15 minutes and obtain immediate medical attention. If swallowed, do not induce vomiting; obtain immediate medical attention. Failure to comply may result in serious injury or death to personnel.

WARNING**CARBON MONOXIDE**

Carbon monoxide is a colorless, odorless, and dangerous gas that deprives the body of oxygen and causes suffocation. Use the following precautions to avoid carbon monoxide poisoning. Failure to comply may result in permanent brain damage or death to personnel.

- Do not idle engine for long periods of time.
- If necessary to run engine in confined area during vehicle service, use proper equipment to vent exhaust gasses outside work area.
- Do not operate personnel heater in enclosed area without adequate ventilation.
- Turn auxiliary diesel heater switch off before filling any fuel tank on vehicle.
- Do not sleep in vehicle with heater operating or engine idling.
- Notify Field Maintenance if exhaust fumes are detected in crew compartment while operating the vehicle.

Be alert at all times for exhaust odors and symptoms of exposure to carbon monoxide, such as headaches, dizziness, loss of muscular control, apparent drowsiness, and coma. If symptoms are evident, move affected personnel to fresh air, keep them warm, do not permit physical exercise, administer artificial respiration (if necessary), and seek immediate medical attention.

WARNING**CLEANING SOLVENTS**

Adhesives, solvents, and sealing compounds can produce harmful vapors; harm skin, eyes, and respiratory tract; and ignite easily. Examples of solvent cleaners are carbon tetrachloride and emulsion-type and petroleum-base cleaners. Comply with the following precautions to avoid serious injury or death to personnel:

- Wear eye protection and protective clothing.

WARNING SUMMARY – (Continued)

- Read and carefully follow manufacturer's instructions.
- Use only in well-ventilated area, away from flame or sparks.
- Keep fire extinguisher nearby.
- If adhesives, solvents, or sealing compounds get on skin or clothing, wash immediately with soap and water.
- Do not use gasoline or solvents that contain gasoline. Gasoline can explode.
- Use hot solution tanks or alkaline solutions correctly by carefully following manufacturer's instructions.
- Solvents used with a spray gun must be used in a spray booth with filter. Personnel operating spray gun must wear face shield.

WARNING



CONNECTOR LUBRICANT

Connector lubricant is harmful to skin and eyes. If lubricant contacts eyes, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in serious injury to personnel.

WARNING



CORROSION PREVENTIVE COMPOUND

Corrosion preventive compound is toxic. Use only in well-ventilated area. Use 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 compound contacts eyes, 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 serious injury or death to personnel.

WARNING



DIELECTRIC GREASE

Dielectric grease is harmful to skin and eyes. If grease contacts eyes, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in serious injury to personnel.

WARNING

WARNING SUMMARY – (Continued)**ETHER CANISTER**

Ether canisters contain hazardous materials. Handle with care and dispose of in accordance with standard operating procedures. Use approved respirator with dual organic vapor/mist and particulate cartridge. Avoid contact with skin and eyes, and avoid breathing fumes. If swallowed, do not induce vomiting. Obtain immediate medical attention. Failure to comply may result in serious injury or death to personnel.

WARNING**ENGINE FLUIDS**

Engine fluids (oil, fuel, and coolant) may be hazardous to human health and the environment. Handle all fluids and other contaminated materials (such as filters and rags) in accordance with standard operating procedures. Recycle or dispose of engine fluids, filters, and other contaminated materials in accordance with standard operating procedures. Failure to comply may result in environmental damage and injury to personnel.

WARNING**FUEL**

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Store diesel fuel in an approved container clearly marked DIESEL FUEL or JP-8, accordingly. Dispose of fuel in an approved container clearly marked DIESEL FUEL or JP-8, accordingly, in accordance with standard operating procedures.

Never use diesel fuel or JP-8 to clean parts. Fuel is highly flammable. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not fill fuel tank with engine running. Do not overfill fuel tank. Clean fuel spills immediately. Ensure fuel nozzle is grounded to filler neck to prevent sparks. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Ensure radios are powered OFF before conducting fueling operations or maintenance activities. Failure to comply may result in injury to personnel.

Radio transmission prohibited 15 meters (50 ft) from other vehicles refueling.

WARNING SUMMARY – (Continued)

Clean up all fuel spills. Spills can create slip and fire hazards. Dispose of materials in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment.

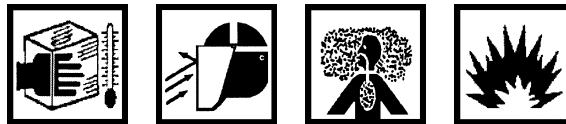
WARNING



HYDRAULIC FLUID

Hydraulic fluid is flammable and harmful to skin and eyes. Wear work gloves and eye protection when handling fluids. Do not perform maintenance while smoking or near flame or sparks. If fluid contacts skin, wash affected area immediately. In case of eye contact, flush with water for 15 minutes and seek medical care immediately. Dispose of hydraulic fluid in accordance with standard operating procedures. Failure to comply may result in serious injury to personnel.

WARNING



REFRIGERANT

The temperature of liquid refrigerant is -20°F (-29°C). Wear full face shield, protective rubberized gloves, and protective clothing when working with refrigerant. If refrigerant contacts skin, remove all contaminated clothing. Treat skin as though it were frostbitten or frozen and seek immediate medical attention. If refrigerant contacts eyes, do not rub them. Flush eyes with cold water for at least 15 minutes to gradually increase temperature above freezing point. Seek immediate medical attention. Failure to comply may result in serious injury or death to personnel.

Do not expose refrigerant containers, empty or full, to open flames or temperatures above 125°F (52°C). Do not discard empty containers where they may be subject to heat from a trash burner; containers may explode. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Refrigerant becomes a poisonous gas in the presence of heat. Do not smoke or allow any type of flame in immediate area while servicing air conditioning system. Never weld, solder, steam clean, or use excessive heat on any part of the air conditioning system while charged/pressurized. Failure to comply may result in damage to equipment and serious injury or death to personnel.

R-134a refrigerant must not be mixed with air and then pressurized. When mixed with large quantities of air and pressurized, R-134a becomes combustible. Failure to comply may result in damage to equipment and environment, and serious injury or death to personnel.

Refrigerant evaporates very quickly and may displace oxygen surrounding work area, especially in a small or enclosed area. This can cause suffocation or brain damage. If leak occurs, avoid breathing refrigerant vapor and thoroughly ventilate area before continuing service. If personnel breathe refrigerant vapors, obtain immediate medical assistance. Failure to comply may result in serious injury or death to personnel.

Federal and state laws require that refrigerant be recovered and recycled. Refrigerant must be recovered from system with authorized recommended equipment before any work can be performed on unit. Always use approved recycling equipment to prevent accidental discharge. Failure to comply may result in damage to equipment and environment, and serious injury or death to personnel.

Do not check compressor oil level when HVAC system is charged with refrigerant. Never open the high side hand valve of the manifold gauge set while HVAC system is operating. If hot, high pressure refrigerant is forced through gauge to refrigerant supply cylinder, which could rupture. Do not disconnect HVAC lines from compressor. Release of refrigerant may cause damage to equipment or environment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

Do not use parts other than those specified for the system being serviced. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Accidental or intentional introduction of liquid contaminants into the environment is a violation of state, federal, and military regulations. Store, install, and dispose of containers in accordance with standard operating procedures. Refer to Army Petroleum, Oil, and Lubricants (POL) (para. 1-8) for information concerning storage, use, and disposal of liquid contaminants. Failure to comply may result in damage to environment and serious injury or death to personnel.

WARNING**SILICONE GASKET MATERIAL**

Silicone gasket material emits a small amount of acid vapor. Ensure work area is well ventilated. Read and carefully follow manufacturer's instructions before use. If silicone gasket material contacts eyes, follow manufacturer's emergency procedures. Seek medical assistance as soon as possible. Failure to comply may result in serious injury to personnel.

WARNING**SILICONE GREASE**

Silicone grease is harmful to skin and eyes. If silicone grease contacts eyes, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in serious injury to personnel.

WARNING**THREAD SEALING COMPOUND**

Thread sealing compound is harmful to skin and eyes. If thread sealing compound contacts eyes, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in serious injury to personnel.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 9-2355-106-10 dated 27 April 2009. Zero in the “Change No.” column indicates an original page or work package.

Date of issue for original manual is:

Original 09 April 2012

THE TOTAL NUMBER OF FRONT AND REAR PAGES IS 64 AND THE TOTAL NUMBER OF WORK PACKAGES IS 83 CONSISTING OF THE FOLLOWING:

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C., 09 APRIL 2012

TECHNICAL MANUAL
OPERATOR'S MANUAL
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP)

M1224
(NSN 2355-01-553-4634) (EIC 1XF)

M1224A1
(NSN 2355-01-561-0281) (EIC 1XM)

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HOW TO USE THIS MANUAL

Operators shall familiarize themselves with the format and contents of this Technical Manual (TM) prior to operating or performing operator maintenance procedures. Learning how to use this TM will enable personnel to quickly locate information, gain proper knowledge of the equipment, and shorten the time necessary to complete the required procedure.

The manual has six chapters:

Chapter 1 – provides General Information, Equipment Description, and Theory of Operation.

Chapter 2 – contains Operator Instructions.

Chapter 3 – provides Troubleshooting Procedures for operator/crew.

Chapter 4 – contains Preventive Maintenance Checks and Services (PMCS), and Lubrication Instructions for the Operator for Before, During, After, Daily, Weekly, and Monthly checks.

Chapter 5 – contains Operator Maintenance Instructions.

Chapter 6 – provides Supporting Information, including References, Components of End Item (COEI) and Basic Issue Items (BII) Lists, Additional Authorization List (AAL), and Expendable and Durable Items List.

Each chapter is divided into work packages, which are identified by four-digit numbers in the upper corner of each page. The Table of Contents in the front of the manual lists all chapters and work packages by title and number.

Three types of notations appear throughout the manual:

WARNINGS identify risk of injury or death to personnel.

CAUTIONS identify risk of damage to equipment.

NOTES provide additional explanations or helpful information for the user.

A Warning Summary appears at the front of the manual. Become familiar with these warnings before operating or performing maintenance on the Mine Resistant Ambush Protected (MRAP) vehicle.

PMCS OVERVIEW

To ensure the vehicle is ready for operation at all times, it must be inspected on a regular basis so items to be serviced may be found before they result in serious damage, equipment failure, or injury to personnel. The PMCS table contains systematic inspections and services to maintain the vehicle in mission-ready condition.

TROUBLESHOOTING PROCEDURES OVERVIEW

Troubleshooting procedures begin at the Troubleshooting Symptom Index work package, which will direct the crewmember to a solution for a symptom or malfunction.

WORK PACKAGE FEATURES

The work package format contains a section titled “INITIAL SETUP.” Within this section are headings titled:

Test Equipment: Test equipment needed to complete a task. If test equipment is not required, this heading will not be used.

Tools and Special Tools: Common tools required to perform maintenance tasks. These common tools should be on hand to properly perform the task. Torque wrenches are required for many tasks; the proper torque wrench should be available to tighten mounting hardware.

Materials/Parts: Mandatory replacement materials or parts (gaskets, O-rings, sealant, etc.). If no mandatory replacement materials/parts are required, this heading will not be used.

Personnel Required: The number of personnel needed to perform a task. If only one crewmember is needed, this heading will not be used.

References: TMs and work packages needed to complete the task.

Equipment Conditions: Conditions that must exist before starting the task. If none are required, this heading will not be used.

CHAPTER 1

**GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF
OPERATION**

FOR

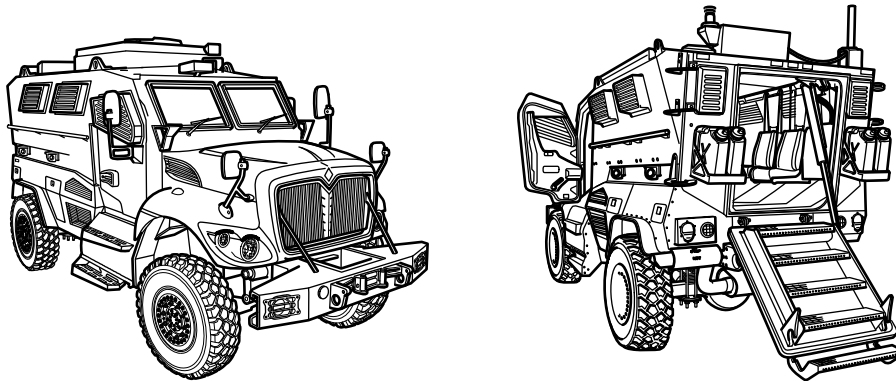
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS**GENERAL INFORMATION**

SCOPE

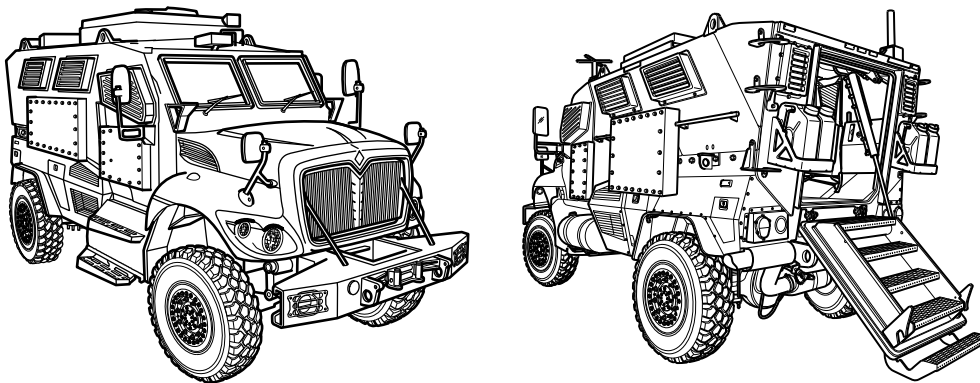
This technical manual contains operator level instructions for operating and servicing the M1224 MRAP and M1224A1 MRAP with Expedient Armor Program (MEAP). It includes cautions and warnings to operators regarding safety for personnel and equipment, the description and function of all controls and indicators, and troubleshooting procedures to be followed by operators if the vehicle malfunctions. It also contains operator maintenance checks and service procedures and other operator level supporting information.

- **Type of manual** – Operator/crew
- **Model number and equipment names:**
 - M1224 MRAP
 - M1224A1 MRAP
- **Purpose of equipment** – These vehicles are capable of supporting multiple missions to include recon, convoy operations, troop transport, CASEVAC, and Combat Engineer and EOD missions for maneuver units. They provide increased survivability for personnel via an armored cabin and V-shaped, blast-resistant hull.



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Figure 1. M1224.



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Figure 2. M1224A1.

General Information - (CONTINUED)

MAINTENANCE FORMS RECORDS AND REPORTS

- (1) (A) Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.
- (2) (F) Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR) and PRODUCT QUALITY DEFICIENCY REPORTS (PQDR).

If your MRAP vehicle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance.

If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to tacomlcmc.daform2028@us.army.mil (scroll down and choose the "Submit Quality Deficiency Report" bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR), or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/facsimile numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

CORROSION PREVENTION AND CONTROL

Corrosion Prevention and Control (CPC) of Army 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. Plastics, 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 ARMY MATERIEL TO PREVENT ENEMY USE

Command decision, according to the tactical situation, will determine when the using organization is to destroy a vehicle. A destruction plan will be prepared by the using organization, unless one was prepared by a higher authority. For general vehicle destruction procedures, refer to TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (U.S. Army Tank-Automotive and Armaments Command).

PREPARATION FOR SHIPPING OR STORAGE

No special preparation, other than maintenance, is required when MRAPs are driven under their own power to their destination.

All doors, except the driver door, should be tied closed. All material that exceeds the width of the vehicle should be removed and secured inside the vehicle. All antennas should be lowered and tied down.

Turn off all Government Furnished Equipment (GFE).

VEHICLE STORAGE

The unit is responsible for adequate storage and protection of new vehicles. Maintain records for vehicles in storage so that proper inspection and maintenance can be performed. Perform the following procedures before storing vehicle:

General Information - (CONTINUED)**STORAGE DURATION 2 MONTHS OR LESS**

1. Wash vehicle with warm water and mild soap when surface is cool to touch. Dry wet surfaces with a chamois or soft cloth.
2. Inspect painted surfaces; touch up all exposed primed or raw metal areas with Chemical Agent Reactive Coating (CARC) paint to prevent rust.
3. Check radiator surge overflow tank for proper level.
4. Cover open ends of exhaust and air intake for the Heating Ventilating and Air Conditioning (HVAC) system.
5. Check 24V battery gauge. Gauge should read no less than 24V. If less than 24V, charge batteries.
6. Ensure fuel fired heater is turned off.
7. Ensure 110V power inverter is turned off.
8. Fill fuel tank to maximum level. Ventilate system by releasing tank cap.
9. Inspect vehicle prior to storage by performing the next appropriate Preventive Maintenance Checks and Services (PMCS), and make any repairs necessary. Ensure that maintenance services and lubrication are up to date.

STORAGE DURATION OVER 2 MONTHS, UP TO 180 DAYS

Units in storage for longer than 2 months require the following additional procedures:

1. Inspect for the following:
 - a. Leaks
 - b. Low or flat tires
 - c. Corrosion
 - d. Water in compartments
 - e. Other problems or shortcomings
2. Perform the next scheduled major maintenance service.
3. Start and run vehicle at fast idle until it reaches operating temperature.
4. To remove surface charge from the battery, operate heater and air conditioner and turn on headlights and other accessories for a few minutes.
5. Drive the vehicle a short distance. Shift the transmission in various ranges; apply and release the service and parking brake systems.
6. Turn off heater and air conditioner and any other accessories; shut off lights. Park vehicle and shut off engine.
7. Disconnect and remove batteries and store in a cool, well-ventilated area. Recharge and clean before use.
8. Drain air tanks.
9. Check radiator surge overflow tank for proper level.
10. Lubricate all exposed components.
11. For vehicles exposed to ultraviolet rays of the sun, cover inside surfaces of windshield and windows to shade the interior.
12. After every 3 months of additional storage, repeat items 1 through 10.

STORAGE FACILITIES

Whenever possible, store vehicles indoors, protected from sunlight, in a dry, well-ventilated area. If indoor storage is not available, select storage lots to eliminate conditions that cause deterioration.

General Information - (CONTINUED)

Park away from transformers and/or electrical motors. When the protective wax in tire compound cracks, ozone in the air attacks the exposed areas.

Park away from trees, high weeds, and grass to prevent damage from tree or weed sap and to minimize bird and insect stains.

Park away from railroad tracks, paint shops, smoky industrial areas, and locations of possible road splash contact.

If a vehicle is parked on an incline, chock the wheels.

LIST OF ABBREVIATIONS / ACRONYMS

Many abbreviations are used in this manual. They are listed below. Learn what each one means. It will make your job easier.

Table 1.

Abbreviation/ Acronym	Definition
A or Amp	Ampere
AAL	Additional Authorization List
ABS	Antilock Brake System
AC	Alternating Current
A/C	Air Conditioner
ACC	Accessory
ACCEL	Accelerate
ADJ	Adjust
AF	Active Fault
AOAP	Army Oil Analysis Program
ATA	American Trucking Association
BII	Basic Issue Items
B.O B/O	Blackout
C-Celsius	Celsius
CAC	Charge Air Cooler
CAGEC	Commercial and Government Entity Code
CARC	Chemical Agent Resistant Coating
CASEVAC	Casualty Evacuation
CCA	Cold Cranking Ampere
CID	Cubic Inch Displacement
cm	Centimeter
COEI	Components of End Item
CPC	Corrosion Prevention and Control
CTA	Common Table of Allowance
Cyl	Cylinder
D	Drive
DA	Department of the Army
DC	Direct Current
DOD	Department of Defense
DT	Turbocharged
DTC	Diagnostic Trouble Code
ECM	Electronic Control Module
ECU	Electronic Control Unit
EIC	End Item Code
EIR	Equipment Improvement Recommendation
EOD	Explosive Ordnance Disposal
ESC	Electronic System Controller

General Information - (CONTINUED)

Abbreviation/ Acronym	Definition
ESD	Electrostatic Discharge
EST	Electronic Service Tool
EXH	Exhaust
F	Fahrenheit
FM	Field Manual
FSS	Fire Suppression System
ft	Feet
gal	Gallons per hour
gal/min	Gallons per minute
GCW	Gross Combined Weight
GCWR	Gross Combined Weight Rating
GFE	Government Furnished Equipment
GFCI	Ground Fault Circuit Interrupter
GND	Ground
GPK	Gunner Protective Kit
GVW	Gross Vehicle Weight
H ₂ O	Water
HI	High
Hp	Horsepower
HVAC	Heating Ventilating and Air Conditioning
IAW	In Accordance With
ICS	Interactive Communication System
IED	Improvised Explosive Device
in.	Inch
IP	Instrument Panel
IR	Infrared
JTA	Joint Table of Allowances
kg	Kilogram
km	Kilometer
km/l	Kilometers per liter
kpa	Kilopascal
kph	Kilometers per hour
L	Liter
LFT	Live Fire Test
lb	Pound
lb-ft	Pound force foot
LED	Light Emitting Diode
LO	Low
LSS	Life Support System
m	Meter
MAC	Maintenance Allocation Chart
MAX	Maximum
MEAP	MRAP Expedient Armor Program
mm	Millimeter
mph	Miles per Hour
MRAP	Mine Resistant Ambush Protected
MSD	Maintenance Support Device
MTOE	Modified Table of Organization and Equipment
MTVR	Medium Tactical Vehicle Replacement
MUA	Multi-Use Adapter

General Information - (CONTINUED)

Abbreviation/ Acronym	Definition
N	Neutral
NATO	North Atlantic Treaty Organization
NBC	Nuclear Biological and Chemical
NEUTL	Neutral
N•m	Newton Meter
NSN	National Stock Number
OGPK	Objective Gunner Protection Kit
opt	Option
PAM	Pamphlet
PMCS	Preventative Maintenance Checks and Services
P/N	Part Number
psi	Pounds per square inch
pt	Pint
PWR	Power (voltage)
QA	Quality Assurance
Assurance	Assurance
qt	Quart
qty	Quantity
R	Reverse
rev	Revolution
RPG	Rocket Propelled Grenade
rpm	Revolutions per minute
SAE	Society of Automotive Engineers
std	Standard
TAMMS	The Army Maintenance Management System
TB	Technical Bulletin
TCM	Transmission Control Module
TDA	Tables of Distribution and Allowances
temp	Temperature
TM	Technical Manual
TMDE	Test Measurement and Diagnostic Equipment
TOE	Table of Organization and Equipment
SAF	Small Arms Fire
U/I	Unit of Issue
V	Volt
WP	Work Package
XFER	Transfer
+/- ±	plus or minus
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
°	degrees (temperature)
®	registered trademark
™	unregistered trademark

SAFETY, CARE, AND HANDLING

The following procedures should be observed when handling all Electrostatic Discharge (ESD) sensitive components and units containing such components. Failure to observe all of these precautions can cause permanent damage to the electrostatic device. This damage can cause the device to fail immediately or at a later date when exposed to an adverse environment.

General Information - (CONTINUED)

1. Turn off and/or disconnect all power, signal sources, and loads used with the unit.
2. Place the unit on a grounded non-conductive work surface.
3. Ground the repair operator using a non-conductive wrist strap or other device using 1 mega-ohm series resistor to protect the operator.
4. Ground any tools (including soldering equipment) that will contact the unit. Contact with the operator's hand provides sufficient ground for tools that are otherwise electrically isolated.
5. All electrostatic sensitive replacement components are shipped in non-conductive foam or tubes and must be stored in the original shipping container until installed.
6. When these devices and assemblies are removed from the unit, they should be placed on the non-conductive work surface or in non-conductive containers.
7. When not being worked on, place disconnected circuit boards in plastic bags that have been coated or impregnated with a non-conductive material.
8. Do not handle these devices unnecessarily or remove them from their packages until actually used or tested.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

CHARACTERISTICS

The Mine Resistant Ambush Protected (MRAP) vehicles M1224 and M1224A1 enhance the effectiveness of ground combat forces in operations against unconventional enemy forces. The vehicles provide occupants with enhanced personnel protection and increased survivability.

The primary mission of the vehicles is to provide ground mobility capable of operating in a threat environment, including ambushes employing mines, Improvised Explosive Devices (IEDs), Rocket Propelled Grenades (RPGs), and Small Arms Fire (SAF). The vehicles will operate in most weather and terrain conditions, including off-road operations, and can be used for troop transport and combat engineering.

The major sub-systems of the vehicles include the powertrain system, electrical system, lighting systems, pneumatic system, body and chassis system, Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS), and Fire Suppression System (FSS). The vehicles feature a V-shaped hull, raised chassis, integral armor, and blow-off wheels and axles to provide increased survivability through improved mine and IED protection.

Each vehicle is capable of carrying a driver and up to five troops. The vehicle is also capable of carrying a manned, top-mounted machine gun. The vehicles are equipped with an Interactive Communication System (ICS) intercom and will normally carry radios for communications to higher, adjacent, and supporting units.

The MRAP vehicle is four-wheel drive. The vehicle is designed for small-unit combat operations in urban or confined areas, including:

- Mounted patrols
- Convoy security
- Casualty evacuation
- Reconnaissance
- Communications
- Command and control
- Troop and cargo transport
- Direct interaction with civilian population

CAPABILITIES

The MRAP vehicle provides integral protection for the crew from shock, fragments, and other effects of mine blasts. It provides crew protection even when a mine is detonated under any wheel or directly under the crew compartment. The vehicle provides crew survivability against antitank mines, small arms fire, IEDs, and overhead airburst. Additional crew protection is provided by the four-point restraint system and shock absorbing seats.

The vehicle has the capability of communicating with other vehicles to locate, prevent, and defend against the effects of mines and IEDs. Communications equipment includes:

- DOD tactical radios
- Satellite communication
- Jammers
- Intercom

Equipment Description and Data - (CONTINUED)

The vehicle can contain situational awareness systems to assist in avoiding mines and IEDs by identification of friendly versus enemy forces and location of potential hazards relative to the vehicle position.

The vehicle is also capable of:

- Operating in temperatures ranging from -25 to +125°F (-32 to +52°C) without Arctic kits.
- Forging water up to 36 in. (91.44 cm) deep.
- Climbing and descending 60 percent grades.

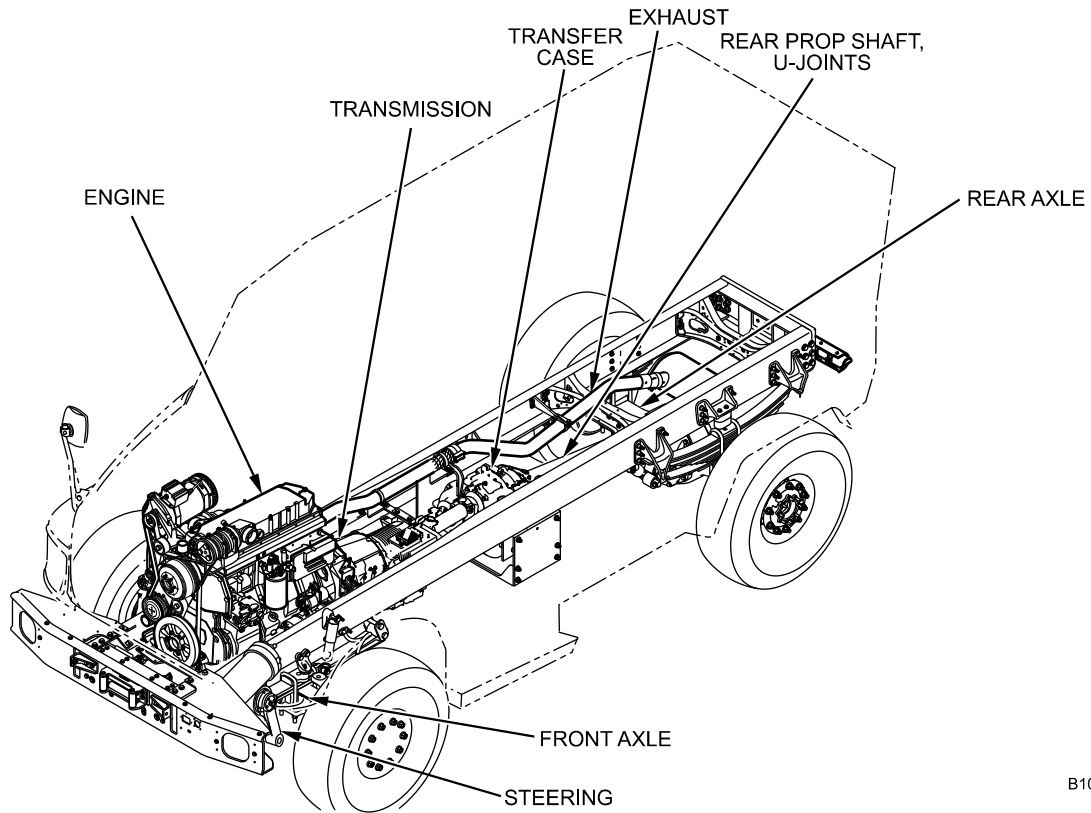
FEATURES

- Antilock Brake System (ABS)
- Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS)
- Flat towing equipped
- Fire Suppression System (FSS)
- Run-flat tires
- Four-point restraint seating system
- Intra-vehicle intercom system
- Blackout lighting and night vision capabilities
- Nuclear, Biological, and Chemical (NBC) overpressure system
- Electric winch
- Weapon mounting capability
- Roof mounted spotlight
- Heated mirrors/windshield
- Tilt steering wheel
- Two-speed with interval windshield wipers and washers
- Fuel fired heater

Equipment Description and Data - (CONTINUED)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

POWERTRAIN SYSTEM

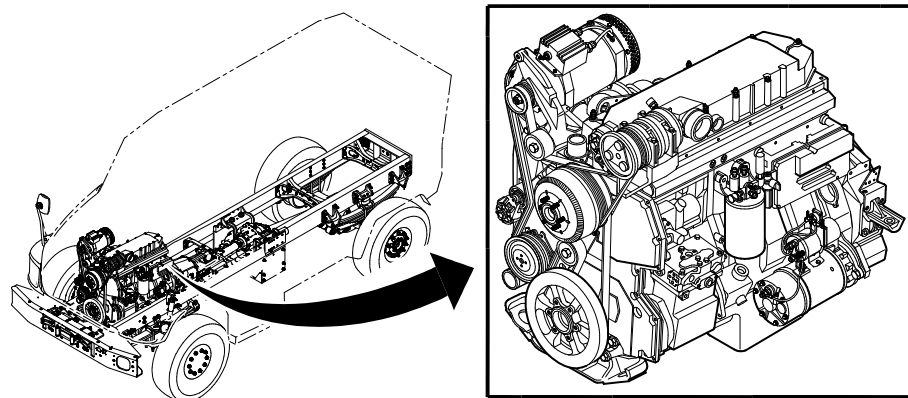


B102200576

Figure 1. Powertrain.

The powertrain system consists of the following major components: engine, transmission, transfer case, exhaust, rear prop shaft, U-joints, rear axle, front axle, and steering.

ENGINE



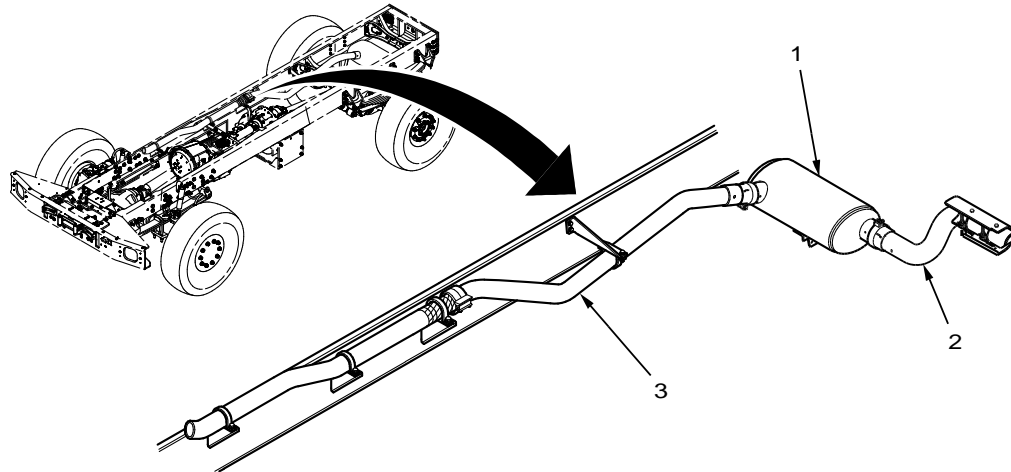
B100100591

Figure 2. Engine.

Equipment Description and Data - (CONTINUED)

The vehicle is powered by a DT 530 in-line, six-cylinder, fuel-injected diesel engine.

EXHAUST SYSTEM

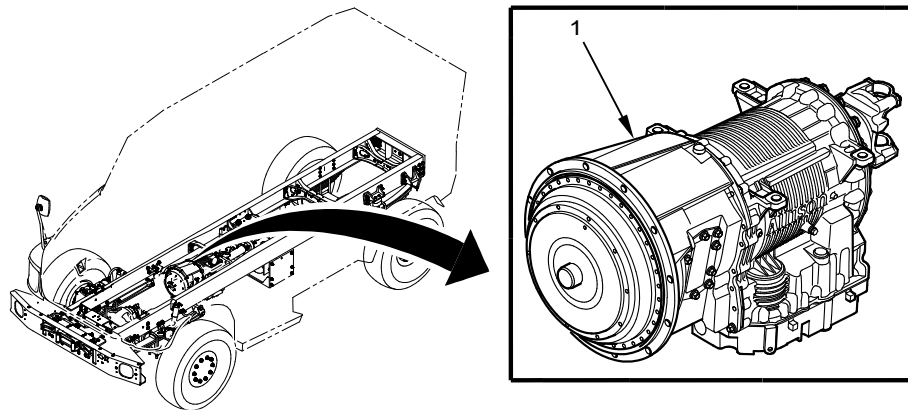


004048

Figure 3. Exhaust Pipe, Muffler, and Tailpipe.

The exhaust system includes the exhaust pipe (Figure 3, Item 3), muffler (Figure 3, Item 1), and tailpipe (Figure 3, Item 2) assembly. The exhaust pipe, muffler and tail pipe assembly route exhaust gasses away from operator and crew, as well as reduce operating noise.

TRANSMISSION



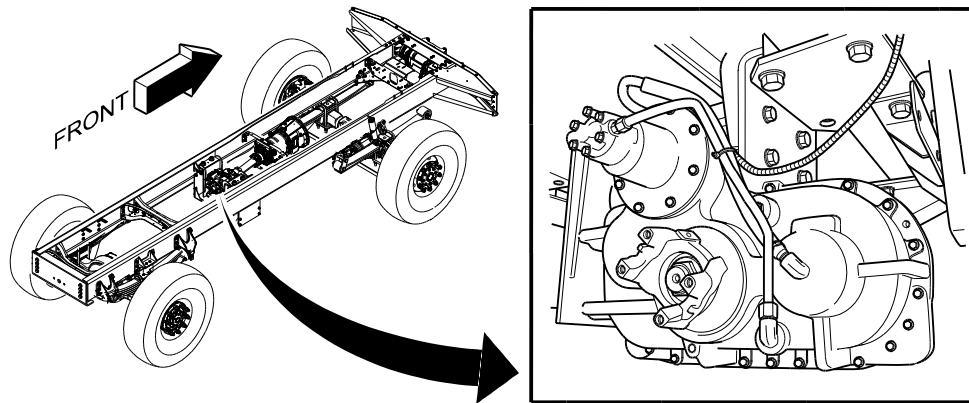
B100700574

Figure 4. Transmission.

The engine is coupled with a 3000SP five-speed automatic transmission (Figure 4, Item 1) with pushbutton controls.

Equipment Description and Data - (CONTINUED)

TRANSFER CASE

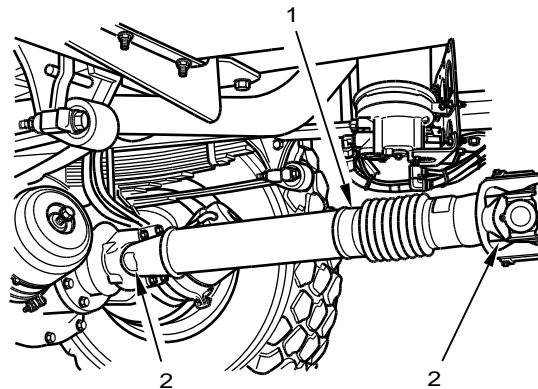


B100800590

Figure 5. Transfer Case.

The engine and transmission are coupled to a two-speed four-wheel drive transfer case.

FRONT AND REAR PROP SHAFTS AND U-JOINTS



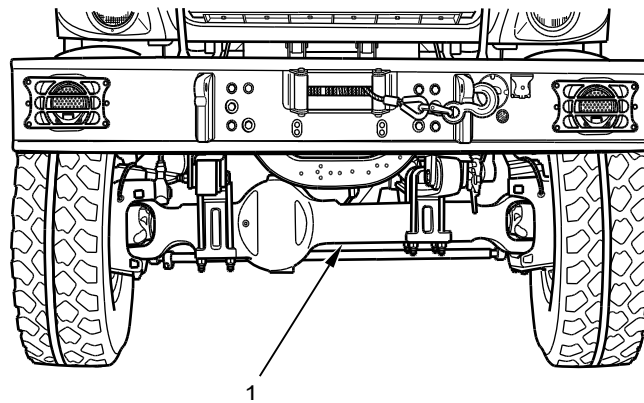
B100900589

Figure 6. Rear Prop Shaft with U-Joints.

Front and rear prop shafts drive the axles. However, only the rear prop shaft (Figure 6, Item 1) and U-joints (Figure 6, Item 2) are accessible to the operator.

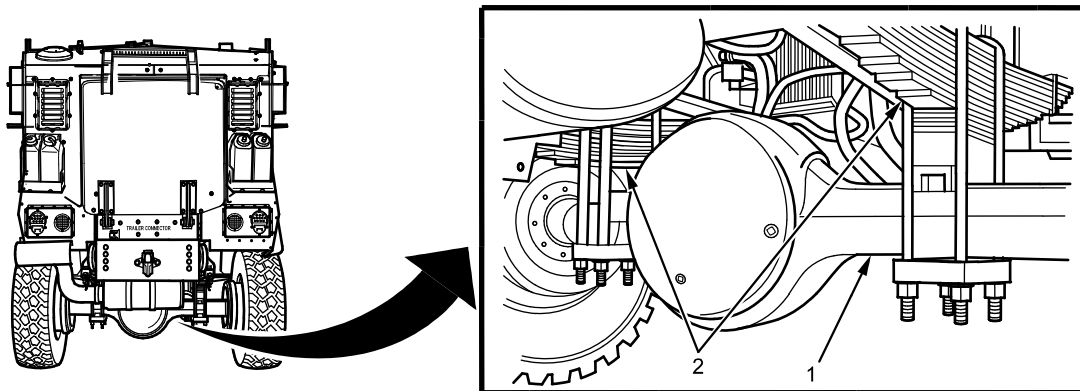
Equipment Description and Data - (CONTINUED)

FRONT AND REAR AXLES



B101000588

Figure 7. Front Axle.

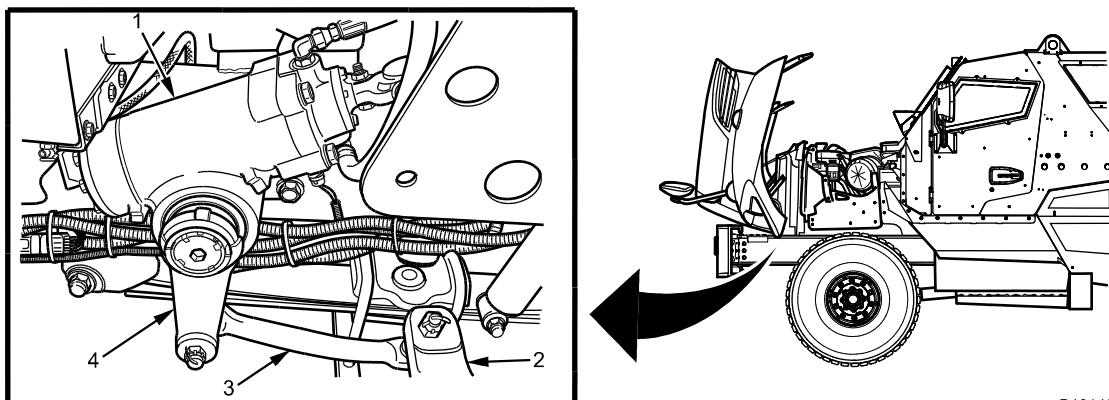


B101100587

Figure 8. Rear Axle.

The vehicle has front (Figure 7, Item 1) and rear (Figure 8, Item 1) solid beam axles, with leaf spring (Figure 8, Item 2) suspension.

STEERING SYSTEM



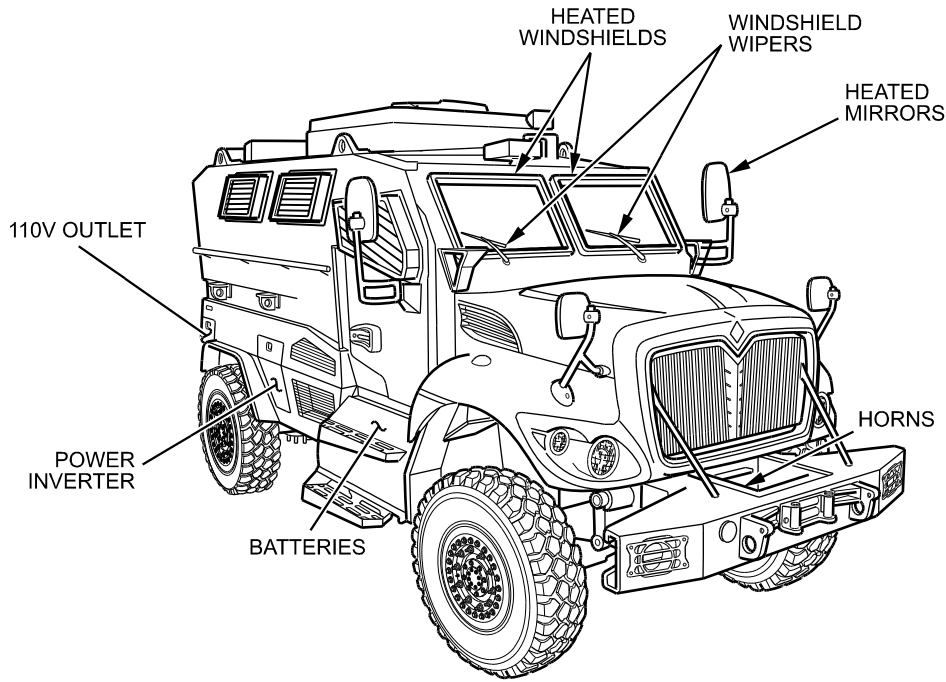
B101400616

Figure 9. Steering Gear Assembly.

Equipment Description and Data - (CONTINUED)

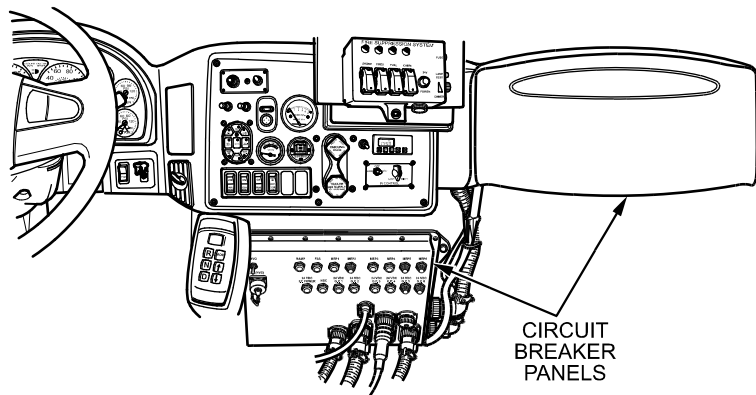
The steering gear (Figure 9, Item 1) connects to the left steering knuckle (Figure 9, Item 2) by means of a pitman arm (Figure 9, Item 4) and drag link (Figure 9, Item 3).

ELECTRICAL SYSTEM



B102200592

Figure 10. Electrical System.



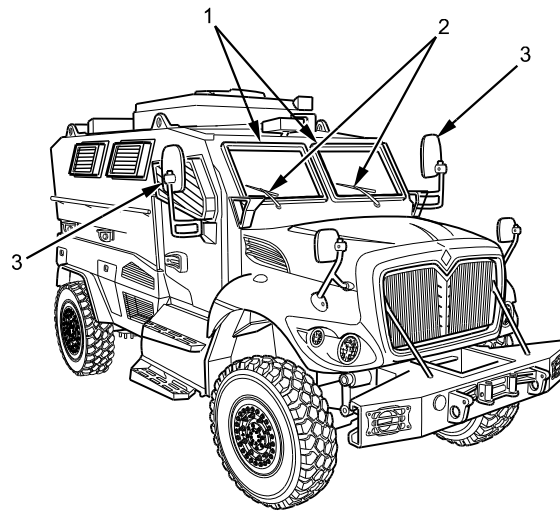
B100600638

Figure 11. Electrical System.

The electrical system consists of the following major components: heated windshields, windshield wipers, heated mirrors, horns, batteries, power inverter, 110V outlet, and circuit breaker panels.

Equipment Description and Data - (CONTINUED)

HEATED WINDSHIELD, WINDSHIELD WIPERS, AND MIRRORS



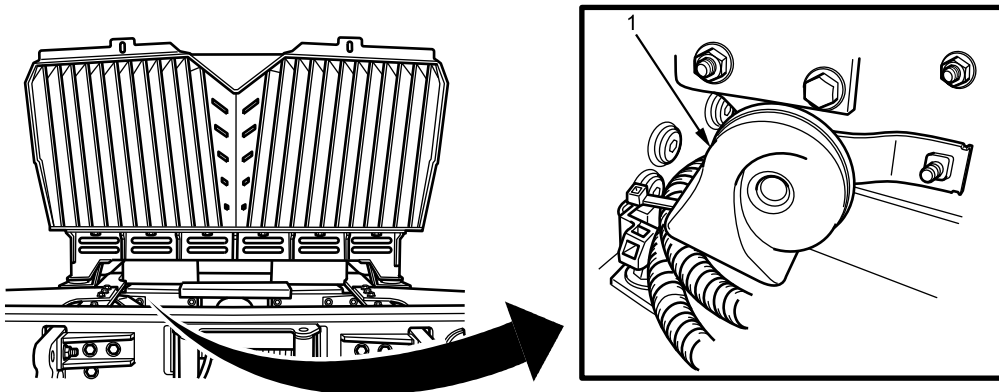
B102200593

Figure 12. Heated Windshield, Mirrors, and Windshield Wipers.

Front windshields (Figure 12, Item 1) and door mounted mirrors (Figure 12, Item 3) are electrically heated by wires embedded in the glass. One switch controls heating of all areas for a predetermined amount of time.

The vehicle has variable-speed windshield wipers (Figure 12, Item 2) with electric washer pump.

HORNS

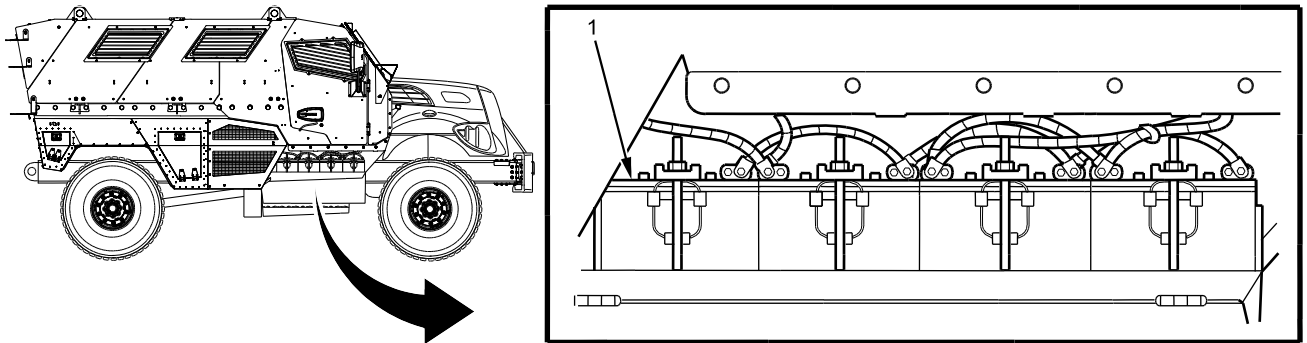


B100600556

Figure 13. Horn.

Two horns (Figure 13, Item 1) are mounted behind the front bumper and activated by a steering wheel push-pad.

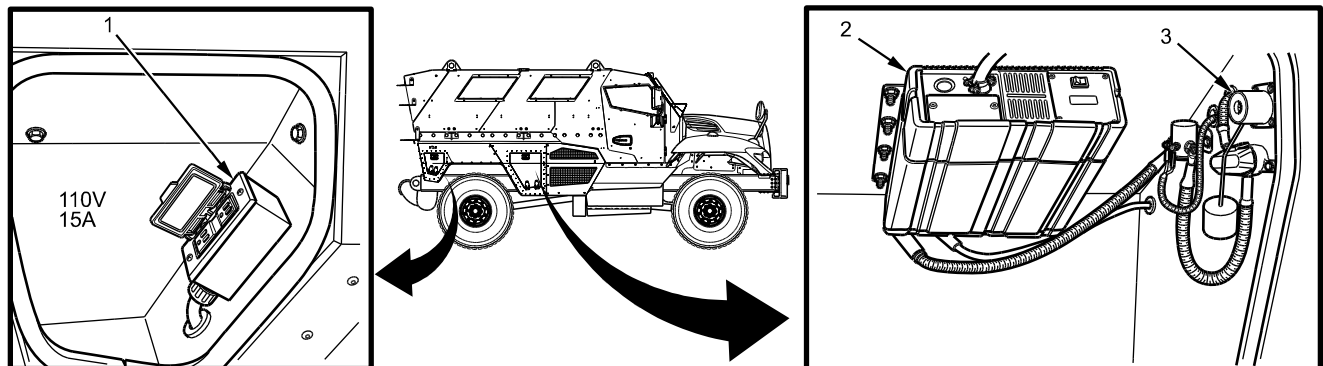
Equipment Description and Data - (CONTINUED)

BATTERIES

B100600617

Figure 14. Batteries.

The electrical system is charged by a 28V 400-amp DC alternator, which runs while the engine is operating and charges the four 12V batteries (Figure 14, Item 1). The four 12V batteries are wired in series and parallel to power 12V and 24V electrical systems.

110V POWER INVERTER, 110V OUTLET, AND NATO SLAVE START CONNECTOR

B100600596

Figure 15. 110V Power Inverter, 110V Outlet, and NATO Slave Start Connector.

A power inverter (Figure 15, Item 2) converts battery power into 110V power for auxiliary equipment, which can be plugged into a 110V AC outlet (Figure 15, Item 1).

The NATO slave start connector (Figure 15, Item 3) is used to jump-start a disabled vehicle with the NATO slave start cable.

Equipment Description and Data - (CONTINUED)

CIRCUIT BREAKER PANELS

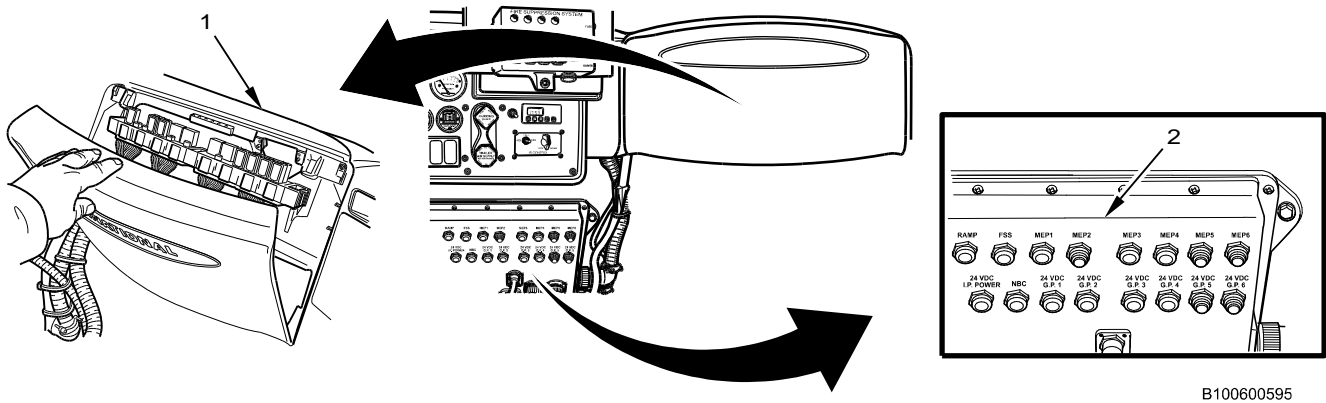


Figure 16. Circuit Breaker Panels.

Two circuit breaker panels (Figure 16, Item 1 and 2) for equipment and electrical system components are located inside the cabin. The circuit breakers are resettable.

LIGHTING SYSTEMS

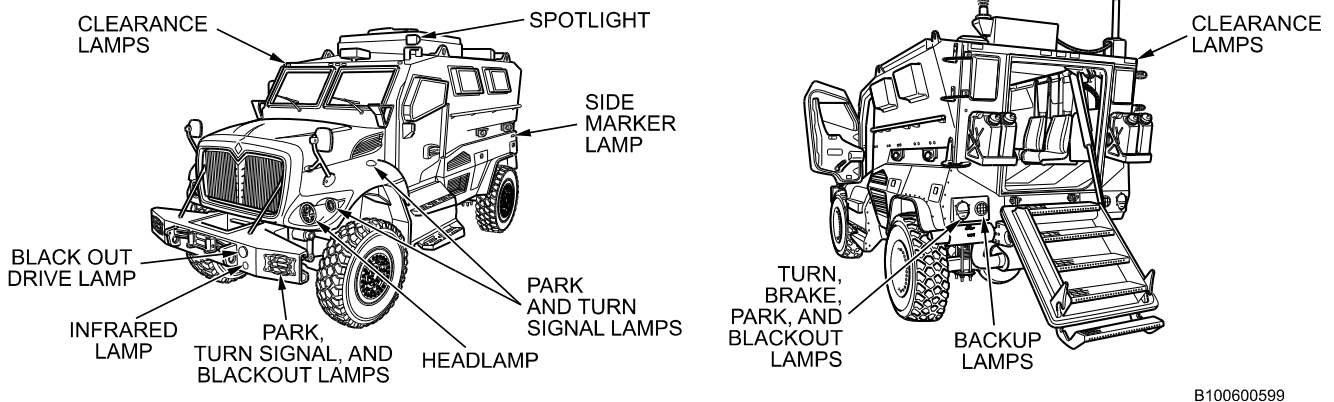
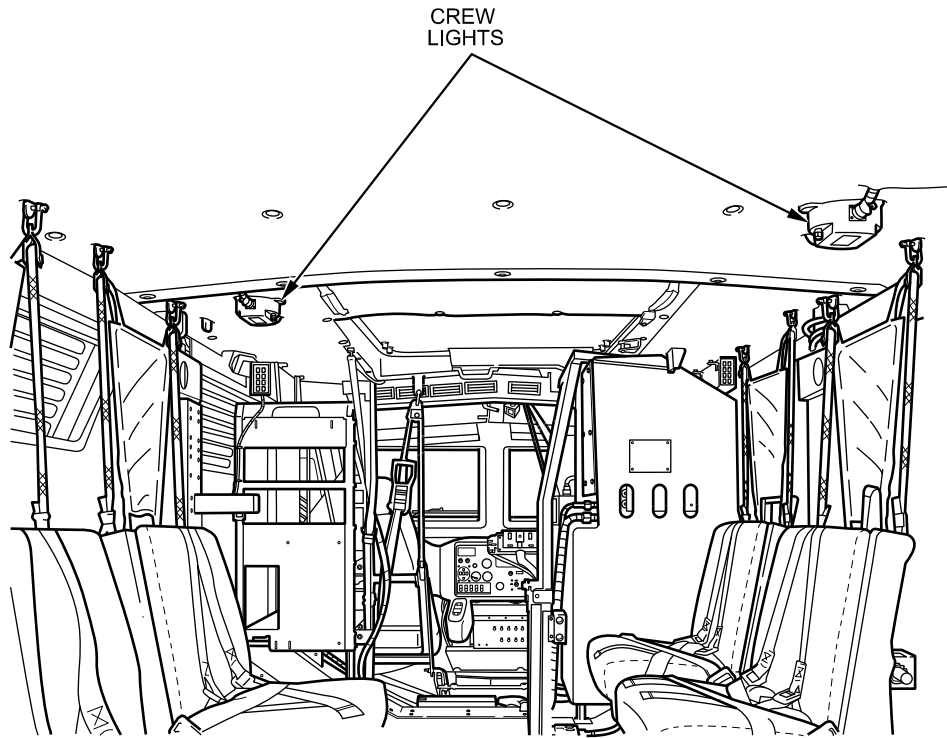


Figure 17. Lighting Systems.

Equipment Description and Data - (CONTINUED)

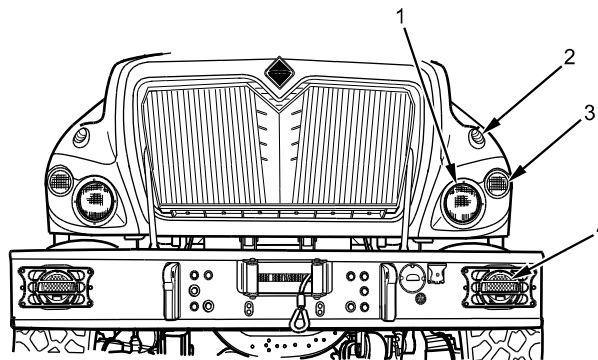


B101800639

Figure 18. Lighting Systems.

The lighting systems consist of the following major components: front clearance lamps, spotlight, side marker lamps, park, and turn signal lamps, headlamps, infrared lamp, front blackout lamps, rear clearance lamps, backup lamps, and rear black out lamps, brake, turn, and park lamps. Interior lamps are also part of this system.

EXTERIOR LIGHTING

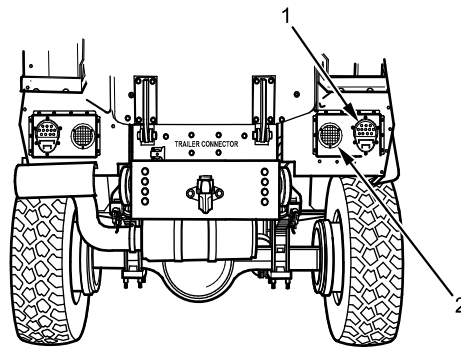


B100600645

Figure 19. Front Lighting.

Front lighting consists of Light Emitting Diodes (LED) and incandescent and halogen bulbs controlled with the Master Vehicle Light Switch (MVLS) located on the Instrument Panel (IP). Front lights include park and turn signal lamps (Figure 19, Item 2, 3, and 4) and headlamps (Figure 19, Item 1).

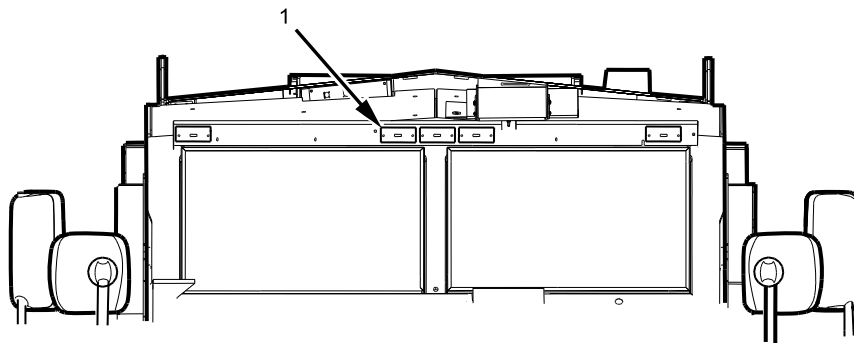
Equipment Description and Data - (CONTINUED)



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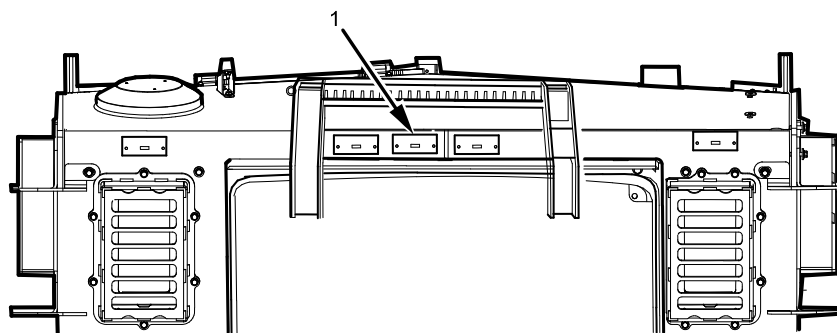
Figure 20. Rear Lighting.

Rear lighting consists of LED lamps controlled with the MVLS located on the IP and transmission gear selector. Rear lights include backup lamps (Figure 20, Item 1) and turn, brake, and park lamps (Figure 20, Item 2).



B100600647

Figure 21. Front Clearance Lamps.

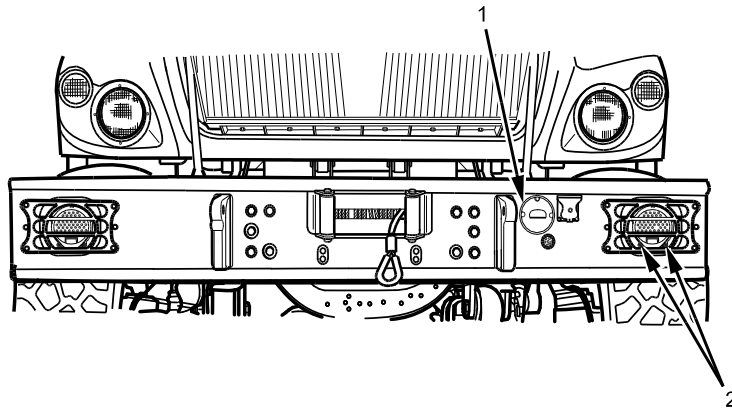


B100600646

Figure 22. Rear Clearance Lamps.

Front (Figure 21, Item 1) and rear (Figure 22, Item 1) clearance lighting consists of RED and AMBER LEDs.

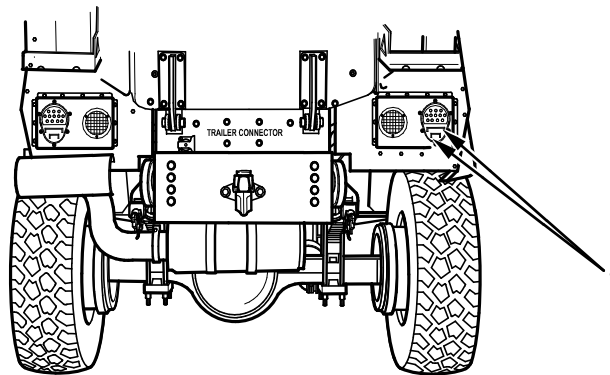
Equipment Description and Data - (CONTINUED)



B100600648

Figure 23. Front Blackout (B.O.) Lighting.

Front B.O. lighting consists of drive (Figure 23, Item 1), park, and turn signal (Figure 23, Item 2) LED lamps.



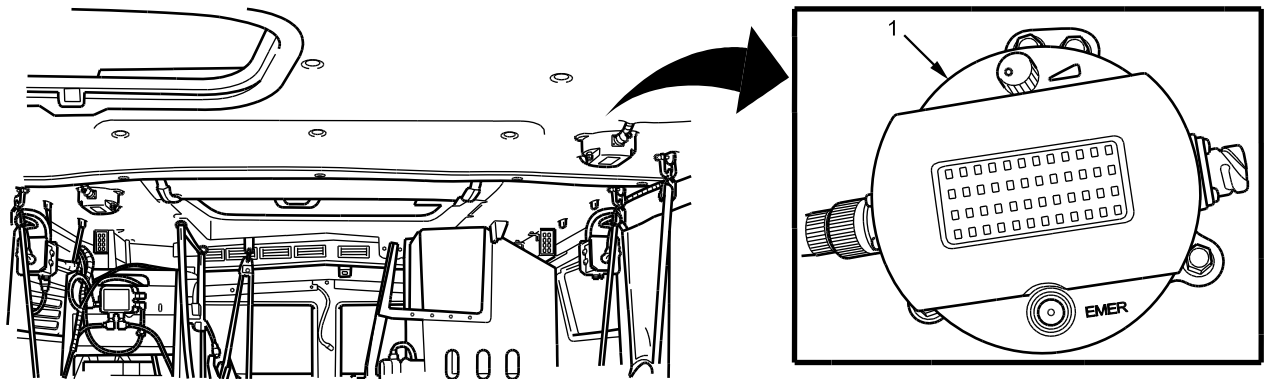
B100600649

Figure 24. Rear B.O. Lighting.

Rear B.O. lighting consists of park, turn signal, and brake (Figure 24, Item 1) LED lamps.

Equipment Description and Data - (CONTINUED)

INTERIOR LIGHTING

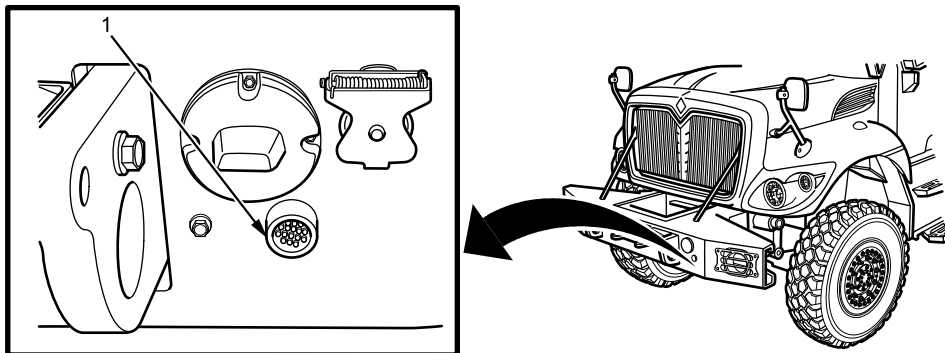


B104000622

Figure 25. Rear Crew Lighting.

Three crew interior LED lights (Figure 25, Item 1) can be controlled together or independently. All lights change color for emergency and can be dimmed for nighttime operation.

INFRARED (IR) LIGHTING

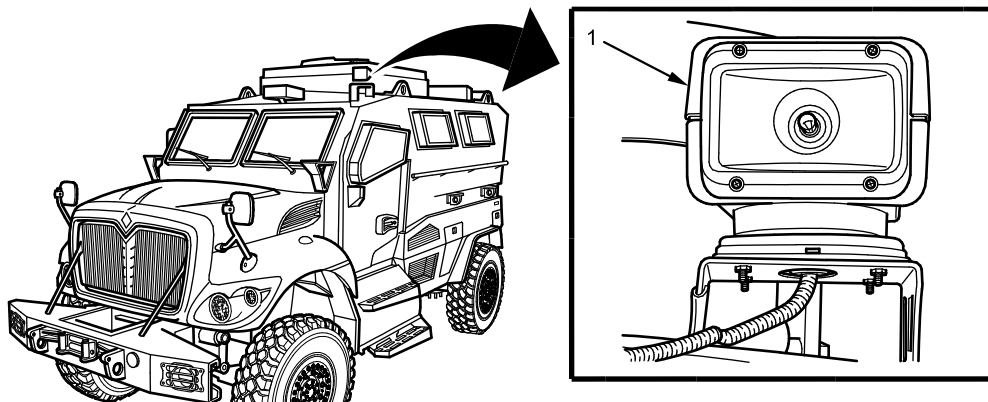


B101800628

Figure 26. IR Lighting.

The vehicle is equipped with LED IR lighting (Figure 26, Item 1) for use with night-vision equipment.

SPOTLIGHT



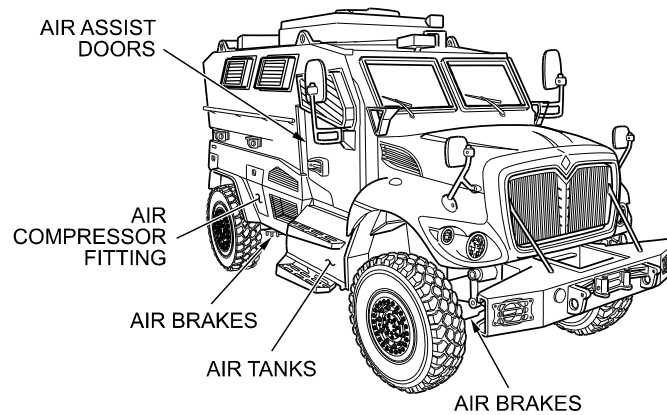
B107600557

Figure 27. Spotlight.

Equipment Description and Data - (CONTINUED)

A 12V, 65W halogen spotlight (Figure 27, Item 1) is controlled from inside vehicle to rotate 370 degrees horizontally and 135 degrees vertically.

PNEUMATIC (AIR) SYSTEM

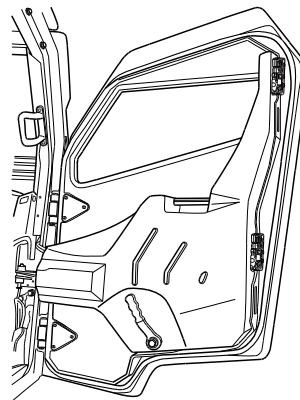


B101800602

Figure 28. Pneumatic (Air) System.

The pneumatic (air) system consists of the following major components: doors, air brakes, air tanks, and air compressor fitting.

PNEUMATIC DOORS



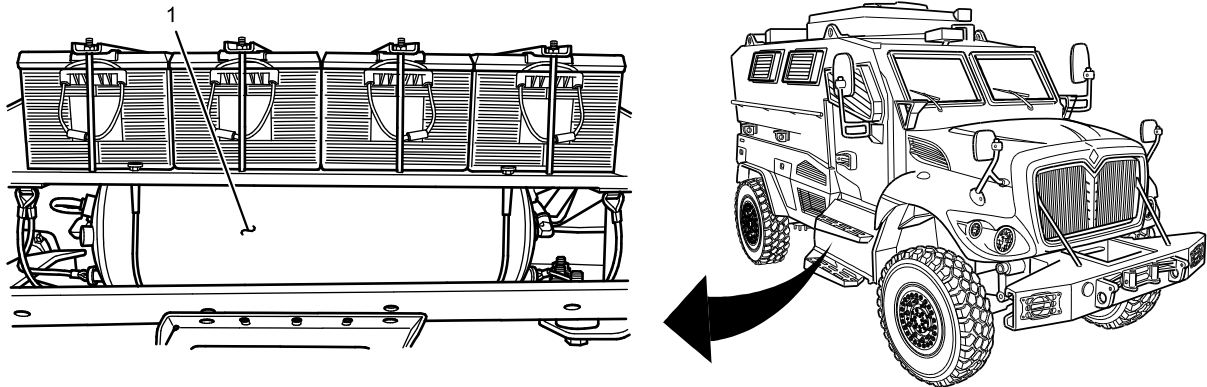
B101800600

Figure 29. Right Pneumatic Cabin Door.

Cabin doors have a pneumatically assisted open-and-close feature. Actuators are hidden behind door trim panel.

Equipment Description and Data - (CONTINUED)

COMPRESSED AIR STORAGE TANKS

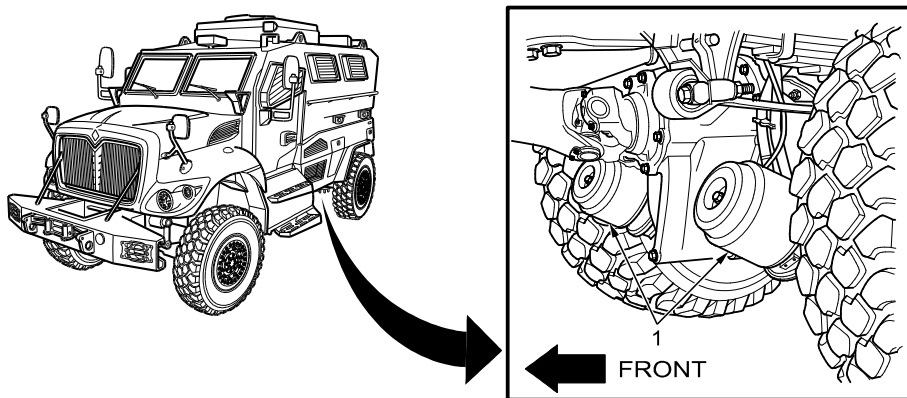


B101200603

Figure 30. Compressed Air Storage Tank.

Compressed air for the braking system is stored in two air tanks (Figure 30, Item 1) (primary and secondary).

REAR AIR BRAKE CHAMBERS



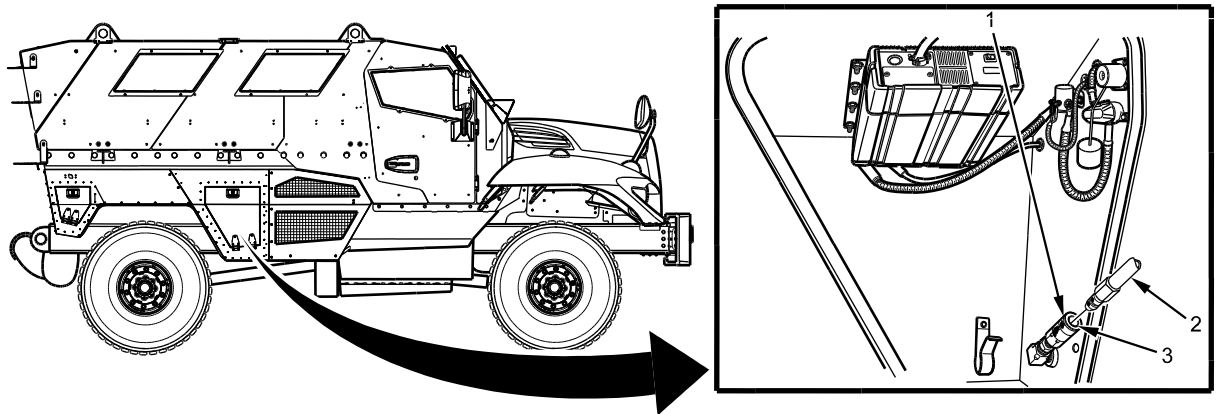
B101200601

Figure 31. Rear Air Brake Chambers.

Right and left rear air brake chambers (Figure 31, Item 1) are easily accessible for caging and uncaging rear air brakes.

Equipment Description and Data - (CONTINUED)

AIR HOSE FITTING

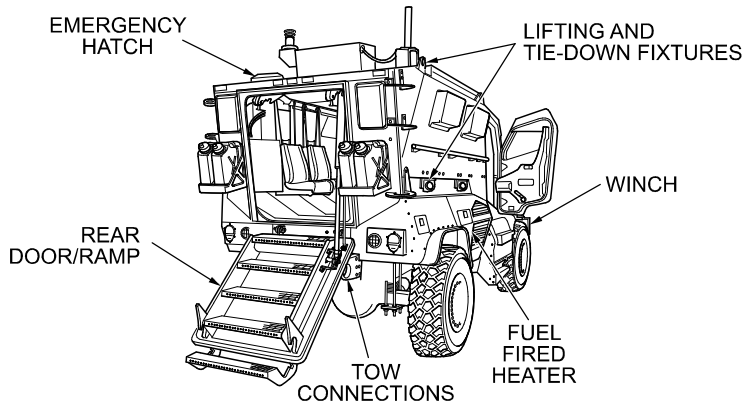


B100600519

Figure 32. Air Hose Fitting.

The air system provides a means of inflating the tires or operating other air-powered equipment by using the air hose fitting (Figure 32, Item 1).

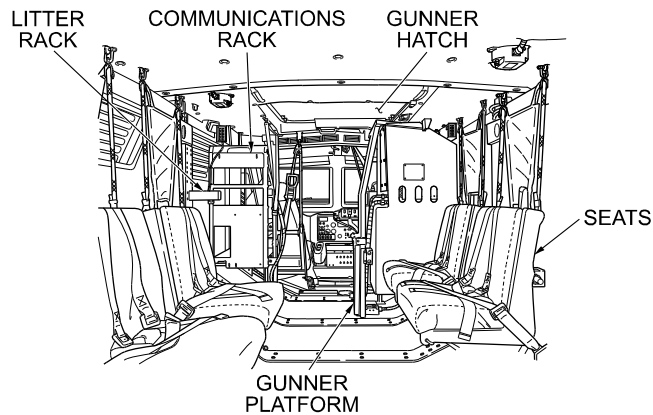
BODY AND CHASSIS SYSTEMS



B101800604

Figure 33. Body and Chassis – Exterior.

Equipment Description and Data - (CONTINUED)

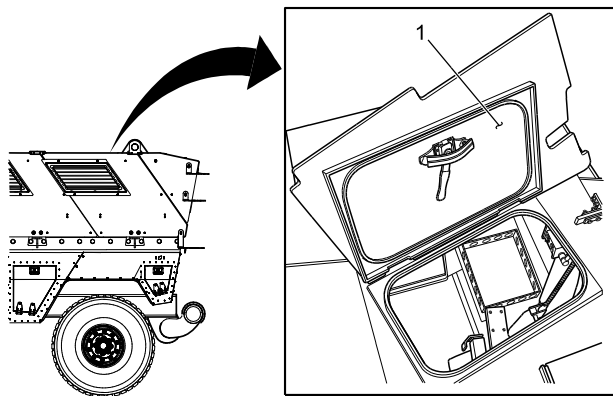


B101800605

Figure 34. Body and Chassis – Interior.

The body and chassis systems consist of the following major components: emergency hatch, lifting and tie-down fixtures, winch, fuel fired heater, tow connections, rear door/ramp, litter rack, communications rack, gunner hatch, seats, and gunner platform.

EMERGENCY HATCH



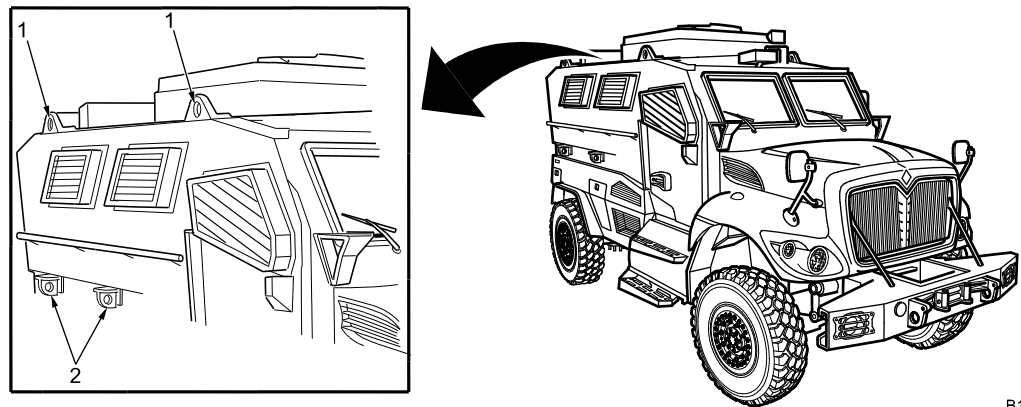
B101800611

Figure 35. Emergency Hatch.

The emergency hatch (Figure 35, Item 1) at the rear of the cabin ceiling can be used to exit the vehicle if other exits are not available.

Equipment Description and Data - (CONTINUED)

LIFTING AND TIE-DOWN FIXTURES

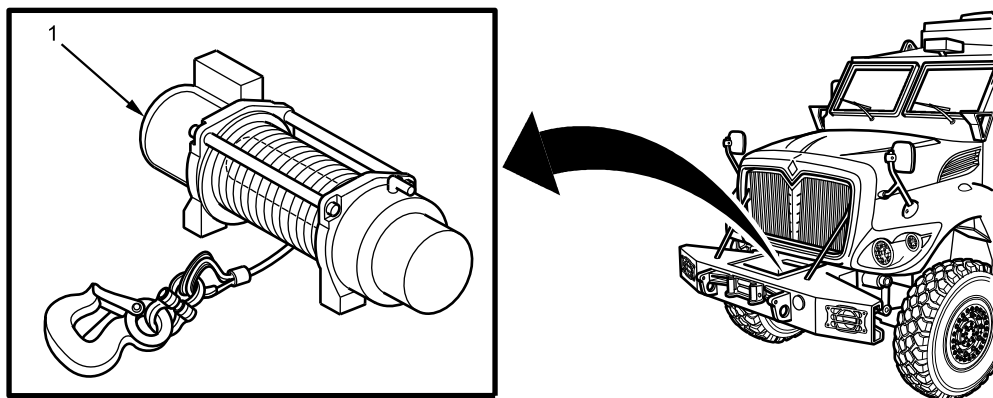


B101800614

Figure 36. Lifting and Tie-Down Fixtures.

Lifting fixtures (Figure 36, Item 1) and tie-down fixtures (Figure 36, Item 2) are on both sides of the vehicle.

ELECTRIC WINCH



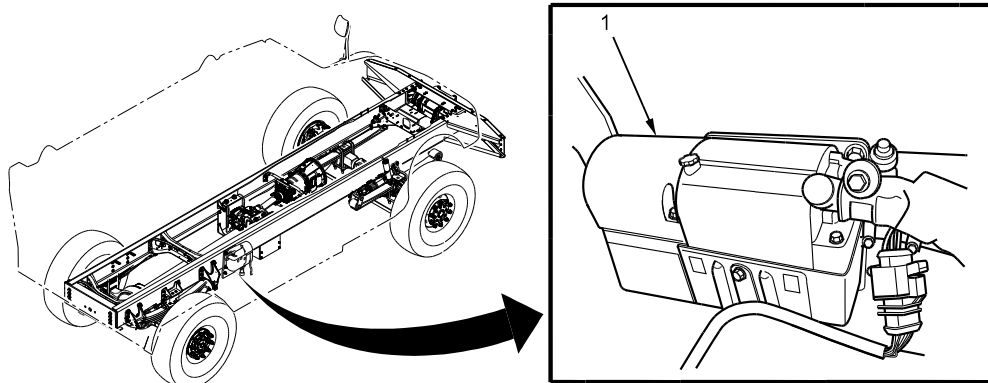
B102000626

Figure 37. Winch.

A 12V remote-controlled electric winch (Figure 37, Item 1) with metal cable and hook can be used to pull a maximum load of 18,000 lb (8165 kg).

Equipment Description and Data - (CONTINUED)

FUEL FIRED HEATER

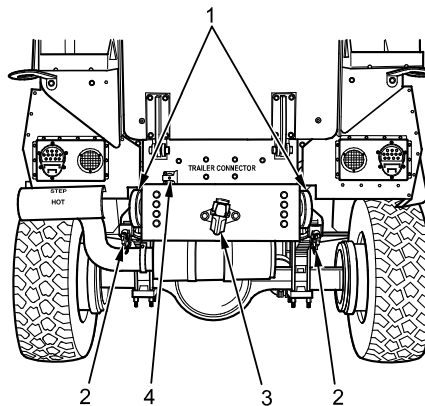


B105200621

Figure 38. Fuel Fired Heater.

A fuel fired heater (Figure 38, Item 1) heats engine coolant and operates independently of the engine to provide cabin heating. It can be operated from the cabin by a switch or a pre-set timer, regulating coolant temperature between 149°F (65°C) and 176°F (80°C).

TOWING ATTACHMENTS



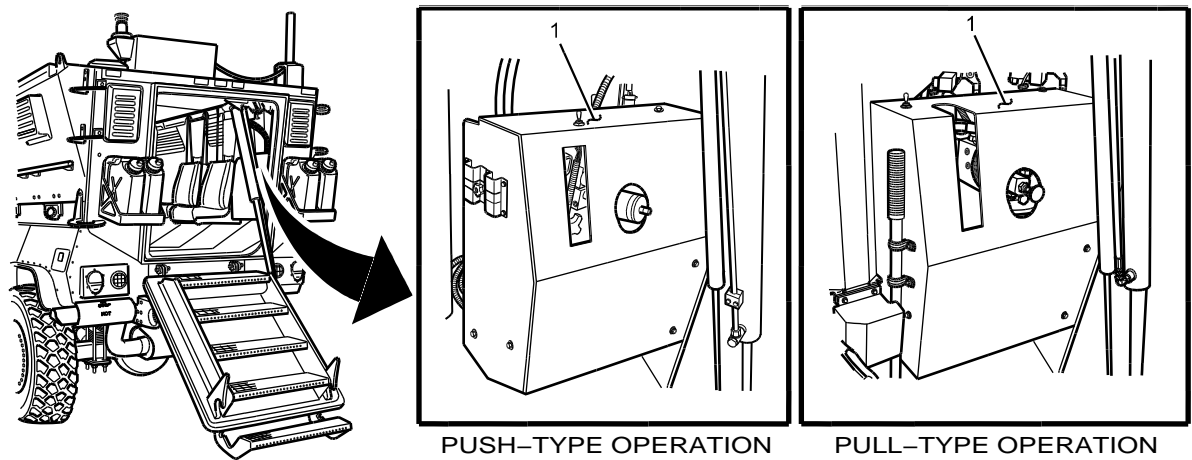
B101500666

Figure 39. Towing.

Vehicle is equipped with front and rear tow hooks (Figure 39, Item 1), gladhands (Figure 39, Item 2), tow pintle (Figure 39, Item 3), and trailer connections (Figure 39, Item 4).

Equipment Description and Data - (CONTINUED)

REAR DOOR/RAMP

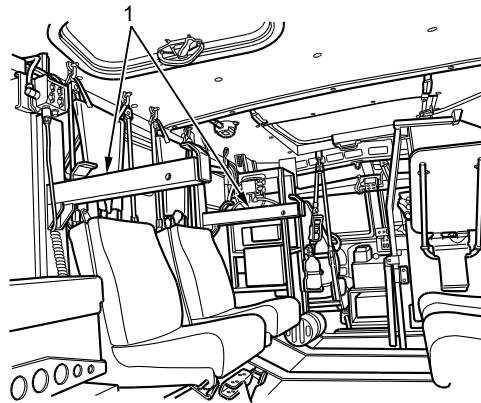


004022

Figure 40. Rear Door/Ramp Pump Assemblies.

The rear door/ramp is operated by a hydraulic system (Figure 40, Item 1) inside the cabin at the rear of the vehicle. In the event of a power loss, the rear door/ramp can be operated manually.

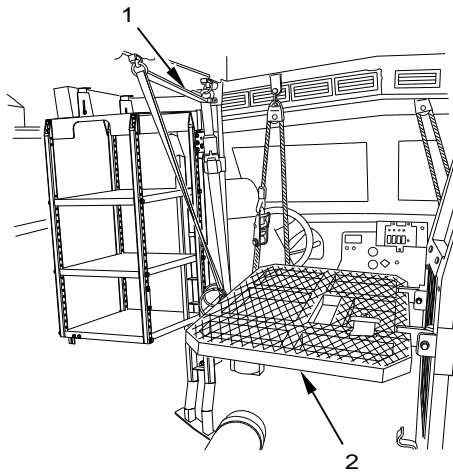
LITTER RACKS



B101800612

Figure 41. Litter Racks, Assembled.

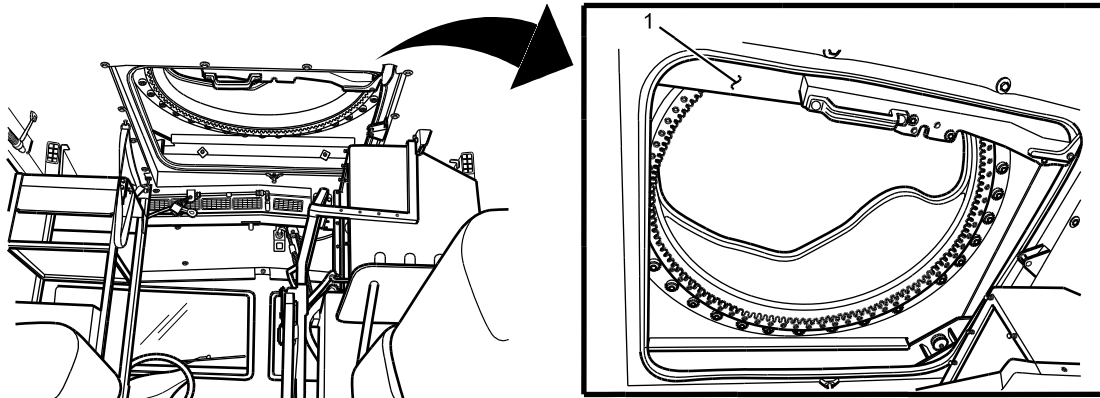
Litter racks (Figure 41, Item 1) can be assembled and fastened to crew area wall for litter transport.

Equipment Description and Data - (CONTINUED)**COMMUNICATIONS RACK**

B101800609

Figure 42. Communications Rack.

Communications equipment can be safely secured to the metal communications rack (Figure 42, Item 1).

GUNNER HATCH

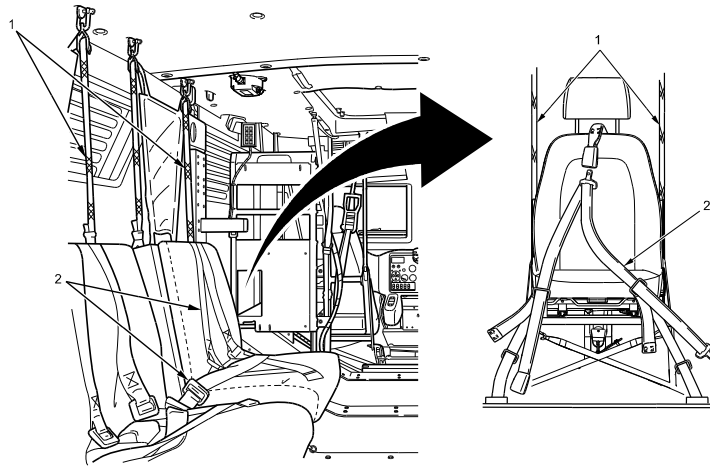
B101800610

Figure 43. Gunner Hatch.

A sliding gunner hatch (Figure 43, Item 1) provides access to the rooftop gunner turret.

Equipment Description and Data - (CONTINUED)

SEATS

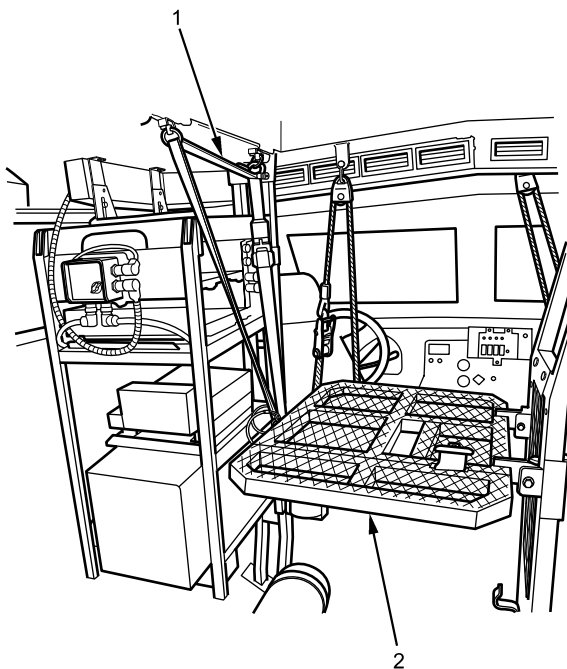


B101800607

Figure 44. Crew Seatbelts and Straps.

All seats have four-point seatbelts (Figure 44, Item 2) . Adjustable straps (Figure 44, Item 1) above and below the seats isolate the seats from impact to the vehicle.

GUNNER PLATFORM



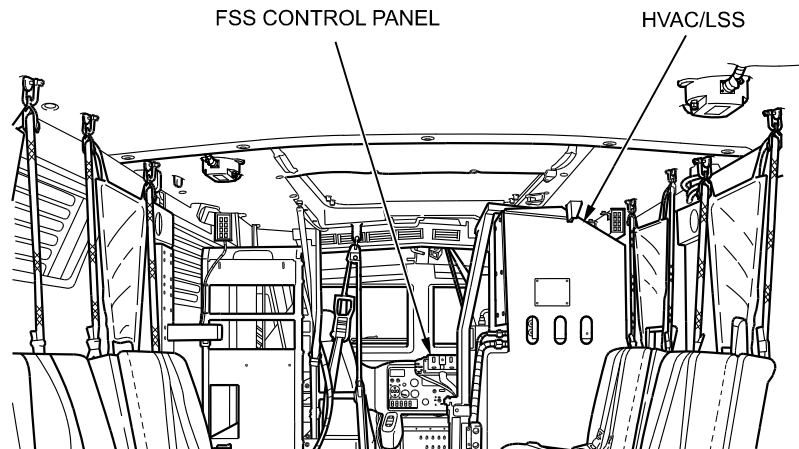
B101800609

Figure 45. Gunner Platform and Support Strap.

Equipment Description and Data - (CONTINUED)

Either the solid- or grated-metal gunner platform (Figure 45, Item 2) can be raised for use and lowered when not needed. In the raised position it is held in place with adjustable support strap (Figure 45, Item 1). On late production vehicles, platform can also be extended to the side.

FIRE SUPPRESSION SYSTEM (FSS) AND HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS)

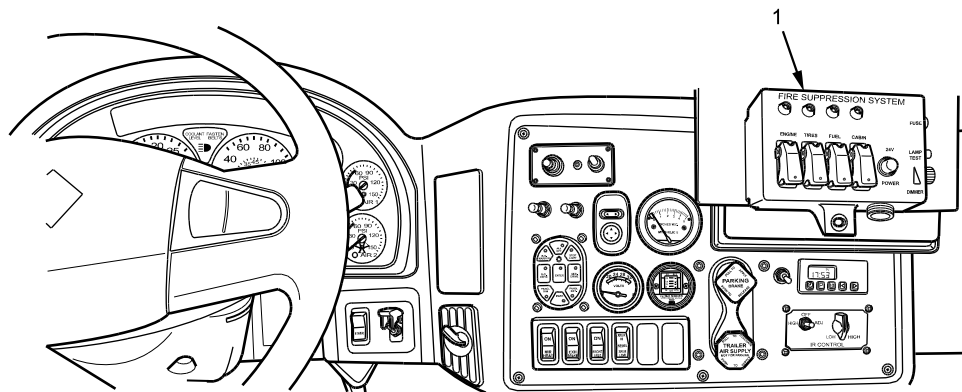


B100600620

Figure 46. FSS and HVAC/LSS.

The Fire Suppression System (FSS) and Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) consist of the following major components: FSS control panel, FSS extinguisher cylinders and nozzles, and HVAC unit.

FSS

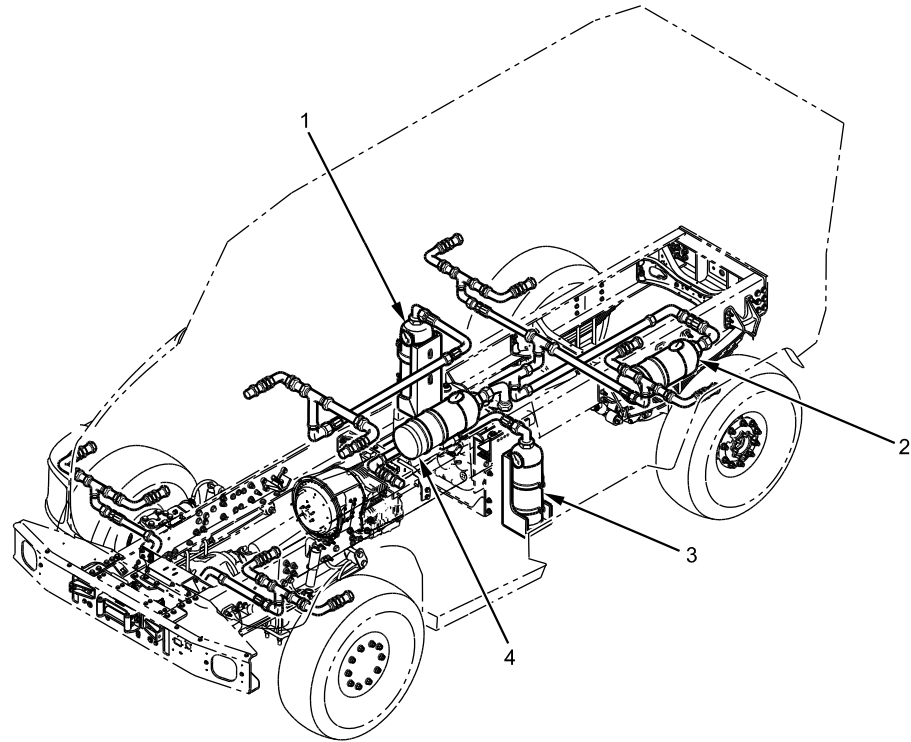


B100600618

Figure 47. FSS Panel.

The FSS control panel (Figure 47, Item 1) is used to extinguish fires in the cabin, engine, tire, and fuel tank areas.

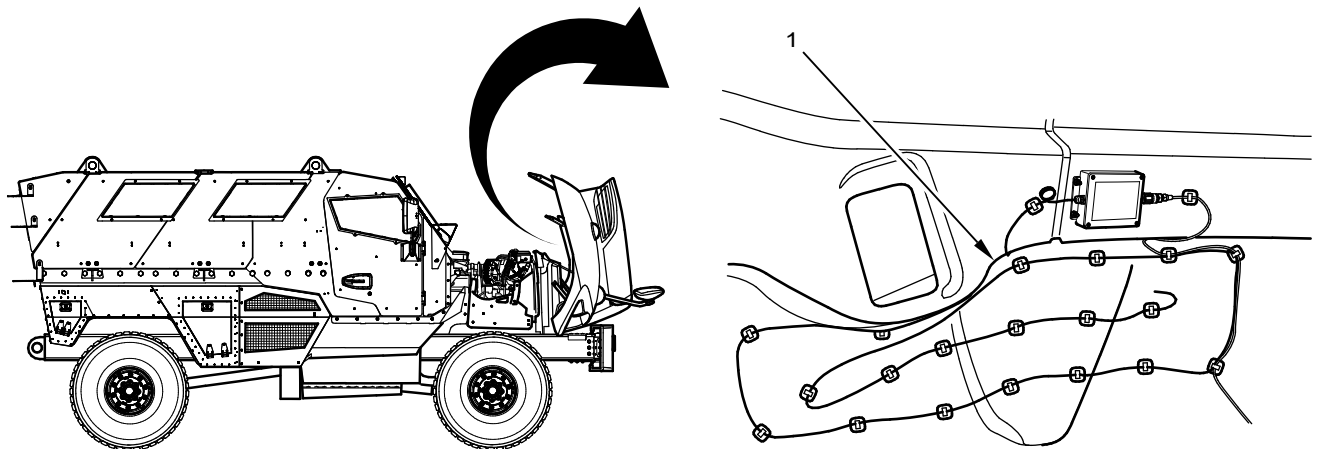
Equipment Description and Data - (CONTINUED)



004047

Figure 48. FSS Cylinders.

There are different systems for different areas: water mist (Figure 48, Item 4) for cabin, HFC227ea Clean Agent (Figure 48, Item 1) for engine, Petrotech TM25 (Figure 48, Item 2) for tires, and Dry Powder ABC 70 (Figure 48, Item 3) for fuel tank. The cabin and engine systems are automatically triggered by sensors. They can be operated manually by the driver in case of a malfunction in the automatic systems. The tire and fuel tank systems are manually operated only, using FSS control panel.

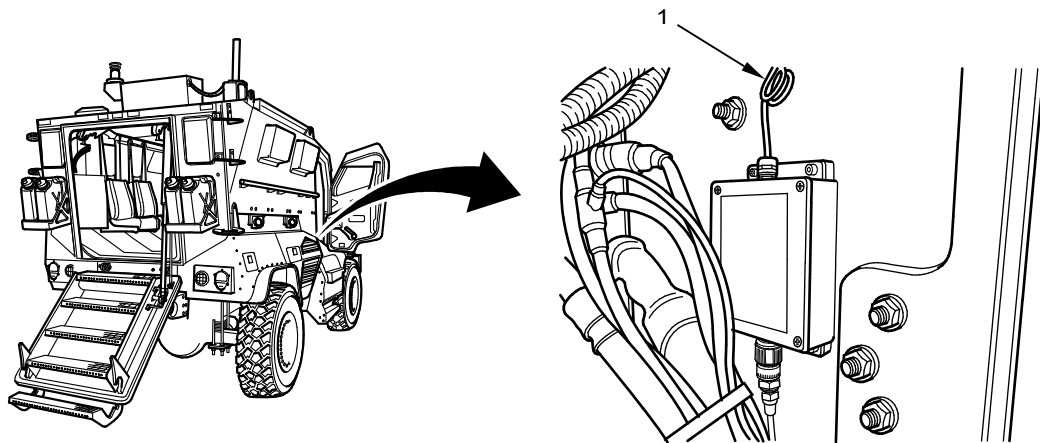


004133

Figure 49. Automatic Engine Sensor and Controller.

Equipment Description and Data - (CONTINUED)

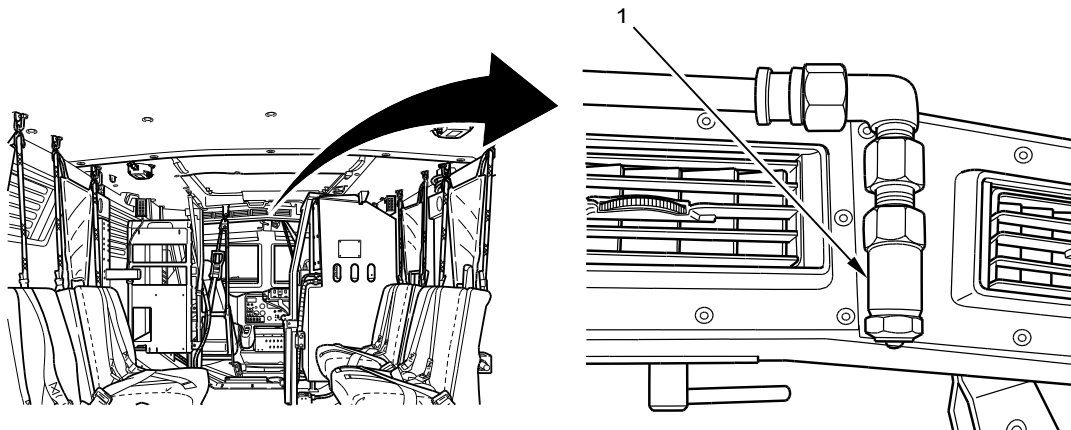
FSS automatic engine sensor wire (Figure 49, Item 1) is located under hood.



004131

Figure 50. Automatic Cabin Sensor and Controller.

FSS automatic cabin sensor wire (Figure 50, Item 1) is located under right side of IP.

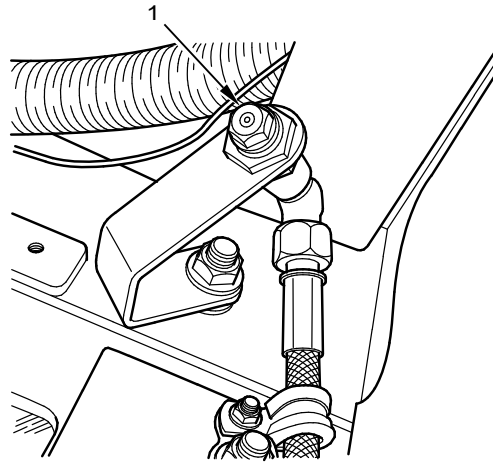


004128

Figure 51. Front of Crew Area Nozzle.

FSS nozzle (Figure 51, Item 1) for front of crew area is located by the air vents along the roof, between crew area and cab.

Equipment Description and Data - (CONTINUED)



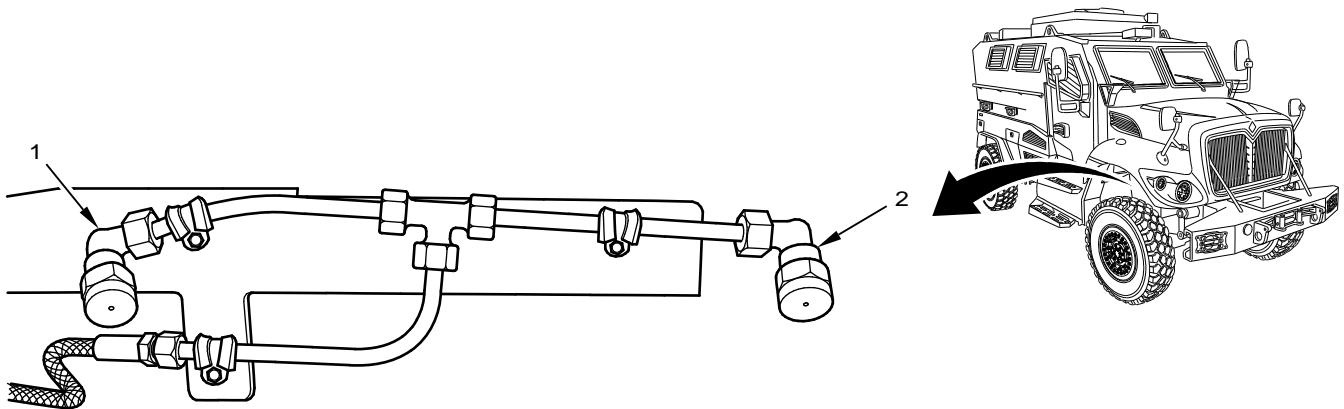
004123

Figure 52. Back of Crew Area Nozzle.

NOTE

Right side shown, left side similar.

FSS nozzles (Figure 52, Item 1) for back of crew area are located in upper rear corners of vehicle interior.



004120

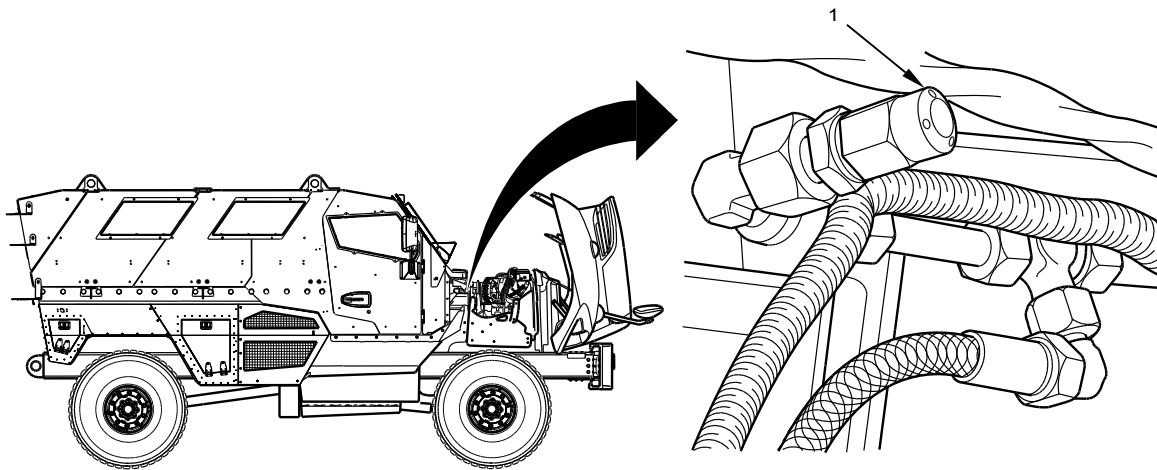
Figure 53. Tire Nozzle Assembly.

NOTE

Right front tire nozzle shown, other tires similar.

FSS tire nozzles (Figure 53, Item 1 and 2) are located over each wheel.

Equipment Description and Data - (CONTINUED)



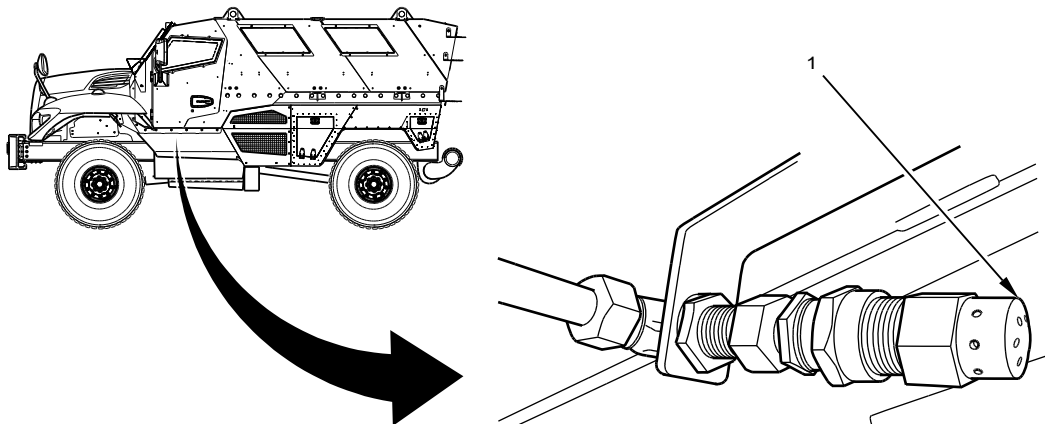
005211

Figure 54. Engine Nozzle Assembly.

NOTE

Right shown, left similar.

FSS nozzle assembly (Figure 54, Item 1) for engine is located behind engine, at firewall opening.



005212

Figure 55. Fuel Tank Nozzle.

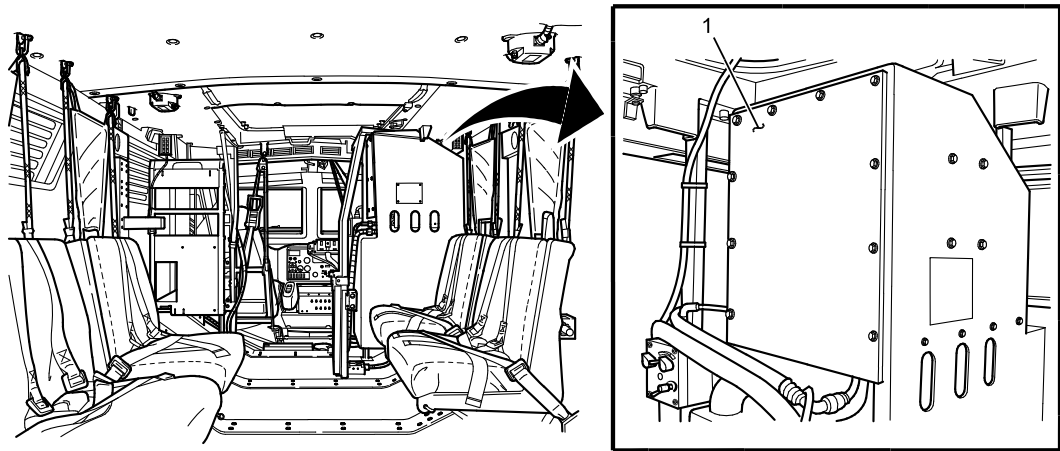
NOTE

Front shown, rear similar.

FSS nozzle assembly (Figure 55, Item 1) for fuel tank is located behind and slightly above fuel tank.

Equipment Description and Data - (CONTINUED)

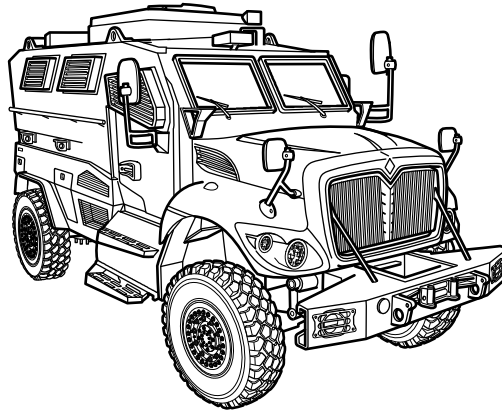
HVAC AND LSS



B100600619

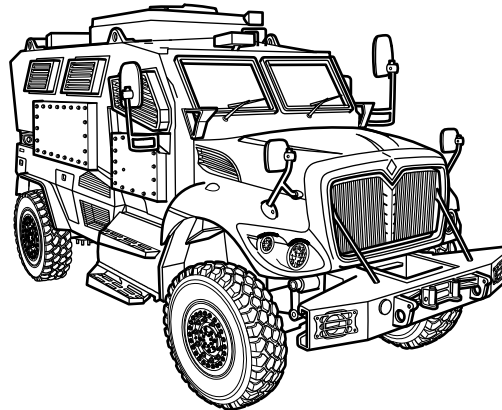
Figure 56. HVAC/LSS.

The HVAC/LSS system (Figure 56, Item 1) regulates fresh and recirculated air within the cabin. It provides protection from extreme hot or cold outside temperatures. Fresh air is received into the vehicle cabin through an inlet on the vehicle roof. The pretreated air then moves through an evaporator and a heater, where fresh air is mixed with recycled air. A blower moves the treated air into the cabin. In wartime configuration, the system provides protection from NBC agents with a special filter.

Equipment Description and Data - (CONTINUED)**DIFFERENCES BETWEEN MODELS**

B101800641

Figure 57. M1224.



B101800642

Figure 58. M1224A1.

Additional armor can be installed under the MRAP Expedient Armor Program (MEAP). MEAP equipped vehicles (M1224A1) have a curb weight of 41,000 lbs and a GVW of 46,500 lbs. The increased weight of MEAP equipped vehicles (M1224A1) over base MRAP vehicles (M1224) requires that they be operated accordingly.

Equipment Description and Data - (CONTINUED)

EQUIPMENT DATA

Refer to the following tables for specific equipment data.

Table 1. Vehicle Weight.

VEHICLE CATEGORY	SPECIFICATION
M1224 (without MEAP kit)	Curb Weight: 37,850 lbs Gross Vehicle Weight (GVW): 43,500 lbs
M1224A1 (with MEAP kit)	Curb Weight: 41,000 lbs Gross Vehicle Weight (GVW): 46,500 lbs

Table 2. Dimensions.

GROUND CLEARANCE	SPECIFICATION
Front Axle Housing	13.0 in. (33.0 cm)
Belly Pan Armor	15.0 in. (38.1 cm)
Rear Axle Housing	10.25 in. (26.0 cm)

Table 3. Performance.

ITEM	SPECIFICATION
Power to Weight Ratio (gross wt)	15 hp/ton
Power to Weight Ratio (MEAP gross wt)	14.5 hp/ton
Fuel Consumption (moving)	4.4 mpg
Angle of Approach	58 degrees
Angle of Departure	46 to 48 degrees
Maximum Grade (climb)	60%
Maximum Grade (descent)	60%
Maximum Grade (side)	30%
Ford Depth	36 in. (0.91 m)
Turning Radius, Curb to Curb	62 feet (18.9 m)
Top Speed	65 mph (105 km/h)
Vehicle Operating Temperature Range	-25° to +125°F (-32° to +52°C)

Table 4. Capacities.

ITEM	SPECIFICATION
Engine Oil with Filter	30 qt (28.3 L) (OE/HDO-15-40)
Cooling System	29 qt (27.6 L) (CID A-A-52624A; Type I/ A or C; ethylene glycol) (50/50 mix with water)
Coolant Overflow Tank	4.8 qt (4.5 L)
Coolant Deaeration Tank	5.9 qt (5.6 L)
Transmission with Filter – Dry	29 qt (27.4 L) (OE/HDO-10)
Transmission with Filter – Drain and Refill	19 qt (18 L) (OE/HDO-10)
Axle – Front	13 qt (12.3 L) (SAE 80W90)
Axle – Rear	19.5 qt (18.5 L) (SAE 80W90)
Wheel Bearing – Rear	1.6 qt (1.5 L) (SAE 80W90)
Rear Door/Ramp Hydraulic Fluid	6.5 qt (6.2 L) (MIL-PRF-46170; Type I)
Power Steering	5.5 qt (5.2 L) (OE/HDO-15-40)
Transfer Case – w/ Cooler	Early production with MTC4210 GCS transfer case: 6 qt (5.7 L) (SAE 80W90). Late production with MTC4210XL-100 transfer case: 8 qt (7.6 L) (SAE 80W90)

Equipment Description and Data - (CONTINUED)

Windshield Wiper Fluid	4 qt (3.8 L) Cleaning Compound, Windshield
A/C System	7.05 lb (3.19 kg) (R134A)

Table 5. Cooling System.

ITEM	SPECIFICATION
Radiator Working Pressure	15 psi (103 kPa) low idle

Table 6. Engine Configuration.

ITEM	SPECIFICATION
Make	International®
Model	DT 530 ST
Type	Four-stroke, in-line
Cylinders	Six
Bore	4.59 in. (116.6 mm)
Stroke	5.35 in. (135.9 mm)
Displacement	530 cu-in. (8.7 L)
Peak Torque	950 lb-ft @ 1200 rpm
Maximum Brake Horsepower (at 2,000 rpm)	330 hp
Maximum Governed Engine Speed	2,200 rpm

Table 7. Oil Filter.

ITEM	SPECIFICATION
Type	Full flow, spin-on
Quantity	1
Oil Pressure	40-70 psi (276-483 kPa)

Table 8. Fuel System Configuration.

ITEM	SPECIFICATION
Type	Diesel injection (electronically controlled)
Fuel Tank Capacity	57 gal. (216 L)
Air Cleaner	Dual element
Fuel Type	Diesel or JP8
Fuel Pressure	66 psi ± 5 psi (455 kPa ± 34 kPa)

Table 9. Electrical System.

ITEM	SPECIFICATION
Alternator	400 amp Neihoff
Front Engine Accessory Drive	Single serpentine belt
Batteries	Exide lead acid (12V, 725 CCA, 4 each, connected in series-parallel for 12V and 24V power)

Table 10. Transmission.

ITEM	SPECIFICATION
Make	Allison
Model	3000SP five-speed
Type	Electronic Control System, WTEC III – Allison 4th Generation

Table 11. Transmission Speeds.

ITEM	SPECIFICATION
Forward	Five
Reverse	One

Equipment Description and Data - (CONTINUED)

Table 12. Transfer Case.

ITEM	SPECIFICATION
Make	Meritor
Model	MTC4210 GCS (early production) MTC4210XL-100 (late production)
Type	Two-speed with NEUTRAL (NEUTL)

Table 13. Axles.

ITEM	SPECIFICATION
Front	MX-18-120/18,000 lbs – Meritor
Rear	RS-23-160/23,000 lbs – Meritor

Table 14. Brake System.

ITEM	SPECIFICATION
Actuation	Air
Number of Brake Chambers	Two per axle, rear also equipped with spring brakes
Type	S-Cam
Front	Bendix shoes – 16.5 x 7
Rear	Bendix shoes – 16.5 x 7
Air Compressor	Bendix Tu-Flo 550
Truck Air System	110-130 psi (758-896 kPa)

Table 15. Wheels.

ITEM	SPECIFICATION
Type	Two-piece bolt-together Hutchinson run flat
Quantity	4
Rim Size	20 x 10.00
Stud Quantity per Wheel	10
Wheel Assembly Bolt Torque	150-170 lb-ft (203-230 N•m)
Lug Nut Torque	450-500 lb-ft (610-678 N•m)
Spacer Plate Torque	175-200 lb-ft (237-271 N•m)

Table 16. Tires.

ITEM	SPECIFICATION
Type	Tubeless radial
Quantity	4 per vehicle
Tire Model	Michelin XZL, Goodyear MV/T
Size	395/85R20
Load Range	J (Michelin), L (Goodyear)
Tire Pressure: Highway (Front and Rear with 23k Rear Axle) (M1224)	115 psi (793 kPa) @ 60 mph
Tire Pressure: Highway (Front with 25.5k Rear Axle) (M1224A1)	115 psi (793 kPa) @ 55 mph
Tire Pressure: Highway (Rear with 25.5k Rear Axle) (M1224A1)	127 psi (876 kPa) @ 55 mph
Tire Pressure: Cross-Country (Front and Rear – All)	77 psi (531 kPa) @ 45 mph
Tire Pressure: Mud/Sand/Snow (Front and Rear – All)	45 psi (310 kPa) @ 20 mph
Tire Pressure: Emergency (Front and Rear – All)	40 psi (276 kPa) @ 10 mph

Equipment Description and Data - (CONTINUED)

Table 17. Towing and Lifting.

ITEM	SPECIFICATION
Pintle Hook Maximum Load Capacity	49,000 lb (22,226 kg)
Front Tiedown Eyes Maximum Load Capacity	49,000 lb (22,226 kg)
Rear Tiedown Eyes Maximum Load Capacity	49,000 lb (22,226 kg)
Side Tiedown Eyes Maximum Load Capacity	25,000 lb (11,339 kg)
Front Tow Eyes Maximum Load Capacity	61,500 lb (27,896 kg)
Forward Lifting Eyes Maximum Load Capacity	30,500 lb (13,835 kg)
Front Hook for Towing Maximum Load Capacity	15,000 lb (6,804 kg)

Table 18. Winch Cable.

ITEM	SPECIFICATION
Diameter	5/8 in. (15.9 mm)
Length	70 ft (21.3 m)
Ultimate Strength	40,000 lb (18,144 kg)
Working Load (Winch Maximum Rated Load)	18,000 lb (8,165 kg)

Table 19. Cabin.

ITEM	SPECIFICATION
Windshield, Door, Side, and Rear Window Glazing	Transparent armor
Personnel Capacity	6

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

THEORY OF OPERATION

DRIVETRAIN

The M1224 and M1224A1 Mine Resistant Ambush Protected (MRAP) vehicles are equipped with a DT530 in-line, six-cylinder, fuel-injected diesel engine, a five-speed automatic transmission, and a two-speed transfer case. These components move the vehicle forward, backward, and into LOW range in severe conditions. The output from the transfer case drives the rear differential when in two-wheel drive, and drives the front and rear differentials when in four-wheel drive. The vehicle must be brought to a full stop to engage four-wheel drive or to shift the transfer case from HIGH to LOW. The vehicle will not move if the transfer case is in NEUTL (NEUTRAL).

BRAKING SYSTEM AND AXLES

The vehicle is equipped with a single-reduction, geared front drive steer axle and straight rear axle, with air-operated cam brakes on all four wheels, and an Antilock Braking System (ABS).

A cam brake consists of an air brake chamber and bracket, automatic slack adjuster, S-camshaft, brake hardware, shoes and linings, spider, and brake drum.

At brake actuation, the S-camshaft rotates and pushes rollers located on the brake shoes against the brake drum. When a brake shoe is forced into the drum, friction slows the movement of the drum to stop the vehicle.

The ABS system uses wheel speed sensors, ABS modulator valves, and an Electronic Control Unit (ECU) to control all vehicle wheels. By monitoring individual wheel turning motion during braking, and adjusting or pulsing the brake pressure at each wheel, the ABS controller is able to optimize slip between the tire and the road surface. When excessive wheel slip or wheel lockup is detected, the ABS controller will activate the pressure modulator valves to simulate a driver pumping the brakes. However, the ABS controller is able to pump the brakes on individual wheels (or pairs of wheels) independently, and with greater speed and accuracy than a driver.

ELECTRICAL SYSTEM

The vehicle has a dual electrical system consisting of a 24V alternator, starter, and four batteries in a series-parallel configuration that provide 12V or 24V power. The vehicle is equipped with a power inverter that supplies 110V AC, with a 110V outlet.

PNEUMATIC (AIR) SYSTEM

The pneumatic system consists of air brakes and air assistance for the side doors.

Opening and closing of the armor-enforced doors is assisted by pneumatic cylinders mounted inside each of the side doors.

There are two air brake chambers per axle. The rear axle also has spring-applied parking brakes. The system has two air supply tanks. One tank supplies air for the front (secondary) brake system. The other supplies air to the rear (primary) brakes. The air is supplied from an engine-driven air compressor.

The air compressor compresses air for brake application. The driver operates a valve that controls air pressure to the brakes, and the pressure is determined by the driver's pedal stroke.

HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS)

The heating, ventilation, and air-conditioning (HVAC) system provides a comfortable cabin environment by controlling temperature and humidity. It also features a special filtration system that protects the vehicle occupants from dust and chemical or biological contaminants.

The HVAC unit is inside the vehicle, on the cabin right side wall, behind the front passenger seat. The NBC filter is accessed externally.

Vehicle occupants can control the HVAC system functions with a mode selection panel, located directly behind the passenger seat. Controls consist of a group of switches.

Theory of Operation - (CONTINUED)**FIRE SUPPRESSION SYSTEM (FSS)**

The vehicle is equipped with multiple sensor-operated and crew-activated fire suppression systems (FSS) that protect the cabin and occupants, the engine, the tires, and the fuel tank.

There are four subsystems: cabin protection, engine protection, tire protection, and fuel tank protection. The cabin and engine protection systems can be operated automatically or manually. The other two systems only operate manually. The cabin protection system is a water mist spray system without chemical additives, designed to protect occupants from extreme heat for a period of 3 minutes. There are different systems for the other three areas: HFC227ea Clean Agent for engine, Petrotech TM25 for tires, and Dry Powder ABC 70 for fuel tank.

Controls for the FSS are located between the driver and front passenger seats and are accessible to the crew. Occupants can easily activate any of the FSS switches by lifting the cover of the desired switch and toggling the switch upward to activate the specific system.

HYDRAULIC SYSTEM (REAR DOOR/RAMP)

Hydraulics are used to open and close the rear door/ramp of the vehicle. An Instrument Panel (IP) mounted toggle switch allows the driver to operate the door/ramp automatically. A second toggle switch mounted on top of the hydraulic system housing allows crewmembers to operate the rear door/ramp. In the event of electrical failure or hydraulic failure, or for an emergency exit, the door can be lowered and raised using a manual release and a handle for the manual hydraulic pump. In a total power failure, the rear door/ramp can be disconnected from the hydraulic cylinder and allowed to free-fall.

END OF WORK PACKAGE

CHAPTER 2
OPERATOR INSTRUCTIONS
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS

DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

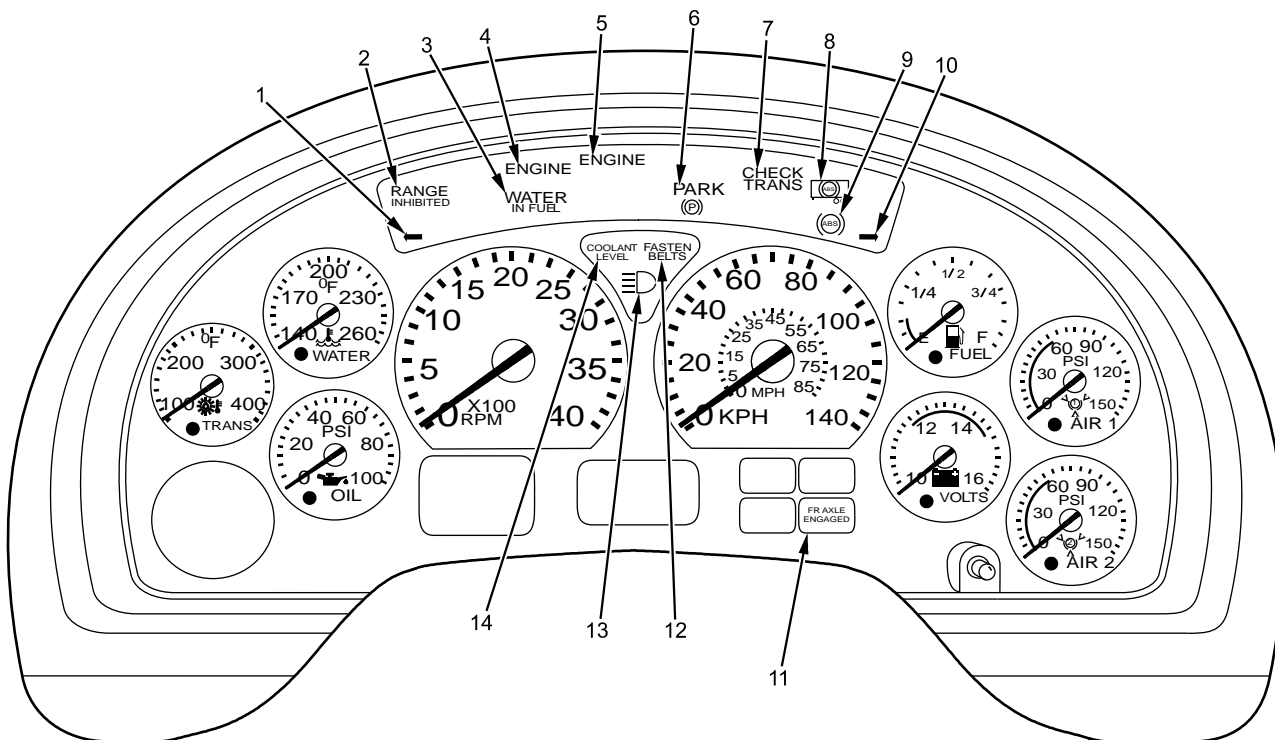
INTRODUCTION

This work package identifies and describes controls and indicators on the Instrument Panel (IP) and auxiliary panels, center console, steering column, door, and floor on the MRAP vehicle.

NOTE

Some warning indicators shown on the IP cluster are not used on this vehicle.

Table 1. IP Cluster Indicators



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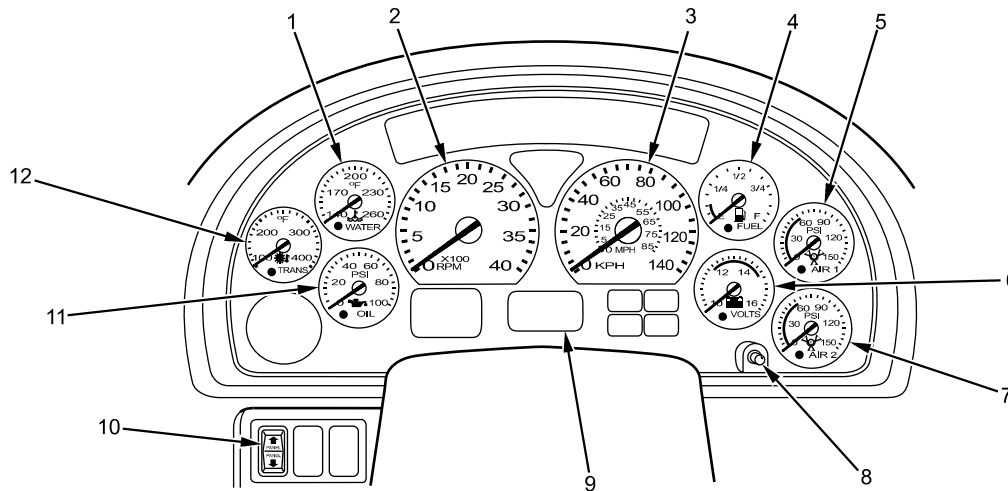
Figure 1. IP Cluster Indicators.

KEY	CONTROL/INDICATOR	FUNCTION
1	Left Arrow	Flashes GREEN when the left turn signal or the hazard lights are turned on.
2	RANGE INHIBITED	Illuminates AMBER when the transmission is not engaged in the selected gear. The warning light goes off when the gearshift button is adjusted to the appropriate gear.
3	WATER IN FUEL	Illuminates AMBER when water is detected in the fuel system. The warning light goes off when the water is removed from the fuel system.
4	AMBER Engine	Illuminates AMBER in conjunction with other warning lights.
5	RED Engine Stop	Illuminates RED in conjunction with other warning lights or general text and warning messages to indicate a RED STOP alert.

Description and Use of Operator Controls and Indicators - (CONTINUED)

KEY	CONTROL/INDICATOR	FUNCTION
6	PARK	Illuminates RED when the parking brake is applied.
7	CHECK TRANS	Illuminates AMBER when a transmission diagnostic trouble code is stored in the Transmission Control Module (TCM).
8	Trailer Antilock Braking System (ABS)	Illuminates AMBER when a trailer ABS malfunction has been detected.
9	ABS	Illuminates AMBER when an ABS malfunction has been detected.
10	Right Arrow	Flashes GREEN when the right turn signal or the hazard lights are turned on.
11	FR AXLE ENGAGED	Illuminates RED when front locking differential has been locked.
12	FASTEN BELTS	Illuminates RED approximately 10-15 seconds to remind driver to fasten seat belt.
13	High Beam	Illuminates BLUE when high beam headlights are on.
14	COOLANT LEVEL	Illuminates RED if low coolant level is detected.

Table 2. IP Cluster Gauges And Dimmer Switch



B100600453

Figure 2. IP Cluster Gauges and Dimmer Switch.

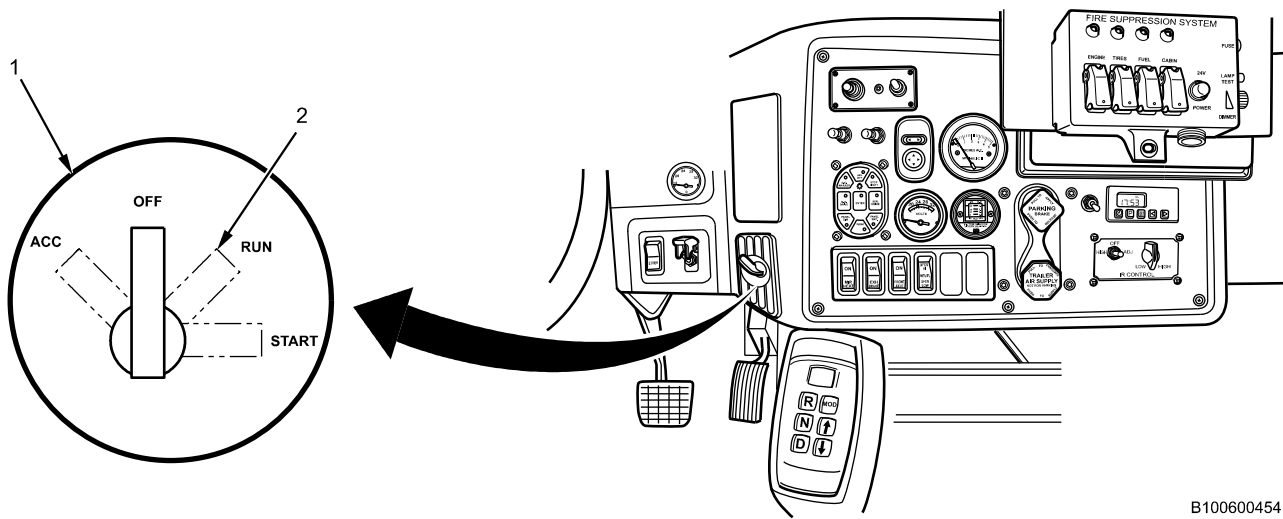
KEY	CONTROL/INDICATOR	FUNCTION
1	Coolant Temp Gauge	Indicates the engine coolant temperature. The RED warning light, located at the beginning of the gauge dial, indicates the engine coolant temperature has exceeded 230°F (110°C) when equipped with a 10-psi (69-kPa) surge tank, and 235°F (113°C) when equipped with a 15-psi (103-kPa) surge tank.
2	Tachometer Gauge	Indicates the engine speed in revolutions per minute (RPM).
3	Speedometer Gauge	Shows the vehicle speed in miles per hour (MPH) or kilometers per hour (KPH).

Description and Use of Operator Controls and Indicators - (CONTINUED)

KEY	CONTROL/INDICATOR	FUNCTION
4	Fuel Gauge	Shows the approximate fuel level in the fuel tank. When the fuel level reaches approximately 1/8 full, the gauge warning light will illuminate and an audible alarm will sound (5 beeps). If equipped – Special Fuel Warning: the RED warning light, located at the beginning of the gauge dial, will illuminate when the gauge falls below 1/3 of a tank and the alarm will continuously sound when gauge falls below 1/10 of a tank (close to E).
5	Air Pressure Gauge #1	Indicates air pressure available for the primary air brakes. The RED gauge warning light and under-limit audible alarm will indicate when the air pressure is less than 70 psi (483 kPa).
6	Battery Voltage Gauge, 12V Side Only	Indicates the battery voltage when the switch is in the ON position and the engine is running. The RED warning light, located at the beginning of the gauge dial, illuminates when the battery voltage is too high or low. This is for the 12V side only. There is a separate gauge on the IP for 24V.
7	Air Pressure Gauge #2	Indicates air pressure available for the secondary air brakes. The RED gauge warning light and under-limit audible alarm will indicate when the air pressure is less than 70 psi (483 kPa).
8	Display/Reset Button	Toggles odometer display between miles traveled, trip odometer, hours (HR), trip hours, and miles per gallon (MPG). Button also resets trip odometer and trip hours.
9	Odometer Display	Displays current transmission gear selection. Registers accumulated distance vehicle has traveled in miles and trip odometer. Registers the hours and trip hours the engine has operated. Displays MPG.
10	Panel Dimmer Switch	Controls the brightness of the odometer display.
11	Oil Pressure Gauge	Indicates engine oil pressure. Normal operating temperature is 20 to 65 psi (138 to 448 kPa). A RED warning light, located at the beginning of the gauge dial, indicates low engine oil pressure.
12	Transmission Oil Temp Gauge	Indicates the transmission lubricant temperature in degrees Fahrenheit. A RED warning light, located at the beginning of the gauge dial, indicates excessive oil temperature.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 3. Ignition Switch



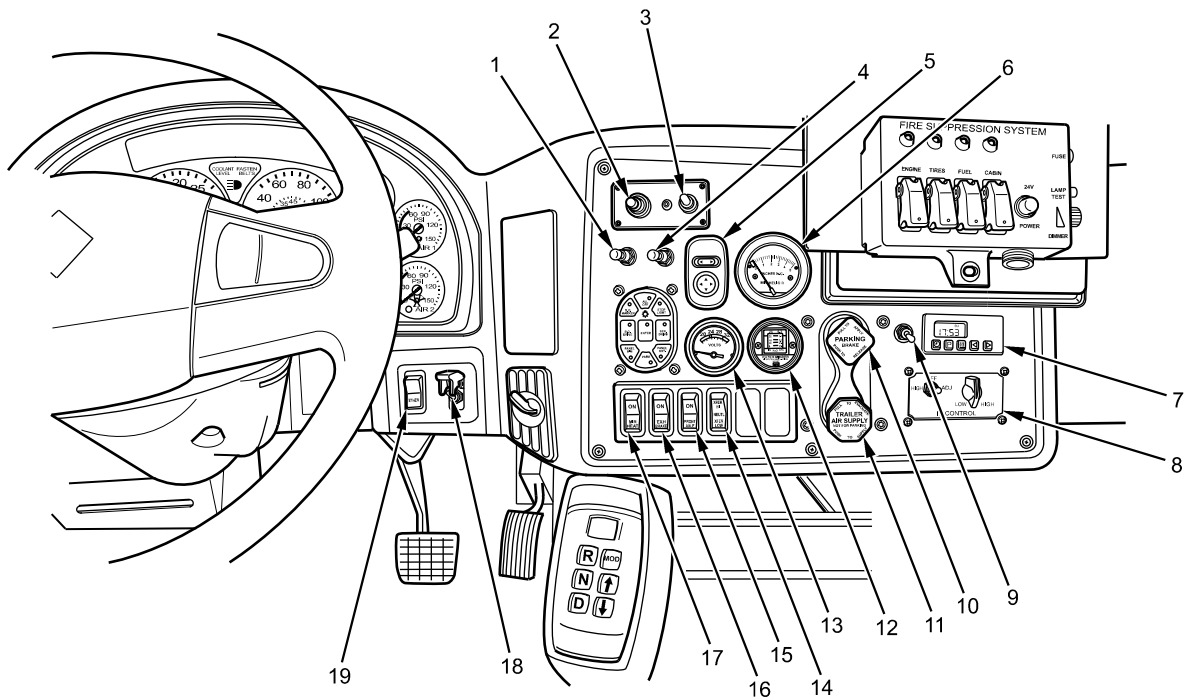
B100600454

Figure 3. Ignition Switch.

KEY	CONTROL/INDICATOR	FUNCTION
1	Ignition Switch	Use the ignition switch to start the engine and to turn all vehicle systems on or off. To start the engine, turn the ignition switch to the START position, then release switch after engine starts. ACC (accessory) will apply power to limited vehicle accessories, such as power mirrors and interior lights.
2	Run	After the engine starts, it will continue to run with the ignition switch in the RUN position.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 4. IP Gauges And Switches



B100600467

Figure 4. IP Gauges and Switches.

KEY	CONTROL/INDICATOR	FUNCTION
1	Rear Crew Light Switch	Operates the two rear crew lights.
2	Spotlight Control Toggle	To operate the spotlight, use the toggle control rotate the spotlight in the desired direction.
3	Spotlight Switch	To operate the spotlight, place the toggle switch to the ON position (up).
4	Rear Door/Ramp Switch	Operates the door/ramp, up or down electrically from the front of the cabin.
5	Rocker Switch with Four Arrows and Rocker Switch with Two Arrows	Use the rocker switch with four arrows to adjust both mirrors left or right and up and down. Use the rocker switch with two arrows to select which mirror needs adjustment.
6	HVAC Pressure Gauge	Measures cabin pressure; monitors HVAC/LSS positive overpressure system performance. Normal pressure is, .8-2.8 w.c. (200-700 Pa).
7	Fuel Fired Heater Timer	Used to automatically turn the heater on and off. The heater timer can be programmed with preset on and off times.
8	Infrared (IR) Controls	The toggle switch will turn the IR system on HIGH, OFF, or to ADJ (adjust). The LOW/HIGH knob adjusts the intensity of the IR system. When the toggle switch is in the ADJ position, the control switch can be adjusted between HIGH or LOW intensity.

Description and Use of Operator Controls and Indicators - (CONTINUED)

KEY	CONTROL/INDICATOR	FUNCTION
9	Fuel Fired Heater Switch	Switch allows the driver to turn the heater on. To turn on the heater, push the toggle switch down. To turn off the heater, push the toggle switch up.
10	PARKING BRAKE Switch	To apply parking brake, pull YELLOW knob out firmly. To release parking brake, push YELLOW knob in firmly. Place transmission in DRIVE (D), release service brakes, and apply gentle pressure to the accelerator pedal to ensure parking brake has released.
11	TRAILER AIR SUPPLY Switch	To apply trailer air supply, pull RED knob out firmly. To release trailer air supply, push RED knob in firmly.
12	Air Cleaner Gauge	The air cleaner gauge indicates how much engine air cleaner capacity has been used and how much filter capacity remains. It measures maximum restriction of the filter elements when engine is operated at full load and locks at that point. Depress the YELLOW RESET button after new filter elements are installed.
13	Battery Voltage Gauge, 24V Side Only	Indicates the 24V battery system voltage when the switch is in the ON position and the engine is running. This is for the 24V system only. There is a separate gauge for 12V system.
14	XFER Switch	Pushing on the top of the XFER HI switch puts the transfer case in high gear. Putting the switch in the NEUTL (neutral) middle position will allow the vehicle to be towed or perform special applications. Pushing on the bottom of the XFER LOW switch places the transfer case in low gear.
15	FRONT AXLE Switch	Pushing the bottom of the FRONT AXLE switch will engage the front axle (4-wheel drive). Pushing the top of the switch will disengage front axle (2-wheel drive).
16	EXH BRAKE Switch	The exhaust brake system on the MRAP has been disabled. No braking assist will be employed by this system.
17	MIR HEAT Switch	To turn on the heating function for the side mirrors and the windshield, push the top of the MIR HEAT rocker switch. To turn the MIR HEAT rocker switch off, push the bottom of the switch.
18	Main Power Switch	To start the vehicle, place the main power switch in the ON position (down).
19	ETHER Start Button	Push the ETHER start button for 2 to 3 seconds to manually inject ether into the engine whenever the ignition is turned to the START position in temperatures below 32°F (0°C).

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 5. Transmission Selector Display

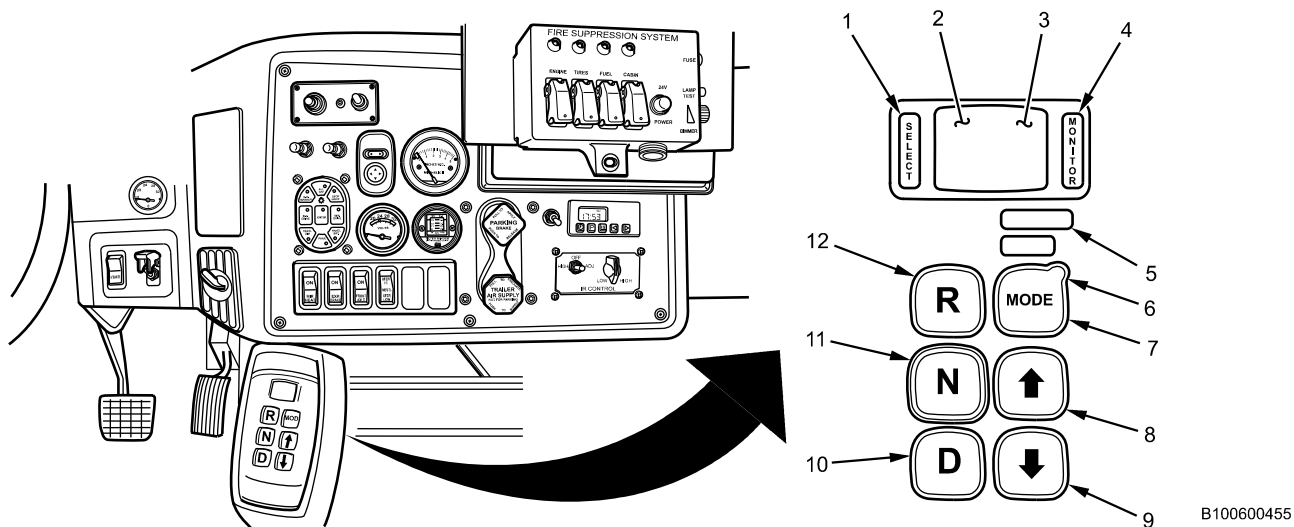


Figure 5. Transmission Gear Selector.

KEY	CONTROL/INDICATOR	FUNCTION
1	SELECT	The SELECT label refer to the function of the left side of display.
2	Display Window (Left Side)	Displays gear selected.
3	Display Window (Right Side)	Displays which gear the transmission is actually in.
4	MONITOR	The MONITOR label refers to the function of the right side of display.
5	Service Light	Indicates a transmission fault.
6	LED	RED LED light is for MODE function.
7	MODE	Used for optional functionality.
8	UP Arrow	Manually upshifts transmission one gear at a time, stopping at the 5th gear.
9	DOWN Arrow	Manually downshifts transmission one gear at a time, stopping at the 1st gear.
10	D	Shifts transmission into DRIVE and allows a full range of gears, 1 through 5.
11	N	Shifts transmission to NEUTRAL (NN). It is also used to start and park vehicle.
12	R	Shifts transmission to REVERSE (RR).

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 6. Master Vehicle Light Switch (MVLS)

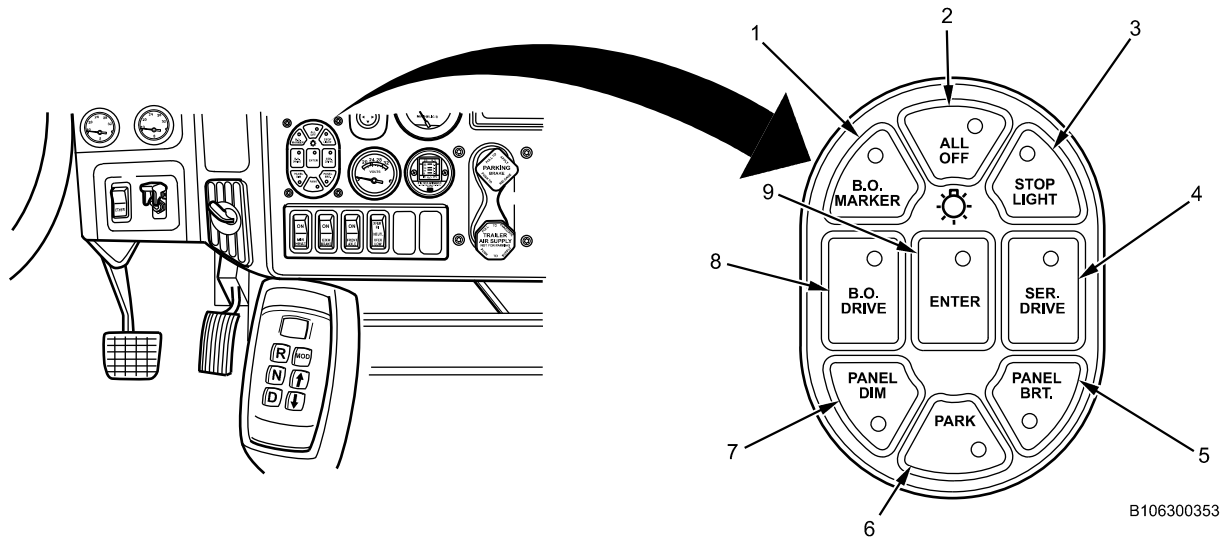


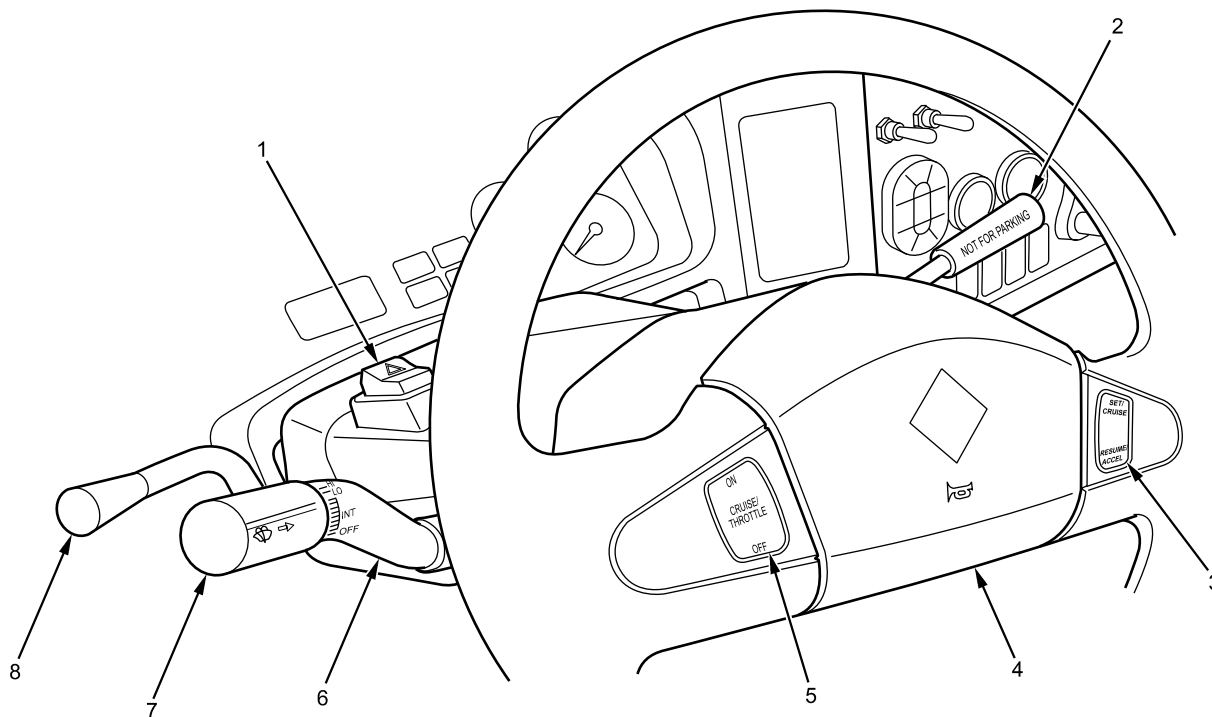
Figure 6. Master Vehicle Light Switch.

KEY	CONTROL/INDICATOR	FUNCTION
1	B.O. MARKER	Press B.O. MARKER and ENTER and front and rear blackout marker lamps will come on. In this mode, B.O. brake lamps will also function.
2	ALL OFF ¹	Press ALL OFF and ENTER to deactivate all lights. The keypad backlight will turn off after 20 seconds.
3	STOP LIGHT	Press STOP LIGHT and ENTER and both stop lights will illuminate when the service brake is pressed. Stop lights are normally in the OFF position.
4	SER. DRIVE	Press SER. DRIVE and ENTER to turn on all lights.
5	PANEL BRT.	Press this button to brighten all panel switches and IP lights.
6	PARK	Press PARK and ENTER to turn all marker lights on.
7	PANEL DIM	Press this button to dim all panel switches and IP lights.
8	B.O. DRIVE	Press B.O. DRIVE and ENTER and all four blackout marker lamps will come on along with the B.O. DRIVE light.
9	ENTER	When a desired mode/function is selected, an indicator light in the button will flash. Pressing ENTER after each selection will activate the mode/function.

¹When the main power switch is turned on, the default selection on the MVLS is ALL OFF. The blinkers, hazard lights, horn, and audible alarm (for low air pressure and malfunction indicator lamps) are only enabled when a selection on the MVLS, other than Black Out, is made. They are all inoperable in ALL OFF, B.O. Marker, and B.O. Drive selections.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 7. Steering Wheel And Column Controls



B100600456

Figure 7. Steering Wheel and Column Controls.

KEY	CONTROL/INDICATOR	FUNCTION
1	Emergency Flasher Switch	To turn on hazard warning flashers, press switch forward. To turn off hazard warning flashers, press switch backward.
2	Trailer Brake Hand Control	When pulled down, the trailer brake hand control routes air pressure to the rear service brake lines. The red trailer air supply knob must be pushed in for trailer brake operation.
3	SET/CRUISE, RESUME/ACCEL Switch	With the CRUISE/THROTTLE switch on, pressing SET/CRUISE sets the cruise speed to current vehicle speed. Pressing the RESUME/ACCEL switch will resume the previously set cruise speed or accelerate the current set vehicle speed. The RESUME/ACCEL switch will also increase engine idle speed when CRUISE/THROTTLE is turned on and vehicle is in park.
4	Horn	Press the center of the steering wheel to sound the horns.
5	CRUISE/THROTTLE Switch	Turns cruise control or throttle control on or off.

Description and Use of Operator Controls and Indicators - (CONTINUED)

KEY	CONTROL/INDICATOR	FUNCTION
6	Turn Signal Lever, Headlight High/Low Beam Lever	Pull up lever to signal right turn. Push down lever to signal left turn. When turn is completed, lever will automatically return to original position. Pull directional lever to activate headlight high beams. Pull directional lever half way back to activate flash-to-pass high beam feature. High beam indicator on dash will illuminate BLUE when high beams are on.
7	Windshield Wiper/Washer Controls	The electric wiper has two constant speeds, high (HI) and low (LO), and a range of intermittent (INT) off/on cycle intervals. The windshield washer is controlled by the WASHER/WIPER knob. Push knob inward to activate washers.
8	Steering Wheel Tilt Adjustment Lever	Pull lever to adjust steering wheel. Release lever when adjustment is complete.

Table 8. Cabin Mounted Foot Controls

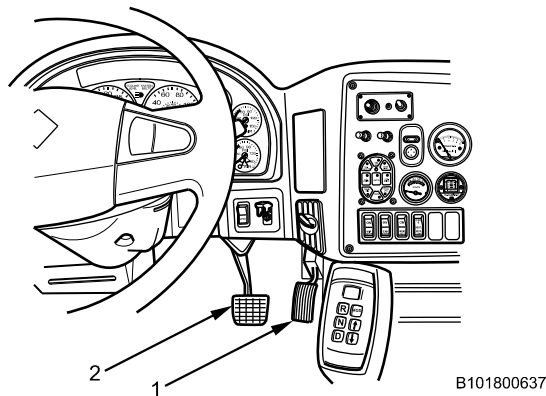
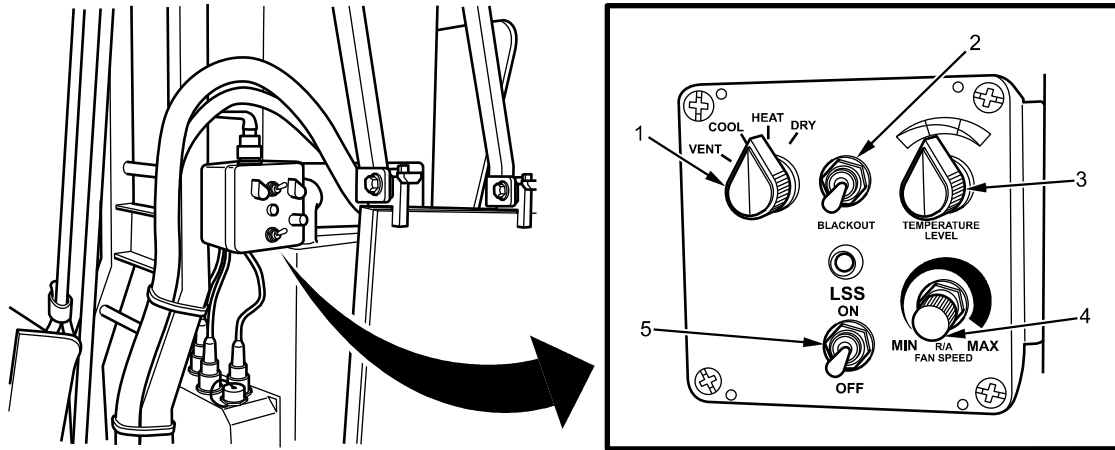


Figure 8. Foot Controls.

KEY	CONTROL/INDICATOR	FUNCTION
1	Throttle Control	Controls engine speed. Apply pressure to accelerate.
2	Service Brake Pedal	Applies service brakes. Apply pressure to stop.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 9. HVAC/LSS Control Panel



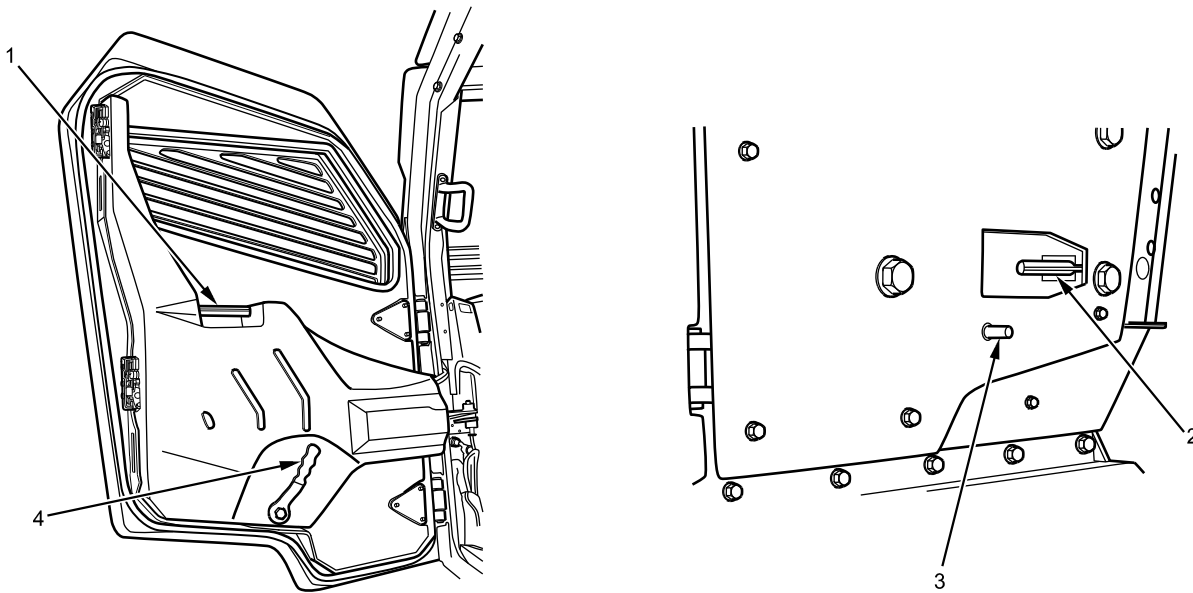
B105200457

Figure 9. HVAC/LSS Control Panel.

KEY	CONTROL/INDICATOR	FUNCTION
1	HVAC/LSS Switch	<p style="text-align: center;">NOTE</p> <p>The HVAC/LSS system will not command air conditioning A/C unless cabin temperature is above 67°F (15°C). In COOL or DRY modes, engine speed increases to 1,300 rpm within 10 seconds.</p> <p>The HVAC/LSS has a fan speed control, a temperature control, and a mode control. The operating mode switch activates or deactivates the following modes: DRY – This is the defrost mode. When using this mode, open the handle above the driver to direct air to the windshield. Use the TEMPERATURE LEVEL knob to adjust heat setting. HEAT – This setting provides maximum heat to the cabin area. VENT – Only fresh air from outside enters the cab through the NBC filter (if installed). Fan speed is not adjustable. COOL – Fresh air and recycled air are mixed and cooled to provide air conditioning.</p>
2	BLACKOUT Switch	The BLACKOUT switch turns LSS GREEN LED light off.
3	TEMPERATURE LEVEL Switch	The TEMPERATURE LEVEL switch heats or cools the cabin air relative to ambient air.
4	RECYCLED AIR (R/A) FAN SPEED Knob	The FAN SPEED knob controls the amount of air that is recirculated within the cabin.
5	LSS ON/OFF Switch	The LSS switch activates or deactivates the HVAC/LSS system. Overpressure is provided when LSS ON/OFF switch is in the ON position. With HVAC/LSS activated, outside contaminants cannot enter the cabin.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 10. Cabin Door Hand Controls (Lower Combat Door Lock Type)



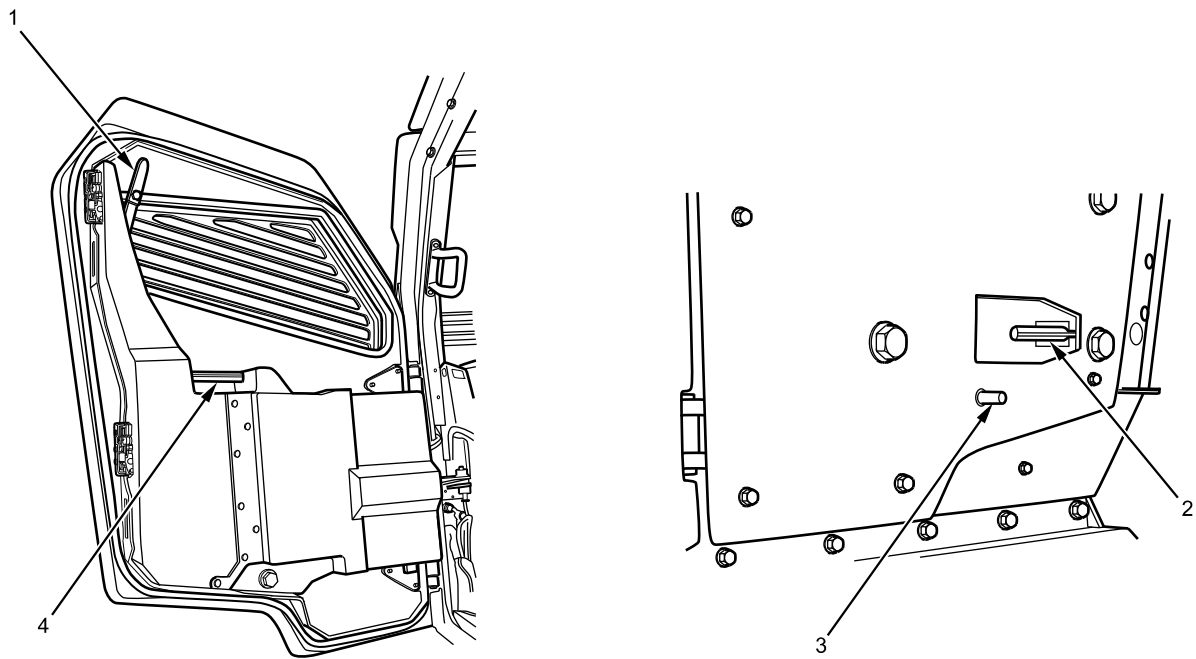
B100000192

Figure 10. Cabin Door Hand Controls (Lower Combat Door Lock Type).

KEY	CONTROL/INDICATOR	FUNCTION
1	Cabin Door Handle, Interior	Push lever to open cabin door from inside cabin. Pull to close.
2	Cabin Door Handle, Exterior	Pull lever to open cabin door from outside cabin. Push to close.
3	Combat Lock, Exterior	Tool required to twist for lock/unlock.
4	Combat Lock, Interior	Combat lock will secure door from being opened from outside. Push lever down to lock from inside. Pull lever up to open.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 11. Cabin Door Hand Controls (Upper Combat Door Lock Type)



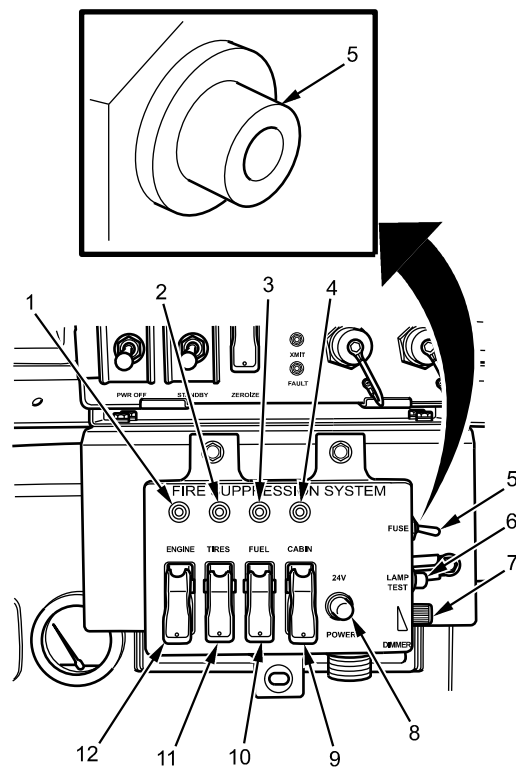
B101800459

Figure 11. Cabin Door Hand Controls (Upper Combat Door Lock Type).

KEY	CONTROL/INDICATOR	FUNCTION
1	Combat Lock, Interior	Combat lock will secure door from being opened from outside. Pull lever down to lock from inside. Push lever up to open.
2	Cabin Door Handle, Exterior	Pull lever to open cabin door from outside cabin. Push to close.
3	Combat Lock, Exterior	Tool required to twist for lock/unlock.
4	Cabin Door Handle, Interior	Push lever to open cabin door from inside cabin. Pull to close.

Description and Use of Operator Controls and Indicators - (CONTINUED)

Table 12. Fire Suppression System (FSS) Controls



B107600460

Figure 12. Fire Suppression System Control Lamps and Switches (Early Production).

KEY	CONTROL/INDICATOR	FUNCTION
1	FSS Engine Indicator	Illuminates when engine FSS has been operated and during Lamp Test. Also illuminates if system detects low pressure in the extinguishing agent cylinder or an electrical fault with the system.
2	FSS Tires Indicator	Illuminates when tires FSS has been operated and during lamp test. Also illuminates if system detects low pressure in the extinguishing agent cylinder or an electrical fault with the system.
3	FSS Fuel Indicator	Illuminates when fuel tank FSS has been operated and during lamp test. Also illuminates if system detects low pressure in the extinguishing agent cylinder or an electrical fault with the system.
4	FSS Cabin Indicator	Illuminates when cabin FSS has been operated and during lamp test. Also illuminates if system detects low pressure in the extinguishing agent cylinder or an electrical fault with the system.
5	FUSE Switch	Push up to turn FSS on. Push down to turn FSS off. Automatically switches off if an electrical short circuit is detected. Late production models toggle switch has been replaced with push-pull switch.
6	LAMP TEST Switch	Pushing this switch illuminates the indicator lamps of the FSS control switch to verify indicator lamps are operational.
7	DIMMER Switch	Controls the intensity of the backlighting of the FSS control switch. Rotate switch up to decrease the intensity. Rotate switch down to increase intensity.

Description and Use of Operator Controls and Indicators - (CONTINUED)

KEY	CONTROL/INDICATOR	FUNCTION
8	POWER ON Light (24V)	Illuminates when the FSS FUSE switch is on.
9	CABIN Switch	Open the cover and push the switch up to manually operate the cabin FSS. The FSS cabin tank dispersion unit is located behind and to the right of the driver seat.
10	FUEL Switch	Open the cover and push the switch up to manually operate the fuel tank FSS. The FSS fuel tank dispersion unit is located above fuel tank and inboard of frame rail.
11	TIRES Switch	Open the cover and push the switch up to manually operate the tire FSS. The FSS tire tank dispersion unit is located behind a closeout panel on the left rear fender above the left rear wheel.
12	ENGINE Switch	Open the cover and push the switch up to manually operate the engine FSS. The FSS engine tank dispersion unit is located on the right side of the vehicle behind the air conditioner fans and condenser.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - ENTER AND EXIT CABIN**

INITIAL SETUP:NOT APPLICABLE

ENTER AND EXIT CABIN**WARNING**

Do not use steering wheel as hand grip to enter or exit vehicle cab. Use of steering wheel for hand grip may cause sudden violent jerking of vehicle. When entering or exiting cab, use three-point contact system. Failure to comply may result in injury or death to personnel.

Do not use cabin door handles as hand grip to enter or exit vehicle cabin. Use of any cabin door handle as hand grip may cause air-assisted door to open or close. Failure to comply may result in injury or death to personnel.

The doors are heavy. Ensure that no one is standing directly behind the door before opening and closing it. Ensure that hands and feet are clear of the area before closing the door. Use caution when opening or closing the doors, especially when the vehicle is parked on an incline. Failure to comply may result in injury to personnel.

1. Pull on the exterior door handle (Figure 1, Item 1) to open door.

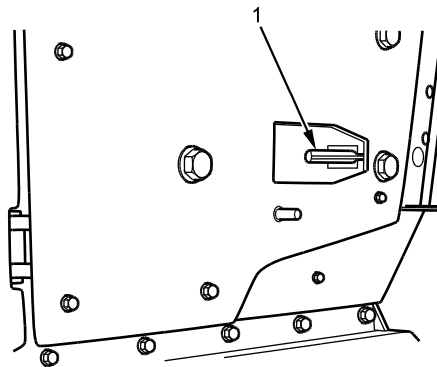


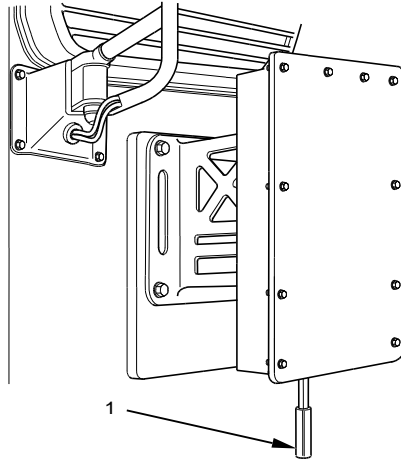
Figure 1. Handle

003615

Operation Under Usual Conditions - Enter and Exit Cabin - (CONTINUED)**NOTE**

Perform step 2 for MEAP equipped vehicles only.

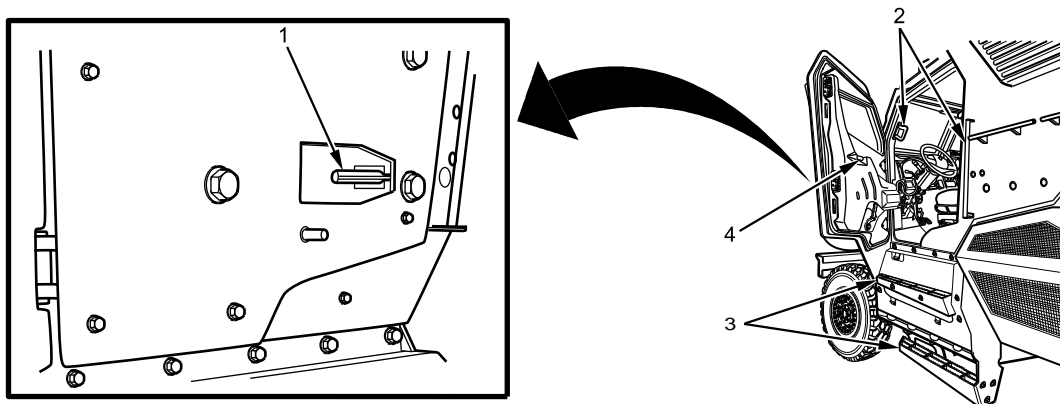
2. Pull on the MEAP exterior door handle (Figure 2, Item 1) to open door.



B101800649

Figure 2. MRAP Expedient Armor Program (MEAP) Door Handle.

3. Enter cabin using grab handles (Figure 3, Item 2) and steps (Figure 3, Item 3).



B100000120

Figure 3. Steps and Handles.

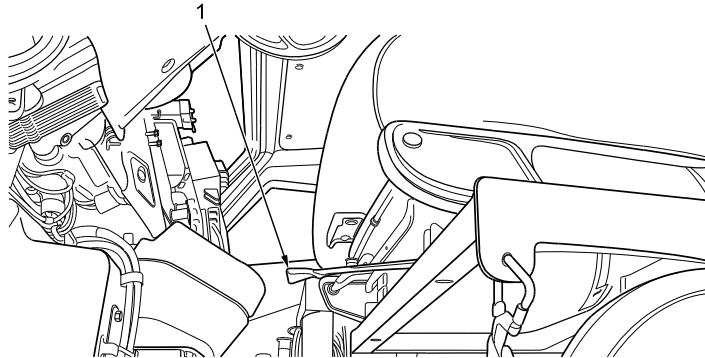
4. Pull on interior door handle (Figure 3, Item 4) to close door.
5. When exiting vehicle from cabin, push on interior door handle (Figure 3, Item 4) to open door.
6. Exit cabin using grab handles (Figure 3, Item 2) and steps (Figure 3, Item 3).
7. Close door by pushing on exterior door handle (Figure 3, Item 1).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - ADJUSTING DRIVER SEAT**

INITIAL SETUP:NOT APPLICABLE

ADJUSTING DRIVER SEAT

003619

Figure 1. Driver Seat Adjustment Lever.

WARNING

Do not stow material under seats. Under-seat area is not designated for stowage, and improper use may lead to seat failure during a blast event. Failure to comply may result in death or injury to personnel.

Do not modify seats or seat attachments, or hang gear on seats. Failure to comply may lead to seat failure during a blast event resulting in death or injury to personnel.

NOTE

The operator should easily be able to reach the brake pedal, the accelerator control, and the Instrument Panel (IP) controls with the seat adjusted and with the seat belt and shoulder harness on.

1. Adjust driver seat forward or backward by moving the seat adjustment lever (Figure 1, Item 1) to left to release seat rail latch, then sliding the seat backward or forward.
2. Release seat adjustment lever (Figure 1, Item 1) to lock seat into desired position.

END OF TASK**END OF WORK PACKAGE**

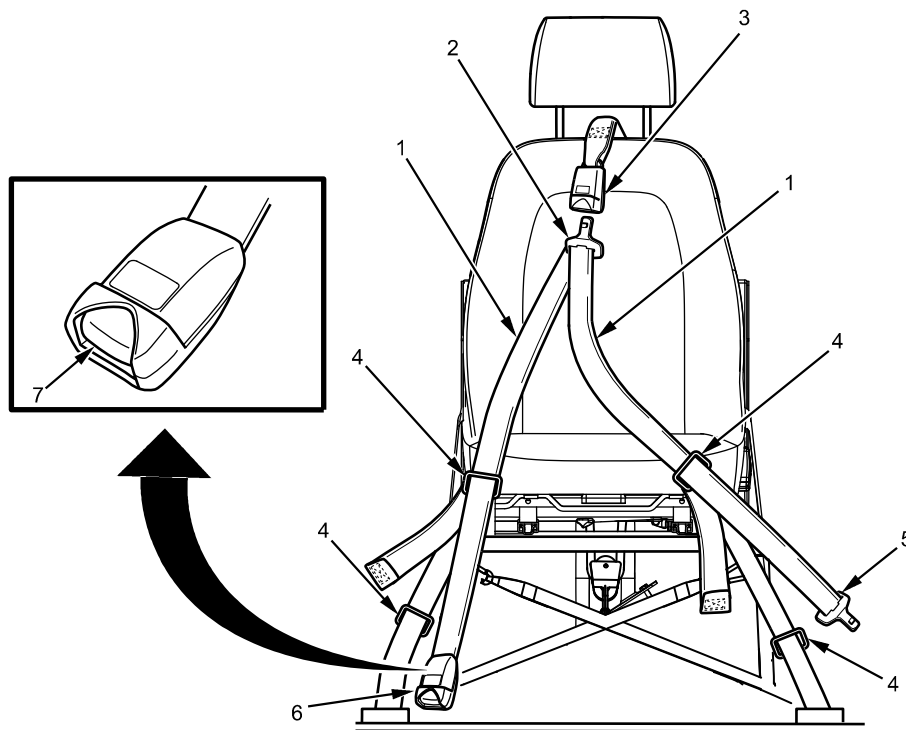
OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - SEAT BELT OPERATION

INITIAL SETUP:

NOT APPLICABLE

SEAT BELT OPERATION



B101800505

Figure 1. Seat Belt Operation.

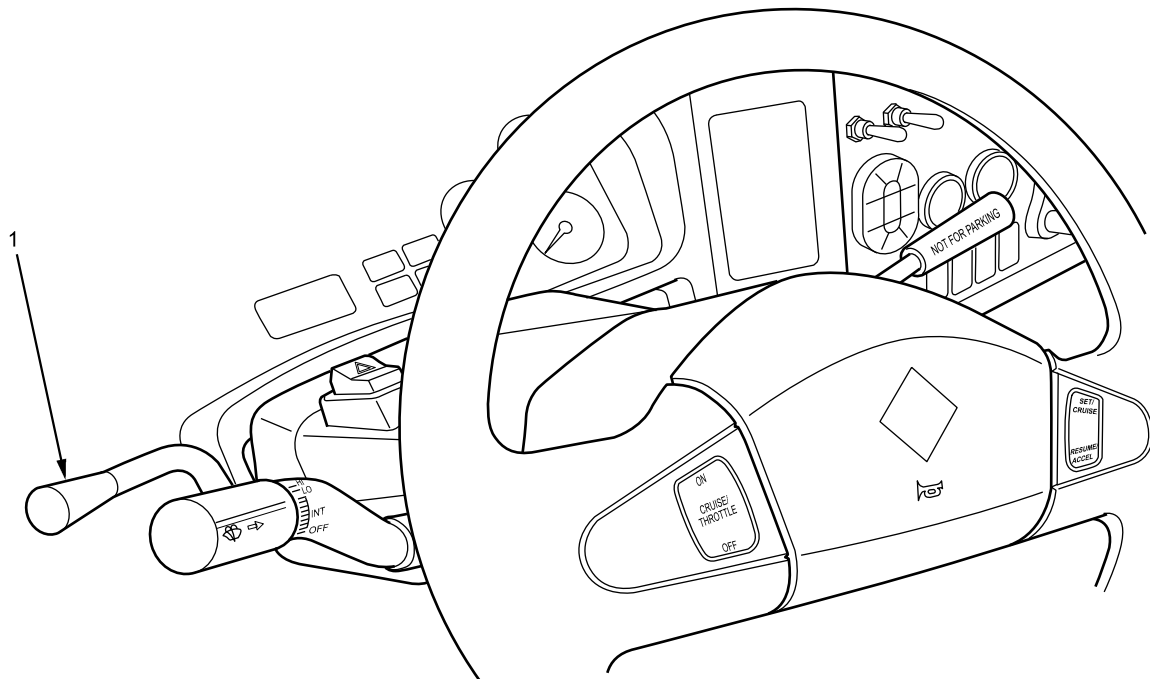
1. Insert latch (Figure 1, Item 2) into buckle (Figure 1, Item 3).
2. Place shoulder straps (Figure 1, Item 1) over shoulders.
3. Install latch (Figure 1, Item 5) into buckle (Figure 1, Item 6).
4. Adjust strap adjusters (Figure 1, Item 4) as desired for snug fit.
5. To remove seat belt, depress RED button (Figure 1, Item 7) on buckle (Figure 1, Item 6) and remove latch (Figure 1, Item 5).
6. Remove shoulder straps (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - ADJUSTING STEERING WHEEL**

INITIAL SETUP:NOT APPLICABLE

ADJUSTING STEERING WHEEL

B100600506

Figure 1. Tilt Steering Wheel Adjustment Lever.

1. Pull steering wheel tilt adjustment lever (Figure 1, Item 1) towards the steering wheel to adjust the steering wheel up or down.
2. Release steering wheel tilt adjustment lever (Figure 1, Item 1) when adjustment is complete.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - ENGINE START PROCEDURE – ABOVE 32°F (0°C)**

INITIAL SETUP:**References**WP 0036

ENGINE START PROCEDURE – ABOVE 32°F (0°C)**WARNING**

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.

CAUTION

To avoid engine damage, if engine fails to start within 30 seconds, release ignition switch and wait 2 to 3 minutes to allow starter motor to cool. If three attempts are made to start engine and engine still fails to start, investigate and determine the cause of the no-start condition. Repeated attempts to start engine will damage starter motor.

NOTE

If temperature is below 32°F (0°C), refer to Cold Weather Starting (Below 32°F [0°C]) in WP 0036, Operation Under Unusual Conditions.

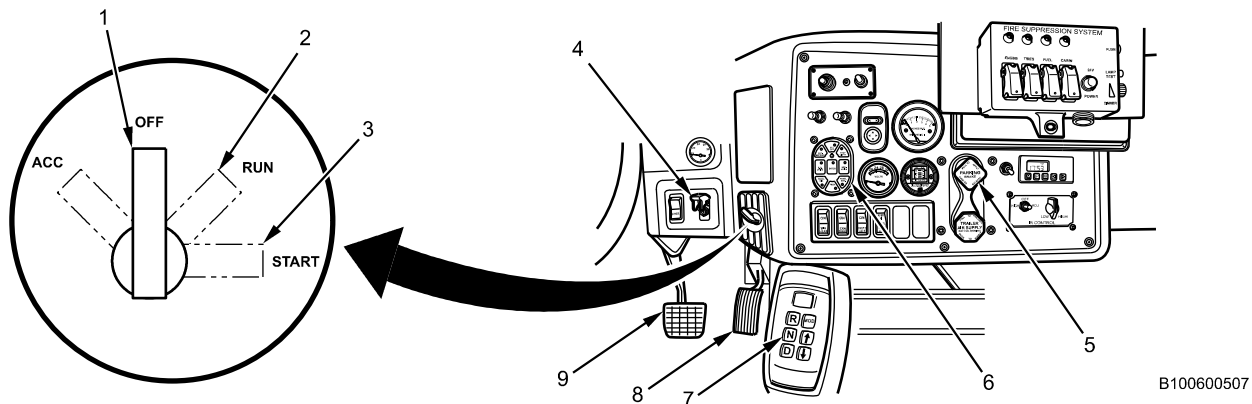
Operation Under Usual Conditions - Engine Start Procedure – Above 32°F (0°C) - (CONTINUED)


Figure 1. Engine Starting.

1. Set parking brake by pulling YELLOW knob (Figure 1, Item 5) out.
2. Apply pressure to service brake (Figure 1, Item 9).
3. Ensure transmission is in NEUTRAL (N) (Figure 1, Item 7).
4. Turn off headlights (Figure 1, Item 6) and all accessories.
5. Turn main power switch (Figure 1, Item 4) ON. Do not depress throttle control pedal (Figure 1, Item 8).
6. Hold ignition switch (Figure 1, Item 1) in START position (Figure 1, Item 3) until engine starts, but no longer than 30 seconds. Release switch as soon as engine starts.
7. Engine will continue to run with ignition switch (Figure 1, Item 1) in RUN position (Figure 1, Item 2).
8. To stop engine, rotate ignition switch (Figure 1, Item 1) counterclockwise to OFF position.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - NORMAL DRIVING PROCEDURES**

INITIAL SETUP:NOT APPLICABLE

NORMAL DRIVING PROCEDURES**WARNING**

Noise levels exceed 85-decibel limit. Exposure to constant, elevated noise levels could cause permanent hearing damage. Single hearing protection (e.g., VIC-3 headset plus earplugs) is required in and around operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result to injury to personnel.

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Speeds must be reduced according to weather and road/terrain conditions. Approach slopes head on and avoid side slopes whenever possible. Failure to comply may cause the vehicle to roll over, which may result in death or serious injury to personnel and damage to equipment.

The seatbelts must be worn during driving operation. Avoid twisting the straps when putting the seatbelt on and be sure to remove slack. This will allow the harness to provide maximum protection in the event of an accident. Failure to comply may result in death or injury to personnel.

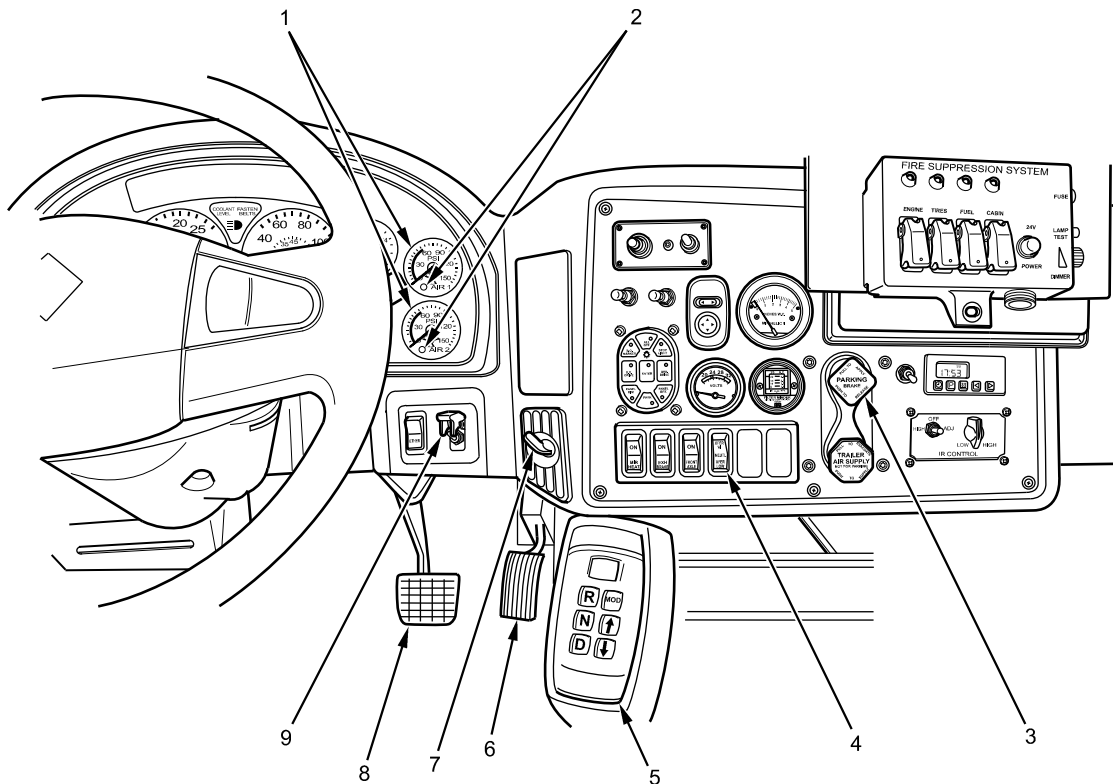
Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

Let air pressure build in both tanks to 100 psi (689 kPa) before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.

Do not operate vehicle with air pressure system loss. Vehicle has reduced or no braking capability and may not stop. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Operations on steep longitudinal grades (in excess of 50 percent slope) can lead to axle damage, resulting in injury or death to personnel.

Operation Under Usual Conditions - Normal Driving Procedures - (CONTINUED)



B100600508

Figure 1. Operating Controls.

1. Turn main power switch (Figure 1, Item 9) on.
2. Turn ignition switch (Figure 1, Item 7) to START position.
3. Check two air pressure gauges (Figure 1, Item 1) on Instrument Panel (IP) cluster during startup and idle. Low air pressure warning light (Figure 1, Item 2) will be on when starting engine. As air pressure reaches 70 psi in both tanks, warning light will go out.
4. Apply service brake (Figure 1, Item 8).

NOTE

Vehicle will not move until transfer case XFER HI or XFER LOW range is selected.

5. Ensure transfer case is in XFER HI or XFER LOW (Figure 1, Item 4).
6. Place transmission selector (Figure 1, Item 5) in DRIVE (D) or REVERSE (R).
7. Release parking brake (Figure 1, Item 3).
8. Release service brake (Figure 1, Item 8).
9. Lightly depress accelerator (Figure 1, Item 6).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - ENGINE SHUTDOWN AND PARKING

INITIAL SETUP:

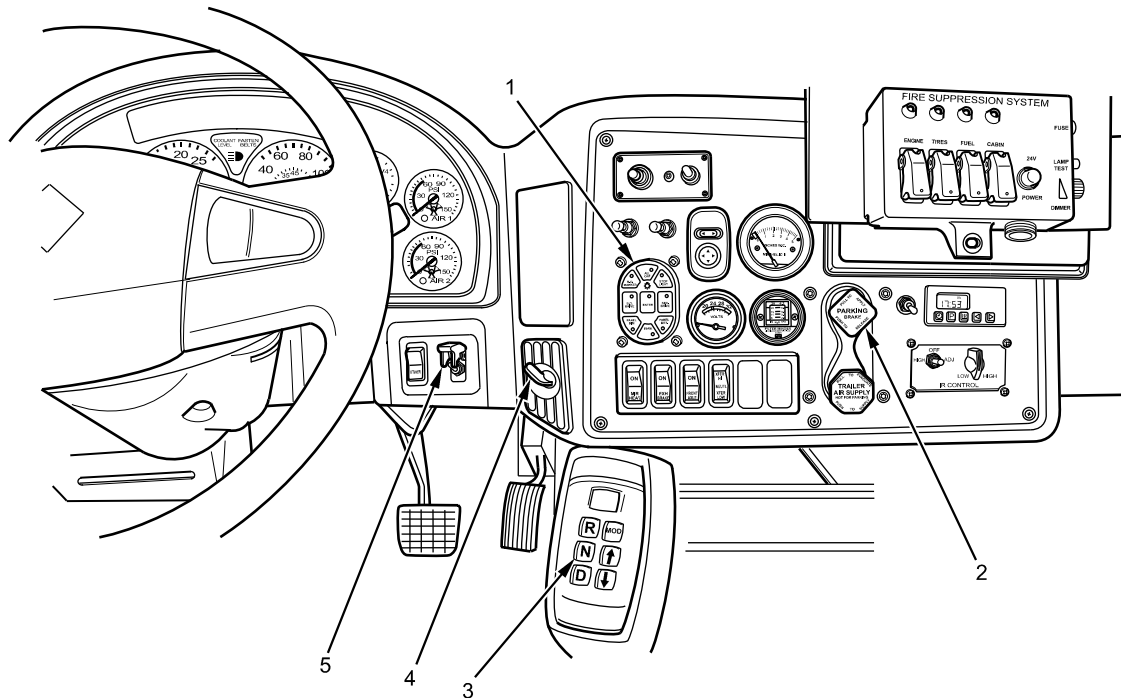
NOT APPLICABLE

ENGINE SHUTDOWN AND PARKING

WARNING

Do not park vehicle on longitudinal slopes greater than 30 percent. Parking on grades in excess of 30 percent slope can lead to parking brake failure, resulting in vehicle rolling forward or backward, which could lead to an accident. Failure to comply may result in injury to personnel or damage to equipment.

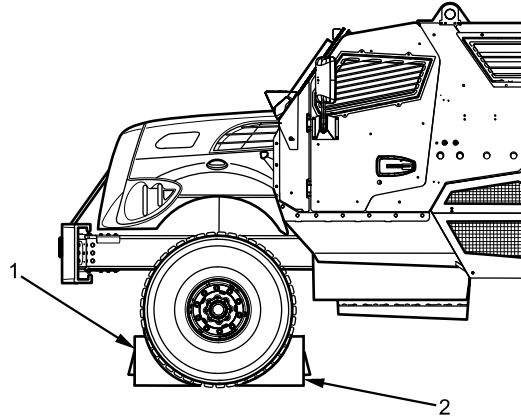
Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.



B100600509

Figure 1. Engine Shutdown and Parking.

1. Stop vehicle.
2. Place transmission (Figure 1, Item 3) in NEUTRAL (N).
3. Set parking brake (Figure 1, Item 2) by pulling YELLOW knob out.
4. Idle engine for 3 to 5 minutes before shutting down. Idling allows lubricating oil and water to carry heat away from vehicle components.
5. Turn ignition switch OFF (Figure 1, Item 4).
6. Turn main power switch OFF (Figure 1, Item 1).

Operation Under Usual Conditions - Engine Shutdown and Parking - (CONTINUED)

B102600390

Figure 2. Chocked Wheel.

NOTE

Front left shown; other wheels similar.

7. Chock wheels by placing chock blocks (Figure 2, Item 1 and 2) in front of and behind tire.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - BRAKE SYSTEMS AND ABS OPERATION

INITIAL SETUP:

NOT APPLICABLE

BRAKE SYSTEMS AND ABS OPERATION

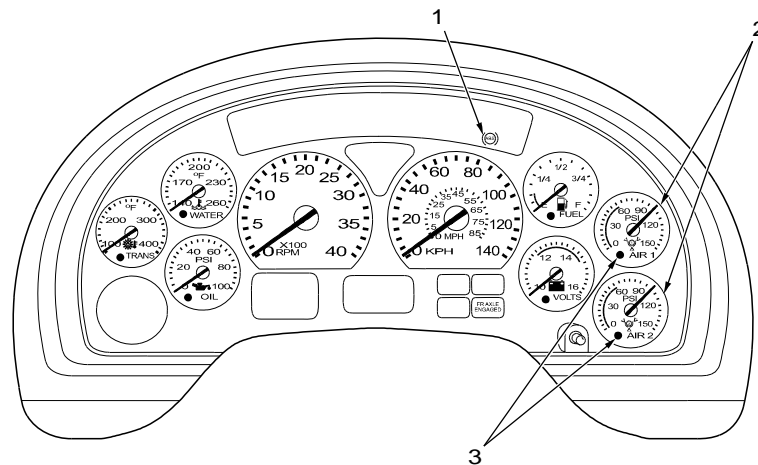
WARNING

Let air pressure build in both tanks to 100 psi before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.

NOTE

Normal air system operating pressure is 110 to 130 psi. If the operating pressure drops below 70 psi, spring brakes will apply and vehicle cannot be moved.

The electronic Antilock Braking System (ABS) improves braking when excessive wheel slippage or wheel lockup is detected. When stopping suddenly, do not pump service brake pedal. Apply steady pressure. The ABS system will take over and apply extra pressure to the wheel or wheels that need it. This will result in a fast pulsation in the brake pedal. This is normal and not a concern.



004023

Figure 1. ABS Indicator Light.

1. Check that ABS indicator light (Figure 1, Item 1) illuminates when ignition switch is turned on.
2. Allow air pressure to build during startup. Idle engine while watching indicator gauges (Figure 1, Item 2).
3. When gauges reach safe operating pressure (approximately 70 psi), RED warning lights (Figure 1, Item 3) will turn off. Safe air pressure for release of parking brake is 100 psi.

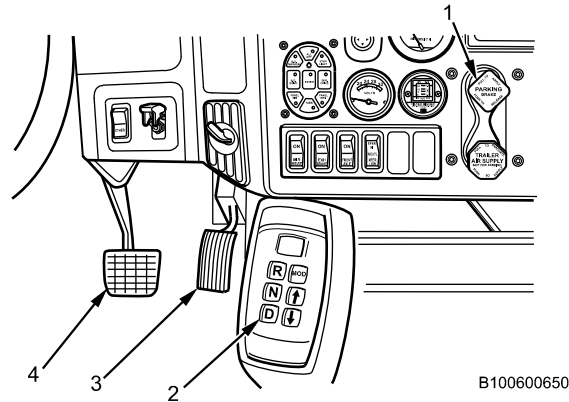
Operation Under Usual Conditions - Brake Systems and ABS Operation - (CONTINUED)

Figure 2. Controls.

4. Place foot on service brake (Figure 2, Item 4) and select DRIVE (D) (Figure 2, Item 2) on transmission gear selector.
5. Release parking brake (Figure 2, Item 1).
6. Apply gentle pressure to the accelerator pedal (Figure 2, Item 3) to ensure parking brake (Figure 2, Item 1) was released.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - EXHAUST BRAKE OPERATION AND USE**

INITIAL SETUP:

NOT APPLICABLE

EXHAUST BRAKE OPERATION AND USE**WARNING**

Do not activate the exhaust brake. This feature is disabled. Failure to comply may result in loss of braking ability and serious injury or death to personnel.

The exhaust braking feature is disabled on M1224 and M1224A1.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - TRANSMISSION OPERATION

INITIAL SETUP:

References

WP 0058

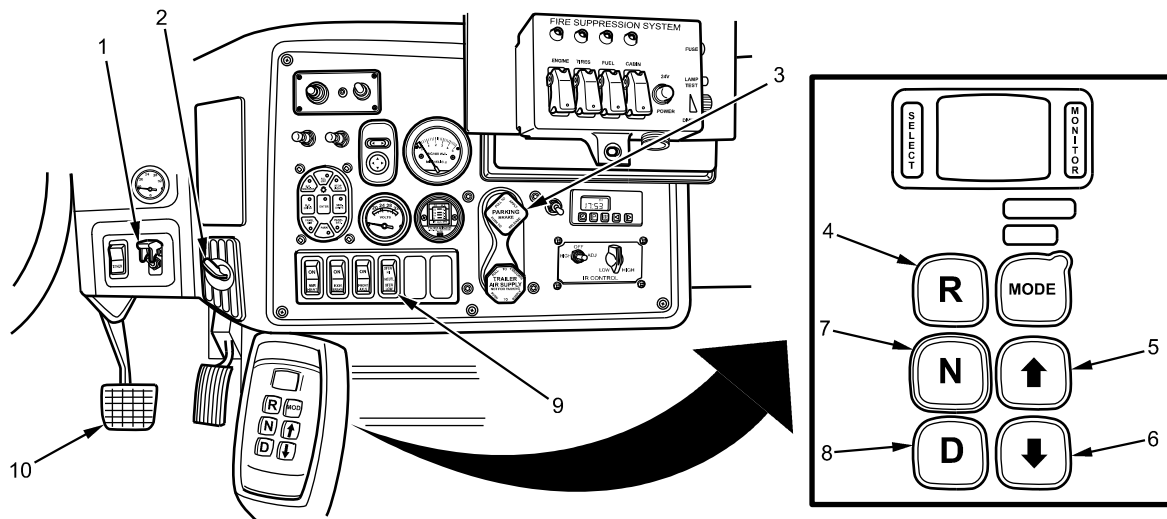
TRANSMISSION OPERATION

CAUTION

During operation, if check transmission warning light comes on, do not shift the transmission into NEUTRAL (N). Refer to Transmission Emergency Operation Procedure (Limp Home) in WP 0058.

NOTE

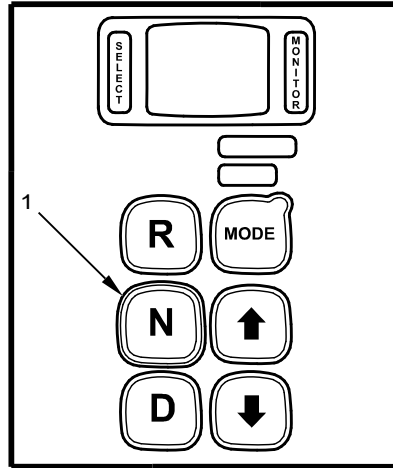
The transmission gear selector is located between the driver and front passenger seats. The service brake pedal must be depressed to place the transmission into any gear.



B100600512

Figure 1. Transmission Controls.

1. Transfer case in XFER HI or XFER LOW range (Figure 1, Item 9).
2. Turn main power switch (Figure 1, Item 1) on.
3. Turn ignition switch (Figure 1, Item 2) to START position.
4. Depress service brake pedal (Figure 1, Item 10).
5. Select REVERSE or DRIVE by pressing either the R button (Figure 1, Item 4) or D button (Figure 1, Item 8) on transmission gear selector.
6. Release parking brake (Figure 1, Item 3).
7. Release service brake (Figure 1, Item 10).
8. When in DRIVE, select a lower range by pressing and releasing the DOWN arrow button (Figure 1, Item 6).
9. When in DRIVE, select a higher range by pressing and releasing UP arrow button (Figure 1, Item 5).

Operation Under Usual Conditions - Transmission Operation - (CONTINUED)

003354

Figure 2. Transmission Control (NEUTRAL)

10. Place transmission in NEUTRAL by pressing the N button (Figure 2, Item 1).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - FOUR-WHEEL DRIVE OPERATION AND USE**

INITIAL SETUP:NOT APPLICABLE

FOUR-WHEEL DRIVE OPERATION AND USE**CAUTION**

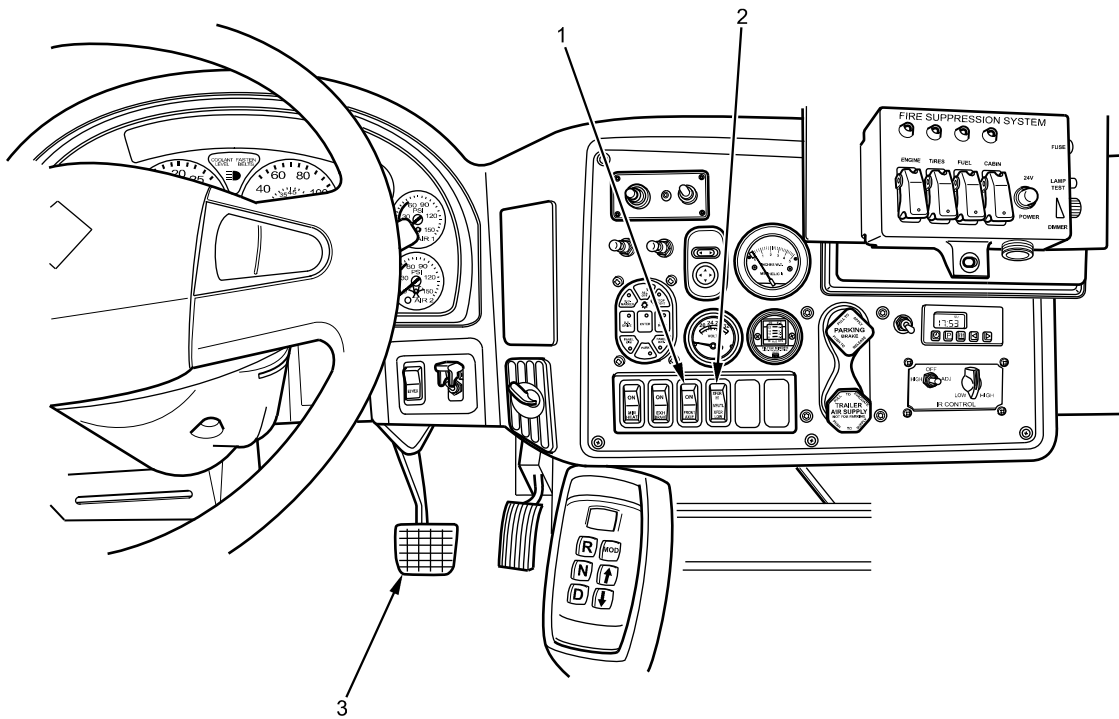
The vehicle cannot be driven in rear-wheel or four-wheel drive with the transfer case in NEUTL (neutral) position. Vehicle must be completely stopped, with service brake applied, before shifting between rear-wheel and four-wheel drive or shifting range in either mode. Failure to comply may result in damage to equipment.

NOTE

When conditions warrant, such as on a grade with mud/sand/snow or when fording, it is likely that four-wheel drive or a lower range will be needed to complete the required task.

If it is known that a certain mode is required to negotiate a given terrain or discrete obstacle, the operator should set the vehicle in that mode before approaching the area. This will minimize damage to terrain and risk of vehicle damage or immobilization.

Operation Under Usual Conditions - Four-Wheel Drive Operation and Use - (CONTINUED)



B100600513

Figure 1. Front Axle and Transfer Case Switches.

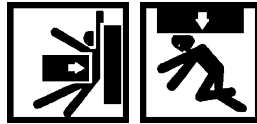
1. Depress service brake (Figure 1, Item 3) while vehicle is stopped.
2. Turn front axle switch (Figure 1, Item 1) on.
3. Select desired range with transfer case control switch (Figure 1, Item 2).
4. Resume driving vehicle.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - REAR DOOR/RAMP OPERATION**

INITIAL SETUP:**References**WP 0058

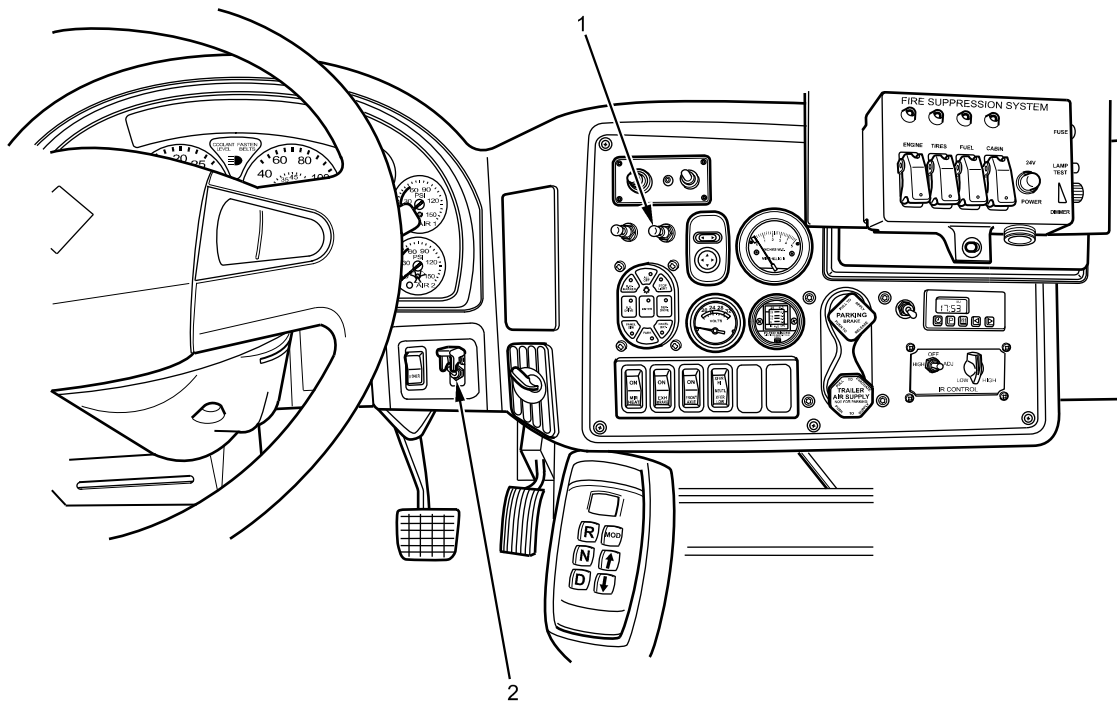
REAR DOOR/RAMP OPERATION**WARNING**

Ensure no one is behind vehicle when lowering rear door/ramp. Use extreme caution when using emergency rear door/ramp release, to ensure no one is struck by door as it falls open. Sound horn before lowering door/ramp. Keep arms and legs clear of rear door/ramp when closing. Do not operate rear door/ramp when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.

NOTE

The rear door/ramp can be operated electrically or manually. A manual emergency release procedure bypasses these systems in the event of failure or emergency. Refer to Rear Door/Ramp Emergency Release WP 0058.

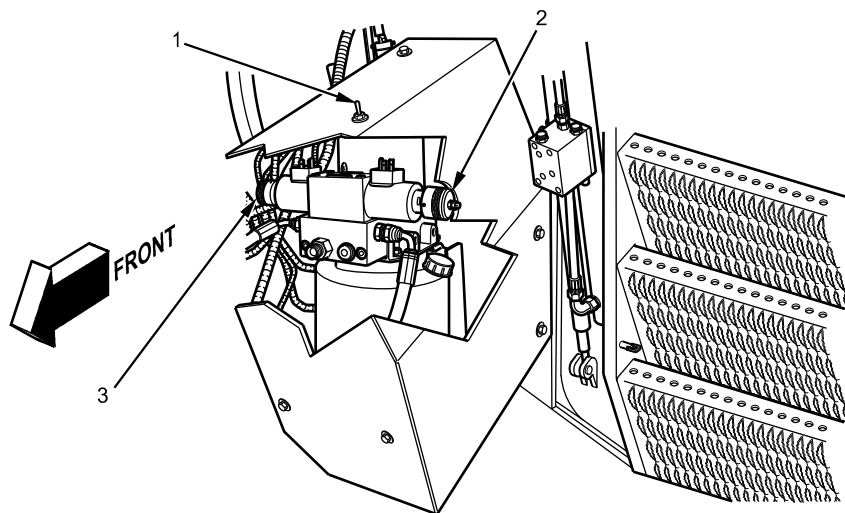
Operation Under Usual Conditions - Rear Door/Ramp Operation - (CONTINUED)



B100600514

Figure 1. Crew Rear Door/Ramp Toggle Switch.

1. To operate door/ramp electrically from the front of cabin, use door/ramp toggle switch (Figure 1, Item 1). With main power switch (Figure 1, Item 2) in ON position, pull toggle switch (Figure 1, Item 1) outward and hold in down position to lower door/ramp. Pull toggle switch (Figure 1, Item 1) outward and hold in up position to raise door/ramp.



B102400515

Figure 2. Crew Rear Door/Ramp Toggle Switch (One Plunger Type).

NOTE

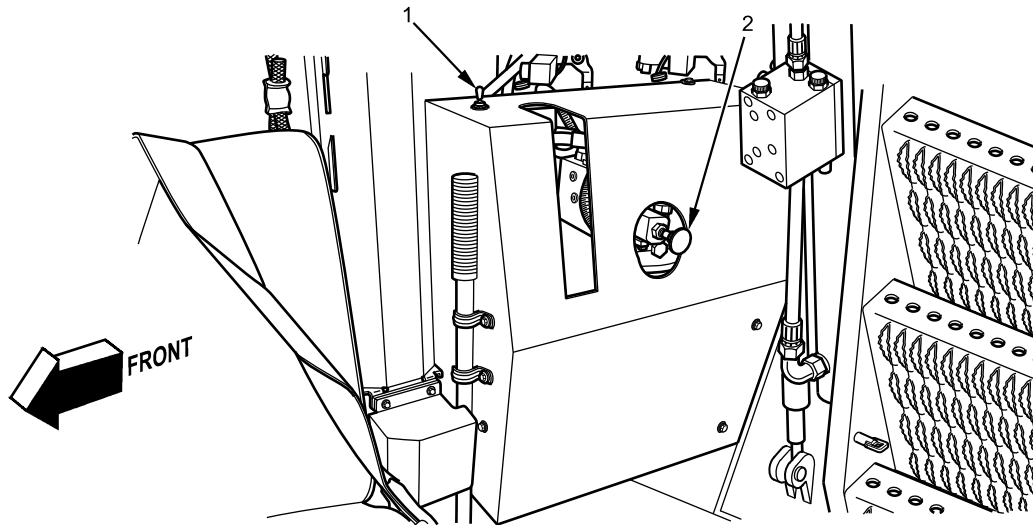
Operation Under Usual Conditions - Rear Door/Ramp Operation - (CONTINUED)

Some models have two plungers and some have one plunger. For models with two plungers, the second plunger is located between the vehicle side wall and the pump cover, opposite the visible plunger.

For two plunger and one plunger models, ensure to pull all plungers outward and hold in the neutral position to enable electrical operation of rear door/ramp from front or rear mounted toggle switch.

Perform step 2 for two plunger models only. Perform step 3 for one plunger models only.

2. Operate door/ramp electrically from crew area:
 - a. Ensure outside plunger (Figure 2, Item 2) is in the neutral position. Rotate plunger counterclockwise to find neutral position.
 - b. Ensure inside plunger (Figure 2, Item 3) is in the neutral position. Rotate plunger clockwise to find neutral position.
 - c. With main power switch (Figure 1, Item 2) in ON position, hold toggle switch (Figure 2, Item 1) in rearward position to lower door/ramp. Place toggle switch (Figure 2, Item 1) in forward position to raise door/ramp.



B102400516

Figure 3. Crew Rear Door/Ramp Toggle Switch (Two Plunger Type).

NOTE

Perform step 3 for one plunger models only.

3. Operate door/ramp electrically from crew area:
 - a. Ensure plunger (Figure 3, Item 2) is in the neutral position. Rotate plunger counterclockwise to find neutral position.
 - b. With main power switch (Figure 1, Item 2) in ON position, hold toggle switch (Figure 3, Item 1) in rearward position to lower door/ramp. Place toggle switch in forward position to raise door/ramp.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - FUEL FIRED HEATER**

INITIAL SETUP:

NOT APPLICABLE

OPERATING PROCEDURES**FUEL FIRED HEATER****WARNING**

Do not operate fuel fired heater or vehicle engine in an enclosed area without adequate ventilation. Failure to comply may result in serious injury to personnel.

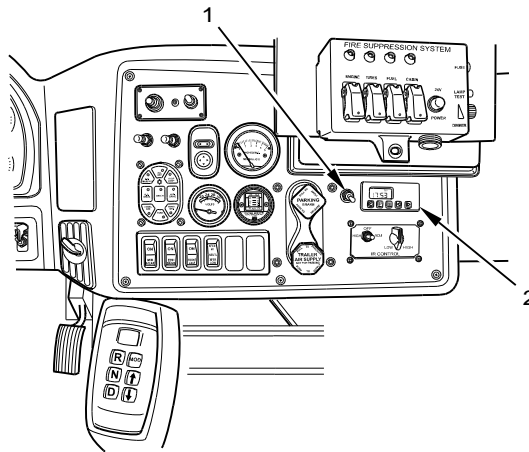
The fuel fired heater must be switched off before fuel tank on the vehicle is filled and when vehicle is not in use. Failure to comply may result in serious injury or death to personnel.

NOTE

Heater may be used with or without engine running.

On initial startup, the heater may require several start attempts to self-prime the fuel system. It is normal for heater to produce exhaust smoke upon start up. If the heater fails to start, it will automatically attempt a second start. If unsuccessful, the heater will shut down completely. If the heater shuts down due to flame-out while in operation mode, it will automatically attempt one restart. If successful, it will continue to run; if not successful, it will shut down completely for a cool-down cycle. During operation, the heater continually senses the input voltage from the batteries. If the input voltage drops to approximately 10.5 volts or increases above 16 volts, the heater will automatically shut down for a cool-down cycle and display a fault code on the control unit display.

Operation Under Usual Conditions - Fuel Fired Heater - (CONTINUED)



003769

Figure 1. Fuel Fired Heater Controls.

The fuel fired heater is turned on or off by a switch (Figure 1, Item 1) and programmed using the timer (Figure 1, Item 2).

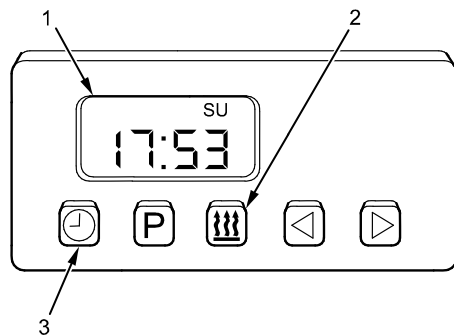
MANUAL OPERATION

NOTE

The timer allows for preselection of turn-on time up to 7 days in advance. The timer also allows run times up to 2 hours before automatically turning off. By default, the timer is preset to operate for 2 hours.

When coolant reaches 176°F (80°C), heater automatically switches to low heat mode and continues to run.

If the coolant temperature continues to rise, heater will automatically switch off when temperature reaches 187°F (86°C).



003605

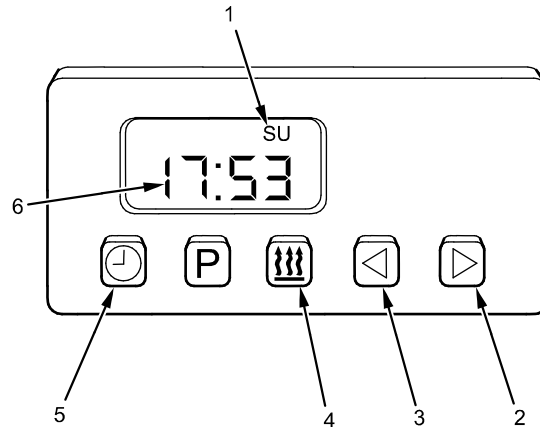
Figure 2. Manual Heater Operation.

1. To turn heater on, move toggle switch (Figure 1, Item 1) to the down position and push the button with three arrows (Figure 2, Item 2) (button will flash RED). The display screen (Figure 2, Item 1) will display programmed off time.
2. To turn heater off, move the toggle switch (Figure 1, Item 1) to the up position and press the button with three arrows (Figure 2, Item 2) (button will flash RED). The display screen will clear. Pushing the button

Operation Under Usual Conditions - Fuel Fired Heater - (CONTINUED)

with the clock symbol (Figure 2, Item 3) will allow the current time and day to be displayed on the screen (Figure 2, Item 1).

OPERATION WITH TIMER



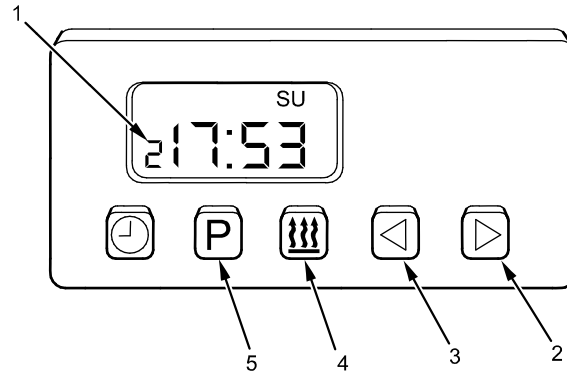
003770

Figure 3. Timer Control Panel.

1. To set time (Figure 3, Item 6) and weekday (Figure 3, Item 1), push button (Figure 3, Item 5) once and hold until 12:00 begins to flash.
2. Using buttons (Figure 3, Item 2 and 3), set present time of day (24-hour clock). When time stops flashing, time has been stored. The weekday will begin to flash.
3. Use buttons (Figure 3, Item 2 and 3) to set present weekday. When weekday stops flashing, weekday has been set.
4. To adjust heater run time once, push button (Figure 3, Item 4). Heater symbol and 120 will appear on the display screen (maximum time of 120 minutes). Use buttons (Figure 3, Item 2 and 3) to adjust desired run time. The running time is factory set to a maximum of 120 minutes. At the end of a heat cycle, the timer will turn the heater off. The heater will complete a cool-down cycle and turn off.
5. To adjust heater run time permanently, push button (Figure 3, Item 3) and hold about 3 seconds until display lights up and flashes. Release button. Use buttons (Figure 3, Item 2 and 3) to set new fixed run time. When the display goes off, the new run time is set.

Operation Under Usual Conditions - Fuel Fired Heater - (CONTINUED)

SETTING RUN TIMES INTO MEMORY



B100000260

Figure 4. Control Panel Display.

1. Three memory settings (Figure 4, Item 1) are available, labeled 1, 2, or 3 appears in the lower left corner of the display screen. Push button (Figure 4, Item 5) until desired memory setting is shown on display.
2. Using buttons (Figure 4, Item 2 and 3), set desired start time of day. When time stops flashing, time of day is set.
3. Using buttons (Figure 4, Item 2 and 3), set desired start day of the week. When day of the week stops flashing, day is set.

USING PRESET START TIMES

1. Push button (Figure 4, Item 5) until desired memory setting (Figure 4, Item 1) appears in lower corner of the display screen. Heater will start at the day and time displayed. Display will go off in 15 seconds. Stored memory location number (1, 2, or 3) will remain displayed. When preset is chosen, button will flash RED.
2. To turn heater off before programmed time expires, push button (Figure 4, Item 4) once. Heat signal to heater will be turned off. Heater will perform a normal cool-down and turn off.

UNLOCKING TIMER CONTROL PANEL

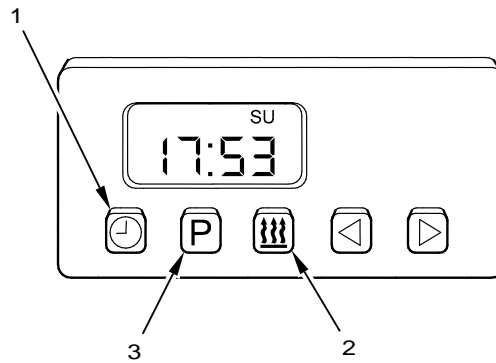
NOTE

The heater timer control panel may become locked due to one of the following conditions:

Overheating – If the heater overheats three times in succession, fault message F15 is displayed and the control panel is locked.

Too many failed start attempts – If the heater performs too many start attempts in succession, fault message F50 is displayed and the control panel is locked.

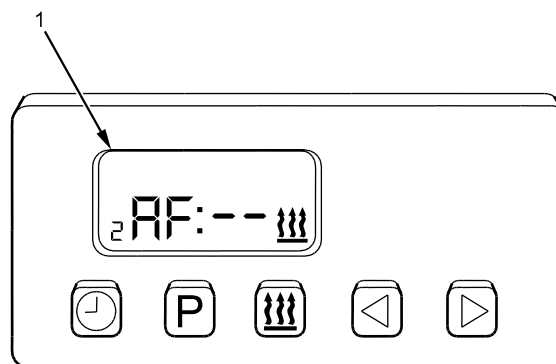
Operation Under Usual Conditions - Fuel Fired Heater - (CONTINUED)



003771

Figure 5. Heater Controls.

1. To unlock the control panel and erase fault memory, turn ignition switch to RUN to activate timer display.
2. Press button (Figure 5, Item 2). Current fault code (e.g., F15 or F50) will be displayed.
3. Press and hold down button (Figure 5, Item 1), and press P button (Figure 5, Item 3) within 2 seconds (timer is in the retrieval mode).
4. Turn ignition switch off.
5. Press and hold down button (Figure 5, Item 1), and press P button (Figure 5, Item 3) within 2 seconds and hold it down. While holding down buttons, turn ignition switch on and wait until display screen changes to dash marks.
6. Press button (Figure 5, Item 2) to turn heater off.
7. Press button (Figure 5, Item 2) to turn heater on.
8. Press and hold down button (Figure 5, Item 1) and press P button (Figure 5, Item 3) within 2 seconds. Timer is in the retrieval mode.



B100000265

Figure 6. Heater Display.

9. The display screen (Figure 6, Item 1) will show AF (active fault).

Operation Under Usual Conditions - Fuel Fired Heater - (CONTINUED)

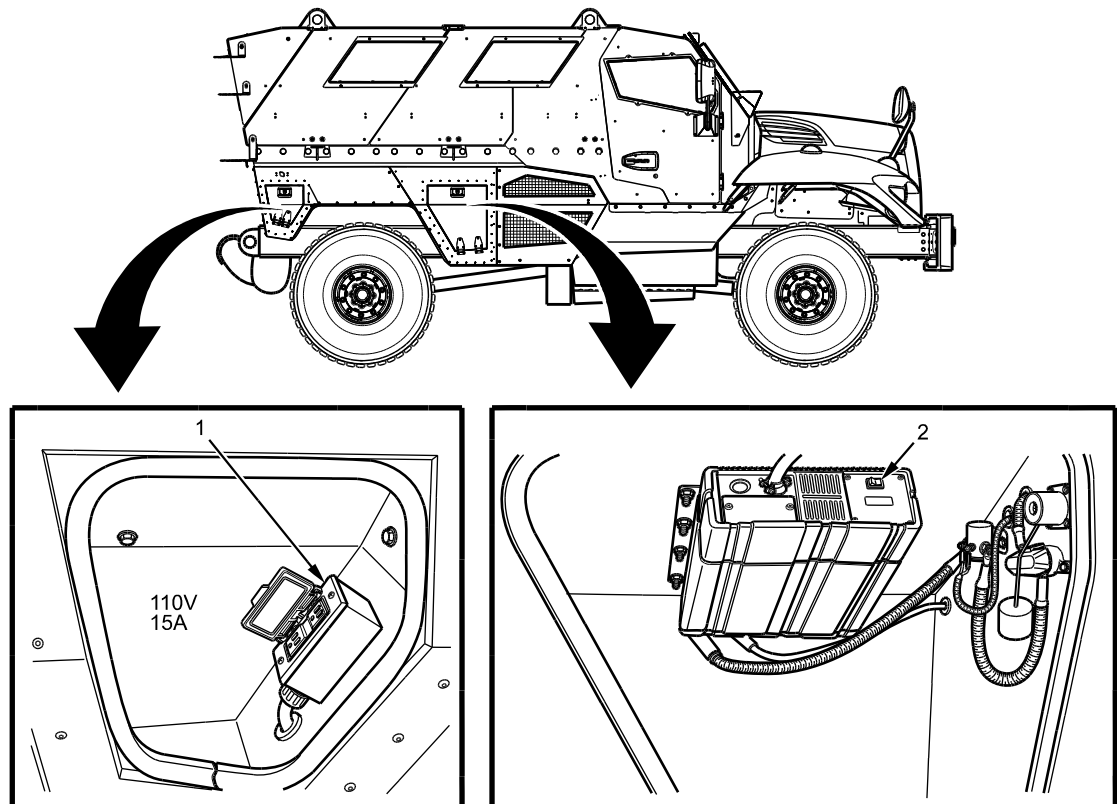
10. After 3 seconds, the control panel is unlocked and heater will start.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - 110V OUTLET AND POWER INVERTER****INITIAL SETUP:**

NOT APPLICABLE

110V OUTLET AND POWER INVERTER

B100600518

Figure 1. 110V Outlet and Power Inverter.

NOTE

On some models, switch for the 110V power inverter is located inside vehicle, behind front passenger seat.

1. Turn main power switch on.
2. To enable 110V outlet (Figure 1, Item 1), turn on switch (Figure 1, Item 2) on face of 110V power inverter.
3. Open outlet (Figure 1, Item 1) cover.

Operation Under Usual Conditions - 110V Outlet and Power Inverter - (CONTINUED)

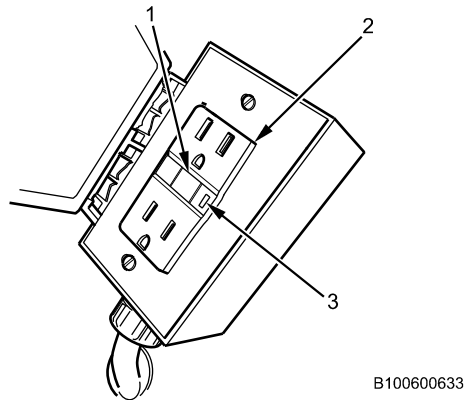
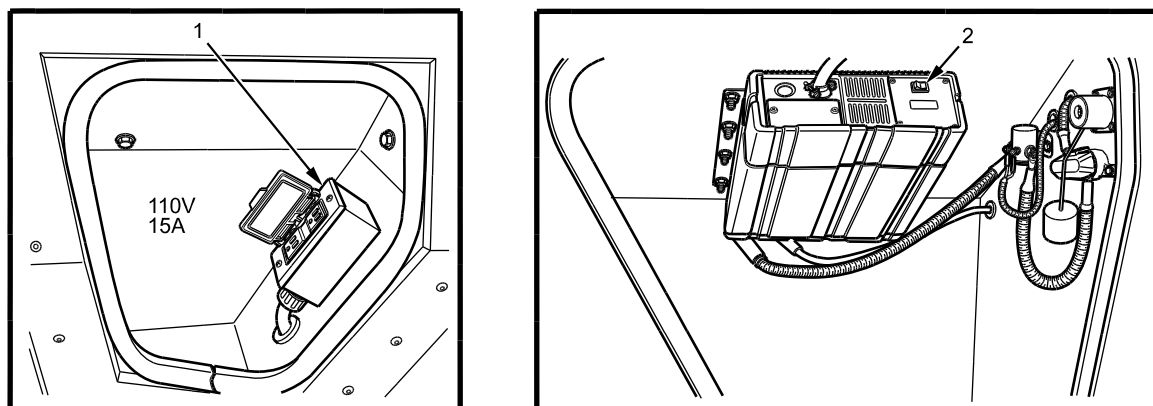


Figure 2. 110V Outlet and Ground Fault Circuit Interrupt.

4. Insert 110V connector from auxiliary equipment into outlet (Figure 2, Item 2). If auxiliary equipment suddenly loses power, check Ground Fault Circuit Interrupter (GFCI) RESET button (Figure 2, Item 1) on outlet. If tripped, outlet LED (Figure 2, Item 3) will turn ORANGE. Check equipment and push RESET button (Figure 2, Item 1) in. If button trips again, there may be a vehicle issue and outlet should not be used until problem is corrected. Notify Field Maintenance.



002147

Figure 3. 110V Outlet and Power Inverter.

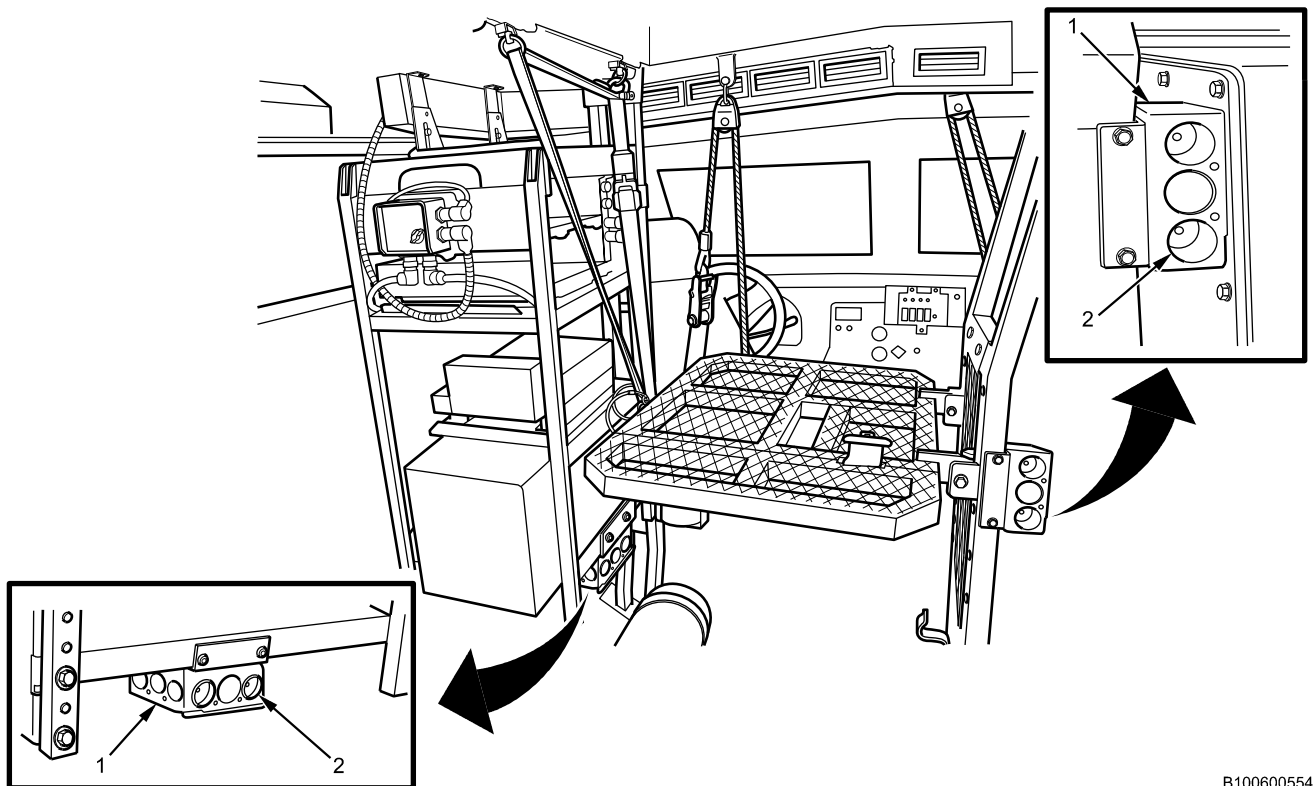
5. To disable 110V outlet (Figure 3, Item 1), turn off switch (Figure 3, Item 2) on face of 110V power inverter.
6. Turn main power switch off.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - 12V AUXILIARY EQUIPMENT SOCKETS****INITIAL SETUP:**

NOT APPLICABLE

12V AUXILIARY EQUIPMENT SOCKETS

B100600554

Figure 1. 12V Sockets.

NOTE

Main power switch must be on to power auxiliary equipment sockets.

1. To use auxiliary equipment sockets (Figure 1, Item 1), push equipment plug inward into socket (Figure 1, Item 2).
2. When done using socket (Figure 1, Item 1), pull equipment plug outward from socket (Figure 1, Item 2).

END OF TASK**END OF WORK PACKAGE**

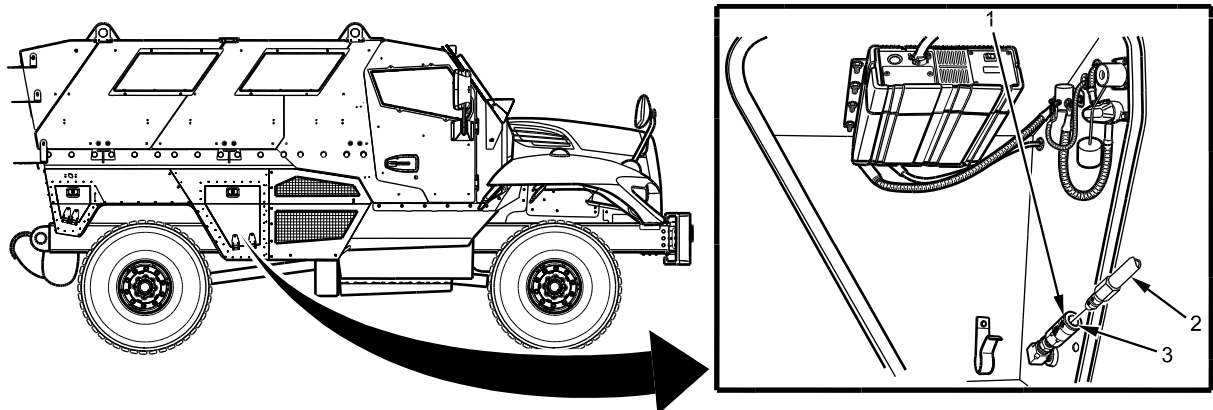
OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - AIR HOSE CONNECTION**

INITIAL SETUP:NOT APPLICABLE

AIR HOSE CONNECTION**WARNING**

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

Wear eye protection when working on or around air systems. Air lines, fittings, and components contain air under pressure. Failure to comply may result in injury or death to personnel.



B100600519

Figure 1. Air Hose Connection.

1. Push quick disconnect (Figure 1, Item 1) down.
2. Insert auxiliary equipment air fitting (Figure 1, Item 2) in quick disconnect (Figure 1, Item 3).
3. Release quick disconnect (Figure 1, Item 1).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - AIR TANK DRAINS

INITIAL SETUP:

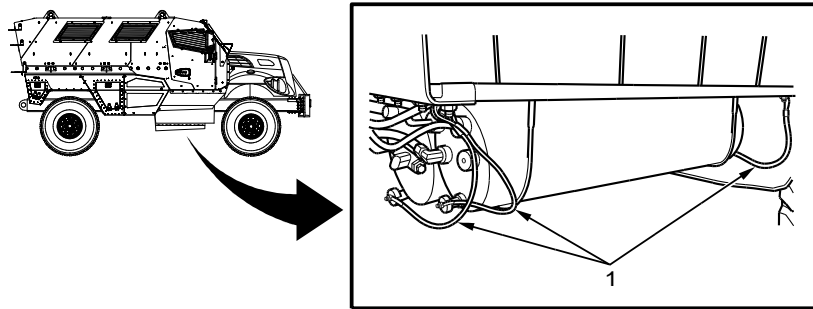
Materials/Parts

Goggles (WP 0083, Item 10)
 Gloves (WP 0083, Item 11)
 Faceshield, industrial (WP 0083, Item 5)

References

WP 0075

AIR TANK DRAINS



003604

Figure 1. Air Tanks and Cords.

WARNING



Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Air drain valves are under pressure. Wear protective goggles and do not place face in front of air drain valves while draining air reservoirs. Open air drain valves slowly to release air pressure gradually. Failure to comply may result in serious injury or death to personnel.

NOTE

Exterior battery box door must be opened to drain air tanks. Refer to WP 0075, Exterior Battery Box Door Open and Close.

1. One at a time, pull drain air release cord (Figure 1, Item 1) located on each air tank.
2. When condensation is no longer draining, release cord (Figure 1, Item 1).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - GUNNER PLATFORM**

INITIAL SETUP:**Personnel Required**Crewmember - (2)

GUNNER PLATFORM**WARNING**

Gunner restraint harness must be worn at all times. Failure to comply may result in serious injury or death to personnel.

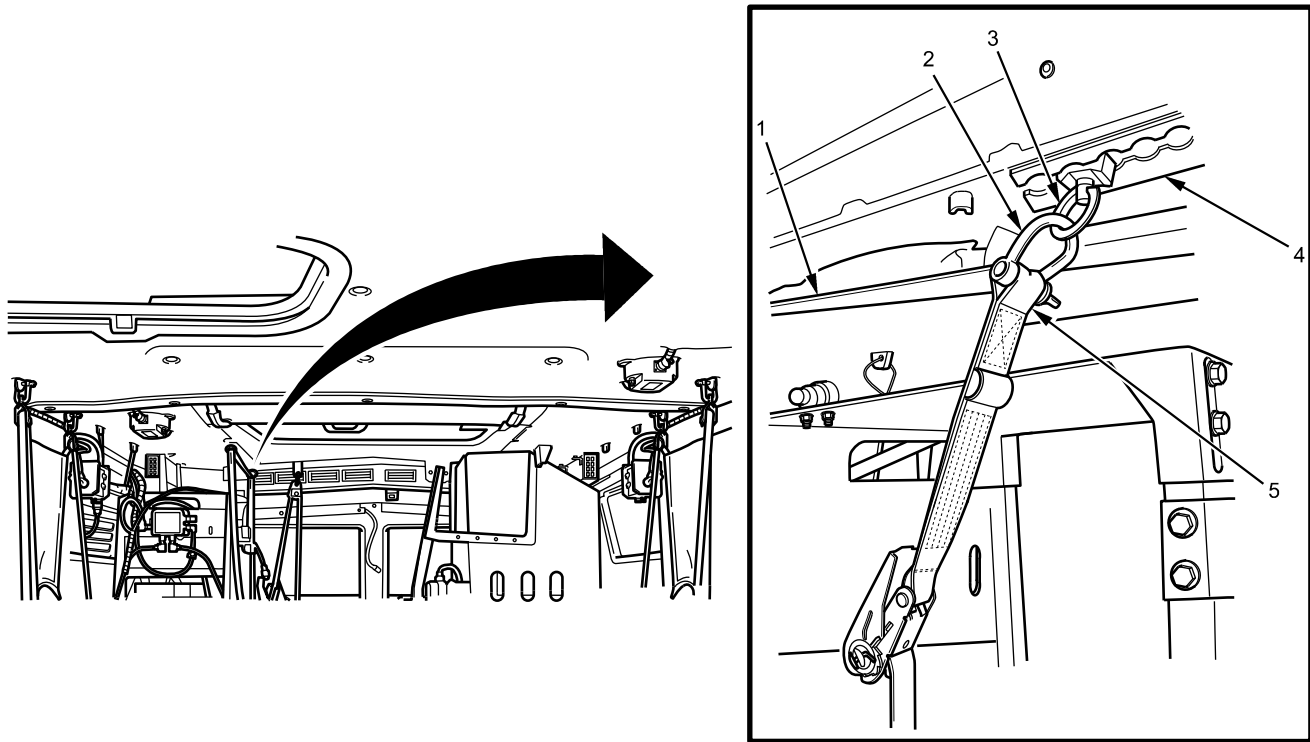
Make sure strap is not kinked, knotted, damaged, cut, or frayed before fastening to platform. If damaged, cut, or frayed, see Field Maintenance for replacement. Have assistant hold platform at height adjustment holes so platform does not free fall. Failure to comply may result in serious injury or death to personnel.

NOTE

The gunner platform is located in front of the HVAC unit.

There are two models of gunner platform stand, a solid sheet-metal platform and a grated-steel platform. Both platforms are secured the same way with support strap.

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)

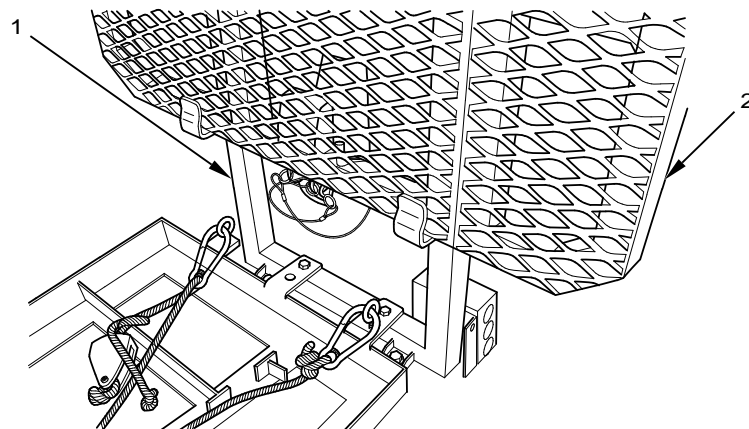


B100600570

Figure 1. Platform Ratchet Strap Front Support.

1. Assemble platform:

- a. Ensure shackle (Figure 1, Item 2) on gunner platform strap (Figure 1, Item 1) is installed through end loop (Figure 1, Item 5) on strap and through front roof mounting ring (Figure 1, Item 3) on roof track (Figure 1, Item 4).



003793

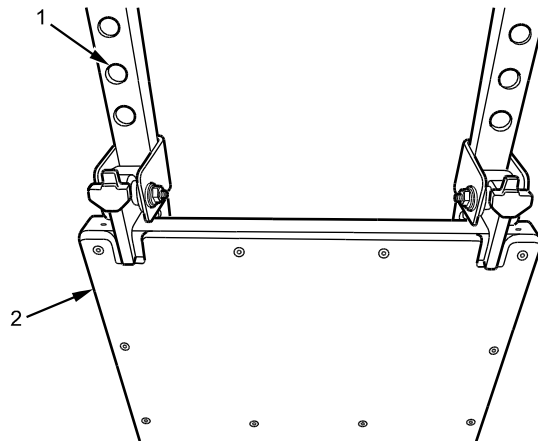
Figure 2. Gunner Platform Stand Retaining Brackets (Grated-Metal Platform).

NOTE

Perform step b for grated metal platforms only.

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)

- b. Pull gunner platform (Figure 2, Item 2) up and out of retaining brackets (Figure 2, Item 1).



B10000284

Figure 3. Gunner Platform Stand (Solid-Metal Platform).

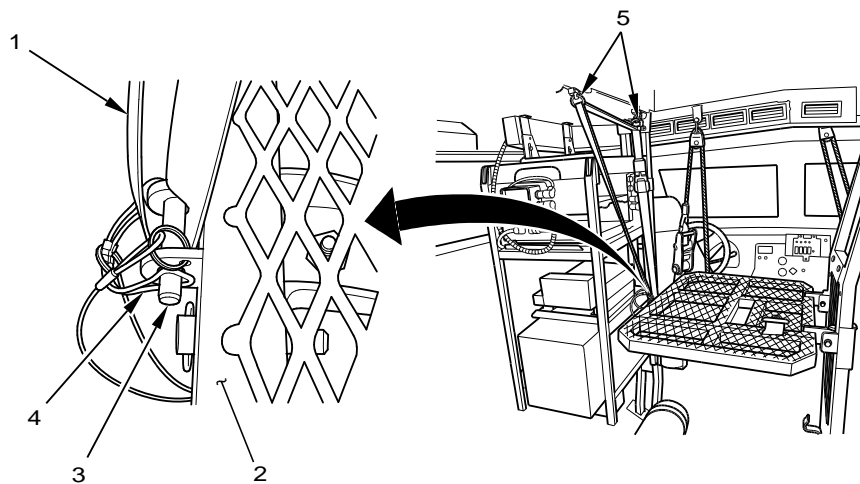
WARNING

Have crewmember hold platform at height adjustment holes so platform does not free fall. Failure to comply may result in serious injury or death to personnel.

NOTE

Perform step c for solid-metal platforms only.

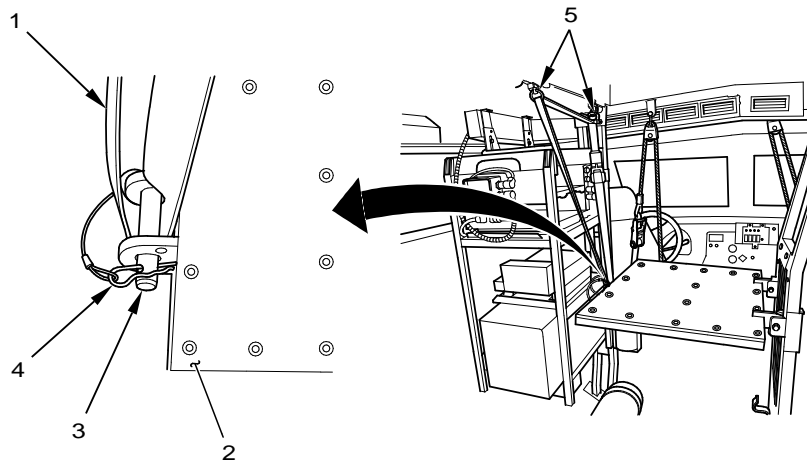
- c. Slide platform (Figure 3, Item 2) upward and find desired height holes (Figure 3, Item 1) on gunner platform stand supports to lock platform in place.



003799

Figure 4. Gunner Platform Support Strap (Grated- Metal Platform).

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)



003802

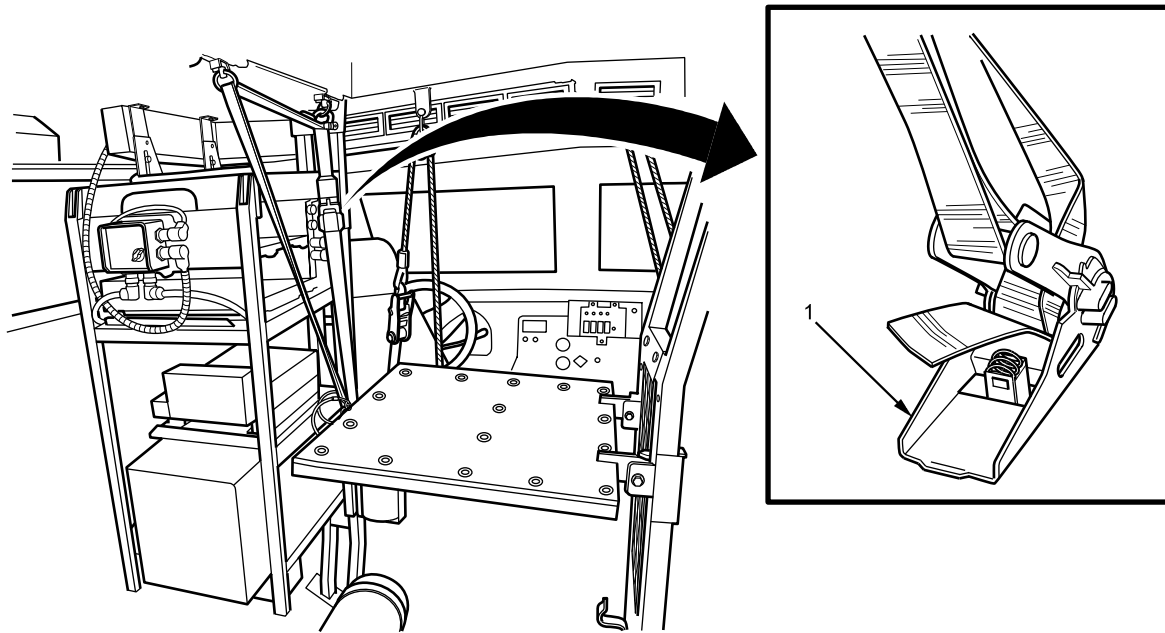
Figure 5. Gunner Platform Support Strap (Solid-Metal Platform).

NOTE

Strap support pin will remain with gunner platform in assembled and disassembled positions.

- d. Remove D-loop (Figure 4, Item 4) or bridge pin (Figure 5, Item 4) from strap support pin (Figure 5, Item 3)(Figure 5, Item 3), and remove strap support pin from gunner platform bracket.
- e. Position gunner platform support strap (Figure 4, Item 1)(Figure 5, Item 1) between bracket and platform stand (Figure 4, Item 2)(Figure 5, Item 2). Install strap support pin (Figure 4, Item 3)(Figure 5, Item 3) through platform bracket and strap.
- f. Secure strap support pin (Figure 4, Item 3)(Figure 5, Item 3) into bracket on gunner platform (Figure 4, Item 2)(Figure 5, Item 2) with attached D-loop (Figure 4, Item 4) or bridge pin (Figure 5, Item 4).
- g. Fully extend gunner platform support strap (Figure 4, Item 1)(Figure 5, Item 1) by adjusting support rings (Figure 4, Item 5)(Figure 5, Item 5) on track along roof near gunner hatch opening.

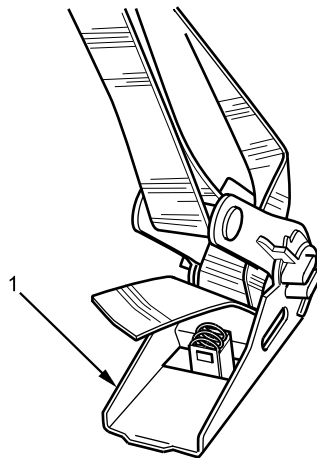
Operation Under Usual Conditions - Gunner Platform - (CONTINUED)



B100600569

Figure 6. Ratchet Strap.

- h. Using gunner platform strap ratchet mechanism (Figure 6, Item 1), ratchet strap tight to secure platform in a level position.

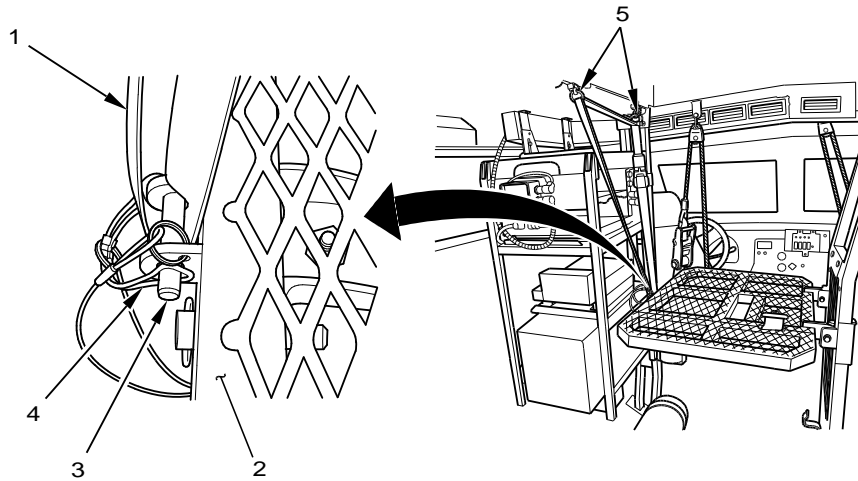


B100000246

Figure 7. Ratchet Strap.

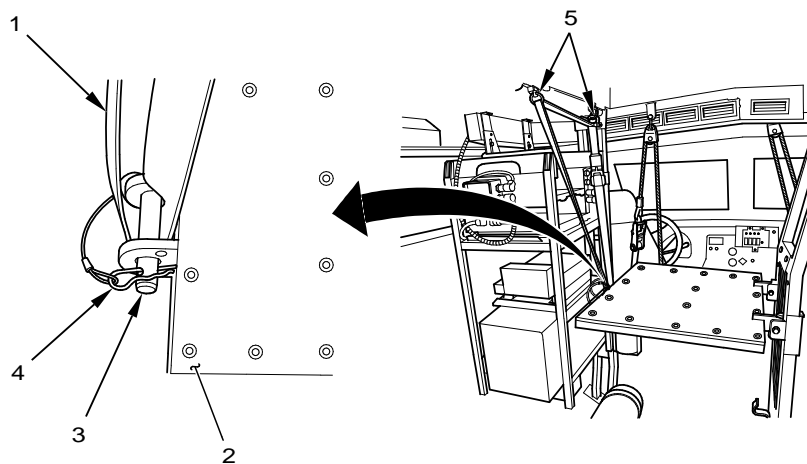
- 2. Disassemble platform:
 - a. Loosen gunner platform strap with ratchet mechanism (Figure 7, Item 1).

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)



003799

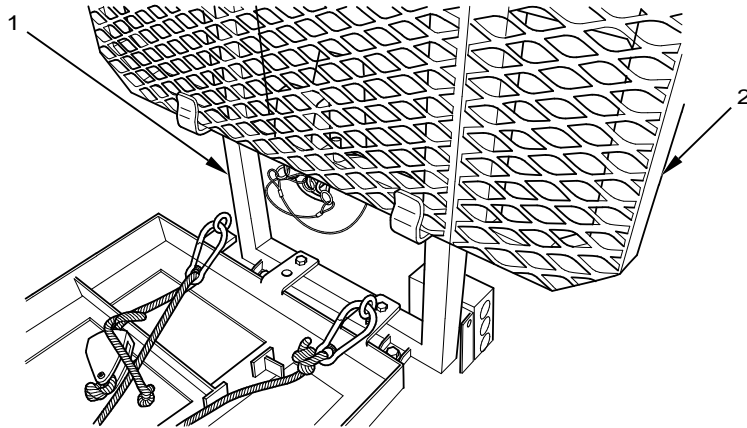
Figure 8. Gunner Platform Support Strap (Grated-Metal Platforms).



003802

Figure 9. Gunner Platform Support Strap (Solid-Metal Platform).

- b. While holding gunner platform (Figure 8, Item 2)(Figure 9, Item 2), remove D-loop (Figure 8, Item 4) or bridge pin (Figure 9, Item 4) from strap support pin (Figure 8, Item 3)(Figure 9, Item 3), and remove strap support pin from gunner platform bracket and support strap (Figure 8, Item 1)(Figure 9, Item 1).
- c. Position strap (Figure 8, Item 1)(Figure 9, Item 1) aside and insert support pin (Figure 8, Item 3)(Figure 9, Item 3) back into gunner platform bracket. Secure pin into bracket with D-loop (Figure 8, Item 4) or bridge pin (Figure 9, Item 4).

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)

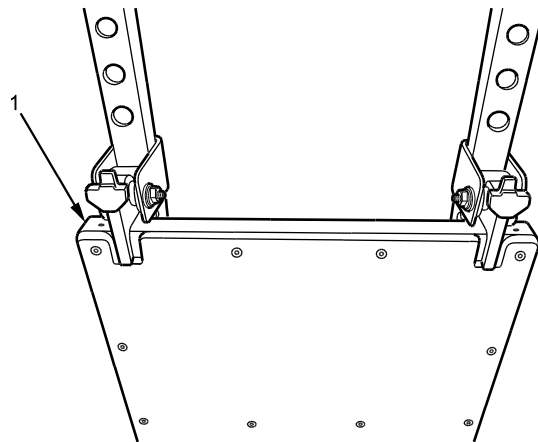
003793

Figure 10. Gunner Platform Stand Retaining Brackets (Grated-Metal Platform).

NOTE

Perform step d for grated metal platforms only.

- d. Fold gunner platform (Figure 10, Item 2) down and lower into retaining brackets (Figure 10, Item 1) on gunner platform stand.



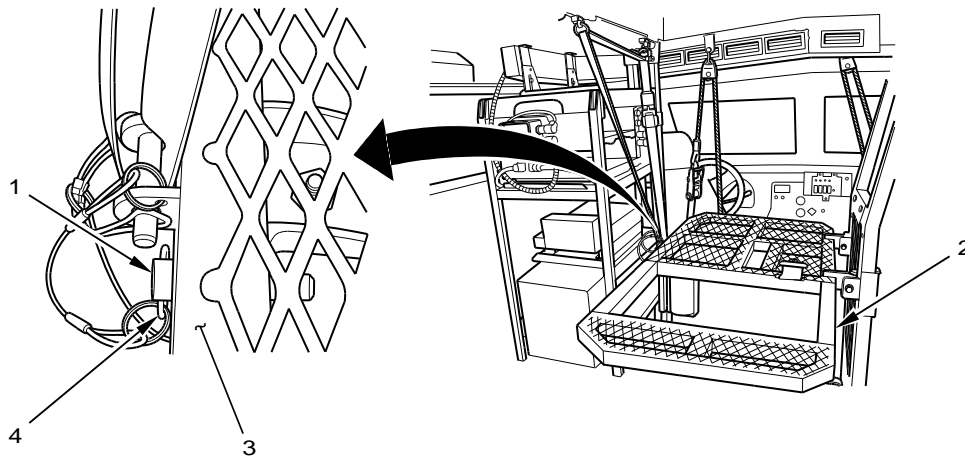
003809

Figure 11. Gunner Platform Stand (Solid-Metal Platform).

NOTE

Perform step e for solid metal platforms only.

- e. Fold gunner platform (Figure 11, Item 1) down and lower to floor.

Operation Under Usual Conditions - Gunner Platform - (CONTINUED)

003811

Figure 12. Gunner Platform Extension.

3. Gunner Platform Extension (Grated Metal Platforms Only):
 - a. While holding gunner platform (Figure 12, Item 3), release D-loop (Figure 12, Item 4) attached to strap support pin (Figure 12, Item 1), and remove pin by pulling through platform.
 - b. Pull extension (Figure 12, Item 2) out to desired length.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - GUNNER HATCH (SLIDING)

INITIAL SETUP:

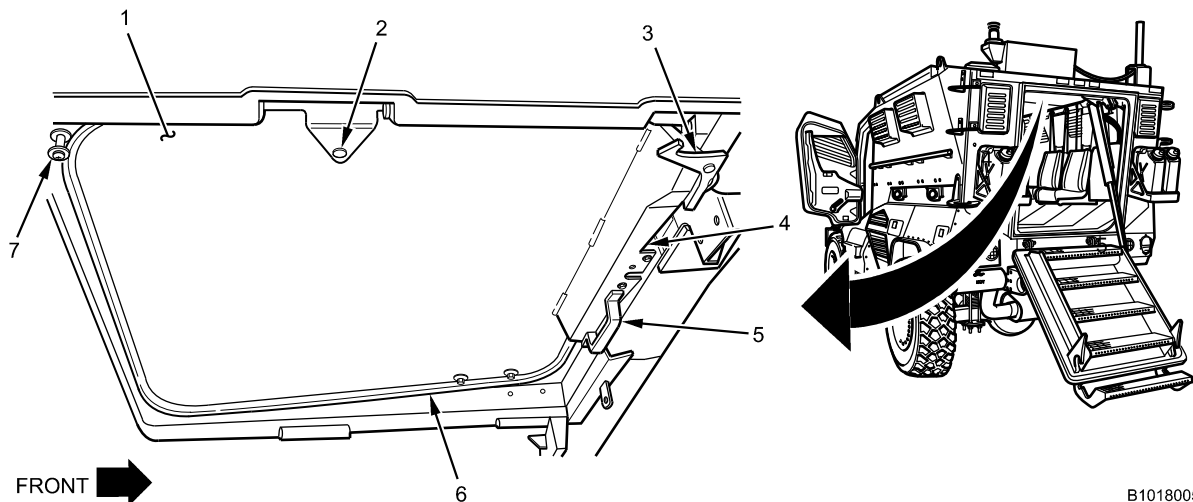
NOT APPLICABLE

GUNNER HATCH (SLIDING)

WARNING

Gunner sliding hatch can only be opened or closed when vehicle is stationary and on level surface. Do not attempt to open or close the hatch when vehicle is in motion. Make sure latch locks are secured into place in the open or closed positions before vehicle starts moving. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Ensure gunner hatch is completely locked in open position before moving vehicle with gunner in position. Use extreme caution when standing in gunner hatch while vehicle is in motion. Gunner should be holding onto weapon or other support to maintain stability at all times. Failure to comply may result in serious injury or death to personnel.



B101800522

Figure 1. Gunner Hatch (Sliding).

1. To open sliding gunner hatch (Figure 1, Item 1), unhook center lock latch (Figure 1, Item 4). Hold BLACK handle (Figure 1, Item 5), slide hatch rearward past intermediate stop (Figure 1, Item 2) until right side hold-open latch (Figure 1, Item 3) engages at rear stop (Figure 1, Item 7) (listen for click as it engages).
2. To close sliding gunner hatch (Figure 1, Item 1), disengage right side hold-open latch (Figure 1, Item 3) from rear stop (Figure 1, Item 7). Keep hands clear of gunner platform frame (Figure 1, Item 6), and keep hold-open latch clear of intermediate stop (Figure 1, Item 2) while closing. Using BLACK handle (Figure 1, Item 5), slide hatch forward until it locks into place with center lock latch (Figure 1, Item 4) (listen for click as it engages).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - GUNNER HATCH (ROOF)

INITIAL SETUP:

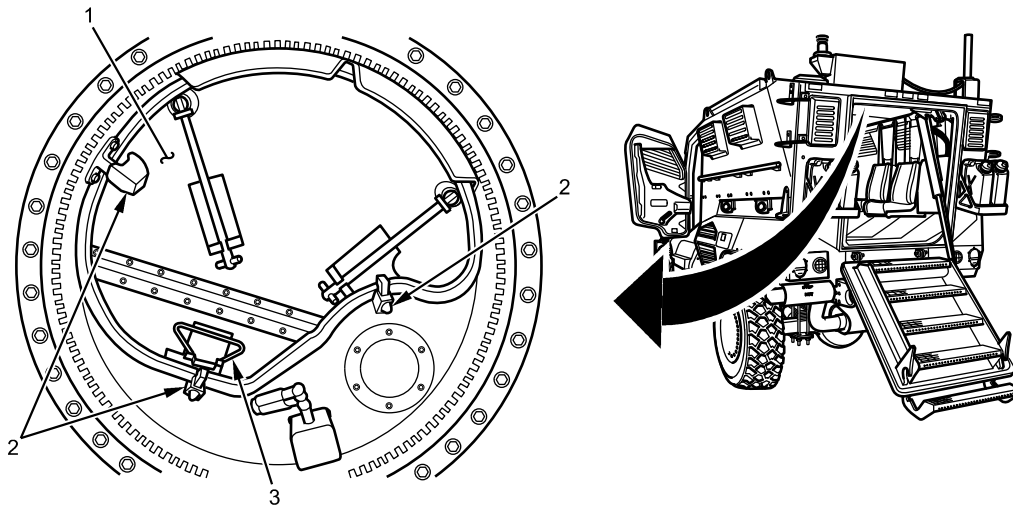
NOT APPLICABLE

GUNNER HATCH (ROOF)

WARNING

Gunner hatch is extremely heavy. Use caution when opening and closing. Wear safety goggles when removing, installing, or working on interior of gunner hatch. Keep arms and hands clear of gunner hatch when closing. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Ensure gunner hatch is completely locked in open position before moving vehicle with gunner in position. Use extreme caution when standing in gunner hatch while vehicle is in motion. Gunner should be holding onto weapon or other support to maintain stability at all times. Failure to comply may result in serious injury or death to personnel.



B100600523

Figure 1. Gunner Hatch.

1. Open hatch:
 - a. Release three latches (Figure 1, Item 2) that secure gunner hatch (Figure 1, Item 1) to turret.
 - b. With handle (Figure 1, Item 3), push open front part of gunner hatch (Figure 1, Item 1).
 - c. Push open the back half of gunner hatch (Figure 1, Item 1).

Operation Under Usual Conditions - Gunner Hatch (Roof) - (CONTINUED)

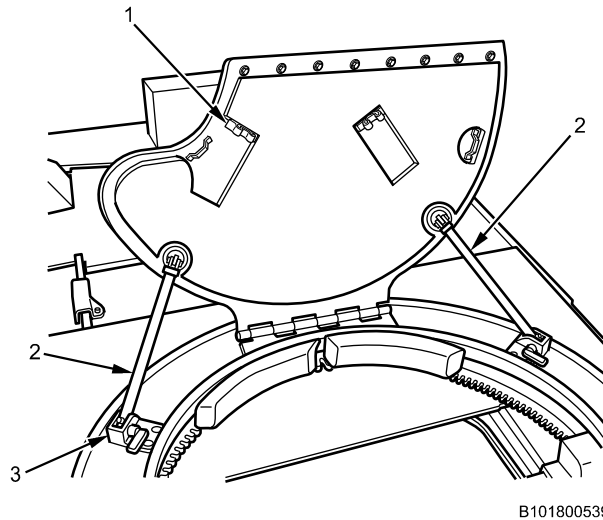


Figure 2. Open Gunner Hatch.

- d. While holding hatch with one hand, pull support rods (Figure 2, Item 2) away from hatch retainers (Figure 2, Item 1).
- e. Lock support rods (Figure 2, Item 2) into roof locks (Figure 2, Item 3).

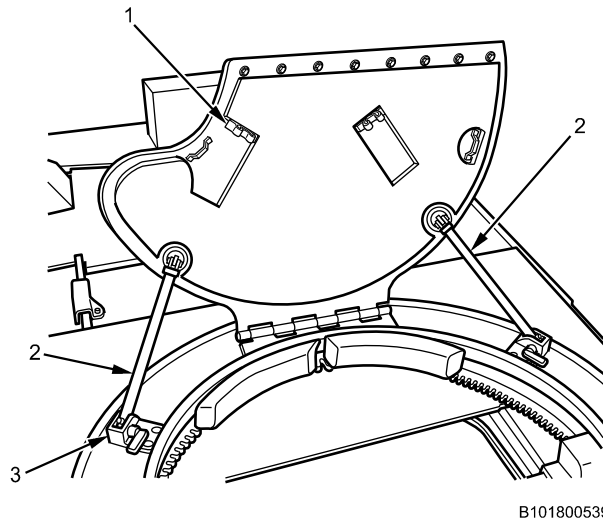


Figure 3. Close Gunner Hatch.

2. Close hatch:
 - a. While holding hatch with one hand, disconnect support rods (Figure 3, Item 2) from roof locks (Figure 3, Item 3) and lock into hatch retainers (Figure 3, Item 1).

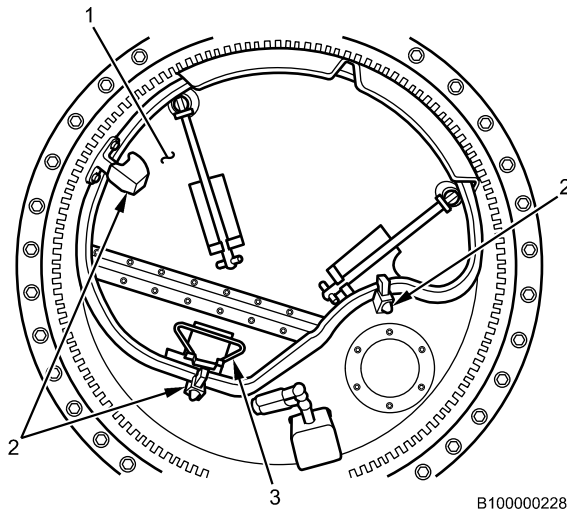
Operation Under Usual Conditions - Gunner Hatch (Roof) - (CONTINUED)

Figure 4. Close Gunner Hatch.

- b. Close hatch (Figure 4, Item 1) using handle (Figure 4, Item 3).
- c. Lock three latches (Figure 4, Item 2) that secure gunner hatch (Figure 4, Item 1) to turret.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - FRONT CREW LIGHT OPERATION

INITIAL SETUP:

References

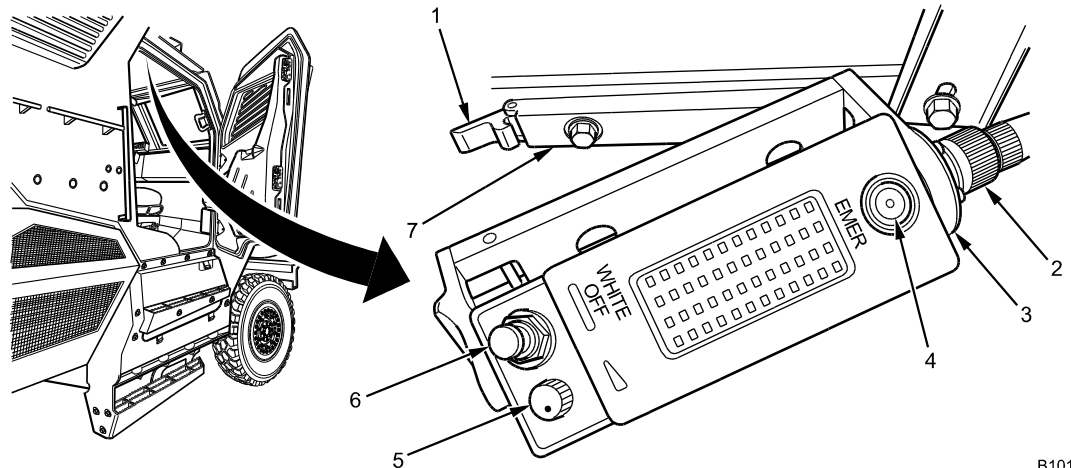
WP 0004

FRONT CREW LIGHT OPERATION

NOTE

The front crew light can be used mounted to the roof or as a portable unit.

Crew lights will flicker under normal operation and vehicle engine is off, if vehicle battery charge drops below 21.5V on 24V battery gauge. Refer to WP 0004, Description and Use of Operator Controls and Indicators.

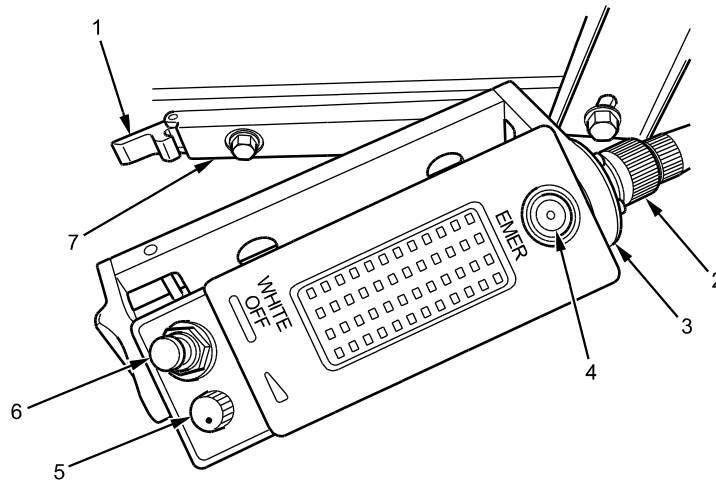


B101800526

Figure 1. Front Crew Light.

1. Roof-mount mode:
 - a. Turn main power switch to ON position.
 - b. Pull toggle switch (Figure 1, Item 6) and then push toward WHITE to illuminate WHITE LED light. To dim lamps, rotate BLACK knob (Figure 1, Item 5) counterclockwise.
 - c. Slide toggle switch (Figure 1, Item 6) in opposite direction to illuminate LED light RED.
 - d. Turn main power switch to OFF position.
 - e. With vehicle power off, pressing EMER button (Figure 1, Item 4) will illuminate RED emergency light for 30 seconds. Slide toggle switch (Figure 1, Item 6) toward WHITE, will also illuminate light for 30 seconds when EMER button (Figure 1, Item 4) is pressed. The lamp will auto power off.

Operation Under Usual Conditions - Front Crew Light Operation - (CONTINUED)



002143

Figure 2. Crew Light.

2. Portable mode:

WARNING

Support lamp before unlatching retaining bracket latch to prevent lamp from free-falling. Failure to comply may result in serious injury to personnel.

NOTE

Portable lamp internal battery recharges from vehicle electrical system. EMER button RED LED flickers slowly to indicate battery is charging.

Internal battery is fully charged when EMER button RED LED stops flickering.

Internal battery is defective when EMER button RED LED flickers rapidly.

- a. While supporting lamp (Figure 2, Item 3), push and release front latch (Figure 2, Item 1) and pull lamp away from retaining bracket (Figure 2, Item 7).
 - b. Unscrew and disconnect electrical connector (Figure 2, Item 2) from lamp (Figure 2, Item 3) and remove lamp.
3. Lamp operation:
- a. Pressing EMER button (Figure 2, Item 4) once illuminates lamp RED for 30 seconds.
 - b. Pressing EMER button (Figure 2, Item 4) twice illuminates lamp RED indefinitely. Use BLACK knob (Figure 2, Item 5) to dim lamp.
 - c. Move toggle switch (Figure 2, Item 6) to WHITE and lamp (Figure 2, Item 3) will remain WHITE indefinitely. Use BLACK knob (Figure 2, Item 5) to dim lamp.
 - d. Turn off lamp (Figure 2, Item 3) by moving toggle switch (Figure 2, Item 6) to middle position.

Operation Under Usual Conditions - Front Crew Light Operation - (CONTINUED)

4. Lamp installation:
 - a. Connect electrical connector (Figure 2, Item 2) to lamp (Figure 2, Item 3).
 - b. Position rear of lamp (Figure 2, Item 3) on retaining bracket (Figure 2, Item 7).
 - c. Press and hold front latch (Figure 2, Item 1) open and push lamp (Figure 2, Item 3) firmly into bracket (Figure 2, Item 7). Release front latch to lock lamp into position.

END OF TASK**END OF WORK PACKAGE**

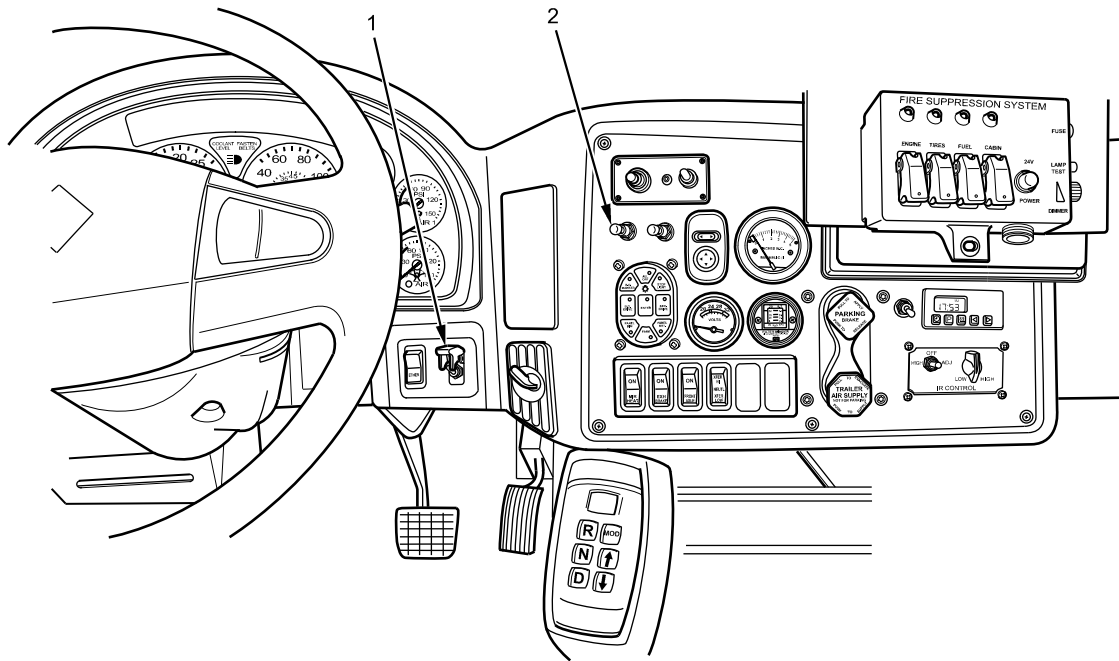
OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - REAR CREW LIGHT OPERATION

INITIAL SETUP:

NOT APPLICABLE

REAR CREW LIGHT OPERATION

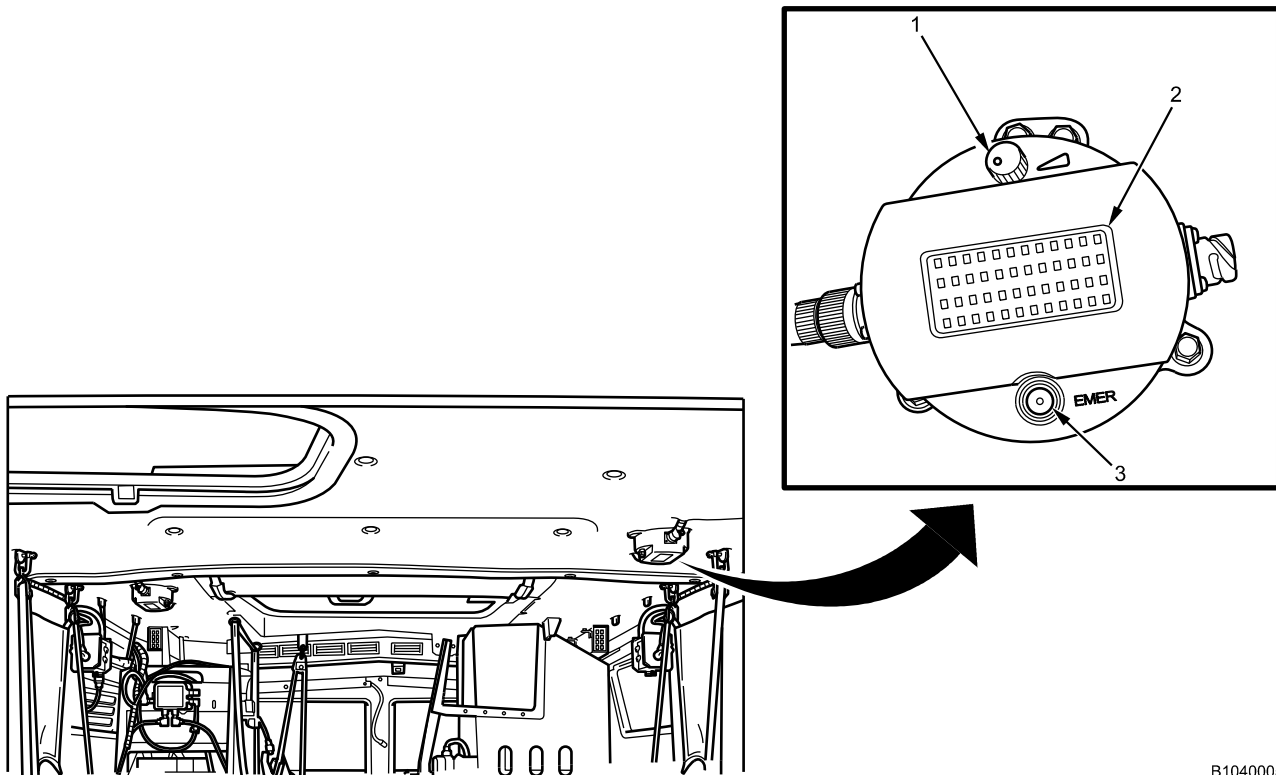


B100600524

Figure 1. Rear Crew Light Switches.

1. Turn main power switch (Figure 1, Item 1) to ON position.
2. With the Instrument Panel (IP) toggle switch (Figure 1, Item 2) in the up position and the rear door/ramp open, the rear crew lights will illuminate RED. If the rear door/ramp is closed, the lamps will illuminate WHITE.

Operation Under Usual Conditions - Rear Crew Light Operation - (CONTINUED)



B104000558

Figure 2. Rear Crew Light.

3. If the IP toggle switch is in the down position, the rear crew lights (Figure 2, Item 2) will light RED.
4. With vehicle power on and rear crew light IP toggle switch in the OFF position, press lamp EMER button (Figure 2, Item 3) to turn lamp emergency light on. Press again to turn off.
5. To dim the lights, rotate BLACK knob (Figure 2, Item 1) counterclockwise.
6. With main power switch OFF, press and release EMER button (Figure 2, Item 3) to turn lamp on RED.
7. Use BLACK knob (Figure 2, Item 1) to dim light, as needed.
8. Press and hold EMER button (Figure 2, Item 3) for 3 seconds to change lamp from RED to WHITE.
9. Press and release EMER button (Figure 2, Item 3) again to turn off lamp.

END OF TASK**END OF WORK PACKAGE**

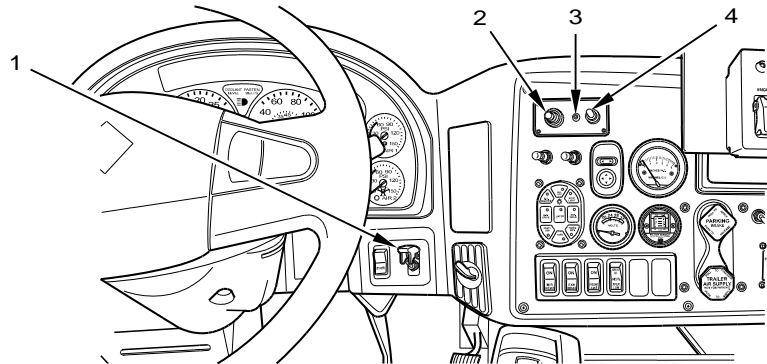
OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - SPOTLIGHT OPERATION

INITIAL SETUP:

NOT APPLICABLE

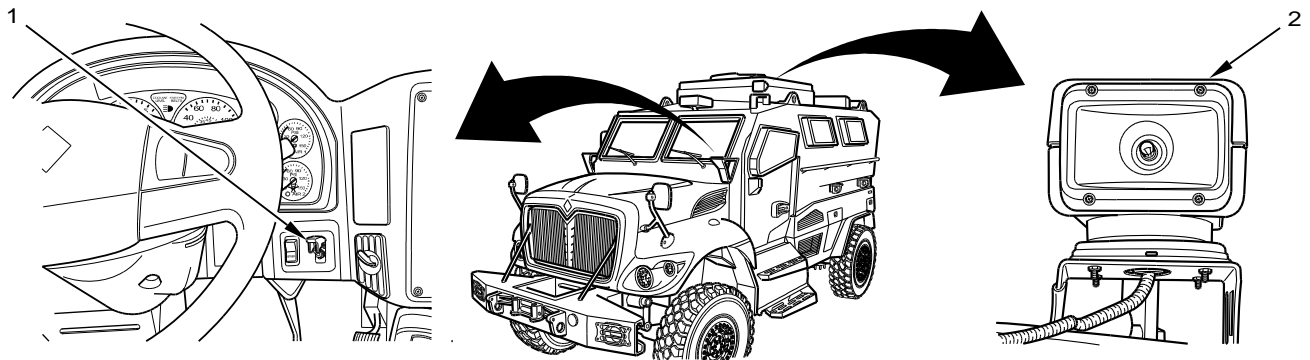
SPOTLIGHT OPERATION



003650

Figure 1. Spotlight Controls.

1. Turn main power switch (Figure 1, Item 1) to ON position.
2. Move toggle switch (Figure 1, Item 4) up to turn spotlight on. The RED indicator (Figure 1, Item 3) will illuminate RED when spotlight is on.



003663

Figure 2. Spotlight.

NOTE

The spotlight can be rotated without the light being on.

3. Use spotlight toggle control (Figure 2, Item 1) to rotate spotlight (Figure 2, Item 2).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - CRUISE CONTROL OPERATION**

INITIAL SETUP:NOT APPLICABLE

CRUISE CONTROL OPERATION**WARNING**

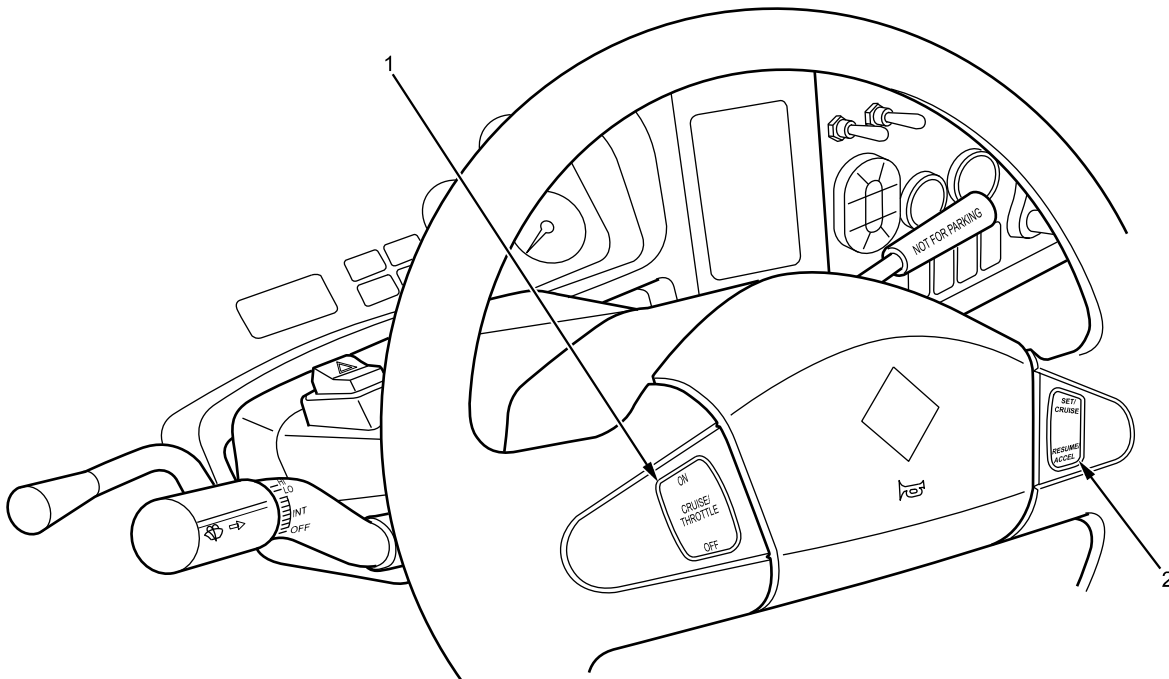
Do not use the cruise control system in heavy traffic or on roads that are winding, snow or ice covered, or have a slippery or loose surface. Unpredictable driving conditions may cause wheel slippage and loss of vehicle control. Failure to comply may result in damage to vehicle and serious injury or death to personnel.

NOTE

CRUISE/THROTTLE – ON/OFF button turns the speed control feature on or off. Vehicle speed does not change when ON position is pressed. This control just activates/deactivates the feature. When the OFF position is pressed, the system will be turned off.

SET/CRUISE – RESUME/ACCEL button sets and controls the vehicle speed. If switch has not been activated, nothing will happen when this button is pushed.

Operation Under Usual Conditions - Cruise Control Operation - (CONTINUED)



B102600478

Figure 1. Cruise Control Buttons.

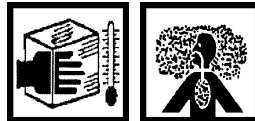
1. Press ON position of the CRUISE/THROTTLE – ON/OFF button (Figure 1, Item 1).
2. Bring vehicle speed to the desired operation speed above 35 mph (50 kph) and push the SET/CRUISE button (Figure 1, Item 2).
3. Once cruise control is set, SET/CRUISE – RESUME/ACCL button (Figure 1, Item 2) can be used to increase or decrease vehicle speed.
4. Tapping the service brake pedal will deactivate the cruise control but will hold the selected speed in memory. To return to this speed, press SET/CRUISE – RESUME/ACCL button (Figure 1, Item 2).
5. When CRUISE/THROTTLE – ON/OFF button (Figure 1, Item 1) is pressed, or vehicle is shut off, selected speed setting is canceled.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - FIRE EXTINGUISHER**

INITIAL SETUP:NOT APPLICABLE

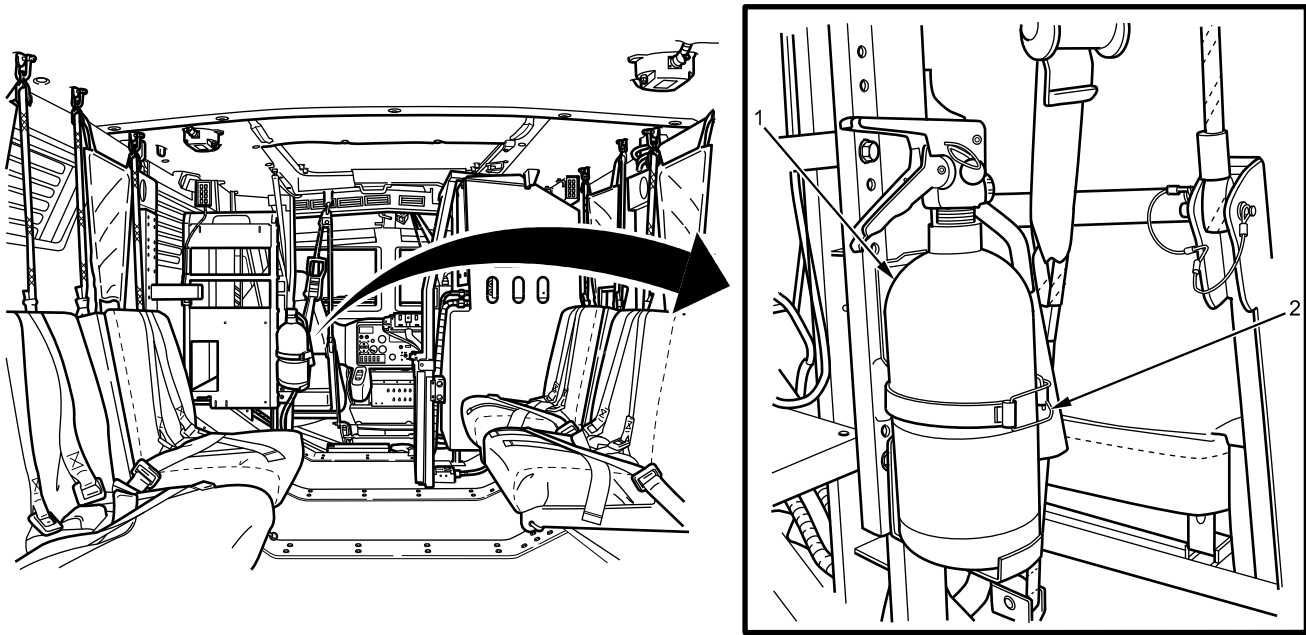
FIRE EXTINGUISHER**WARNING**

Fire Suppression System (FSS) extinguisher can move violently when discharging. Ensure extinguisher is properly secured during use. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Replace fire extinguisher immediately after use, even if only partly used, and confirm that replacement extinguisher is correct part number and chemical agent before installing. Failure to comply may result in serious injury or death to personnel.

NOTE

The vehicle has a dry-chemical, portable, hand-held fire extinguisher.

Operation Under Usual Conditions - Fire Extinguisher - (CONTINUED)

B101800571

Figure 1. Hand-Held Fire Extinguisher.

1. Remove hand-held fire extinguisher (Figure 1, Item 1) from holddown by releasing band clamp (Figure 1, Item 2).
2. Pull pin to activate.
3. Install hand-held fire extinguisher (Figure 1, Item 1) to holddown by connecting band clamp (Figure 1, Item 2) securely.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER USUAL CONDITIONS - WATER AND FUEL CANS

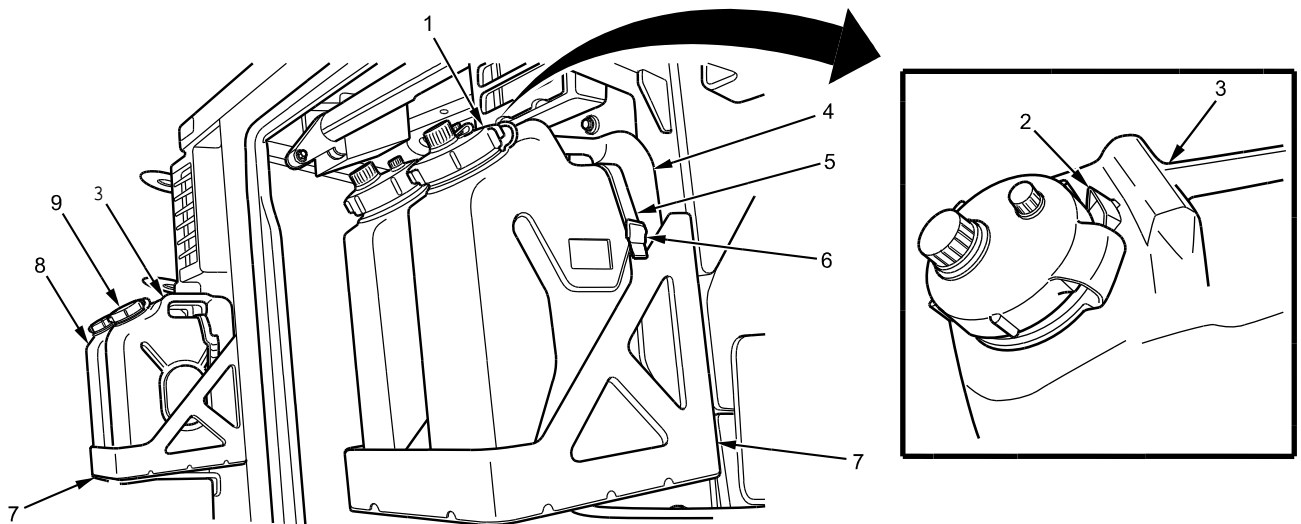
INITIAL SETUP:

NOT APPLICABLE

WATER AND FUEL CANS

NOTE

The vehicle has four 5-gallon cans for transporting water and fuel.



002324

Figure 1. Water and Fuel Cans.

1. To remove FUEL cans (Figure 1, Item 8) or WATER cans (Figure 1, Item 4), pull upward on strap (Figure 1, Item 5) and push down on spring-loaded buckle (Figure 1, Item 6) simultaneously.
2. Lift FUEL or WATER cans out of storage bracket (Figure 1, Item 7), using handle (Figure 1, Item 3).
3. To open FUEL can (Figure 1, Item 8), unscrew cap (Figure 1, Item 9) counterclockwise.
4. To open WATER can (Figure 1, Item 4), pull tab (Figure 1, Item 2) with thumb and unscrew cap (Figure 1, Item 1) counterclockwise.
5. Twist cap (Figure 1, Item 1)(Figure 1, Item 9) clockwise to close.
6. To replace FUEL can (Figure 1, Item 8) or WATER can (Figure 1, Item 4), insert can into storage bracket (Figure 1, Item 7), using handle (Figure 1, Item 3).
7. Feed strap (Figure 1, Item 5) through handle (Figure 1, Item 3).
8. Lock cans in place by holding spring-loaded buckle (Figure 1, Item 6) open and feeding strap (Figure 1, Item 5) into buckle. Pull downward on strap until tightened, and release buckle (Figure 1, Item 6).

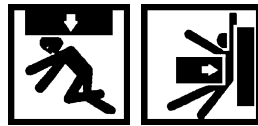
END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
OPERATION UNDER USUAL CONDITIONS - OPEN/CLOSE HOOD

INITIAL SETUP:**Personnel Required**

Crewmember - (2)

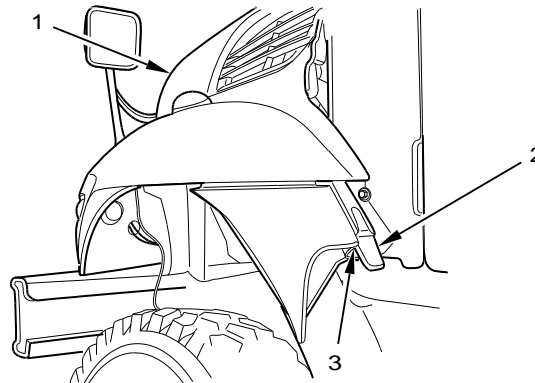
OPEN HOOD**WARNING**

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Components labeled with no-step markings are not designed to be used for climbing or standing. These components will not support personnel. Failure to comply may result in damage to equipment and serious injury or death to personnel.

NOTE

Left shown; right similar.

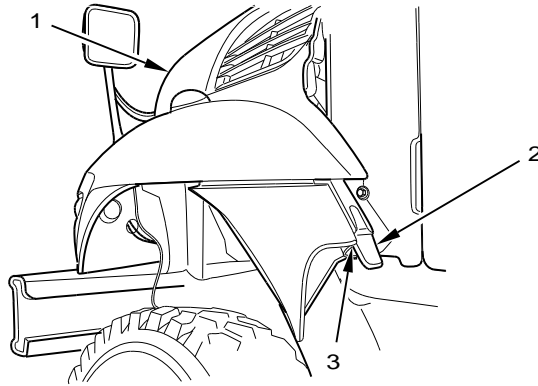


B101800391

Figure 1. Engine Hood and Latch.

1. Lift up on hood latch (Figure 1, Item 2) to unlock bracket (Figure 1, Item 3).
2. Remove hood latch (Figure 1, Item 2) from bracket (Figure 1, Item 3).
3. Ensure both left and right side hood latches (Figure 1, Item 2) are unlocked.
4. With crewmember, lift hood (Figure 1, Item 1) forward until completely opened. Safety cables will hold hood in place.

END OF TASK

Operation Under Usual Conditions - Open/Close Hood - (CONTINUED)**CLOSE HOOD**

B101800391

Figure 2. Engine Hood and Latch.

1. Lower hood (Figure 2, Item 1) with crewmember assistance until seated.
2. Position hood latch (Figure 2, Item 2) into bracket (Figure 2, Item 3).
3. Lock hood latch (Figure 2, Item 2) by pushing down.
4. Ensure both left and right hood latches (Figure 2, Item 2) are locked/secured.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - OPEN/CLOSE FUEL TANK CAP (FUELING VEHICLE)**

INITIAL SETUP:NOT APPLICABLE

OPEN FUEL TANK CAP (FUELING VEHICLE)**WARNING**

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Do not fill fuel tank with engine running. Do not overfill fuel tank. Clean fuel spills immediately. Ensure fuel nozzle is grounded to filler neck to prevent sparks. Failure to comply may result in injury or death to personnel and damage to equipment.

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.

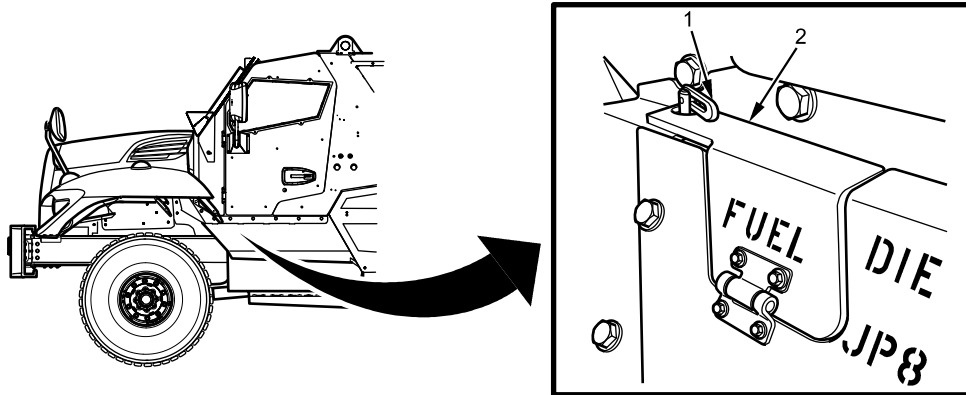
Ensure radios are powered OFF before conducting fueling operations or maintenance activities. Failure to comply may result in injury to personnel.

Radio transmission is prohibited 50 feet (15 meters) from other vehicles refueling.

Operation Under Usual Conditions - Open/Close Fuel Tank Cap (Fueling Vehicle) - (CONTINUED)

WARNING

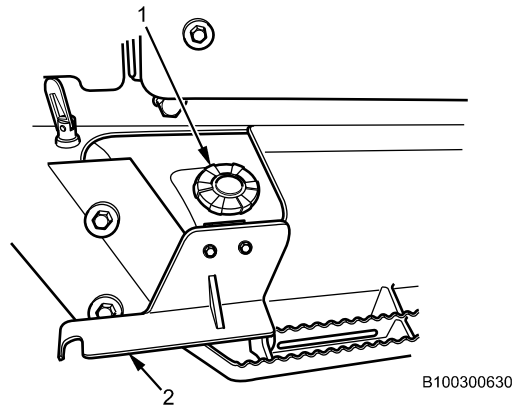
Clean up all fuel spills. Spills can create slip and fire hazards. Dispose of materials in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment



B100300629

Figure 1. Fuel Tank Access Armor Door Open.

1. Lift holddown release (Figure 1, Item 1) up on exterior fuel tank access armor door (Figure 1, Item 2) to open.



B100300630

Figure 2. Fuel Tank Cap Open.

2. Swing exterior fuel tank access armor door (Figure 2, Item 2) down.
3. Twist fuel tank cap counterclockwise (Figure 2, Item 1) to open.

END OF TASK

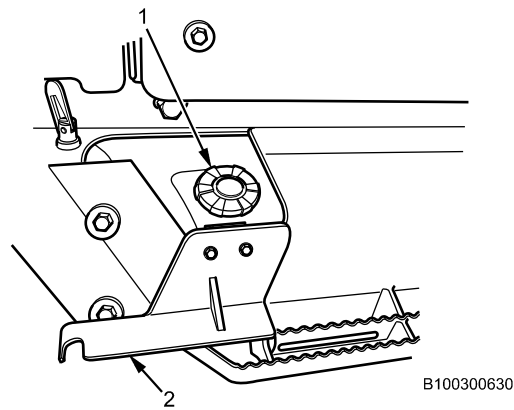
Operation Under Usual Conditions - Open/Close Fuel Tank Cap (Fueling Vehicle) - (CONTINUED)**CLOSE FUEL TANK CAP**

Figure 3. Fuel Tank Cap Open.

1. Twist fuel tank cap clockwise (Figure 3, Item 1) to close.
2. Swing exterior fuel tank access armor door (Figure 3, Item 2) up.

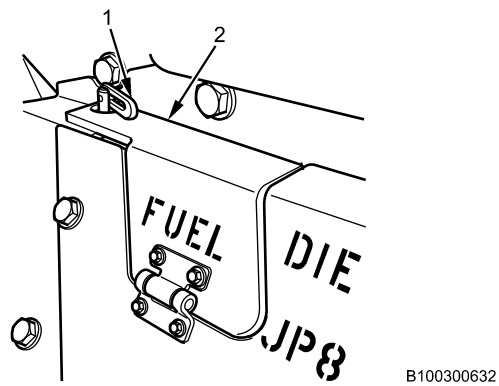


Figure 4. Fuel Tank Access Armor Door Close.

3. Push holddown release (Figure 4, Item 1) down on exterior fuel tank access armor door (Figure 4, Item 2) to lock.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER USUAL CONDITIONS - PREPARATION FOR MOVEMENT**

INITIAL SETUP:NOT APPLICABLE

PREPARATION FOR MOVEMENT**WARNING**

Heavy object/loads, such as tool boxes and heavy parts, must always be transported on the floor, with the weight distributed as equally as possible between left and right sides of vehicle. Heavy cabinets must always be mounted as low as possible, with the weight distributed as equally as possible between left and right sides of vehicle. Remember to consider the weight of items stored in cabinets. Heavy items must be positioned as low as possible, with weight distributed as equally as possible between left and right sides of vehicle. Failure to comply will decrease vehicle stability and increase risk of rollover, causing vehicle damage and possible injury or death to personnel.

1. Secure all objects that can shift during movement by bracing, cushioning, or using tiedowns. The method used must not damage walls or equipment.
2. Verify all unsecured items are securely attached to walls and floor.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - EXTREME HEAT AND/OR DUST**

INITIAL SETUP:**References**

TB-MED 507

WP 0061

EXTREME HEAT AND/OR DUST**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Speeds must be reduced according to weather and road/terrain conditions. Approach slopes head-on and avoids side slopes whenever possible. Failure to comply may cause the vehicle to roll over, which may result in death or serious injury to personnel and damage to equipment.

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

Noise levels exceed 85-decibel limit. Exposure to constant, elevated noise levels could cause permanent hearing damage. Single hearing protection (e.g., VIC-3 headset plus earplugs) is required in and around operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result to injury to personnel.

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

In extreme temperature environments, follow work-rest schedules as well as the guidance of TB-MED 507, Heat Stress Control and Heat Stress Management. Failure to comply may result in injury to personnel.

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Operation Under Unusual Conditions - Unusual Environment/Weather - Extreme Heat and/or Dust - (CONTINUED)**CAUTION**

When operating vehicle in temperatures above 100°F (38°C), use care to prevent overheating the engine. Observe water and transmission oil temperature gauges closely. Failure to comply may result in damage to equipment.

Check fluid levels often in extreme heat. Vehicle cooling and lubrication systems support each other. Failure to comply may cause failure of other systems, and will cause damage to equipment.

Temperatures may change as much as 70°F (21°C) between day and night. Due to expansion and contraction of all fluids, use care when filling fuel tank and fluid reservoirs to prevent overflow when temperatures change. (Filling tank full of cold fuel may cause fuel tank to overflow when fuel expands as fuel heats up.) Failure to comply may result in damage to equipment.

The engine oil pressure has three monitoring systems: low oil pressure light, check engine light, and oil pressure gauge. If any two of the three systems indicate a problem, park the vehicle, shut down the engine, and notify Field Maintenance. If only one system indicates a problem and the other two are operating normally, proceed with your mission and notify Field Maintenance upon completion. Failure to comply may result in damage to equipment.

The engine coolant temperature has three monitoring systems: water temperature light, check engine light, and water temperature gauge. If any two of the three indicate a problem, park the vehicle and allow engine to idle until water temperature cools down. If water temperature does not go down, shut engine off and notify Field Maintenance. Failure to comply may result in damage to equipment.

Moisture and dirt in the filter elements will plug the filters and cause engine damage. Monitor air cleaner restriction gauge while in these conditions to prevent a plug.

Above-normal coolant temperature can occur while driving in a transmission gear ratio that would lug the engine. To correct this, engine speed should be increased by shifting into the next lower gear to increase engine revolutions per minute (rpm). This will increase coolant flow through the radiator.

Overheating of engine or transmission has occurred if:

- Engine coolant temperature is at or above 230°F (110°C), as indicated by water temperature gauge.
- Engine oil pressure drops below normal operating range (40-70 psi [276-483 kPa]).
- Transmission oil temperature is at or above 250°F (120°C), as indicated by transmission oil temperature gauge.

When operating vehicle in extreme heat/dust conditions:

1. Check all fluids and oil levels often.
2. Check air cleaner restriction gauge frequently. If indicator shows RED and stays there, replace filters.
3. If water temperature gauge indicates coolant temperature is above 220°F (104°C), perform the following steps:
 - a. Downshift to next lower gear range, slow vehicle, and continue operation.
 - b. When water temperature gauge reads normal, upshift to normal gear range and continue operation.
 - c. If water temperature gauge does not return to normal, stop vehicle, place transmission gear selector in NEUTRAL (N), set parking brake, and allow engine to cool by letting engine idle at 700 rpm for 3 to 5 minutes.
 - d. When water temperature gauge returns to normal, shift to normal gear range and continue operation.

Operation Under Unusual Conditions - Unusual Environment/Weather - Extreme Heat and/or Dust - (CONTINUED)

4. If temperature continues to increase, shut off engine and refer to WP 0061, Engine Troubleshooting. If troubleshooting does not correct the problem notify field maintenance.
5. Allow engine to cool before refilling fuel tank, to prevent condensation. Keep the external surface of the engine, radiator, Air Conditioning (AC) condenser, and accessories clean to avoid dirt buildup or damage.
6. Inspect the radiator, AC condenser, and accessories for dirt buildup or damage.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - MUD, SAND, OR SNOW**

INITIAL SETUP:**References**TB-MED 508

MUD, SAND, OR SNOW**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Speeds must be reduced according to weather and road/terrain conditions. Approach slopes head-on and avoids side slopes whenever possible. Failure to comply may cause the vehicle to roll over, which may result in death or serious injury to personnel and damage to equipment.

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

Noise levels exceed 85-decibel limit. Exposure to constant, elevated noise levels could cause permanent hearing damage. Single hearing protection (e.g., VIC-3 headset plus earplugs) is required in and around operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result to injury to personnel.

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

Driving in mud can degrade vehicle braking and speed up brake shoe wear. If braking degrades while operating in mud, clean brakes by driving vehicle approximately 500 ft (153 m) with service brakes applied. This must be done with brake drums totally out of mud so the drying action can take place. If braking is not restored by drying brakes, stop vehicle as soon as possible and notify Field Maintenance. Impaired braking ability may result in damage to equipment and serious injury or death to personnel.

Do not exceed 20 mph when driving on sand, mud, or soft terrain. Failure to comply may result in loss of vehicle control which will result in injury to personnel and damage to equipment.

Operation Under Unusual Conditions - Unusual Environment/Weather - Mud, Sand, or Snow - (CONTINUED)

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

In extreme cold temperature environments, follow work-rest schedules as well as the guidance of TB-MED 508, Prevention and Management of Cold Weather Injuries. Failure to comply may result in injury to personnel.

CAUTION

Moisture and dirt in the filter elements will plug the filters and cause engine damage. Monitor air cleaner restriction gauge while in these conditions to prevent a plug.

The engine oil pressure has three monitoring systems: low oil pressure light, check engine light, and oil pressure gauge. If any two of the three systems indicate a problem, park the vehicle, shut down the engine, and notify Field Maintenance. If only one system indicates a problem and the other two are operating normally, proceed with your mission and notify Field Maintenance upon completion. Failure to comply may result in damage to equipment.

The engine coolant temperature has three monitoring systems: water temperature light, check engine light, and water temperature gauge. If any two of the three indicate a problem, park the vehicle and allow engine to idle until water temperature cools down. If water temperature does not go down, shut engine off and notify Field Maintenance. Failure to comply may result in damage to equipment.

1. Check air cleaner restriction gauge frequently. If indicator shows RED and stays there, replace filters.
2. Set transmission gear selector to DRIVE (D). Manually select SECOND or THIRD gear to avoid wheel spin. For better traction, keep speeds low and operate in low four-wheel drive range.
3. Begin driving vehicle slowly. Do not spin wheels when beginning to move vehicle.
4. Keep accelerator control steady after vehicle reaches a desired speed.
5. Turn vehicle slowly when on loose or slippery surfaces. Turning too fast could cause vehicle to get stuck.
6. When driving over hills, steer vehicle straight up and down hills whenever possible.
7. Activate turn signals sooner than required, to give early warning to following vehicles.
8. Apply service brakes sooner than normal by lightly pressing brake pedal. This will give early warning to the following vehicles that you will be slowing or stopping and allow for additional stopping distance.
9. Keep windshield, windows, mirrors, headlights, stoplights, and marker lights clean and free of mud, snow, and ice. Use defroster, windshield wipers, and washer fluid to keep windshield free of mud, snow, and ice.
10. After driving through slush or water, drive slowly and test service brakes. If vehicle does not slow down normally, perform the following steps:
 - a. Turn hazard flashers on until brake control is regained.
 - b. Continue to drive slowly.
 - c. To dry out brake shoes and drums, lightly press and hold service brake pedal 5 to 10 seconds at a time, while lightly applying accelerator (this will cause a slight drag to dry the brake shoes). You should only have to do this two to three times to dry brakes.
 - d. Resume appropriate driving speed.

Operation Under Unusual Conditions - Unusual Environment/Weather - Mud, Sand, or Snow - (CONTINUED)**NOTE**

If vehicle skids or starts to slide, perform the following steps.

FRONT WHEEL SKID

1. Let up slowly on accelerator pedal.
2. If braking, release brakes. This allows front wheels to roll and regain traction.
3. If turning vehicle, straighten wheels to regain traction.
4. Do not oversteer during these conditions. Oversteering will cause loss of control of the vehicle.

REAR WHEEL SKID

1. Let up slowly on accelerator pedal. This causes rear wheels to regain traction.
2. If braking, release brakes. This allows rear wheels to roll and regain traction.
3. Steer vehicle towards direction rear wheels are sliding.
4. Do not oversteer during these conditions. Oversteering will cause loss of control of the vehicle.

TIRE PRESSURE, SPEED, AND GRADE RESTRICTIONS

- Tire Pressure – mud/sand/snow (front and rear – all) – 45 psi (310 kPa) @ 20 mph
- Maximum Grade (climb) – 60%
- Maximum Grade (descent) – 60%
- Maximum Grade (side) – 30%

WARNING

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

Do not park vehicle on longitudinal slopes greater than 30 percent. Parking on grades in excess of 30 percent slope can lead to parking brake failure, resulting in vehicle rolling forward or backward, which could lead to an accident. Failure to comply may result in injury to personnel or damage to equipment.

CAUTION

Operator must take every precaution to prevent snow from blowing into engine when parked. Snow will melt and later form ice that can jam engine controls.

Park vehicle as follows:

1. Park vehicle so vehicle does not face into the wind, if possible.
2. Apply service brake and place transmission gear selector into NEUTRAL (N).
3. Shut off engine, chock wheels, and clean mud off vehicle body.

CAUTION

Do not direct high-pressure water stream at seals, air intake, exhaust outlet, radiator, condenser, or other components of vehicle that could be easily damaged by high-pressure water stream. Failure to comply may result in damage to equipment.

Operation Under Unusual Conditions - Unusual Environment/Weather - Mud, Sand, or Snow - (CONTINUED)

4. Clean mud from wheels, axles, universal joints, steering mechanism, oil coolers, air filters, radiator, Charge Air Cooler (CAC) and hoses as soon as possible.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - COLD WEATHER STARTING (BELOW 32°F [0°C])**

INITIAL SETUP:**References**

TB-MED 508

WP 0017

COLD WEATHER STARTING (BELOW 32°F [0°C])**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground Guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

CAUTION

Do not increase the engine speed until the oil pressure gauge is in the normal range 40-70 psi (276-483 kPa). To avoid damage to engine and related components, shut engine off if oil pressure is not registered within 20 to 30 seconds on Instrument Panel (IP) gauge cluster oil pressure gauge. Do not turn ignition switch to START position while engine is rotating. The fuel/water separator filter should be drained of all water before topping off fuel tank. During cold weather operations, keep fuel tank as full as possible. This will keep water from forming and freezing in the fuel lines. If engine fails to start in cold environment after five attempts, refer to WP 0061, Engine Troubleshooting. Failure to comply may result in damage to equipment.

The engine oil pressure has three monitoring systems: low oil pressure light, check engine light, and oil pressure gauge. If any two of the three systems indicate a problem, park the vehicle, shut down the engine, and notify Field Maintenance. If only one system indicates a problem and the other two are operating normally, proceed with your mission and notify Field Maintenance upon completion. Failure to comply may result in damage to equipment.

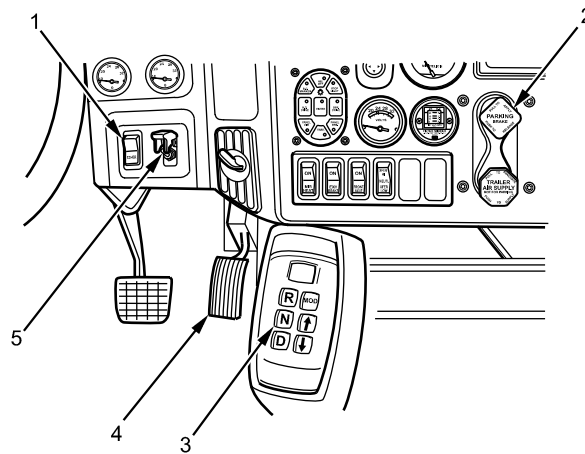
The engine coolant temperature has three monitoring systems: water temperature light, check engine light, and water temperature gauge. If any two of the three indicate a problem, park the vehicle and allow engine to idle until water temperature cools down. If water temperature does not go down, shut engine off and notify Field Maintenance. Failure to comply may result in damage to equipment.

Operation Under Unusual Conditions - Unusual Environment/Weather - Cold Weather Starting (Below 32°F [0°C]) - (CONTINUED)

NOTE

Vehicle has an electronically controlled engine. When idling in cold weather, the engine may automatically increase idle rpm to maintain a safe engine operating temperature. Increase in idle rpm in cold weather is normal. In cold conditions if the intake air temperature is below 32°F (0°C) and after 5 minutes of engine idling, engine idle speed will automatically increase or decrease in rpm (because of software in the Engine Control Module [ECM]) to maintain a coolant temperature between 149°F (65°C) and 160°F (71°C).

Fuel fired heater may also be used during, or programmed to come on before cold weather starts. Refer to WP 0017, Fuel Fired Heater.



B100000160

Figure 1. IP.

1. Place main power switch (Figure 1, Item 5) in the ON position. Do not depress accelerator pedal (Figure 1, Item 4).
2. Set parking brake (Figure 1, Item 2) and ensure transmission is in NEUTRAL (N) (Figure 1, Item 3).
3. Adjust operator seat. Adjust both driver door and passenger door outside mirrors.
4. Push the ETHER start button (Figure 1, Item 1) for 2 to 3 seconds to manually inject ether into the engine.

Operation Under Unusual Conditions - Unusual Environment/Weather - Cold Weather Starting (Below 32°F [0°C]) - (CONTINUED)

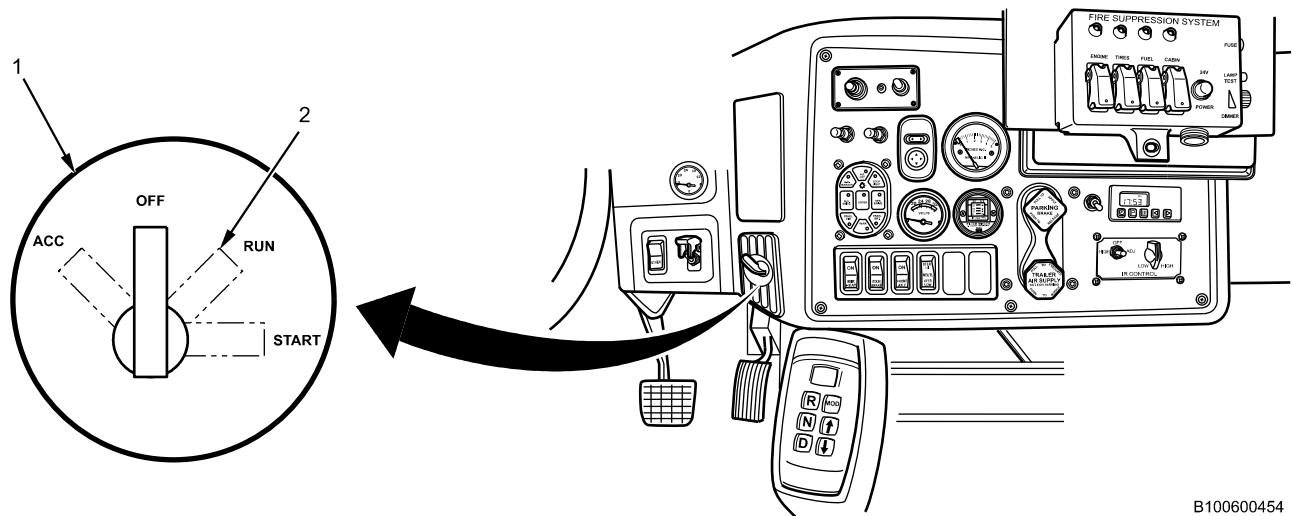


Figure 2. Ignition Switch.

5. Turn ignition switch (Figure 2, Item 1) clockwise to the RUN position (Figure 2, Item 2). This position should be held for at least 20 seconds before starting vehicle. This allows the ether start system to cycle and provide ether to engine air intake manifold.

CAUTION

To avoid engine damage, if engine fails to start within 30 seconds, release ignition switch and wait 2 to 3 minutes to allow starter motor to cool. If three attempts are made to start engine and engine still fails to start, investigate and determine the cause of the no-start condition. Repeated attempts to start engine will damage starter motor.

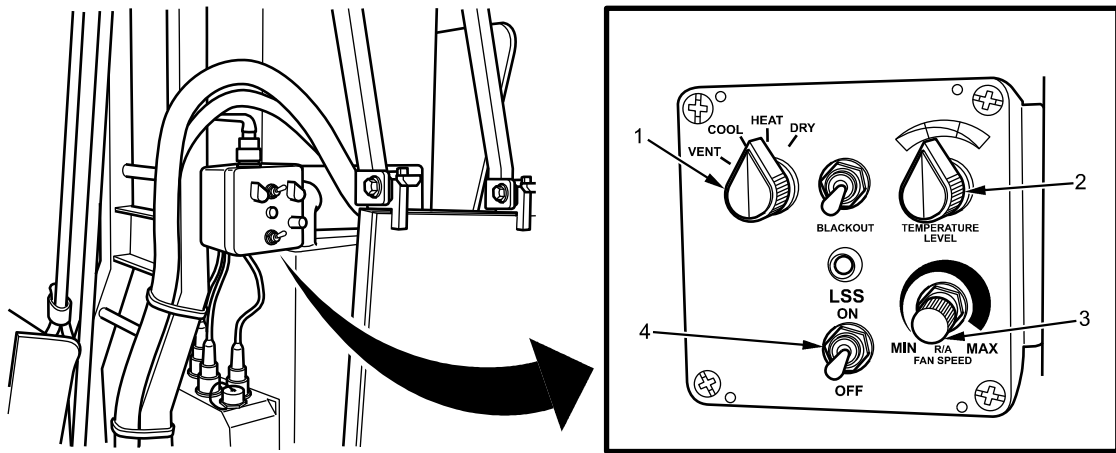
6. Turn ignition switch to START position until engine starts, but do not hold switch longer than 30 seconds. Release switch as soon as engine starts.

NOTE

The following step disengages the engine restart interlock, which would prevent the starter engagement from moving to the ON position.

7. If engine fails to start easily, turn ignition switch to OFF position prior to next start attempt.

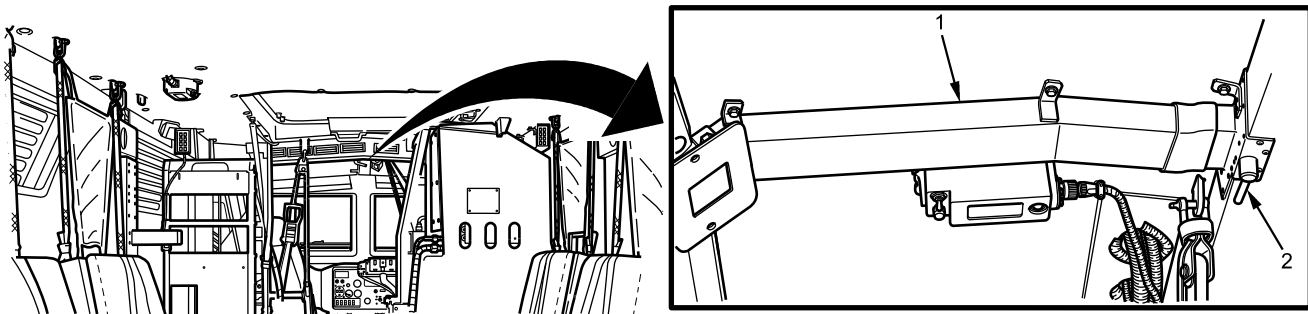
Operation Under Unusual Conditions - Unusual Environment/Weather - Cold Weather Starting (Below 32°F [0°C]) - (CONTINUED)



B100500670

Figure 3. Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Controls.

8. After engine has started: turn LSS switch (Figure 3, Item 4) on. Turn HVAC/LSS mode switch (Figure 3, Item 1) to DRY, turn TEMPERATURE LEVEL switch (Figure 3, Item 2) to RED zone and turn FAN SPEED knob (Figure 3, Item 3) to appropriate speed setting.



B100500669

Figure 4. Windshield Defrost Lever.

9. Turn windshield DEFROST lever (Figure 4, Item 2) above driver on HVAC duct (Figure 4, Item 1) (ceiling of vehicle) to ON position.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - OPERATING VEHICLE IN COLD WEATHER (BELOW 32°F [0°C])**

INITIAL SETUP:**References**

TB-MED 507

TB-MED 508

WP 0070

OPERATING VEHICLE IN COLD WEATHER (BELOW 32°F [0°C])**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

In extreme temperature environments, follow work-rest schedules as well as the guidance of TB-MED 507, Heat Stress Control and Heat Stress Management, and TB-MED 508, Prevention and Management of Cold Weather Injuries. Failure to comply may result in injury to personnel.

Ensure tire pressures are maintained at the proper pressures for normal operations. Low air pressures can result in tire failures, which could lead to an accident causing personnel injury and damage to equipment.

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Speeds must be reduced according to weather and road/terrain conditions. Approach slopes head-on and avoids side slopes whenever possible. Failure to comply may cause the vehicle to rollover, which may result in death or serious injury to personnel and damage to equipment.

The driver's field of view is limited. Ensure that the mirrors are positioned so as to allow for a maximum range of vision prior to vehicle operation. Ground guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may lead to a vehicle collision/accident resulting in death or injury to personnel and damage to equipment.

Noise levels exceed 85-decibel limit. Exposure to constant, elevated noise levels could cause permanent hearing damage. Single hearing protection (e.g., VIC-3 headset plus earplugs) is required in and around operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result to injury to personnel.

Driving in mud can degrade vehicle braking and speed up brake shoe wear. If braking degrades while operating in mud, clean brakes by driving vehicle approximately 500 ft (153 m) with service brakes applied. This must be done with brake drums totally out of mud so the drying action can take place. If braking is not restored by drying brakes, stop vehicle as soon as possible and notify Field Maintenance. Implied braking ability may result in damage to equipment and serious injury or death to personnel.

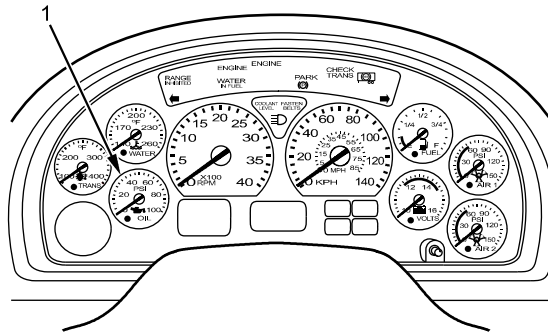
Operation Under Unusual Conditions - Unusual Environment/Weather - Operating Vehicle in Cold Weather (Below 32°F [0°C]) - (CONTINUED)

Do not exceed 20 mph when driving on sand, mud, or soft terrain. Failure to comply may result in loss of vehicle control which will result in injury to personnel and damage to equipment.

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

CAUTION

In cold weather, do not start driving immediately after starting engine. The engine, cooling system, and transmission must warm up. The transmission will only operate in NEUTRAL (N), REVERSE (R), and third gears when the transmission fluid temperature is below 19°F (-7°C). Above 19°F (-7°C), the transmission will operate in all ranges. In cold weather, if oil pressure gauge does not show appropriate oil pressure reading within 10 to 15 seconds after starting engine, shut down immediately and refer to WP 0061, Engine Troubleshooting. Lack of lubrication may damage engine. Ensure oil pressure gauge is in safe range during idle and increases as engine speed increases. Failure to comply may result in damage to equipment.



B100000162

Figure 1. Oil Pressure Gauge.

1. After cold weather starting, check that oil pressure gauge (Figure 1, Item 1) is in safe range during idle and increases as engine speed increases.
2. Run engine until it idles smoothly, and then increase engine speed to 1200 to 1500 rpm for another 25 minutes, using throttle idle control switches.
3. Set transmission gear selector to DRIVE (D), release parking brake, and slowly drive vehicle 3 to 5 miles to warm up the driveline components, tires, and brakes.
4. Park vehicle as follows:

WARNING

Soft shoulders can collapse. Vehicles can roll over, causing severe injury or death. Avoid driving or parking on soft shoulders. Use care when next to water or in rain-soaked soil.

Operation Under Unusual Conditions - Unusual Environment/Weather - Operating Vehicle in Cold Weather (Below 32°F [0°C]) - (CONTINUED)

Do not park vehicle on longitudinal slopes greater than 30 percent. Parking on grades in excess of 30 percent slope can lead to parking brake failure, resulting in vehicle rolling forward or backward, which could lead to an accident. Failure to comply may result in injury to personnel or damage to equipment.

CAUTION

Driver must take every precaution to prevent snow from blowing into engine when parked. Snow will melt and later form ice that can jam engine controls.

- a. Park vehicle on a level surface, in a sheltered area, out of the wind if possible. If no shelter is available, park vehicle so it does not face wind.
- b. Park on high, dry ground if possible, or spread out planks or brush to make raised or dry area so tires will not freeze to the ground in snow, water, ice, or mud.

CAUTION

The engine must be kept running until the engine coolant temperature reaches a minimum of 160°F (71°C) prior to shutting the engine off. Depending on environmental conditions, it could take up to 45 minutes for coolant temperatures to reach 160°F (71°C). Drain water from fuel/water separator after shutdown. Failure to comply may result in damage to equipment.

5. Shut engine off as follows:
 - a. Press down on service brake.
 - b. Set transmission gear selector in NEUTRAL (N).
 - c. Do not turn engine off until coolant temperature reaches 160°F (71°C).
 - d. Let engine return to normal idle.
 - e. Turn ignition switch in OFF position.
 - f. Place main power switch to OFF position.
 - g. Drain water from fuel/water separator after shutdown. Refer to WP 0070, Fuel Water Separator Draining.

END OF TASK**END OF WORK PACKAGE**

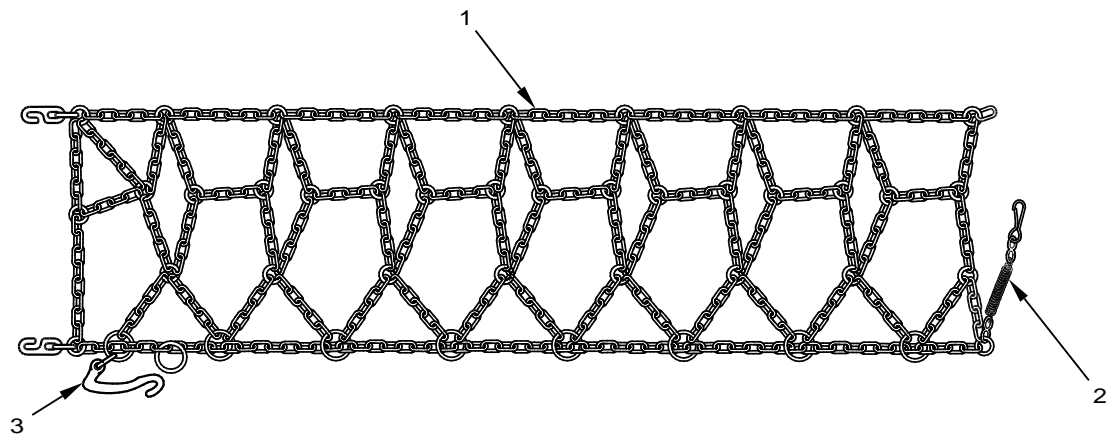
OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - TIRE CHAIN INSTALLATION**

INITIAL SETUP:**Personnel Required**Crewmember - (2)

TIRE CHAIN INSTALLATION**NOTE**

One tire chain shown, other tire chains similar.

Chains must be installed on all four tires.

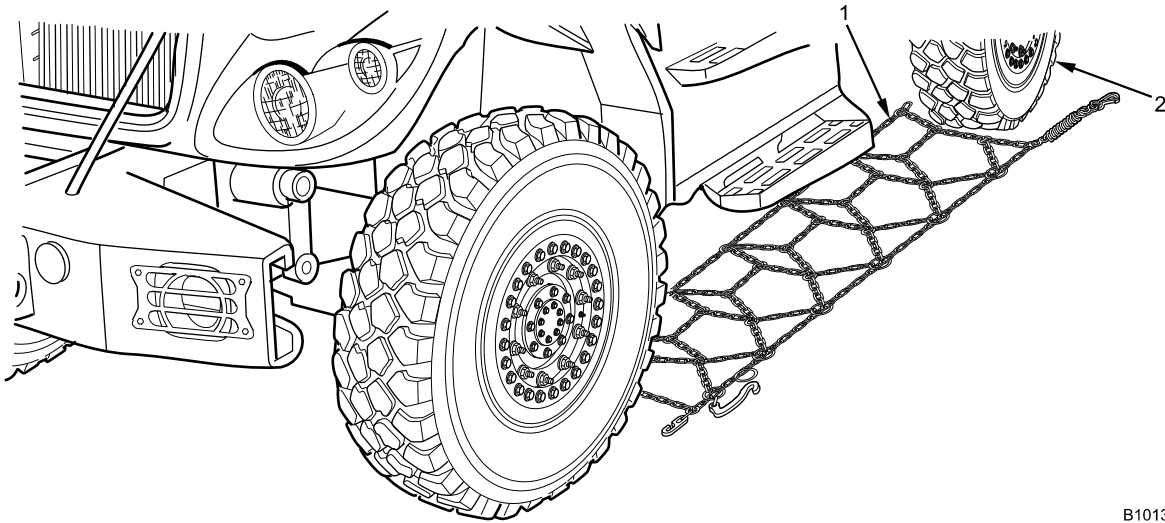


B102600419

Figure 1. Tire Chain.

1. Apply parking brake and set transmission gear selector to NEUTRAL (N).
2. Spread tire chain (Figure 1, Item 1) out flat in front of tire and ensure all tire links are straight.
3. Arrange tire chain (Figure 1, Item 1) so tension lever (Figure 1, Item 3) and tension spring (Figure 1, Item 2) are positioned outward away from vehicle.

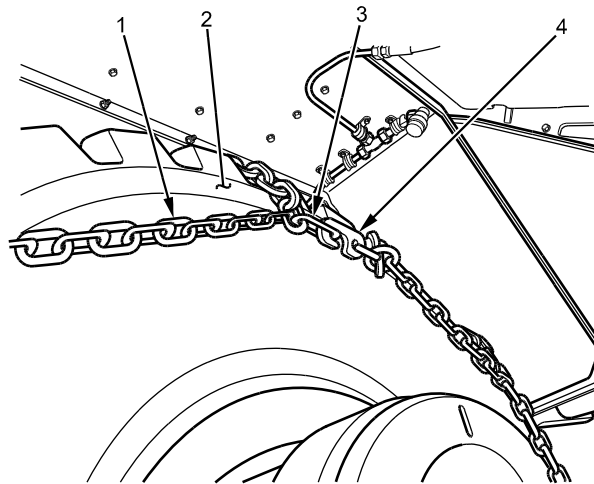
Operation Under Unusual Conditions - Unusual Environment/Weather - Tire Chain Installation - (CONTINUED)



B101300500

Figure 2. Left Rear Tire Chain Installation.

4. Apply service brake, release parking brake, and set transmission gear selector in DRIVE (D).
5. With crewmember to watch tire chain (Figure 2, Item 1), drive slowly forward onto tire chain. Drive approximately 1/4 of wheel rotation onto chain.
6. Set transmission gear selector in NEUTRAL (N), apply parking brake, and turn engine off.
7. Pull front of chain over top of tire.



B102600458

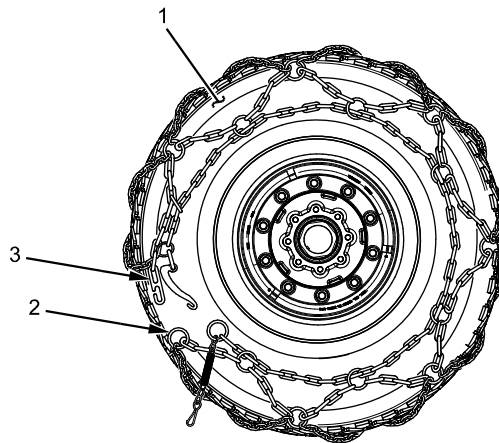
Figure 3. Left Rear Inner Tire Shown.

CAUTION

Ensure that chain links are not twisted during connection. Failure to comply may result in damage to the tire and/or chain.

8. Connect side chain (Figure 3, Item 1) on inboard side of tire (Figure 3, Item 2) by attaching side chain end ring (Figure 3, Item 3) on closing hook (Figure 3, Item 4).

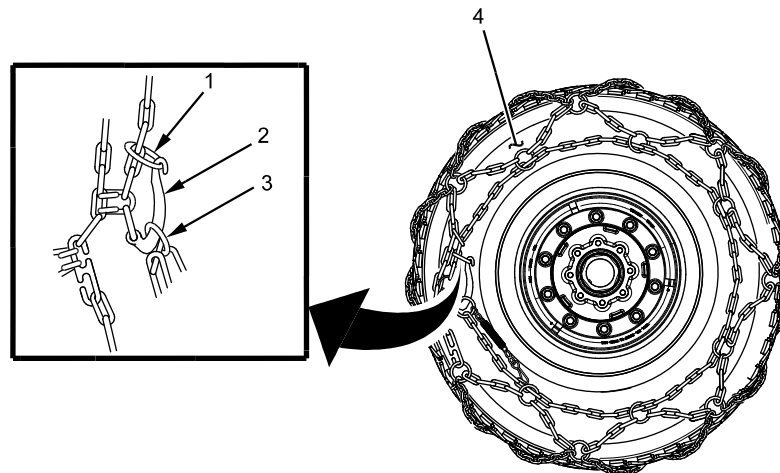
Operation Under Unusual Conditions - Unusual Environment/Weather - Tire Chain Installation - (CONTINUED)



B102600413

Figure 4. Side Tire Chain Installation.

9. Connect side chain on outboard side of tire (Figure 4, Item 1) by attaching side chain end ring (Figure 4, Item 2) on closing hook (Figure 4, Item 3).

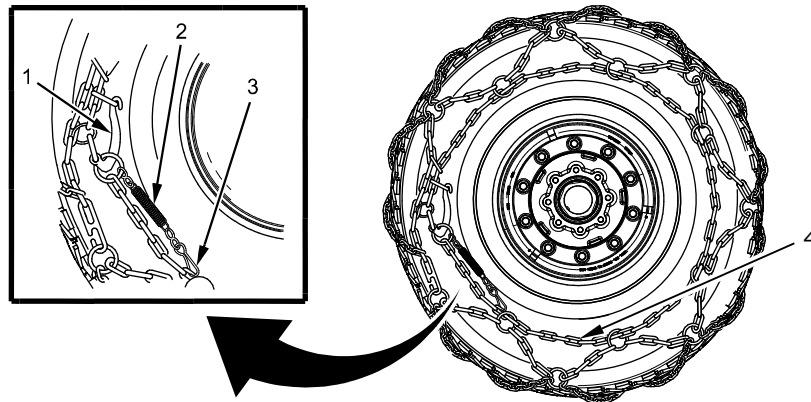


B102600416

Figure 5. Tire Chain Tension.

10. Tighten tension on outboard side of tire (Figure 5, Item 4) by inserting tension lever (Figure 5, Item 2) into next tension chain link (Figure 5, Item 3).
11. Secure tension lever hook end into tension lever ring (Figure 5, Item 1).

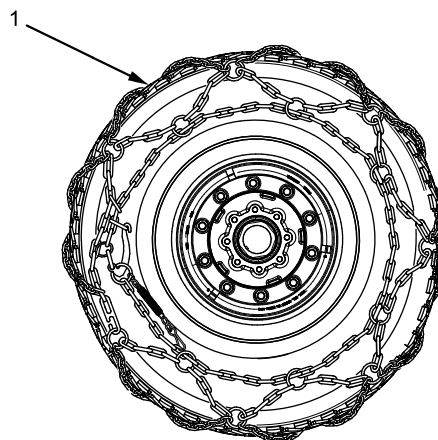
Operation Under Unusual Conditions - Unusual Environment/Weather - Tire Chain Installation - (CONTINUED)



002594

Figure 6. Tire Chain Tension.

12. Feed tension spring (Figure 6, Item 2) and tension spring hook (Figure 6, Item 3) through outboard side chain (Figure 6, Item 4).
13. Clip tension spring hook (Figure 6, Item 3) on outboard side chain (Figure 6, Item 4), as far from tension lever (Figure 6, Item 1) as possible.



B102600415

Figure 7. Tire Chain Installation.

NOTE

Uniform tension should be maintained throughout tire surface. If adjustment is required, repeat steps 12 and 13.

14. Drive vehicle 500 ft (152 m) and check that tire chain (Figure 7, Item 1) has not deflected more than 1/2 in. (13 mm) from tire surface.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - TIRE CHAIN REMOVAL**

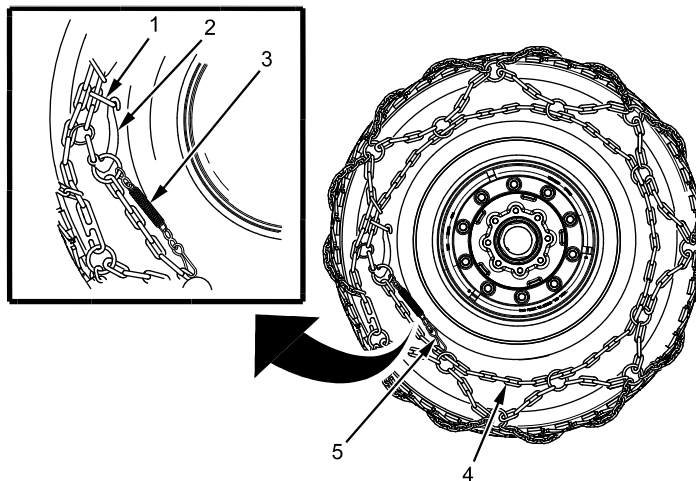
INITIAL SETUP:

Personnel Required
Crewmember - (2)

TIRE CHAIN REMOVAL**NOTE**

After using tire chains, ensure that they are dry before storing. Mud- and dirt-covered tire chains should be rinsed in hot water and then completely dried.

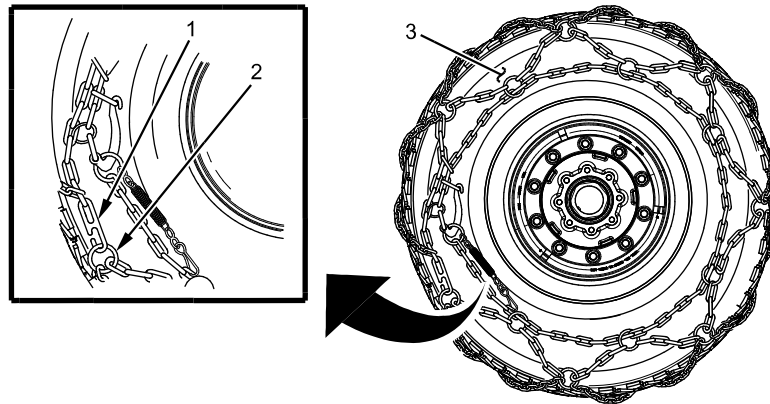
One tire chain shown, other tire chains similar.



B102600414

Figure 1. Tire Chain Removal.

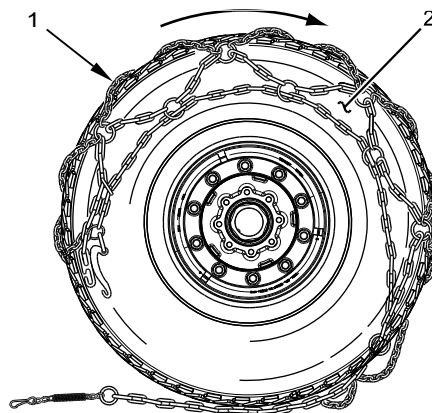
1. Unhook tension spring hook (Figure 1, Item 5) from side chain (Figure 1, Item 4), and feed tension spring (Figure 1, Item 3) through side chain.
2. Unhook tension lever ring (Figure 1, Item 1) and slide tension chain link off tension lever (Figure 1, Item 2).

Operation Under Unusual Conditions - Unusual Environment/Weather - Tire Chain Removal - (CONTINUED)


002596

Figure 2. Tire Chain Removal.

3. Starting on outboard side of tire (Figure 2, Item 3), unhook closing hook (Figure 2, Item 1) from side chain end ring (Figure 2, Item 2).
4. Repeat previous step on inboard side of tire.



002598

Figure 3. Right Rear Tire Chain Removal.

CAUTION

Ensure that the tire chain does not fall off the tire and collapse into a pile in front of or behind the rolling wheel assembly. If the wheel assembly rolls over the tire chain, damage to the tire chain could result.

5. Start engine, release parking brake, and drive forward or backward. Have crewmember assist to guide tire chain (Figure 3, Item 1) off tire (Figure 3, Item 2).
6. Once tire chain is free of wheel assembly, have crewmember assist in removing of tire chain from vehicle travel area.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER UNUSUAL CONDITIONS - UNUSUAL ENVIRONMENT/WEATHER - THROTTLE IDLE CONTROL SWITCHES

INITIAL SETUP:

NOT APPLICABLE

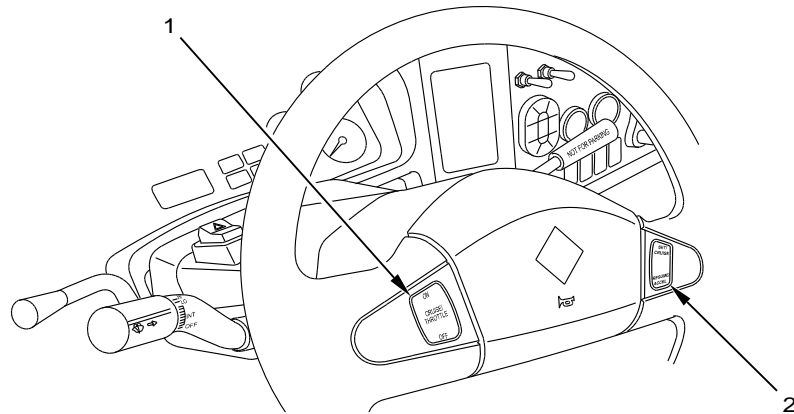
THROTTLE IDLE CONTROL SWITCHES

NOTE

To use throttle control switches, parking brake must be set and transmission must be in NEUTRAL (N). If these settings change while using switches, rpm will drop to normal parameters.

There are two throttle idle control switches. RESUME/ACCEL (deceleration/acceleration) switch sets and holds engine rpm. If switch has not been activated, nothing will happen when pushing this switch. ON/OFF switch turns throttle control on or off.

To activate and enable each of the control switches:



002600

Figure 1. Throttle Idle Control Switches.

1. a. Press ON button on CRUISE/THROTTLE switch (Figure 1, Item 1).
- b. Press and hold RESUME/ACCEL switch (Figure 1, Item 2) to increase or decrease engine rpm.
- c. Tap lightly on service brake pedal to deactivate throttle control and hold selected rpm in memory. To return to this rpm, press RESUME/ACCEL button (Figure 1, Item 2).
- d. To cancel rpm setting, press OFF button on CRUISE/THROTTLE switch (Figure 1, Item 1), shut vehicle off, and release parking brake or shift transmission gear selector out of NEUTRAL (N).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - FORDING WATER**

INITIAL SETUP:NOT APPLICABLE

FORDING WATER**WARNING**

Do not attempt to ford water deeper than 36 inches (91 cm), including wave height. Ensure bottom surface under water is firm. Reduce speed during fording. Unless absolutely necessary, do not stop while driving in the water. Ensure brakes are dry and operating correctly after fording before commencing normal driving. Failure to comply may result in injury to personnel and damage to equipment.

CAUTION

If engine stops while fording, immediately attempt to restart engine. If the engine will not restart, have vehicle towed or use winch to pull vehicle from water with another vehicle as soon as possible. Failure to comply may result in damage to equipment.

1. Ensure depth of fording site is not more than 36 inches (91 cm).
2. Ensure bottom of fording site is firm enough so vehicle will not become mired.
3. Stop vehicle at edge of water before fording, if conditions permit.

CAUTION

Ensure brake drums are cool before entering water. Failure to comply may result in damage to equipment.

4. If brakes have been heavily used or are hot, allow drums and shoes to cool before entering water, if the conditions permit.
5. Approach water slowly and cautiously, and drive vehicle through water as slowly as possible to avoid causing waves.
6. Select DRIVE (D) gear on the transmission gear selector and LOW range on the transfer case.
7. If vehicle accidentally enters water deeper than 36 in. (91 cm), perform the following steps:
 - a. Press and hold service brake pedal to stop vehicle.
 - b. Set transmission gear selector to REVERSE (R).
 - c. Let up on service brake pedal.
 - d. Press down lightly on accelerator pedal and slowly back vehicle out of water.
 - e. Once out of water far enough, turn vehicle around, stop, and select DRIVE (D) on transmission gear selector.
8. To dry out brake shoes and drums, lightly press and hold service brake pedal 5 to 10 seconds at a time, while lightly applying the accelerator (this will cause a slight drag to dry the brake shoes). You should only have to do this two or three times to dry brakes.
9. When clear of fording area, stop vehicle.
10. If water entered the interior of the vehicle, notify Field Maintenance as soon as possible to ensure water is drained properly from hull.
11. Set transmission gear selector to appropriate gear and continue mission.
12. Remove water and clean deposits from all areas of vehicle as soon as possible.

Operation Under Unusual Conditions - Fording Water - (CONTINUED)

13. If vehicle came in contact with saltwater, wash vehicle with fresh water as soon as possible to minimize possible corrosion.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - OPERATION ON STEEP GRADES (ASCENDING GRADES)**

INITIAL SETUP:NOT APPLICABLE

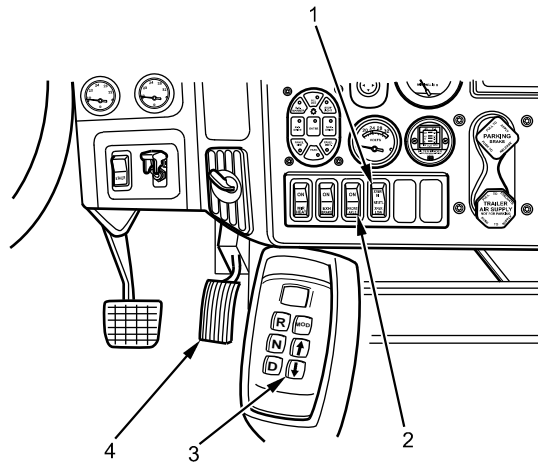
OPERATION ON STEEP GRADES (ASCENDING GRADES)**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

Always ascend hills with extreme care and approach slopes head on. Do not shift into a lower gear than is necessary to maintain momentum. Attempt to maintain a constant engine speed and do not come to a complete stop while ascending hill. Use good judgment. If hill appears too steep to climb, do not attempt. Failure to comply may result in vehicle rollover or rollback, causing damage to equipment and serious injury or death to personnel.

Operations on steep longitudinal grades (in excess of 50 percent slope) can lead to axle damage, resulting in injury or death to personnel.

Stop vehicle before beginning ascent. Ensure transfer case is in XFER LOW and place AXLE switch in ON position before ascending grade. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Operation Under Unusual Conditions - Operation on Steep Grades (Ascending Grades) - (CONTINUED)

B100600479

Figure 1. Ascent Controls.

1. Prior to ascent, stop vehicle with service brake.
2. Use transfer case selector switch (Figure 1, Item 1) to shift into XFER LOW.
3. Place AXLE switch (Figure 1, Item 2) in ON position.
4. Select SECOND (2) or FIRST (1) gear on the transmission gear selector (Figure 1, Item 3), depending on length and grade of slope.
5. Maintain slow and steady speed going uphill by applying steady pressure on accelerator pedal (Figure 1, Item 2). If vehicle starts to slow, increase accelerator pressure steadily; do not come to complete stop. If wheels start to slip and vehicle is close to top of hill, "walk" vehicle remaining distance by turning front wheels sharply left and right if situation permits. This action will provide fresh traction into the surface and will usually result in enough traction to complete the climb.
6. Sound horn before reaching top of hill to alert personnel that vehicle is approaching.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - OPERATION ON STEEP GRADES (DESCENDING GRADES)**

INITIAL SETUP:NOT APPLICABLE

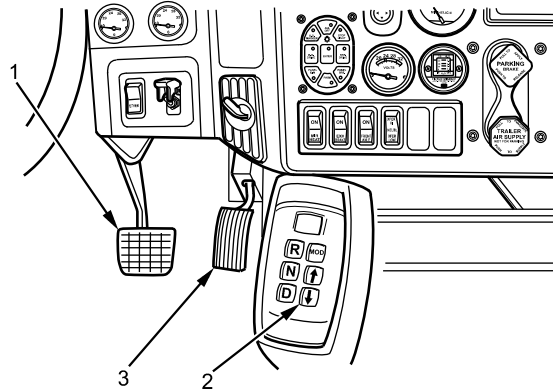
OPERATION ON STEEP GRADES (DESCENDING GRADES)**WARNING**

The driver is responsible for the safety of personnel riding in their vehicle. Drivers must refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Crew capacity for the vehicle is 6 persons. Driver must visually check to make sure all areas of vehicle are clear of personnel prior to attempting to start engine. Always use seat belts/shoulder harnesses when vehicle is in operation. Ensure driver side and passenger side mirrors are adjusted to allow full range of vision. Failure to comply may result in serious injury or death to personnel.

Never coast downhill. Service brakes alone should not be used to control speed on major downgrades. Failure to comply may result in injury or death to personnel.

Operations on steep longitudinal grades (in excess of 50 percent slope) can lead to axle damage, resulting in injury or death to personnel.

When the exhaust brake switch is turned on, switch will light but no braking assist is available. The exhaust brake system is disabled and cannot be activated via the switch. Service brake must be primarily used when descending long grades. Use hard pressure braking with applications of 3 to 5 seconds' duration, instead of long, continuous applications. This type of brake application minimizes temperature rise, brake fade, and air consumption by the air brake system. Failure to comply may result in loss of braking ability and serious injury or death to personnel.

Operation Under Unusual Conditions - Operation on Steep Grades (Descending Grades) - (CONTINUED)

B100600480

Figure 1. Descent Controls.

1. Prior to descent, stop vehicle with service brake (Figure 1, Item 1).
2. Control downhill speed by removing foot from accelerator pedal (Figure 1, Item 3) and manually selecting a lower gear from the transmission gear selector (Figure 1, Item 2) than would be required to ascend slope.

CAUTION

Do not drag brakes. Dragging brakes will cause brake system to overheat. Failure to comply may result in damage to equipment.

3. Use service brake (Figure 1, Item 1) while descending. Do not drag brakes.

END OF TASK**END OF WORK PACKAGE**

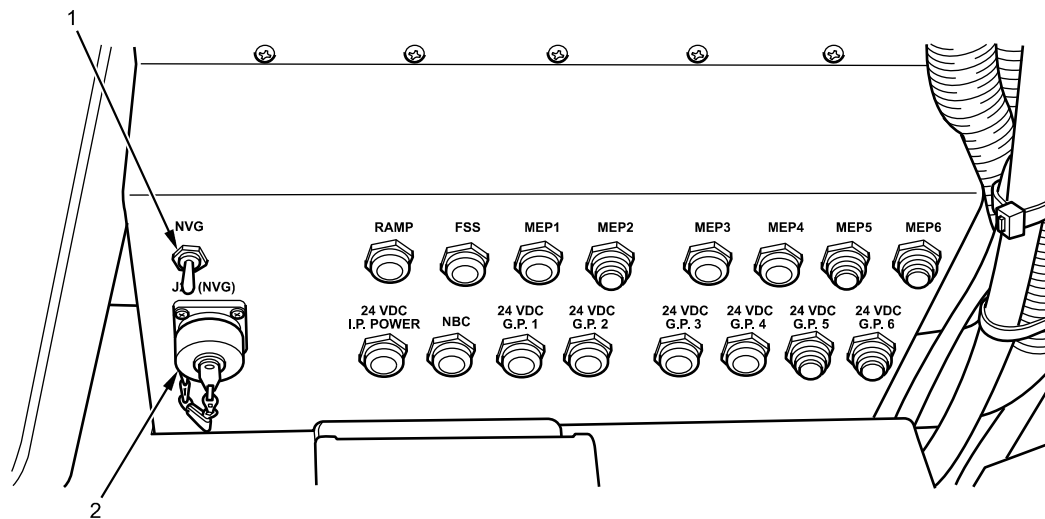
OPERATOR INSTRUCTIONS

OPERATION UNDER UNUSUAL CONDITIONS - NIGHT VISION OPERATION

INITIAL SETUP:

NOT APPLICABLE

NIGHT VISION OPERATION



B100000149

Figure 1. Night Vision Controls.

To operate night vision function:

1. Remove protective cap from Night Vision Connection port (NVG) (Figure 1, Item 2) located on circuit breaker panel under instrument panel.
2. Connect night vision device to NVG (Figure 1, Item 2).
3. Place night vision toggle switch (Figure 1, Item 1) in NVG position (up).

To disable night vision function:

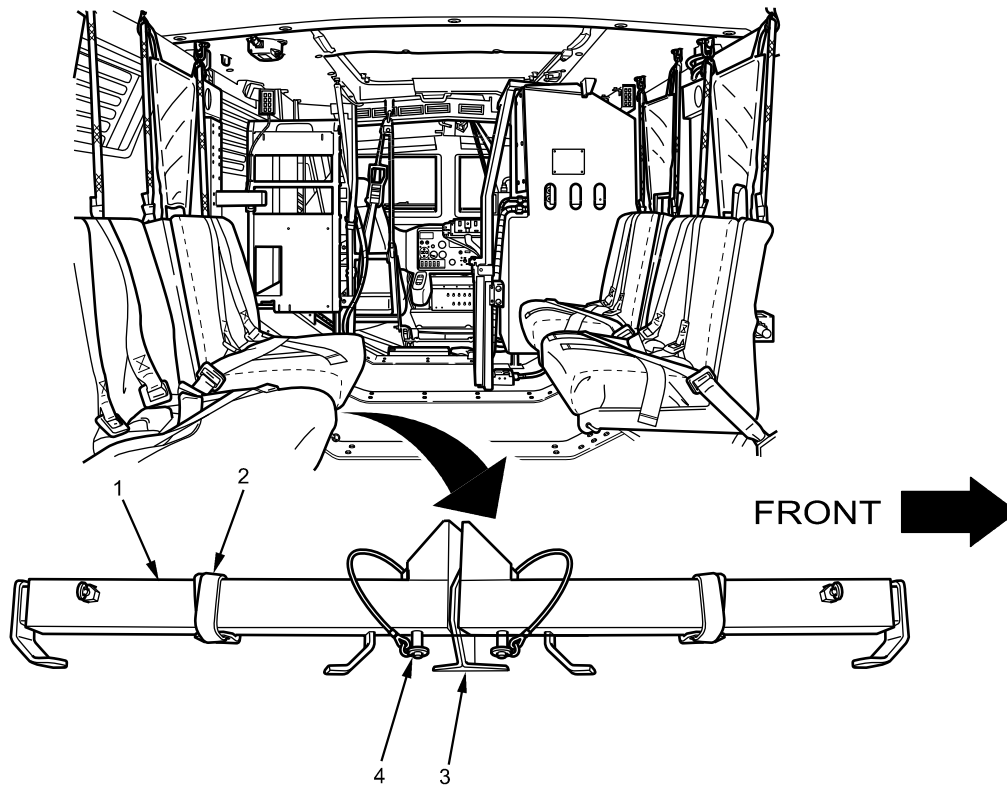
1. Place night vision toggle switch (Figure 1, Item 1) in off position (down).
2. Disconnect night vision device from night vision connection port (Figure 1, Item 2).
3. Replace protective cap on night vision connection port (Figure 1, Item 2).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - LITTER ARM REMOVAL FROM STORAGE BRACKET****INITIAL SETUP:**

NOT APPLICABLE

LITTER ARM REMOVAL FROM STORAGE BRACKET

B101800563

Figure 1. Litter Arms in Bracket.

1. Remove hook-and-loop strip (Figure 1, Item 2).
2. Remove retaining pin (Figure 1, Item 4) from litter arm (Figure 1, Item 1) and storage bracket (Figure 1, Item 3).
3. Remove litter arm (Figure 1, Item 1) from storage bracket (Figure 1, Item 3) by sliding toward rear of cabin.
4. Repeat steps 1-3 to remove other arm, sliding arm toward front of cabin.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

OPERATION UNDER UNUSUAL CONDITIONS - LITTER ARM INSTALLATION ON SUPPORT BRACKET

INITIAL SETUP:

NOT APPLICABLE

LITTER ARM INSTALLATION ON SUPPORT BRACKET

WARNING



Keep personnel clear of litter-lift moving parts. Ensure litters and patients are properly secured and clear of rear door/ramp and all other obstacles during litter-lift movement. Failure to comply may result in serious injury or death to personnel.

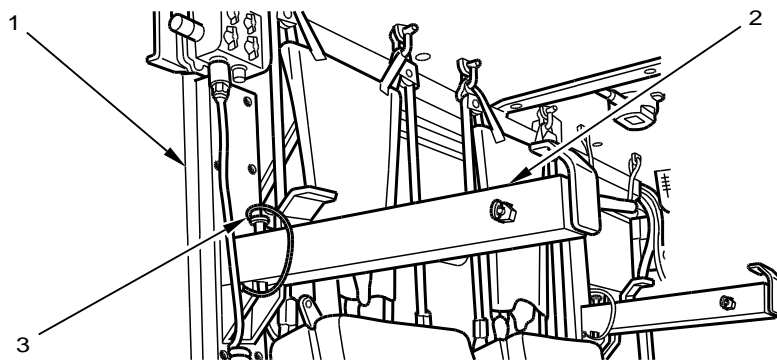
Ensure litters and patients are properly secured and clear of rear door/ramp. Failure to comply may result in serious injury or death to personnel.

Ensure litter arm extension retaining pins engage to lock extensions in position. Failure to comply may result in serious injury or death to personnel.

NOTE

Litter arms are interchangeable on litter support brackets.

1. Slide litter arm (Figure 1, Item 3) into litter support bracket (Figure 1, Item 1).



002874

Figure 1. Litter Arms in Support Brackets.

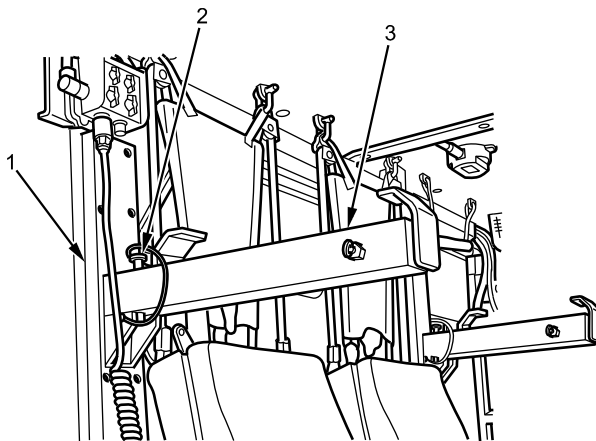
2. Install retaining pin (Figure 1, Item 2) through litter arm (Figure 1, Item 3) and litter support bracket (Figure 1, Item 1).
3. Repeat steps 1-2 for other litter arm.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - LITTER ARM REMOVAL FROM SUPPORT BRACKET**

INITIAL SETUP:NOT APPLICABLE

LITTER ARM REMOVAL FROM SUPPORT BRACKET

B101800624

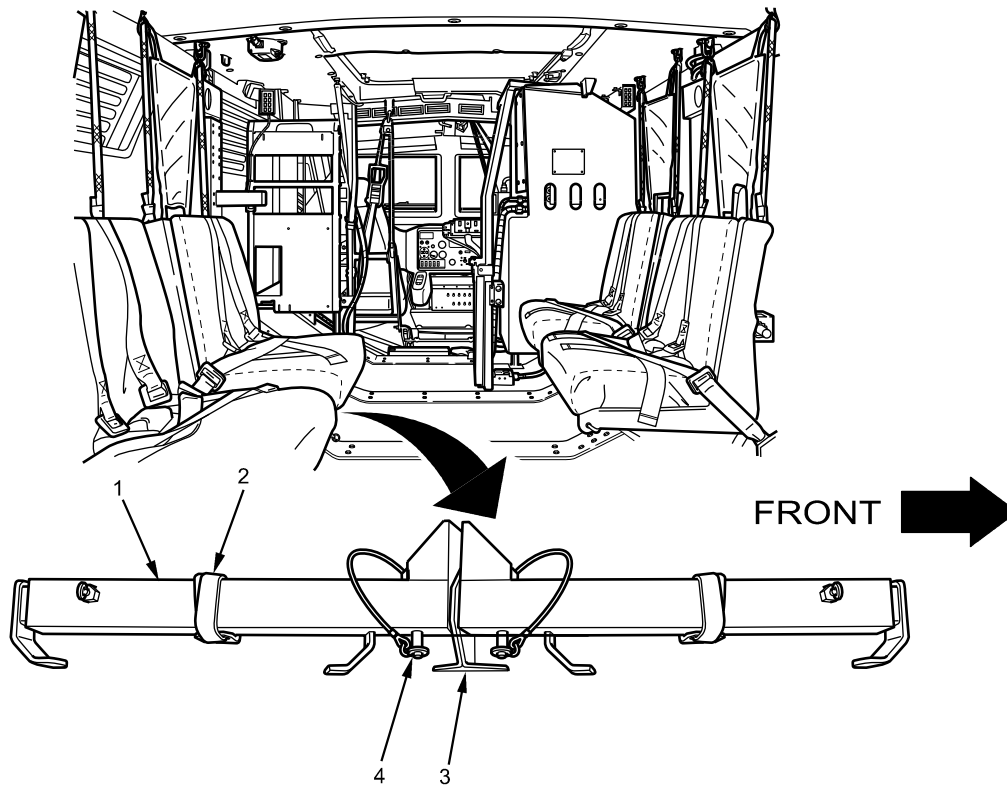
Figure 1. Litter Arms in Support Brackets.

1. Remove retaining pin (Figure 1, Item 2) from litter arm (Figure 1, Item 3) and litter support bracket (Figure 1, Item 1).
2. Remove litter arm (Figure 1, Item 3) from litter support bracket (Figure 1, Item 1).
3. Repeat steps 1-2 for other litter arm.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - LITTER ARM INSTALLATION ON STORAGE BRACKET****INITIAL SETUP:**

NOT APPLICABLE

LITTER ARM INSTALLATION ON STORAGE BRACKET

B101800563

Figure 1. Litter Arms in Bracket.

1. Slide litter arm (Figure 1, Item 1) toward rear of cabin.
2. Fasten hook-and-loop strip (Figure 1, Item 2).
3. Install retaining pin (Figure 1, Item 4) in litter arm (Figure 1, Item 1) and storage bracket (Figure 1, Item 3).
4. Repeat steps 1-3 to install other arm, sliding arm toward front of cabin.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - LITTER INSTALLATION**

INITIAL SETUP:**References**WP 0045

LITTER INSTALLATION**NOTE**

Litter arms must be installed before installing litter on litter rack. Refer to WP 0045 Litter Arm Removal from Storage Bracket and Litter Arm Installation on Support Bracket, in this work package.

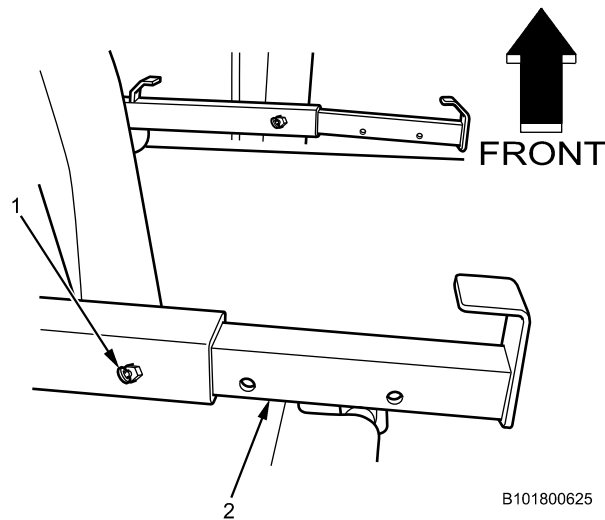


Figure 1. Litter Arm Extensions.

1. Pull out spring-loaded retaining pin (Figure 1, Item 1) and hold to release litter arm extension (Figure 1, Item 2).
2. Slide out litter arm extension (Figure 1, Item 2).

WARNING

Ensure litter arm extension retaining pins engage to lock extensions in position. Failure to comply may result in serious injury or death to personnel.

3. Release retaining pin (Figure 1, Item 1) to secure litter arm extension (Figure 1, Item 2) in extended position.
4. Repeat steps 1-3 for other litter arm.

Operation Under Unusual Conditions - Litter Installation - (CONTINUED)

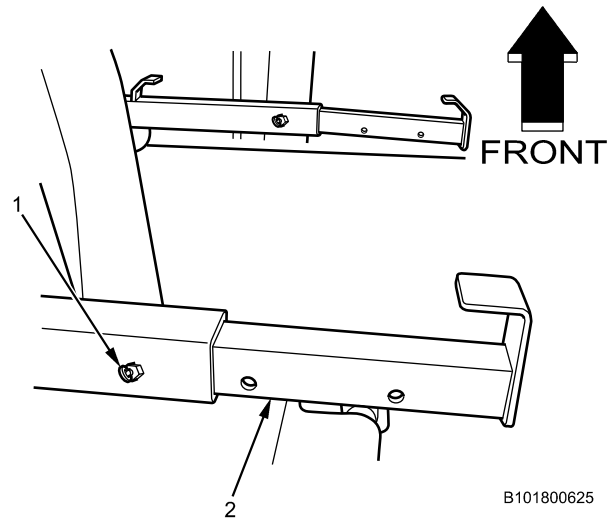


Figure 2. Litter Arm Extensions.

WARNING



Keep personnel clear of litter-lift moving parts. Ensure litters and patients are properly secured and clear of rear door/ramp and all other obstacles during litter-lift movement. Failure to comply may result in serious injury or death to personnel.

5. Place litter in position.
6. Pull out spring-loaded retaining pin (Figure 2, Item 1) to release litter arm extension (Figure 2, Item 2).
7. Slide litter arm extension (Figure 2, Item 2) in to capture front of litter.

WARNING

Ensure litter arm extension retaining pins engage to lock extensions in position. Failure to comply may result in serious injury or death to personnel.

8. Release retaining pin (Figure 2, Item 1) to secure litter arm extension (Figure 2, Item 2) in retracted position.
9. Repeat steps 1-8 for other litter arm.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - LITTER REMOVAL**

INITIAL SETUP:NOT APPLICABLE

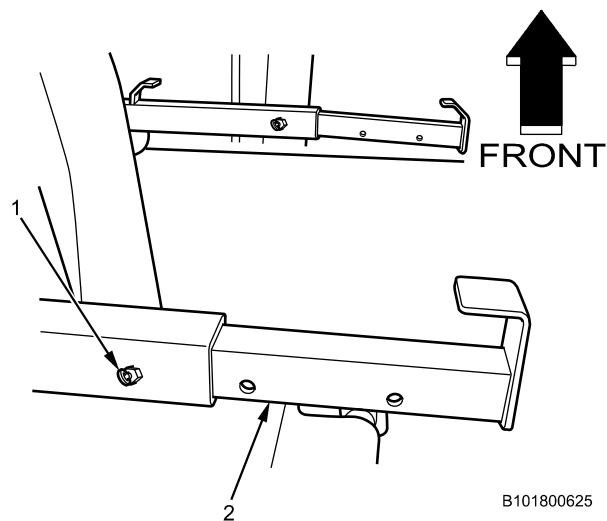
LITTER REMOVAL

Figure 1. Litter Arm Extensions.

1. Pull out spring-loaded retaining pin (Figure 1, Item 1) and hold to release litter arm extension (Figure 1, Item 2).
2. Slide litter arm extension (Figure 1, Item 2) away from litter.
3. Release retaining pin (Figure 1, Item 1) to secure litter arm extension (Figure 1, Item 2) in extended position.
4. Repeat steps 1-3 for other litter arm.
5. Remove litter from rack.
6. Pull out spring-loaded retaining pin (Figure 1, Item 1) and hold to release litter arm extension.
7. Slide litter arm extension (Figure 1, Item 2) in.
8. Release retaining pin (Figure 1, Item 1) to secure litter arm extension (Figure 1, Item 2) in collapsed position.
9. Repeat steps 6-8 for other litter arm.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

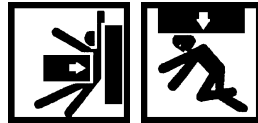
OPERATION UNDER UNUSUAL CONDITIONS - MANUAL REAR DOOR/RAMP OPERATION

INITIAL SETUP:

NOT APPLICABLE

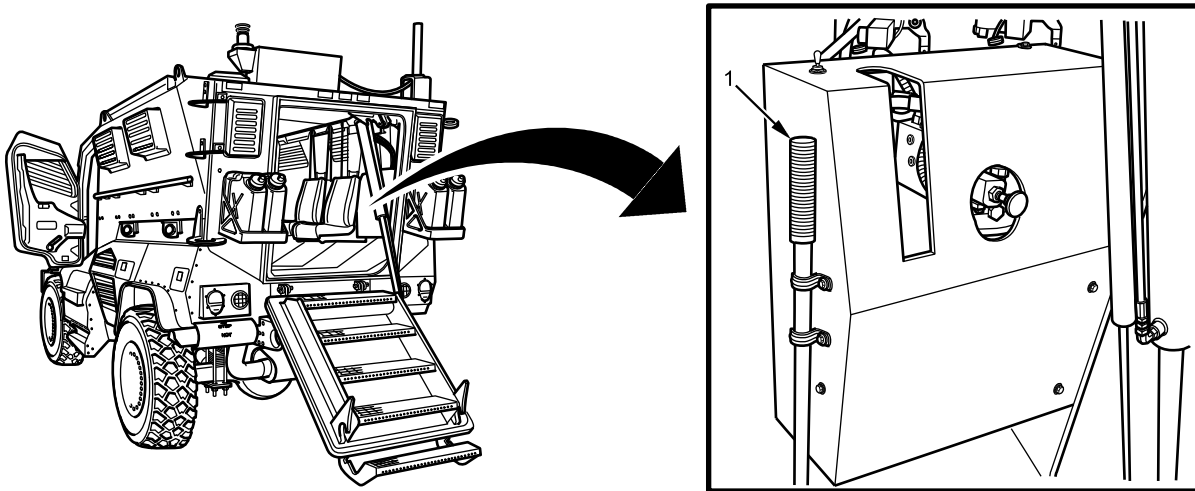
MANUAL REAR DOOR/RAMP OPERATION

WARNING



Rear cabin door/ramp is heavy. Make sure door/ramp is secured so it will not move. Failure to comply may result in serious personal injury or death to personnel.

Ensure no one is behind vehicle when lowering rear door/ramp. Use extreme caution when using emergency rear door/ramp release, to ensure no one is struck by door as it falls open. Sound horn before lowering door/ramp. Keep arms and legs clear of rear door/ramp when closing. Do not operate rear door/ramp when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.



B231805906

Figure 1. Manual Door Handle Storage.

NOTE

Rear door/ramp can be manually operated in the event of a power failure.

Perform steps 1-3 for push-type plunger vehicles.

1. Remove pump handle (Figure 1, Item 1) from side of hydraulic pump cover.

Operation Under Unusual Conditions - Manual Rear Door/Ramp Operation - (CONTINUED)

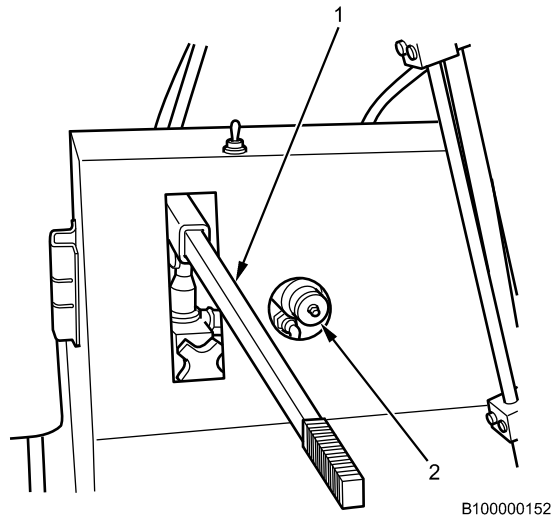


Figure 2. Front Plunger and Handle – Lowering (Push-Type Plunger).

2. To lower rear door/ramp, push front hydraulic plunger (Figure 2, Item 2) inward and rotate clockwise.
3. Insert hydraulic pump handle (Figure 2, Item 1) into hydraulic pump. Pump handle up and down to lower rear door/ramp.

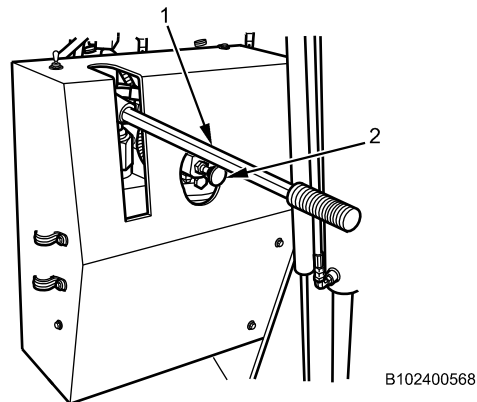


Figure 3. Front Plunger and Handle – Lowering.

NOTE

Perform steps 4-5 for pull-plunger knob-type vehicles only.

4. To lower rear door/ramp, pull front plunger knob (Figure 3, Item 2) outward and rotate counterclockwise.
5. Insert pump handle (Figure 3, Item 1) into pump. Pump handle up and down to lower rear door/ramp.

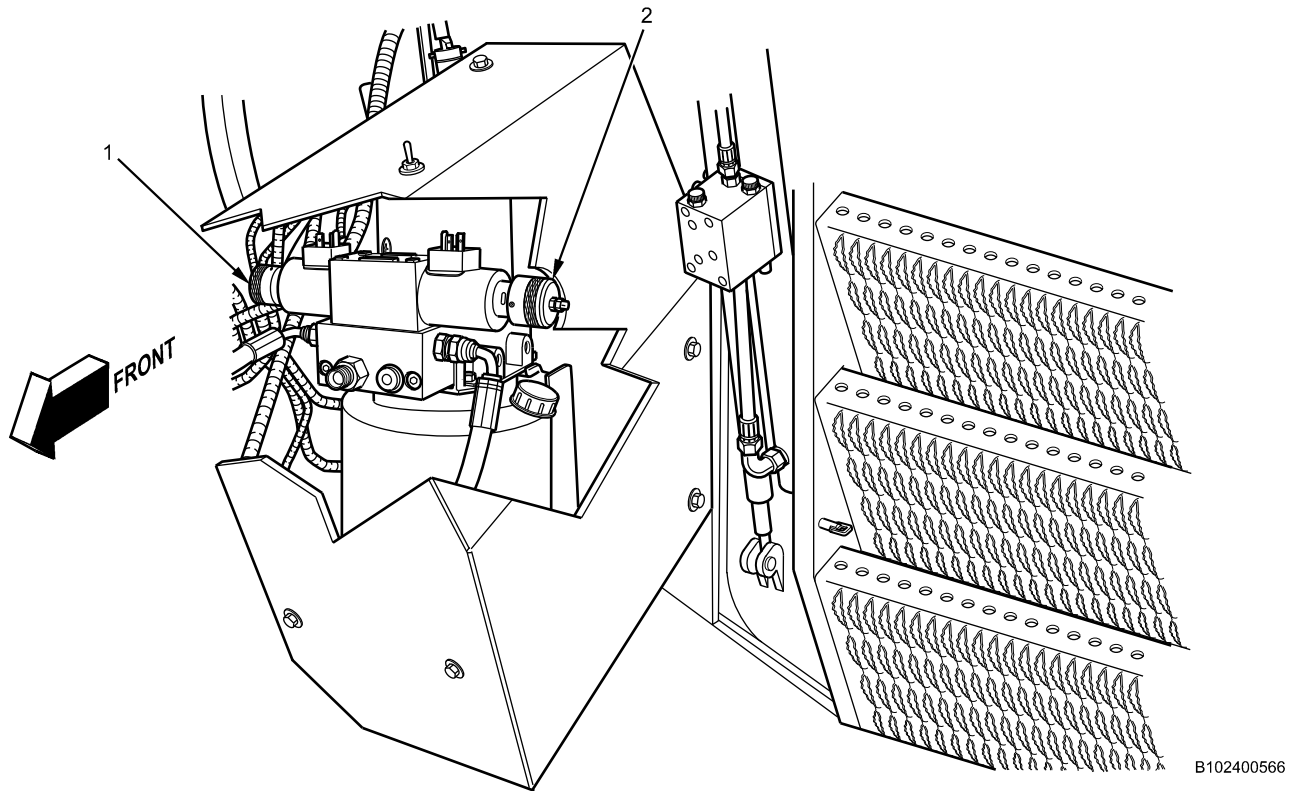
Operation Under Unusual Conditions - Manual Rear Door/Ramp Operation - (CONTINUED)


Figure 4. Plungers – Raising (Push-Type Plunger).

NOTE

Perform steps 6-8 for push-type plunger-type vehicles only.

6. To raise rear door/ramp on models with push-type plungers, verify front plunger (Figure 4, Item 2) is rotated counterclockwise and outward.
7. Push rear plunger (Figure 4, Item 1) inward and rotate counterclockwise.
8. Insert hydraulic pump handle (Figure 2, Item 1) into hydraulic pump. Pump handle up and down to raise rear door.

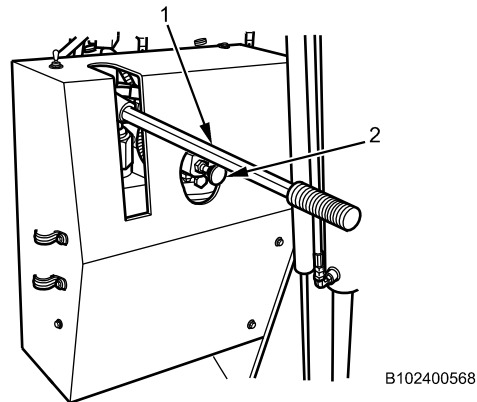
Operation Under Unusual Conditions - Manual Rear Door/Ramp Operation - (CONTINUED)

Figure 5. Plunger and Handle – Raising.

NOTE

Perform steps 9-10 for pull-plunger knob-type vehicles only.

9. To raise rear door/ramp on models with pull-type plungers, push plunger knob (Figure 5, Item 2) inward and rotate clockwise.
10. Insert pump handle (Figure 5, Item 1) into hydraulic pump. Pump handle up and down to raise rear door/ramp.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

OPERATION UNDER UNUSUAL CONDITIONS - PINTLE OPERATION

INITIAL SETUP:

NOT APPLICABLE

PINTLE OPERATION

WARNING

Do not position hands near pintle hook when connecting or removing towed equipment. Ensure service brake lights, emergency flashers, and turn signals on towed equipment operate in coordination with the towing vehicles. Failure to comply may result in serious injury or death to personnel.

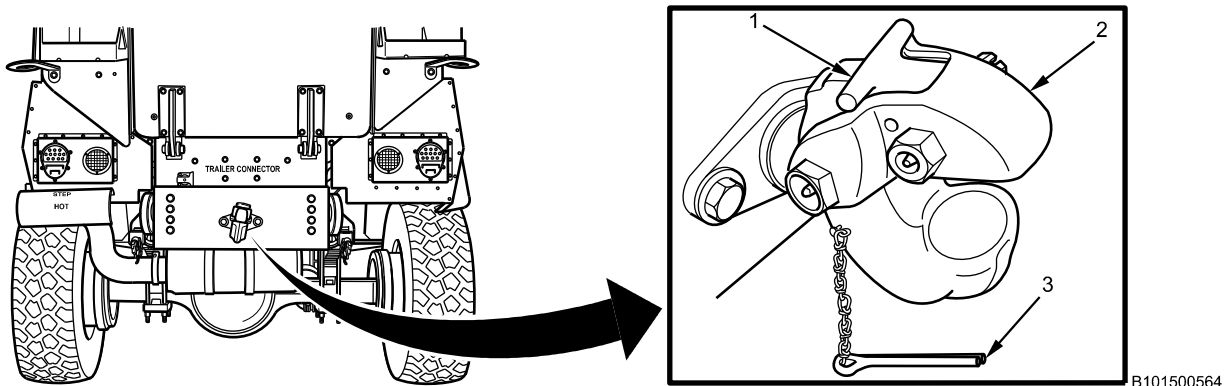


Figure 1. Opening Tow Pintle.

1. To open pintle, remove cotter pin (Figure 1, Item 3), pull release lever (Figure 1, Item 1) back, and raise pintle hook jaw (Figure 1, Item 2) until it locks into open position.

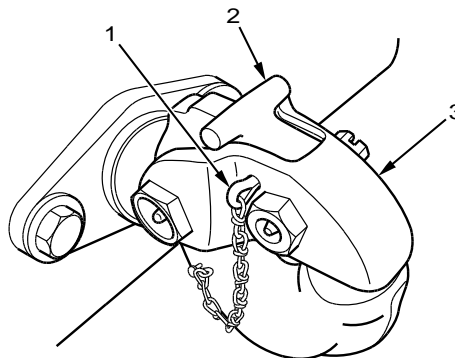


Figure 2. Closing Tow Pintle.

2. To close pintle, firmly grip top of pintle jaw (Figure 2, Item 3) to prevent it from dropping closed. Pull release lever (Figure 2, Item 2) back and lower pintle jaw (Figure 2, Item 3) into closed position.

Operation Under Unusual Conditions - Pintle Operation - (CONTINUED)

3. Insert cotter pin (Figure 2, Item 1) to secure pintle in closed position.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - SERVICE AND EMERGENCY BRAKE GLADHAND AIR HOSE CONNECTING**

INITIAL SETUP:NOT APPLICABLE

SERVICE AND EMERGENCY BRAKE GLADHAND AIR HOSE CONNECTING**WARNING**

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

Do not operate vehicle with air pressure system loss. Vehicle has reduced or no braking capability and may not stop. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Wear eye protection when working on or around air systems. Air lines, fittings, and components contain air under pressure. Failure to comply may result in injury or death to personnel.

NOTE

Gladhands are used to provide service brake and emergency air brake pressure to a disabled vehicle by a functioning vehicle. Gladhands are found on the front and rear of vehicle. Rear gladhands are used on recovery vehicles to distribute air pressure, and front gladhands are used to allow disabled vehicle to receive air pressure.

Service brake connection is on right side of vehicle, labeled SERVICE. Emergency brake connection is on left side of vehicle, labeled EMERGENCY.

Operation Under Unusual Conditions - Service and Emergency Brake Gladhand Air Hose Connecting - (CONTINUED)

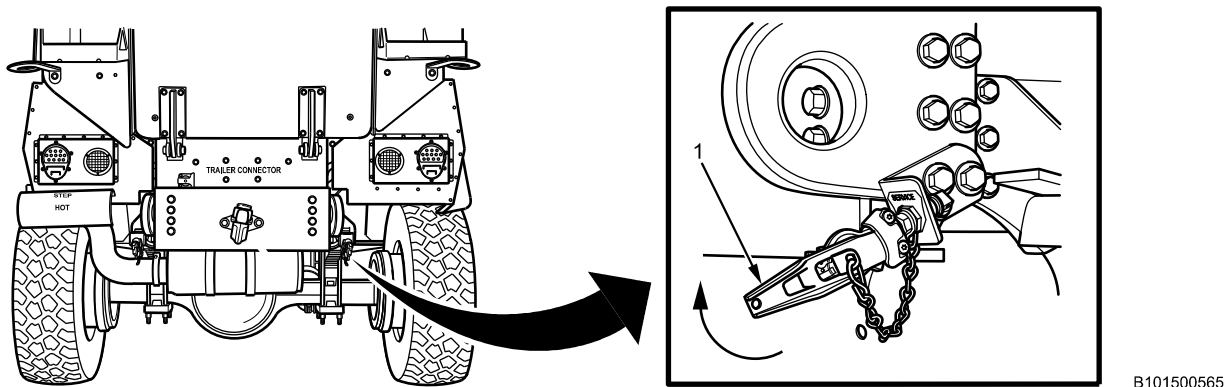
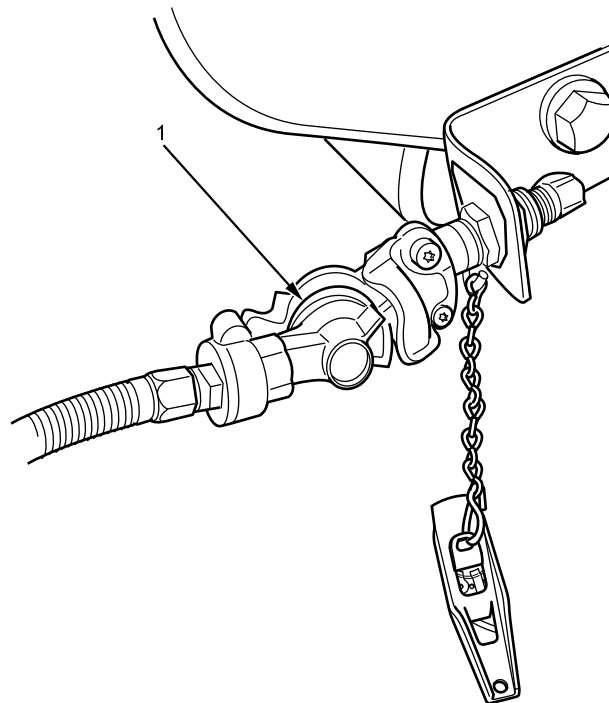


Figure 1. Dummy Gladhand Removal (Rear Service Shown, Front Similar).

1. Remove dummy rear coupling (Figure 1, Item 1) from SERVICE brake connection on towing vehicle by twisting.
2. Remove dummy rear coupling (Figure 1, Item 1) from EMERGENCY brake connection on towing vehicle by twisting.
3. Repeat steps 1 and 2 on equipment or vehicle to be towed.

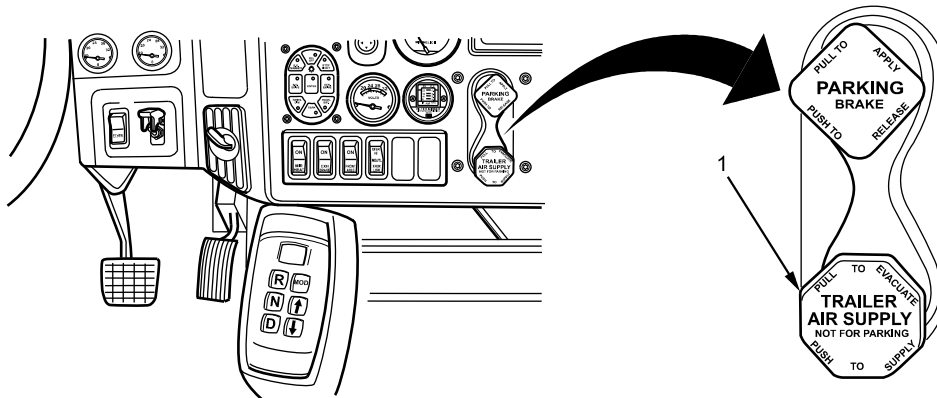


B101500429

Figure 2. Connecting Air Hose to Gladhand (Service Hose Shown, Emergency Hose Similar).

4. Attach BLUE SERVICE air hose (Figure 2, Item 1) to SERVICE brake connection on rear of towing vehicle by mating rubber bushings together and twisting into place.
5. Connect RED EMERGENCY air hose to EMERGENCY brake connection on rear of towing vehicle by mating rubber bushings together and twisting securely into place.

Operation Under Unusual Conditions - Service and Emergency Brake Gladhand Air Hose Connecting - (CONTINUED)



B106300432

Figure 3. Engaging Trailer Air Supply.

WARNING

Let air pressure build in both tanks to 100 psi (689 kPa) before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.

6. Push in RED trailer air supply control button (Figure 3, Item 1). Start the towing vehicle.
7. Repeat steps 4 and 5 on equipment or vehicle to be towed.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - SERVICE AND EMERGENCY BRAKE GLADHAND AIR HOSE DISCONNECTING**

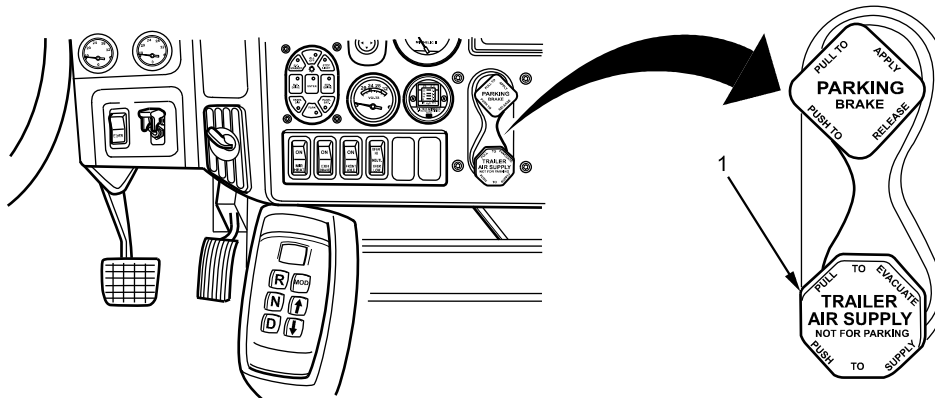
INITIAL SETUP:NOT APPLICABLE

SERVICE AND EMERGENCY BRAKE GLADHAND AIR HOSE DISCONNECTING**WARNING**

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

Wear eye protection when working on or around air systems. Air lines, fittings, and components contain air under pressure. Failure to comply may result in injury or death to personnel.

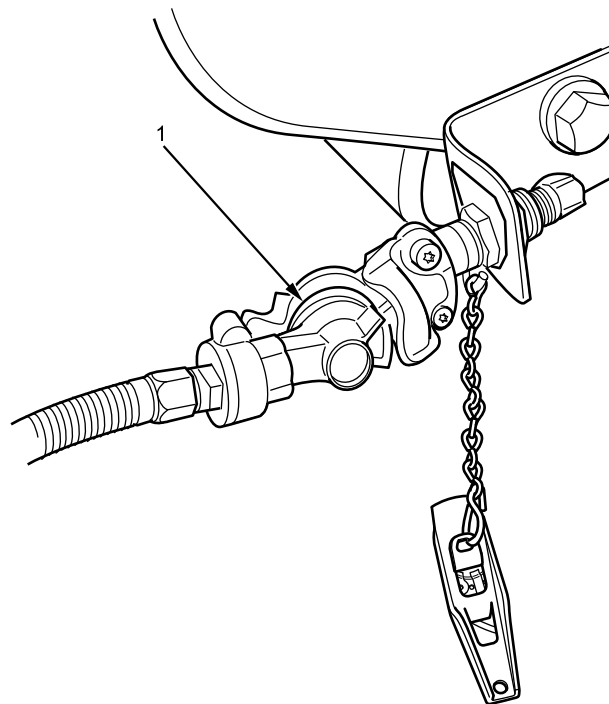
Operation Under Unusual Conditions - Service and Emergency Brake Gladhand Air Hose Disconnecting - (CONTINUED)



B106300432

Figure 1. Engaging Trailer Air Supply.

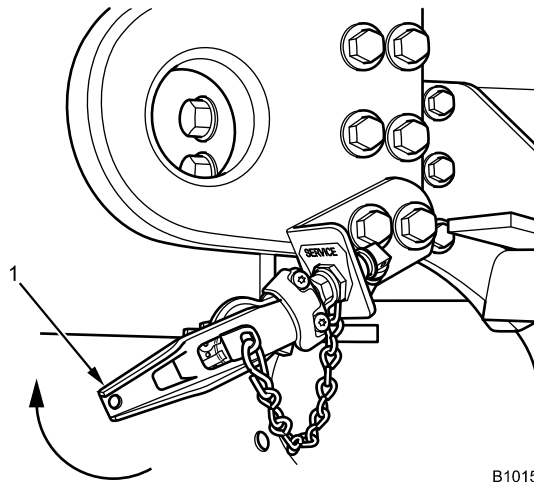
1. Pull out RED trailer air supply control button (Figure 1, Item 1) on towing vehicle.



B101500429

Figure 2. Disconnecting Air Hose from Gladhand (Service Hose shown; Emergency Similar).

2. Disconnect BLUE SERVICE air hose (Figure 2, Item 1) from SERVICE brake connection on rear of towing vehicle.
3. Disconnect RED EMERGENCY air hose from SERVICE brake connection on rear of towing vehicle.
4. Repeat steps 2 and 3 on equipment or vehicle to be towed.

Operation Under Unusual Conditions - Service and Emergency Brake Gladhand Air Hose Disconnecting - (CONTINUED)

B101500428

Figure 3. Dummy Gladhand Installation (Rear Service Shown; Front Similar).

5. Install dummy rear coupling (Figure 3, Item 1) on SERVICE brake connection on towing vehicle by twisting until tightened securely.
6. Install dummy rear coupling (Figure 3, Item 1) on EMERGENCY brake connection on towing vehicle by twisting until tightened securely.
7. Repeat steps 5 and 6 on equipment or vehicle to be towed.

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - TRAILER CABLE CONNECTING**

INITIAL SETUP:NOT APPLICABLE

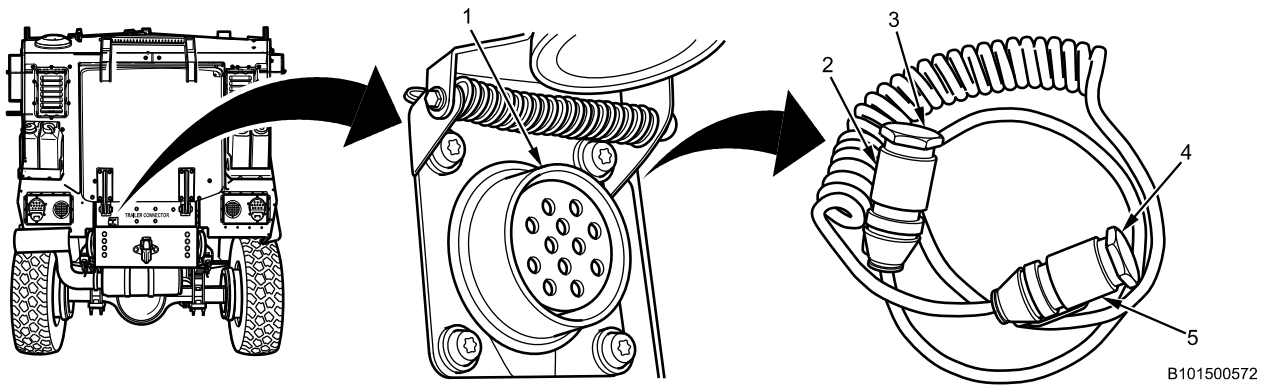
TRAILER CABLE CONNECTING

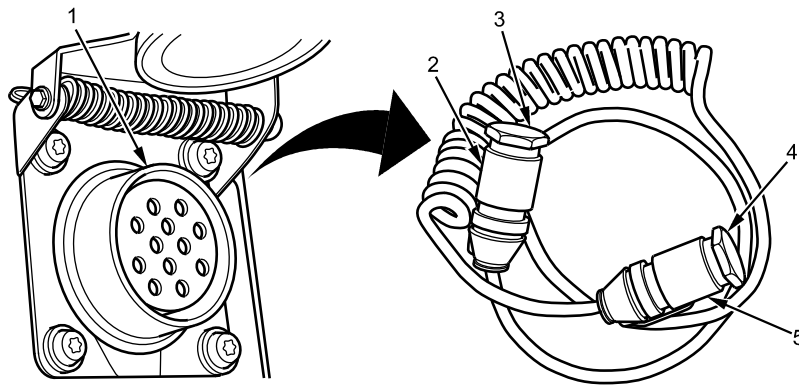
Figure 1. Cable Connection.

1. Remove BLACK cap (Figure 1, Item 3) from end of trailer cable connector (Figure 1, Item 2).
2. Lift cover on vehicle trailer connector (Figure 1, Item 1) from towing vehicle.
3. Push trailer cable connector (Figure 1, Item 2) into vehicle trailer connector (Figure 1, Item 1).
4. Remove BLACK cap (Figure 1, Item 4) from end of trailer cable connector (Figure 1, Item 5) and connect cable to equipment or vehicle being towed.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - TRAILER CABLE DISCONNECTING**

INITIAL SETUP:NOT APPLICABLE

TRAILER CABLE DISCONNECTING

B101500577

Figure 1. Cable Disconnection.

1. Lift cover on vehicle trailer connector (Figure 1, Item 1) from towing vehicle.
2. Pull trailer cable connector (Figure 1, Item 2) out of vehicle trailer connector (Figure 1, Item 1).
3. Insert BLACK cap (Figure 1, Item 3) on end of trailer cable connector (Figure 1, Item 2).
4. Disconnect trailer cable connector (Figure 1, Item 5) from equipment being towed or disabled vehicle, and insert BLACK cap (Figure 1, Item 4) on end of trailer cable connector.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**OPERATION UNDER UNUSUAL CONDITIONS - INTERIM NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC)
DECONTAMINATION**

INITIAL SETUP:**References**FM 3-5

NBC DECONTAMINATION

This vehicle is equipped for extended protection against NBC fallout. If vehicle has entered a contaminated area, perform the following steps.

1. Remove vehicle from contaminated area.
2. Proceed at the earliest opportunity to an area where a thorough decontamination may be performed. Refer to FM 3-5 for decontamination information.

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**EMERGENCY OPERATION**

INITIAL SETUP:**Personnel Required**

Crewmember - (2)

TM 9-2320-279-10-1

TM 9-2320-279-10-2

References

FM 21-305

FM 4-30.31

TB 9-2320-279-12-1

TC 43-35

TM 10633A-10A

TM 10867B-12

WP 0004

WP 0010

WP 0011

WP 0021

WP 0031

WP 0040

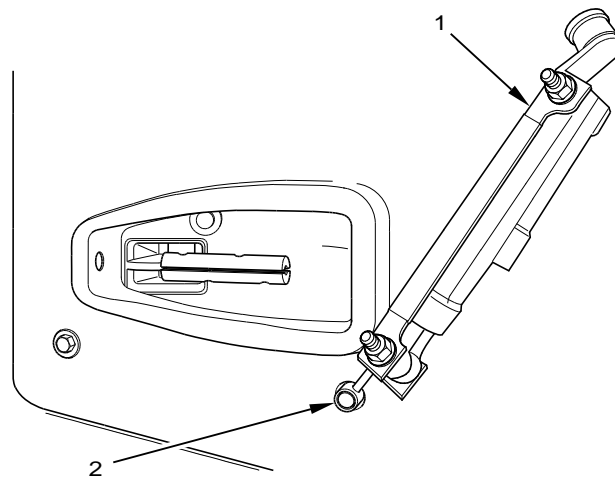
WP 0073

EMERGENCY EVACUATION**WARNING**

Notify Field Maintenance following all emergency operations so that vehicle can be inspected and restored to proper operating condition. Failure to comply may result in injury or death to personnel.

NOTE

Emergency rescue procedures from outside of vehicle require unlocking the combat lock.



B10000188

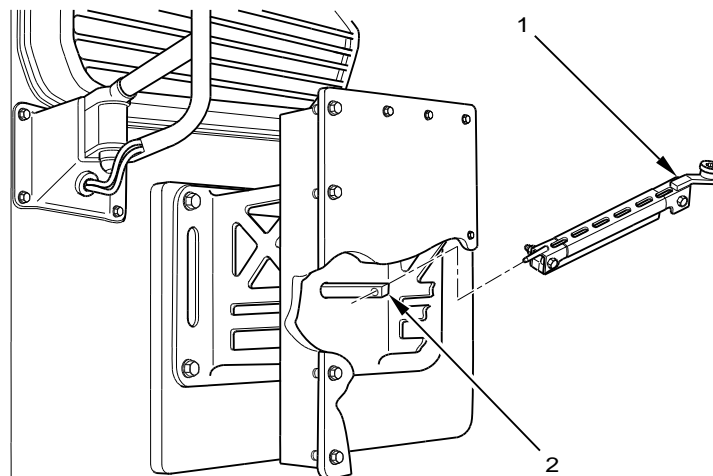
Figure 1. Combat Lock Shaft and Universal Combat Lock Tool – Passenger Side.

1. To open combat lock without MRAP Expedient Armor Program (MEAP) armor installed:

NOTE

Passenger side shown without MEAP.

- a. Insert universal combat lock tool (Figure 1, Item 1) into hole in combat lock shaft (Figure 1, Item 2).
- b. For passenger side, rotate combat lock shaft (Figure 1, Item 2) with universal combat lock tool (Figure 1, Item 1) counterclockwise to disengage combat lock.
- c. For driver side, rotate combat lock shaft with universal combat lock tool clockwise to disengage combat lock.



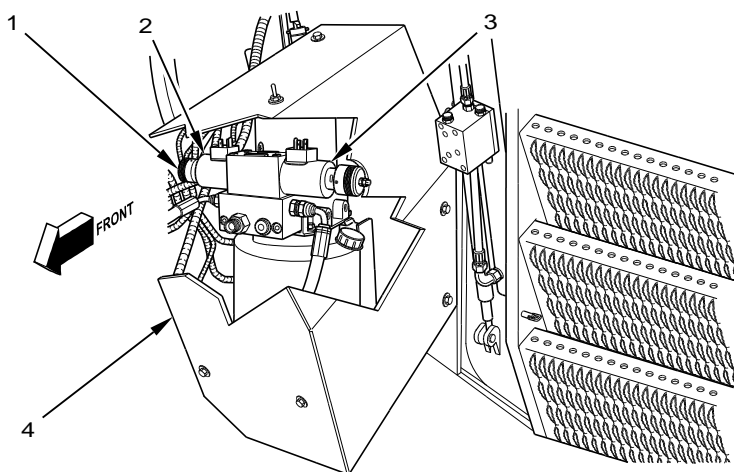
B103300461

Figure 2. Combat Lock Shaft and Universal Combat Lock Tool – Driver Side.

NOTE

Driver side shown with MEAP.

2. To open combat lock with MEAP armor installed:
 - a. Insert universal combat lock tool (Figure 2, Item 1) into hole in combat lock shaft (Figure 2, Item 2) behind MEAP armor.
 - b. For passenger side, rotate combat lock shaft (Figure 2, Item 2) with universal combat lock tool (Figure 2, Item 1) counterclockwise to disengage combat lock.
 - c. For driver side, rotate combat lock shaft with universal combat lock tool clockwise to disengage combat lock.

REAR DOOR/RAMP EMERGENCY RELEASE (TWO-PLUNGER TYPE)

004146

Figure 3. Rear Door/Ramp Hydraulic Pump, Behind Sheet Metal Cover (2-Plunger Type).

WARNING

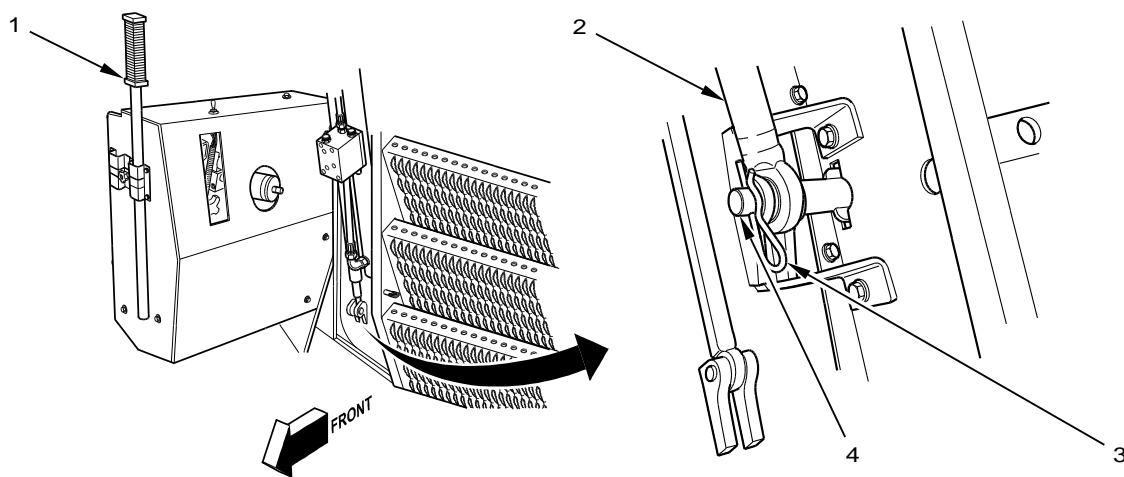
Never touch any part of a hydraulic assembly before ensuring system is depressurized. The rear door actuating system operates under high pressure. Pressurized hydraulic fluid can penetrate skin and body tissue. Contact with pressurized hydraulic fluid requires prompt medical attention, even if an injury is not evident. Failure to comply may result in serious injury, amputation, or death to personnel.

NOTE

Hydraulic pressure needs to be released from rear door/ramp hydraulic cylinder before emergency release lock pin is removed.

Rear pressure relief valve is located directly behind the front manual pressure valve, under sheet metal cover.

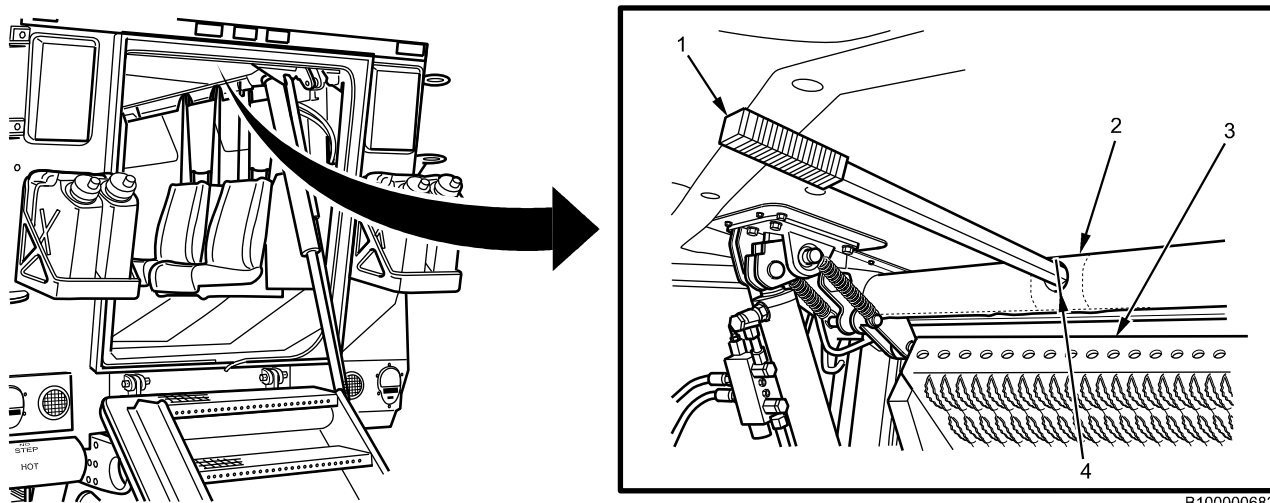
1. Reach behind front manual pressure valve (Figure 3, Item 3) under sheet metal cover (Figure 3, Item 4) and locate knurled knob (Figure 3, Item 1) on rear pressure valve (Figure 3, Item 2). Push knurled knob in and release to relieve hydraulic pressure from main hydraulic cylinder.



004145

Figure 4. Rear Door/Ramp Bridge Pin and Lock Pin (Two-Plunger Type).

2. Remove bridge pin (Figure 4, Item 3) from lock pin (Figure 4, Item 4).
3. Remove lock pin (Figure 4, Item 4) from lower connection point of main hydraulic cylinder (Figure 4, Item 2).
4. Remove pump handle (Figure 4, Item 1) from side of sheet metal cover.



B100000683

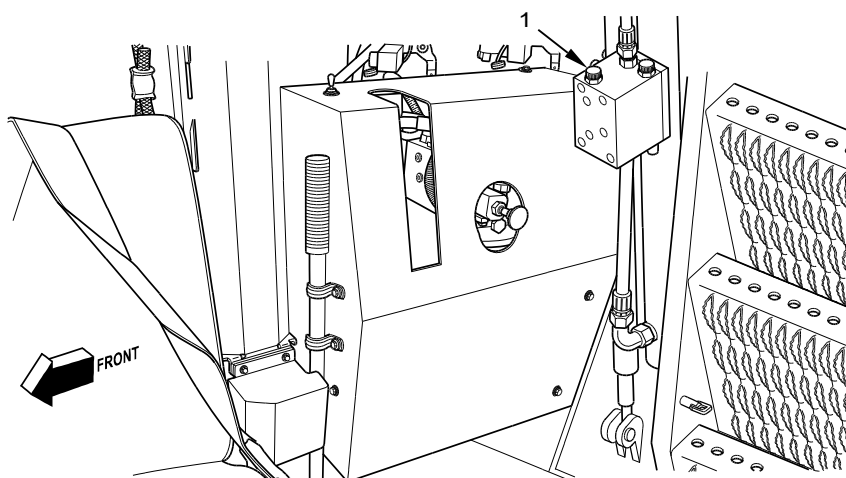
Figure 5. Rear Door/Ramp Lock Center Bar and Handle (Two-Plunger Type).

5. Place rear door/ramp pump handle (Figure 5, Item 1) in hole (Figure 5, Item 4) on center bar (Figure 5, Item 2). Pull down on pump handle (Figure 5, Item 1) and hold to unlock rear door/ramp (Figure 5, Item 3).

WARNING

Ensure no one is behind vehicle when lowering rear door/ramp. Sound horn before lowering door/ramp. Use extreme caution when using emergency rear door/ramp release, to ensure no one is struck by door as it falls open. Once the rear door lock is released, the rear door/ramp may fall unassisted. Keep arms and legs clear of rear door/ramp when closing. Do not operate rear door/ramp when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.

6. Push rear door/ramp (Figure 5, Item 3) open.

REAR DOOR/RAMP EMERGENCY RELEASE (SINGLE-PLUNGER TYPE)

004144

Figure 6. Rear Door/Ramp Hydraulic Cylinder Relief Valve Knob (Single-Plunger Type).

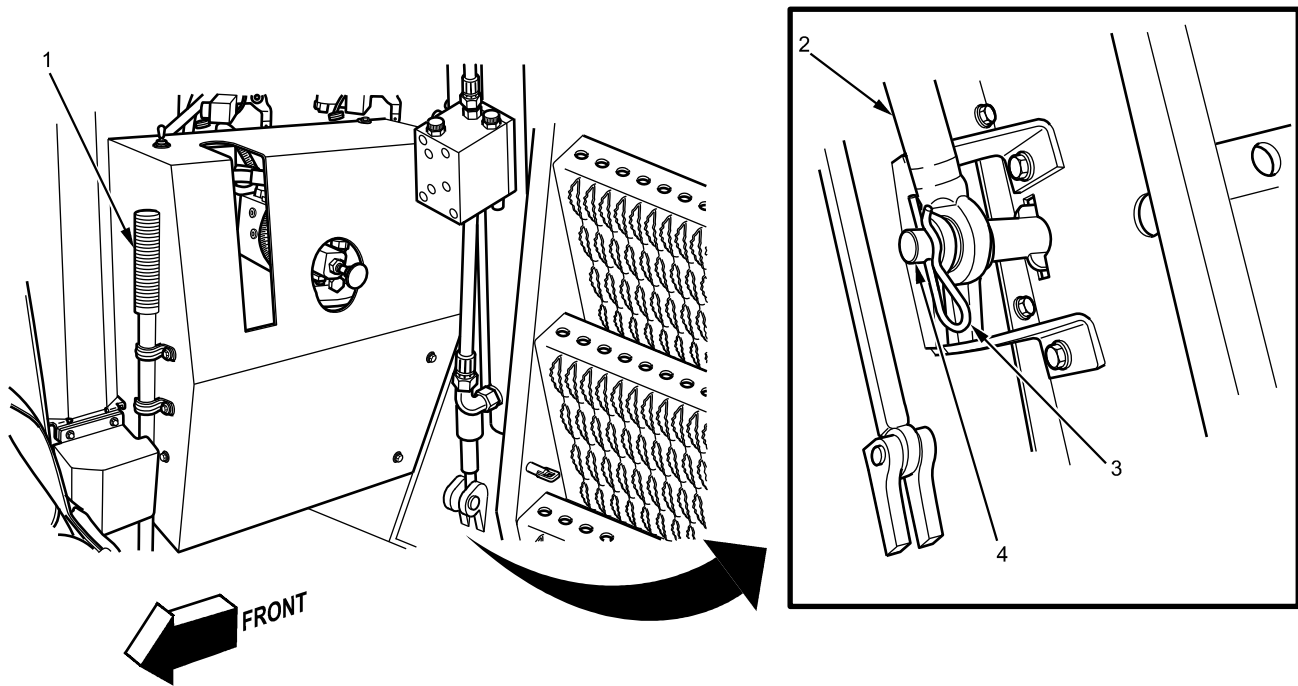
WARNING

Never touch any part of a hydraulic assembly before ensuring system is depressurized. The rear door actuating system operates under high pressure. Pressurized hydraulic fluid can penetrate skin and body tissue. Contact with pressurized hydraulic fluid requires prompt medical attention, even if an injury is not evident. Failure to comply may result in serious injury, amputation, or death to personnel.

NOTE

Hydraulic pressure needs to be released from rear door/ramp hydraulic cylinder before emergency release lock pin is removed.

1. Turn knurled knob (Figure 6, Item 1) counterclockwise to release hydraulic pressure from main hydraulic cylinder.



B102400668

Figure 7. Rear Door/Ramp Bridge Pin and Lock Pin (Single-Plunger Type).

2. Remove bridge pin (Figure 7, Item 3) from lock pin (Figure 7, Item 4).
3. Remove lock pin (Figure 7, Item 4) from lower connection point of main hydraulic cylinder (Figure 7, Item 2).
4. Remove pump handle (Figure 7, Item 1) from side of sheet metal cover.

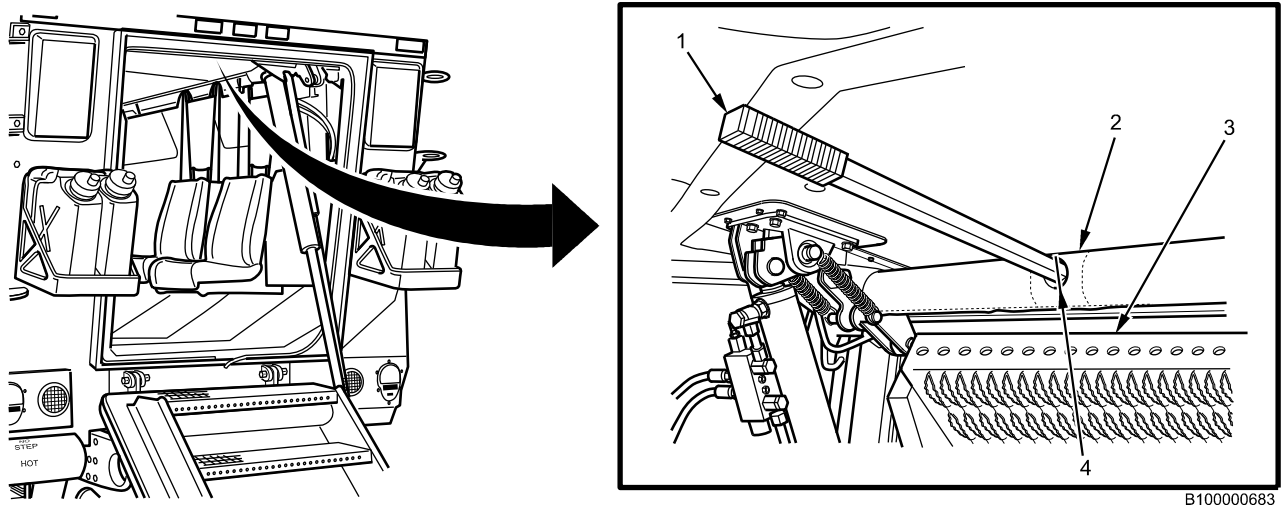


Figure 8. Rear Door/Ramp Lock Center Bar and Handle (Single-Plunger Type).

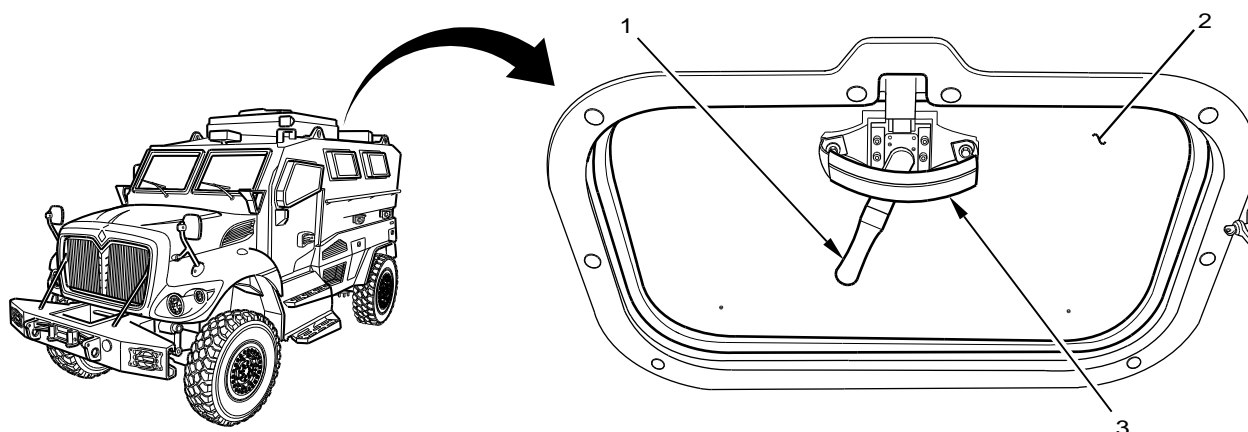
5. Place rear door/ramp pump handle (Figure 8, Item 1) in hole (Figure 8, Item 4) on center bar (Figure 8, Item 2). Pull down on pump handle (Figure 8, Item 1) and hold to unlock rear door/ramp (Figure 8, Item 3).

WARNING



Ensure no one is behind vehicle when lowering rear door/ramp. Sound horn before lowering door/ramp. Use extreme caution when using emergency rear door/ramp release, to ensure no one is struck by door as it falls open. Once the rear door lock is released, the rear door/ramp may fall unassisted. Keep arms and legs clear of rear door/ramp when closing. Do not operate rear door/ramp when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.

6. Push rear door/ramp (Figure 8, Item 3) open.

EMERGENCY ROOF HATCH

004138

Figure 9. Emergency Roof Hatch (Shown from Inside Vehicle).

WARNING

Emergency hatch door is extremely heavy. Use caution and keep arms, hands, and head clear of hatch when opening or closing. Ensure hatch door is properly secured in both the open or closed position. Do not operate vehicle with emergency roof hatch open. Failure to comply may result in serious injury or death to personnel.

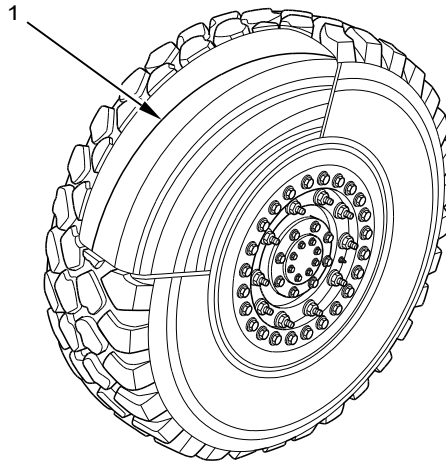
1. Open roof hatch (Figure 9, Item 2) by pulling latch lever (Figure 9, Item 1) toward front of cabin and pushing hatch upward simultaneously.
2. Close roof hatch (Figure 9, Item 2) by pulling on BLACK handle strap (Figure 9, Item 3) until hatch is closed. Latch lever (Figure 9, Item 1) will automatically latch.

RUN FLAT TIRES**WARNING**

Use caution when operating vehicle with one or more deflated tires. The run flat system allows continued operation of vehicle, but requires reduced speed (30 mph) and results in reduced handling capability. Failure to comply may result in damage to equipment and serious injury or death to personnel.

NOTE

The vehicle is equipped with run flat tires (Figure 10, Item 1). If tires lose air, vehicle can still be operated at a speed up to 30 mph (48 kph) for up to 30 miles (48 km).

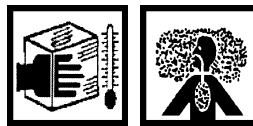


004137

Figure 10. Run Flat Tire.

FIRE SUPPRESSION SYSTEM (FSS)

WARNING



Exposure to large quantities of dry chemical fire extinguisher in cab may result in temporary breathing difficulty during and immediately after discharge. Ventilate and wash cab thoroughly prior to reentry. If respiratory irritation or distress occurs, move victim to fresh air. Seek medical attention if irritation persists.

Chemical fire suppression agents are refrigerants and can freeze skin. Extinguisher will be extremely cold after discharging. Avoid contact with chemical agent and do not touch extinguisher after use. Failure to comply may result in serious personal injury.

Ensure that stowed items don't interfere with the Fire Suppression System (FSS). Do not stow any items around the valve outlet port nozzles that may interfere with the proper operation of the AFES. Failure to comply may result in death or injury to personnel and damage to equipment.

Ensure that the Fire Suppression System (FSS) dual spectrum thermal sensors are kept clean. If the dual spectrum thermal sensors are not kept clean, the FSS may not function properly in the event of a fire. Failure to comply may result in injury or death to personnel.

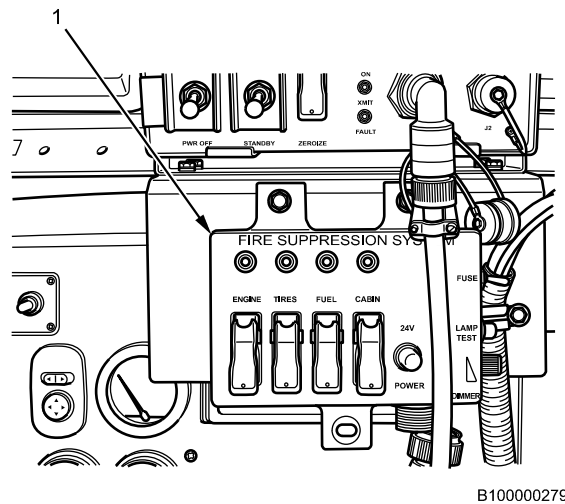


Figure 11. FSS Control Switches.

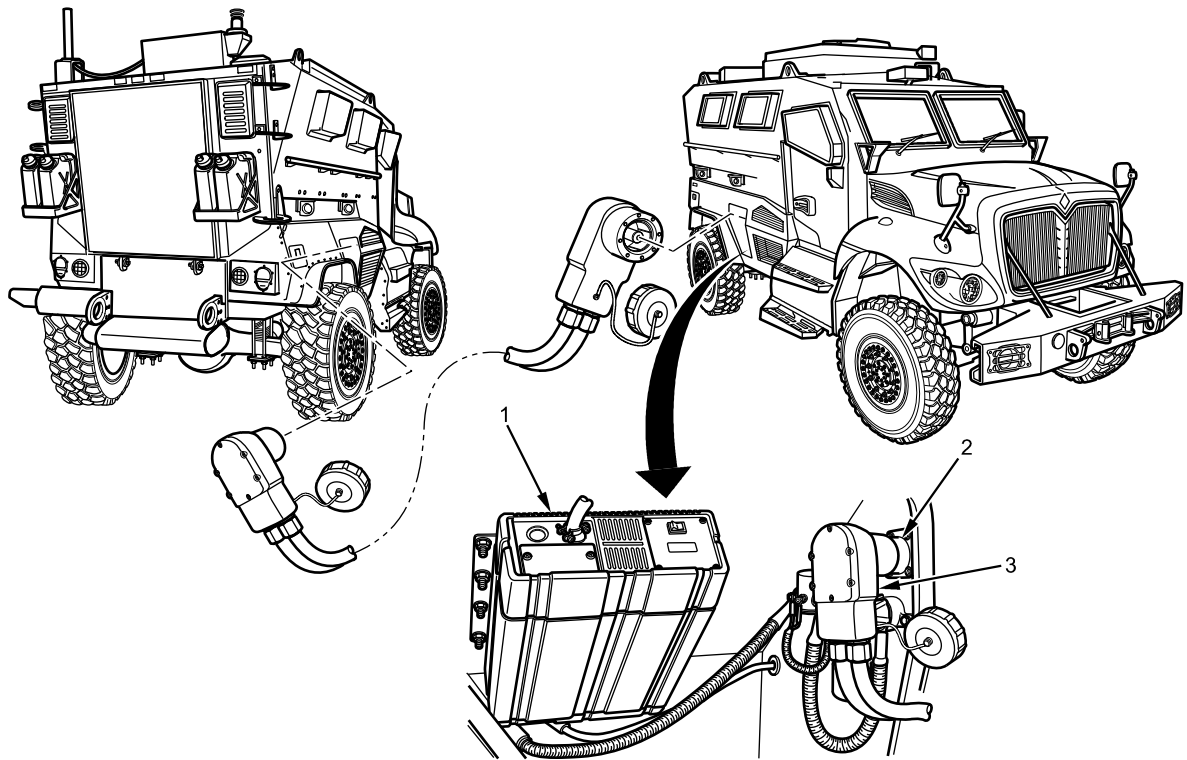
1. Operate the FSS manually as follows:
 - a. Determine area of fire.
 - b. Lift appropriate switch cover on FSS control panel (Figure 11, Item 1) and push toggle switch up to activate.
 - c. Notify Field Maintenance that system was discharged.

SLAVE STARTING

WARNING



Use extreme caution when testing or working on or around electrical circuits. Always assume that electrical circuits are live. Electrical shock can occur upon contact with voltage high enough to cause current flow through muscles or nerves. On Direct Current (DC) systems, generally 1 milliamp of current can be felt, 5 milliamps can cause severe pain, 15 milliamps can cause loss of muscle control, and 70 milliamps can be fatal. Wear protective clothing; ensure skin, clothing, and surrounding areas are dry; do not wear jewelry; and touch only the insulated, nonmetallic parts of electrical components and testing equipment. To prevent electrical arcing, avoid shorting electrical test probes and jumper wires. Electrical arcing can cause bright flashes of light, capable of causing temporary blindness. If electrical injury occurs, immediately shut off power supply and seek medical assistance. Failure to comply may result in serious injury or death to personnel.



B100600468

Figure 12. 110V Inverter, Slave Receptacle and Cable.

NOTE

If the batteries on the vehicle have run down and will not start the vehicle, use another vehicle to provide power to start disabled vehicle.

1. Position vehicles close enough to open stowage boxes while still able to move safely between vehicles.
2. Turn off ignition on both vehicles. Refer to WP 0011, Engine Shutdown and Parking. Unplug unnecessary accessories. Turn off lights, radios, 110V power inverter (Figure 12, Item 1), and any other electrical equipment that might cause a spark while connecting slave cable to both vehicles.
3. Locate slave receptacles (Figure 12, Item 2) on both vehicles, and remove GREEN protective caps.
4. Connect slave cable (Figure 12, Item 3) to disabled vehicle.
5. Connect slave cable (Figure 12, Item 3) to operational vehicle.
6. Start operational vehicle. Refer to WP 0010, Normal Driving Procedures. Run operational vehicle engine at 1000 rpm or higher to charge battery before attempting to start disabled vehicle. Refer to WP 0040, Throttle Idle Control Switches.
7. Start disabled vehicle.
8. When disabled vehicle is running smoothly, disconnect slave cable (Figure 12, Item 3) from both vehicles and install GREEN protective caps on slave receptacles.

CAUTION

Batteries must be fully charged before driving vehicle or operating accessories. Failure to comply may result in overcharging, causing damage to equipment.

9. Allow disabled vehicle to run and charge for at least 10 minutes before operating vehicle or accessories.

TRANSMISSION EMERGENCY OPERATION PROCEDURES (LIMP HOME)**WARNING**

When operating the vehicle in the transmission limp home mode, the operator must stay in vehicle and use only the service brakes to hold the vehicle in place. Failure to comply may result in injury or death to personnel.

CAUTION

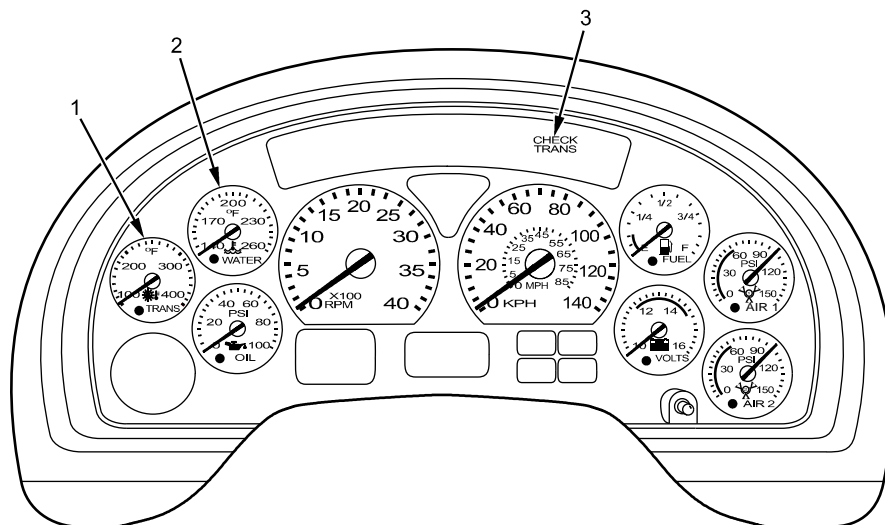
If transmission range selector flashes current range selection while operating vehicle (shift selection is inhibited), do not shut off engine or attempt to change range selection. Shutting off engine may result in the inability to select a drive range at startup. Move vehicle to safe place and notify Field Maintenance as soon as possible.

Do not shift into NEUTRAL (N) if CHECK TRANS indicator light comes on. Vehicle may be rendered inoperable.

Depending on what gear transmission is locked into, vehicle may not be able to drive up steep grades.

If transmission overheats during limp home mode, operator should stop vehicle (do not turn off engine). Allow transmission and engine to cool down to normal operating temperatures. If engine and transmission do not cool down or if overheating reoccurs, operator should turn off engine and notify Field Maintenance. Failure to comply may result in damage to equipment.

1. Apply service brakes and stop vehicle. Do not shift into NEUTRAL (N).



B100600586

Figure 13. Transmission Oil Gauge, Water Gauge, and Check Trans Light.

WARNING

Locked gears may limit vehicle speed or prohibit vehicle from ascending grades and traversing certain terrains. If transmission is locked in gear, a careful decision must be made to continue with mission or not. Failure to comply may result in injury or death to personnel.

2. Select REVERSE (R) on transmission gear selector and note if vehicle transmission shifts.
 - a. If transmission shifts into REVERSE (R), shift to DRIVE (D) and continue with mission. Notify Field Maintenance when mission is complete. Operator must monitor the water temperature gauge (Figure 13, Item 2) and transmission oil temperature gauge (Figure 13, Item 1) to ensure engine and transmission do not overheat. Refer to Overheating of Engine in this work package.
 - b. If transmission does not shift into REVERSE (R), transmission may be locked into a specific gear and may not shift out of gear, even if engine is turned off. If transmission is locked into gear and engine cannot be turned off, operator cannot leave cabin until the engine is shut down. Call for wrecker support. Do not shut vehicle off until decision is made to deadline vehicle. When engine is turned off, vehicle will be deadlined and not be operable until problem is corrected. If vehicle is deadlined, notify Field Maintenance.
 - c. If vehicle shifts normally and CHECK TRANS light (Figure 13, Item 3) remains on, turn off engine, wait 15 seconds, and restart engine. If CHECK TRANS light does not stay on, fault has cleared and vehicle can be operated normally. If CHECK TRANS light comes on and remains on after the second start-up, turn off engine and notify Field Maintenance.

OVERHEATING OF ENGINE

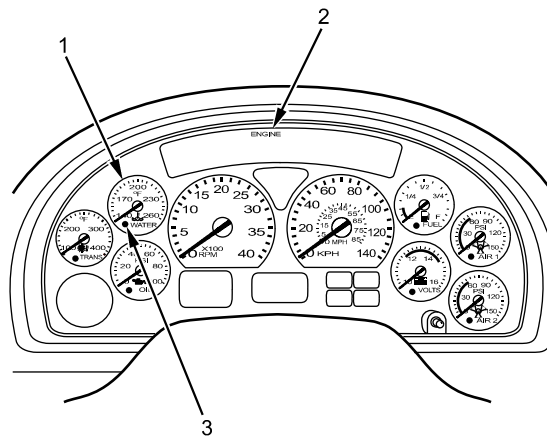
WARNING



Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.

CAUTION

Operating the vehicle with an overheated engine can cause permanent engine damage.



B100600541

Figure 14. Water Temperature Gauge and Check Engine Light.

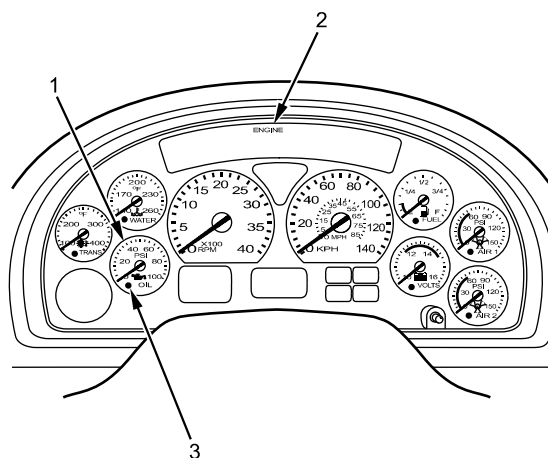
NOTE

The engine coolant temperature has three monitoring systems: water temperature light (Figure 14, Item 3), RED check engine light (Figure 14, Item 2), and water temperature gauge (Figure 14, Item 1).

1. If only one monitoring system indicates a problem and the other two are operating normally, shift transmission to next lower gear and observe water temperature.
2. If one monitoring system continues to indicate a problem, proceed with mission and notify Field Maintenance upon completion.
3. If any two of the three monitoring systems indicate a problem, park vehicle and allow engine to idle until water temperature cools down.
4. If water temperature does not go down, shut engine off and notify Field Maintenance. Refer to WP 0011 , Engine Shutdown and Parking.

LOSS OF OIL PRESSURE**CAUTION**

Operating the vehicle after loss of oil pressure can cause permanent engine damage.



B100600542

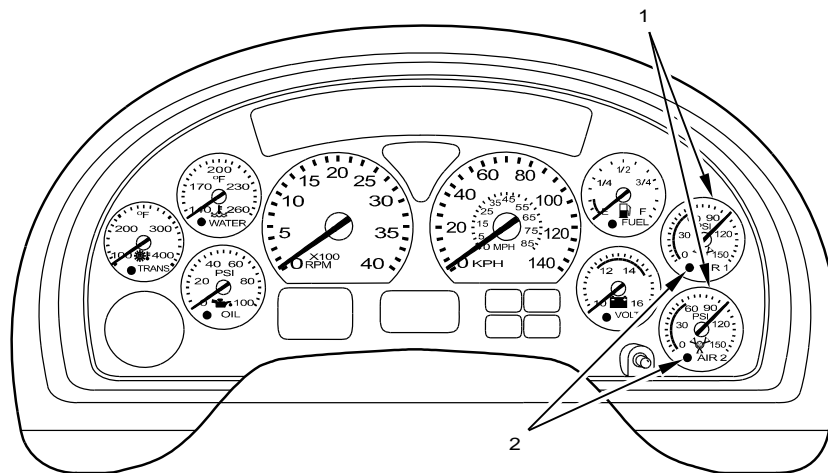
Figure 15. Engine Oil Pressure Gauge and Check Engine Light.

NOTE

The engine oil pressure has three monitoring systems: low oil pressure light (Figure 15, Item 3), RED check engine light (Figure 15, Item 2), and oil pressure gauge (Figure 15, Item 1).

1. If only one system indicates a problem and the other two are operating normally, proceed with mission and notify Field Maintenance upon completion.
2. If any two of the three systems indicate a problem, park vehicle, shut engine off and notify Field Maintenance. Refer to WP 0011 , Engine Shutdown and Parking.

LOSS OF AIR SYSTEM PRESSURE



005213

Figure 16. Air Tank Gauges.

Vehicle is equipped with two air tanks located on the right side of vehicle, under the battery box. Two Instrument Panel (IP) cluster gauges (Figure 16, Item 1) monitor air pressure. Normal air system operating pressure is 110 to 130 psi (758 to 896 kPa).

Each gauge has a low air pressure warning light (Figure 16, Item 2). Warning lights will illuminate RED when pressure in either section of the split air brake system is reduced to 70 psi (483 kPa).

If low air pressure warning light illuminates:

WARNING

Do not operate vehicle with air pressure system loss. Vehicle has reduced or no braking capability and may not stop. Failure to comply may result in damage to equipment and serious injury or death to personnel.

1. Remove vehicle from road as quickly and safely as possible. Reduced braking will occur and spring brakes will engage if air brake pressure is below 70 psi (483 kPa).
2. Notify Field Maintenance.

ENGINE OUT OF FUEL (RESTART PROCEDURES)**WARNING**

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Store diesel fuel in an approved container clearly marked DIESEL FUEL. Dispose of fuel in an approved container clearly marked DIESEL FUEL in accordance with standard operating procedures.

Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.

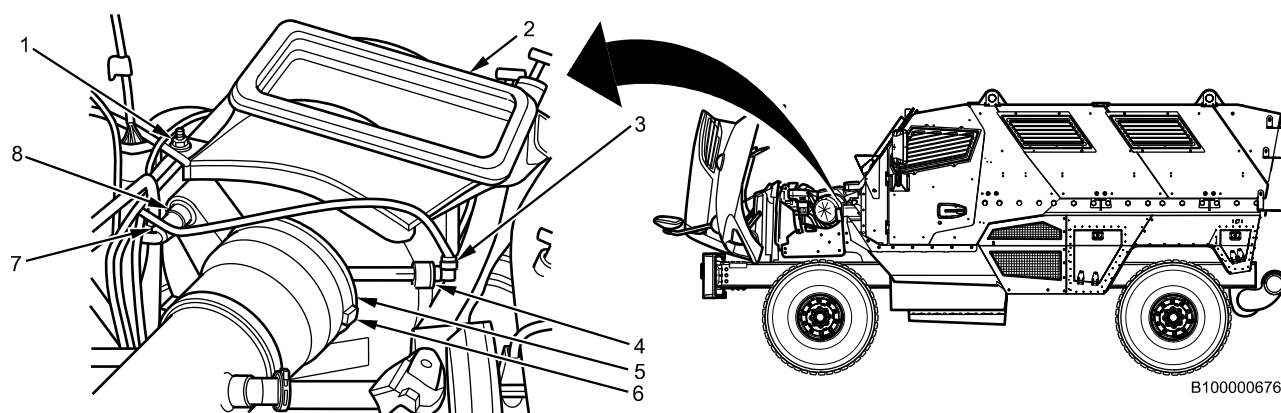


Figure 17. Air Cleaner Assembly.

1. Open engine hood. Refer to WP 0031 , Operation Under Usual Conditions.
2. Loosen hose clamp (Figure 17, Item 6) and remove hose (Figure 17, Item 5).
3. Remove two hex nuts (Figure 17, Item 1) and air cleaner assembly (Figure 17, Item 2) from support bracket.
4. Disconnect Intake Air Temperature (IAT) sensor connector (Figure 17, Item 7) from IAT sensor (Figure 17, Item 8).
5. Disconnect air filter restrictor gauge tubing (Figure 17, Item 3) from air filter restrictor angle fitting (Figure 17, Item 4).

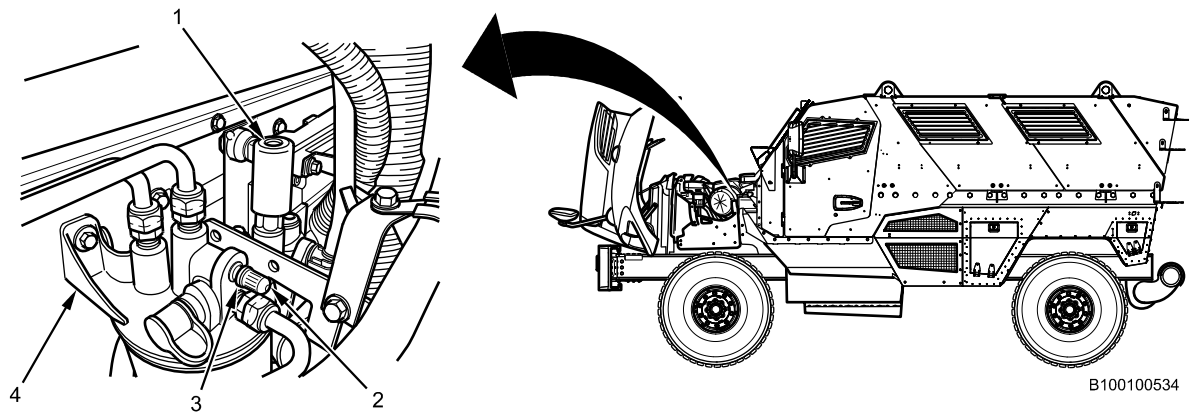


Figure 18. Fuel Bleed Valve and Pump.

CAUTION

Avoid bumping filter in housing, to prevent dirt and debris from entering clean side piping of turbocharger. Dirt or debris may cause engine issues if allowed to enter turbocharger.

6. Lift air cleaner to access priming pump (Figure 18, Item 1) and fuel prime bleed valve (Figure 18, Item 3).
7. Remove dust cap (Figure 18, Item 2) from bleed valve (Figure 18, Item 3) on fuel filter header (Figure 18, Item 4).
8. Place rag under fuel prime bleed valve (Figure 18, Item 3) to collect excess fuel.
9. Press center stem on bleed valve (Figure 18, Item 3) inward.
10. Operate priming pump (Figure 18, Item 1) by pushing down and releasing continually until fuel discharges from bleed valve (Figure 18, Item 3). Release bleed valve.
11. Remove fuel soaked rag.
12. Replace dust cap (Figure 18, Item 2).

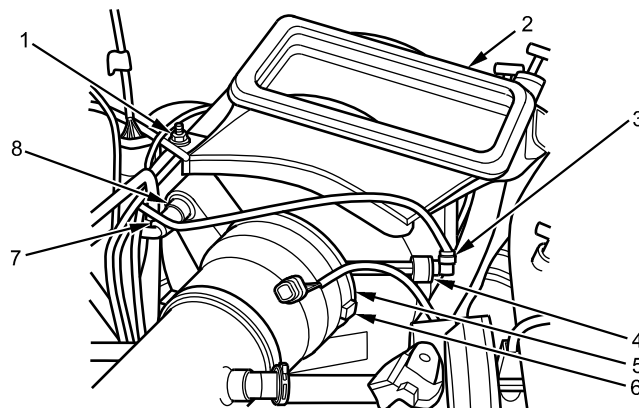


Figure 19. Air Cleaner Assembly.

13. Install air cleaner assembly (Figure 19, Item 2) on support bracket with two hex nuts (Figure 19, Item 1) and tighten securely.
14. Connect IAT sensor connector (Figure 19, Item 7) to IAT sensor (Figure 19, Item 8).
15. Connect air filter restrictor gauge tubing (Figure 19, Item 3) to air filter restrictor angle fitting (Figure 19, Item 4).
16. Install hose (Figure 19, Item 5) and clamp (Figure 19, Item 6).
17. Close engine hood. Refer to WP 0031, Open and Close Hood.

FLAT TOWING HOOKUP PREPARATION

WARNING

If brakes of disabled vehicle are inoperable, do not flat tow disabled vehicle. Request wrecker support. Do not move towing vehicle without assistance of ground guide. Ground guide must be visible to operator at all times. When using wrecker to tow a vehicle with nonfunctional brakes, use extreme caution and reduce speed accordingly. Ensure that all personnel are clear of vehicle before removing wheel chocks and starting to tow vehicle. The maximum speed limit on unpaved roads when towing is 15 mph (24 kph). Terrain, weather, and other conditions may require reduced speeds. Avoid sharp turns. On paved roads, speeds may be increased to 25 mph (40 kph) if conditions permit. When towing, ensure that all personnel are clear of vehicle before removing the wheel chocks and starting vehicle towing. Personnel must not occupy vehicle being towed. Use reasonable speeds for road conditions and cautions when making turns. Prior to disconnecting tow bar, ensure that vehicles are on level surface with wheels chocked. Failure to comply may result in damage to equipment and serious injury or death to personnel.

When performing like-vehicle towing operations, never proceed up or down grades greater than 20 percent.

CAUTION

Like-vehicle towing must be accomplished using vehicle of equal or greater weight. Refer to Table 1 for M1224 and Table 2 for M1224A1 vehicle data. Failure to comply may result in damage to disabled and towing vehicle.

Tires should be inflated to highway pressure, or damage to tires may result. Refer to WP 0002, Equipment Description and Data.

Towed vehicle must not exceed Gross Vehicle Weight (GVW) of towing vehicle. Exceeding GVW may cause damage to disabled and towing vehicles.

NOTE

Recovery personnel face several challenges that may affect recovery efforts. These challenges include size, weight, route clearance, and vehicle design issues.

The procedures in this work package were developed during Live Fire Tests (LFT) and Evaluation events at Aberdeen and Yuma Proving Grounds. Due to design, towing provisions may differ from vehicle to vehicle. Validate procedures in training prior to actual recovery missions. Final procedures will be published once all towing and recovery testing is complete, and final vehicle configurations are identified.

The following tables and illustrations identify correct towing equipment to use.

Table 1. M1224 Vehicle Data.

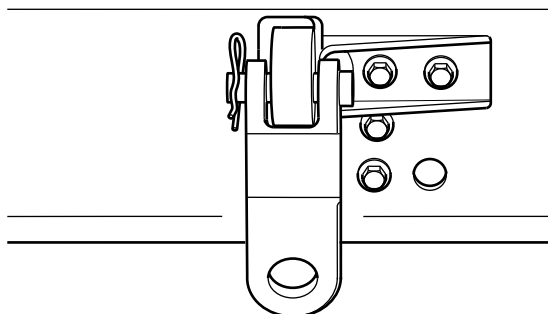
CREW	OVERALL LENGTH	OVERALL WIDTH	OVERALL HEIGHT	VEHICLE CURB WEIGHT	GROSS VEHICLE WEIGHT
6	260 in.	120 in.	112 in.	36,800 lbs	43,500 lbs

Table 2. M1224A1 Vehicle Data.

CREW	OVERALL LENGTH	OVERALL WIDTH	OVERALL HEIGHT	VEHICLE CURB WEIGHT	GROSS VEHICLE WEIGHT
6	260 in.	120 in.	159 in. w/Objective Gunner Protective Kit (OGPK)	39,100 lbs	43,500 lbs

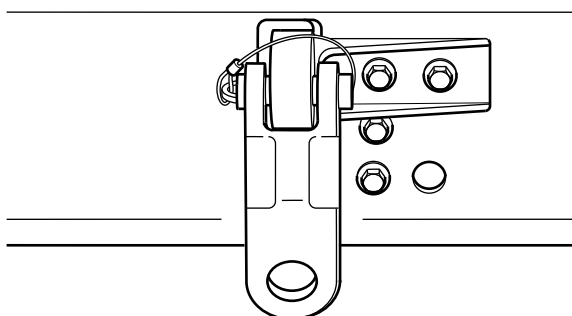
Table 3. Tow Bars and Adapters.

TOW BAR NSN	TYPE	ADAPTER NSN	TOW BAR CAPACITY
2340-01-267-2912 (U.S. Army)	V- type, light, medium, and heavy duty	2540-00-863-3153 2½-10 ton light duty	112,000 lbs M88A1 GVW
2350-01-496-8356 (USMC)	Medium duty	2530-01-520-6538 M 809/939 up to 78,000 lbs	83,000 lbs



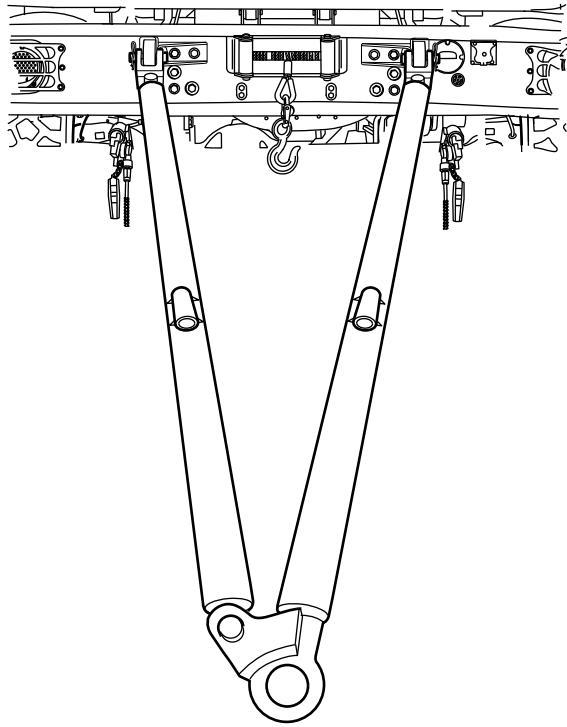
B101500485

Figure 20. U.S. Army Adapter.



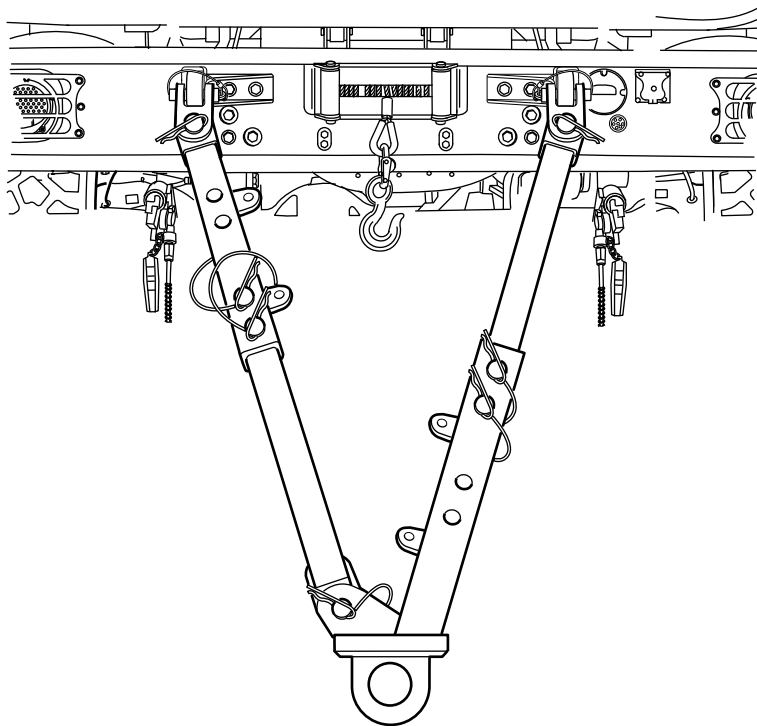
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Figure 21. USMC MTRV Adapter.



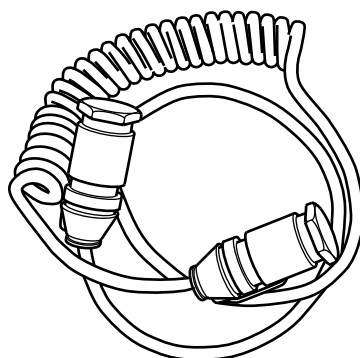
B101500486

Figure 22. U.S. Army Heavy Duty Tow Bar.



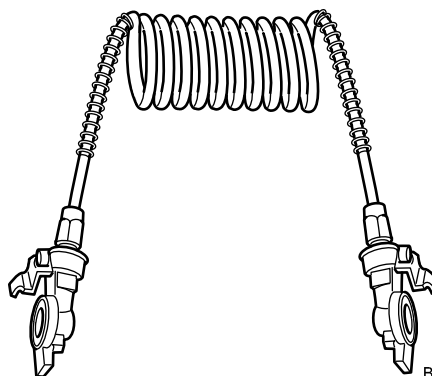
B101500483

Figure 23. USMC MTRV Tow Bar.



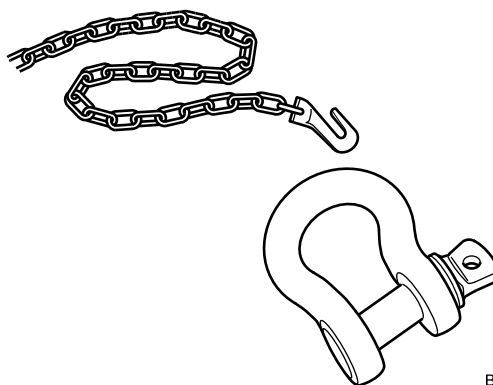
B101500560

Figure 24. Trailer Cable.



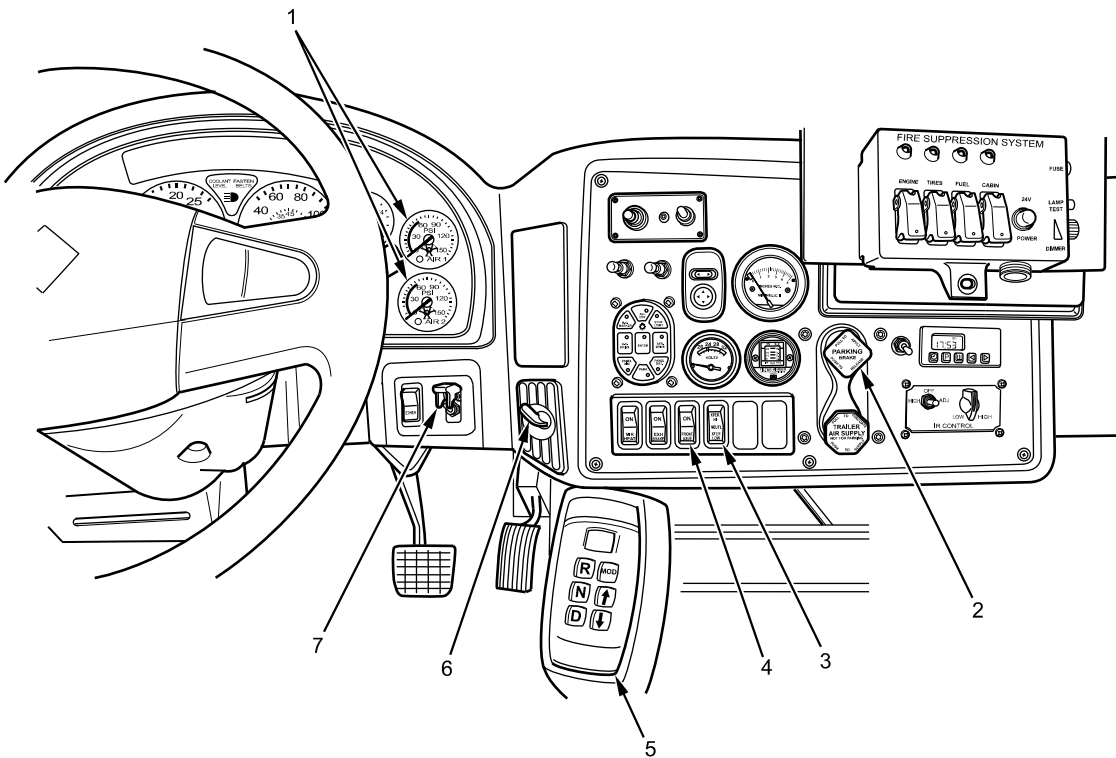
B101500562

Figure 25. Gladhand Air Line (Two Required).



B101500561

Figure 26. Safety Chain (Two Required) and Shackle (Four Required).



B100600535

Figure 27. Towing Preparation Controls.

1. Set parking brake (Figure 27, Item 2) of disabled vehicle.

NOTE

If the following steps cannot be performed on the disabled vehicle, call for wrecker support.

2. Place main power switch (Figure 27, Item 7) in ON position.
3. Turn ignition switch (Figure 27, Item 6) to RUN position and start vehicle. If vehicle cannot be started, turn ignition switch to RUN position.

CAUTION

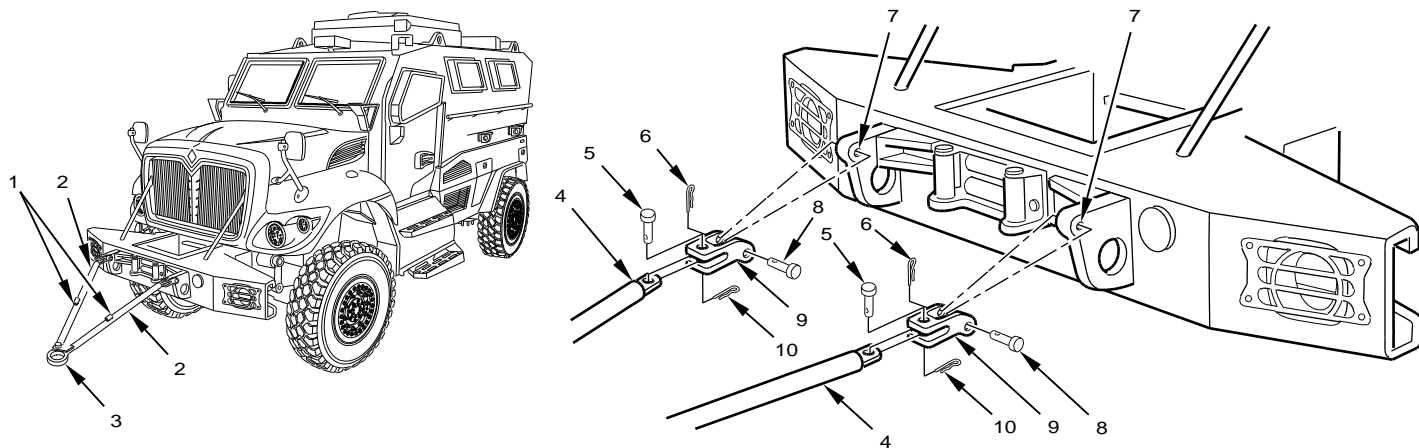
Drive shaft must be removed if transfer case will not shift into NEUTL (neutral). Failure to do so will result in transfer case damage.

4. Place transfer case switch (Figure 27, Item 3) in NEUTL (neutral).
5. Verify front axle switch (Figure 27, Item 4) is off.
6. Place transmission gear selector (Figure 27, Item 5) into NEUTRAL (N).
7. Allow air pressure of disabled vehicle to build to 125 psi (862 kPa) on gauges (Figure 27, Item 1). If this is not possible, rear brakes must be manually caged. Refer to WP 0073, Rear Spring Brake Caging and Uncaging.
8. Turn ignition switch (Figure 27, Item 6) to OFF position.
9. Place main power switch (Figure 27, Item 7) in OFF position.
10. Chock wheels. Refer to WP 0011, Normal Driving Procedures.

TOW BAR AND ADAPTER HOOKUP

NOTE

The following procedure is for installing U.S. Army tow bar adapters to U.S. Army Heavy Duty Tow Bar if not already installed.



005246

Figure 28. Tow Bar Assembly.

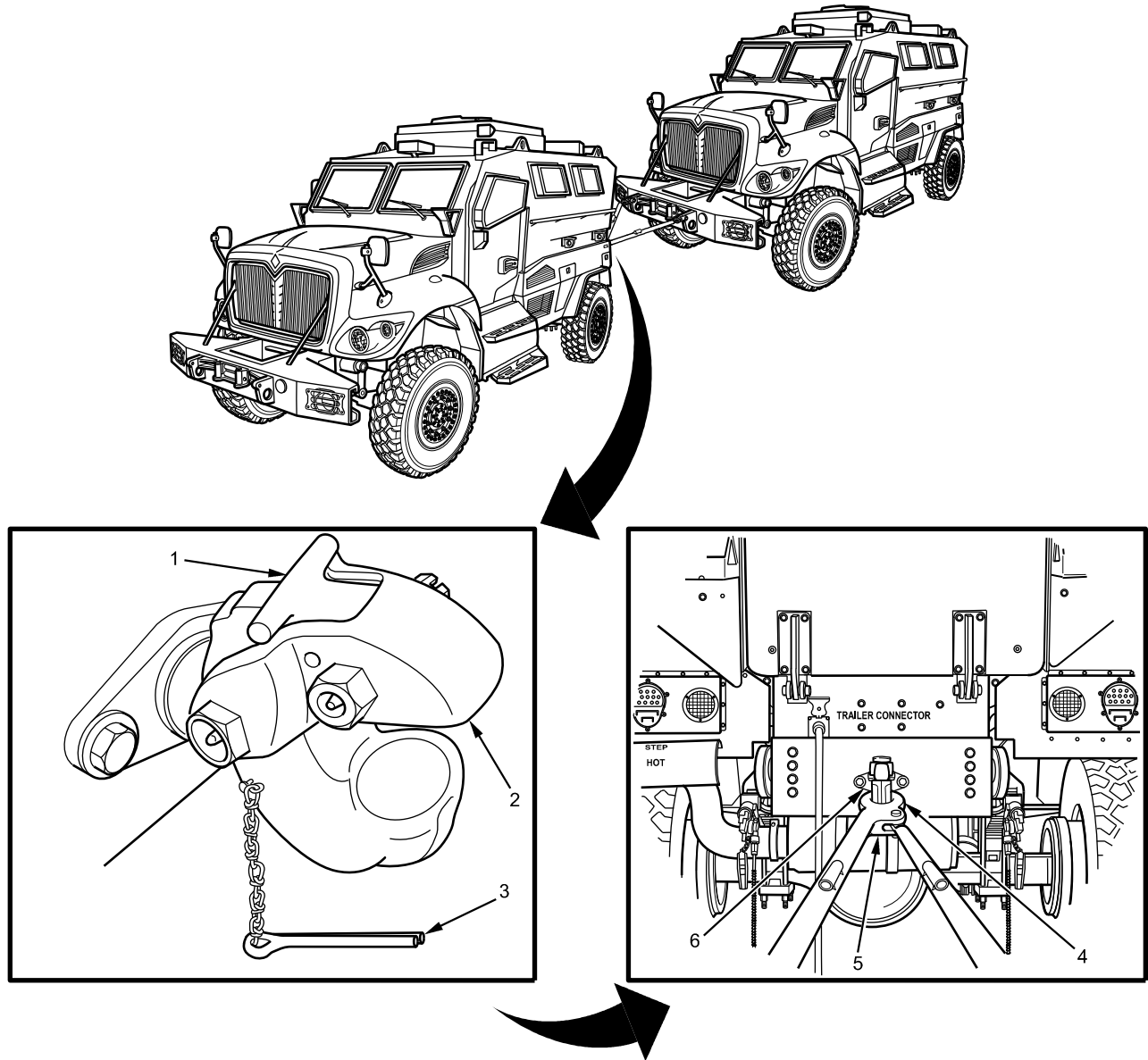
1. Remove bridge pins (Figure 28, Item 10) from adapter locking pins (Figure 28, Item 5).
2. Fasten adapters (Figure 28, Item 9) to each of the tow bar ends (Figure 28, Item 4).
3. Insert locking pins (Figure 28, Item 5) through adapters (Figure 28, Item 9) and tow bar ends (Figure 28, Item 4).
4. Lock locking pins (Figure 28, Item 5) in place with bridge pins (Figure 28, Item 10).
5. Remove adapter bridge pins (Figure 28, Item 6) and locking pins (Figure 28, Item 8). Install adapter locking pins (Figure 28, Item 1) on tow bar legs (Figure 28, Item 2) if adapter locking pins are not present.

WARNING

Do not attempt to lift tow bar without assistant or suitable lifting device. Use extreme caution when opening coupler jaw, as tow bar could spring out of coupler. Failure to comply may result in serious injury or death to personnel.

6. With crewmember assistance, lift and hold one leg of tow bar (Figure 28, Item 2) and align adapter (Figure 28, Item 9) to tow eye (Figure 28, Item 7) on disabled vehicle.
7. Fasten locking pin (Figure 28, Item 8) through adapter (Figure 28, Item 9) and tow eye (Figure 28, Item 7).
8. Install bridge pin (Figure 28, Item 6) into locking pin (Figure 28, Item 8).
9. Repeat Steps 6-8 for other leg of tow bar.

PINTLE TOW BAR HOOKUP



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Figure 29. Pintle Connection.

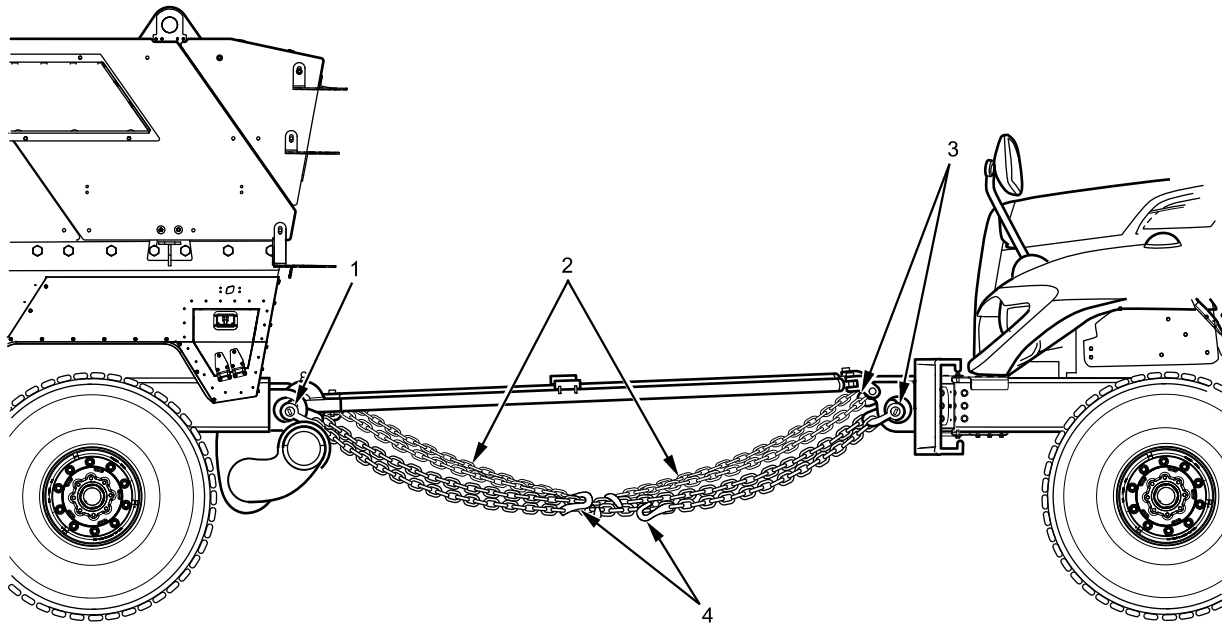
1. Pull to remove hook lock pin (Figure 29, Item 3).
2. To open pintle jaw (Figure 29, Item 2), pull rearward on latch (Figure 29, Item 1), while lifting upward on jaw.

WARNING

Do not position hands near pintle hook when connecting or removing towed equipment. Ensure service brake lights, emergency flashers, and turn signals on towed equipment operate in coordination with the towing vehicle. Failure to comply may result in serious injury or death to personnel.

3. With crewmember assistance, lift tow bar (Figure 29, Item 5) while crewmember guides towing vehicle slowly back to disabled vehicle.
4. Connect tow bar lunette eye (Figure 29, Item 4) to pintle hook (Figure 29, Item 6).
5. To close pintle jaw (Figure 29, Item 2), pull rearward on latch (Figure 29, Item 1). Jaw will drop into place. Insert lock pin.
6. Pull towing vehicle forward slightly to verify that pintle jaw (Figure 29, Item 2) has locked onto lunette eye (Figure 29, Item 4).

SAFETY CHAIN HOOKUP

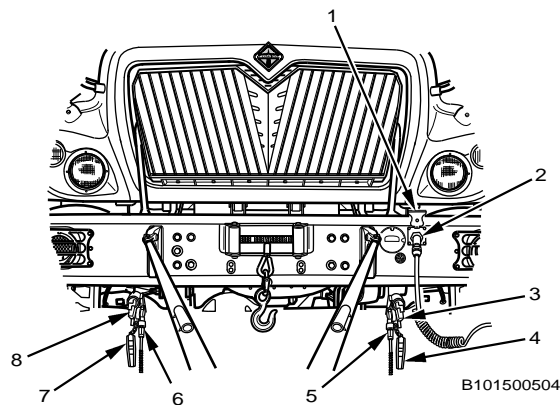


B101500548

Figure 30. Safety Chains.

1. Attach shackles (Figure 30, Item 1)(Figure 30, Item 3) to rear of towing vehicle and front of disabled vehicle.
2. Route safety chain (Figure 30, Item 2) through front towing shackles (Figure 30, Item 3) of disabled vehicle and rear towing shackles (Figure 30, Item 1) of towing vehicle.
3. Connect safety chain hooks (Figure 30, Item 4) on links of chain (Figure 30, Item 2) to take up chain slack.

TRAILER AND GLADHAND CONNECTIONS



B101500504

Figure 31. Gladhand Air Lines and Electrical Cable – Disabled Vehicle.

1. Connect trailer light cable (Figure 32, Item 1) on rear of towing vehicle by lifting trailer light connection door (Figure 32, Item 2) and plugging cable into connector.

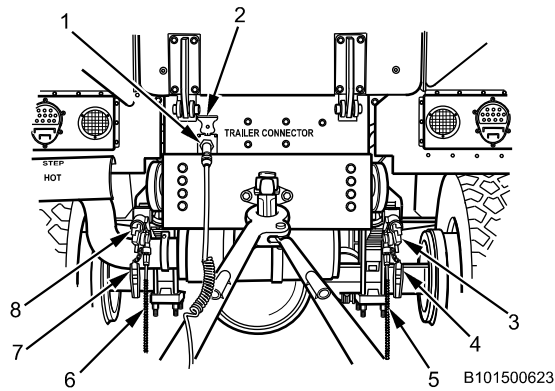


Figure 32. Gladhand Air Lines and Electrical Cable – Towing Vehicle.

2. Connect trailer light cable (Figure 31, Item 2) to front of disabled vehicle by lifting trailer light connection door (Figure 31, Item 1) and plugging cable into connector.

NOTE

Vehicle gladhands are labeled SERVICE and EMERGENCY.

3. Disconnect dummy coupling (Figure 32, Item 7) from EMERGENCY gladhand (Figure 32, Item 8) on towing vehicle.
4. Connect RED EMERGENCY air line (Figure 32, Item 6) to EMERGENCY gladhand (Figure 32, Item 8) on towing vehicle.
5. Disconnect dummy coupling (Figure 31, Item 4) from EMERGENCY gladhand (Figure 31, Item 3) on front of disabled vehicle.
6. Connect opposite end of RED EMERGENCY air line (Figure 31, Item 5) to EMERGENCY gladhand (Figure 31, Item 3) on front of disabled vehicle.
7. Disconnect dummy coupling (Figure 32, Item 4) from SERVICE gladhand (Figure 32, Item 3) on rear of towing vehicle.
8. Connect BLUE SERVICE air line (Figure 32, Item 5) to SERVICE gladhand (Figure 32, Item 3) on rear of towing vehicle.
9. Disconnect dummy coupling (Figure 31, Item 7) from SERVICE gladhand (Figure 31, Item 8) on front of disabled vehicle.
10. Connect opposite end of BLUE SERVICE air line (Figure 31, Item 6) to SERVICE gladhand (Figure 31, Item 8) on front of disabled vehicle.
11. Start engine in towing vehicle. Refer to WP 0010, Normal Driving Procedures.
12. Push in TRAILER AIR SUPPLY KNOB on towing vehicle. Refer to WP 0004, Description and Use of Operator Controls and Indicators.
13. Remove wheel chocks from disabled vehicle. Refer to WP 0011, Engine Shutdown and Parking.
14. Release parking brake on disabled vehicle. Refer to WP 0010, Normal Driving Procedures.

WARNING

When performing like-vehicle towing operations, never proceed up or down grades greater than 20 percent. Failure to comply may result in damage to equipment and serious injury to personnel

15. Tow disabled vehicle.

TRAILER ELECTRICAL CABLE AND GLADHAND DISCONNECT

NOTE

Trailer light connections are located on left side of vehicles.

1. Disconnect trailer light cable (Figure 33, Item 1) from rear of towing vehicle by lifting trailer light connection door (Figure 33, Item 2) and unplugging cable from connector.

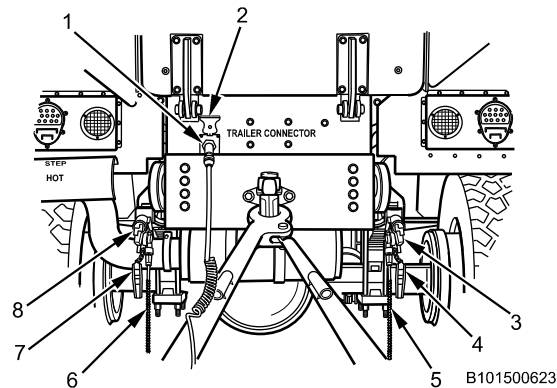


Figure 33. Gladhand Lines and Electrical Cable – Towing Vehicle.

2. Disconnect trailer light cable (Figure 34, Item 2) from front of disabled vehicle by lifting trailer light connection door (Figure 34, Item 1) and unplugging cable from connector.

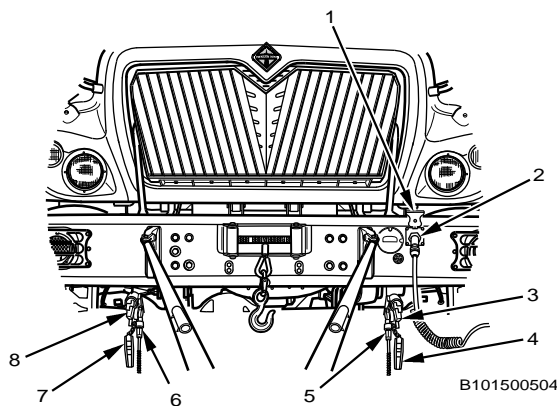


Figure 34. Gladhand Lines and Electrical Cable – Disabled Vehicle.

3. Drain air tanks. Refer to WP 0021, Air Tank Drains.

WARNING

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

4. Disconnect RED EMERGENCY air line (Figure 33, Item 6) from EMERGENCY gladhand (Figure 33, Item 8) on towing vehicle.
5. Connect dummy coupling (Figure 33, Item 7) to EMERGENCY gladhand (Figure 33, Item 8) on towing vehicle.
6. Disconnect opposite end of RED EMERGENCY air line (Figure 34, Item 5) from EMERGENCY gladhand (Figure 34, Item 3) on front of disabled vehicle.
7. Connect dummy coupling (Figure 34, Item 4) to EMERGENCY gladhand (Figure 34, Item 3) on disabled vehicle.
8. Disconnect BLUE SERVICE air line (Figure 33, Item 5) from SERVICE gladhand (Figure 33, Item 3) on towing vehicle.
9. Connect dummy coupling (Figure 33, Item 4) to SERVICE gladhand (Figure 33, Item 3) on towing vehicle.

10. Disconnect opposite end of BLUE SERVICE air line (Figure 34, Item 6) from SERVICE gladhand (Figure 34, Item 8) on disabled vehicle.
11. Connect dummy coupling (Figure 34, Item 7) to SERVICE gladhand (Figure 34, Item 8) on disabled vehicle.

SAFETY CHAIN DISCONNECT

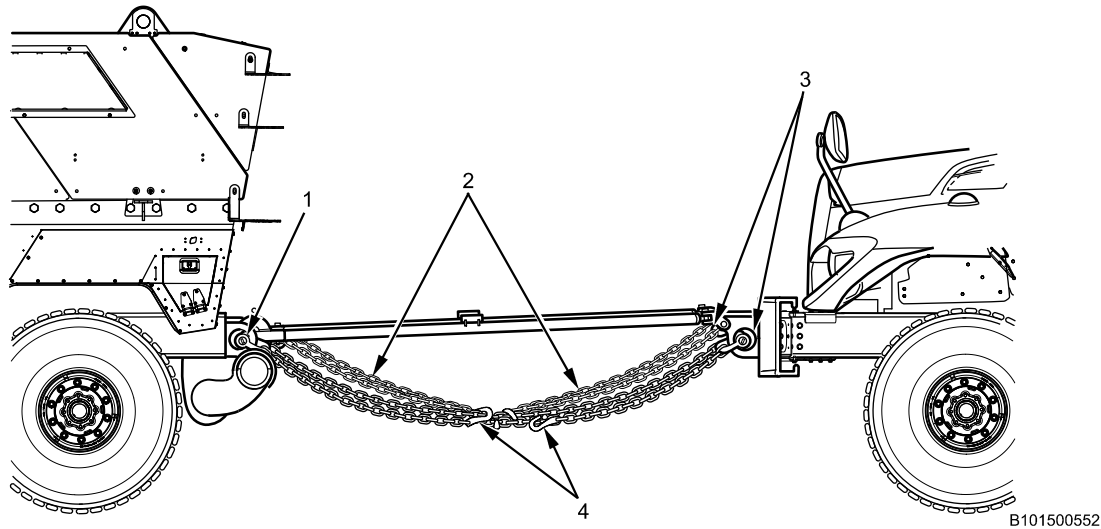


Figure 35. Safety Chains.

1. Unhook safety chain hooks (Figure 35, Item 4) from chain links (Figure 35, Item 2).
2. Pull safety chains (Figure 35, Item 2) back through front towing shackles (Figure 35, Item 3) of disabled vehicle and towing shackles (Figure 35, Item 1) on towing vehicle.
3. Remove shackles (Figure 35, Item 1)(Figure 35, Item 3) from rear of towing vehicle and front of disabled vehicle.

PINTLE TOW BAR DISCONNECT

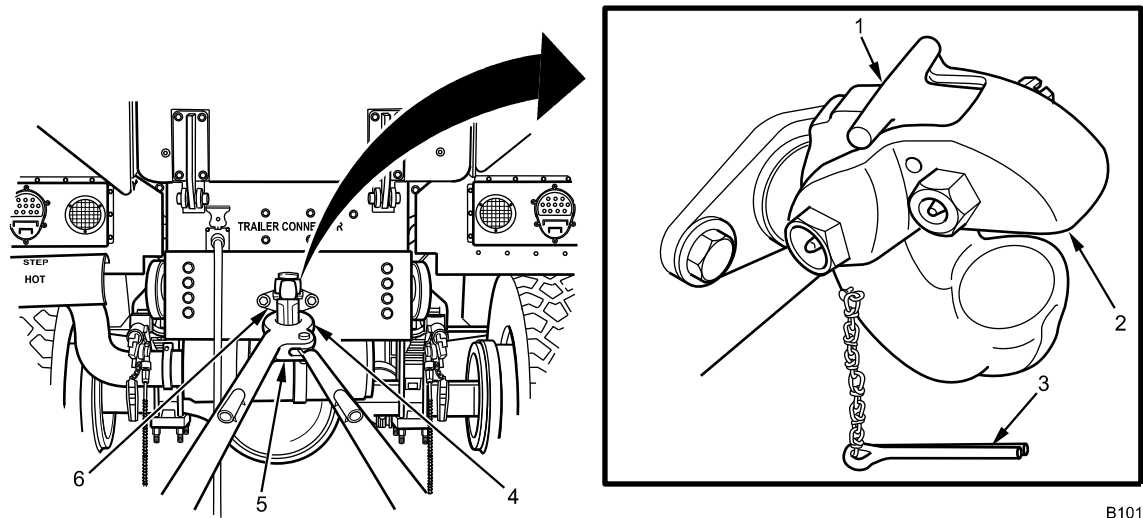


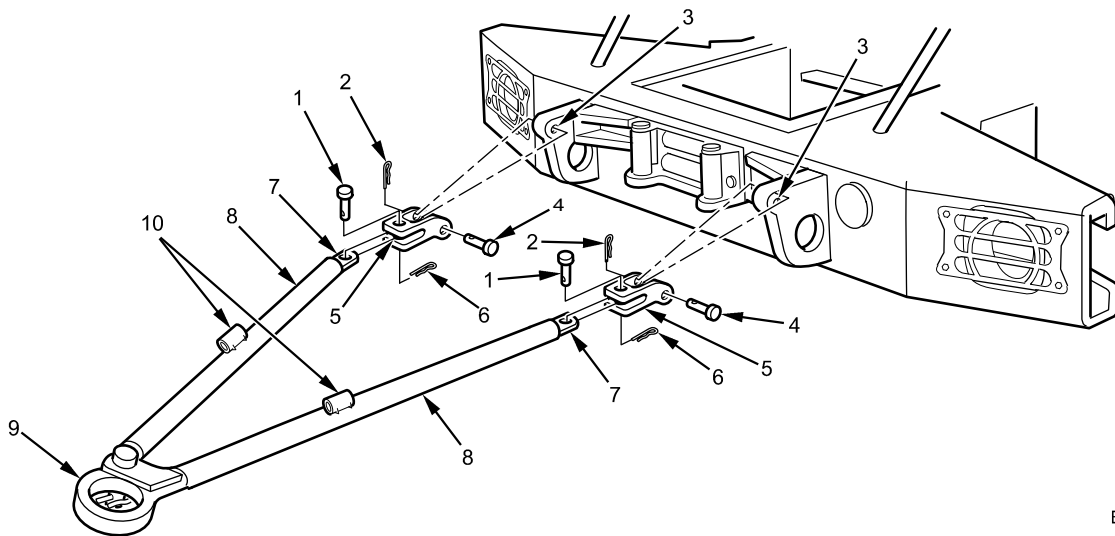
Figure 36. Pintle Connection.

1. Remove hook lock pin (Figure 36, Item 3).

WARNING

Do not put hands near pintle hook when aligning lunette eye with pintle hook. Failure to comply may result in serious injury or death to personnel.

2. Pull rearward on pintle latch (Figure 36, Item 1) and open jaw (Figure 36, Item 2).
3. With crewmember assistance, lift tow bar (Figure 36, Item 5) while crewmember guides towing vehicle slowly forward, away from disabled vehicle.
4. Disconnect tow bar lunette eye (Figure 36, Item 4) from pintle hook (Figure 36, Item 6).
5. Pull pintle latch (Figure 36, Item 1) rearward and close pintle jaw (Figure 36, Item 2).
6. Insert lock pin (Figure 36, Item 3).

TOW BAR AND ADAPTER DISCONNECT

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Figure 37. Tow Bar Assembly.

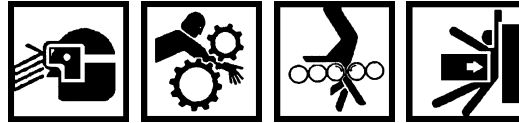
1. Remove adapter bridge pin (Figure 37, Item 2).

WARNING

Do not attempt to lift tow bar without assistant or suitable lifting device. Use extreme caution when opening coupler jaw, as tow bar could spring out of coupler. Failure to comply may result in serious injury or death to personnel.

2. With crewmember assistance, hold one leg of tow bar (Figure 37, Item 8) and remove locking pin (Figure 37, Item 4) from adapter (Figure 37, Item 5) on tow eye (Figure 37, Item 3) of disabled vehicle.
3. Lower tow bar leg (Figure 37, Item 8) and adapter (Figure 37, Item 5) to ground.
4. Repeat Steps 1-3 for other leg of tow bar.
5. Fasten locking pins (Figure 37, Item 4) and bridge pins (Figure 37, Item 2) through tow bar adapters (Figure 37, Item 5).
6. Remove bridge pins (Figure 37, Item 6) from adapters (Figure 37, Item 5).
7. Remove locking pins (Figure 37, Item 1) from adapters and tow bar ends (Figure 37, Item 7).

8. Remove adapters (Figure 37, Item 5) from tow bar ends (Figure 37, Item 7).
9. Install locking pins (Figure 37, Item 1) and bridge pins (Figure 37, Item 6) on adapters (Figure 37, Item 5).

RIGGING WINCH FOR PULLING**WARNING**

Vehicle curb weight exceeds winch capacity. Do not use winch for vehicle self-recovery operations. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not exceed rated pulling capacity of winch. Winch is rated to pull maximum load of 18,000 lbs (8165 kg) when pulling first layer of winch cable onto winch drum. Inspect winch cable for damage regularly. Ensure snatch blocks are adequately rated for the load. Failure to comply may result in damage to equipment and serious injury to personnel.

All personnel involved in winch operations must wear safety goggles and leather gloves. During winching operations, all personnel must remain either inside the vehicle or outside a circled area with a radius that is twice the length of the extended winch cable. Failure to comply may result in serious injury or death to personnel.

Before removing winch cable from vehicle, check winch cable for damage such as frayed wires, binds, or kinks. If damage found, replace cable. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Winch cable is under tension when installed. Wear safety goggles and work gloves when handling. Do not wear loose clothing; it can get caught in winch cable as winch cable winds around spool drum. Failure to comply may result in serious injury or death to personnel.

When operating winch, ensure there are no objects in path of winch cable or vehicle. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Wear heavy, leather-palmed work gloves when handling winch cable. Never let moving winch cable slide through hands, even when wearing gloves. Winch cable can become frayed or contain broken wires. A broken wire could cut through gloves and injure hands. Failure to comply can result in serious injury to personnel.

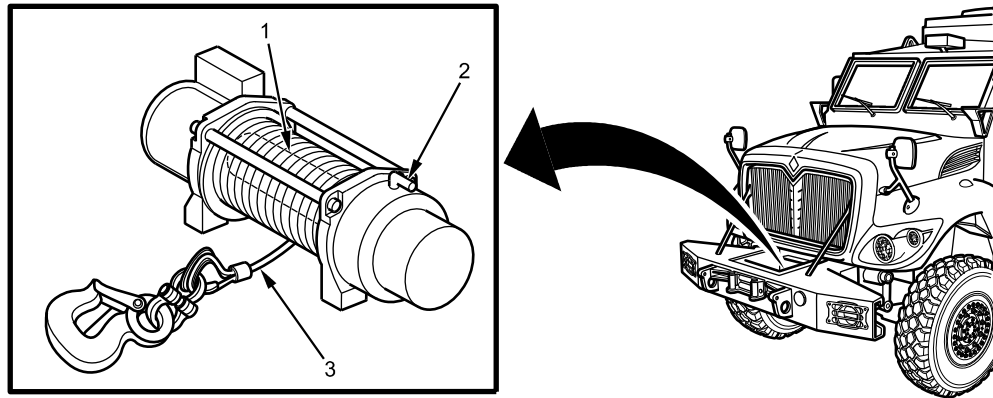
Keep a minimum of five wraps of winch cable on drum when using winch. Fewer wraps may cause winch cable to pull free of drum and release load. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Keep fingers and hands clear of drum and rollers while operating the winch. Fingers and hands can be pulled into drum or rollers by the winch cable. Failure to comply may result in serious injury or death to personnel.

CAUTION

Never leave remote control plugged into winch while free spooling, rigging, or sitting idle. Never hook winch cable back onto itself. Always use a choker chain, wire choker rope, or tree trunk protector on the anchor. Select correct anchor for load. Failure to comply may result in damage to equipment.

Avoid continuous side pulls that can pile up winch cable at one end of the drum. Ensure the clutch is fully engaged or disengaged. Never use winch to tow other vehicles. Never jog winch cable under load. Shock loads can momentarily exceed capacity of winch cable and winch. Never use winch to secure a load during transport. Never submerge winch in water. Disconnect remote when not in use and store in designated stowage place. Prolonged use of the winch without cooling will damage the motor. In addition, if the engine is idling during winching, the battery may drain faster than it is charging. Pay close attention to VOLTS gauge on IP cluster. Failure to comply may result in damage to equipment.



B102000615

Figure 38. Winch Assembly.

NOTE

The winch is controlled by a hand-held remote-control switch to allow the operator to stand clear during winching operation.

For prolonged use of winch, start engine.

Chock wheels before using winch.

Free-spooling of winch drum will conserve battery power.

1. Disengage winch clutch by rotating winch clutch lever (Figure 38, Item 2) away from winch drum (Figure 38, Item 1) to allow free-spooling of winch drum. If not able to pull manually, use remote control.
2. Pull out enough winch cable (Figure 38, Item 3) to reach target area. Keep enough tension on winch cable to prevent it from twisting or overlapping.
3. Engage winch clutch lever (Figure 38, Item 2), if disengaged.

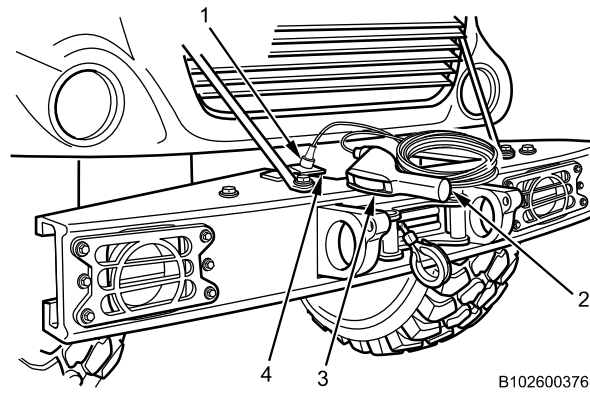


Figure 39. Winch Remote Control.

4. Connect plug (Figure 39, Item 1) on remote control (Figure 39, Item 2) to vehicle socket (Figure 39, Item 4).
5. Put winch cable under tension slowly, using switch (Figure 39, Item 3) on remote control (Figure 39, Item 2).
6. Slowly and steadily begin winching. Be sure winch cable is winding evenly and tightly around drum.

AFTER WINCH PULL

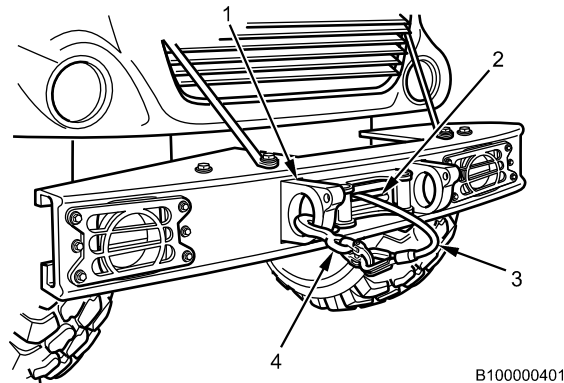


Figure 40. Winch Hook Stowage.

1. Disconnect winch cable hook (Figure 40, Item 4) from pulled object.
2. Rewind winch cable (Figure 40, Item 3) by reeling carefully out and in under tension to ensure proper alignment on drum spool.
3. Stop winch with winch cable hook (Figure 40, Item 4) 3 feet from rollers (Figure 40, Item 2).
4. Connect winch cable hook (Figure 40, Item 4) to front towing eye (Figure 40, Item 1).
5. Continue reeling winch cable (Figure 40, Item 3) until snug.
6. If engine is running, turn vehicle ignition off. Refer to WP 0011, Engine Shutdown and Parking. Disconnect remote control and clean if necessary. Return remote control to storage.

EMERGENCY SHUTDOWN

1. If turning the ignition switch to the OFF position fails to shut off the engine, perform the following steps:
 - a. Ensure ignition switch is in OFF position and parking brake knob is pulled out. Refer to WP 0011, Engine Shutdown and Parking.
 - b. Place main power switch in OFF position. Refer to WP 0011, Engine Shutdown and Parking.
 - c. Chock wheels. Refer to WP 0011, Engine Shutdown and Parking.
 - d. Notify Field Maintenance.

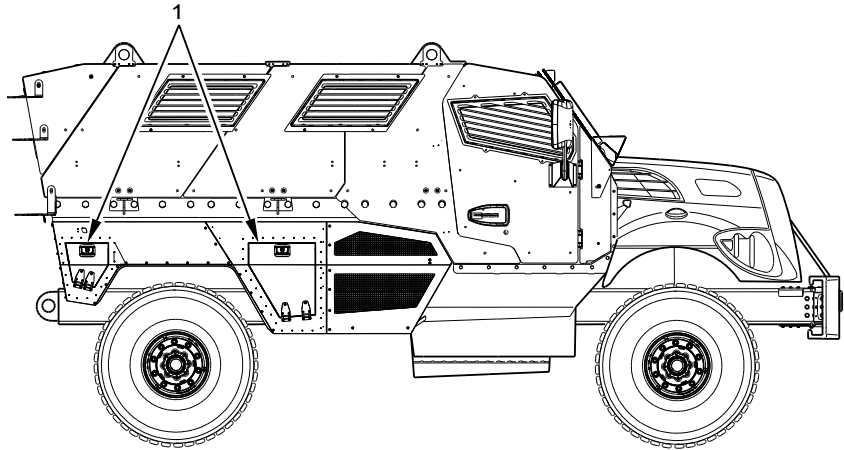
END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
STOWAGE AND DECAL/DATA PLATE GUIDE

Stowage Guide

NOTE

Right and left stowage boxes are located the same. Right side shown.



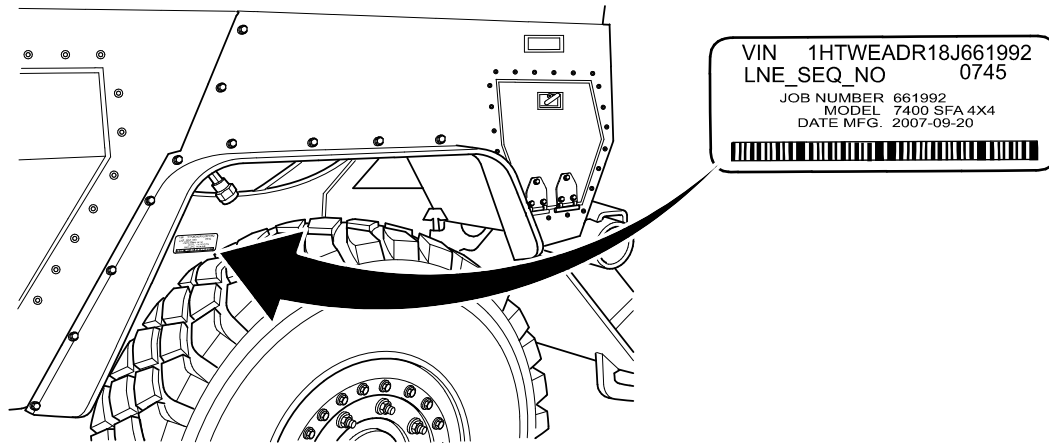
005138

Figure 1. Stowage Box Location, Right Side of Vehicle.

For Components of End Item (COEI) and Basic Issue Items (BII) lists refer to WP 0081. There are four main stowage compartments on this vehicle. Two located at the right and left rear (Figure 1, Item 1) and two located at the right and left front sides (Figure 1, Item 1) of the vehicle. When you receive the vehicle, the BII will be stored in the right front stowage box. Items for each stowage unit is determined by local load plans.

STOWAGE AND DECAL/DATA PLATE GUIDE - (CONTINUED)

DECAL/DATA PLATE INFORMATION

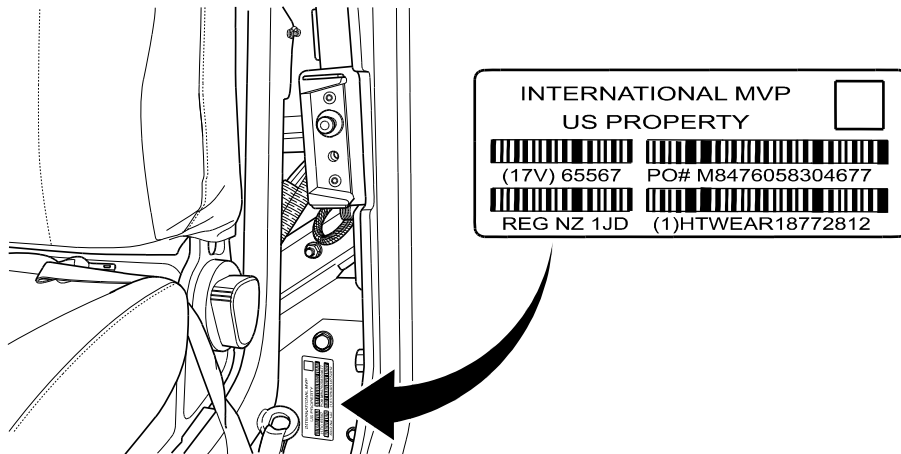


004697

Figure 2. Left Rear Plate.

Table 1. Left Rear Plate

ITEM	DECAL
1	Vehicle Identification Number



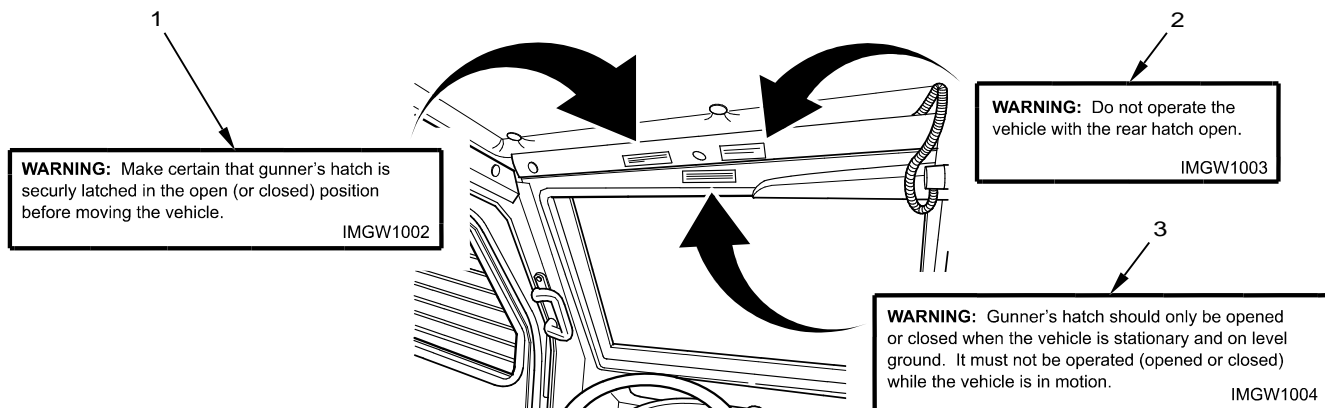
004699

Figure 3. Vehicle Interior (Left Side).

Table 2. Vehicle Interior (Left Side)

ITEM	DECAL
1	Vehicle Serial Number

STOWAGE AND DECAL/DATA PLATE GUIDE - (CONTINUED)

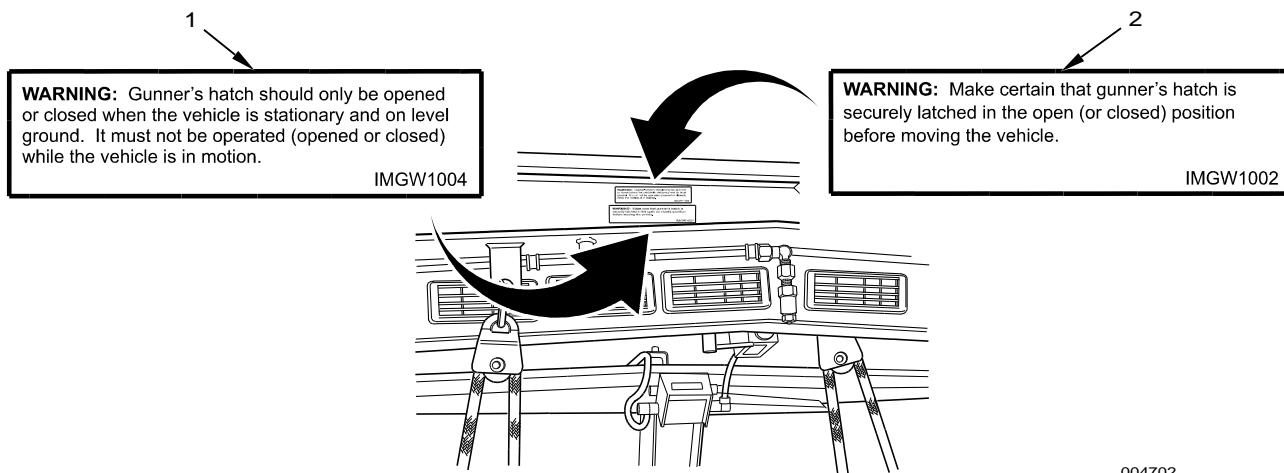


004701

Figure 4. Driver's Forward Interior Decals.

Table 3. Forward Interior (Left Side).

ITEM	DECAL
1	Gunner's Hatch Latch Warning
2	Operation Warning
3	Gunner's Hatch Warning



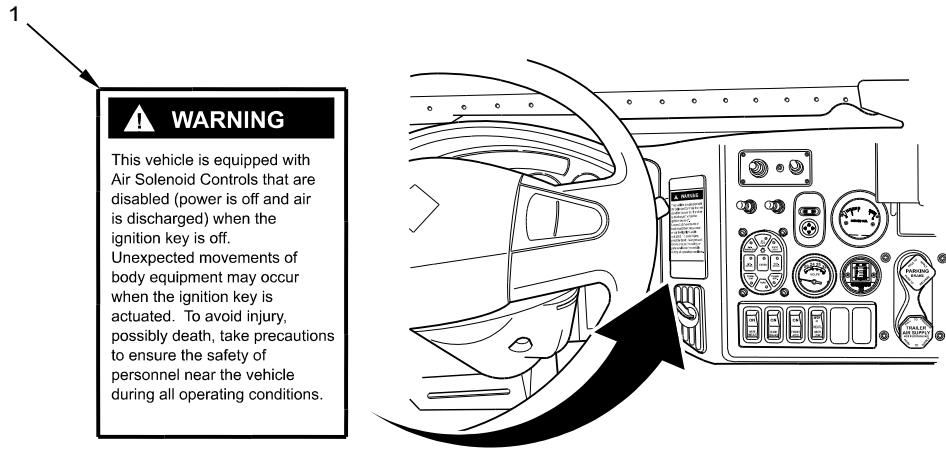
004702

Figure 5. Center Forward Interior Decals.

Table 4. Center Forward Interior Decals.

ITEM	DECAL
1	Gunner's Hatch Warning
2	Gunner's Hatch Latch Warning

STOWAGE AND DECAL/DATA PLATE GUIDE - (CONTINUED)

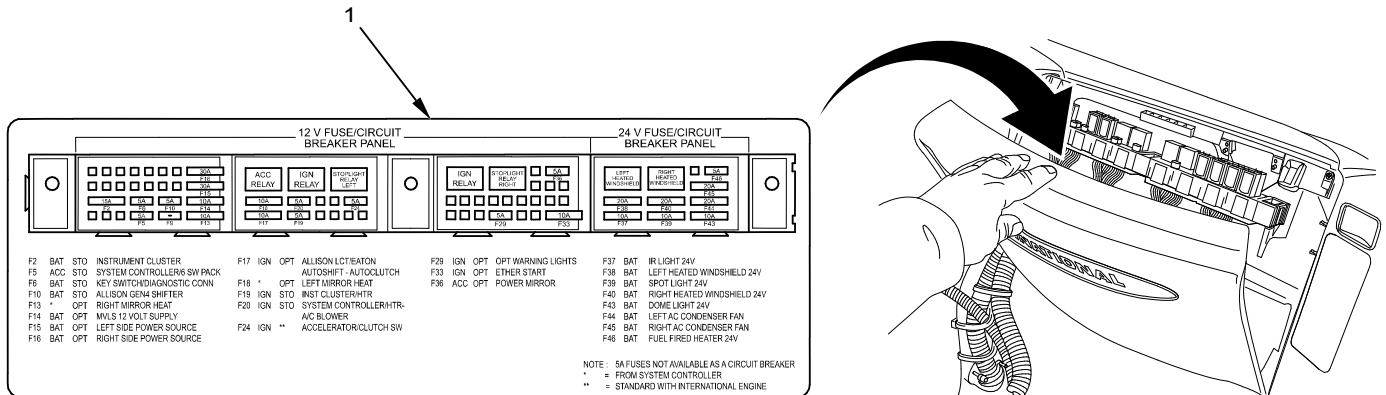


004703

Figure 6. Instrument Panel Decal.

Table 5. Instrument Panel Decal

ITEM	DECAL
1	Engine Start Warning



004704

Figure 7. Instrument Panel Fuse/Relay Decal.

Table 6. Instrument Panel Fuse/Relay Decal.

ITEM	DECAL
1	Instrument Panel Fuse/Relay Panel

STOWAGE AND DECAL/DATA PLATE GUIDE - (CONTINUED)

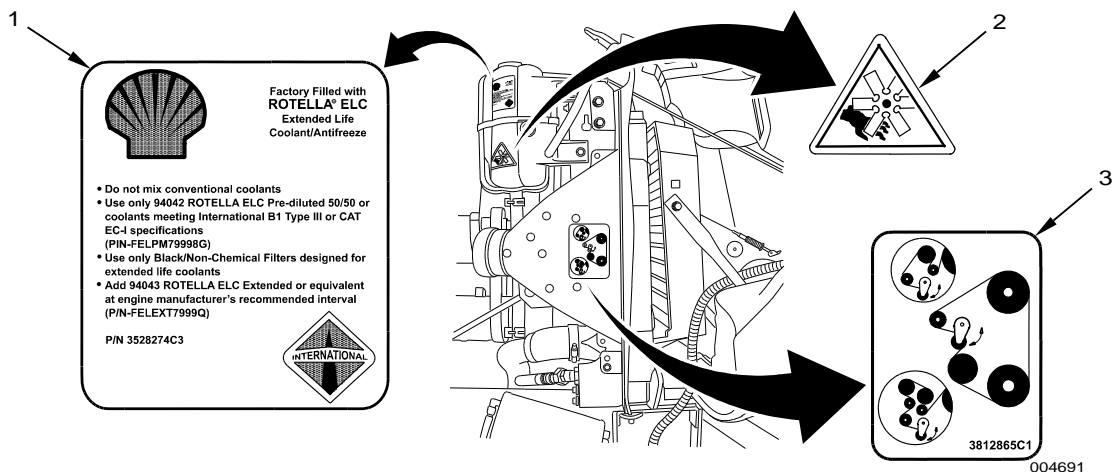


Figure 8. Fan Belt and Antifreeze Decal.

Table 7. Engine Decals (Right Side).

ITEM	DECAL
1	Radiator Overflow/Coolant Fill Caution
2	Fan Blade Warning
3	Accessory Belt Tensioner

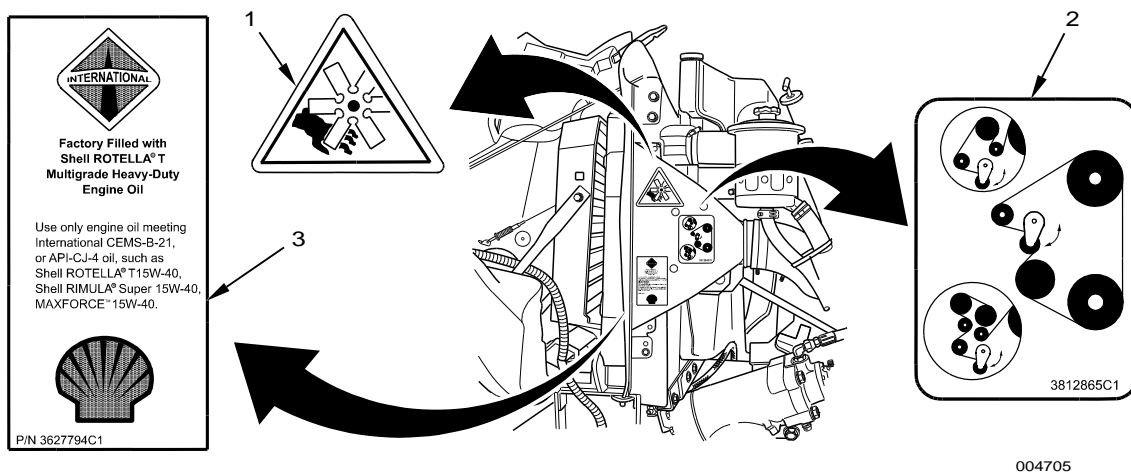


Figure 9. Fan Belt and Engine Oil Decal.

Table 8. Engine Decals (Left Side).

ITEM	DECAL
1	Accessory Belt Tensioner
2	Fan Blade Warning
3	Engine Oil Caution

STOWAGE AND DECAL/DATA PLATE GUIDE - (CONTINUED)

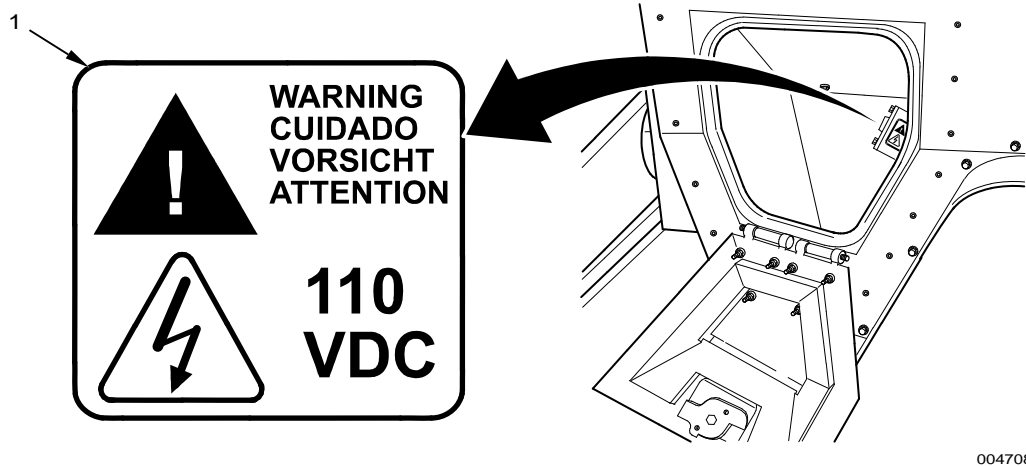


Figure 12. 110 VDC Warning Decal.

Table 11. Table 13. 110 VDC Warning Decal.

ITEM	DECAL
1	110-Volt Warning

END OF WORK PACKAGE

CHAPTER 3
TROUBLESHOOTING PROCEDURES
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS
TROUBLESHOOTING SYMPTOM INDEX

Malfunction/Symptom	Troubleshooting Procedure
Engine Malfunctions	
1. Engine fails to crank when ignition switch is turned to START position.	WP 0061
2. Engine cranks but fails to start.	WP 0061
3. Engine shuts down while running.	WP 0061
4. CHECK ENGINE lamp on instrument panel is illuminated.	WP 0061
5. Engine runs roughly after proper warm-up, does not develop full power, or produces excessive exhaust smoke.	WP 0061
6. Engine overheats.	WP 0061
7. Excessive engine oil consumption.	WP 0061
Transmission Malfunctions	
8. Transmission noisy when operating.	WP 0062
9. Transmission temperature gauge or RED high transmission LED indicates overheating during operation.	WP 0062
10. AMBER CHECK TRANS light remains on after start-up.	WP 0062
11. Vehicle will not move forward or backward.	WP 0062
12. Both transmission gear selector displays show slanted lines.	WP 0062
Steering and Suspension Malfunctions	
13. Wheel wobbles or steering shimmies.	WP 0063
14. Vehicle wanders or pulls to one side.	WP 0063
15. Vehicle is hard to steer, or steering is slow to respond or intermittent.	WP 0063
Air Pressure System Malfunctions	
16. Air pressure gauges showing 65 psi (448 kPa) or less, and RED air gauge LEDs are on.	WP 0064
17. Air tank drain valves stuck open.	WP 0064
18. Air system connections or hoses are loose, leaking, or damaged.	WP 0064
19. Trailer brakes do not apply when service brake pedal or parking brake is applied.	WP 0064
Electrical System Malfunctions	
20. No electrical circuits operate.	WP 0065
21. Instrument Panel (IP) VOLTS gauge for 24V system displays a reading less than 27V with engine running.	WP 0065
22. One or more lighting circuits do not operate.	WP 0065
Winch System Malfunctions	
23. Winch does not pay in or pay out.	WP 0066
24. Winch unusually noisy when operating.	WP 0066

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
ENGINE SYSTEMS TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Materials/Parts**

Gloves, leather (WP 0083, Item 11)
 Goggles (WP 0083, Item 10)
 Rag (WP 0083, Item 23)

WP 0071

WP 0079

References

WP 0010
 WP 0058
 WP 0072
 WP 0069
 WP 0070

Equipment Condition

Parking brake set (WP 0011)
 Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Main power switch off (WP 0011)
 Wheels chocked (WP 0011)
 Engine hood open and secured (WP 0031)

TROUBLESHOOTING PROCEDURE**WARNING**

Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Battery acid must not contact eyes, skin, or clothing. If battery acid contacts eyes or skin, flush area with large amounts of water for 15 minutes and seek immediate medical care. If swallowed, do not induce vomiting. 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 serious injury or death to personnel.

Use extreme caution when testing or working on or around electrical circuits. Always assume that electrical circuits are live. Electrical shock can occur upon contact with voltage high enough to cause current flow through muscles or nerves. On Direct Current (DC) systems, generally 1 milliamp of current can be felt, 5 milliamps can cause severe pain, 15 milliamps can cause loss of muscle control, and 70 milliamps can be fatal. Wear protective clothing; ensure skin, clothing, and surrounding areas are dry; do not wear jewelry; and touch only the insulated, nonmetallic parts of electrical components and testing equipment. To prevent electrical arcing, avoid shorting electrical test probes and jumper wires. Electrical arcing can cause bright flashes of light, capable of causing temporary blindness. If electrical injury occurs, immediately shut off power supply and seek medical assistance. Failure to comply may result in serious injury or death to personnel.

Turn main power switch off prior to performing maintenance on battery or electrical system. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion. Do not allow tools to contact battery box or other battery terminals when removing or installing terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Disconnect battery ground cable or power source prior to working on electrical components. If electrical shock occurs, administer first aid and seek medical assistance immediately. Failure to comply may result in serious injury or death to personnel.

When reconnecting the batteries, always connect the negative terminals last to avoid arcing or sparking that may cause an explosion.

Engine Systems Troubleshooting Procedures - (CONTINUED)

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Cooling system components become extremely hot during normal operation. Allow engine to cool completely prior to washing radiator. Use extreme care when working in close quarters in engine compartment. Failure to comply may result in serious injury or death to personnel.

SYMPTOM

Engine fails to crank when ignition switch is turned to START position.

MALFUNCTION

main power switch is off.

CORRECTIVE ACTION

Verify main power switch is on. Refer to WP 0010, Normal Driving Procedures.

MALFUNCTION

Circuit breakers are tripped.

CORRECTIVE ACTION

Reset tripped circuit breakers. Refer to WP 0072, Circuit Breaker Reset. If circuit breakers trip again, notify Field Maintenance.

MALFUNCTION

Transmission gear selector is not in NEUTRAL (N) position.

CORRECTIVE ACTION

Select NEUTRAL (N) from transmission gear selector and attempt to restart engine. Refer to WP 0010, Normal Driving Procedures.

MALFUNCTION

Battery connections are dirty or corroded. Battery terminals and/or battery cables are loose or damaged.

CORRECTIVE ACTION

Tighten loose connections or terminals. Clean dirty or corroded connections or terminals. If cables are damaged, notify Field Maintenance.

SYMPTOM

Engine cranks but fails to start.

MALFUNCTION

Circuit breakers are tripped.

CORRECTIVE ACTION

Reset tripped circuit breakers by pushing center RED button. Refer to WP 0072, Circuit Breaker Reset. If circuit breaker trips again, notify Field Maintenance.

Engine Systems Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Fuel tank is empty.

CORRECTIVE ACTION

Fill fuel tank. Refer to WP 0058, Engine Out of Fuel Restart Procedure.

MALFUNCTION

Fuel tank is empty and fuel level does not match fuel gauge indication.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Exhaust is restricted. Inspect exhaust system for kinks, dents, or other restrictions.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Air cleaner restriction gauge reads 25 or above.

CORRECTIVE ACTION

Reset air cleaner restriction gauge. If air filter restriction gauge still reads 25 or above after resetting, replace air filter. Refer to WP 0069, Engine Air Filter Assembly Removal and Installation.

SYMPTOM

Engine shuts down while running.

MALFUNCTION

Fuel gauge indicates fuel tank is empty.

CORRECTIVE ACTION

Fill tank. Refer to WP 0058, Engine Out of Fuel Restart Procedure. If engine still fails to start, notify Field Maintenance.

MALFUNCTION

Fuel tank is empty and fuel level does not match fuel gauge indication.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Engine oil level is low.

CORRECTIVE ACTION

Add engine oil. Refer to WP 0079, Lubrication Instructions.

SYMPTOM

CHECK ENGINE lamp on instrument panel is illuminated.

MALFUNCTION

Engine electronic fuel system malfunctioning.

Engine Systems Troubleshooting Procedures - (CONTINUED)**CORRECTIVE ACTION**

Notify Field Maintenance.

SYMPTOM

Engine runs roughly after proper warm-up, does not develop full power, or produces excessive exhaust smoke.

MALFUNCTION

Air cleaner restriction gauge reads 25 or above.

CORRECTIVE ACTION

Reset air cleaner restriction gauge. If air filter restriction gauge still reads 25 or above after resetting, replace air filter. Refer to WP 0069, Engine Air Filter Assembly Removal and Installation.

MALFUNCTION

Fuel/water separator contains water and/or contamination.

CORRECTIVE ACTION

Drain fuel from sediment bowl until clean fuel flows out. Refer to WP 0070, Fuel/Water Separator Draining.

MALFUNCTION

Fuel filter is leaking or damaged.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Fuel lines or connections are leaking or damaged.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Exhaust system has kinks, dents, or other restrictions.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Charge air cooler fins are plugged with dirt or mud.

CORRECTIVE ACTION

Clean charge air cooler fins. Refer to WP 0071, Radiator Assembly Cleaning.

SYMPTOM

Engine overheats.

MALFUNCTION

Coolant level is low.

Engine Systems Troubleshooting Procedures - (CONTINUED)**CORRECTIVE ACTION****WARNING**

Cooling system components become pressurized and extremely hot during normal operation. To prevent serious injury from hot coolant or scalding steam, use the following safety procedure when removing radiator cap, surge tank cap, or deaeration cap:

- Allow engine to cool for 15 minutes.
- Wrap a thick cloth around cap to be removed.
- Loosen cap slowly one-quarter to one-half turn counterclockwise, and pause to allow pressure to release.
- Continue to turn cap counterclockwise to remove.
- Ensure all personnel stay clear of radiator while engine is running. Air in radiator will be released, which may cause hot coolant to spray out. Failure to comply may result in serious injury to personnel.

Wear safety goggles and work gloves while servicing cooling system. Label all connections and reference areas before removing parts. Failure to comply may result in damage to equipment and serious injury or death to personnel.

STEP 1. Add coolant to overflow reservoir until level is at ADD mark for a cold engine or MAX mark for hot engine. Refer to WP 0079, Lubrication Instructions. If coolant overflow reservoir is empty, notify Field Maintenance.

MALFUNCTION

Debris is present between radiator and charge air cooler.

CORRECTIVE ACTION

Remove debris.

MALFUNCTION

Radiator grill or cooling fins are obstructed, damaged, or plugged with dirt.

CORRECTIVE ACTION

Clear obstruction. Refer to WP 0071, Radiator Assembly Cleaning. If damaged, contact Field Maintenance.

MALFUNCTION

Surge tank reservoir, radiator, or hoses are leaking or damaged.

CORRECTIVE ACTION

Notify Field Maintenance.

Engine Systems Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Belt is damaged or cut or fan blades are broken or missing.

CORRECTIVE ACTION

Notify Field Maintenance.

SYMPTOM

Excessive engine oil consumption.

MALFUNCTION

Engine oil leaks are present.

CORRECTIVE ACTION

Notify Field Maintenance.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

TRANSMISSION TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Materials/Parts**

Rag (WP 0083, Item 23)
 Gloves, nitrile, large (WP 0083, Item 12)
 Goggles (WP 0083, Item 10)

References

WP 0004
 WP 0058
 WP 0079

Equipment Condition

Parking brake set (WP 0011)
 Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Main power switch off (WP 0011)
 Wheels chocked (WP 0011)
 Engine hood open and secured (WP 0031)

TROUBLESHOOTING PROCEDURE**WARNING**

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Use care when working with hot transmission and fluid during maintenance procedures. Wear protective goggles, work gloves, and long sleeves to avoid injury. Avoid contact with hot transmission oil or sump when draining transmission oil. If transmission oil temperature is above 220°F (104°C), allow transmission oil to cool before removing dipstick. Failure to comply may result in serious injury or death to personnel.

SYMPTOM

Transmission noisy when operating.

MALFUNCTION

Transmission fluid level is incorrect.

CORRECTIVE ACTION

If transmission fluid level is low, add fluid as required and run transmission selector through all gears. Refer to WP 0079, Lubrication Instructions. If still noisy, notify Field Maintenance. If transmission fluid level is high, transmission is overfilled. Notify Field Maintenance.

SYMPTOM

Transmission temperature gauge or RED high transmission temperature LED indicates overheating during operation.

MALFUNCTION

Transmission fluid level is incorrect.

CORRECTIVE ACTION

If fluid level is low, add fluid as required and run transmission selector through all gears. Refer to WP 0079, Lubrication Instructions. If still indicates high temp reading, notify Field Maintenance. If fluid is high, transmission is overfilled. Notify Field Maintenance.

Transmission Troubleshooting Procedures - (CONTINUED)**SYMPTOM**

AMBER CHECK TRANS light remains on after start-up.

MALFUNCTION

Transmission has electrical control or internal malfunction.

CORRECTIVE ACTION

If AMBER CHECK TRANS light remains on after start-up, prior to operating vehicle, turn off engine, wait 15 seconds, and restart engine. If CHECK TRANS light does not stay on, fault has cleared and vehicle can be operated normally. If CHECK TRANS light comes on and remains on after the second start-up, turn off engine and notify Field Maintenance. Vehicle may be operated in transmission limp home mode. Refer to WP 0058, Transmission Emergency Operation Procedures (Limp Home).

SYMPTOM

Vehicle will not move forward or backward.

MALFUNCTION

Transmission is set to DRIVE (D) or REVERSE (R).

CORRECTIVE ACTION

Verify HI or LOW has been selected from transfer case (XFER) switch. Refer to WP 0004, Description and Use of Operator Controls and Indicators.

MALFUNCTION

Transmission controller will not engage or move from NEUTRAL (N) to other gears.

CORRECTIVE ACTION

Verify gear selection. If in selected gear, Notify Field Maintenance.

SYMPTOM

Both transmission gear selector displays show slanted lines.

MALFUNCTION

A transmission selector fault code has been logged.

CORRECTIVE ACTION

Notify Field Maintenance.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
STEERING AND SUSPENSION TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Materials/Parts**

Rag (WP 0083, Item 23)

References

WP 0079

Equipment Condition

Parking brake set (WP 0011)

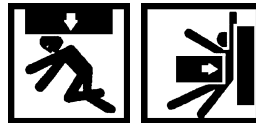
Transmission set in NEUTRAL (N) (WP 0011)

Engine off (WP 0011)

Main power switch off (WP 0011)

Wheels chocked (WP 0011)

Engine hood open and secured (WP 0031)

TROUBLESHOOTING PROCEDURE
WARNING

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

SYMPTOM

Wheel wobbles or steering shimmies.

MALFUNCTION

Lug nuts are loose, missing, or broken.

CORRECTIVE ACTION

Tighten loose lug nuts. At end of mission, notify Field Maintenance to have lug nuts tightened to proper torque requirements and replace missing lug nuts.

MALFUNCTION

Wheels are bent, or tires are bulged.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Wheel rim bolts are missing.

CORRECTIVE ACTION

When three or more consecutive wheel rim bolts are missing, notify Field Maintenance to replace wheel and tire assembly.

SYMPTOM

Vehicle wanders or pulls to one side.

MALFUNCTION

Steering components are bent or damaged.

CORRECTIVE ACTION

Notify Field Maintenance.

Steering and Suspension Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Tire air pressure is not correct.

CORRECTIVE ACTION

Inflate tire to proper pressure. Refer to , Tire Inflation Procedure.

SYMPTOM

Vehicle is hard to steer, or steering is slow to respond or has intermittent assist.

MALFUNCTION

King pin or steering linkage is stiff due to poor lubrication.

CORRECTIVE ACTION

Lubricate king pin and steering linkage fittings. Refer to WP 0079, Lubrication Instructions.

MALFUNCTION

Power steering reservoir fluid is low or empty.

CORRECTIVE ACTION

If fluid is low, add to FULL line. Refer to WP 0079, Lubrication Instructions. If empty, notify Field Maintenance.

MALFUNCTION

Power steering noisy.

CORRECTIVE ACTION

Check fluid level. Refer to WP 0079, Lubrication Instructions. If full, notify Field Maintenance.

MALFUNCTION

Power steering system lines, hoses, and/or connections are leaking, loose, or damaged.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Tire air pressure is not correct.

CORRECTIVE ACTION

Inflate tires to proper pressure. Refer to , Tire Inflation Procedure.

MALFUNCTION

Power steering noisy.

CORRECTIVE ACTION

Check fluid, if full, notify Field Maintenance.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
AIR PRESSURE SYSTEM TROUBLESHOOTING PROCEDURES

INITIAL SETUP:**Materials/Parts**

Gloves, leather (WP 0083, Item 11)
Goggles (WP 0083, Item 10)

References

WP 0004
WP 0021
WP 0058
WP 0075

Equipment Condition

Parking brake set (WP 0011)
Transmission set in NEUTRAL (N) (WP 0011)
Engine OFF (WP 0011)
Main power switch OFF (WP 0011)
Wheels chocked (WP 0011)
Battery box armor door open (WP 0075)

TROUBLESHOOTING PROCEDURE**WARNING**

Air drain valves are under pressure. Wear protective goggles and do not place face in front of air drain valves while draining air tanks. Open air drain valves slowly to release air pressure gradually. Failure to comply may result in serious injury or death to personnel.

Do not disconnect any air line or fitting until system pressure has been relieved. Hoses may whip and injure personnel, and air under pressure can penetrate skin. Failure to comply may result in serious injury or death to personnel.

SYMPTOM

Air pressure gauges show 65 psi (448 kPa) or less, and RED air gauge LED's are on.

MALFUNCTION

TRAILER AIR SUPPLY knob is not pulled out.

CORRECTIVE ACTION

Pull out TRAILER AIR SUPPLY knob. Refer to WP 0004, Description and Use Of Operator Controls and Indicators. If knob is pulled out, notify Field Maintenance

MALFUNCTION

All air tank drain valves are stuck open.

CORRECTIVE ACTION

Check air tank drain cords. Refer to WP 0075, Exterior Battery Box Armor Door Open and Close and WP 0021, Air Tank Drains. If connected properly, notify Field Maintenance.

MALFUNCTION

Air system connections or hoses are loose, leaking, or damaged.

CORRECTIVE ACTION

If connections are loose or leaking, tighten and notify Field Maintenance. If hoses, lines, or fittings are damaged, notify Field Maintenance.

SYMPTOM

Trailer brakes do not apply when service brake pedal or parking brake is applied.

Air Pressure System Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Service and emergency air hoses are not properly connected and secured to gladhands.

CORRECTIVE ACTION

Properly connect and secure the service and emergency air hoses. Refer to WP 0058, Trailer and Gladhand Connections. If connected properly and symptom still exists, notify Field Maintenance.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

ELECTRICAL SYSTEM TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Materials/Parts

Goggles (WP 0083, Item 10)
 Faceshield, industrial (WP 0083, Item 5)

WP 0075

Equipment Condition

Parking brake set (WP 0011)
 Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Main power switch off (WP 0011)
 Wheels chocked (WP 0011)

References

WP 0004
 WP 0026
 WP 0058

TROUBLESHOOTING PROCEDURE

WARNING



Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Battery acid must not contact eyes, skin, or clothing. If battery acid contacts eyes or skin, flush area with large amounts of water for 15 minutes and seek immediate medical care. If swallowed, do not induce vomiting. 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 serious injury or death to personnel.

Turn main power switch off prior to performing maintenance on battery or electrical system. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion. Do not allow tools to contact battery box or other battery terminals when removing or installing terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

SYMPTOM

No electrical circuits operate.

MALFUNCTION

main power switch is in the OFF position.

CORRECTIVE ACTION

Turn main power switch to ON position. Refer to WP 0004, Description and Use of Operator Controls and Indicators.

Electrical System Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Battery cables have loose connections, corrosion, or damage.

CORRECTIVE ACTION

If battery connections are loose, tighten them. If battery connections are corroded, clean them. Refer to WP 0075, Exterior Battery Box Armor Door Open and Close. If battery cables are damaged, notify Field Maintenance.

MALFUNCTION

Circuit breakers are tripped.

CORRECTIVE ACTION

Reset circuit breakers. Refer to WP 0072, Circuit Breaker Reset. If circuit breakers trip again, notify Field Maintenance.

SYMPTOM

Instrument Panel (IP) VOLTS gauge for 24V system displays a reading less than 27V with engine running.

MALFUNCTION

Charging system is faulty.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Battery cables have loose connections, corrosion, and/or damage. Refer to WP 0075, Exterior Battery Box Armor Door Open and Close.

CORRECTIVE ACTION

If battery connections are loose, corroded, or damaged, notify Field Maintenance.

MALFUNCTION

Circuit breakers are tripped.

CORRECTIVE ACTION

Reset circuit breakers. Refer to WP 0072, Circuit Breaker Reset. If circuit breakers trip again, notify Field Maintenance.

MALFUNCTION

Serpentine belt is broken or loose.

CORRECTIVE ACTION

Notify Field Maintenance.

SYMPTOM

One or more lighting circuits do not operate.

MALFUNCTION

Lighting system controls are in the OFF position.

Electrical System Troubleshooting Procedures - (CONTINUED)**CORRECTIVE ACTION****NOTE**

Master Vehicle Light Switch (MVLS) must be in Blackout OFF position when operating cabin and crew lights. Refer to WP 0004, Description and Use of Operator Controls and Indicators and WP 0026 Rear Crew light Operation.

Turn lighting system controls to ON position.

MALFUNCTION

Circuit breakers are tripped.

CORRECTIVE ACTION

Reset circuit breakers. Refer to WP 0072, Circuit Breaker Reset. If circuit breakers trip again, notify Field Maintenance.

MALFUNCTION

Trailer socket connection is loose or corroded, or connectors/cables are damaged.

CORRECTIVE ACTION

If connector/cable is loose, reconnect cable connector. Refer to WP 0058, Trailer and Gladhand Connections. If cable connections are corroded, clean them. If cable connections are damaged, notify Field Maintenance.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

WINCH TROUBLESHOOTING PROCEDURES

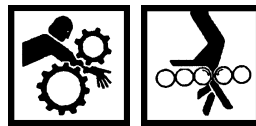
INITIAL SETUP:**Materials/Parts**

Gloves, leather (WP 0083, Item 11)
Goggles (WP 0083, Item 10)

Transmission set in NEUTRAL (N) (WP 0011)
Engine off (WP 0011)
Battery disconnect switch off (WP 0011)
Wheels chocked (WP 0011)

Equipment Condition

Parking brake set (WP 0011)

TROUBLESHOOTING PROCEDURE
WARNING

Cable is under tension when installed. Wear safety goggles and work gloves when handling. Do not wear loose clothing; it can get caught in cable as cable winds around spool drum. Failure to comply may result in serious injury or death to personnel.

When operating winch, ensure there are no objects in path of cable or vehicle. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Wear heavy, leather-palmed work gloves when handling cable. Never let moving cable slide through hands, even when wearing gloves. Cable can become frayed or contain broken wires. A broken wire could cut through gloves and injure hands. Failure to comply can result in serious injury to personnel.

To prevent accidental release, do not remove mechanical lever lockpin unless pull-cable fitting is attached. Failure to comply may result in damage to equipment and serious injury to personnel.

Do not exceed rated pulling capacity of winch. Winch is rated to pull maximum load of 18,000 lb (8165 kg) when pulling first layer of wire rope onto winch drum. Failure to comply may result in damage to equipment and serious injury to personnel.

Keep fingers and hands clear from drum or rollers while operating the winch. Fingers and hands can be pulled into the drum or rollers by the cable. Failure to comply may result in serious injury or death to personnel.

During winching operations, all personnel must remain either inside the vehicle or outside a circled area with a radius that is twice the length of the extended winch wire rope when measured from both the winch and the load point. Failure to comply may result in death or injury to personnel.

SYMPTOM

Winch does not pay in or pay out.

MALFUNCTION

Winch remote control not functioning properly.

CORRECTIVE ACTION

Connect remote control properly, or replace remote control with a known good unit.

Winch Troubleshooting Procedures - (CONTINUED)**MALFUNCTION**

Electrical connections have improper connections, corrosion, or damage.

CORRECTIVE ACTION

If not connected, connect. If corroded, clean. If damaged, notify Field Maintenance.

MALFUNCTION

Mechanical or electrical failure prevents operation.

CORRECTIVE ACTION

Notify Field Maintenance.

MALFUNCTION

Cable has twists or tangles that would cause it to bind.

CORRECTIVE ACTION

Pay out or take up cable as necessary to straighten cable. If cable is frayed at any point, notify Field Maintenance.

SYMPTOM

Winch unusually noisy when operating.

MALFUNCTION

Cable has twists or tangles that would cause it to bind.

CORRECTIVE ACTION

Pay out or take up cable as necessary to straighten cable. If cable is frayed at any point, notify Field Maintenance.

END OF WORK PACKAGE

CHAPTER 4
MAINTENANCE INSTRUCTIONS
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

PURPOSE AND USE

To ensure the vehicle is ready for operation at all times, it must be inspected on a regular basis so items to be serviced may be found before they result in serious damage, equipment failure, or injury to personnel. The PMCS table in the following work package contains systematic inspections and services required to maintain the vehicle in mission-ready condition.

GENERAL SERVICE AND INSPECTION PROCEDURES

Always perform PMCS in the same order. If a component does not pass PMCS inspection, troubleshoot it with the instructions in this manual or notify Field Maintenance. If a problem is found that is beyond your echelon of repair, contact Field Maintenance.

Inspect the vehicle for the following items:

Cleanliness – Dirt, grease, oil, and debris get in the way and may cover up a serious problem.

Nuts and Screws – Check for obvious looseness, missing parts, and bent or broken conditions. Look for chipped paint, bare metal, or rust around screw heads. If a loose screw or nut is found, tighten it or report it to Field Maintenance.

Welds – Look for loose or chipped paint, rust, or gaps where parts are welded together. If a cracked weld is found, report it to Field Maintenance.

Electrical Wires and Connectors – Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and ensure wires are in good shape. If damaged wires or connectors are found, or any electrical system operates intermittently, report it to Field Maintenance.

Fluid Lines, Fittings, and Air Lines – Look for wear, damage, or leaks, and ensure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also identify a leak. If a leak comes from a loose fitting or connector, tighten it. Start vehicle, let air tanks fill, shut off engine, and listen for air leaks. If any part is broken or worn out, start vehicle, listen for air leak, and report it to Field Maintenance.

Damage – Damage is defined as any condition that affects safety or would render the vehicle unserviceable for mission requirements.

Fluid Leakage – It is necessary for you to know how fluid leakage affects the status of the MRAP. Following are types/classes of leakage you need to know to be able to determine the status of the MRAP. Learn these leakage definitions and remember - when in doubt, notify your supervisor. Equipment operation is allowed with minor leakage (Class I or II). Consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS. Class III leaks should be reported immediately to your supervisor.

Class I: Seepage of fluid indicated by wetness or discoloration that is not great enough to form drops.

Class II: Leakage of fluid great enough to form drops but not enough to cause drops to fall from item being checked/inspected.

Class III: Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

Corrosion Control – Corrosion control maintenance is a requirement of the vehicle. While performing PMCS, look for rust, peeling paint, blistering, damage that can cause corrosion, or other signs of corrosion. Inspect the entire vehicle as well as the specific areas mentioned in the PMCS. Also look for and always be aware of missing or damaged corrosion preventive compounds. Report problem areas as soon as possible to Field Maintenance. Correcting problem areas as soon as possible will maximize the life of the vehicle. Appearance and color of corrosion is dependent on the metal/components involved. Use the following table to aid in visual detection of corrosion.

Table 1. Visual Detection of Corrosion.

METAL/COMPONENT	CORROSION
Steel	Powdery, Reddish-Brown Film
Aluminum	Powdery, White Film

Preventive Maintenance Checks and Services (PMCS) Introduction - (CONTINUED)

METAL/COMPONENT	CORROSION
Brass	Green Film
Electrical Connection	Green Film

This MRAP is not enrolled in the Army Oil Analysis Program. HARDTIME INTERVALS APPLY.

EXPLANATION OF PMCS TABLE

ITEM NO: Provides logical order for PMCS performance and is used as a source number for DA Form 2404, on which your PMCS results will be recorded.

INTERVAL: Indicates when check or service is to be performed.

Before — performed prior to operating the MRAP.

During — performed while MRAP components or systems are in operation.

After — performed immediately after operating the MRAP.

Weekly — performed once a week. If the MRAP has not been operated in a week, also do Before PMCS.

Monthly — performed once a month. If the MRAP has not been operated in a month, also do After PMCS at the same time.

ITEM TO BE CHECKED/SERVICED: Lists the system, common name, or location of the item to be inspected.

PROCEDURE: Provides instructions for inspecting and servicing items. If a defect is found, repair, fill, remove, or adjust as indicated, or have item repaired or replaced at higher maintenance level.

EQUIPMENT NOT READY/AVAILABLE IF: Provides information for deadlining a vehicle when checks or services reveal a defect or deficiency of a component(s) of the vehicle.

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

INITIAL SETUP:

Materials/Parts

- Gloves, nitrile, large (WP 0083, Item 12)
- Gloves, leather (WP 0083, Item 11)
- Goggles (WP 0083, Item 10)
- Rag (WP 0083, Item 23)

- WP 0077
- WP 0078

Equipment Condition

- Parking brake set (WP 0011)
- Transmission set in NEUTRAL (N) (WP 0011)
- Engine OFF (WP 0011)
- Main power switch OFF (WP 0011)
- Wheels chocked (WP 0011)

References

- WP 0021
- WP 0069
- WP 0075

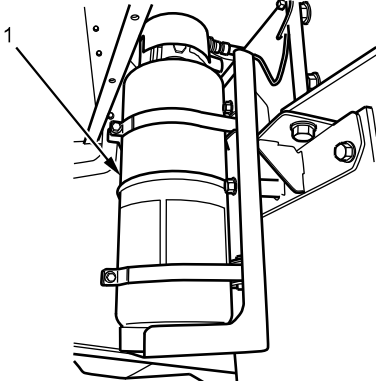
Table 1. PMCS

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before	Exterior of vehicle	1. Check for obvious damage or missing items that would impair operation. 2. Visually check under vehicle for evidence of fluid leakage.	Any damage that prevents operation. Any fuel or Class III oil or coolant leak.
2	Before	Exterior ballistic glass	<p style="text-align: center;">CAUTION</p> Do not use ammonia or any cleaning product that contains ammonia to clean ballistic glass. Ammonia breaks down the bond between the inner and outer layers of ballistic glass. Do not use aerosol window cleaners. The aerosol propellant may cause ballistic glass separation. Failure to comply may result in damage to equipment. 1. Check ballistic glass for damage that would impair operator's vision.	Ballistic glass is cracked, broken, or discolored (cloudy) sufficiently to impair operator's vision.

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			2. Inspect surface of ballistic glass for complete breaks, delamination, scratches, gouges, tape, decals, adhesives, or impaired visibility.	The bond between glass and frame is separated from glass or frame. Any complete break on surface of glass. Any major damage to the surface of the glass from gouges.
3	Before	Exterior Fire Suppression System (FSS) extinguishers	<p style="text-align: center;">NOTE</p> <p>The FSS cylinder for the engine is located on the right side of the vehicle behind the air conditioner fans and condenser. Cylinder for the fuel tank is located on the left side behind the air conditioner fans and condenser. Cylinder for the tires is located behind a closeout panel on the left rear fender above the left rear wheel. Refer to Left Side Rear Stowage Box Removal and Installation WP 0077 . Exterior dispersion nozzles are located near the front tires, rear tires, in the engine compartment, and above the fuel tank.</p> <p>Left side cylinder shown.</p> <ol style="list-style-type: none"> 1. Confirm that all fire suppression cylinders (Figure 1, Item 1) are mounted correctly on vehicle. 2. Verify that each cylinder pressure gauge needle is in GREEN zone. <ol style="list-style-type: none"> 3. Check all bolts, nuts, and other fasteners on FSS cylinder brackets for tightness. 	<p>Any FSS cylinders missing.</p> <p>Pressure gauge needle is not in GREEN zone. Notify Field Maintenance.</p> <p>FSS cylinders not securely mounted.</p>


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>4. Inspect nozzles and fittings for obstruction.</p>  <p style="text-align: right;">B101800667</p> <p style="text-align: center;">Figure 1. FSS Cylinder.</p>	<p>Nozzles are obstructed.</p>
4	Before	Tires	<p>Check tread depth and tire inflation, and note if tread is evenly worn. Check tires for cuts, gouges, cracks, or other damage. Check if valve caps and stems are missing, broken, or damaged.</p>	<p>Any tire has wear or damage that allows ply or belt material to be exposed through tread or sidewall. Any tire has tread or sidewall separation.</p>
5	Before	Mirrors	<p>Inspect for broken, dirty, cracked, or loose mirrors. Check for proper alignment. Check power mirrors and heated mirrors for proper operation. Check that visibility is not impaired due to dirty mirrors.</p>	<p>Mirror has impaired visibility.</p>
6	Before	Armor panels	<ol style="list-style-type: none"> 1. Inspect armor panels for damage, corrosion, and combat damage. 2. Check that all nuts and bolts are secure. 	<p>Panels are severely damaged or corroded.</p> <p>Nuts or bolts are loose.</p>
7	Before	Lights	<p style="text-align: center;">CAUTION</p> <p>Vehicle operation with damaged or inoperable lights may violate IAW AR 385-10.</p>	


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Check that all interior and exterior lights illuminate and are clean.</p>	<p>Any service light does not function or is broken. Notify Field Maintenance.</p>
8	Before	Steering	<p>1. Check that all nuts and bolts are secure.</p> <p>2. Check pitman arm (Figure 2, Item 1) and drag link (Figure 2, Item 2) for cracks, bends, or missing fasteners.</p> <div> </div> <p style="text-align: center;">B231403589</p> <p style="text-align: center;">Figure 2. Pitman Arm and Drag Link.</p> <p>3. Check steering shaft (Figure 3, Item 1).</p> <div> </div> <p style="text-align: center;">B230603588</p> <p style="text-align: center;">Figure 3. Steering Shaft.</p>	<p>Nuts or bolts are loose.</p> <p>Evident damage. Cracked or excessively worn tie rod, or broken power steering cylinder, gear shaft, or drag link. Excessive steering play. Cracked, split, or damaged hydraulic lines/fittings.</p> <p>Evident damage. Excessive steering play.</p>
9	Before	Leaf springs and hardware	<p>1. Check that all nuts and bolts are secure.</p>	<p>Nuts or bolts are loose.</p>


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			2. Check that springs and hangers are not bent or damaged.	Springs or hangers are bent or damaged.
10	Before	Brakes	<p style="text-align: center;">WARNING</p>  <p>Wear eye protection when working on or around air systems. Air lines, fittings, and components contain air under pressure. Failure to comply may result in injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>Service drive lights must be on before audible warning will operate.</p> <p>1. Check air brakes as follows:</p> <p style="margin-left: 20px;">a. Check front and rear brake hoses for cracked, worn, or frayed hoses, and for secure couplings.</p> <p style="margin-left: 20px;">b. Check front and rear brake chambers for cracks, rust, dents and secure mounting</p> <p style="margin-left: 20px;">c. Check for missing or damaged slack adjusters.</p>	Brakes are malfunctioning; notify Field Maintenance. Hoses cracked, frayed, or worn. Brake chambers are cracked, loose, or rusted.

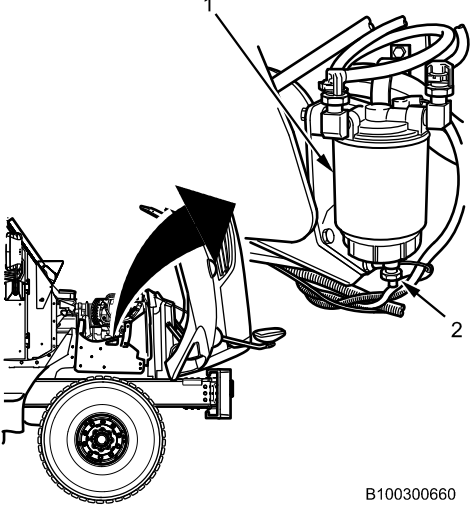




Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	Before	Fuel tank	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.</p> <p>Do not fill fuel tank with engine running. Do not overfill fuel tank. Clean fuel spills immediately. Ensure fuel nozzle is grounded to filler neck to prevent sparks. Failure to comply may result in injury or death to personnel and damage to equipment.</p> <p>Radio transmission is prohibited 50 feet (15 meters) from other vehicles refueling.</p> <p>Ensure radios are powered OFF before conducting fueling operations or maintenance activities. Failure to comply may result in injury to personnel.</p> <p>Clean up all fuel spills. Spills can create slip and fire hazards. Dispose of materials in accordance with local hazardous waste disposal procedures. Failure to comply may result in injury to personnel and damage to the environment</p> <ol style="list-style-type: none"> 1. Check fuel tank for adequate fuel level. Check fuel tank strainer for dirt and debris. 2. Check that rubber seal is present in fuel tank cap and is not damaged. 3. Check fuel tank cap. 	<p>Fuel tank strainer is visibly plugged. Notify Field Maintenance.</p> <p>Rubber seal missing or damaged.</p> <p>Tank cap is missing or damaged.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
12	Before	Fuel/water separator	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.</p> <p>Do not fill fuel tank with engine running. Do not overfill fuel tank. Clean fuel spills immediately. Ensure fuel nozzle is grounded to filler neck to prevent sparks. Failure to comply may result in injury or death to personnel and damage to equipment.</p> <p style="text-align: center;">NOTE</p> <p>If water is present in sediment bowl, drain fuel from bowl into a suitable container until clean fuel flows out.</p> <ol style="list-style-type: none"> 1. Check fuel/water separator (Figure 4, Item 1) and drain (Figure 4, Item 2) for leaks, damage, and loose connections. 2. Check sediment bowl for water. Refer to Fuel Water Separator Draining WP 0070. 	<p>Any fuel leak or broken drain valve.</p>

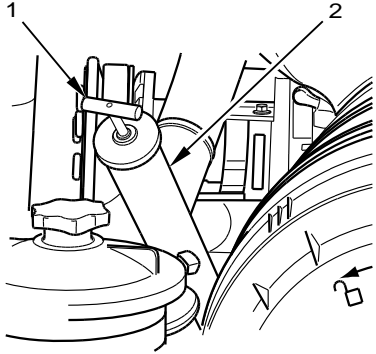
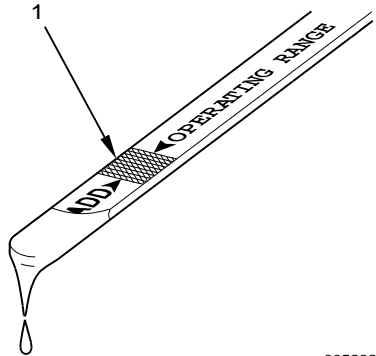
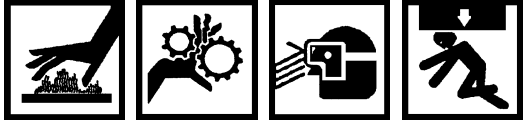
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right;">B100300660</p> <p style="text-align: center;">Figure 4. Fuel/Water Separator.</p>	
13	Before	Engine oil level	<p style="text-align: center;">WARNING</p> <div style="display: flex; justify-content: space-around;">     </div> <p>Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.</p> <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <p style="text-align: center;">CAUTION</p> <p>Do not overfill engine oil. Failure to comply may result in damage equipment.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p style="text-align: center;">NOTE</p> <p>Rubber seal should fit completely in fill tube, and dipstick should not move freely.</p> <p>1. Check engine oil level as follows:</p> <p style="padding-left: 20px;">a. With engine off, turn dipstick handle (Figure 5, Item 1) counterclockwise, pull dipstick out, and wipe clean with lint-free rag.</p> <p style="padding-left: 20px;">b. Insert dipstick until fully seated, then remove. Oil level should be within OPERATING RANGE (Figure 6, Item 1) hash marks above ADD on the dipstick.</p> <p style="padding-left: 20px;">c. If oil level is low, add correct engine oil to correct level.</p> <p style="padding-left: 20px;">d. Repeat step 2 to verify reading.</p> <p style="padding-left: 20px;">e. Insert dipstick into fill tube (Figure 5, Item 2), and turn clockwise until snug.</p>	<p>If overfull, or if vehicle has Class III leak, notify Field Maintenance.</p> <p>Dipstick missing or damaged.</p>

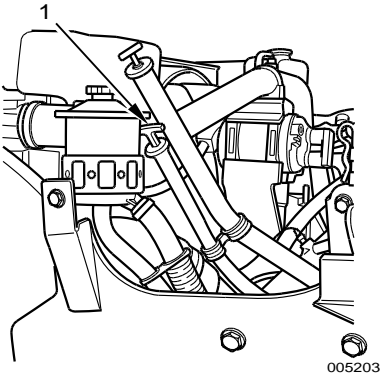
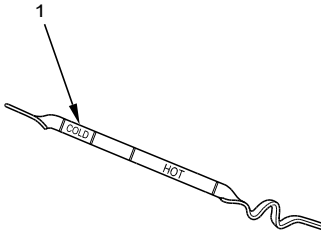
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right;">005201</p> <p>Figure 5. Engine Oil Dipstick.</p>  <p style="text-align: right;">005202</p> <p>Figure 6. Engine Oil Operating Range.</p>	
14	Before	Transmission oil level	<p style="text-align: center;">WARNING</p>  <p>Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.</p>	





Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <p style="text-align: center;">CAUTION</p> <p>Do not overfill transmission oil. Failure to comply may result in damage to equipment.</p> <p>Before performing the hot-check procedure, ensure transmission fluid is at operating temperature, to ensure accurate reading and help prevent transmission damage. The fluid level rises as temperature increases. During operation, an overfull transmission can become overheated, leading to transmission damage.</p> <p>Ensure vehicle is parked on a level surface with wheels chocked and parking brake applied. Failure to comply may result in damage to equipment.</p> <p>1. Check transmission oil level as follows:</p> <p style="margin-left: 40px;">a. Start and run engine at idle (500-800 rpm) for about 1 minute.</p> <p style="margin-left: 40px;">b. With service brake applied, shift to DRIVE (D) and then to REVERSE (R) to clear hydraulic system of air.</p> <p style="margin-left: 40px;">c. Shift to NEUTRAL (N) and allow the engine to remain at idle (500-800 rpm).</p>	<p>If overfull or if vehicle has Class III leak, notify Field Maintenance.</p> <p>Dipstick missing or damaged.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>d. With engine running, remove dipstick (Figure 7, Item 1) from fill tube and wipe clean.</p> <p>e. Insert dipstick (Figure 7, Item 1) into the tube until it stops, then remove. Check fluid level. Repeat to verify reading.</p>  <p>Figure 7. Transmission Fluid Dipstick.</p> <p>f. If fluid level is within COLD band (Figure 8, Item 1) transmission can be operated until fluid is hot enough to perform hot run check.</p>  <p>Figure 8. Transmission Fluid Dipstick Cold Range.</p>	

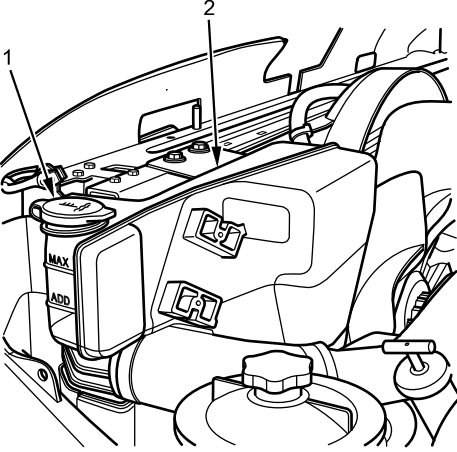

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>g. If fluid level is not within COLD band, add fluid or notify Field Maintenance to drain fluid as necessary to bring fluid level to middle of COLD band. Turn engine off.</p> <p>h. Perform hot check at first opportunity after normal transmission operating temperature of 160°-200°F (71°-93°C) is reached.</p>	
15	Before	Coolant level	<p style="text-align: center;">WARNING</p> <div style="display: flex; justify-content: space-around;">     </div> <p>Cooling system components become extremely hot during normal operation. Allow engine to cool completely prior to working on or near radiator. Use extreme care when working in close quarters in engine compartment. Failure to comply may result in serious injury or death to personnel.</p> <p>Cooling system components become pressurized and extremely hot during normal operation. To prevent serious injury from hot coolant or scalding steam, use the following safety procedure when removing radiator cap, surge tank cap, or deaeration cap:</p> <p>Allow engine to cool for 15 minutes.</p> <p>Wrap a thick cloth around cap to be removed.</p> <p>Loosen cap slowly one-quarter to one-half turn counterclockwise, and pause to allow pressure to release.</p> <p>Continue to turn cap counterclockwise to remove.</p>	

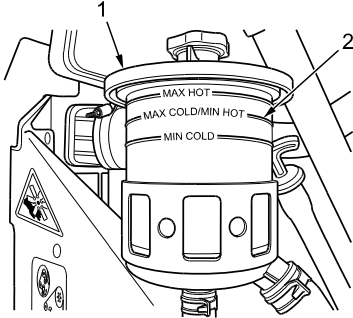
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Ensure all personnel stay clear of radiator while engine is running. Air in radiator will be released, which may cause hot coolant to spray out. Failure to comply may result in serious injury to personnel.</p> <p>Wear safety goggles and work gloves while servicing cooling system. Label all connections and reference areas before removing parts. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Engine fluids (oil, fuel, and coolant) may be hazardous to human health and the environment. Handle all fluids and other contaminated materials (such as filters and rags) in accordance with standard operating procedures. Recycle or dispose of engine fluids, filters, and other contaminated materials in accordance with standard operating procedures. Failure to comply may result in environmental damage and injury to personnel.</p> <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <ol style="list-style-type: none"> 1. Check coolant level in coolant overflow reservoir (Figure 9, Item 2) when engine is cold. Check level is above ADD mark (Figure 9, Item 1). If coolant level is low, add 50/50 mixture of coolant and water to overflow reservoir until level is at ADD mark for cold engine, or MAX mark for hot engine. 	<p>Any leak exists or coolant overflow reservoir is empty. Notify Field Maintenance.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>2. Check coolant overflow reservoir and cap for damage and leakage.</p>  <p style="text-align: right;">B100600659</p> <p style="text-align: center;">Figure 9. Coolant Reservoir.</p>	<p>Coolant overflow reservoir or cap missing or damaged enough to allow leakage.</p>
16	Before	Belts	<p style="text-align: center;">WARNING</p>  <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <ol style="list-style-type: none"> 1. Check belts for frays, cracks, loose fibers, and visible signs of wear. 2. With engine off, press serpentine belts (fan, alternator, water pump, air compressor, and refrigerant compressor) to check tightness. 	<p>Belts cracked or frayed.</p> <p>Belts loose or worn.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

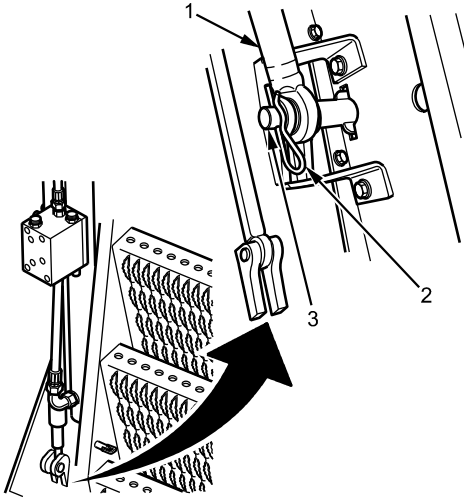
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	Before	Windshield washer fluid	Check windshield wiper fluid reservoir fluid level to verify fluid level is up to the FULL mark. If low, add fluid. Refer to Windshield Washer Service WP 0078.	Reservoir empty.
18	Before	Power steering fluid	<ol style="list-style-type: none"> 1. Check power steering fluid level. Ensure that fluid is at the MAX COLD/MIN HOT level (Figure 10, Item 2) on reservoir when system is cold. If fluid is below MAX COLD/MIN HOT mark, add fluid to bring to that level. 2. Check power steering reservoir for leaks, damage, and secure mounting. 3. Check power steering hoses, connections, and cap (Figure 10, Item 1) for looseness, leaks, and damage. <div style="text-align: center;">  <p>Figure 10. Power Steering Fluid Reservoir.</p> </div>	Reservoir empty. Any Class III leak. Damage to components causing Class III leak. Reservoir cap missing.
19	Before	Starter	Check that starter engages smoothly and engine starts properly.	Engine does not start, excessive or unusual noises coming from starter, or starter does not make any noise.
20	Before	Cabin interior	Inspect cabin interior for any loose or missing bolts.	Cabin has several loose or missing bolts. Notify Field Maintenance.

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Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
21	Before	Rear door/ramp	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Rear cabin door/ramp is heavy. Make sure door/ramp is secured so it will not move. Failure to comply may result in serious personal injury or death to personnel.</p> <ol style="list-style-type: none"> 1. Check door/ramp hinges and mounting hardware for cracked or broken hinges and missing or loose hinge bolts or nuts. 2. Check area under door/ramp pump for leaks 3. Check mounting pin and lockpins on door/ramp hydraulic cylinder (Figure 11, Item 1). 4. Check hydraulic lines from top of door/ramp pump to the reservoir. 5. Check door/ramp door seal for cuts, tears, or missing door seal. 	<p>Ramp hinges are cracked or broken; mounting hardware is missing or has loose bolts or nuts.</p> <p>Class III leak noticed.</p> <p>Any mounting pin (Figure 11, Item 3) cracked, broken, or missing. Any lockpin (Figure 11, Item 2) missing.</p> <p>Any hydraulic line is cut or bulging, or any Class III leak present.</p> <p>Door seal missing or will not seal properly</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>6. Operate door/ramp.</p>  <p style="text-align: right;">B102400661</p> <p style="text-align: center;">Figure 11. Rear Door/Ramp.</p>	<p>Rear door/ramp will not operate or malfunctions.</p>
22	Before	Interior ballistic glass interior	<p style="text-align: center;">CAUTION</p> <p>Do not use ammonia or any cleaning product that contains ammonia to clean ballistic glass. Ammonia breaks down the bond between the inner and outer layers of ballistic glass. Do not use aerosol window cleaners. The aerosol propellant may cause ballistic glass separation. Failure to comply may result in damage to equipment.</p> <ol style="list-style-type: none"> 1. Check ballistic glass for damage that would impair operator's vision. 2. Inspect inner surface of ballistic glass for complete breaks, delamination, scratches, gouges, tape, decals, adhesives, or impaired visibility. 	<p>Ballistic glass is cracked, broken, or discolored (cloudy) sufficiently to impair operator's vision.</p> <p>The bond between glass and frame is separated from glass or frame. Any major damage to surface of glass from gouges.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
23	Before	Seat mounts	Check and inspect all seats. Make sure seats are firmly engaged to avoid forward or rearward movement when starting or stopping. Make sure anchor mounting fasteners to floor, as well as tether straps to floor or cabin back, are tight and straps are not worn.	Seat cannot be secured correctly.
24	Before	Seatbelts	<ol style="list-style-type: none"> 1. Inspect seatbelts for proper operation. Make sure anchor mountings are tight and there is no fraying of seatbelt material. 2. Inspect seatbelt buckle to make sure it latches. 	Seatbelts damaged, frayed, or not functional. Buckle damaged or not functional.
25	Before	Litter arms	<ol style="list-style-type: none"> 1. Inspect litter arms (Figure 12, Item 1), lock pins (Figure 12, Item 4), and storage bracket (Figure 12, Item 3) for damage. 2. Check that litter arms and storage brackets are fastened securely with straps (Figure 12, Item 2) and tighten as necessary. <div style="text-align: center;"> <p style="text-align: right; margin-right: 50px;">B101800658</p> </div>	Litter arms or storage brackets are damaged. Litter arms or storage brackets are not properly strapped to vehicle.

Figure 12. Litter Rack Arms.

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)


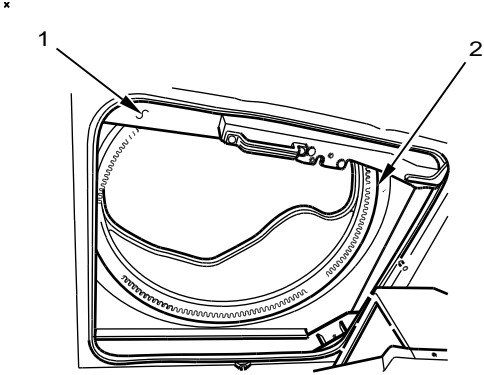

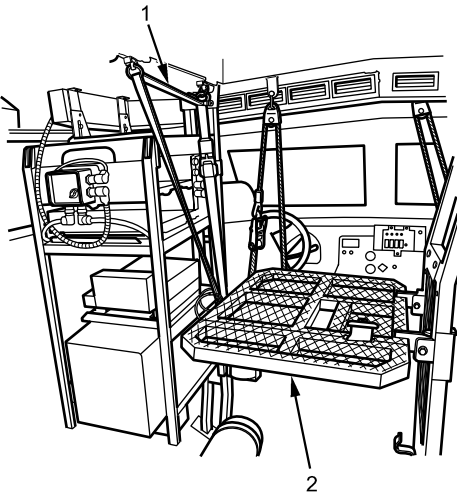
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
26	Before	Weapon station	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Gunner hatch is extremely heavy. Use caution when opening and closing. Wear safety goggles when removing, installing, or working on interior of gunner hatch. Keep arms and hands clear of gunner hatch when closing. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Gunner sliding hatch can only be opened or closed when vehicle is stationary and on level surface. Do not attempt to open or close the hatch when vehicle is in motion. Make sure latch locks are secured into place in the open or closed positions before vehicle starts moving. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <ol style="list-style-type: none"> 1. Check that gunner hatch (Figure 13, Item 1) operates smoothly and hatch latch engages and secures hatch in open position. Clean and lubricate as needed. 2. Inspect turret ring (Figure 13, Item 2) for evidence of any sagging that would cause rubbing or binding with Objective Gunner Protection Kit (OGPK). <div style="text-align: center;">  </div> <p style="text-align: right; font-size: small;">003747</p>	<p>Gunner hatch does not operate properly or latch does not engage.</p> <p>Turret does not rotate freely.</p>

Figure 13. Gunner Hatch and Turret.

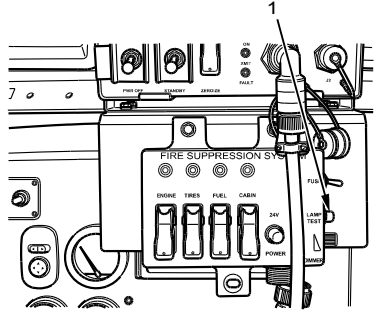
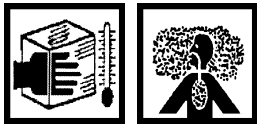
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			3. Inspect inner and outer welds that affix the turret ring to mounting plate for any cracks or breaks.	Any welds are cracked or broken.
27	Before	Gunner platform	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Make sure gunner platform support strap is not kinked, knotted, damaged, cut, or frayed before fastening to platform. If damaged, cut or frayed, see Field Maintenance for replacement. Have assistant hold platform at height adjustment holes so platform does not free fall. Failure to comply may result in serious injury or death to personnel.</p> <p>Inspect gunner platform (Figure 14, Item 2) and straps (Figure 14, Item 1).</p> <div style="text-align: center;">  <p style="text-align: right; margin-right: 50px;">B101800655</p> </div> <p style="text-align: center;">Figure 14. Gunner Platform.</p>	Gunner platform is damaged. Straps missing, damaged, cut, or frayed.
28	Before	Gunner restraint system	Inspect belt for proper operation. Make sure anchor mountings are tight and there is no fraying of belt material.	Belt damaged, frayed, or not functional.

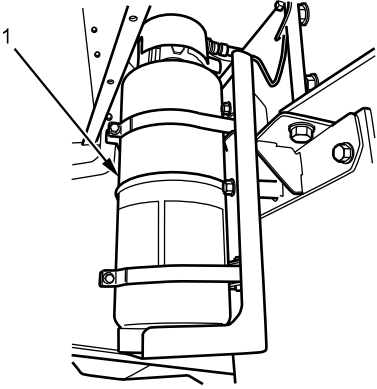
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
29	Before	Front doors	<ol style="list-style-type: none"> 1. Check door hinges and mounting hardware for cracked or broken hinges and missing or loose hinge bolts or nuts. 2. Check air lines for cuts and leaks. 3. Inspect door seal for cuts, tears, or missing door seal. 	<p>Door hinges are cracked or broken; mounting hardware is missing or has loose bolts or nuts.</p> <p>Any air line is cut or leaking.</p> <p>Door seal damaged, missing, or will not seal properly.</p>
30	Before	Emergency hatch handle	Check that emergency hatch handle functions properly.	Emergency hatch handle does not function properly.
31	Before	Portable fire extinguisher	<ol style="list-style-type: none"> 1. Inspect portable fire extinguisher for any signs of damage or leaks. Make sure handle is not broken and safety pin is present. 2. Check that portable fire extinguisher bottles are secure in stowage bracket. 	<p>Fire extinguisher handle missing or broken, safety pin missing.</p> <p>Fire extinguisher bottle is not secure in stowage bracket.</p>
32	Before	Fire Suppression System (FSS) controls	<ol style="list-style-type: none"> 1. Check lights on FSS as follows: <ol style="list-style-type: none"> a. Press lamp test button (Figure 15, Item 1) to check lights on the operation panel. 	<p>All system light do not function during lamp test, or light remains lit after test button is released.</p> <p>Notify Field Maintenance.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>b. Release lamp test button. No warning lights should be lit.</p>  <p style="text-align: center;">B100600665</p> <p style="text-align: center;">Figure 15. FSS Control Panel.</p>	
33	Before	Fire Suppression System (FSS) extinguishers, cylinder, and nozzles	<p style="text-align: center;">WARNING</p>  <p>Fire Suppression System (FSS) extinguisher can move violently when discharging. Ensure extinguisher is properly secured during use. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>The vehicle has four FSS cylinders. Cylinder for the crew cabin interior system is located next to the communications rack behind the driver seat. Cylinder for the engine is located on the right side of the vehicle behind the air conditioner fans and condenser. Cylinder for the fuel tank is located on the left side behind the air conditioner fans and condenser. Cylinder for the tires is located behind a closeout panel on the left rear fender above the left rear wheel. Refer to Left Side Rear Stowage Box Removal and Installation WP 0077.</p>	

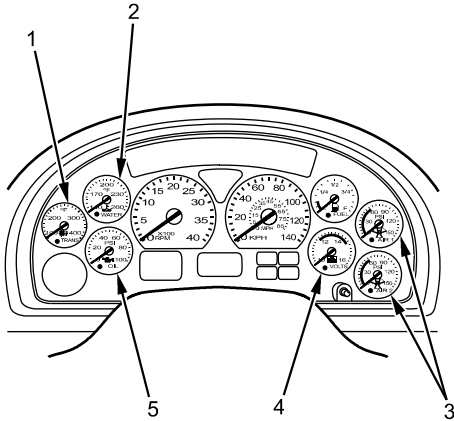
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Left side cylinder shown.</p> <ol style="list-style-type: none"> 1. Confirm that all fire suppression cylinders (Figure 16, Item 1) are mounted on vehicle.  <p style="text-align: right; font-size: small;">B101800667</p> <p style="text-align: center;">Figure 16. FSS Cylinder.</p> <ol style="list-style-type: none"> 2. Verify each cylinder pressure gauge or indicator is in the GREEN zone. 3. Check all bolts, nuts, and other fasteners on FSS brackets for tightness. 4. Inspect nozzles and fittings for obstruction. 	<p>FSS cylinders missing.</p> <p>Pressure gauge needle is not in GREEN zone. Notify Field Maintenance.</p> <p>FSS cylinders not securely mounted.</p> <p>Nozzles are obstructed.</p>
34	Before	Heating Ventilating and Air Conditioning (HVAC)	Check control panel operation and airflow of heating and cooling system.	HVAC/LSS will not operate or maintain approximately 40°-80°F (4.4°-26.7°C) cabin temperature, or HVAC pressure gauge is below 1 inch Water Column (WC).
35	During	Instrument Panel (IP) cluster gauges	<p>NOTE</p> <p>The following checks should be made with the engine running.</p>	


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<ol style="list-style-type: none"> 1. Check for operation of all panel gauges and switches. 2. Check if oil pressure (Figure 17, Item 5) is building to 15 psi (103 kPa). Engine oil pressure gauge should begin a gradual rise to a operating range of 20-65 psi (138-448 kPa). 3. Check VOLTS gauge (Figure 17, Item 4) for 12V system to see if the alternator is charging. Proper operating range is 12V-14V. Check the IP VOLTS gauge for 24V system to see if the alternator is charging. Proper operating range is 27V or higher. 4. Check WATER gauge (Figure 17, Item 2) to see if temperature is within operating range of 190°-205°F (88°-96°C). 5. Check TRANS gauge (Figure 17, Item 1) to see if temperature is within a operating range of 160°-200°F (71°-93°C). 6. Check AIR pressure gauges (Figure 17, Item 3) for normal operation, and check if pressure of 105-125 psi (724-862 kPa) causes the governor to audibly release air. 	<p>Gauge needle does not move or RED warning LED remains lit. Notify Field Maintenance.</p> <p>Oil pressure below 15 psi (103 kPa).</p> <p>If gauges are not reading in their ranges, notify Field Maintenance.</p> <p>WATER temperature gauge reading hotter than maximum operating range.</p> <p>TRANS temperature gauge reading hotter than maximum operating range.</p> <p>Unable to build or maintain air pressure.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: center;">B100000436</p> <p style="text-align: center;">Figure 17. IP Gauges.</p>	
36	During	Lights and horns	<ol style="list-style-type: none"> 1. Vehicle operation with damaged or inoperable lights may violate IAW AR 385-10. 2. Check that all lights illuminate and are clean. 3. Check operation of horn by turning ignition switch on, turning lights on, and pressing the horn symbol on steering wheel pad. 	<p>All lights do not function.</p> <p>Horns do not function when lights are on. Notify Field Maintenance.</p>
37	During	Windshield wipers	<ol style="list-style-type: none"> 1. Check all windshield wiper and washer system functions using multifunction turn signal lever. 2. Check for worn rubber on blades and for blades securely mounted on wiper arms. 	<p>Wipers or washer inoperative</p> <p>Wiper blades too worn or damaged to effectively clear windshield.</p>
38	During	Heating Ventilating and Air Conditioning (HVAC)	Check control panel operation and airflow of heating and cooling system.	HVAC/LSS will not operate or maintain approximately 40°-80°F (4.4°-26.7°C) cabin temperature, or Nuclear, Biological, and Chemical (NBC)

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				gauge on IP is below 1 inch WC.
39	During	Windshield and heated mirrors	<p style="text-align: center;">NOTE</p> <p>Perform the following inspection only if windshield and mirror heat is required for climatic conditions.</p> <p>Turn windshield and heated mirrors on and check for proper operation.</p>	Windshield and mirror heat do not operate and mission requires use of this system.
40	During	Engine	<ol style="list-style-type: none"> 1. Listen for any unusual noises. Notify Field Maintenance upon completion of mission. 2. Check AIR CLEANER RESTRICTION gauge on IP for indication of filter element air restriction. For element replacement, see Engine Air Filter Assembly Service WP 0069. 	AIR CLEANER RESTRICTION gauge indicates RED.
41	During	Transmission	Check operation for smooth shifting through gears.	Transmission is malfunctioning.
42	During	Transfer case and front axle	<ol style="list-style-type: none"> 1. Check for proper shifting in and out of LOW and HI selections. 2. Check for proper on or off engagement of front axle. 	Transfer case, or switch is malfunctioning. Front axle or switch is malfunctioning.
43	During	Steering	Check power steering to check for binding.	Steering gear is malfunctioning.
44	During	Brakes	<p style="text-align: center;">WARNING</p>  <p>Wear eye protection when working on or around air systems. Air lines, fittings, and components contain air under pressure. Failure to comply may result in injury or death to personnel.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Ensure air brake system with vehicle on a firm level surface and clear of all personnel, buildings, and equipment. Failure to comply may result in damage to equipment or serious injury or death to personnel.</p> <p>Do not operate vehicle with air pressure system loss. Vehicle has reduced or no braking capability and may not stop. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Let air pressure build in both tanks to 100 psi (689 kPa) before releasing the parking brake. Low air pressure may affect vehicle braking capability. Failure to comply may result in injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>Service drive lights must be on before audible warning will operate.</p> <p>1. Check air brakes as follows:</p> <p style="margin-left: 40px;">a. Push in parking brake knob. Push in Trailer Air Supply valve knob if a trailer is coupled with the vehicle.</p> <p style="margin-left: 40px;">b. Check the air compressor or governor cutout pressure (should be approximately 120 psi [827 kPa]).</p> <p style="margin-left: 40px;">c. Shut engine off and turn ignition switch back to RUN.</p>	<p>Brakes are malfunctioning; Notify Field Maintenance. Hoses cracked, frayed, or worn. Brake chambers are cracked, loose, or rusted.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>d. Without brake pedal applied, note air pressure drop for 1 minute. Pressure drop should be less than 2 psi (14 kPa) for vehicles without trailers, and less than 3 psi (21 kPa) for vehicles with trailers.</p> <p>e. Depress and hold brake pedal and make sure there is no more than a 3 psi (21 kPa) drop per minute.</p> <p>f. Depress and release brake pedal to decrease system air pressure, and check for warning light and buzzer to come on at about 64-76 psi (441-524 kPa).</p> <p>g. Depress and release brake pedal to decrease system air pressure, and check to make sure Trailer Air Supply valve knob and parking brake knob pop out between 20 to 45 psi (138 to 310 kPa).</p> <p>h. Start engine, allow air pressure to build to normal operating pressure, shift into a low gear, and gently pull against service and parking brakes separately to make sure they will hold vehicle from moving.</p> <p>i. Check front and rear brake hoses for cracked, worn, or frayed hoses, and for secure couplings.</p> <p>j. Check front and rear brake chambers for cracks, rust, dents and secure mounting.</p> <p>k. Check for missing or damaged slack adjusters.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
45	After	Fire Suppression System (FSS) control panel	1. Check lights on FSS control as follows: 2. 1. Press lamp test button to check lights on operation panel. 3. 2. Release lamp test button. No warning lights should be lit.	Any system light does not illuminate during lamp test, or light remains lit after test button is released. Notify Field Maintenance.
46	After	Interior ballistic glass	<p style="text-align: center;">CAUTION</p> <p>Do not use ammonia or any cleaning product that contains ammonia to clean ballistic glass. Ammonia breaks down the bond between the inner and outer layers of ballistic glass. Do not use aerosol window cleaners. The aerosol propellant may cause ballistic glass separation. Failure to comply may result in damage to equipment.</p> 1. Check ballistic glass for damage that would impair operator's vision. 2. Inspect inner surface of ballistic glass for complete breaks, delamination, scratches, gouges, tape, decals, adhesives, or impaired visibility.	Ballistic glass is cracked, broken, or discolored (cloudy) sufficiently to impair operator's vision. The bond between glass and frame is separated from glass or frame. Any complete break on inner surface of glass. Any major damage to surface of glass from gouges.
47	After	Exterior of vehicle	Check for obvious damage or missing items that would impair operation.	Any damage that prevents operation.

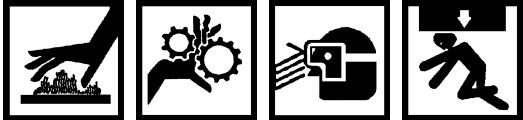
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
48	After	Tires	<ol style="list-style-type: none"> 1. Check tread depth and tire inflation, and note if tread is evenly worn. Check tires for cuts, gouges, cracks, or other damage. Check if valve caps and stems are missing, broken, or damaged. 2. Check wheels for broken, cracked, or bent surfaces. 3. Check wheel nuts and wheel studs for obvious looseness or damage. Tighten loose nuts. 4. Check wheel hub oil seal for leaks. 5. Check valve caps for tightness. 	<p>Any tire has wear or damage that allows ply or belt material to be exposed through tread or sidewall. Any tire has tread or sidewall separation.</p> <p>Wheel is broken, cracked, or bent.</p> <p>Two or more wheel nuts and/or wheel studs in consecutive order are missing or damaged.</p> <p>Hub oil seal leak. Class III oil leak.</p> <p>Missing valve caps.</p>
49	After	Armor panels	<ol style="list-style-type: none"> 1. Inspect armor panels for damage, corrosion, and combat damage. 2. Check that all nuts and bolts are secure. 	<p>Panels are severely damaged or corroded. Notify Field Maintenance.</p> <p>Any loose nuts or bolts.</p>
50	After	Exterior ballistic glass	<p style="text-align: center;">CAUTION</p> <p>Do not use ammonia or any cleaning product that contains ammonia to clean ballistic glass. Ammonia breaks down the bond between the inner and outer layers of ballistic glass. Do not use aerosol window cleaners. The aerosol propellant may cause ballistic glass separation. Failure to comply may result in damage to equipment.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<ol style="list-style-type: none"> 1. Check ballistic glass for damage that would impair operator's vision. 2. Inspect surface of ballistic glass for complete breaks, delamination, scratches, gouges, tape, decals, adhesives, or blurred visibility. 	<p>Ballistic glass is cracked, broken, or discolored (cloudy) sufficiently to impair operator's vision.</p> <p>The bond between glass and frame is separated from glass or frame. Any complete break on surface of glass. Any major damage to surface of glass from gouges.</p>
51	After	Lights	<ol style="list-style-type: none"> 1. Vehicle operation with damaged or inoperable lights may violate IAW AR 385-10. 2. Check that all interior and exterior lights illuminate and are clean. 	Any service light does not function or is broken. Notify Field Maintenance.
52	After	Shock absorbers and leaf springs	<p style="text-align: center;">NOTE</p> <p>Shock absorbers may have a thin film of oil on the outer surface due to a normal condition known as misting. Misting is not considered a leak and will not be evident as a stream of fluid.</p> <ol style="list-style-type: none"> 1. Check shock absorbers on front axle for leaks and damage. 2. Inspect leaf springs on front and rear axles for cracks, broken leaves, or obvious damage. 3. Check for broken, missing, or loose bolts; missing or damaged bushings; or broken, loose, or missing axle mounting parts. 	<p>Any Class III leak.</p> <p>Any spring components are missing or broken.</p> <p>Any broken, damaged, or missing mounting parts.</p>
53	After	Area under vehicle	Visually inspect under vehicle for leaks.	Any fuel or Class III leak.
54	After	Air tanks	<ol style="list-style-type: none"> 1. Check air tanks for obvious missing mounting hardware, cracked lines, or missing drain cords. 	Air tanks not secure, cracked lines, or missing drain cords.

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			2. Listen for audible air leaks.	Leaking tanks.
55	After	Engine oil level	<p style="text-align: center;">WARNING</p>  <p>Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.</p> <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <p style="text-align: center;">CAUTION</p> <p>Do not overfill engine oil. Failure to comply may result in damage equipment.</p> <p style="text-align: center;">NOTE</p> <p>Rubber seal should fit completely in fill tube, and dipstick should not move freely.</p> <p>1. Check engine oil level as follows:</p>	<p>If overfull, or if vehicle has Class III leak, notify Field Maintenance.</p> <p>Dipstick missing or damaged.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

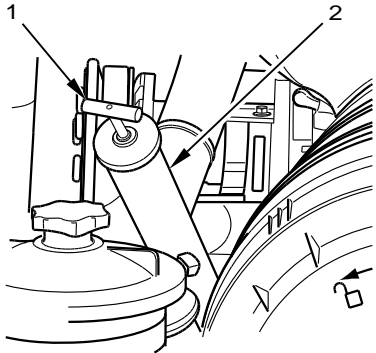
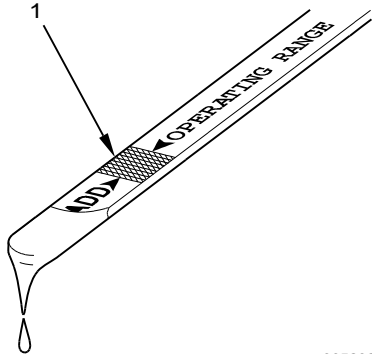




ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>a. With engine off, turn dipstick handle (Figure 18, Item 1) counterclockwise, pull dipstick out, and wipe clean with lint-free rag.</p> <p>b. Insert dipstick until fully seated, then remove. Oil level should be within OPERATING RANGE (Figure 19, Item 1) hash marks above ADD on the dipstick.</p> <p>c. If oil level is low, add to correct engine oil level.</p> <p>d. Repeat step 2 to verify reading.</p> <p>e. To install, completely insert dipstick into fill tube (Figure 18, Item 2), and turn clockwise until snug.</p>  <p style="text-align: right; font-size: small;">005201</p>	

Figure 18. Engine Oil Dipstick.

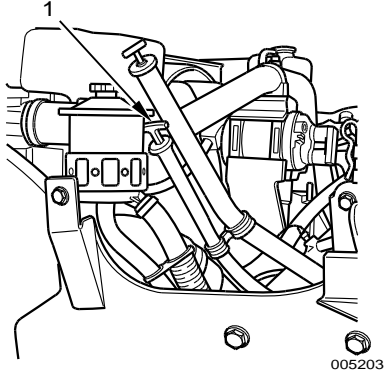
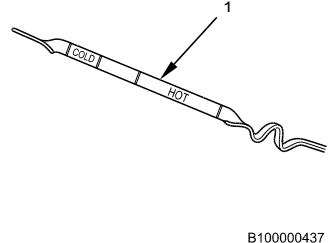
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right; font-size: small;">005202</p> <p style="text-align: center;">Figure 19. Engine Oil Operating Range.</p>	
56	After	Transmission oil level	<p style="text-align: center;">WARNING</p> <div style="display: flex; justify-content: space-around;">     </div> <p>Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.</p> <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p>	


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p style="text-align: center;">CAUTION</p> <p>Before performing the hot-check procedure, ensure transmission fluid is at operating temperature, to ensure accurate reading and help prevent transmission damage. The fluid level rises as temperature increases. During operation, an overfull transmission can become overheated, leading to transmission damage.</p> <p>Do not overfill transmission oil. Failure to comply may result in damage to equipment.</p> <p>Ensure vehicle is parked on a level surface. Failure to comply may result in damage to equipment.</p> <p>1. Check transmission oil level as follows:</p> <p style="padding-left: 40px;">a. Operate transmission in DRIVE (D) range until normal operating temperature of 180°-220° F (71°-93° C) is reached.</p> <p style="padding-left: 40px;">b. Shift to NEUTRAL (N). Allow the engine to idle (500-800 rpm).</p> <p style="padding-left: 40px;">c. With engine running at idle speed, remove dipstick (Figure 20, Item 1) from tube and wipe clean.</p> <p style="padding-left: 40px;">d. Insert dipstick (Figure 20, Item 1) into tube until it stops, then remove. Check fluid level. Repeat to verify reading.</p>	<p>If overfull, or if vehicle has Class III leak, notify Field Maintenance.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p>Figure 20. Transmission Fluid Dipstick.</p> <p>e. If fluid level is not within HOT band (Figure 21, Item 1), add fluid as necessary to bring fluid level within band. Safe operating level is within HOT band on dipstick.</p>  <p>Figure 21. Transmission Fluid Dipstick.</p>	
57	After	Power steering fluid	<ol style="list-style-type: none"> 1. Check power steering reservoir for leaks, damage, and secure mounting. 2. Check power steering hoses, connections, and cap for looseness, leaks, and damage. 	<p>Any Class III leak.</p> <p>Damage to components causing Class III leak.</p>


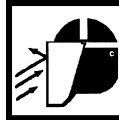


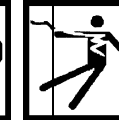

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>3. Check power steering fluid level. Ensure that fluid is at the MAX COLD/MIN HOT level on white plastic reservoir when system is cold. If fluid is below MAX COLD/MIN HOT mark, add fluid to bring to that level.</p>	<p>Reservoir will not hold fluid.</p>
58	After	Radiator/overflow tank and Charge Air Cooler (CAC)	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Cooling system components become extremely hot during normal operation. Allow engine to cool completely prior to working on or near radiator. Use extreme care when working in close quarters in engine compartment. Failure to comply may result in serious injury or death to personnel.</p> <p>Cooling system components become pressurized and extremely hot during normal operation. To prevent serious injury from hot coolant or scalding steam, use the following safety procedure when removing radiator cap, surge tank cap, or deaeration cap:</p> <p>Allow engine to cool for 15 minutes.</p> <p>Wrap a thick cloth around cap to be removed.</p> <p>Loosen cap slowly one-quarter to one-half turn counterclockwise, and pause to allow pressure to release.</p> <p>Continue to turn cap counterclockwise to remove.</p> <p>Ensure all personnel stay clear of radiator while engine is running. Air in radiator will be released, which may cause hot coolant to spray out. Failure to comply may result in serious injury to personnel.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Wear safety goggles and work gloves while servicing cooling system. Label all connections and reference areas before removing parts. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Engine fluids (oil, fuel, and coolant) may be hazardous to human health and the environment. Handle all fluids and other contaminated materials (such as filters and rags) in accordance with standard operating procedures. Recycle or dispose of engine fluids, filters, and other contaminated materials in accordance with standard operating procedures. Failure to comply may result in environmental damage and injury to personnel.</p> <ol style="list-style-type: none"> 1. Check for radiator damage, looseness, or dirt buildup. 2. Check cooling system for leaks. 3. Check coolant level in reservoir and level is above ADD mark. If coolant level is low, add 50/50 mixture of coolant and water to overflow reservoir until level is at ADD mark for a cold engine, or MAX mark for hot engine 4. Inspect Charge Air Cooler (CAC) system mounting-to-radiator connections for cracks. Check hoses for weakness, cracks, and ruptured/worn areas. Check couplings and clamps for tightness and signs of corrosion or rust. 	<p>Radiator damage that would hinder operation.</p> <p>Any leaks.</p> <p>Any leak or coolant overflow reservoir is empty. Notify Field Maintenance.</p> <p>Damage to CAC system resulting in unfiltered air entering system.</p>
59	After	Belts	<ol style="list-style-type: none"> 1. Check belts for frays, cracks, loose fibers, and visible signs of wear. 2. With engine off, press serpentine belts (fan, alternator, water pump, air compressor, and refrigerant compressor) to check tightness. 	<p>Belts cracked or worn.</p> <p>Belts cracked or worn.</p>
60	After	Windshield washer fluid	Check windshield wiper fluid reservoir fluid level. To verify fluid level is up to the FULL mark. If additional fluid is required, see Expendable and Durable Items List.	IAW AR-385-10.

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
61	Weekly	Pintle hook	1. Check pintle hook for secure mounting and proper operation. Check that safety latch engages hook lock. 2. Check that safety pin is secure and functional.	Pintle hook is not mounted securely or safety latch does not engage properly. Safety pin is not secure and functional.
62	Weekly	Exhaust system	Check exhaust system for secure mounts, tight clamps and bolts, rust, damaged pipes, and any indication of an exhaust leak.	Any mounts are broken, pipes are rusted through or broken, or any indication of an exhaust leak.
63	Weekly	Air filters	Check filters for damage, excessive oil, and dirt.	Filter are damaged or dirty, or filter gauge is in RED zone.
64	Weekly	Gladhands	1. Check gladhands for damage, bent bracket, or loose mounting. 2. Check gladhand seals for cracks or other damage.	Gladhands are bent, broken, or not mounted securely. Gladhand seals are damaged or not sealing properly.
65	Weekly	Hood latches	Check hood latches for cracks or any other damage.	Hood latch is damaged or fails to secure hood properly.
66	Weekly	Batteries	<p style="text-align: center;">WARNING</p> <div style="display: flex; justify-content: space-around; align-items: center;">       </div> <p>Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p>	

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>Battery acid must not contact eyes, skin, or clothing. If battery acid contacts eyes or skin, flush area with large amounts of water for 15 minutes and seek immediate medical care. If swallowed, do not induce vomiting. 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 serious injury or death to personnel.</p> <p>Turn main power switch off prior to performing maintenance on battery or electrical system. Always remove negative battery terminals first. When reconnecting, always connect negative terminals last to avoid arcing or sparks that could cause an explosion. Do not allow tools to contact battery box or other battery terminals when removing or installing terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>Battery cover must be opened. Refer to Exterior Battery Box Armor Door Removal and Installation WP 0075.</p> <p>The following check is for wet-cell acid filled batteries only.</p> <p>Ensure electrolyte is filled to level/split ring in battery filler opening. If fluid is low, fill with distilled water to bottom of split ring.</p> <ol style="list-style-type: none"> 1. Twist battery caps counterclockwise, and remove battery caps from level/split ring (Figure 22, Item 2). Check if fluid is gassing (boiling). 	<p>Battery electrolyte fluid is gassing or boiling. Notify Field Maintenance.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

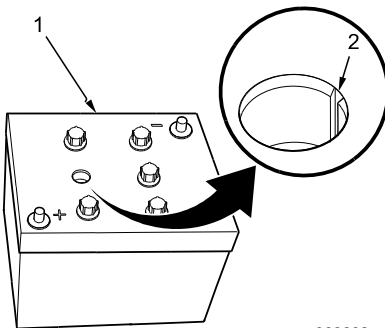


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>2. Check terminals and clamps, battery tray, and tiedown (holddown) rods. Check battery (Figure 22, Item 1) for secure mounting.</p> <p>3. Check level of electrolyte in batteries as follows:</p> <p>a. Twist battery caps counterclockwise, and remove battery caps from vent well.</p> <p>b. Fill to bottom of split ring (Figure 22, Item 2)</p> <p>c. Fill all batteries as needed.</p> <p>d. Install battery caps by twisting clockwise until tight.</p>  <p>The diagram shows a perspective view of a battery tray with several caps. An arrow labeled '1' points to one of the caps. A circular inset labeled '2' provides a magnified view of the split ring on the battery tray, showing the electrolyte level inside.</p>	<p>One or more batteries missing, unserviceable, or leaking; terminal or cables loose, corroded, or holddowns not secure.</p>

Figure 22. Electrolyte Fill Level.

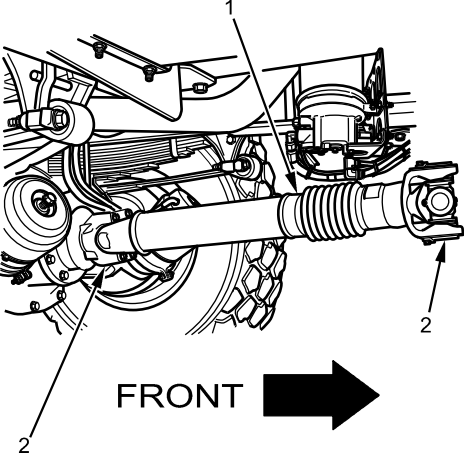

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
67	Weekly	Air tank draining	<p style="text-align: center;">WARNING</p>  <p>Air drain valves are under pressure. Wear protective goggles and do not place face in front of air drain valves while draining air reservoirs. Open air drain valves slowly to release air pressure gradually. Failure to comply may result in serious injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>Battery box door must be opened. Refer to Exterior Battery Box Armor Door Removal and Installation WP 0075.</p> <p>Refer to Air Tank Drains in Operation Under Usual Conditions WP 0021.</p> <p>Drain and inspect air tanks.</p>	<p>Air tanks will not drain, tanks are damaged, or drain cords are missing.</p>
68	Monthly	Cabin exterior	<ol style="list-style-type: none"> 1. Inspect door hinge pins and fasteners for damage or misalignment. 2. Inspect vehicle frame for cracks and bent, broken, or missing crossmembers. 	<p>Door will not close securely.</p> <p>Bent frame or cracked, bent, broken, or missing crossmembers.</p>
69	Monthly	Slave receptacle	<p>Inspect slave receptacle for damage and missing cover or cap.</p>	<p>Damaged or missing components.</p>

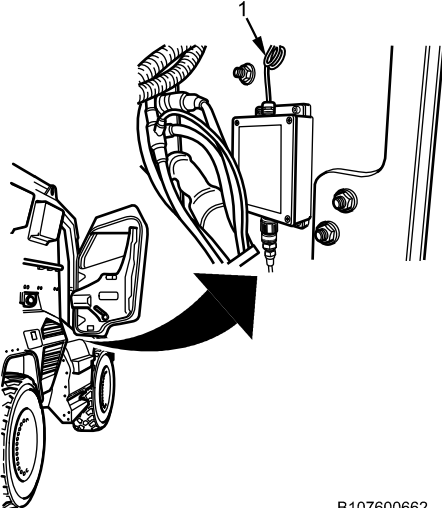
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
70	Monthly	Fuel tank	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.</p> <p>Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Do not fill fuel tank with engine running. Do not overfill fuel tank. Clean fuel spills immediately. Check fuel nozzle is grounded to filler neck to prevent sparks. Failure to comply may result in injury or death to personnel and damage to equipment.</p> <p>Check fuel tank mounting hardware for looseness or damage.</p>	<p>Mounting hardware loose or tank damaged.</p>
71	Monthly	Rear propeller shaft	<ol style="list-style-type: none"> 1. Visually inspect propeller shaft (Figure 23, Item 1) for damage. 	<p>Bent or cracked propeller shaft.</p>


Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>2. Inspect propeller shaft couplings (Figure 23, Item 2) for loose or missing parts.</p>  <p style="text-align: right;">B100900654</p> <p style="text-align: center;">Figure 23. Rear Propeller Shaft.</p>	<p>Couplings not secure.</p>
72	Monthly	Winch	<p style="text-align: center;">WARNING</p>  <p>Cable is under tension when installed. Wear safety goggles and work gloves when handling. Do not wear loose clothing; it can get caught in cable as cable winds around spool drum. Failure to comply may result in serious injury or death to personnel.</p> <p>When operating winch, ensure there are no objects in path of cable or vehicle. Failure to comply may result in damage to equipment and serious injury or death to personnel.</p> <p>Wear heavy, leather-palmed work gloves when handling cable. Never let moving cable slide through hands, even when wearing gloves. Cable can become frayed or contain broken wires. A broken wire could cut through gloves and injure hands. Failure to comply can result in serious injury to personnel.</p>	

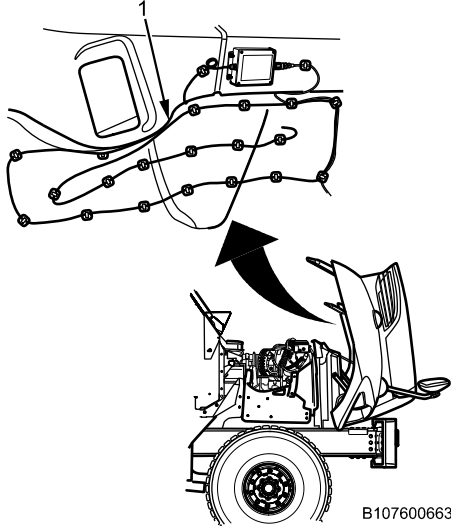
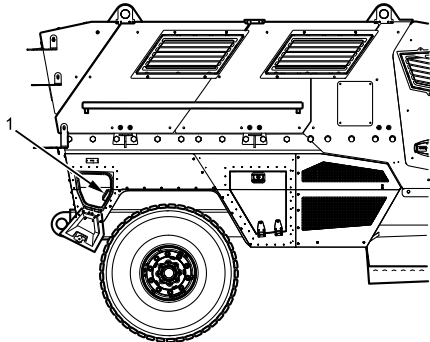
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<ol style="list-style-type: none"> 1. Check operation of winch. 2. Inspect cable for frayed, kinked, or cut sections. 3. Inspect fairleads (rollers). 	<p>Winch does not operate.</p> <p>Cable is frayed, kinked, or cut. Notify Field Maintenance.</p> <p>Fairleads missing or damaged. Notify Field Maintenance.</p>
73	Monthly	Cabin protection sensor (heat detector)	<p style="text-align: center;">NOTE</p> <p>The cabin system sensor is located on the right side kick panel in the passenger footwell.</p> <ol style="list-style-type: none"> 1. Inspect sensor and sensor wire (Figure 24, Item 1) for wear and proper connections. 2. Inspect sensor detection tubes, connectors, and plastic bands for kinks, and chafing. Inspect sensor detection tube mounting clips and sensor for secure mounting. <div style="text-align: center;">  <p style="text-align: right; font-size: small;">B107600662</p> </div> <p style="text-align: center;">Figure 24. Cabin Sensor and Wire.</p>	<p>Worn, kinked, or broken sensor wires. Any warning lights on.</p> <p>Broken, kinked, or abraded detection tubes. Insecure mounting.</p>

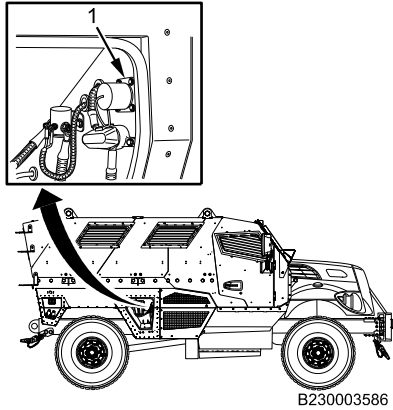

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
74	Monthly	Engine protection sensor (heat detector)	<p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.</p> <p style="text-align: center;">NOTE</p> <p>The engine system sensor is located on the underside of the engine hood.</p> <ol style="list-style-type: none"> 1. Lift hood and inspect sensor and sensor wires (Figure 25, Item 1) for wear and for proper connections. 2. Inspect sensor detection tubes, connectors, and plastic bands for kinks and chafing. Inspect sensor detection tube mounting clips and sensor for secure mounting. 	<p>Worn, kinked, or broken sensor wires. Any warning lights on.</p> <p>Broken, kinked, or abraded detection</p>

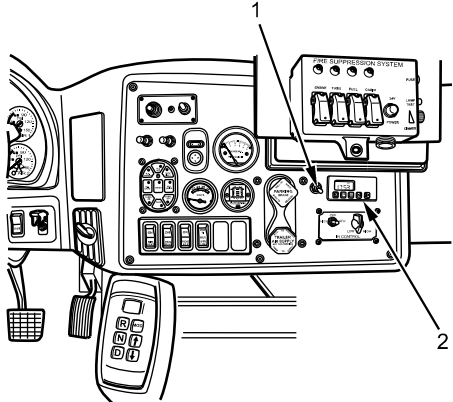
Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right; margin-right: 20px;">B107600663</p> <p style="text-align: center;">Figure 25. Hood Sensor and Wire.</p>	<p>tubes. Insecure mounting.</p>
75	Monthly	110V outlet	<ol style="list-style-type: none"> 1. Inspect 110V outlet (Figure 26, Item 1) and wiring for corrosion, frays, splits, damage, and security of mounting. 2. Visually inspect Ground Fault Circuit Interrupter (GFCI) button. If ORANGE LED is lit, push RESET button.  <p style="text-align: right; margin-right: 20px;">B230002954</p> <p style="text-align: center;">Figure 26. 110V Outlet.</p>	<p>110V outlet or wiring is damaged or corroded.</p> <p>GFCI button will not reset. Notify Field Maintenance.</p>
76	Monthly	NATO jump start connector	<ol style="list-style-type: none"> 1. Inspect NATO jump start connector (Figure 27, Item 1) and wiring for corrosion, frays, splits, damage, and secure mounting. 	<p>NATO jump start connector or wiring is damaged or corroded.</p>

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>2. Clean NATO jump start connector.</p>  <p>The diagram shows a close-up of a NATO jump start connector with a label '1' pointing to a specific part. Below it is a side view of a vehicle with an arrow pointing to the location of the connector on the rear side.</p> <p style="text-align: right;">B230003586</p> <p>Figure 27. NATO Jump Start Connector.</p>	
77	Monthly	Fuel fired heater	<p style="text-align: center;">WARNING</p>  <p>Do not operate fuel fired heater or vehicle engine in an enclosed area without adequate ventilation. Failure to comply may result in serious injury to personnel.</p> <p>The fuel fired heater must be switched off before fuel tank on the vehicle is filled and when vehicle is not in use. Failure to comply may result in serious injury to personnel.</p> <p>Operate fuel fired heater using timer (Figure 28, Item 2) and on/off switch (Figure 28, Item 1) functions.</p>	Fuel fired heater does not operate correctly, emits

Preventive Maintenance Checks and Services (PMCS) - (CONTINUED)

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: center;">B100600664</p> <p style="text-align: center;">Figure 28. Fuel Fired Heater Controls.</p>	fuel odor, or is leaking fuel.

MANDATORY REPLACEMENT PARTS

There are no replacement parts required for these PMCS procedures.

END OF WORK PACKAGE

CHAPTER 5
MAINTENANCE INSTRUCTIONS
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS
AIR CLEANER ASSEMBLY REMOVAL AND INSTALLATION

INITIAL SETUP:**Materials/Parts**

Gloves, leather (WP 0083, Item 11)
 Goggles (WP 0083, Item 10)

Equipment Condition

Parking brake set (WP 0011)

Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Battery disconnect switch off (WP 0011)
 Wheels chocked (WP 0011)
 Engine hood open and secured (WP 0031)

WARNING

Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.

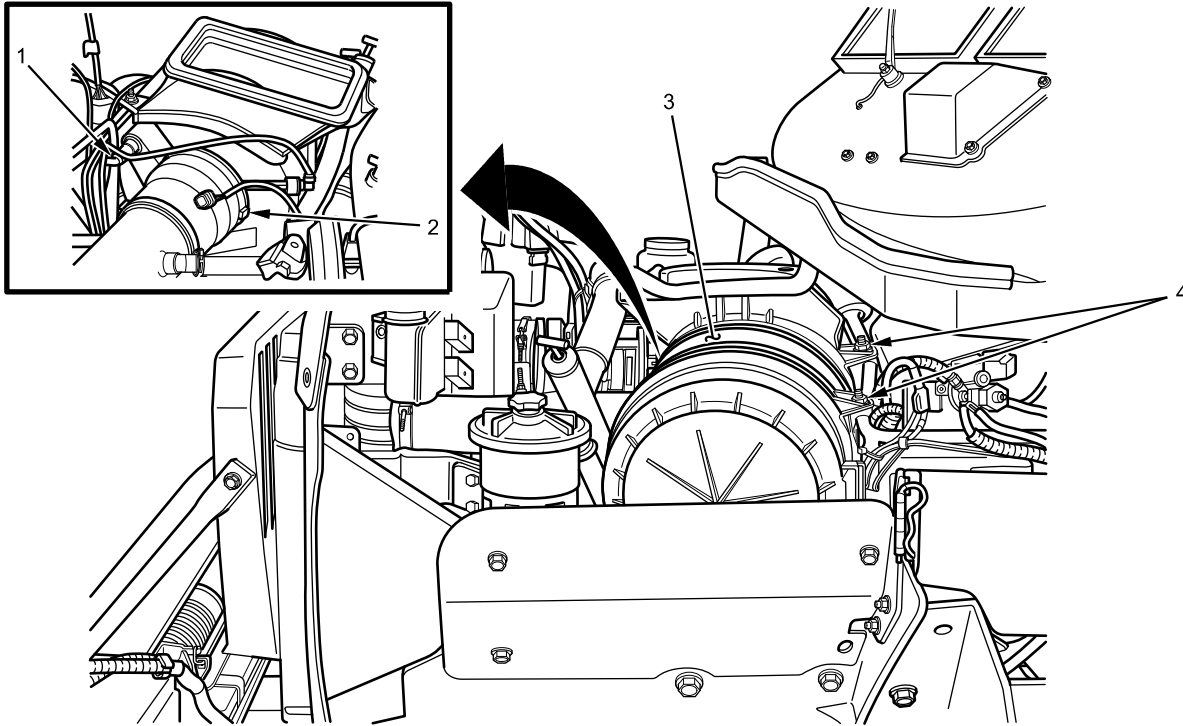
Hood is extremely heavy. Ensure there is adequate space to open hood completely without pinning personnel between hood and another structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Area around engine compartment may be slippery. Watch for slippery surfaces and ensure footing is secure to avoid slipping. Failure to comply may result in serious injury or death to personnel.

Air Cleaner Assembly Removal and Installation - (CONTINUED)

REMOVAL

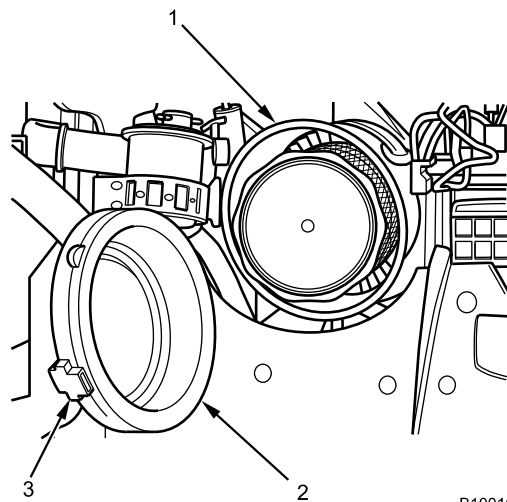
1. Loosen hose clamp (Figure 1, Item 2) and disconnect hose.



B100600394

Figure 1. Air Cleaner Assembly.

2. Disconnect intake air temperature (IAT) sensor connector (Figure 1, Item 1).
3. Remove two hex nuts (Figure 1, Item 4) securing air cleaner assembly (Figure 1, Item 3) to support bracket.
4. Lift air cleaner assembly to clear armor, and remove air cleaner cover (Figure 2, Item 2) from air cleaner assembly (Figure 2, Item 1) by lifting latch (Figure 2, Item 3) and rotating counterclockwise.

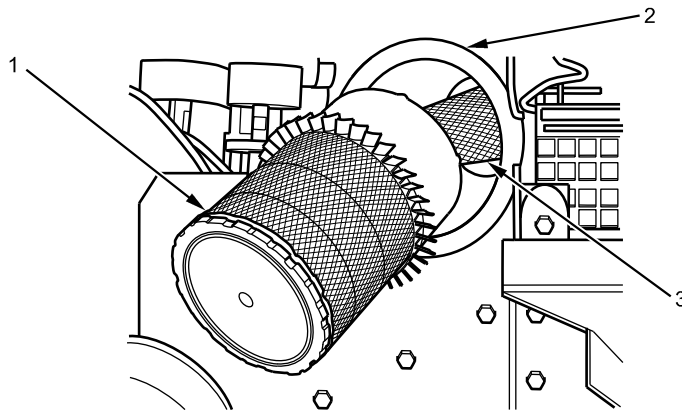


B100100493

Figure 2. Air Cleaner Assembly Side View.

Air Cleaner Assembly Removal and Installation - (CONTINUED)

- Remove air filter element (Figure 3, Item 1) and internal filter element (Figure 3, Item 3) from air cleaner assembly (Figure 3, Item 2).



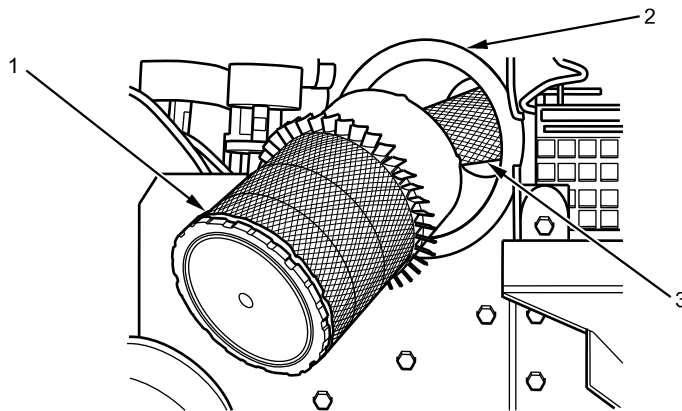
B230100107

Figure 3. Air Filter Elements.

END OF TASK**INSTALLATION****NOTE**

Filters must be replaced if gaskets are damaged or non-resilient, or filter bodies have dents, excessive pleat bunching, or covered in debris.

- Install internal filter element (Figure 4, Item 3) and air filter element (Figure 4, Item 1) into air cleaner assembly (Figure 4, Item 2).



B230100107

Figure 4. Air Filter Elements.

- Align and install air cleaner cover (Figure 5, Item 2) on air cleaner assembly (Figure 5, Item 1). Rotate clockwise to lock latch (Figure 5, Item 3).

Air Cleaner Assembly Removal and Installation - (CONTINUED)

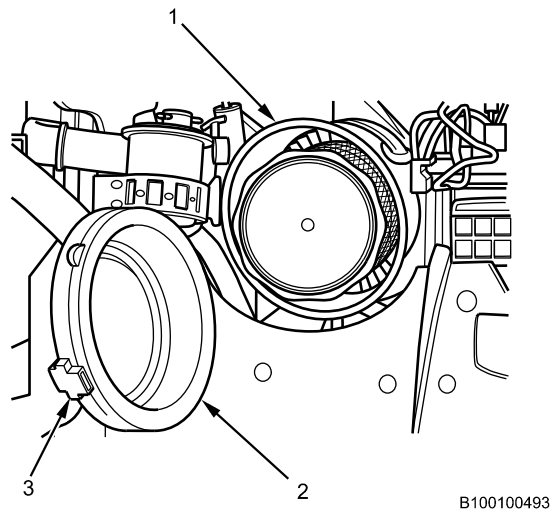


Figure 5. Air Cleaner Assembly Side View.

3. Install air cleaner assembly (Figure 6, Item 2) on support bracket with two hex nuts (Figure 6, Item 3) and tighten securely.

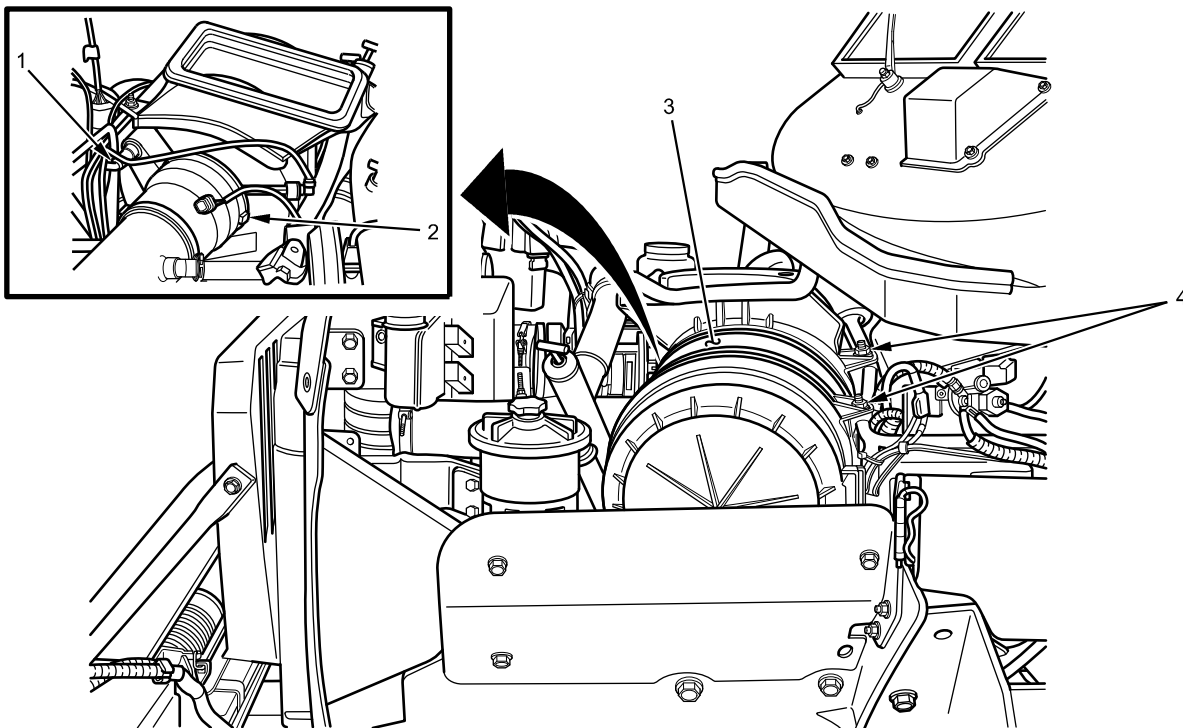
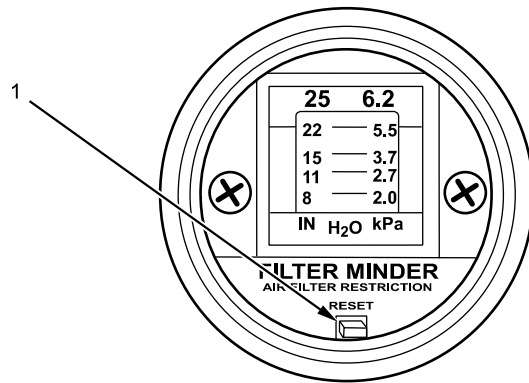


Figure 6. Air Cleaner Assembly.

4. Connect IAT sensor connector (Figure 6, Item 1).
5. Attach hose with hose clamp (Figure 6, Item 2) and tighten securely.
6. Reset air cleaner restriction gauge on instrument panel by pushing RESET button (Figure 7, Item 1). YELLOW indicator will drop below window.

Air Cleaner Assembly Removal and Installation - (CONTINUED)

B230100111

Figure 7. Air Cleaner Restriction Gauge.

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Turn main power switch ON(WP 0010).
2. Start engine (WP 0010).
3. Verify operation of instrument panel (IP) gauges (WP 0010).
4. Shut engine OFF (WP 0011).
5. Turn main power switch off(WP 0011).
6. Close and secure engine hood (WP 0031).
7. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS
FUEL/WATER SEPARATOR DRAINING

INITIAL SETUP:**Materials/Parts**

Cup, measuring (WP 0083, Item 4)
Rag (WP 0083, Item 22)

Transmission set in NEUTRAL (N) (WP 0011)

Engine OFF (WP 0011)

Main power switch OFF (WP 0011)

Wheels chocked (WP 0011)

Engine hood open and secured (WP 0031)

Equipment Condition

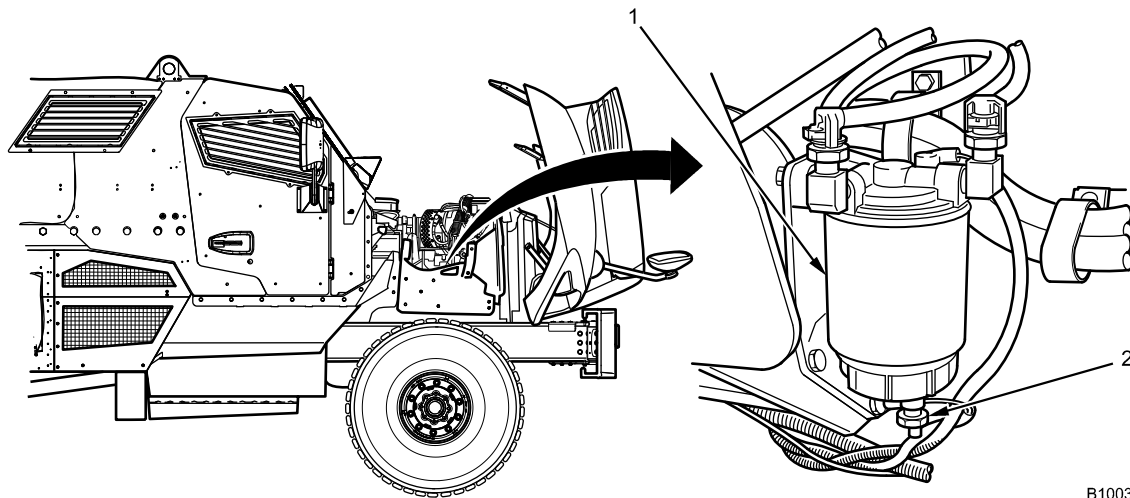
Parking brake set (WP 0011)

WARNING

Engine fluids (oil, fuel, and coolant) may be hazardous to human health and the environment. Handle all fluids and other contaminated materials (such as filters and rags) in accordance with standard operating procedures. Recycle or dispose of engine fluids, filters, and other contaminated materials in accordance with standard operating procedures. Failure to comply may result in environmental damage and injury to personnel.

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Fuel/Water Separator Draining - (CONTINUED)**DRAINING**

B100300494

Figure 1. Fuel/Water Separator.

1. Place measuring cup under fuel/water separator (Figure 1, Item 1).
2. Turn fuel/water separator drain valve (Figure 1, Item 2) counterclockwise and allow water and contaminated fuel to drain out of collection bowl until clean fuel flows out.
3. Turn fuel/water separator drain valve (Figure 1, Item 2) clockwise to close.
4. Remove measuring cup.

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Turn main power switch ON(WP 0010).
2. Start engine (WP 0010).
3. Verify operation of center console gauges (WP 0010).
4. Shut engine OFF (WP 0011).
5. Turn main power switch off(WP 0011).
6. Close and secure engine hood (WP 0031).
7. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS
RADIATOR ASSEMBLY CLEANING

INITIAL SETUP:**Equipment Condition**

Parking brake set (WP 0011)

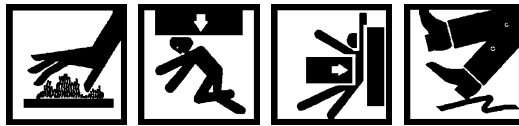
Transmission set in NEUTRAL (N) (WP 0011)

Engine OFF (WP 0011)

Main power switch OFF (WP 0011)

Wheels chocked (WP 0011)

Engine hood open and secured (WP 0031)

WARNING

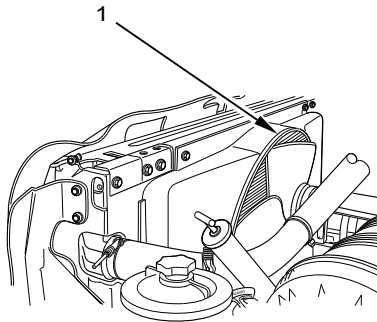
Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Area around engine compartment may be slippery. Watch for slippery surfaces and ensure footing is secure to avoid slipping. Failure to comply may result in serious injury or death to personnel.

Cooling system components become extremely hot during normal operation. Allow engine to cool completely prior to washing radiator. Use extreme care when working in close quarters in engine compartment. Failure to comply may result in serious injury or death to personnel.

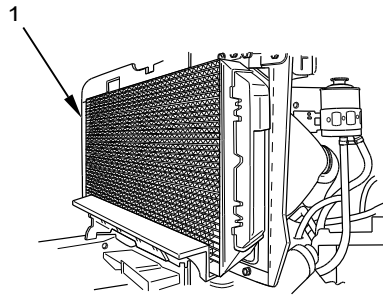
CAUTION

Do not use high-pressure washer or caustic cleaning solutions on radiator heat exchanger fins and tubes. High-pressure washing and caustic cleaning solutions could damage radiator.

Radiator Assembly Cleaning - (CONTINUED)**CLEANING**

005205

Figure 1. Radiator.



005206

Figure 2. Charge Air Cooler.

Clean the heat exchanger fins (Figure 1, Item 1) in the radiator of debris, dirt, leaves, etc. with water hose. The same method may be used to clean the Charge Air Cooler (CAC) (Figure 2, Item 1). If debris cannot be removed, contact Field Maintenance.

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Close and secure engine hood (WP 0031).
2. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**CIRCUIT BREAKER RESET**

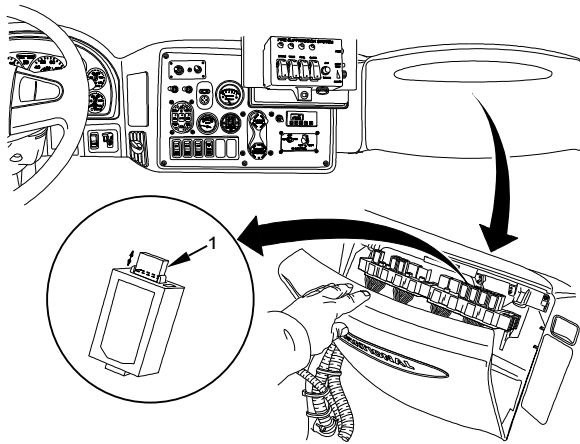
INITIAL SETUP:**Equipment Condition**

Parking brake set (WP 0011)
Transmission set in NEUTRAL (N) (WP 0011)

Engine OFF (WP 0011)
Main power switch OFF (WP 0011)
Wheels chocked (WP 0011)

BREAKER PANEL CIRCUIT BREAKER RESET**NOTE**

If circuit breaker trips again, notify Field Maintenance.



003961

Figure 1. Breaker Panel Circuit Breaker Reset.

1. Reset tripped circuit breaker by pushing RED button (Figure 1, Item 1) down.

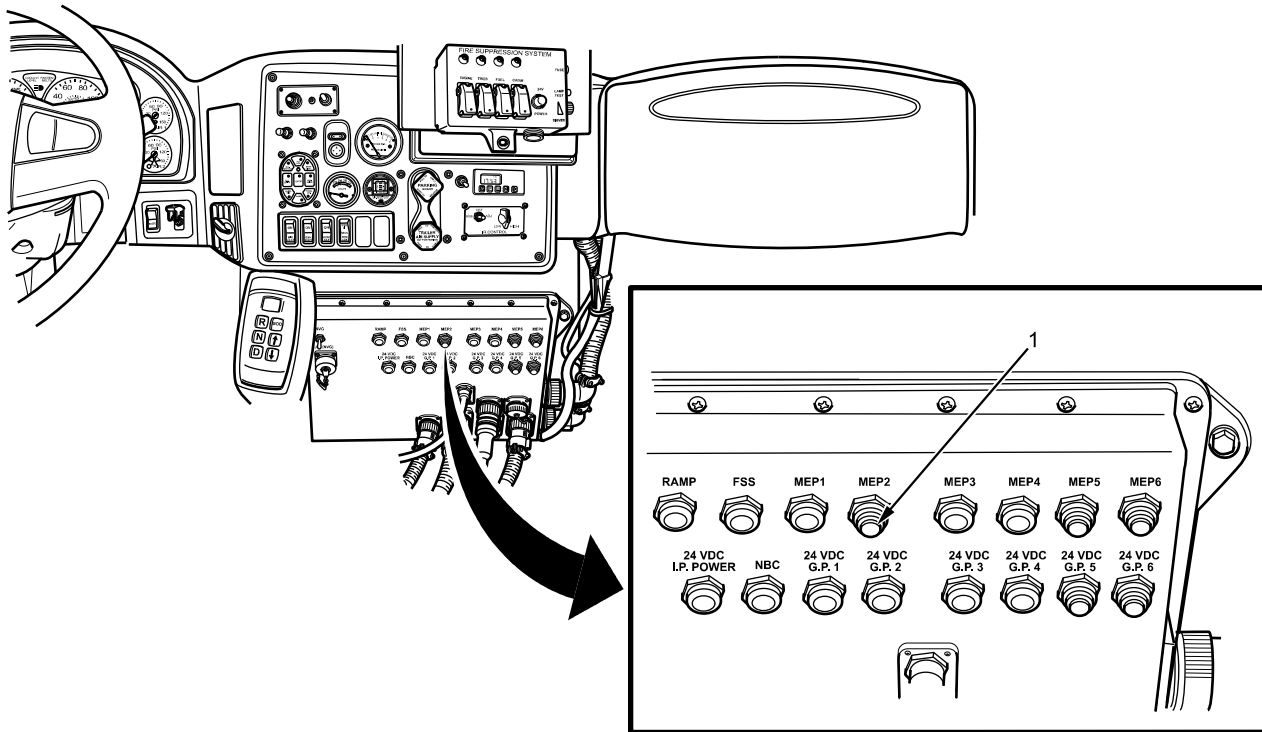
END OF TASK

Circuit Breaker Reset - (CONTINUED)

24V POWER DISTRIBUTION CENTER CIRCUIT BREAKER RESET

NOTE

If circuit breaker trips again, notify Field Maintenance.



B100600501

Figure 2. 24V Power Distribution Center Circuit Breaker Reset.

1. Reset tripped circuit breaker by pushing button (Figure 2, Item 1) in.

END OF TASK

FOLLOW-ON MAINTENANCE

1. Remove wheel chocks (WP 0011).

END OF TASK

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

REAR SPRING BRAKE CAGING AND UNCAGING

INITIAL SETUP:

Materials/Parts

Faceshield, industrial (WP 0083, Item 5)

Equipment Condition

Parking brake set (WP 0011)

Transmission set in NEUTRAL (N) (WP 0011)

Engine shut OFF (WP 0011)

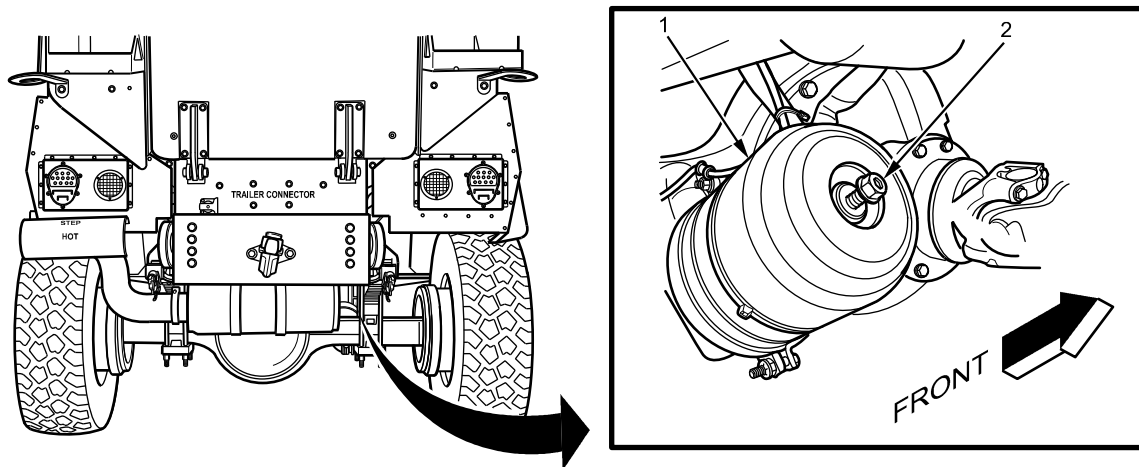
Main power switch OFF (WP 0011)

Wheels chocked (WP 0011)

NOTE

Right side shown; left side similar.

CAGING

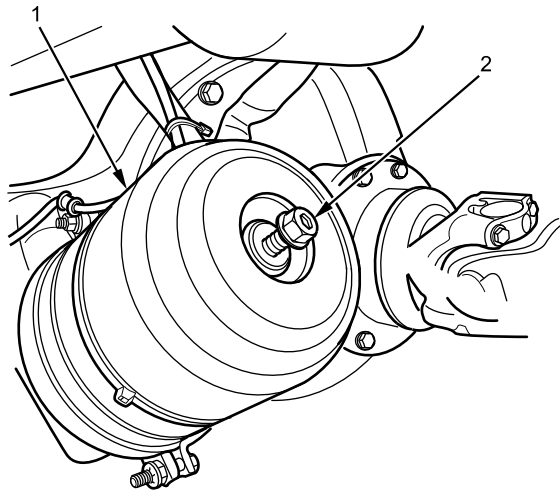


B101200497

Figure 1. Air Chamber Caging.

Turn adjusting bolt (Figure 1, Item 2) on air chamber (Figure 1, Item 1) counterclockwise until spring is completely retracted.

END OF TASK

Rear Spring Brake Caging and Uncaging - (CONTINUED)**UNCAGING**

B231202384

Figure 2. Air Chamber Uncaging.

Turn adjusting bolt (Figure 2, Item 2) on air chamber (Figure 2, Item 1) clockwise until spring is completely released.

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Remove wheel chocks (WP 0011).
2. Turn main power switch ON (WP 0010).
3. Start engine and allow air brake system pressure to build to normal range (WP 0010).
4. Checks for leaks (WP 0010).
5. Turn engine OFF (WP 0011).
6. Turn main power switch OFF (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS
TIRE INFLATION PROCEDURE

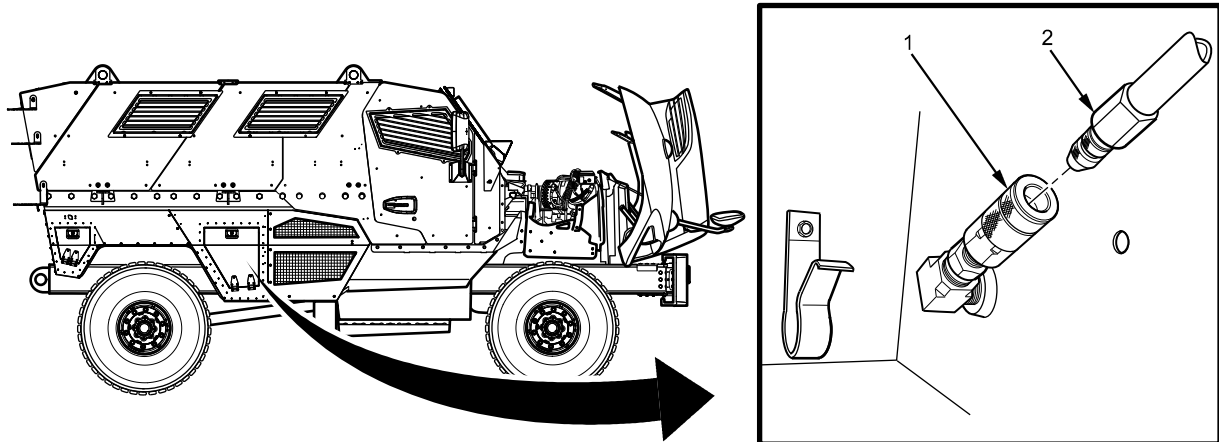
INITIAL SETUP:

Equipment Condition

Parking brake set WP 0011
 Transmission set in NEUTRAL (N) WP 0011

Engine running at high idle (1000-1200 rpm)
 WP 0040
 Wheels chocked WP 0011

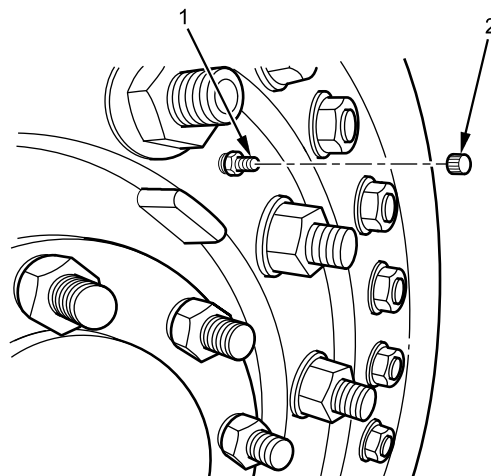
INFLATION



B10500499

Figure 1. Air Hose Connection.

1. Connect tire inflator air hose (Figure 1, Item 2) to air hose fitting (Figure 1, Item 1) located in right side forward storage box.

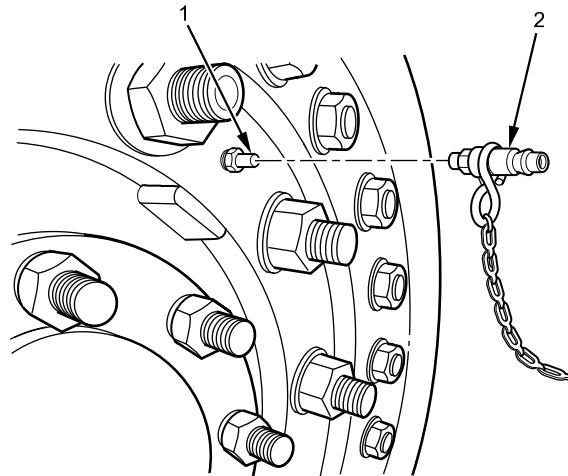


B101200410

Figure 2. Valve Stem Cap.

2. Remove valve stem cap (Figure 2, Item 2) from valve stem (Figure 2, Item 1).

Tire Inflation Procedure - (CONTINUED)



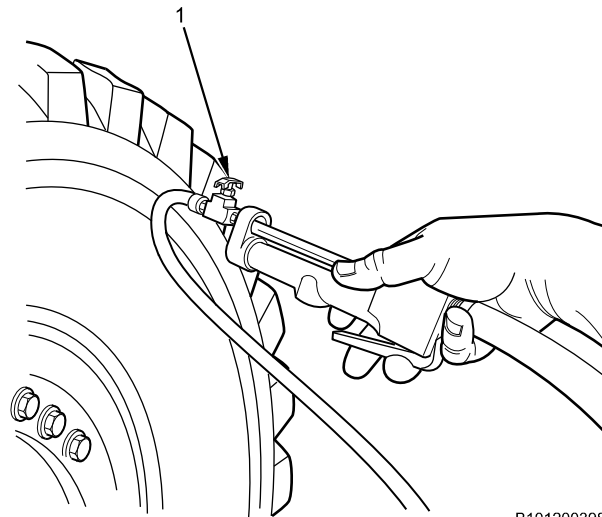
B101201383

Figure 3. Valve Stem Fitting.

NOTE

Valve stem fitting is chained to end of tire inflator.

3. Screw valve stem fitting (Figure 3, Item 2) on valve stem (Figure 3, Item 1).

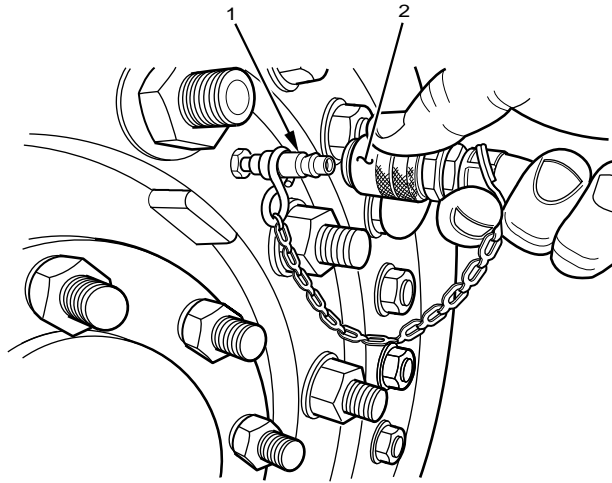


B101200398

Figure 4. Tire Inflator Valve.

4. Ensure tire inflator valve (Figure 4, Item 1) is closed by rotating clockwise until seated.

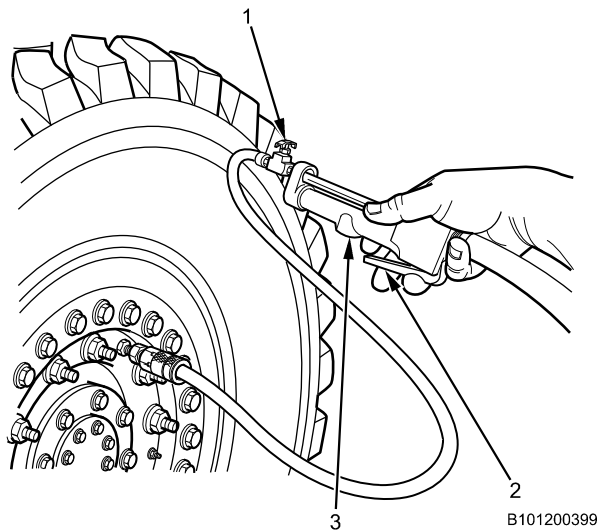
Tire Inflation Procedure - (CONTINUED)



B101201384

Figure 5. Tire Inflater Hose-to-Valve Stem Fitting Connection.

5. Connect tire inflator hose (Figure 5, Item 2) to valve stem fitting (Figure 5, Item 1).

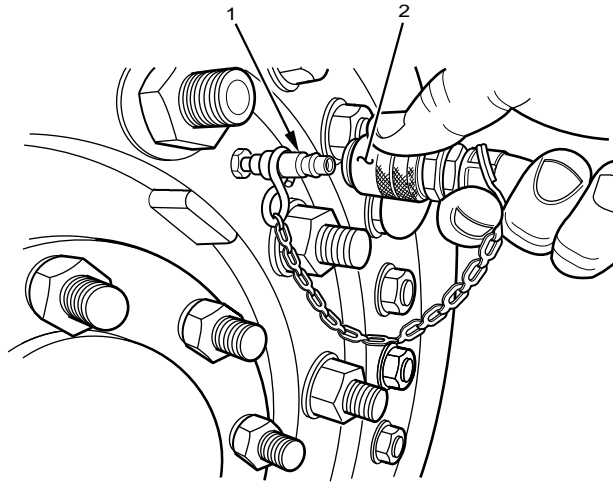


B101200399

Figure 6. Tire Inflation.

6. Squeeze inflator handle (Figure 6, Item 2) to inflate tire. Release tire inflator handle to read tire pressure gauge (Figure 6, Item 3) on inflator.
7. To release air from tire, open valve (Figure 6, Item 1) by rotating counterclockwise.
8. Close valve to read tire pressure on gauge.

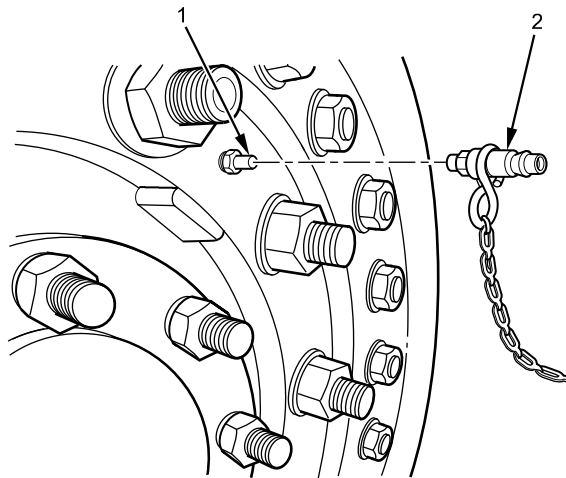
Tire Inflation Procedure - (CONTINUED)



B101201384

Figure 7. Tire Inflater Hose-to-Valve Stem Fitting Connection.

9. Remove tire inflator hose (Figure 7, Item 2) from valve stem fitting (Figure 7, Item 1).

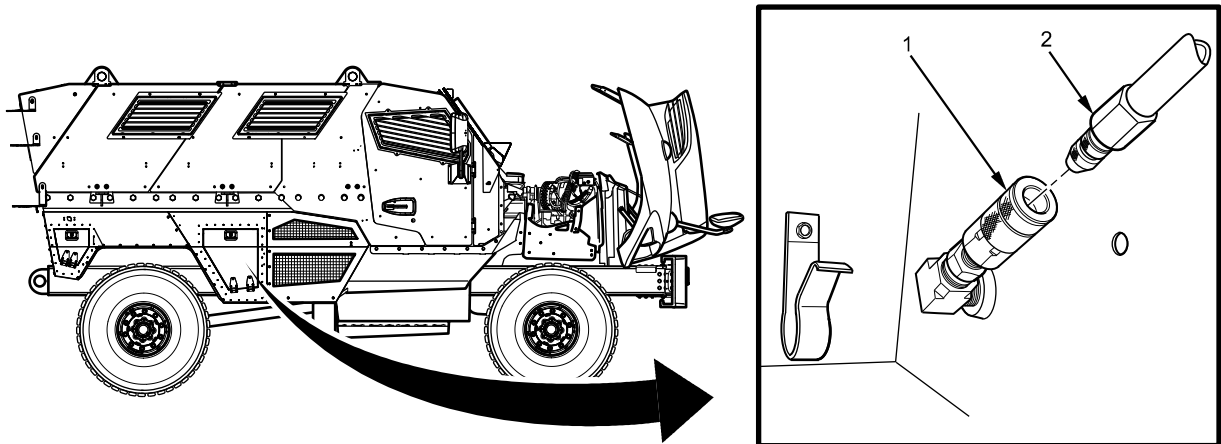


B101201383

Figure 8. Valve Stem Fitting.

10. Remove valve stem fitting (Figure 8, Item 2) from valve stem (Figure 8, Item 1).

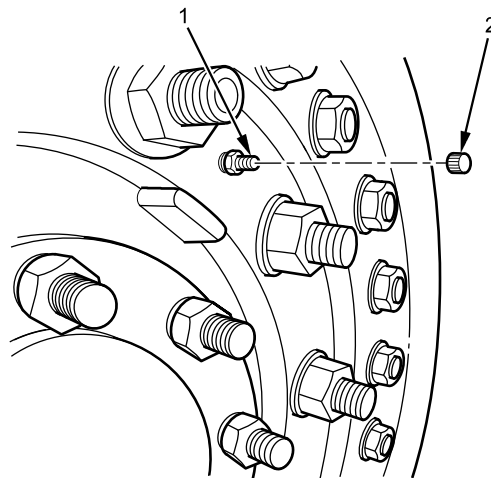
Tire Inflation Procedure - (CONTINUED)



B105000499

Figure 9. Air Hose Disconnect.

11. Remove tire inflator air hose fitting (Figure 9, Item 2) from air fitting (Figure 9, Item 1).



B101200410

Figure 10. Valve Stem Cap.

12. Install valve stem cap (Figure 10, Item 2) on valve stem (Figure 10, Item 1).

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Reduce engine speed to idle for 2-3 minutes (WP 0040).
2. Engine off (WP 0011).

Tire Inflation Procedure - (CONTINUED)

3. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS
EXTERIOR BATTERY BOX ARMOR DOOR OPEN AND CLOSE PROCEDURE

INITIAL SETUP:**Materials/Parts**

Face shield, industrial (WP 0083, Item 5)
 Gloves, leather (WP 0083, Item 11)
 Goggles (WP 0083, Item 10)

Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Main power switch off (WP 0011)
 Wheels chocked (WP 0011)

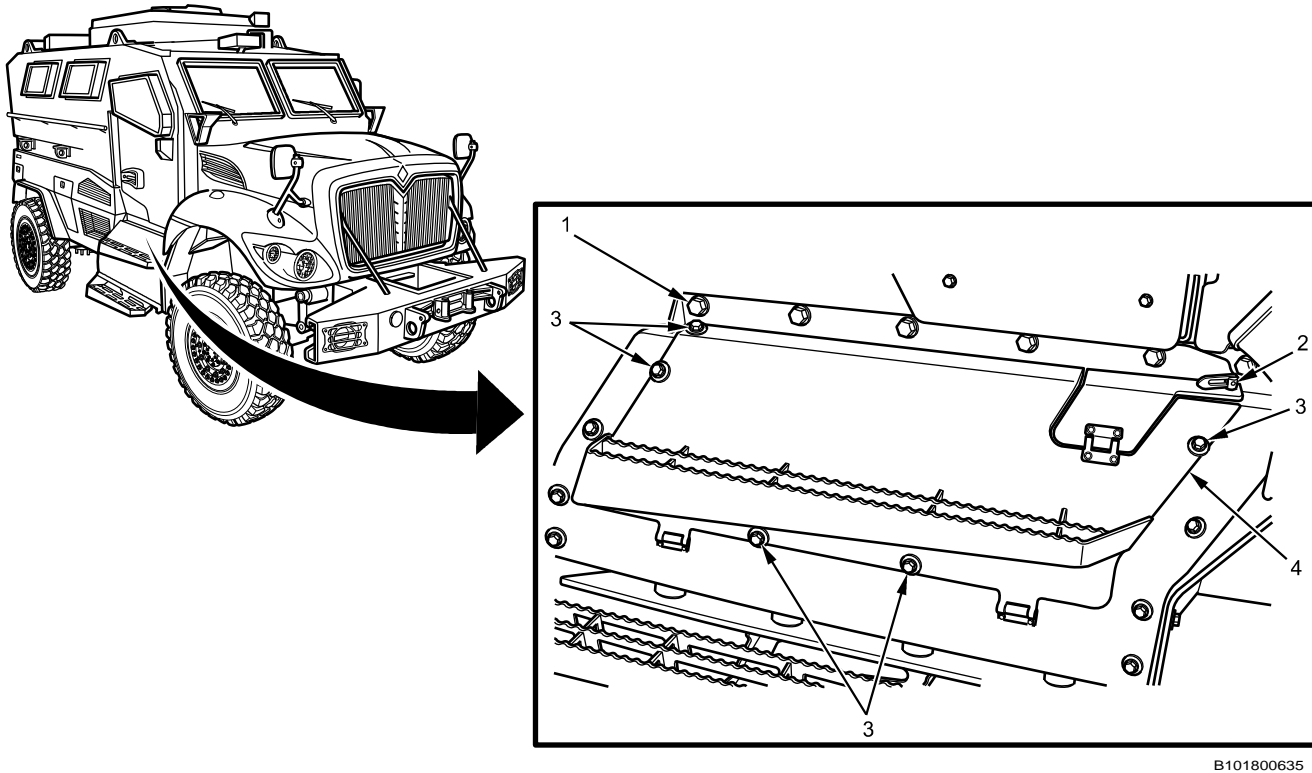
Equipment Condition

Parking brake set (WP 0011)

OPEN**WARNING**

Wear protective eye goggles, face shield, and long sleeves when working on or near batteries. Batteries contain corrosive acid and can produce explosive gases. Batteries supply electrical current that can cause burns and electrical shock. Always check electrolyte level with engine off. Avoid leaning over or onto battery. Do not wear jewelry and do not smoke or have open flame or spark near battery. Do not allow tools to contact battery box or battery terminals. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Battery acid must not contact eyes, skin, or clothing. If battery acid contacts eyes or skin, flush area with large amounts of water for 15 minutes and seek immediate medical care. If swallowed, do not induce vomiting. 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 serious injury or death to personnel.

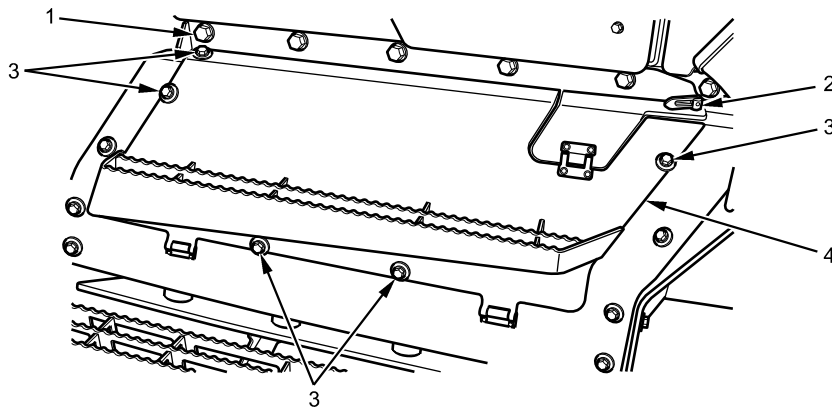
Exterior Battery Box Armor Door Open And Close Procedure - (CONTINUED)

B101800635

Figure 1. Battery Box Armor Door.

1. Remove rear cab body bolt (Figure 1, Item 1) from cab.
2. Remove five bolts and flat washers (Figure 1, Item 3) from battery box armor door.
3. Flip access door holddown (Figure 1, Item 2) to up position.
4. Swing battery box door (Figure 1, Item 4) down to open.

END OF TASK

Exterior Battery Box Armor Door Open And Close Procedure - (CONTINUED)**CLOSE**

B101800636

Figure 2. Battery Box Armor Door.

1. Swing battery box door (Figure 2, Item 4) up to close.
2. Install five bolts and flat washers (Figure 2, Item 3). Tighten securely.
3. Flip access door holddown (Figure 2, Item 2) to down position.
4. Install rear cab body bolt (Figure 2, Item 1) to cab.

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS**EXTERIOR FUEL TANK ARMOR DOOR OPEN AND CLOSE**

INITIAL SETUP:**Materials/Parts**

Gloves, leather (WP 0083, Item 11)

Equipment Condition

Parking brake set (WP 0011)

Transmission set in NEUTRAL (N) (WP 0011)

Engine off (WP 0011)

Main power switch off (WP 0011)

Wheels chocked (WP 0011)

OPEN**WARNING**

Fuel is flammable and can explode. Keep all open flames, flammable materials, ignition sources, and sparks away from diesel fuel and keep fire extinguisher nearby. Do not smoke when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Failure to comply may result in serious injury or death to personnel.

Never use diesel fuel to clean parts. Fuel is highly flammable. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Exterior Fuel Tank Armor Door Open and Close - (CONTINUED)

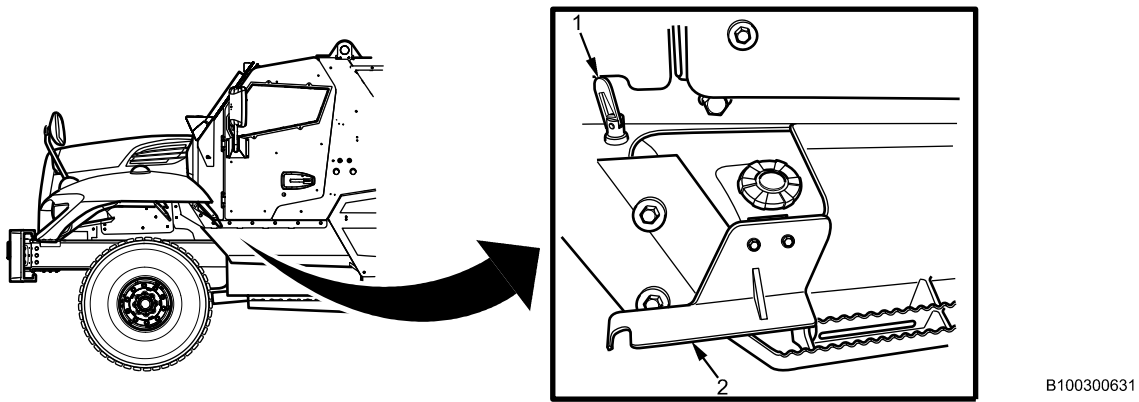


Figure 1. Exterior Fuel Tank Access Armor Door.

1. Release holddown (Figure 1, Item 1) on exterior fuel tank access armor door (Figure 1, Item 2). Swing exterior fuel tank access armor door down to open.

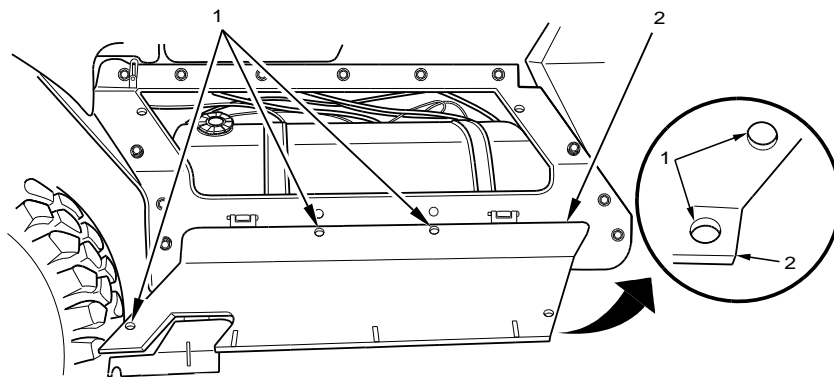


Figure 2. Exterior Fuel Tank Armor Door.

2. Remove five bolts and washers from five locations (Figure 2, Item 1) in exterior fuel tank armor door (Figure 2, Item 2). Swing exterior fuel tank armor door down to open.

END OF TASK

CLOSE

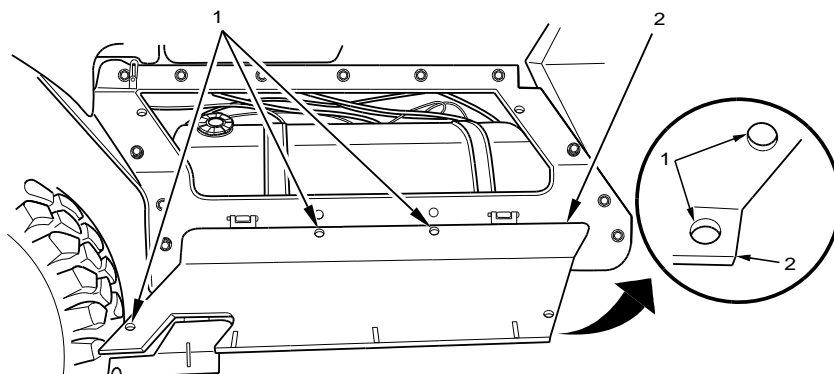
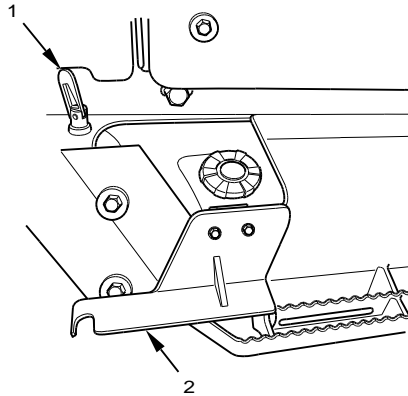


Figure 3. Exterior Fuel Tank Armor Door.

Exterior Fuel Tank Armor Door Open and Close - (CONTINUED)

1. Swing exterior fuel tank armor door (Figure 3, Item 2) up to close. Install bolts and washers in five locations (Figure 3, Item 1) (arrows pointing to bolts and washers locations). Tighten bolts securely.



005208

Figure 4. Exterior Fuel Tank Access Armor Door.

2. Swing exterior fuel tank access armor door (Figure 4, Item 2) up to close. Secure exterior fuel tank access armor door with holddown (Figure 4, Item 1).

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

LEFT SIDE REAR STOWAGE BOX REMOVAL AND INSTALLATION

INITIAL SETUP:

Materials/Parts

Gloves (WP 0083, Item 11)
 Gloves, nitrile, large (WP 0083, Item 12)
 Grease (WP 0083, Item 9)

Transmission set in NEUTRAL (N) (WP 0011)
 Engine off (WP 0011)
 Main power switch off (WP 0011)
 Wheels chocked (WP 0011)

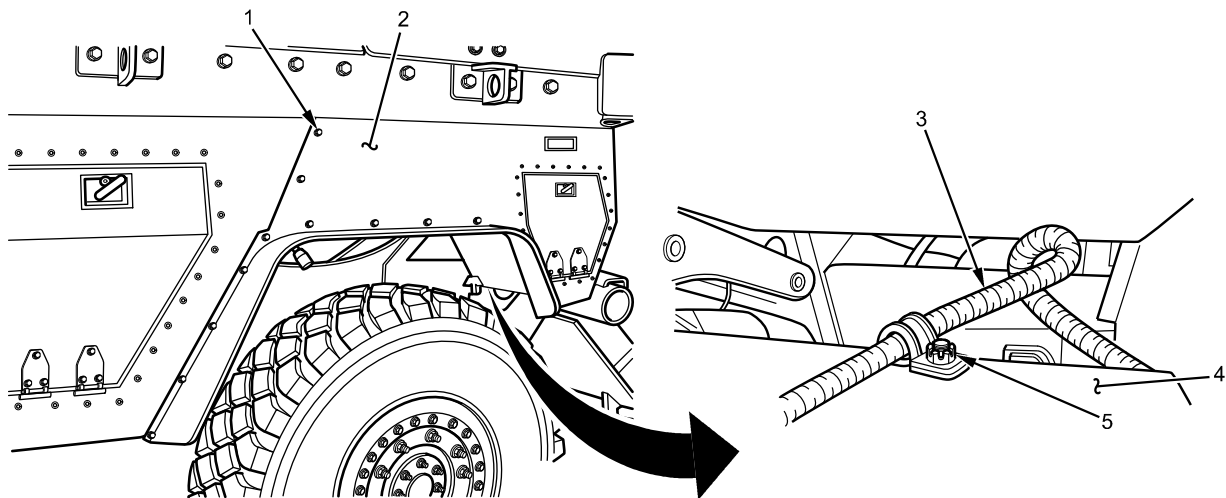
Equipment Condition

Parking brake set (WP 0011)

REMOVAL

NOTE

Light harness retainer bolt must be accessed from inside storage box.

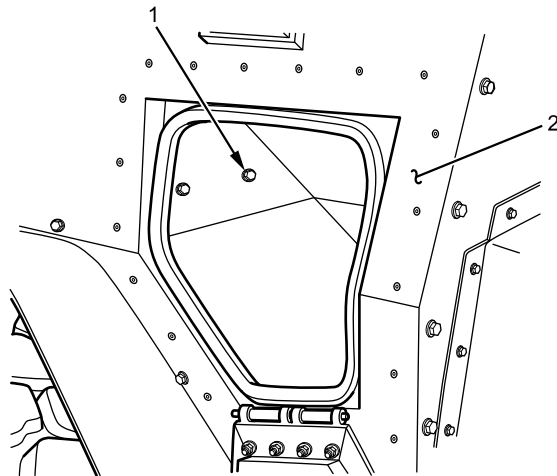


B101800496

Figure 1. Sidemarker Light Harness – Back of Stowage Box.

1. Remove nut and bolt (Figure 1, Item 5) securing sidemarker light harness (Figure 1, Item 3) on backside of stowage box (Figure 1, Item 4).
2. Remove 17 bolts (Figure 1, Item 1) securing left side rear stowage box (Figure 1, Item 2) to body.

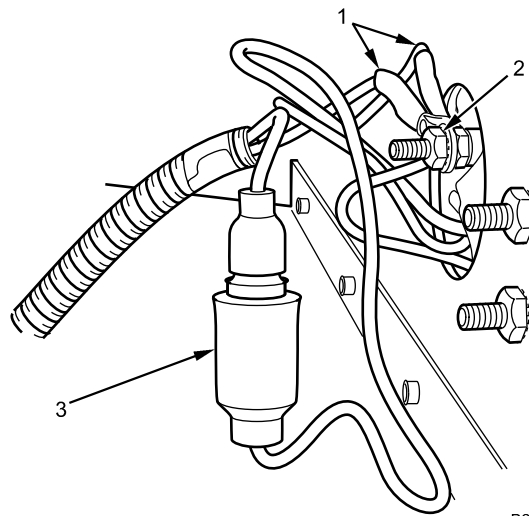
Left Side Rear Stowage Box Removal and Installation - (CONTINUED)



B231800727

Figure 2. Left Rear Stowage Box Inside Bolts.

3. Remove four bolts (Figure 2, Item 1) securing left side rear stowage box (Figure 2, Item 2) to body from inside box.



B230601337

Figure 3. Sidemarker Wiring.

4. Pull left side rear stowage box away from body and disconnect positive wire (Figure 3, Item 3) from sidemarker light.
5. Remove nut (Figure 3, Item 2) securing ground wires (Figure 3, Item 1).
6. Remove left side rear stowage box.

END OF TASK

Left Side Rear Stowage Box Removal and Installation - (CONTINUED)**INSTALLATION**

1. Position left side rear stowage box on body.

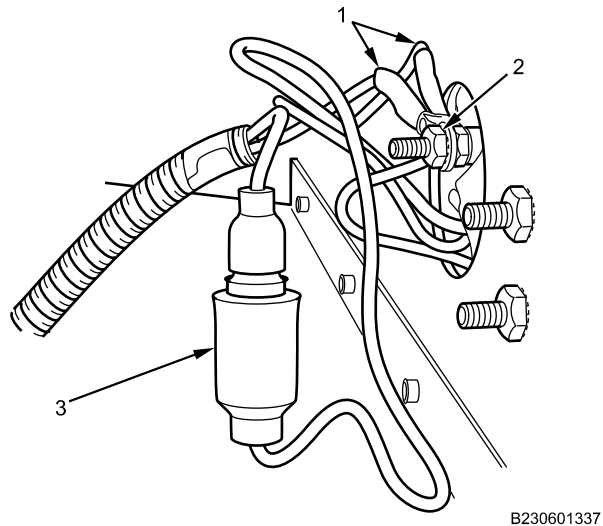


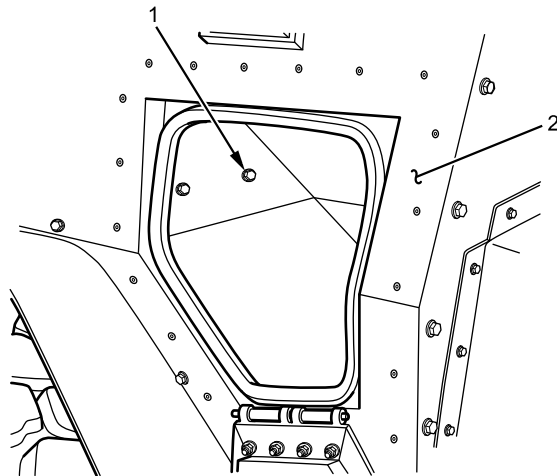
Figure 4. Sidemarker Wiring

WARNING

Dielectric grease is harmful to skin and eyes. If grease contacts eyes, rinse thoroughly and contact physician if irritation persists. If skin is contacted, wash thoroughly with soap and water. Failure to comply may result in serious injury to personnel.

2. Apply dielectric grease to connectors (Figure 4, Item 1 and 3).
3. Connect positive wire (Figure 4, Item 3) to sidemarker light.
4. Position ground wires (Figure 4, Item 1) and install nut (Figure 4, Item 2) and tighten securely.

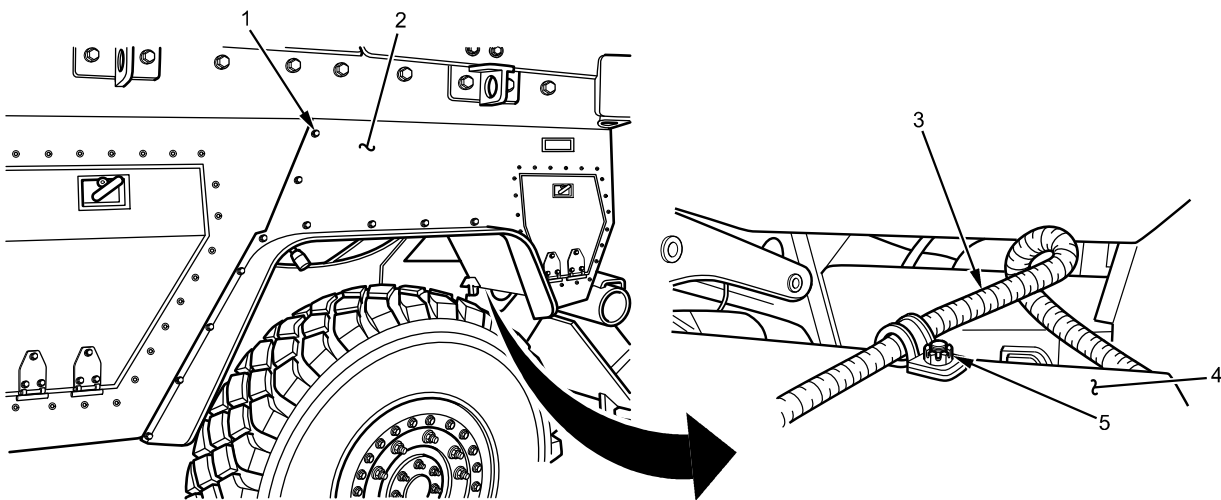
Left Side Rear Stowage Box Removal and Installation - (CONTINUED)



B231800727

Figure 5. Left Side Rear Stowage Box Inside Bolts.

5. Align left side rear stowage box (Figure 5, Item 2) to body.
6. Loosely install four bolts (Figure 5, Item 1) securing left side rear stowage box (Figure 5, Item 2).



B101800496

Figure 6. Left Side Rear Stowage Box Installation.

7. Install 17 bolts (Figure 6, Item 1) securing left side rear stowage box (Figure 6, Item 2) to body and tighten securely.
8. Tighten four bolts (Figure 5, Item 1) inside stowage box (Figure 5, Item 2) securely.
9. Install nut and bolt (Figure 6, Item 5) securing sidemarker light harness (Figure 6, Item 3) on backside of stowage box (Figure 6, Item 4).

END OF TASK

Left Side Rear Stowage Box Removal and Installation - (CONTINUED)**FOLLOW-ON MAINTENANCE**

1. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS

WINDSHIELD WASHER SERVICE

INITIAL SETUP:**Materials/Parts**

Cleaning compound (WP 0083, Item 3)

Transmission set in NEUTRAL (N) (WP 0011)

Engine off (WP 0011)

Main power switch off (WP 0011)

Wheels chocked (WP 0011)

Engine hood open and secured (WP 0031)

Equipment Condition

Parking brake set (WP 0011)

WARNING

Engine hood is extremely heavy and requires two-person lift. Ensure that there is adequate space in front of the vehicle to open hood completely without pinning or pinching personnel between hood and any other structure. Use extreme care when working under hood and make sure it is properly supported. Failure to comply may result in serious injury or death to personnel.

Engine components become extremely hot during normal operation. Allow engine to cool completely prior to performing maintenance. Use extreme care when working in close quarters in engine compartment. Stay clear of rotating parts. Wear safety goggles, work gloves, and long sleeves or shop coat. Failure to comply may result in serious injury or death to personnel.

Fluids pose a slip hazard if spilled. Wipe up spills immediately and dispose of in accordance with standard operating procedures. Failure to comply may result in injury or death to personnel.

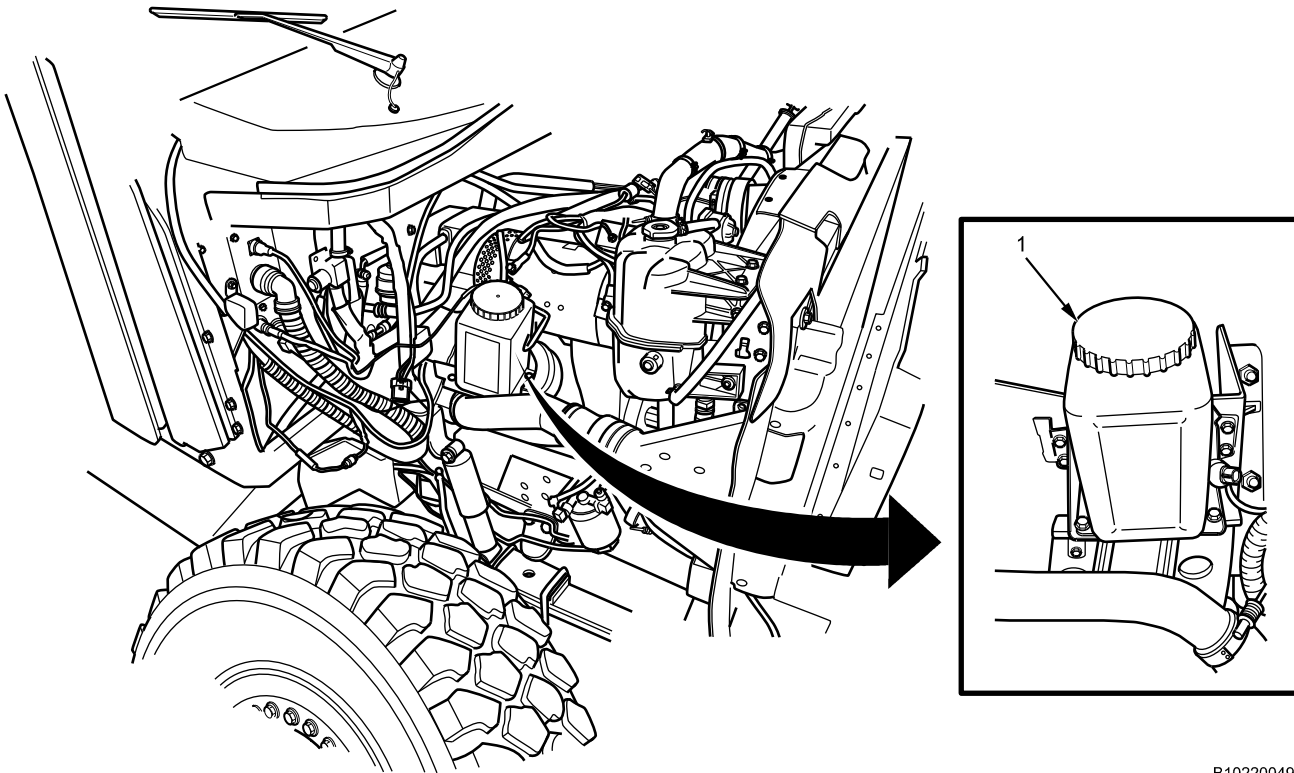
Windshield Washer Service - (CONTINUED)**FILL**

Figure 1. Washer Fluid Reservoir.

1. Open washer fluid reservoir cap (Figure 1, Item 1).
2. Add fluid to reservoir until fluid level reaches FILL LINE. Do not overfill.
3. Install reservoir cap (Figure 1, Item 1).

END OF TASK**FOLLOW-ON MAINTENANCE**

1. Close and secure engine hood (WP 0031).
2. Remove wheel chocks (WP 0011).

END OF TASK**END OF WORK PACKAGE**

OPERATOR INSTRUCTIONS
LUBRICATION INSTRUCTIONS

INITIAL SETUP:

NOT APPLICABLE

GENERAL LUBRICATION INSTRUCTIONS

This work package includes all lubrication services to be performed on the M1224 and M1224A1 MRAP vehicles. Lubrication intervals are based on normal operation. Lubricate more often during constant use and less often during inactive periods. Use the correct grade of lubricant for climate and seasonal temperature expected.

Lubrication Instructions - (CONTINUED)

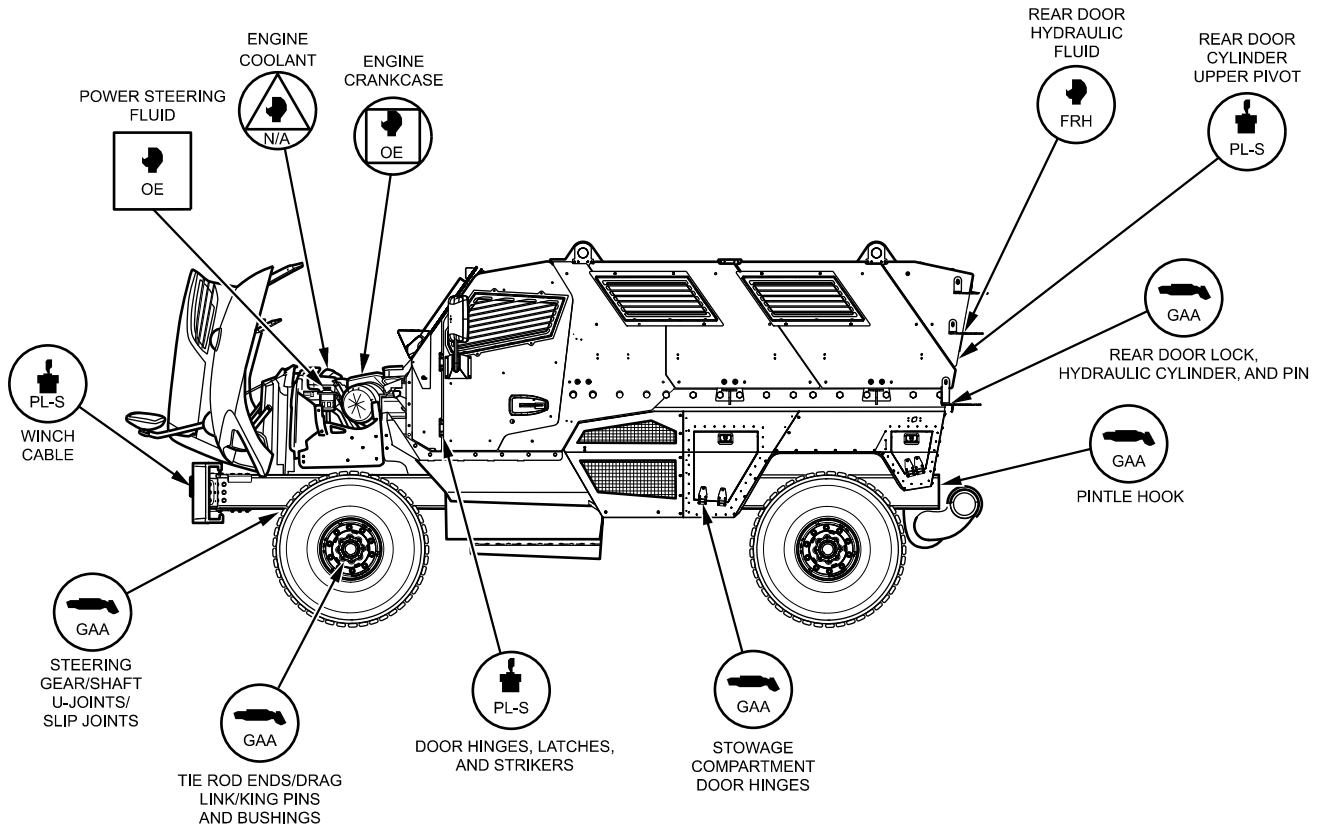


TABLE OF LUBRICANTS			SYMBOLS	FREQUENCY	METHOD OF APPLICATION
ID	SPECIFICATION	TYPE OF LUBRICANT			
GAA	MIL-PRF-10924	GREASE, ARTILLERY, AND AUTOMOTIVE		1 YEAR OR 6,000 MILES	GREASE GUN
PL-S	MIL-PRF-32033	OIL		1 YEAR OR 10,000 MILES	BRUSH
FRH	MIL-PRF-46170	HYDRAULIC FLUID		1 YEAR OR 40,000 MILES	HAND
OE	MIL-PRF-2104	OIL			
N/A	A-A-52624	COOLANT-ANTIFREEZE		2 YEARS OR 72,000 MILES	

B230605484

Figure 1. Body Overview.

Lubrication Instructions - (CONTINUED)

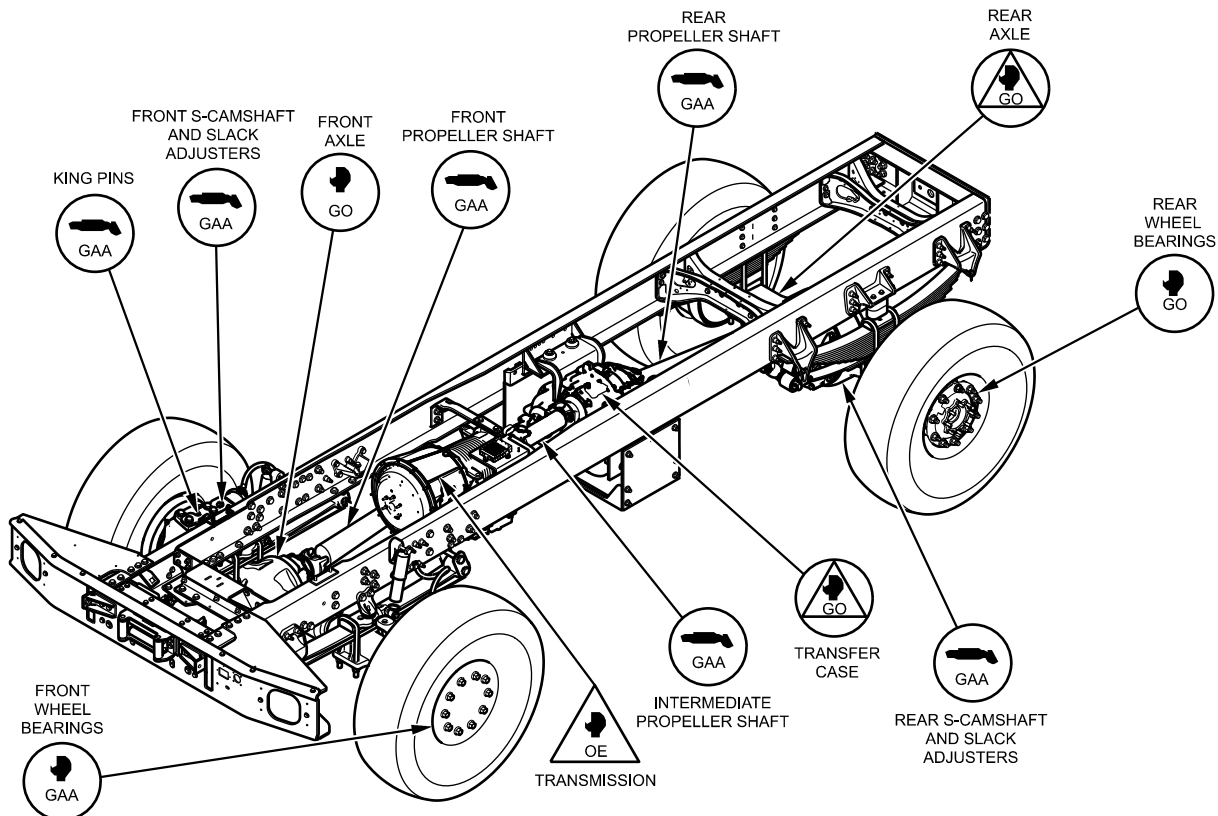
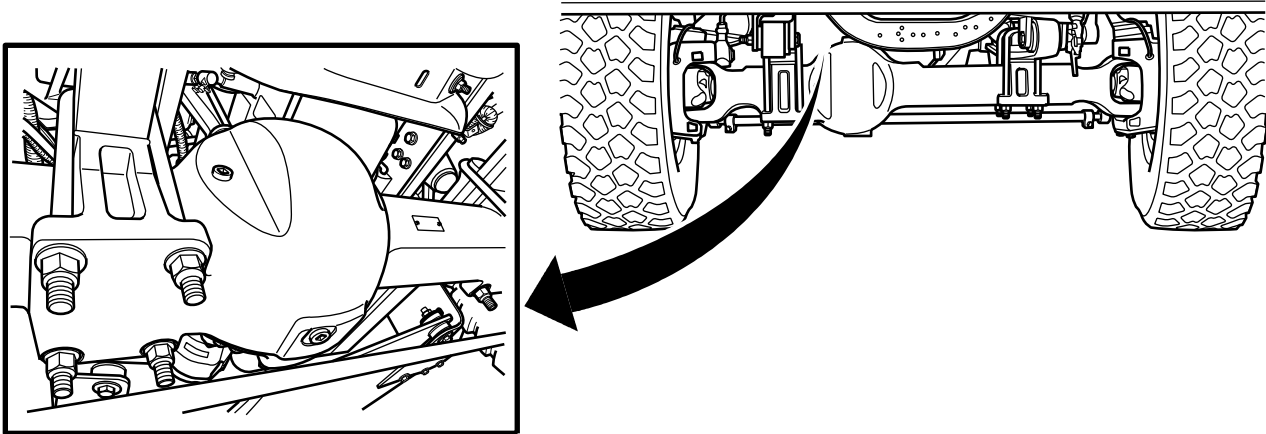


TABLE OF LUBRICANTS			SYMBOLS	FREQUENCY	METHOD OF APPLICATION
ID	SPECIFICATION	TYPE OF LUBRICANT			
GAA	MIL-PRF-10924	GREASE, ARTILLERY, AND AUTOMOTIVE		1 YEAR OR 10,000 MILES	GREASE GUN
OE	MIL-PRF-2104	OIL		2 YEARS OR 12,000 MILES	BRUSH
GO	SAE J2360	OIL		2 YEARS OR 50,000 MILES	HAND

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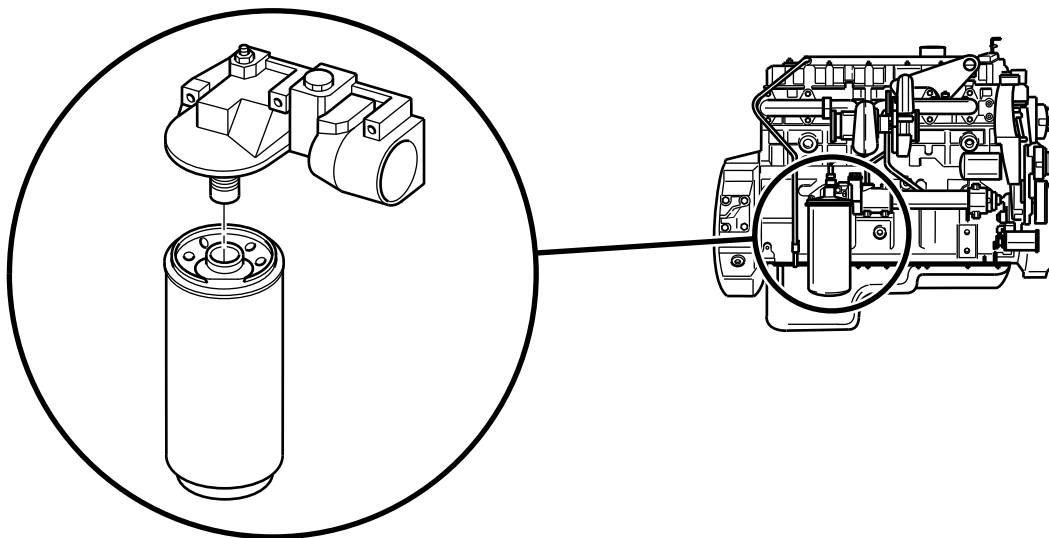
Figure 2. Chassis Overview.

Lubrication Instructions - (CONTINUED)



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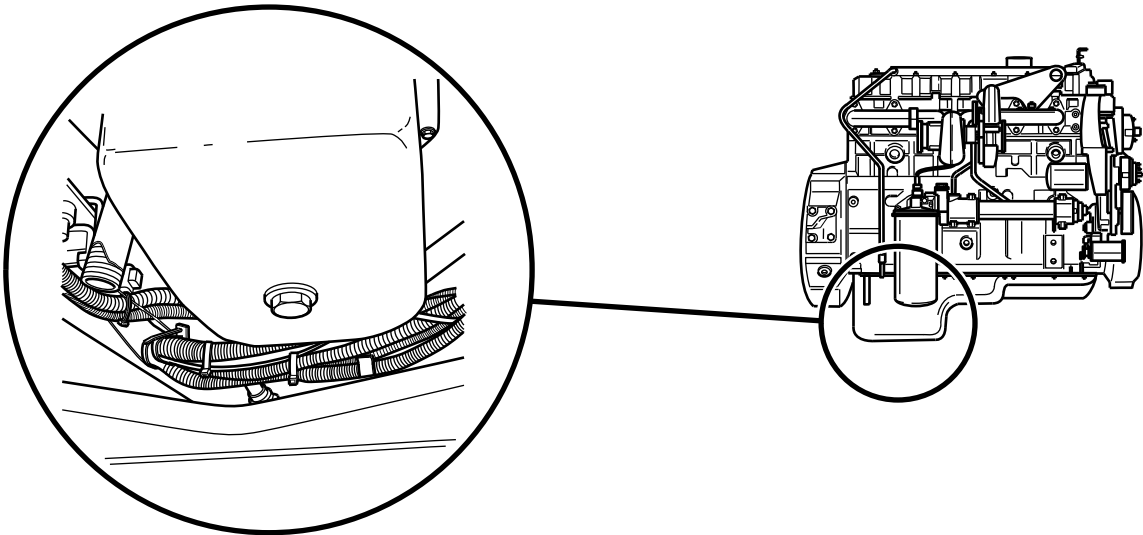
Figure 3. Front Axle.



B100000199

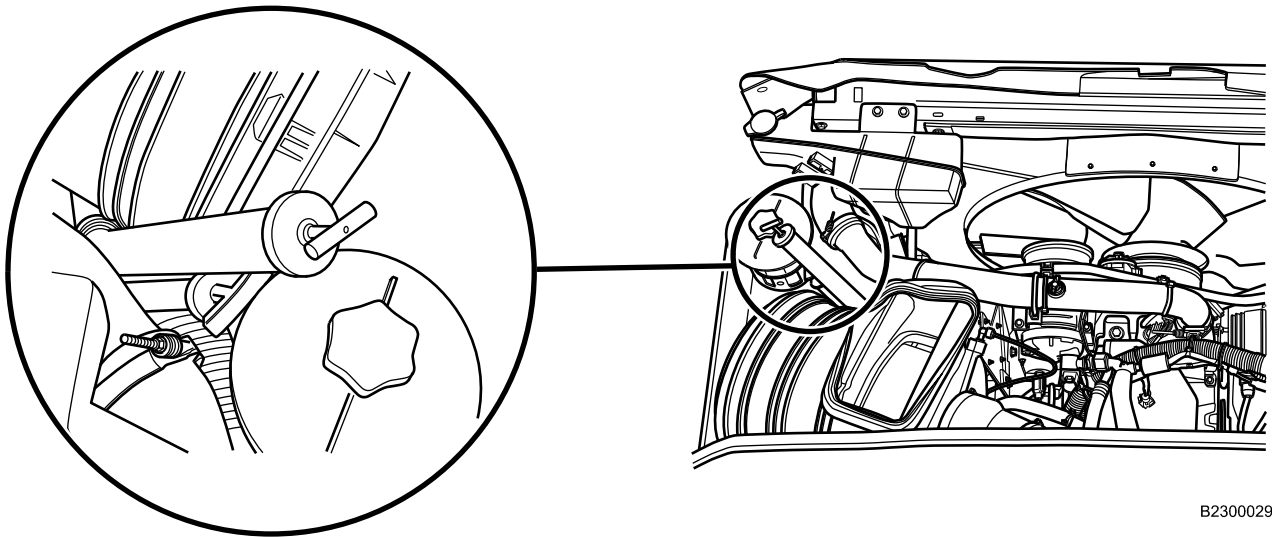
Figure 4. Oil Filter.

Lubrication Instructions - (CONTINUED)



B230002971

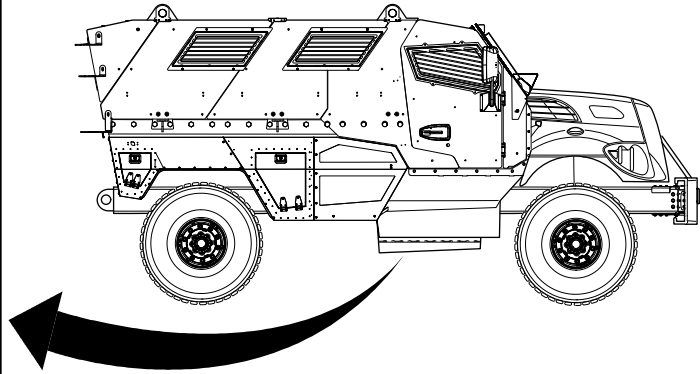
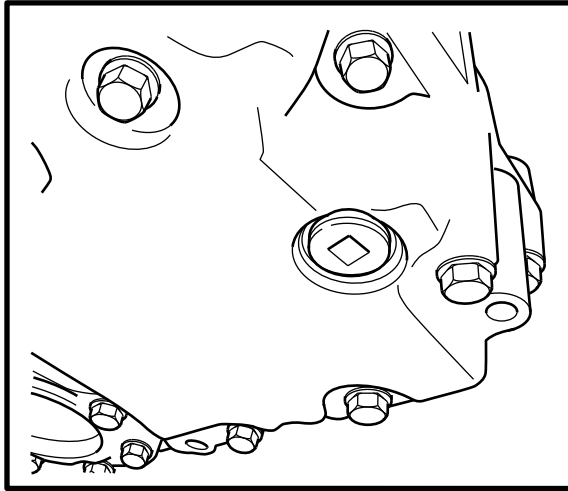
Figure 5. Engine Oil Pan.



B230002972

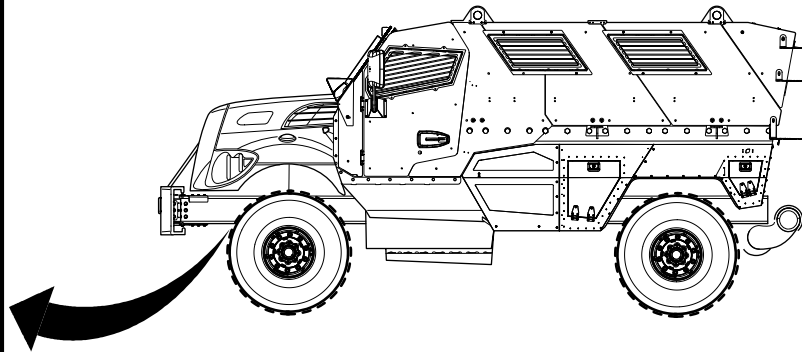
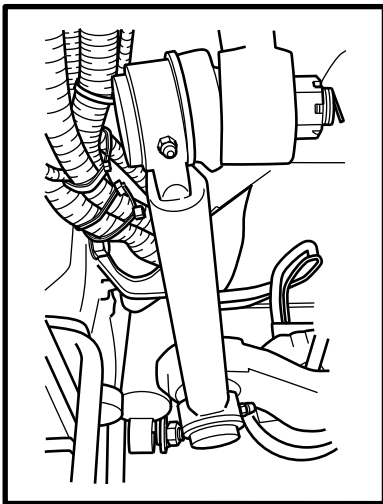
Figure 6. Engine Oil Dipstick, Transmission Fluid Dipstick, and Power Steering Reservoir.

Lubrication Instructions - (CONTINUED)



B230002973

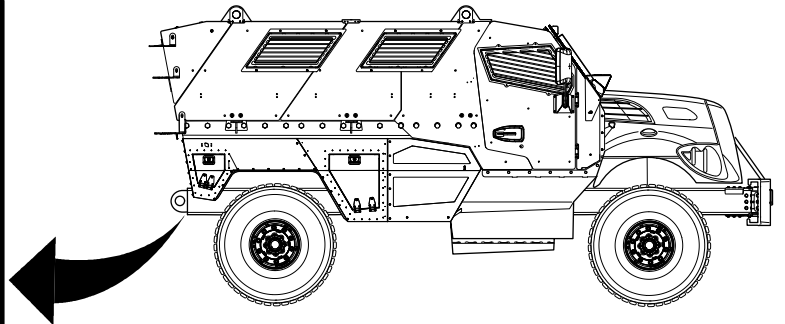
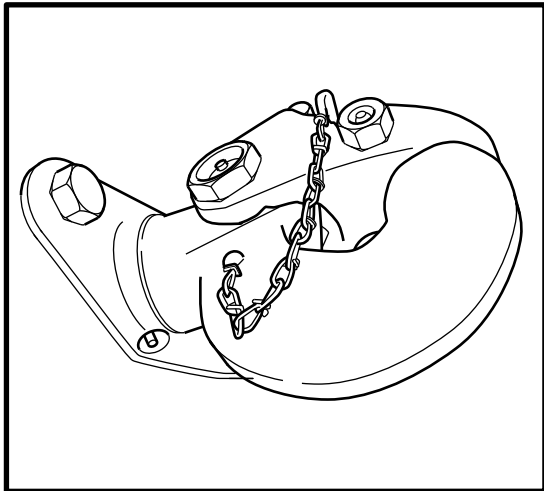
Figure 7. Transmission Drain.



B230002974

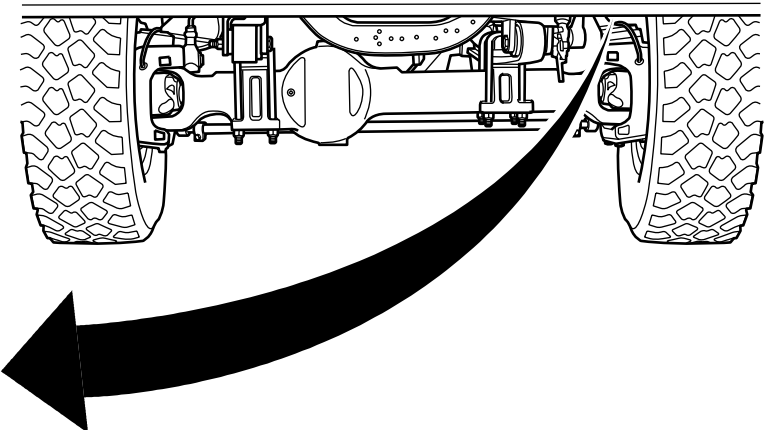
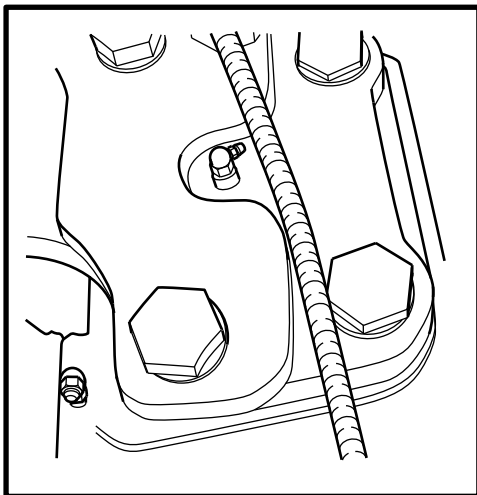
Figure 8. Drag Link.

Lubrication Instructions - (CONTINUED)



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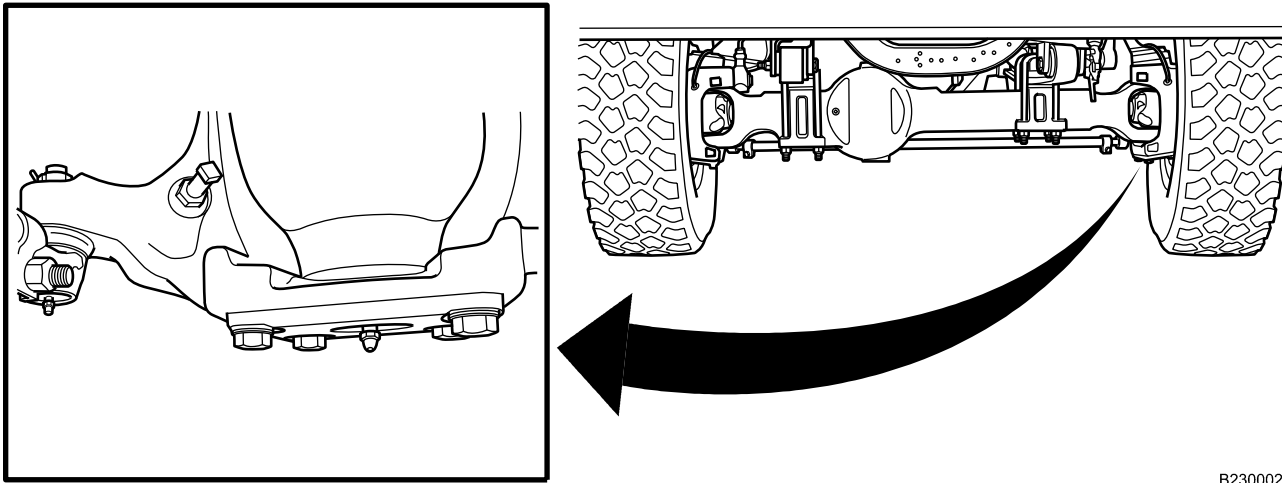
Figure 9. Pintle Hook.



B230002976

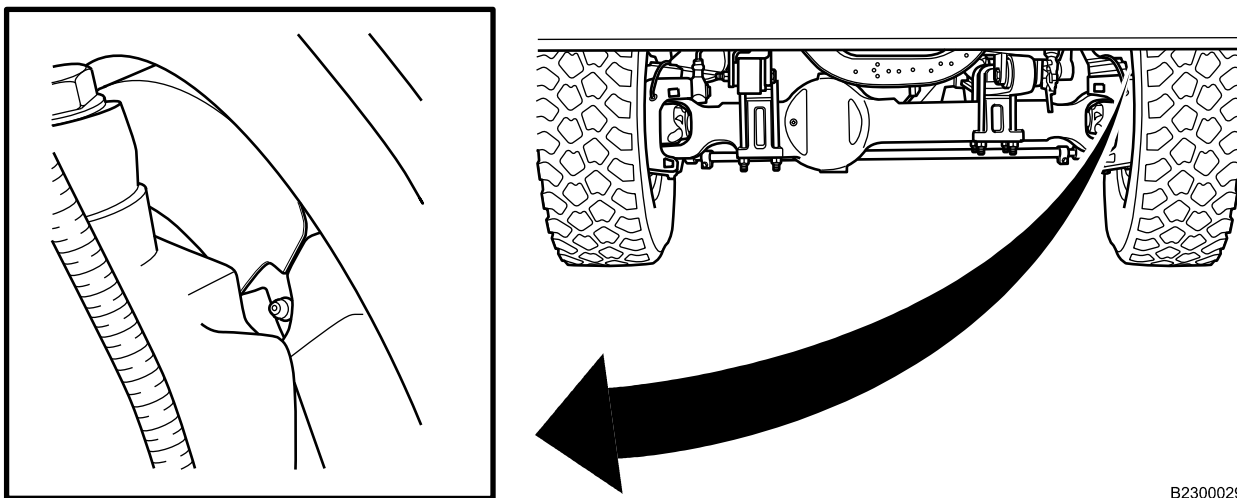
Figure 10. Left Front Upper King Pin and Inner S-Camshaft (Right Similar).

Lubrication Instructions - (CONTINUED)



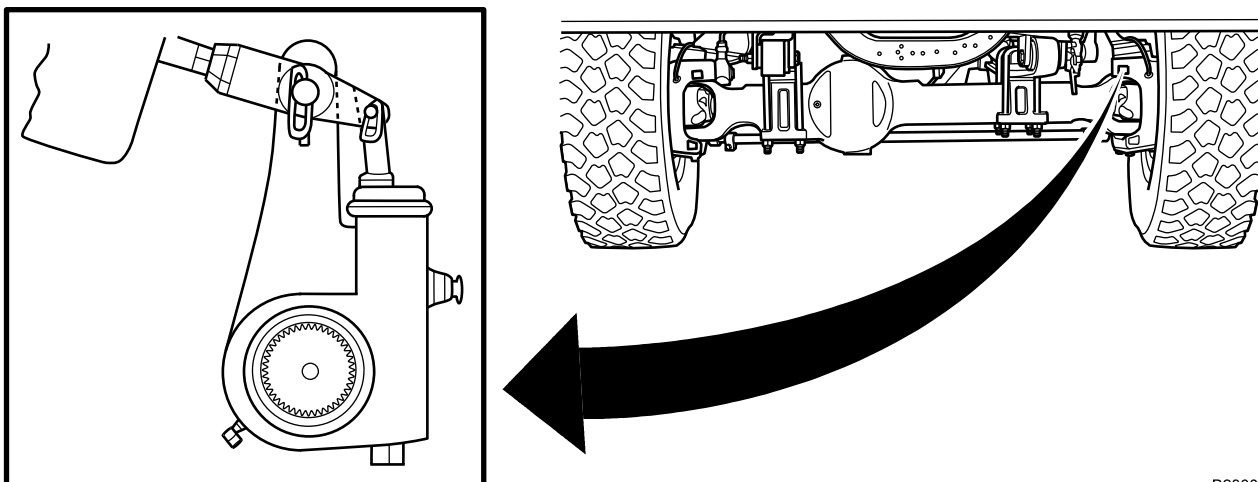
B230002977

Figure 11. Left Front Lower King Pin (Right Similar).



B230002978

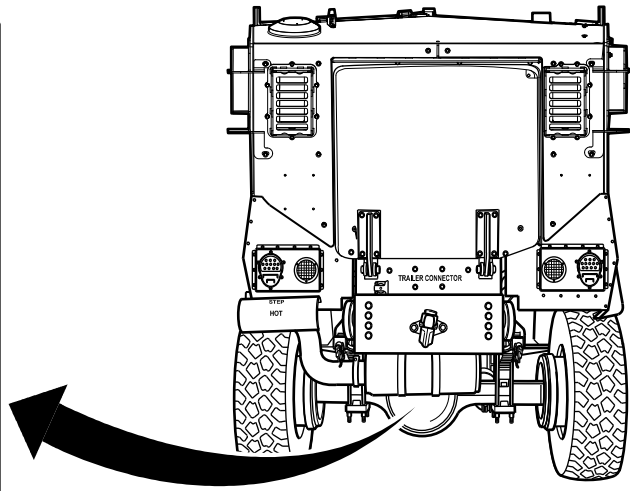
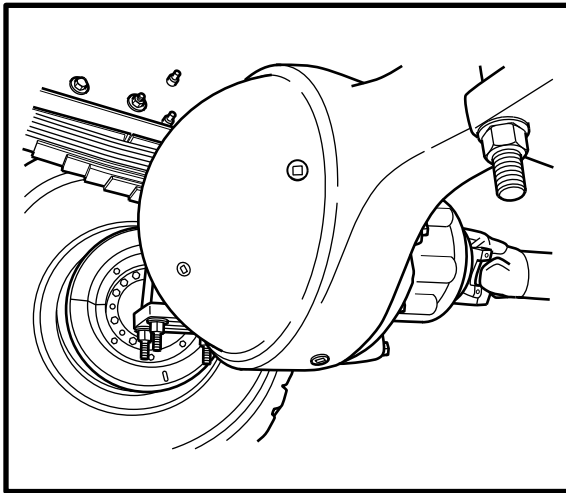
Figure 12. Left Front Outer S-Camshaft (Right Similar).



B230002979

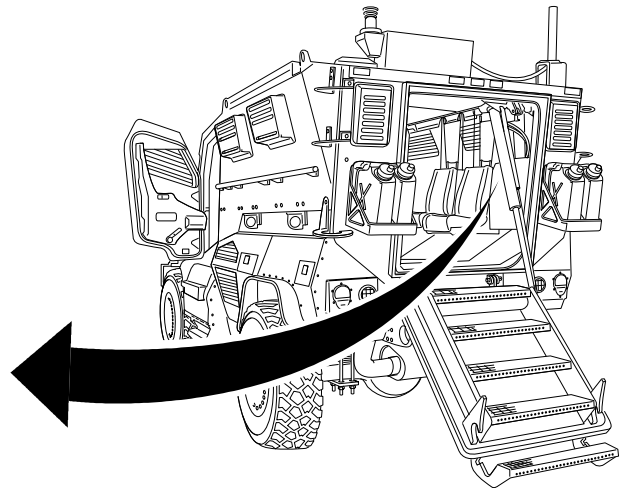
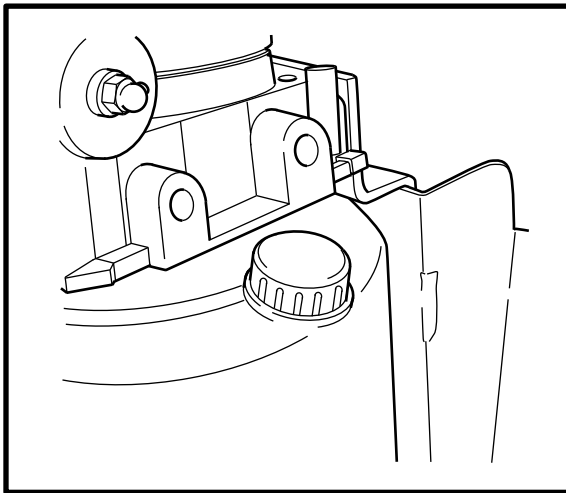
Figure 13. Left Front Slack Adjuster (Right Similar).

Lubrication Instructions - (CONTINUED)



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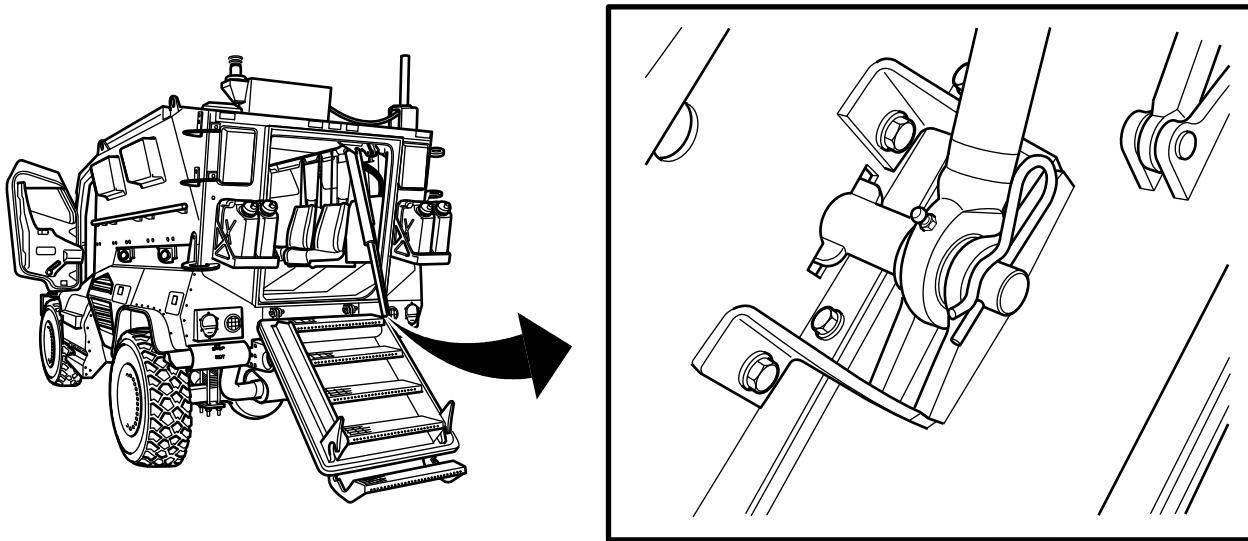
Figure 14. Rear Axle.



B230002980

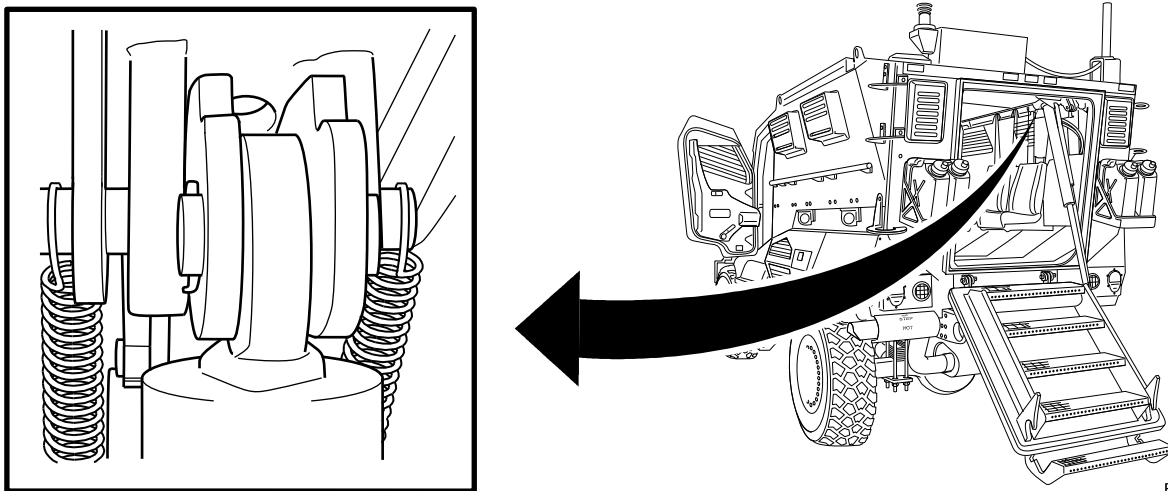
Figure 15. Rear Door Hydraulic Fluid Reservoir.

Lubrication Instructions - (CONTINUED)



B230002981

Figure 16. Rear Door Hydraulic Cylinder at Door.



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Figure 17. Rear Door Hydraulic Cylinder Upper Pivot.

Lubrication Instructions - (CONTINUED)

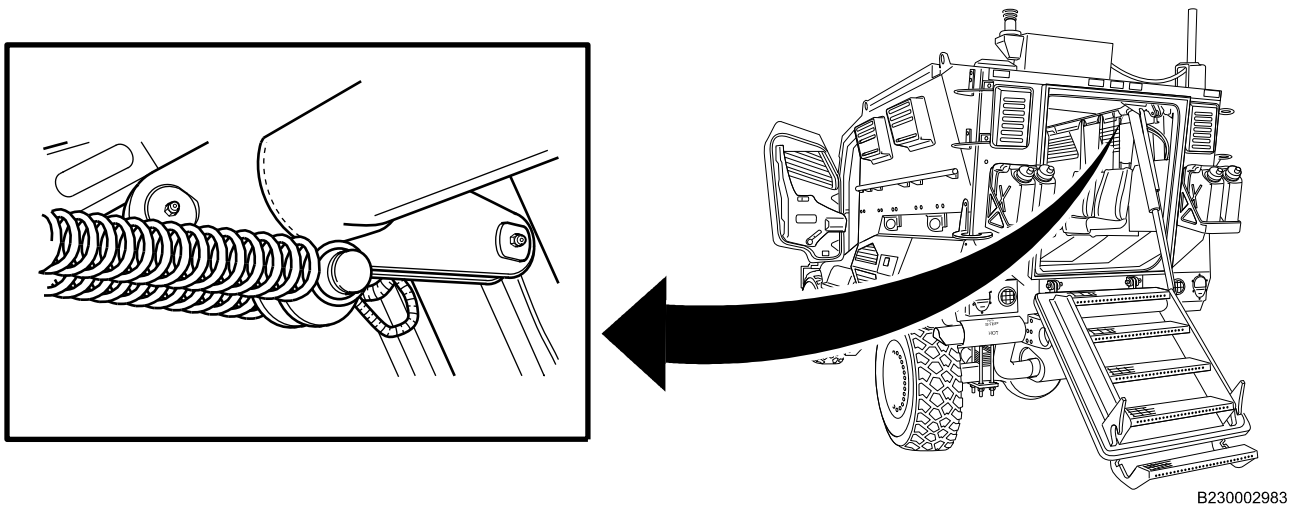


Figure 18. Left Rear Door Lock (Right Similar).

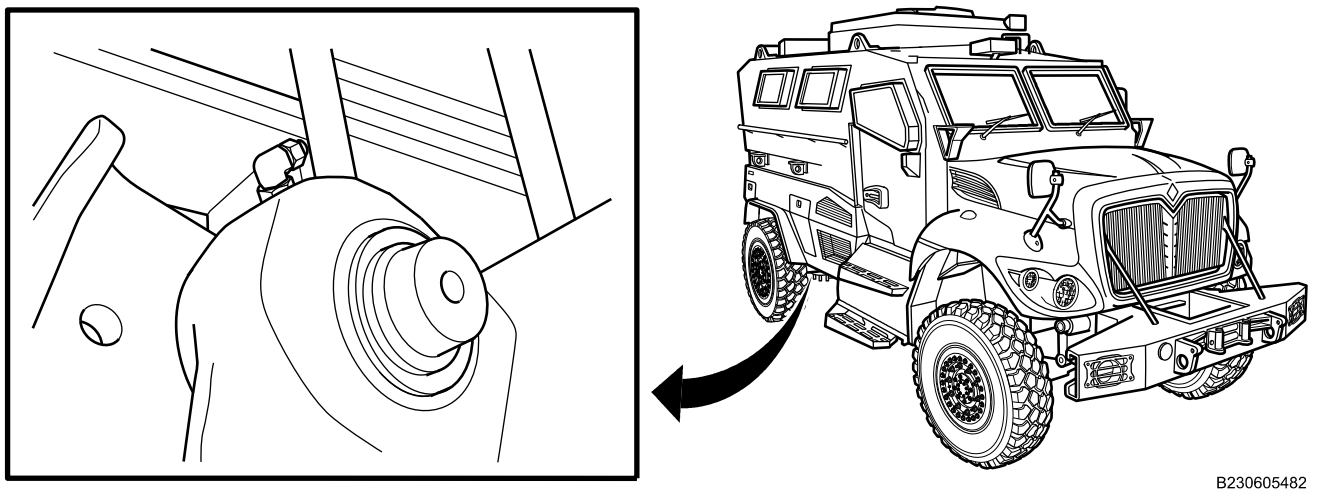
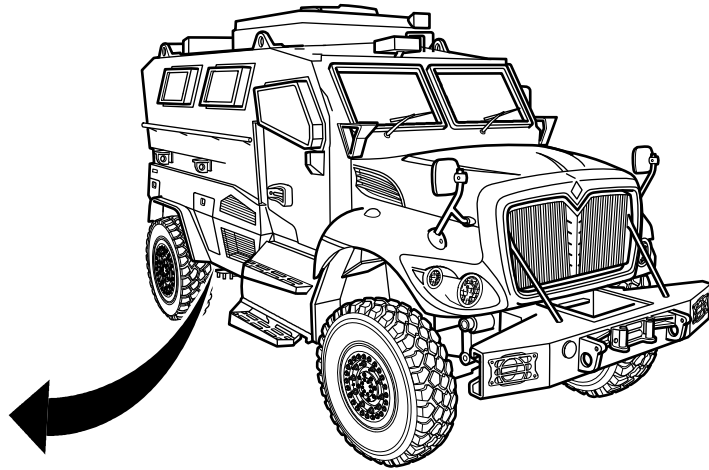
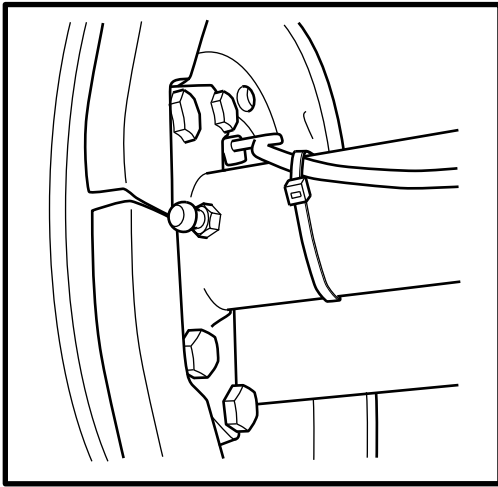


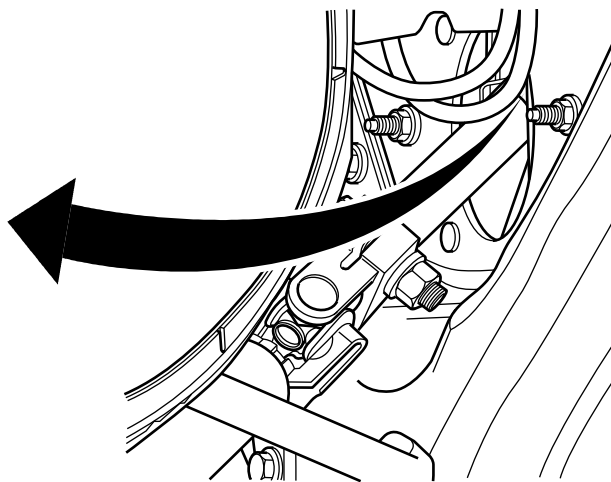
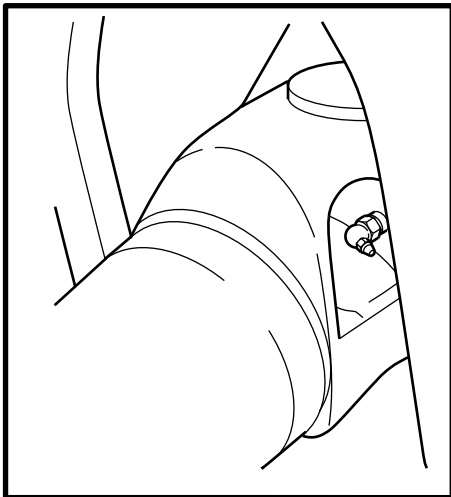
Figure 19. Right Rear Slack Adjuster (Left Similar).

Lubrication Instructions - (CONTINUED)



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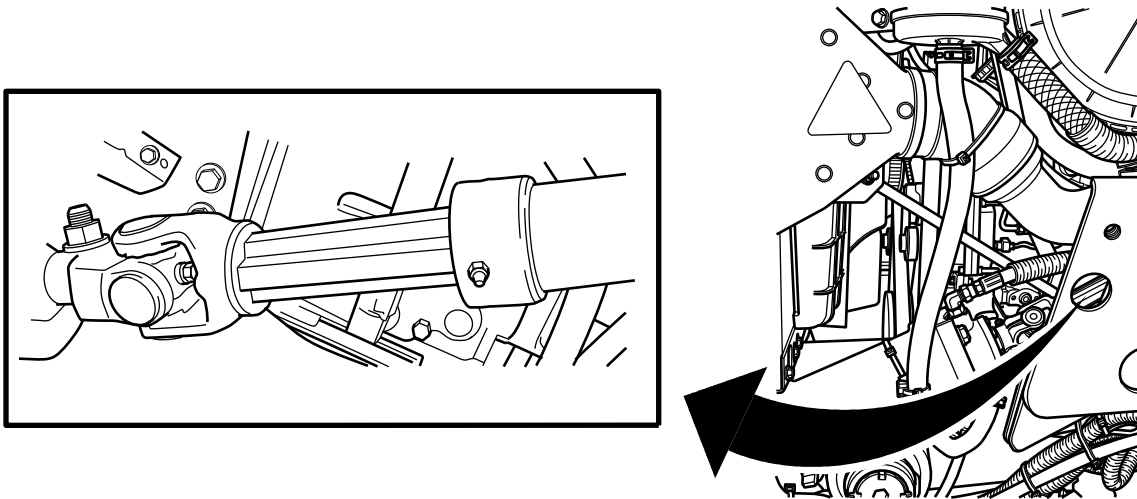
Figure 20. Right Rear Outer S-Camshaft (Left Similar).



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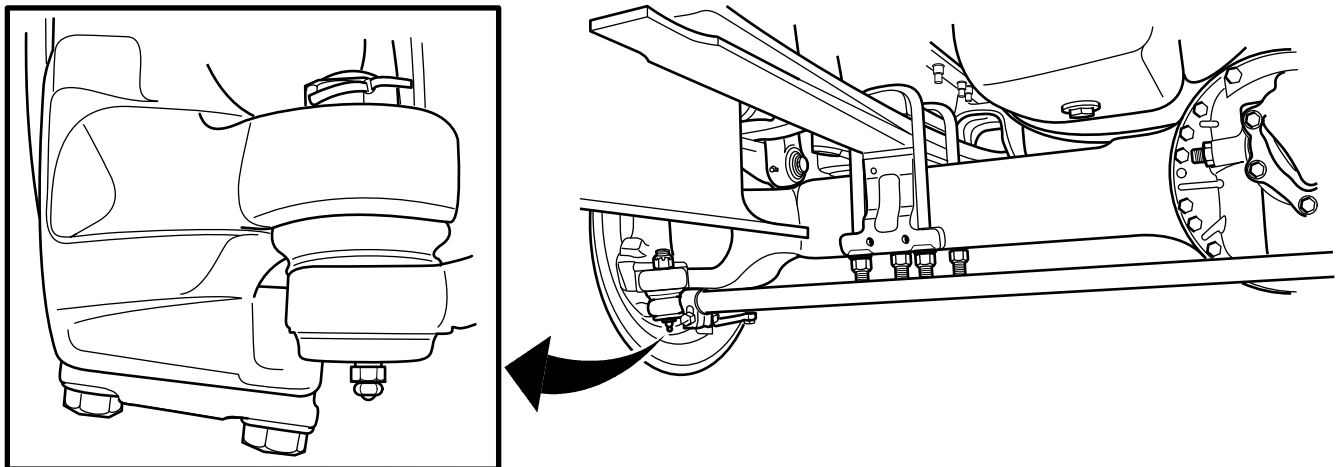
Figure 21. Intermediate Steering Shaft, Upper.

Lubrication Instructions - (CONTINUED)



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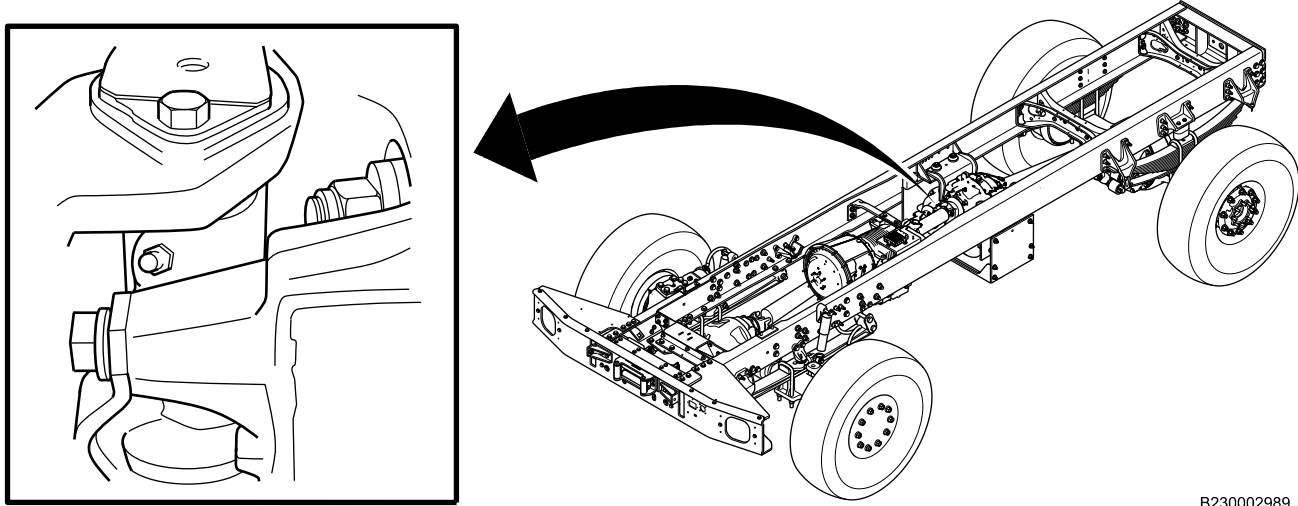
Figure 22. Intermediate Steering Shaft, Lower.



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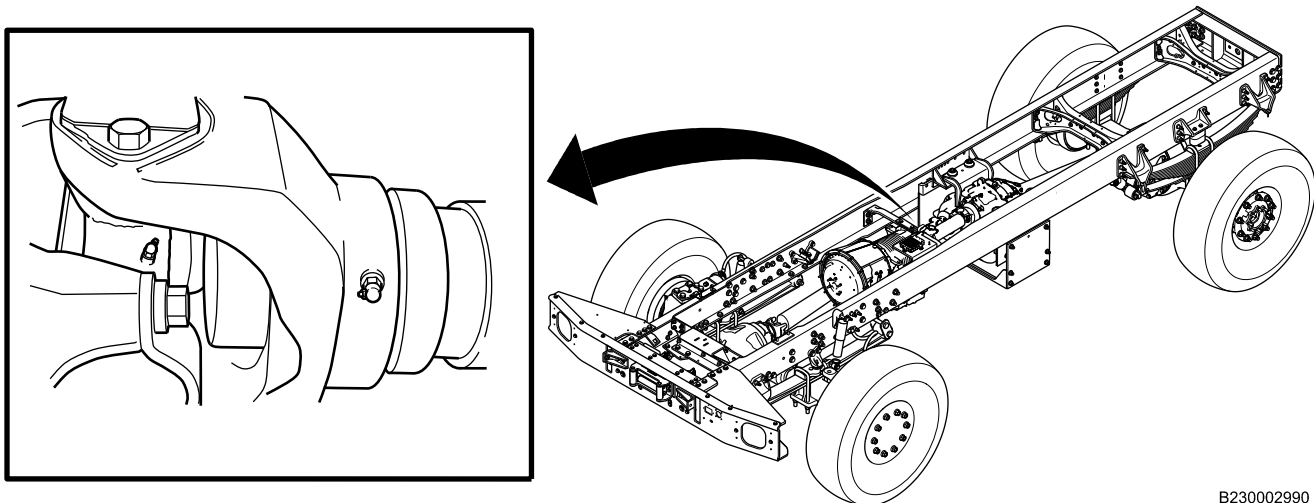
Figure 23. Left Tie Rod End (Right Similar).

Lubrication Instructions - (CONTINUED)



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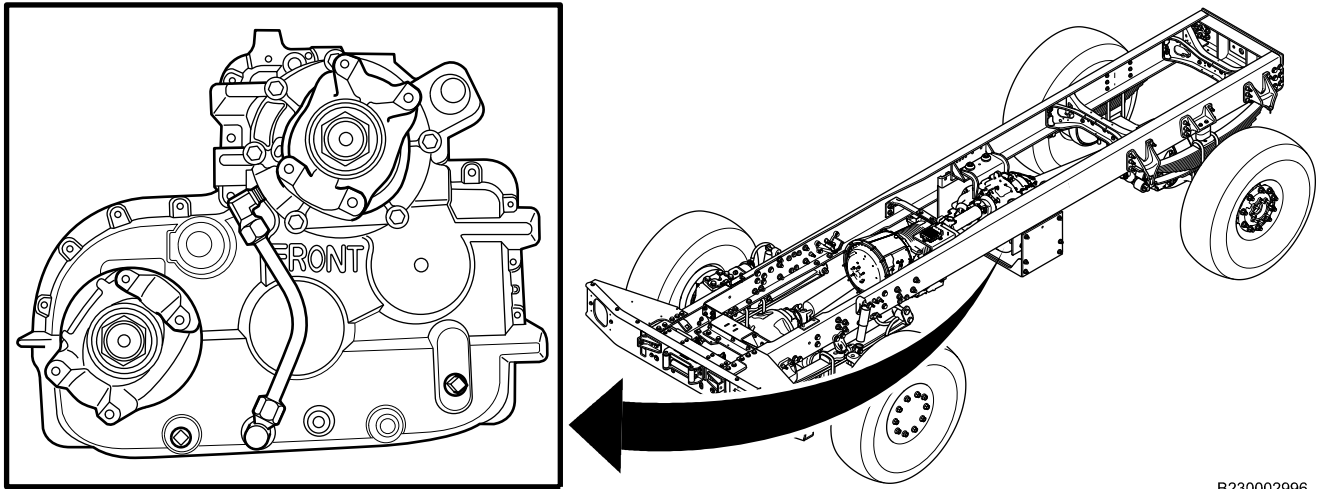
Figure 24. Intermediate Propeller Shaft, Rear.



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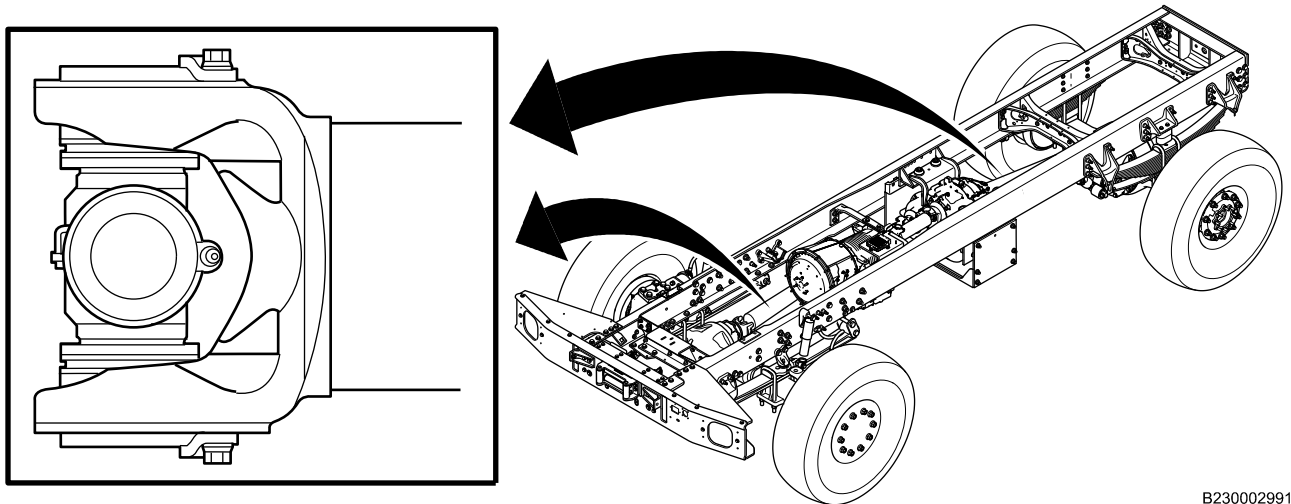
Figure 25. Intermediate Propeller Shaft, Front.

Lubrication Instructions - (CONTINUED)



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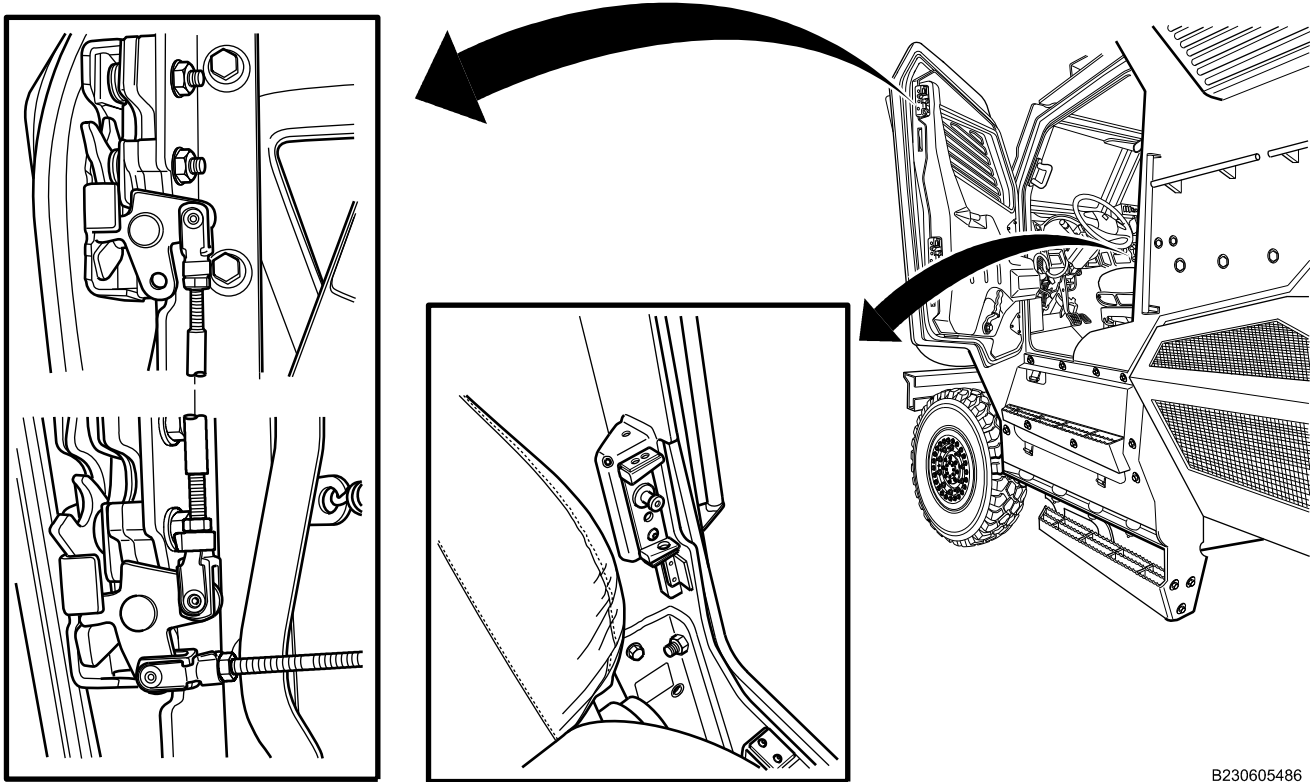
Figure 26. Transfer Case.



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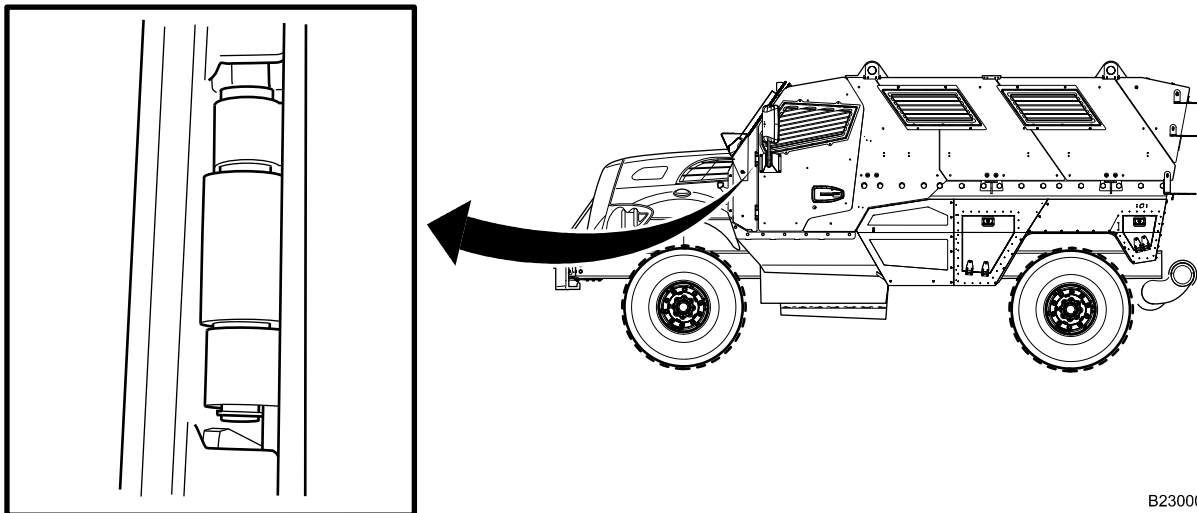
Figure 27. Front and Rear Propeller Shafts — Two Universals Each.

Lubrication Instructions - (CONTINUED)



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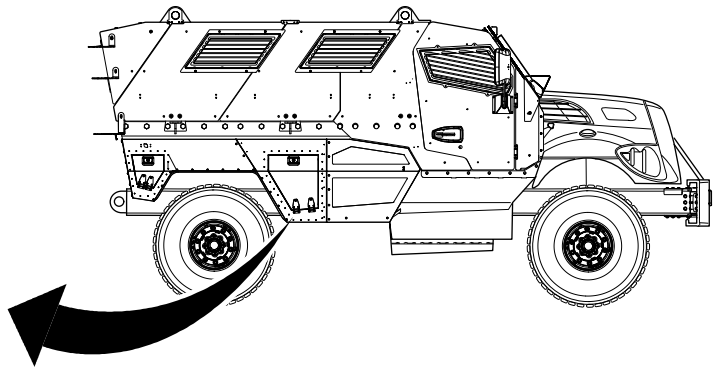
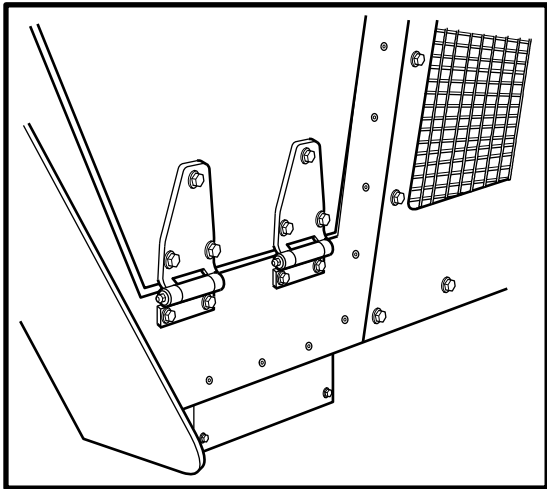
Figure 28. Left Door Latches and Striker, Upper.



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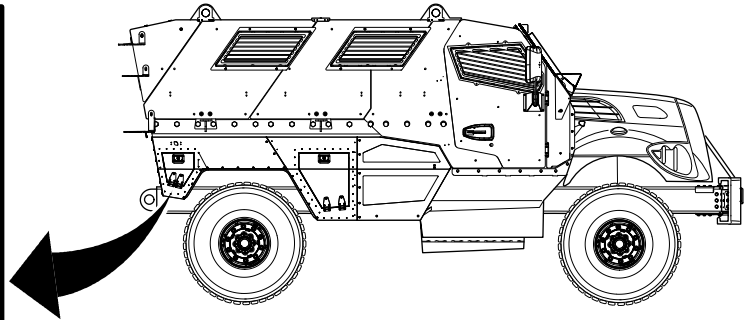
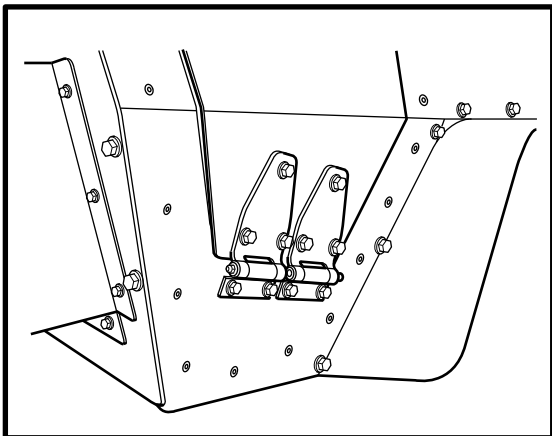
Figure 29. Left Door Hinge, Upper.

Lubrication Instructions - (CONTINUED)



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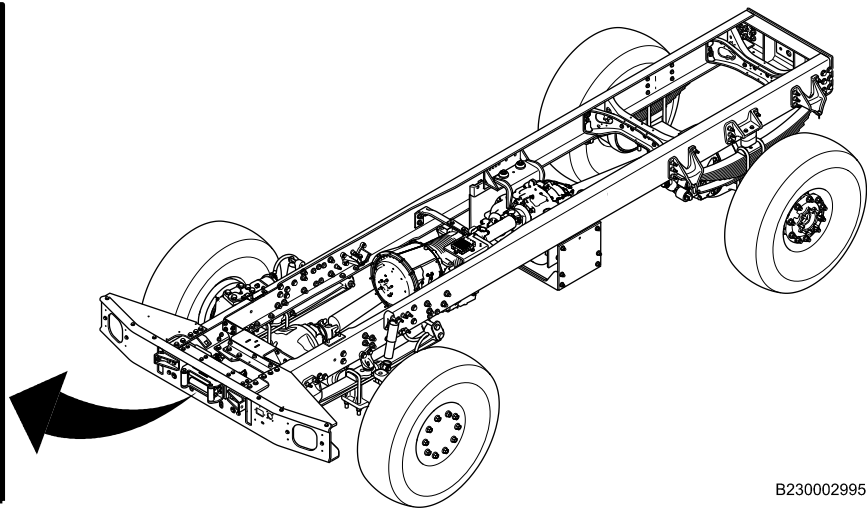
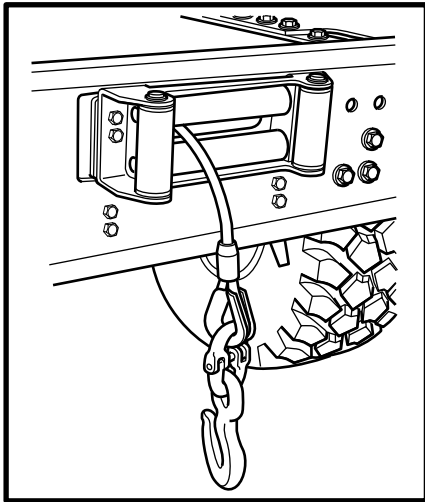
Figure 30. Right Front Stowage Compartment (Left Similar).



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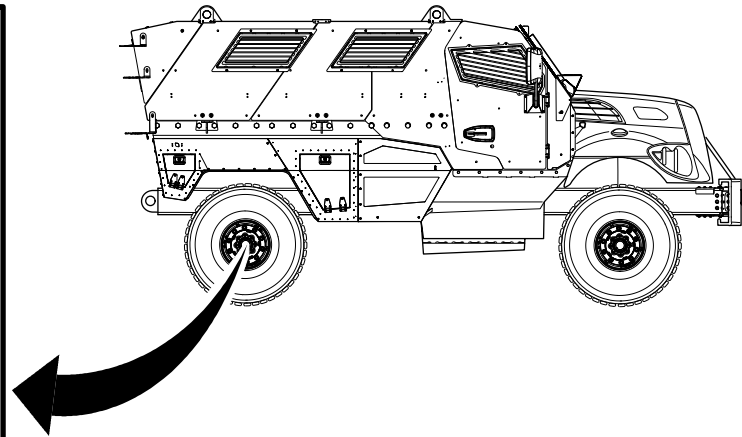
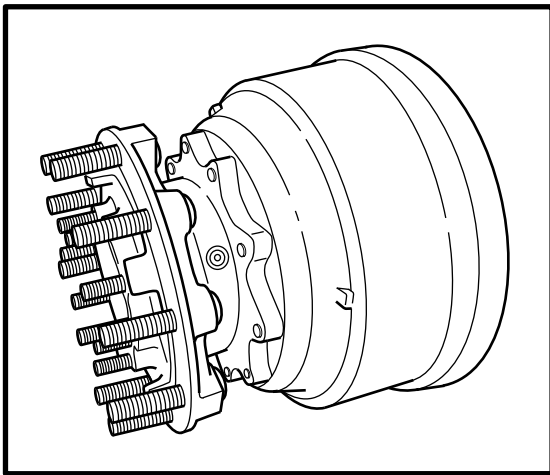
Figure 31. Right Rear Stowage Compartment (Left Similar).

Lubrication Instructions - (CONTINUED)



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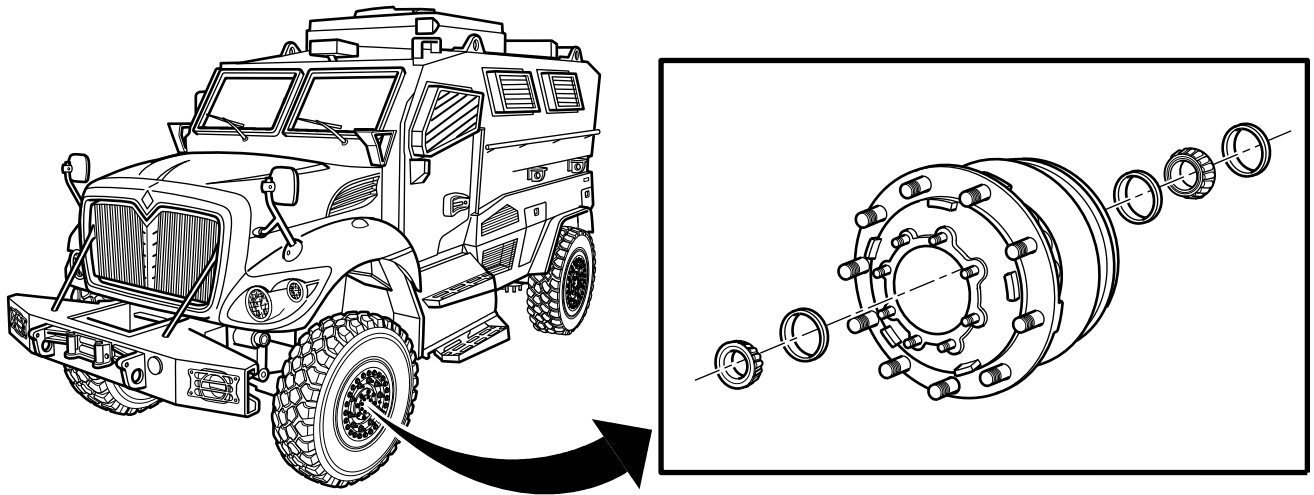
Figure 32. Winch Cable.



B230104665

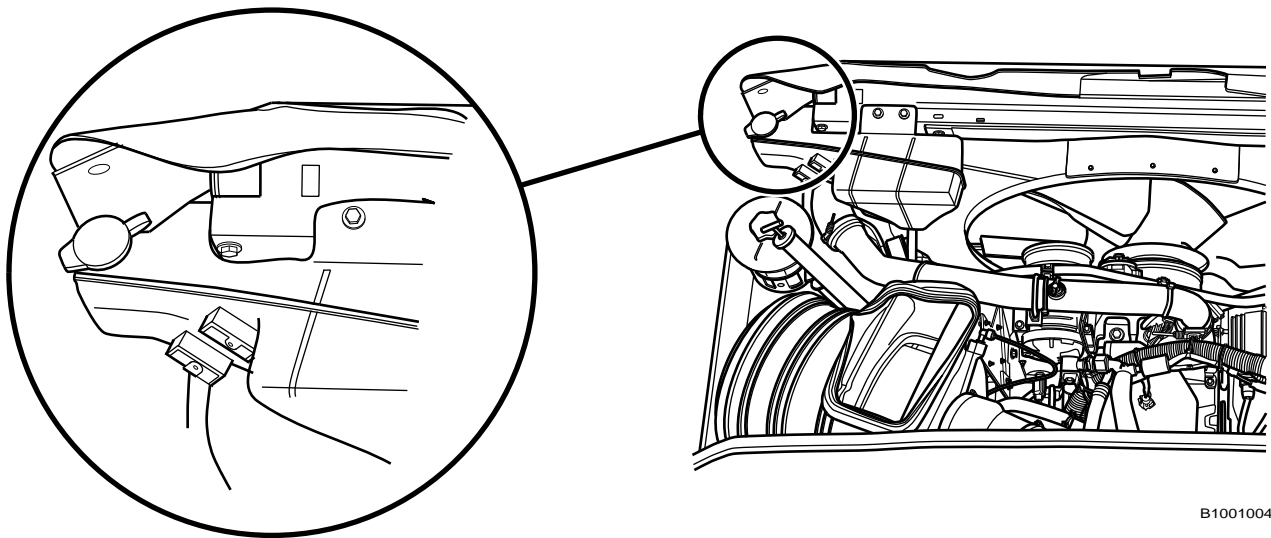
Figure 33. Rear Wheel Bearings.

Lubrication Instructions - (CONTINUED)



B230605485

Figure 34. Front Wheel Bearings.



B100100488

Figure 35. Engine Coolant.

Lubrication Instructions - (CONTINUED)

Table 1. Lubrication Schedule.

PART	CHANGE INTERVAL	CAPACITY	FLUID/LUBRICANT	TEMPERATURE RANGE	NATIONAL STOCK NUMBERS (NSN)
Refer to Figures 3-35 for visual details.					
Engine Crankcase Oil	1 yr or 6,000 miles	30 qt (28.3L)	MIL-PRF-2104 OE/HDO-15-40 (SAE 15W-40)	0°F to +120°F (-18°C to +49°C)	9150-01-178-4725 (1 qt) 9150-01-421-1424 (5 gal) 9150-01-421-1432 (55 gal)
			MIL-PRF-46167 OEA-30 (SAE 0W-30)	< -50°F to +90°F (< -45°C to +32°C)	9150-00-402-4478 (1 qt) 9150-00-402-2372 (5 gal) 9150-00-491-7197 (55 gal)
Power Steering Fluid	1 yr or 40,000 miles	5.5 qt (5.2L)	MIL-PRF-2104 OE/HDO-15-40 (SAE 15W-40)	0°F to +120°F (-18°C to +49°C)	9150-01-178-4725 (1 qt) 9150-01-421-1424 (5 gal) 9150-01-421-1432 (55 gal)
			OE/HDO-10 (SAE 10W)	< -15°F to +120°F (< -26°C to +49°C)	9150-01-496-1957 (1 qt) 9150-00-186-6668 (5 gal) 9150-00-191-2772 (55 gal)
			MIL-PRF-46167 OEA-30 (SAE 0W-30)	< -50°F to +90°F (< -45°C to +32°C)	9150-00-402-4478 (1 qt) 9150-00-402-2372 (5 gal) 9150-00-491-7197 (55 gal)
Steering Gear/Shaft U-Joints/Slip Joint	1 yr 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz)
					9150-01-197-7690 (1.75 lb)
					9150-01-197-7689 (6.5 lb)
					9150-01-197-7692 (35 lb)
					9150-01-197-7691 (120 lb)
9150-01-501-7745 (370 lb)					
Front Wheel Bearing	1 yr or 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz)
					9150-01-197-7690 (1.75 lb)
					9150-01-197-7689 (6.5 lb)
					9150-01-197-7692 (35 lb)
					9150-01-197-7691 (120 lb)
9150-01-501-7745 (370 lb)					
Rear Wheel Bearing	1 yr or 10,000 miles	1 qt (.95L)	SAE J2360 GO-85W/140 (SAE 85W-140)	10°F to 120°F (-12°C to +49°C)	9150-01-048-4591 (1 qt) 9150-01-035-5395 (5 gal) 9150-01-035-5396 (55 gal)
			SAE J2360 GO-75 (SAE 75)	-40°F to +50°F (-40°C to +10°C)	9150-01-035-5390 (1 qt) 9150-01-035-5391 (5 gal)
Tie Rod Ends/Drag Link/King Pins and Bushings	1 yr or 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz)
					9150-01-197-7690 (1.75 lb)
					9150-01-197-7689 (6.5 lb)
					9150-01-197-7692 (35 lb)
					9150-01-197-7691 (120 lb)
9150-01-501-7745 (370 lb)					

Lubrication Instructions - (CONTINUED)

PART	CHANGE INTERVAL	CAPACITY	FLUID/LUBRICANT	TEMPERATURE RANGE	NATIONAL STOCK NUMBERS (NSN)
Rear Door Lock, Hydraulic Cylinder, Pin, Stowage Compartment Door Hinges, and Pintle Hook	1 yr or 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz) 9150-01-197-7690 (1.75 lb) 9150-01-197-7689 (6.5 lb) 9150-01-197-7692 (35 lb) 9150-01-197-7691 (120 lb) 9150-01-501-7745 (370 lb)
Front Axle	1 yr or 10,000 miles	13 qt (12.3L)	SAE J2360 GO-85W/140 (SAE 85W-140)	10°F to 120°F (-12°C to +49°C)	9150-01-048-4591 (1 qt) 9150-01-035-5395 (5 gal) 9150-01-035-5396 (55 gal)
			SAE J2360 GO-75 (SAE 75W)	-40°F to +50°F (-40°C to +10°C)	9150-01-035-5390 (1 qt) 9150-01-035-5391 (5 gal)
Rear Axle	2 yrs or 50,000 miles	19.75 qt (18.7L)	SAE J2360 GO-85W/140 (SAE 85W-140)	10°F to 120°F (-12°C to +49°C)	9150-01-048-4591 (1 qt) 9150-01-035-5395 (5 gal) 9150-01-035-5396 (55 gal)
			SAE J2360 GO-75 (SAE 75W)	-40°F to +50°F (-40°C to +10°C)	9150-01-035-5390 (1 qt) 9150-01-035-5391 (5 gal)
Transfer Case	2 yrs or 50,000 miles	8 qt (7.57L)	SAE J2360 GO-80/90 (SAE 80W-90)	-10°F to 120°F (-23°C to +49°C)	9150-01-422-9329 (1 qt) 9150-01-422-9335 (5 gal) 9150-01-422-9340 (55 gal)
			SAE J2360 GO-75 (SAE 75W)	-40°F to +50°F (-40°C to +10°C)	9150-01-035-5390 (1 qt) 9150-01-035-5391 (5 gal)
Propeller Shafts, U-Joints and Slip Joint	1 yr or 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz) 9150-01-197-7690 (1.75 lb) 9150-01-197-7689 (6.5 lb) 9150-01-197-7692 (35 lb) 9150-01-197-7691 (120 lb) 9150-01-501-7745 (370 lb)
Transmission Fluid	2 yrs or 12,000 miles	29 qts (27.4 L) dry w/filter	MIL-PRF-2104 OE/HDO-15-40 (SAE 15W-40)	-10°F to +120°F (-23°C to +49°C)	9150-01-178-4725 (1 qt) 9150-01-421-1424 (5 gal) 9150-01-421-1432 (55 gal)
		19 qt (18 L) w/filter, drain and refill	MIL-PRF-46167 OEA-30 (SAE 0W-30)	< -50°F to +90°F (< -45°C to +32°C)	9150-00-402-4478 (1 qt) 9150-00-402-2372 (5 gal) 9150-00-491-7197 (55 gal)

Lubrication Instructions - (CONTINUED)

PART	CHANGE INTERVAL	CAPACITY	FLUID/LUBRICANT	TEMPERATURE RANGE	NATIONAL STOCK NUMBERS (NSN)
Air Brakes – S-Camshafts and Slack Adjusters	1 yr or 10,000 miles	As required	MIL-PRF-10924 GAA	All temperatures	9150-01-197-7693 (14 oz) 9150-01-197-7690 (1.75 lb) 9150-01-197-7689 (6.5 lb) 9150-01-197-7692 (35 lb) 9150-01-197-7691 (120 lb) 9150-01-501-7745 (370 lb)
Door Hinges, Latches, Strikers, Seat Adjuster Slides, Bll Storage Int/Ext, Rear Door Cylinder Upper Pivot, and Winch Cable	1 yr or 10,000 miles	As required	MIL-PRF-32033 PL-S	-40°F to +120°F (-40°C to +49°C)	9150-00-836-8641 (1/2 oz) 9150-00-261-8146 (1 oz) 9150-00-273-2389 (4 oz) 9150-00-458-0075 (16 oz) 9150-01-374-2021 (16 oz) 9150-00-231-6689 (1 qt) 9150-00-231-9045 (1 gal) 9150-00-231-9062 (5 gal) 9150-00-281-2060 (55 gal)
Rear Door Hydraulic Fluid	1 yr or 10,000 miles	6.5 qt (6.2 L)	MIL-PRF-46170 Type I	-40°F to +120°F (-40°C to +49°C)	9150-00-111-6256 (1 qt) 9150-00-111-6254 (1 gal) 9150-01-111-6255 (5 gal) 9150-01-158-0462 (55 gal)
Coolant – Antifreeze	2 yrs or 72,000 miles	29 qt (27.6 L)	A-A-52624 Type 1B (60% Ethylene Glycol Concentration)	< -50°F to +120°F (< -45°C to +49°C)	6850-01-464-9266 (1 gal) 6850-01-464-9263 (5 gal) 6850-01-464-9096 (55 gal)
			A-A-52624 Type 1C (50% Ethylene Glycol Concentration)	< -30°F to +120°F (< -34°C to +49°C)	6850-01-471-6530 (1 gal) 6850-01-471-6534 (5 gal) 6850-01-471-6521 (55 gal)

END OF WORK PACKAGE

CHAPTER 6
SUPPORTING INFORMATION
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP) VEHICLE

OPERATOR INSTRUCTIONS
REFERENCES

SCOPE

This work package lists all field manuals, forms, technical manuals, and miscellaneous publications referenced in this manual.

FIELD MANUALS

FM 3-5	NBC Decontamination
FM 3-11.4	Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection
FM 3-100	Chemical Operations and Fundamentals
FM 4-25.11	First Aid
FM 4-30.31	Recovery and Battle Damage Assessment and Repair
FM 21-305	Manual for the Wheeled Vehicle Driver

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2408-9	Equipment Control Record
DA Form 5988-E	Equipment Inspection and Maintenance Worksheet
SF 361	Transportation Discrepancy Report
SF 364	Report of Discrepancy
SF 368	Product Quality Deficiency Report

TECHNICAL BULLETINS

TB 9-2320-279-12-1	Operator Maintenance Component of End Item (COEI) for MUA Parts
TB 9-2355-106-13 & P1	IMG CAT I MRAP Expedient Armor Program (MEAP)

TECHNICAL MANUALS

TM 10633A-10A	Truck, Wrecker, 7-Ton, MK 36
TM 10867B-12	Operator Manual for Medium Duty Tow Bar Kit (USMC)
TM 1-1500-344-23	Aircraft Weapons Systems Cleaning and Corrosion Control
TM 43-0139	Painting Instructions for Army Materiel
TM 4700-15/1	Marine Corps Integrated Maintenance Management System (MIMMS)
TM 750-244-6	Procedures for Destruction of Tank Automotive Equipment to Prevent Enemy Use
TM 9-247	Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Material and Related Materials Including Chemicals Series, 8x8 Heavy Expanded Mobility Tactical Trucks HEMTT
TM 9-2320-279-10-1 M977	Series, 8x8 Heavy Expanded Mobility Tactical Trucks HEMTT
TM 9-2320-279-10-2 M977	Operator's, Unit, and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) for Standard Automotive Tool Set (SATS)
TM 9-4910-783-13	Forward Repair System (FRS)
TM 9-4940-658-10	Lead Acid Storage Batteries Manual
TM 9-6140-200-14	

MISCELLANEOUS PUBLICATIONS

CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-970	Expendable/Durable items (Except Medical, Class V, Repair Parts, and Heraldic Items)
AFI 21-101	Aircraft and Equipment Maintenance Management
AR 385-10	The Army Safety Program
AR 735-11-2	Reporting of Item and Packaging Discrepancies
AR 750-1	Army Materiel Maintenance Policy
DA PAM 25-30	Consolidated Index of Army Publications and Blank Forms
DA PAM 738-750	Functional Users Manual for the Army Maintenance Management System (TAMMS)
DA PAM 750-8	The Army Maintenance Management System User Manual

References - (CONTINUED)

TC 43-35	Recovery and Training Equipment Improvement Recommendation Report
TO 00-20-1	Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS

COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

Explanation of Columns in the COEI List and BII List

This work package lists COEI and BII for the MRAP M1224 and M1224A1 to help you inventory items for safe and efficient operation of the equipment.

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the MRAP M1224 and M1224A1. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the MRAP M1224 and M1224A1 in operation, operate them, and to do emergency repairs. Although shipped separately packaged, BII must be with the MRAP M1224 and M1224A1 during operation and when transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

Column (1) Item Number. Gives you the reference number of the item listed.

Column (2) National Stock Number (NSN) and Illustration. Identifies the stock number of the item to be used for requisitioning purposes and provides an illustration of the item.

Column (3) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (4) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (5) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

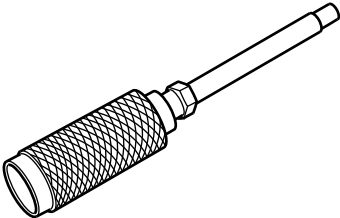
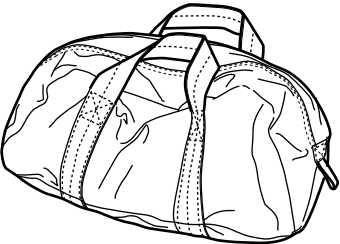
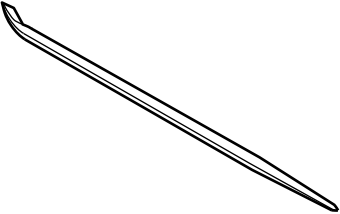
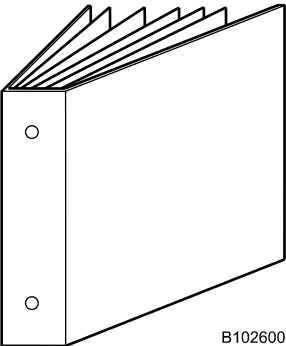
Column (6) Qty Rqr. Indicates the quantity required.

Table 1. Components of End Item List

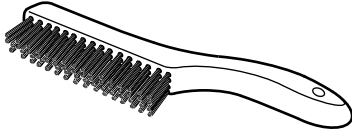
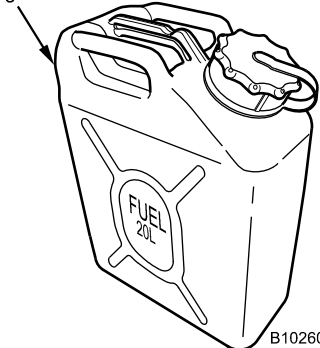
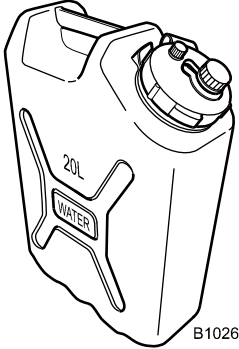
(1)	(2)	(3)	(4)	(5)	(6)
ILLUS NUMBER	NATIONAL STOCK NUMBER (NSN)	DESCRIPTION, PART NUMBER/(CAGEC)	USABLE ON CODE	U/I	QTY RQR
NA	NA-	NA:	NA	NA	NA

Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

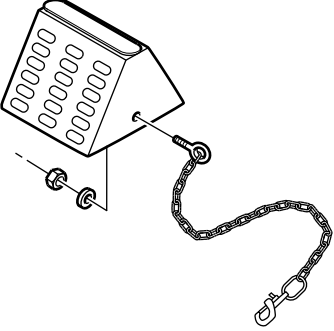

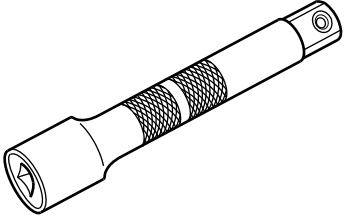
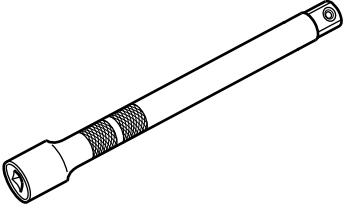
Table 1. Basic Issue Items List

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	4930-00-204-2550  B100000299	ADAPTER, HAND LUBRICATING GUN : (in tool bag) 5855 (04043)		EA	1
2	5140-00-473-6256  B102600334	BAG, TOOL SATCHEL : #6 OD cotton duck w/web strap handles (left stowage box) MIL-B-43663 (81349)		EA	1
3	5120-00-224-1372  B102600335	BAR, PINCH : 26 in. (strapped to front bumper) 02710 (66080)		EA	1
4	7510-00-889-3494  B102600312	BINDER, LOOSE LEAF : 3-ring, green (under driver seat) 11677003 (19207)		EA	1

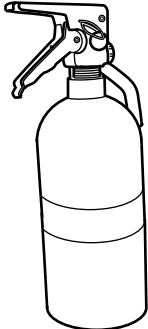
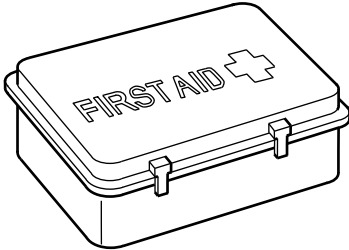
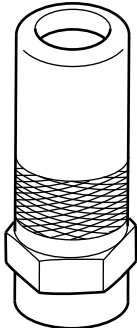
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
5	7920-00-269-1259  B102600331	BRUSH, WIRE SCRATCH : (in tool bag) 20010 (76861)		EA	1
6	7240-01-337-5268 9  B102600337	CAN, FUEL, MILITARY, PLASTIC : 5-gallon, tan (mounted on rear of vehicle) 3007547 (1EFH8)		EA	2
7	7240-00-089-3827  B102600336	CAN, WATER, MILITARY, PLASTIC : 5-gallon, tan (mounted on rear of vehicle) 3819249 (45152)		EA	2

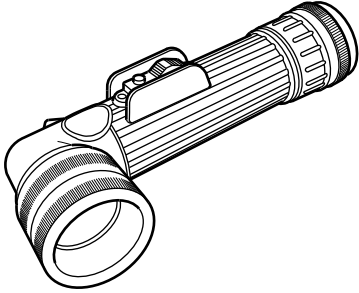
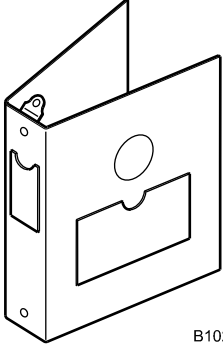
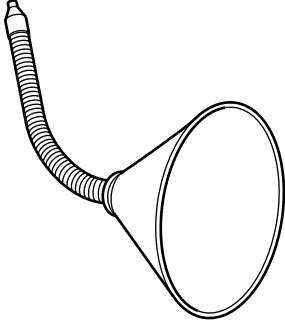
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
8	2540-01-500-6119  B102600313	CHOCK, WHEEL : (in stowage box) A-A-52475-1 (58536)		EA	2
9	5120-00-224-1390  B102600338	CROWBAR, PINCH POINT : 59-62 inches (strapped to front bumper) 5120-00-224-1390 (80244)		EA	1
10	5120-01-335-1050  B100000579	EXTENSION, SOCKET WRENCH : 5 in. long, 1/2-inch drive (in tool bag) SXX5 (55719)		EA	1
11	5120-00-227-8074  B100000580	EXTENSION, SOCKET WRENCH : 10 in. long, 1/2-inch drive (in tool bag) 5463 (U1862)		EA	1

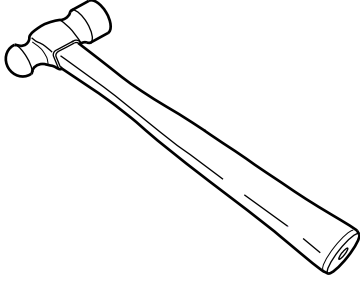
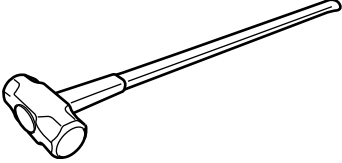
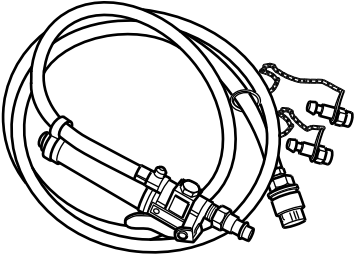
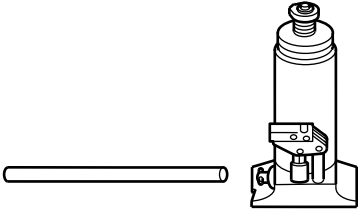
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
12	4210-01-388-7854  B102600314	EXTINGUISHER, FIRE : portable CO2, 2.5-lb (in stowage box) A52471-1-S (58536)		EA	1
13	6545-00-922-1200  B102600318	FIRST AID KIT : general purpose (crew area) 11677011 (19207)		EA	1
14	4730-00-050-4208  B100000307	FITTING, LUBRICATION, STRAIGHT, GREASE GUN : (in tool bag) LIC-5000 (36251)		EA	1

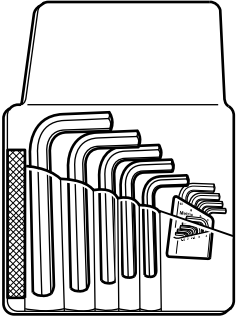
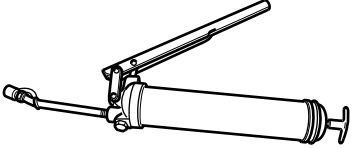
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
15	6230-00-264-8261  B102600339	FLASHLIGHT MX 991U : green, angle head (in tool bag) N47-IB (84609)		EA	2
16	7510-01-065-0166  B102600340	FOLDER, EQUIPMENT RECORD : 2.5 in. x 8 in. x 10 in. (under driver seat) 3819258 (45152)		EA	1
17	7240-00-559-7364  B102600333	FUNNEL, STEEL, FLEX MOUNT : (in tool bag) 495 (OT115)		EA	1

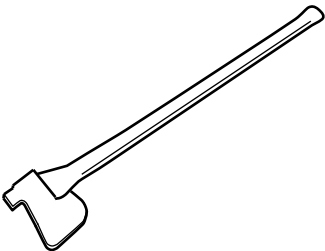
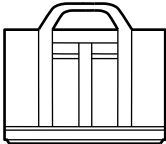

Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
18	5120-00-061-8546  B102600332	HAMMER, HAND, MACHINIST'S BALL PEEN : 2-lb (in tool bag) A-A-1305 (58536)		EA	1
19	5120-00-243-2957  B100000310	HAMMER, HAND, SLEDGE, DOUBLE-FACED : 10-lb (strapped to front bumper) 01116 (66080)		EA	1
20	4910-01-038-2820  B100000404	INFLATOR-GAGE, PNEUMATIC TIRE : with hose (right stowage box) 11677140-5 (19207)		EA	1
21	5120-00-188-1788  B102600327	JACK, HYDRAULIC, HAND : 20-ton (in stowage box) 5120-00-188-1788 (80244)		EA	1


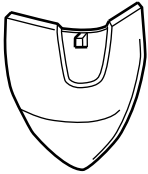

Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
22	5120-01-335-1508  B100000300	KEY SET, SOCKET HEAD : (in tool bag) AWM140DK (55719)		EA	1
23	4930-00-253-2478  B100000298	LUBRICATING GUN, HAND : (in tool bag) 1142-B (1PL57)		EA	1



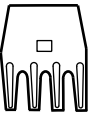
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
-	5110-01-416-7827  B100000684	AX, SINGLE BIT : 595-010 (0T9K4)		EA	1
-	5140-01-416-8569  B100000685	BAG, CARRYING : 595-030 (0T9K4)		EA	1
-	5110-01-416-7830  B100000686	SHEATH, AX HEAD : 595-020 (0T9K4)		EA	1


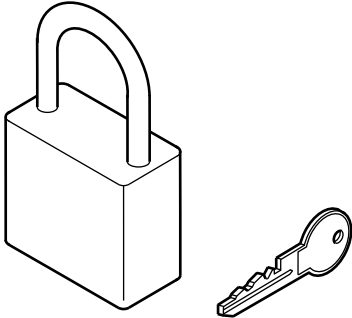
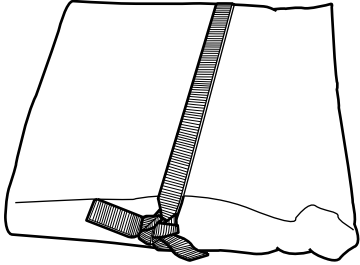
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
-	5120-01-416-8572  B100000687	BROAD PICK ATTACHMENT : 595-070 (0T9K4)		EA	1
-	5120-01-416-8570  B100000688	SHOVEL ATTACHMENT : 595-040 (0T9K4)		EA	1
-	5120-01-416-8571  B100000689	MATTOCK ATTACHMENT : 595-050 (0T9K4)		EA	1

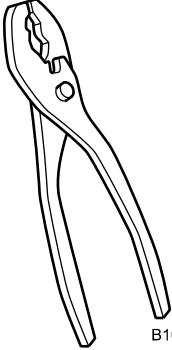
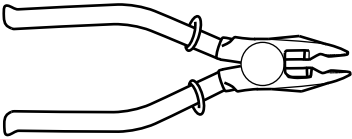

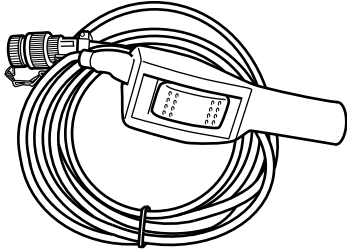
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

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-	5120-01-416-8574  B100000690	FASTENER, RAKE-HOE ATTACHMENT : 595-090 (0T9K4)		EA	1
-	5120-01-416-8573  B100000691	PICK ATTACHMENT : 595-060 (0T9K4)		EA	1
-	5120-01-416-8577  B100000692	RAKE-HOE ATTACHMENT : 595-080 (0T9K4)		EA	1

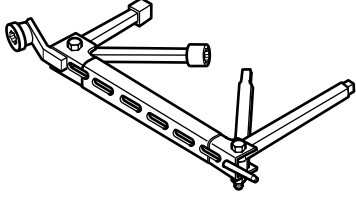
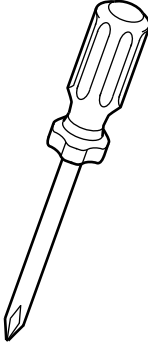
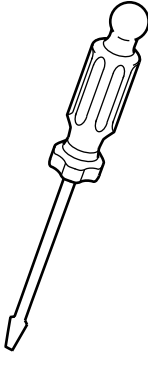
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
-	5120-01-416-8575  B100000693	LOCK PIN SET : 595-999 (0T9K4)		EA	7
25	5340-01-408-8452  B102600328	PADLOCK : (in tool bag) 5200GLKA10 (22107)		BX	4
26	8340-00-174-6865  B100000302	PANEL MARKER SIGNAL : ground to air, red/yellow (in stowage box) 8340-00-174-6865 (64067)		EA	2

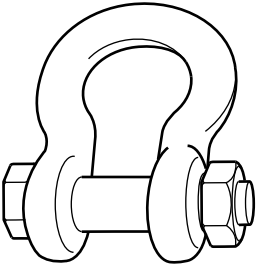
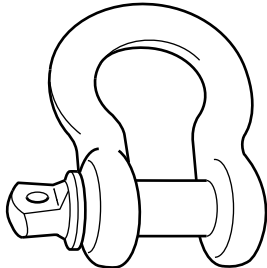
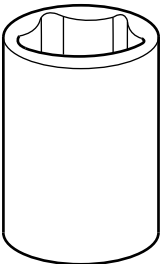
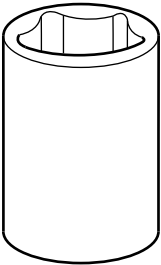
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
27	5120-00-223-7397  B102600319	PLIERS : combination, slip joint, 8 in. long (in tool bag) 5214421 (19207)		EA	1
28	5120-00-239-8251  B100000405	PLIERS : lineman's side cutting, 8 in. long (in tool bag) 67-067 (08292)		EA	1
29	5120-01-355-1902  B100000406	RATCHET, 1/2-in DRIVE : (in tool bag) SL80 (55719)		EA	1
30	N/A  B100000407	REMOTE CONTROL, WINCH : (in stowage box) 345809PC7 (10001)		EA	1

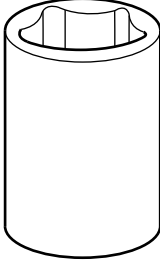
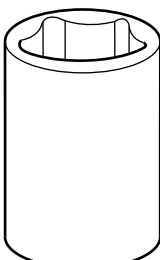
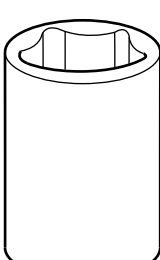
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
31	2540-01-574-0491  B102600361	LOCK REMOVAL DEVICE: universal combat lock tool for all MRAP variants ()		EA	1
32	5120-00-234-8912  B102600326	SCREWDRIVER : cross tip, #3, 6 in. long (in tool bag) B107.30 (05047)		EA	1
33	5120-00-293-3309  B102600320	SCREWDRIVER : flat tip, #2, 6 in. long (in tool bag) 66-160 (1CV05)		EA	1

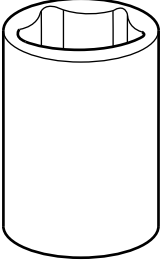
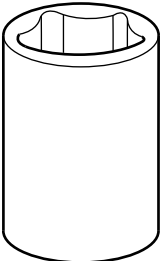
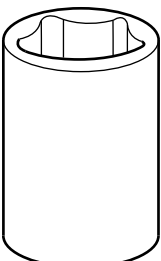
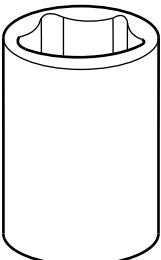
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
34	4030-01-187-0964  B10000581	SHACKLE : safety anchor (in stowage box) 12328579 (19207)		EA	4
35	2510-01-321-1221  B10000582	SHACKLE : 12-ton (in stowage box) G-209-11/4 (75535)		EA	1
36	5120-00-237-0984  B10000578	SOCKET : socket wrench, 1/2-inch drive, 7/16 inch, 12 pt (in tool bag) B107.1CL1ST1 (05047)		EA	1
37	5120-01-349-1042  B10000578	SOCKET : socket wrench, 1/2-inch drive, 10 mm, 6 pt (in tool bag) TWM10A (55719)		EA	1

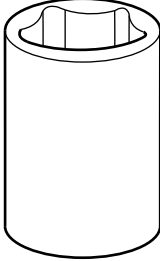
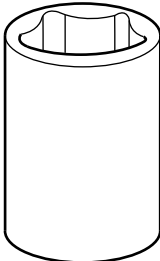
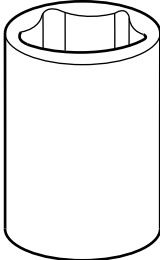
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
38	5120-00-189-7932  B100000578	SOCKET: socket wrench, 1/2-inch drive, 9/16 inch, 12 pt (in tool bag) 1U-7102 (11083)		EA	1
39	5120-00-189-7934  B100000578	SOCKET: socket wrench, 1/2-inch drive, 7/8 inch, 12 pt (in tool bag) 3819318 (45152)		EA	1
40	5120-00-189-7946  B100000578	SOCKET: socket wrench, 1/2-inch drive, 5/8 inch, 12 pt (in tool bag) 11677025-2 (19207)		EA	1

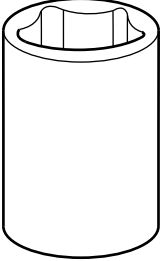
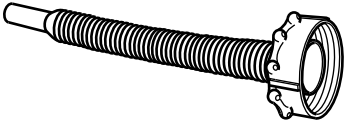
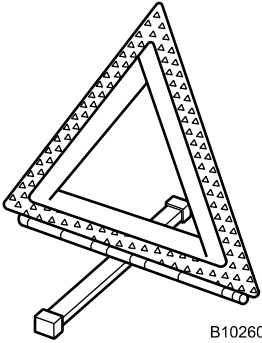
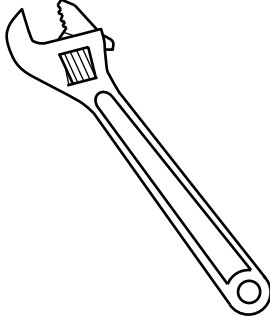
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
41	5120-00-189-7985 	SOCKET: socket wrench, 1/2-inch drive, 3/4 inch, 12 pt (in tool bag) ST-1224 (65814)		EA	1
42	5120-01-348-9033 	SOCKET: socket wrench, 1/2-inch drive, 14 mm, 6 pt (in tool bag) TWM14A (55719)		EA	1
43	5120-01-348-9035 	SOCKET: socket wrench, 1/2-inch drive, 16 mm, 6 pt (in tool bag) TWM16 (55719)		EA	1
44	5120-01-348-9037 	SOCKET: socket wrench, 1/2-inch drive, 18 mm, 6 pt (in tool bag) TWM18 (55719)		EA	1

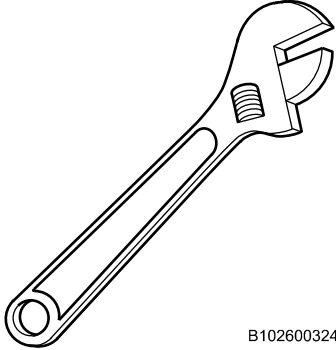
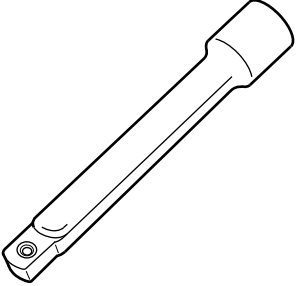
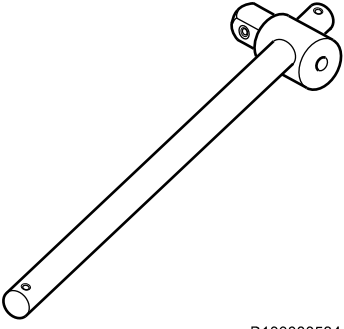
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
45	5120-01-398-7919  B100000578	SOCKET: socket wrench, 1/2-inch drive, 19 mm, 6 pt (in tool bag) 00944259000 (53800)		EA	1
46	5120-01-398-7937  B100000578	SOCKET: socket wrench, 1/2-inch drive, 1/2 inch, 6 pt (in tool bag) 00944055000 (53800)		EA	1
47	5120-01-398-8033  B100000578	SOCKET: socket wrench, 1/2-inch drive, 13 mm, 6 pt (in tool bag) 00944255000 (53800)		EA	1

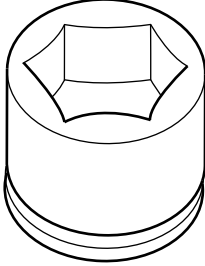
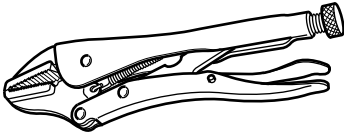
Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
48	5130-00-714-0600  B100000578	SOCKET: socket wrench, 1/2-inch drive, 15/16 inch, 6 pt (in tool bag) 7330H (1CV05)		EA	1
49	7240-00-177-6154  B100000301	SPOUT : military can, flexible w/filter screen, 16 inches long (right stowage box) 11677020 (19207)		EA	1
50	9905-00-148-9546  B102600323	WARNING DEVICE KIT : highway (in stowage box) 11669000 (19207)		EA	1
51	5120-00-240-5328  B102600321	WRENCH : adjustable, 8 inch (in tool bag) MS15461-3 (34623)		EA	1

Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
52	5120-00-264-3796  B102600324	WRENCH : adjustable, 12 inch (in tool bag) 11655778-5 (19207)		EA	1
53	5120-00-243-7328  B100000583	WRENCH, LUG NUT – EXTENSION : socket wrench, 8 inch, 3/4-inch drive (in tool bag) 13912 (08292)		EA	1
54	5120-00-709-4072  B100000584	WRENCH, LUG NUT – HANDLE : socket wrench, 19.5 inch sliding tee, 3/4-inch drive (in tool bag) B107.10 (05047)		EA	1

Components of End Item (COEI) and Basic Issue Items (BII) Lists - (CONTINUED)

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
55	5130-01-400-0196 	WRENCH, LUG NUT – SOCKET : socket wrench, 33 mm (in tool bag) 07533M (1CV05)		EA	1
56	5120-00-494-1911 	WRENCH, PLIER, LOCKING : vise grip, 10 inch (in tool bag) 10WR (1JU00)		EA	1

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
ADDITIONAL AUTHORIZATION LIST (AAL)

Scope

This work package lists additional items you are authorized for the support of the M1224 and M1224A1 models.

General

This list identifies items that do not have to accompany the vehicle and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanation Of Columns In The AAL

Column (1) National Stock Number (NSN), identifies the stock number of the item to be used for requisitioning purposes.

Column (2) Description, Commercial and Government Entity Code (CAGEC), and Part Number (P/N), identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the CAGEC (in parentheses) and the part number.

Column (3) Usable On Code, when applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified in the following table:

Table 1. Usable On Codes.

USABLE ON CODE	MODEL
1CT	M1224
4CT	M1224A1

Column (4) Unit of Issue (U/I), indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) Qty Recm. Indicates the quantity recommended.

Table 2. Additional Authorized Items.

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/(CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
2540-00-863-3153	ADAPTERS, US ARMY 10894255 (19207)		ea	2
2530-01-520-6538	ADAPTERS, USMC 3406263 (45152)		ea	2
4010-01-556-5581	CABLE, TRAILER ABCH0587 (3P0G5)		ea	1
3940-01-270-3389	CHAINS, SAFETY 1482010 (45152)		ea	2
2540-01-483-2930	CROSS-CHAIN, TIRE A08SV (4N506)		pr	2
2590-01-576-2424	CUTTER 22-01943 (ORAU7)		ea	6
4720-01-391-8291	LINE, AIR 3216-H-4298 (78500)		ea	2
4030-01-187-0964	SHACKLES 12328579 (19207)		ea	4

Additional Authorization List (AAL) - (CONTINUED)

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/(CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
2540-01-267-2912	TOW BAR, US ARMY HEAVY DUTY 12322663 (19207)		ea	1
2550-01-4967-8256	TOW BAR, USMC MTRV 3428515 (45152)		ea	1

END OF WORK PACKAGE

OPERATOR INSTRUCTIONS
EXPENDABLE AND DURABLE ITEMS LIST

Scope

This work package lists expendable and durable items that you will need to operate and maintain the M1224 and M1224A1 MRAP vehicles. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanations of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use brake fluid (WP 0098, item 5)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (C = Crew).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER AND (CAGEC)	(5) U/I
1	C	6850-01-464-9266	Antifreeze, ethylene glycol, type B A-A-52624 (58536)	GL
2	C	6850-01-471-6530	Antifreeze, ethylene glycol, type C A-A-52624 (58536)	GL
3	C	6850-00-926-2275	Cleaning compound, windshield, washer solvent concentrate 16 oz, 12 ea WA30D (60703)	BX
4	C	7240-00-138-7985	Cup, measuring 3126-00 (3T537)	EA
5	C	4240-00-017-9767	Faceshield, industrial 1104124-7 (18876)	EA
6	C	9150-01-197-7693	Grease, automotive and artillery, 14 oz M-10924-B (81349)	CA
7	C	9150-01-197-7690	Grease, automotive and artillery, 1-3/4 lb M-10924-C (81349)	CN
8	C	9150-01-197-7689	Grease, automotive and artillery, 6-1/2 lb M-10924-D (81349)	CN
9	C	9150-01-573-111 0	Grease, dielectric, low-current connections, Nye NyoGel® 760G, 8 oz	TU
10	C	4240-00-052-3776	Goggles ANSI Z87.1 (80204)	EA

Expendable and Durable Items List - (CONTINUED)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER AND (CAGEC)	(5) U/I
11	C	8415-00-268-8350	Gloves, leather A-A-50016 (53547)	PR
12	C	8415-01-283-3866	Gloves, nitrile, large C-4542 (53547)	PR
13	F	9150-01-111-6256	Hydraulic fluid, petroleum base, quart MIL-PRF-46170 (81349)	QT
14	C	9150-01-048-4591	Lubricating oil, axle-differential - Meritor GL-5, SAE 85W/140 gear oil M2105-1-85W140 (81343)	QT
15	F	9150-00-402-4478	Lubricating oil, engine crankcase, SAE 0W-30, -50°F to +90°F (-45°C to +32°C) MIL-PRF-46167 (81349)	QT
16	F	9150-01-178-4725	Lubricating oil, engine crankcase, SAE 15W-40, 0°F to +120°F (-18°C to +49°C) MIL-PRF-2104 (81349)	QT
17	F	9150-01-231-6689	Lubricating oil, hinges, latches, winch cable, PL-S, -40°F to +120°F (-40°C to +49°C) MIL-PRF-32033 (81349)	QT
18	F	9150-01-178-4725	Lubricating oil, power steering, SAE 15W-40, 0°F to +120°F (-18°C to +49°C) MIL-PRF-2104 (81349)	QT
19	F	9150-00-402-4478	Lubricating oil, power steering, SAE 0W-30, -50°F to +90°F (-45°C to +32°C) MIL-PRF-46167 (81349)	QT
20	F	9150-01-177-3988	Lubricating oil, transmission, SAE 10W, -10°F to +120°F (-23°C to +49°C) MIL-PRF-46167 (81349)	QT
21	F	9150-00-402-4478	Lubricating oil, transmission, SAE 0W-30, -50°F to +90°F (-45°C to +32°C) MIL-PRF-46167 (81349)	QT
22	C	9150-01-422-9329	Lubricating oil, transfer case, SAE 80W-90, -10°F to +120°F (-23°C to +49°C) MIL-PRF-2105 (81349)	QT
23	F	7920-00-205-1711	Rag, wiping 7920-00-205-1711 (80244)	EA

END OF WORK PACKAGE

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D		
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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 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 (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code) <i>Your Address</i>	DATE <i>Date you filled out this form</i>
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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>
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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>
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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 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 9-2355-106-10						DATE 09 APRIL 2012	TITLE OPERATOR MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
ITEM	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i>	DATE
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TM 9-2355-106-10	DATE 09 APRIL 2012	TITLE OPERATOR MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
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By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW

*Administrative Assistant to the
Secretary of the Army*

1208004

RAYMOND T. ODIERNO
*General, United States Army
Chief of Staff*

By Order of the Secretary of the Air Force:

NORTON A. SCHWARTZ
*General, United States Air Force
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 381167
requirements for TM 9-2355-106-10

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meter = 0.3937 Inch
 1 Decimeter = 10 Centimeters = 3.94 Inches
 1 Meter = 10 Decimeters = 100 Centimeters
 = 1000 Millimeters = 39.37 Inches.
 1 Dekameter = 10 Meters = 32.8 Feet
 1 Hectometer = 10 Dekameters = 328.08 Feet
 1 Kilometer = 10 Hectometers = 1000 Meters
 = 0.621 Mile = 3,280.8 Feet
 Millimeters = Inches times 25.4
 Inches = Millimeters divided by 25.4

WEIGHTS

1 Centigram = 10 Milligrams = 0.154 Grain
 1 Decigram = 10 Centigrams = 1.543 Grains
 1 Gram = 0.001 Kilogram = 10 Decigrams
 = 1000 Milligrams = 0.035 Ounce
 1 Dekagram = 10 Grams = 0.353 Ounce
 1 Hectogram = 10 Dekagrams = 3.527 Ounces
 1 Kilogram = 10 Hectograms = 1000 Grams = 2.205 Pounds
 1 Quintal = 100 Kilograms = 220.46 Pounds
 1 Metric Ton = 10 Quintals = 1000 Kilograms
 = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liter = 0.034 Fluid Ounce
 1 Centiliter = 10 Milliliters = 0.34 Fluid Ounce
 1 Deciliter = 10 Centiliters = 3.38 Fluid Ounces
 1 Liter = 10 Deciliters = 1000 Milliliters
 = 33.82 Fluid Ounces
 1 Dekaliter = 10 Liters = 2.64 Gallons
 1 Hectoliter = 10 Dekaliters = 26.42 Gallons
 1 Kiloliter = 10 Hectoliters = 264.18 Gallons

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inch
 1 Sq Decimeter = 100 Sq Centimeters = 15.5 Sq Inches
 1 Sq Meter (Centare) = 10 Sq Decimeters
 = 10,000 Sq Centimeters = 10.764 Sq Feet
 1 Sq Dekameter (Are) = 100 Sq Meters = 1,076.4 Sq Feet
 1 Sq Hectometer (Hectare) = 100 Sq Dekameters
 = 2,471 Acres
 1 Sq Kilometer = 100 Sq Hectometers
 = 1,000,000 Sq Meters = 0.386 Sq Mile

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.061 Cu Inch
 1 Cu Decimeter = 1000 Cu Centimeters = 61.02 Cu Inches
 1 Cu Meter = 1000 Cu Decimeters
 = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

5/9 (°F - 32°) = °C
 9/5 (°C + 32°) = °F
 -35° Fahrenheit is equivalent to -37° Celsius
 0° Fahrenheit is equivalent to -18° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 100° Fahrenheit is equivalent to 38° Celsius
 212° Fahrenheit is equivalent to 100° Celsius

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>	<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches.....	Centimeters.....	2.540	Centimeters.....	Inches.....	0.394
Feet.....	Meters.....	0.305	Meters.....	Feet.....	3.280
Yards.....	Meters.....	0.914	Meters.....	Yards.....	1.094
Miles.....	Kilometers.....	1.609	Kilometers.....	Miles.....	0.621
Square Inches.....	Square Centimeters.....	6.451	Square Centimeters.....	Square Inches.....	0.155
Square Feet.....	Square Meters.....	0.093	Square Meters.....	Square Feet.....	10.764
Square Yards.....	Square Meters.....	0.836	Square Meters.....	Square Yards.....	1.196
Square Miles.....	Square Kilometers.....	2.590	Square Kilometers.....	Square Miles.....	0.386
Acres.....	Square Hectometers.....	0.405	Square Hectometers.....	Acres.....	2.471
Cubic Feet.....	Cubic Meters.....	0.028	Cubic Meters.....	Cubic Feet.....	35.315
Cubic Yards.....	Cubic Meters.....	0.765	Cubic Meters.....	Cubic Yards.....	1.308
Fluid Ounces.....	Milliliters.....	29.573	Milliliters.....	Fluid Ounces.....	0.034
Pints.....	Liters.....	0.473	Liters.....	Pints.....	2.113
Quarts.....	Liters.....	0.946	Liters.....	Quarts.....	1.057
Gallons.....	Liters.....	3.785	Liters.....	Gallons.....	0.264
Ounces.....	Grams.....	28.349	Grams.....	Ounces.....	0.035
Pounds.....	Kilograms.....	0.454	Kilograms.....	Pounds.....	2.205
Short Tons.....	Metric Tons.....	0.907	Metric Tons.....	Short Tons.....	1.102
Pound-Feet.....	Newton-Meters.....	1.356	Newton-Meters.....	Pound-Feet.....	0.738
Pounds-Inches.....	Newton-Meters.....	0.11375	Kilopascals.....	Pounds per Square Inch.....	0.145
Pounds per Square Inch...	Kilopascals.....	6.895	Kilometers per Liter.....	Miles per Gallon.....	2.354
Ounce-Inches.....	Newton-Meters.....	0.007062	Kilometers per Hour.....	Miles per Hour.....	0.621
Miles per Gallon.....	Kilometers per Liter.....	0.425	°Fahrenheit.....	°Celsius..... °C = (°F-32)x5/9	
Miles per Hour.....	Kilometers per Hour.....	1.609	°Celsius.....	°Fahrenheit..... °F = (9/5x°C)+32	

PIN: 084301-000