

ARMY *TM 9-2355-106-23-2
AIR FORCE TO 36A12-1C-2400-2-2

TECHNICAL MANUAL
FIELD MAINTENANCE 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
19 NOVEMBER 2012

WARNING SUMMARY

EXPLANATION OF WARNING ICONS

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.



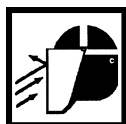
ELECTRICAL – electrical wire to hand with electricity symbol running through body shows that shock hazard is present.



FALLING PARTS – arrow bouncing off human shoulder and head shows that falling parts present a danger to life or limb.



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.



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.

WARNING SUMMARY – (Continued)



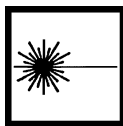
HEAVY PARTS – heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.



HELMET PROTECTION – arrow bouncing of head with helmet shows that falling parts present a danger.



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



LASER LIGHT – laser light hazard symbol indicates extreme danger for eyes from laser beams and reflections.



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.



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

WARNING SUMMARY – (Continued)



SHARP OBJECT – pointed object in foot 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.



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

GENERAL WARNINGS

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 jackstands 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

A/C



Do not install or remove air-conditioning testing or charging equipment while engine is running. Failure to comply may result in serious injury or death to personnel.

WARNING

AIR DRAIN VALVES

WARNING SUMMARY – (Continued)



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.

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

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.

Ensure batteries are disconnected before removing ESC. Failure to comply may result in serious injury or death to personnel.

WARNING SUMMARY – (Continued)

WARNING

BRAKES (ALSO SEE HAZARDOUS MATERIALS WARNINGS)

Before working on air brake system or any auxiliary pressurized system, make sure air pressure has been drained from all reservoirs. Failure to comply may result in serious injury or death to personnel.

If springs are missing or damaged, replace with new spring hardware kit before installing new brake shoes. Replace brake shoes if there are any signs of overheating, if step on center wear tab of brake shoe lining is not visible, or if thickness on any part of brake shoe is ¼ in. (6 mm) or less. Drums must be turned or replaced if there were any signs of overheating on old brake shoes. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not allow grease or oil to contact brake linings. Linings can absorb grease and oil, causing early glazing and reduced braking action. Failure to comply may result in serious injury or death to personnel.

Before removing ABS Control Module, disconnect battery disconnect switch and disconnect batteries. Failure to comply may result in damage to equipment and serious injury or death to personnel.

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

WARNING SUMMARY – (Continued)



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.

WARNING

DMM (DIGITAL MULTIMETER)



Ensure power is off before cutting, soldering, or removing a circuit component to insert the Digital Multi-meter (DMM) for current measurements. Even small amounts of current can be dangerous. Failure to comply may result in serious injury to personnel.

When routing DMM leads, do not crimp leads, run leads too close to moving parts, or let leads touch hot engine surfaces. Failure to comply may result in serious injury to personnel.

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.

WARNING SUMMARY – (Continued)

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

ENGINE (ALSO SEE HAZARDOUS MATERIALS WARNINGS.)



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.

Some engine components are heavy and bulky and require assistance for lifting. Use assistance of crewmember or lifting device as required. Failure to comply may result in damage to equipment and serious injury 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.

Prior to performing work on crossmember, place wooden block between crossmember and front engine mount. Failure to comply may result in damage to equipment and serious injury 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.

Use lifting device capable of lifting 1000 lbs to lift emergency hatch from vehicle. Clear all nonessential personnel from area when lifting hatch from vehicle. Do not stand directly under hatch door while lowering to floor. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING

EXHAUST

WARNING SUMMARY – (Continued)



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

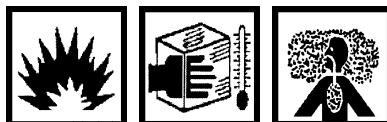
FAN BLADE



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

FSS (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, main power 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.

WARNING SUMMARY – (Continued)

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. Failure to comply may result in serious injury or death to personnel.

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.

WARNING

FUEL LINES/PUMP



Do not loosen fuel lines at filter housing to bleed fuel system. Periodic loosening of fittings will result in increased thread wear. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Do not overtighten bolts for fuel pump or cross-thread connections on fuel lines. This will interfere with sealing and operation of fuel pump. If seal is not complete or lines leak due to cross-threads, fuel pump will not operate properly and vehicle may not run. Starting vehicle without fuel pressure in lines or pump may result in damage to equipment and serious injury or death to personnel.

WARNING

GUNNER HATCH



WARNING SUMMARY – (Continued)

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.

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 HEATSHRINK TUBING



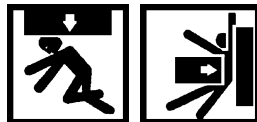
Never use open flame to apply heat to heatshrink tubing. Allow heatshrink tubing to cool before handling. Failure to comply may result in serious injury to personnel.

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. 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.

WARNING SUMMARY – (Continued)

WARNING

INSTRUMENT PANEL



The instrument panel is bulky and heavy and cannot be removed by one person. Before removing the side A-pillar mounting bolts, obtain assistance for remainder of removal. Failure to comply may result in damage to equipment and serious injury or death to personnel.

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 jackstands under frame rails to properly support vehicle. Do not support vehicle under front and rear axles. Use additional jackstands 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

PITMAN ARM

Pitman arm will be extremely tight. Do not pound on pitman arm or apply heat to pitman arm or sector shaft. Never weld pitman arm or sector shaft. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

Proper installation of pitman is critical to vehicle safety. Install pitman arm after steering gear is mounted on vehicle so proper torque can be applied to pitman arm. Otherwise, pitman arm could loosen and cause an accident. If pitman arm is loose, replace pitman arm and sector shaft. Always use a new tab lock retainer. If tabs and notches do not line up, tighten beyond specified torque value until two tabs align. Never back off retainer to align retaining tabs. Failure to comply may result in damage to equipment and serious injury or death to personnel.

When installing new cotter pin, tighten nut until slot appears and insert cotter pin. Never back off nut to install cotter pin. Failure to comply may result in damage to equipment and serious 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. 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.

Attach a lifting device and sling to rear door/ramp prior to removing mounting bolts. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Rear door/ramp is heavy. Ensure lifting device and sling are in place prior to removing rear door/ramp mounting bolts. Failure to comply may result in serious injury or death to personnel.

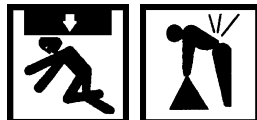
WARNING

RIFLES

Remove rifles from rifle racks being worked on. Ensure rifles are not loaded and store in safe manner. Failure to comply may result in serious injury or death to personnel.

WARNING

TOWING EYES

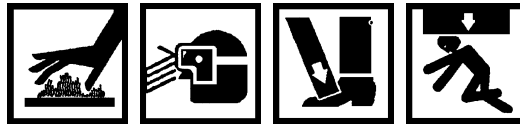


Do not remove both rear towing eyes at the same time, Entire rear frame crossmember assembly will fall. Replace one towing eye at a time. Failure to comply may result in damage to equipment and serious injury or death to personnel.

WARNING SUMMARY – (Continued)

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 jackstand to slip, resulting in damage to equipment and serious injury or death to personnel.

EXPLANATION OF HAZARDOUS MATERIALS ICONS

WARNING SUMMARY – (Continued)



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.



RADIATION – three circular wedges shows that the material emits radioactive energy and can injure human tissue.



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

WARNING



ANTI-SEIZE COMPOUND

WARNING SUMMARY – (Continued)

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



ASBESTOS

Brake dust contains asbestos, a known health hazard. Always wear safety goggles and an approved respirator during all brake service procedures. Wear respirator during removal of wheels through assembly. Handle all brake parts with care; brake dust covers all brake parts. Failure to comply may result in serious injury or death to personnel.

Never use compressed air or dry brushing to clean brake parts or assemblies. Use an industrial vacuum cleaner with a HEPA filter system to clean dust from brake drums, backing plates, and other brake parts. After vacuuming, remove any remaining dust with a rag soaked in water and wrung until nearly dry. Carefully clean parts in a well-ventilated or open-air area. During brake disassembly, carefully place all parts on the floor to avoid getting dust into the air. Do not use compressed air to clean clothing after working on brakes; use vacuum with HEPA filter system. 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

WARNING SUMMARY – (Continued)



CARC (CHEMICAL AGENT RESISTANT COATING)

Vehicles are finished with a chemical agent resistant coating (CARC). CARC contains isocyanates, which are highly irritating to skin and respiratory system. Breathing CARC vapor or dried paint dust can cause coughing, shortness of breath, burning sensation in throat and nose, watering of eyes, pain during respiration, and chest tightness. Skin contact with particulates can cause itching or redness of skin. Sensitivity to isocyanates may increase from repeated exposure. Use the following precautions to prevent injury from exposure. Failure to comply may result in serious injury to personnel.

- Never weld or cut CARC coated surfaces. Grinding or sanding CARC coated surfaces will create harmful dust.
- Personnel who have lung or breathing problems or who have had a reaction to isocyanates must not be in any area where CARC painting operations are performed or CARC dust particles are present.
- CARC painting operations must be performed only by qualified painters wearing protective gear and respirators and working in fully equipped facilities. All personnel in the area must wear high-efficiency air purifying respirators, protective goggles, gloves, and other protective clothing. Thoroughly wash all clothing before reuse.

WARNING



CLEANING SOLVENTS

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

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

WARNING SUMMARY – (Continued)

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

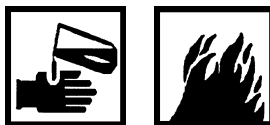


ETHER CANISTER

Ether canisters contain hazardous, combustible and flammable 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.

Ether canisters are pressurized, combustible 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.

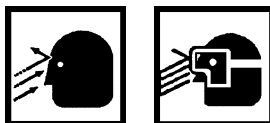
WARNING



ENGINE FLUIDS

Engine fluids (oil, fuel, and coolant) may flammable and 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



WARNING SUMMARY – (Continued)

FIBERGLASS

Direct contact with fiberglass materials or exposure to airborne fiberglass dust may irritate skin, eyes, nose, and throat. Minimize exposure to fiberglass particles by wearing long sleeves and long pants, work gloves, hat, and face shield or safety goggles with side shields. Personnel who experience irritation or have a known sensitivity should wear an approved particulate respirator. After working with fiberglass materials, wash skin with soap and running water and change clothing before touching eyes. Failure to comply may result in 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.

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



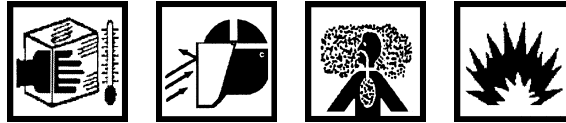
NBC (NUCLEAR, BIOLOGICAL, and CHEMICAL) SYSTEM

NBC system maintenance procedures require at least two personnel due to risk of medical emergency from possible exposure to NBC agents. Maintenance must be performed by properly trained, authorized personnel with proper safety equipment and protective clothing. Make sure batteries are disconnected and

WARNING SUMMARY – (Continued)

area is well ventilated. Do not smoke or allow open flame near vehicle. Never operate system with cover or panel removed. Failure to comply may result in serious injury or death to personnel.

WARNING



REFRIGERANT

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.

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.

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.

WARNING



HVAC SYSTEM

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.

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.

WARNING SUMMARY – (Continued)

Refer to Army 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 publication supersedes TM 9-2355-106-23-2, dated 27 April 2009, including all changes. Zero in the “Change No.” column indicates an original page or work package.

Date of issue for original manual is:

Original 19 November 2012

THE TOTAL NUMBER OF FRONT AND REAR PAGES IS 68, AND THE TOTAL NUMBER OF WORK PACKAGES IS 103, CONSISTING OF THE FOLLOWING:

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C., 19 NOVEMBER 2012

TECHNICAL MANUAL
FIELD MAINTENANCE MANUAL
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP)

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

M1224A1
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(F) Air Force - By Air Force AFTO Form 22 directly to Warner Robins, Tech Data Home office, 584 CBSS/GBHDE, 480 Richard Ray Blvd Ste 200, Robins AFB GA 31098-1640. You may also send in your recommended changes via electronic mail or by fax. Our fax number is DSN 472-3104 or Commercial (478) 222-3104. Forward all electronic AFTO 22 submissions to the following mail account: Robins.ce.afto22@robins.af.mil. Recommendations concerning changes to this manual shall be submitted in accordance with TO 00-5-1-WA-1.

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CHAPTER 4
TROUBLESHOOTING PROCEDURES
FOR
MINE RESISTANT AMBUSH PROTECTED (MRAP)

FIELD MAINTENANCE

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0335
WP 0384
WP 0426
WP 0427
WP 0782

Materials/Parts

Cable lock straps - (4) (WP 0796, Item 124)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0092
WP 0257
WP 0303
WP 0319
WP 0333

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Air cleaner assembly removed (WP 0257)

Drawings Required

Schematic (WP 0789, Figure 65)

TROUBLESHOOTING PROCEDURE

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.

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.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

Remove cable lock straps as necessary to perform procedure. Note position and size of cable lock straps to aid installation.

Cable lock straps not shown in some illustrations for clarity.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Turn blackout lights ON (TM 9-2355-106-10).
4. Have assistant press brake pedal.
5. Observe blackout stoplights.

CONDITION/INDICATION

Does either blackout stoplight illuminate?

DECISION

NO Go to Step 19.
YES Go to next step.

STEP

6. Observe blackout stoplights.

CONDITION/INDICATION

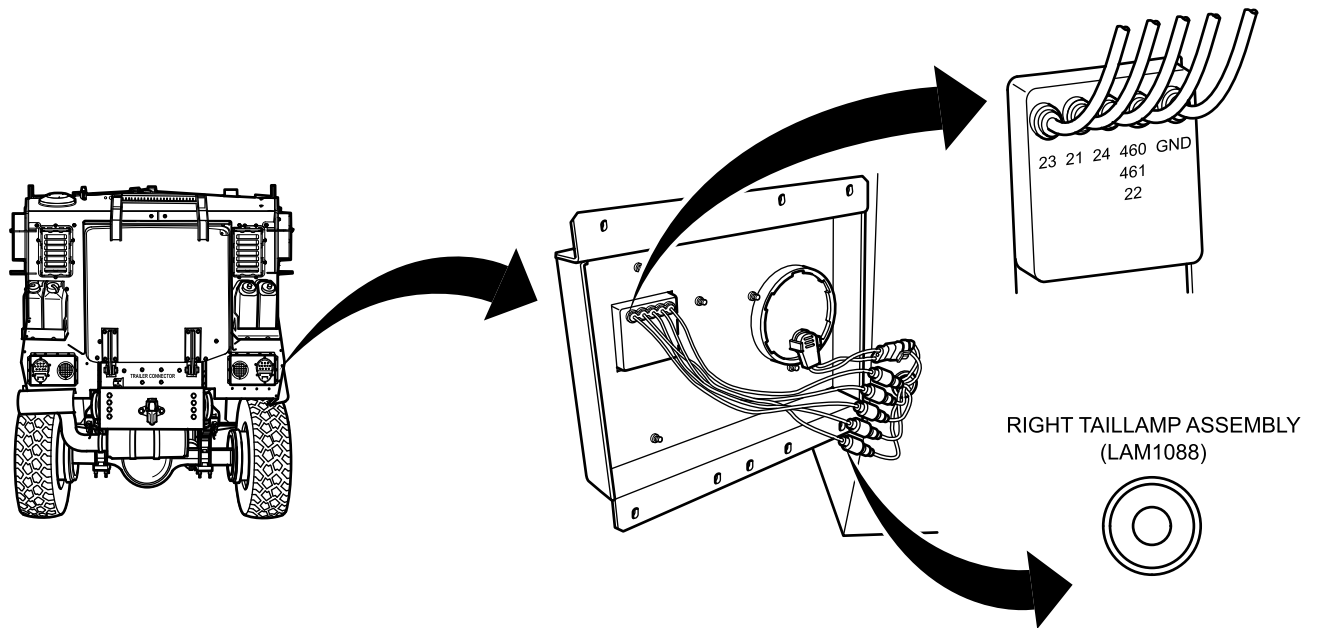
Does right blackout stoplight illuminate?

DECISION

YES Go to Step 13.
NO Go to next step.

STEP

7. Remove right taillamp assembly. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).
8. Turn MAIN POWER switch ON (TM 9-2355-106-10).
9. Turn ignition switch ON (TM 9-2355-106-10).
10. Turn blackout lights ON (TM 9-2355-106-10).
11. Have assistant press brake pedal.
12. Measure DC voltage between center terminals of vehicle side of bullet connectors leading to terminals 23 and ground with multimeter. Refer to Figure 1.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)


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Figure 1. Behind Right Taillamp Assembly.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

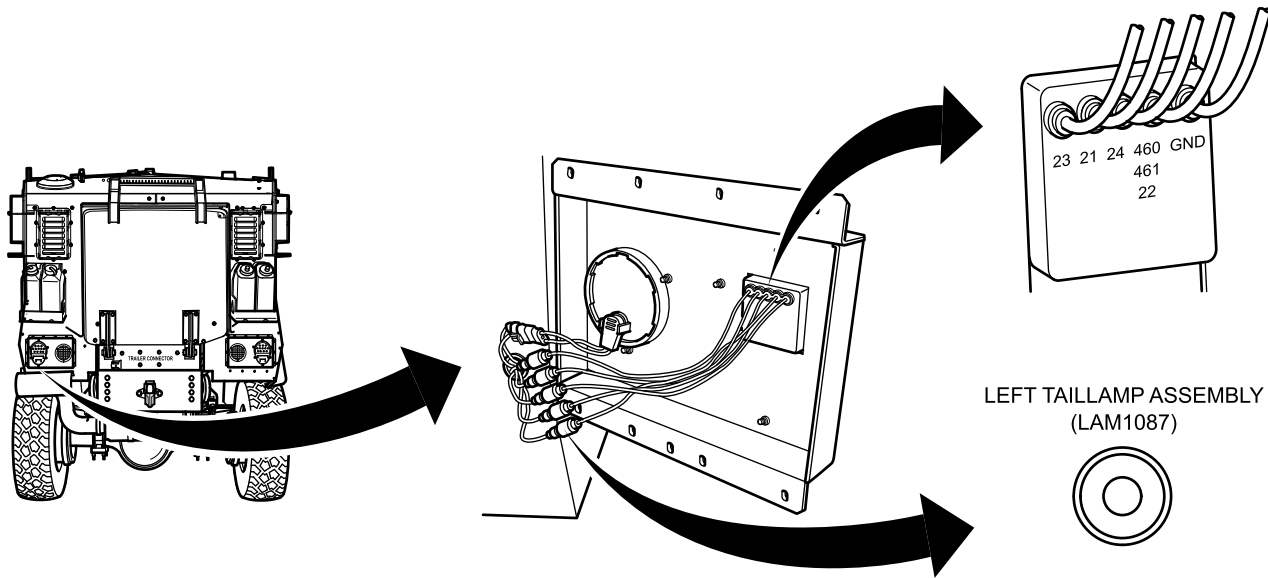
NO Go to Step 89.
 YES Go to Step 93.

STEP

13. Remove left taillamp assembly. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).
14. Turn MAIN POWER switch ON (TM 9-2355-106-10).
15. Turn ignition switch ON (TM 9-2355-106-10).
16. Turn blackout lights ON (TM 9-2355-106-10).
17. Have assistant press brake pedal.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Measure DC voltage between center terminals of vehicle side of bullet connectors leading to terminals 23 and ground with multimeter. Refer to Figure 2.



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Figure 2. Behind Left Taillamp Assembly.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

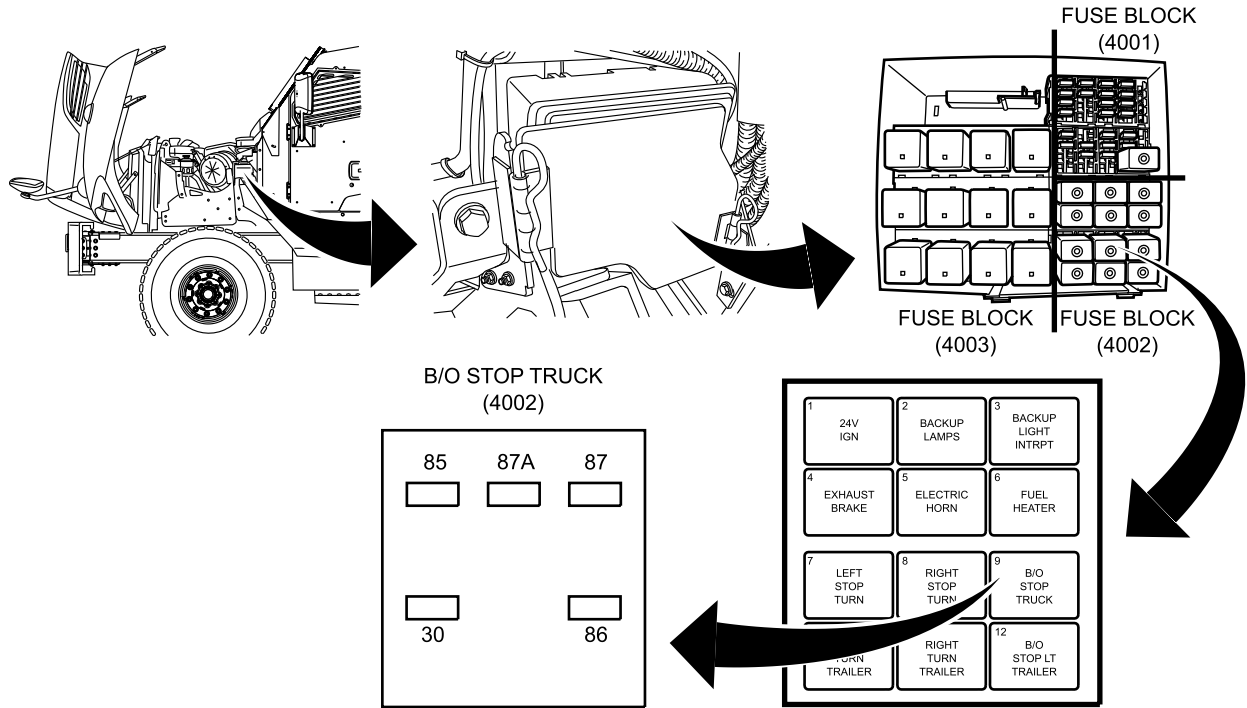
DECISION

NO Go to Step 89.
YES Go to Step 94.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

19. Remove B/O STOP TRUCK relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 3.



B230605315

Figure 3. Underhood Power Distribution Center (PDC).

20. Measure resistance between B/O STOP TRUCK relay socket terminal 85 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 87.
 YES Go to next step.

STEP

21. Turn MAIN POWER switch ON (TM 9-2355-106-10).
22. Turn ignition switch ON (TM 9-2355-106-10).
23. Turn blackout lights ON (TM 9-2355-106-10).
24. Have assistant press brake pedal.
25. Measure DC voltage between ground and B/O STOP TRUCK relay socket terminals 86 and then 87 with multimeter. Refer to Figure 3.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V for each test?

DECISION

YES Go to Step 27.
 NO Go to next step.

STEP

26. Refer to results from Step 25.

CONDITION/INDICATION

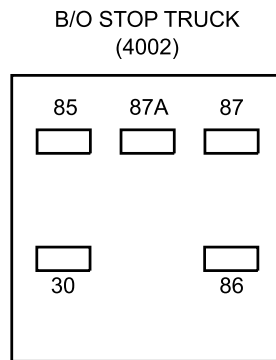
Does multimeter read between 10.5V and 13.5V for either test?

DECISION

NO Go to Step 62.
 YES Go to Step 87.

STEP

- 27. Turn ignition switch OFF (TM 9-2355-106-10).
- 28. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 29. Measure resistance between B/O STOP TRUCK relay socket terminal 30 and ground with multimeter. Refer to Figure 4.



B230605442

Figure 4. B/O STOP TRUCK Relay Socket.

CONDITION/INDICATION

Does multimeter read more than 1.5 ohms?

DECISION

NO Go to Step 78.
 YES Go to next step.

STEP

- 30. Connect jumper wire between B/O STOP TRUCK relay socket terminals 87 and 30. Refer to Figure 4.
- 31. Turn MAIN POWER switch ON (TM 9-2355-106-10).

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

32. Turn ignition switch ON (TM 9-2355-106-10).
33. Turn blackout lights ON (TM 9-2355-106-10).
34. Have assistant press brake pedal.
35. Observe blackout stoplights.

CONDITION/INDICATION

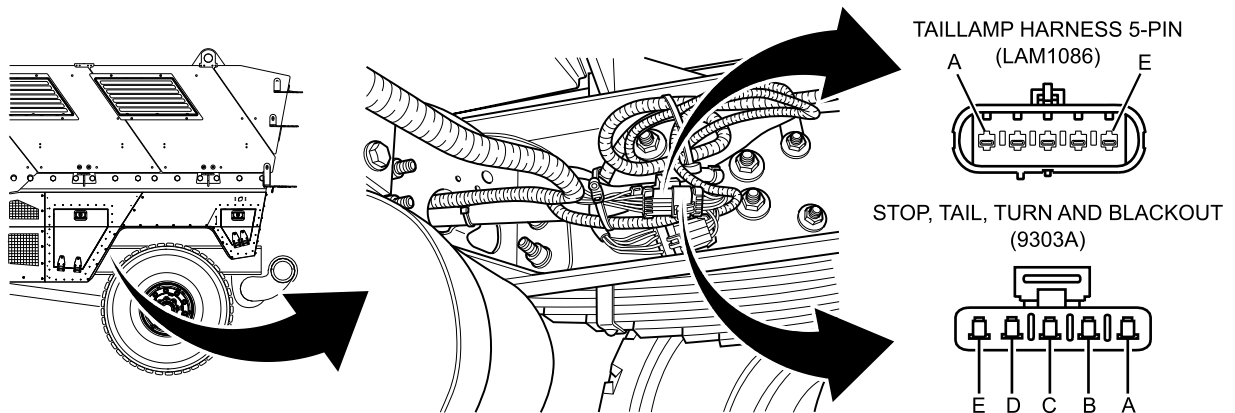
Does either blackout stoplight illuminate?

DECISION

YES Go to Step 91.
NO Go to next step.

STEP

36. Turn ignition switch OFF (TM 9-2355-106-10).
37. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
38. Disconnect connector 9303A from LAM1086. Refer to Figure 5.



B230605061

Figure 5. Above Left Rear Spring.

39. Measure resistance between connector 9303A terminal E and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 68.
YES Go to next step.

STEP

40. Disconnect connector 9720. Refer to Figure 6.

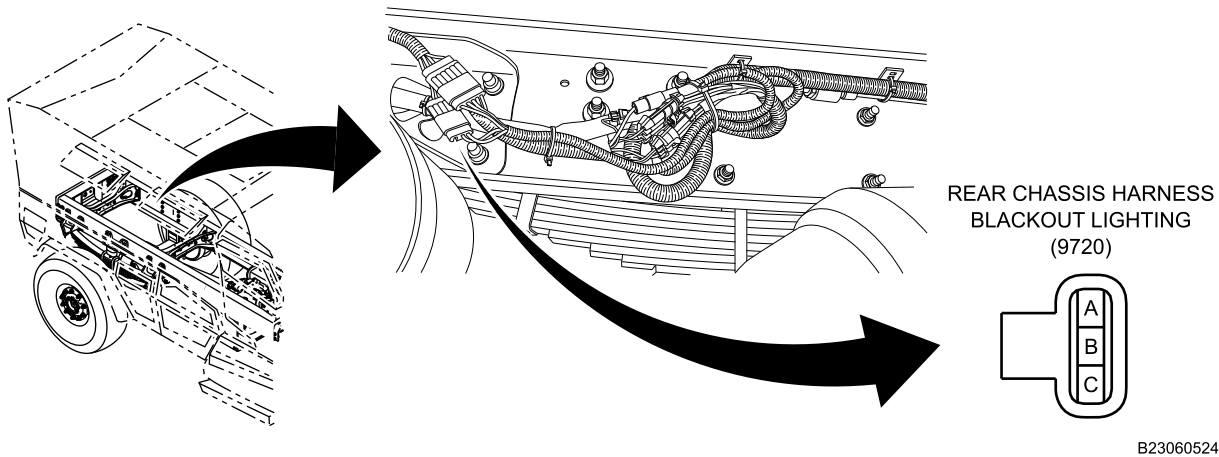
BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 6. Inboard Rear of Left Frame Rail.

41. Turn MAIN POWER switch ON (TM 9-2355-106-10).
42. Turn ignition switch ON (TM 9-2355-106-10).
43. Turn blackout lights ON (TM 9-2355-106-10).
44. Have assistant press brake pedal.
45. Measure DC voltage between connector 9720 terminal A and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 89.
NO Go to next step.

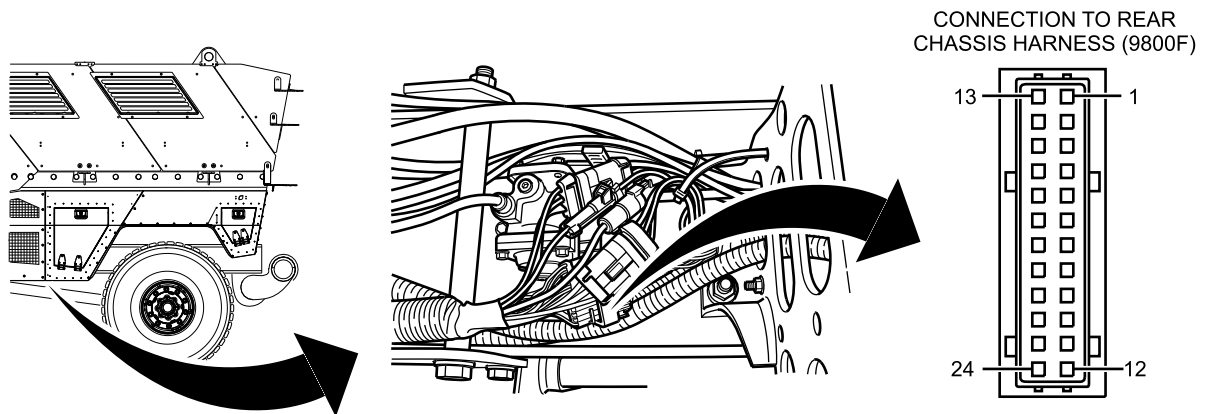
BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

46. Turn ignition switch OFF (TM 9-2355-106-10).
47. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

NOTE

Do not completely remove air dryer.

48. Position air dryer aside without disconnecting air lines. Refer to Air Dryer Removal and Installation (WP 0517).
49. Disconnect connector 9800F. Refer to Figure 7.



B230611209

Figure 7. Inboard Left Frame Rail.

50. Turn MAIN POWER switch ON (TM 9-2355-106-10).
51. Turn ignition switch ON (TM 9-2355-106-10).
52. Turn blackout lights ON (TM 9-2355-106-10).
53. Have assistant press brake pedal.
54. Measure DC voltage between connector 9800F terminals 6 and 12 with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

- YES Go to Step 86.
NO Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

55. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
56. Disconnect connector 9714. Refer to Figure 8.

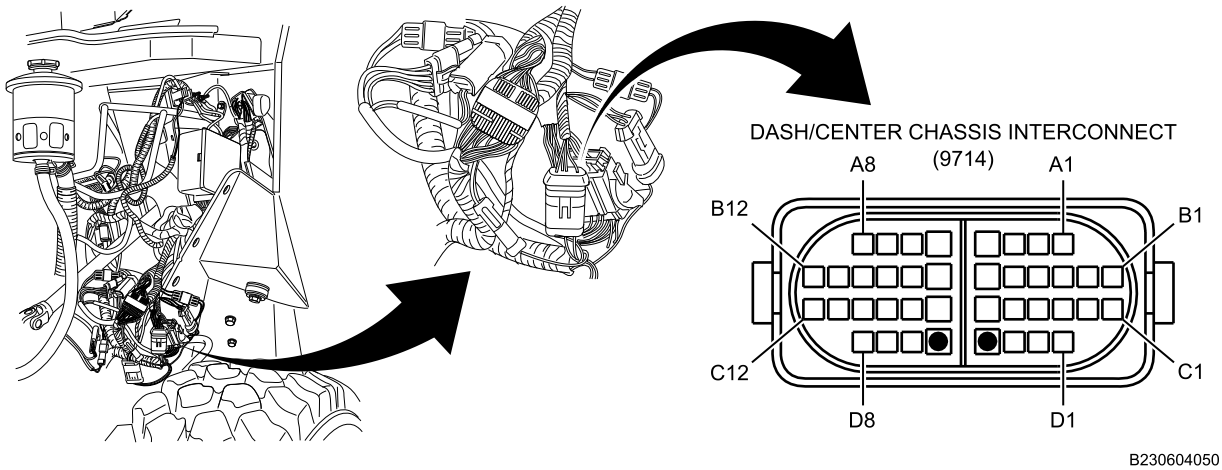


Figure 8. Below Air Cleaner.

57. Turn MAIN POWER switch ON (TM 9-2355-106-10).
58. Turn ignition switch ON (TM 9-2355-106-10).
59. Turn blackout lights ON (TM 9-2355-106-10).
60. have assistant press brake pedal.
61. Measure DC voltage between connector 9714 terminal D2 and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

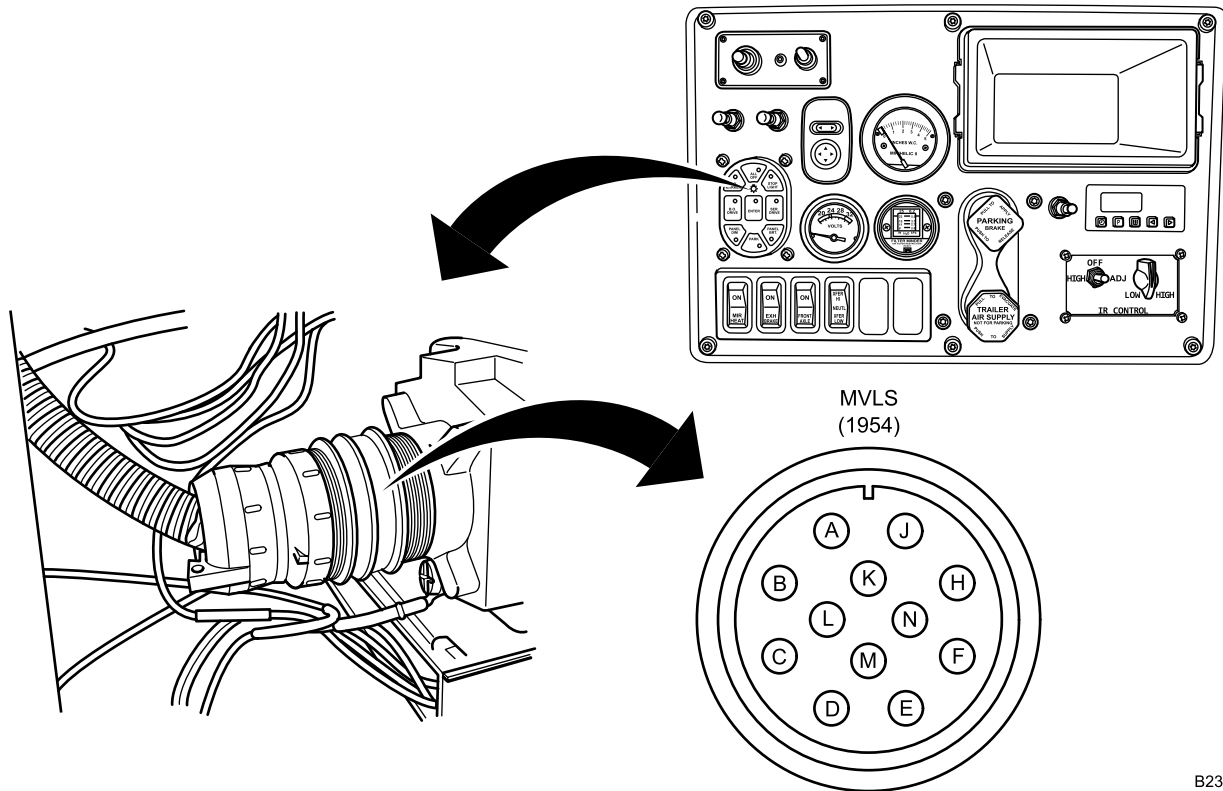
DECISION

YES Go to Step 88.
NO Go to Step 87.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

62. Disconnect connector 1954. Refer to Figure 9. Refer to Master Vehicle Light Switch (MVLS) Removal and Installation (WP 0303).



B230604571

Figure 9. Behind Master Vehicle Light Switch (MVLS) Switch.

63. Measure resistance between connector 1954 terminal N and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read more than 1.5 ohms?

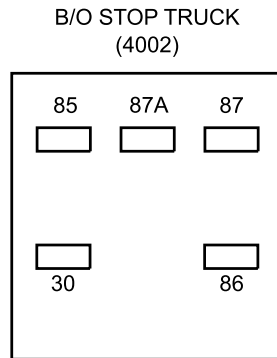
DECISION

NO Go to Step 74.
 YES Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

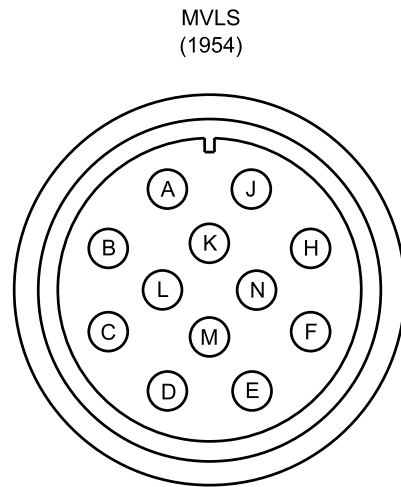
64. Connect jumper wire between B/O STOP TRUCK relay socket terminals 85 and 86. Refer to Figure 10.



B230605442

Figure 10. B/O STOP TRUCK Relay Socket.

65. Measure resistance between connector 1954 terminal N and ground with multimeter. Refer to Figure 11.



B230603184

Figure 11. Connector 1954.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 95.
NO Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

66. Disconnect connector 1701 (engine side). Refer to Figure 12.

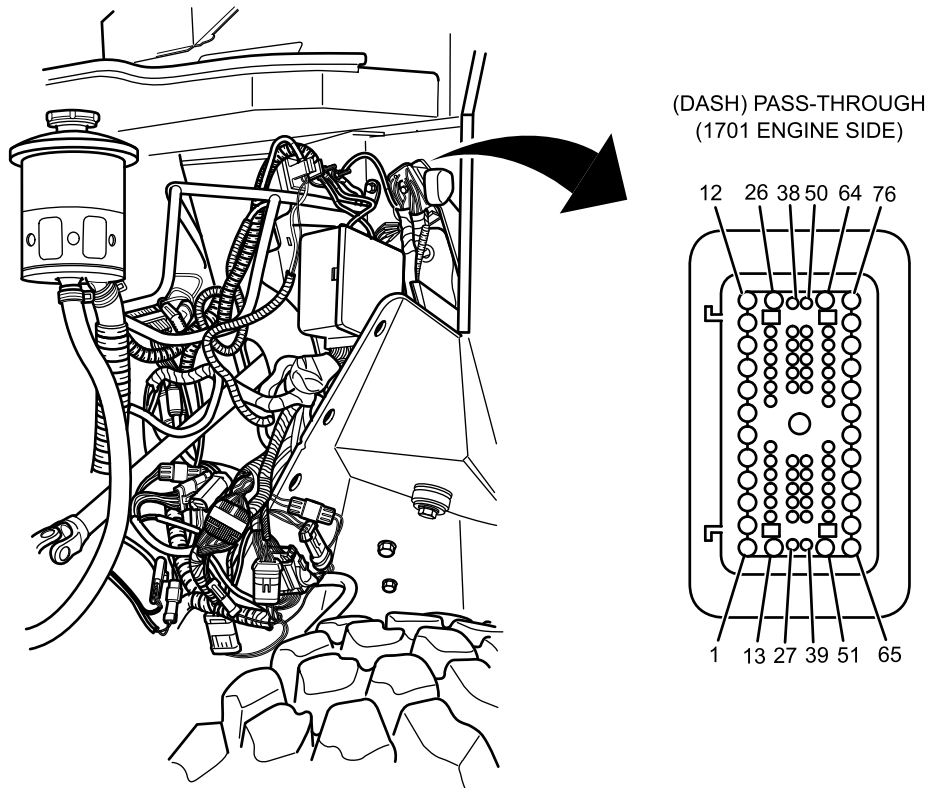


Figure 12. Left Firewall.

67. Measure resistance between connector 1701 (engine side) terminal 25 and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

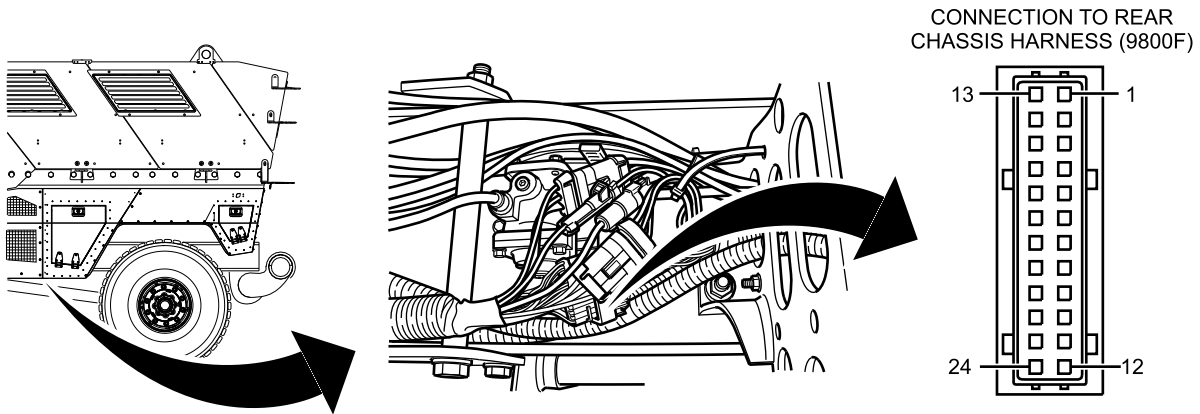
NO Go to Step 87.
 YES Go to Step 90.

B230604025

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 68. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
- 69. Disconnect connector 9800F. Refer to Figure 13.



B230611209

Figure 13. Inboard Left Frame Rail.

- 70. Measure resistance between connector 9800F terminal 12 and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

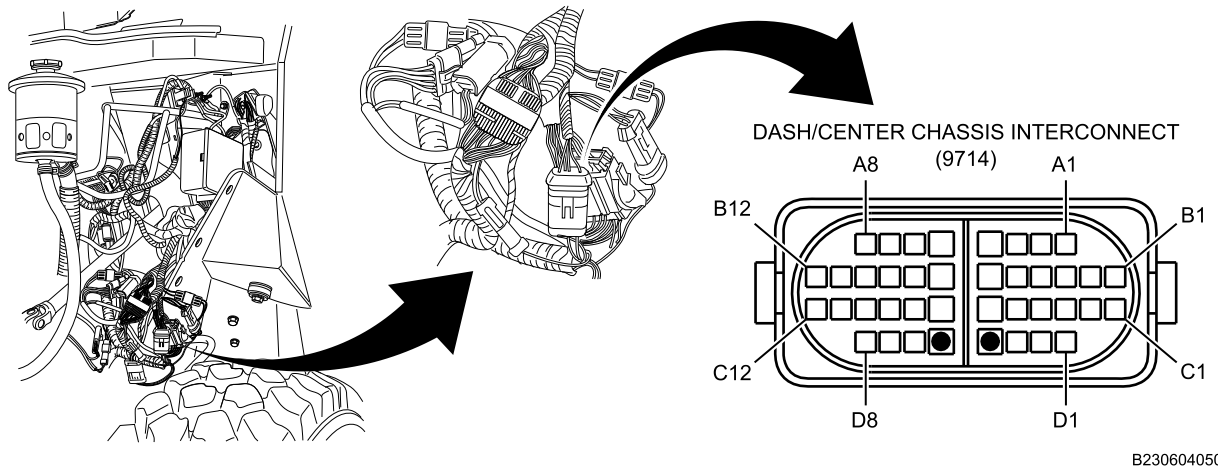
Does multimeter read less than 5 ohms?

DECISION

- YES Go to Step 86.
- NO Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

71. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
72. Disconnect connector 9714. Refer to Figure 14.



B230604050

Figure 14. Below Air Cleaner.

73. Measure resistance between connector 9714 terminal C6 and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

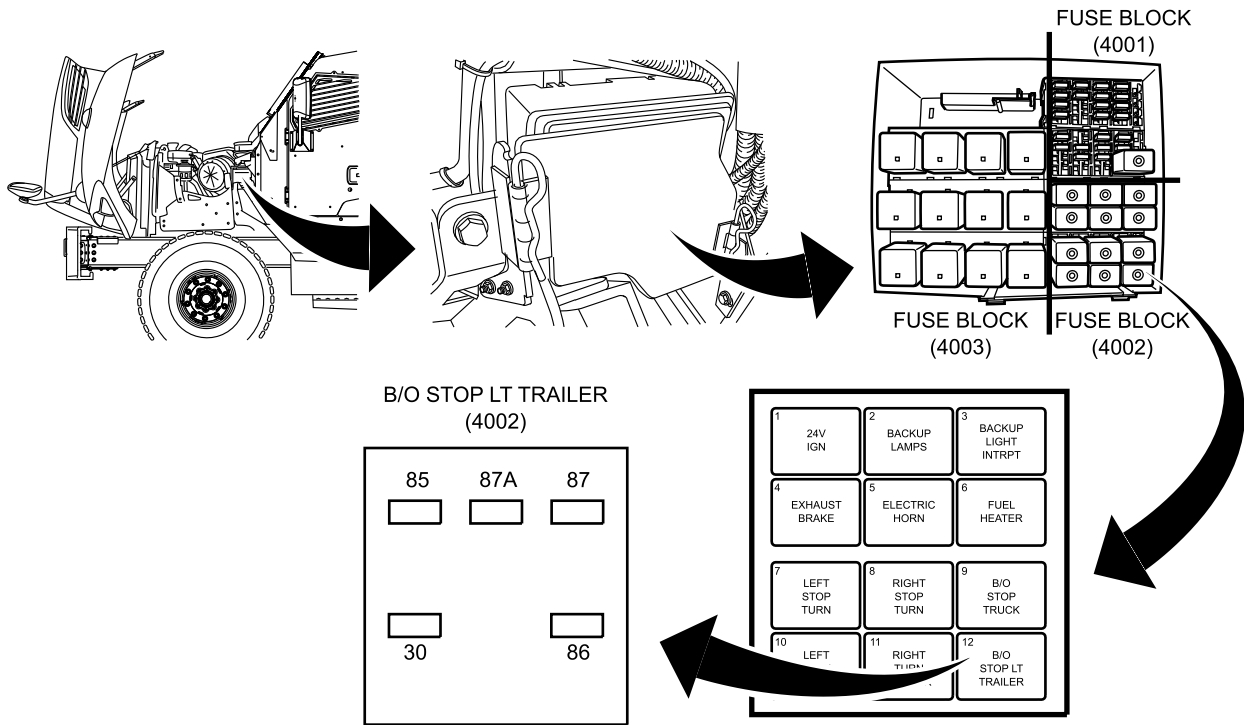
DECISION

YES Go to Step 88.
 NO Go to Step 87.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

74. Remove B/O STOP TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 15.

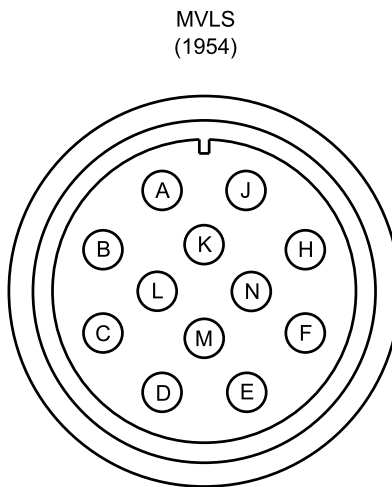


B230605318

Figure 15. Underhood Power Distribution Center (PDC).

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

75. Measure resistance between connector 1954 terminal N and ground with multimeter. Refer to Figure 16.



B230603184

Figure 16. Connector 1954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 92
NO Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

76. Disconnect connector 1701 (engine side). Refer to Figure 17.

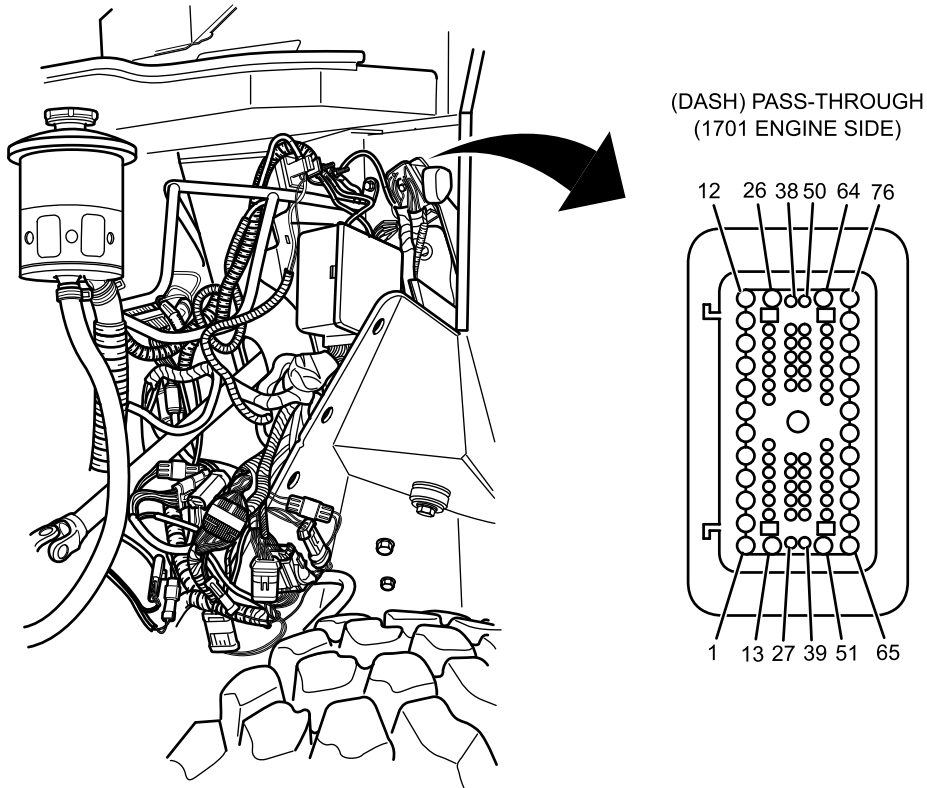


Figure 17. Left Firewall.

B230604025

77. Measure resistance between connector 1701 (engine side) terminal 25 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 87.
 YES Go to Step 90.

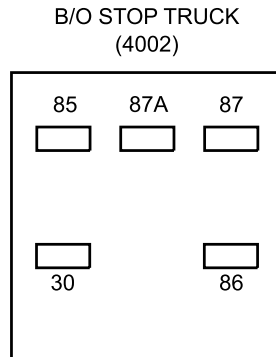
STEP

78. Remove right taillamp assembly. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Leave multimeter connected for remainder of procedure.

79. Measure resistance between B/O STOP TRUCK relay socket terminal 30 and ground with multimeter. Refer to Figure 18.



B230605442

Figure 18. B/O STOP TRUCK Relay Socket.

CONDITION/INDICATION

Does multimeter read more than 1.5 ohms?

DECISION

YES Go to Step 93.
NO Go to next step.

STEP

80. Remove left taillamp assembly. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).

CONDITION/INDICATION

Does multimeter read OL?

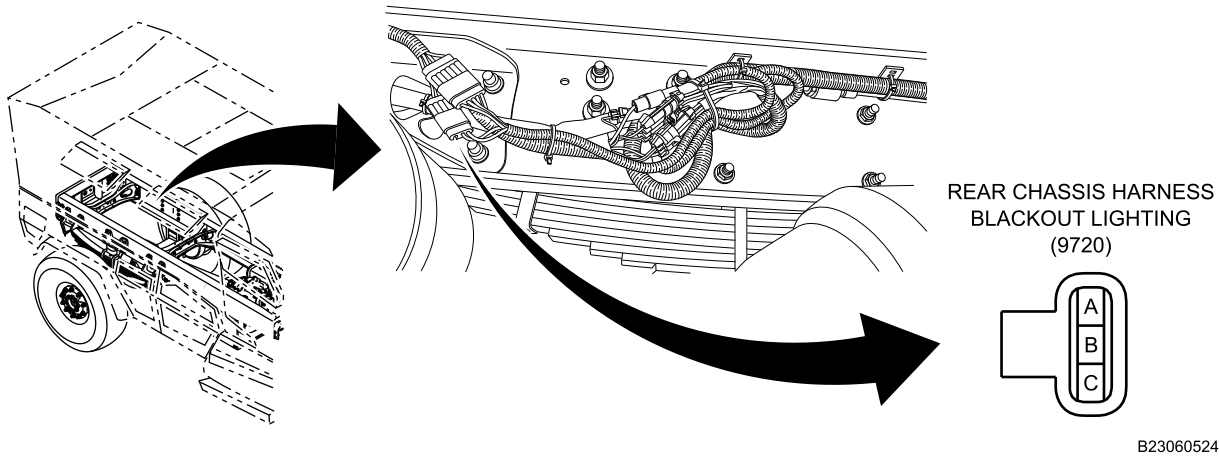
DECISION

YES Go to Step 94.
NO Go to next step.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

81. Disconnect connector 9720. Refer to Figure 19.



B230605247

Figure 19. Inboard Rear of Left Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

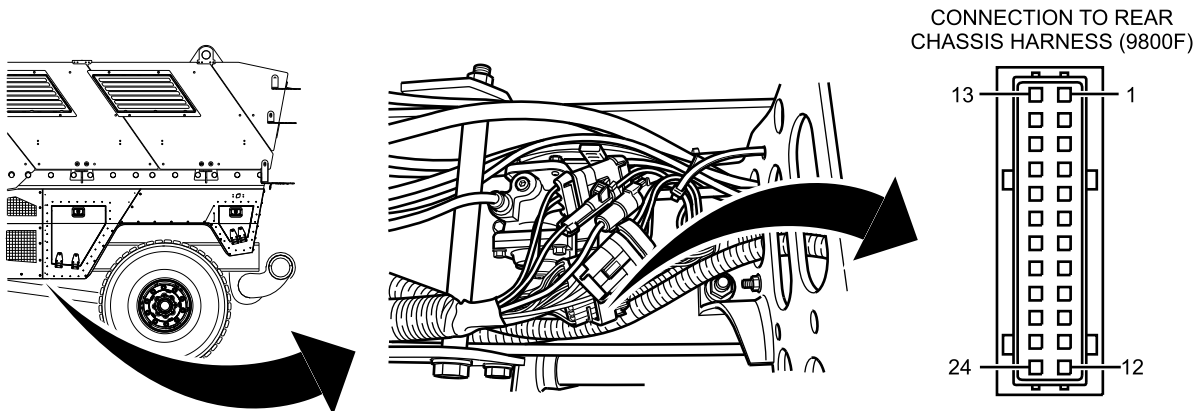
DECISION

YES Go to Step 89.
NO Go to next step.

STEP

82. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).

83. Disconnect connector 9800F. Refer to Figure 20.



B230611209

Figure 20. Inboard Left Frame Rail.

CONDITION/INDICATION

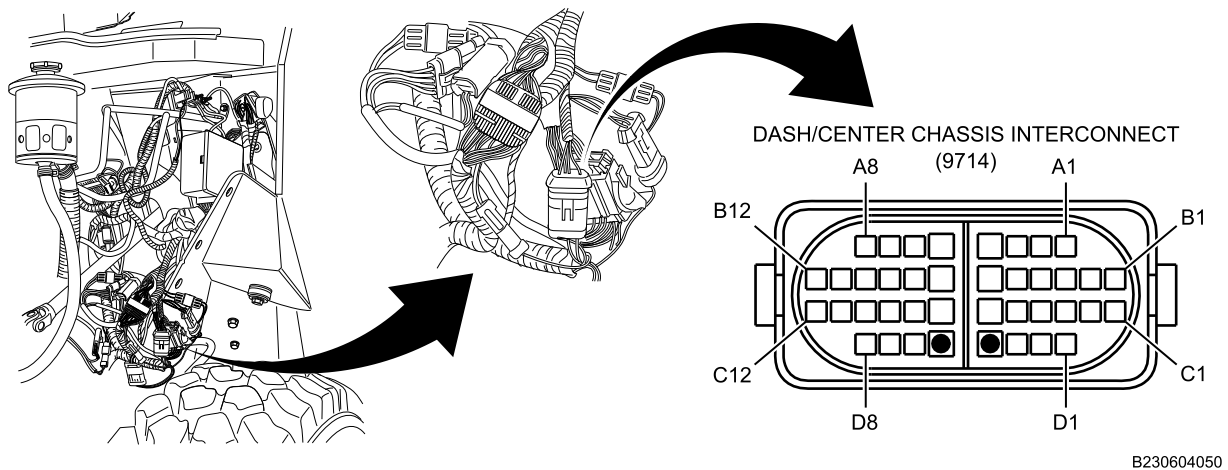
Does multimeter read OL?

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 86.
 NO Go to next step.

STEP

84. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
 85. Disconnect connector 9714. Refer to Figure 21.



B230604050

Figure 21. Below Air Cleaner.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 88.
 NO Go to Step 87.

MALFUNCTION

- 86. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 87. PDC harness is faulty.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 88. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 89. Taillamp harness is faulty.

ACTION

Replace taillamp harness. Refer to Taillamp Harness Removal and Installation (WP 0384).

END OF TEST**MALFUNCTION**

- 90. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319).

END OF TEST**MALFUNCTION**

- 91. Relay is faulty.

ACTION

Replace B/O STOP TRUCK relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 92. Relay is faulty.

ACTION

Replace B/O STOP TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 93. Right blackout stoplight is faulty.

BLACKOUT STOPLIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace right blackout stoplight. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).

END OF TEST**MALFUNCTION**

- 94. Left blackout stoplight is faulty.

ACTION

Replace left blackout stoplight. Refer to Composite Taillamp Assembly Removal and Installation (WP 0297).

END OF TEST**MALFUNCTION**

- 95. Voltage from MVLS is not within specification.

ACTION

Diagnose MVLS. Refer to Master Vehicle Light Switch (MVLS) Troubleshooting Procedure (WP 0092).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0384
WP 0375
WP 0424
WP 0426
WP 0427
WP 0453
WP 0597
WP 0598
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0092
WP 0257
WP 0303
WP 0319
WP 0333
WP 0335
WP 0336
WP 0361
WP 0382
WP 0383

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 53

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 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.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Start engine (TM 9-2355-106-10).
3. Press Master Vehicle Light Switch (MVLS) SER DRIVE button, then press ENTER within 5 seconds (TM 9-2355-106-10).
4. Observe both backup lights (TM 9-2355-106-10).

CONDITION/INDICATION

Are both backup lights off?

DECISION

NO Go to Step 86.
YES Go to next step.

STEP

5. Have assistant shift transmission to REVERSE (R).
6. Observe both backup lights.

CONDITION/INDICATION

Are both backup lights on?

DECISION

YES Return vehicle to service.
NO Go to next step.

STEP

7. Observe both backup lights.

CONDITION/INDICATION

Is either backup light on?

DECISION

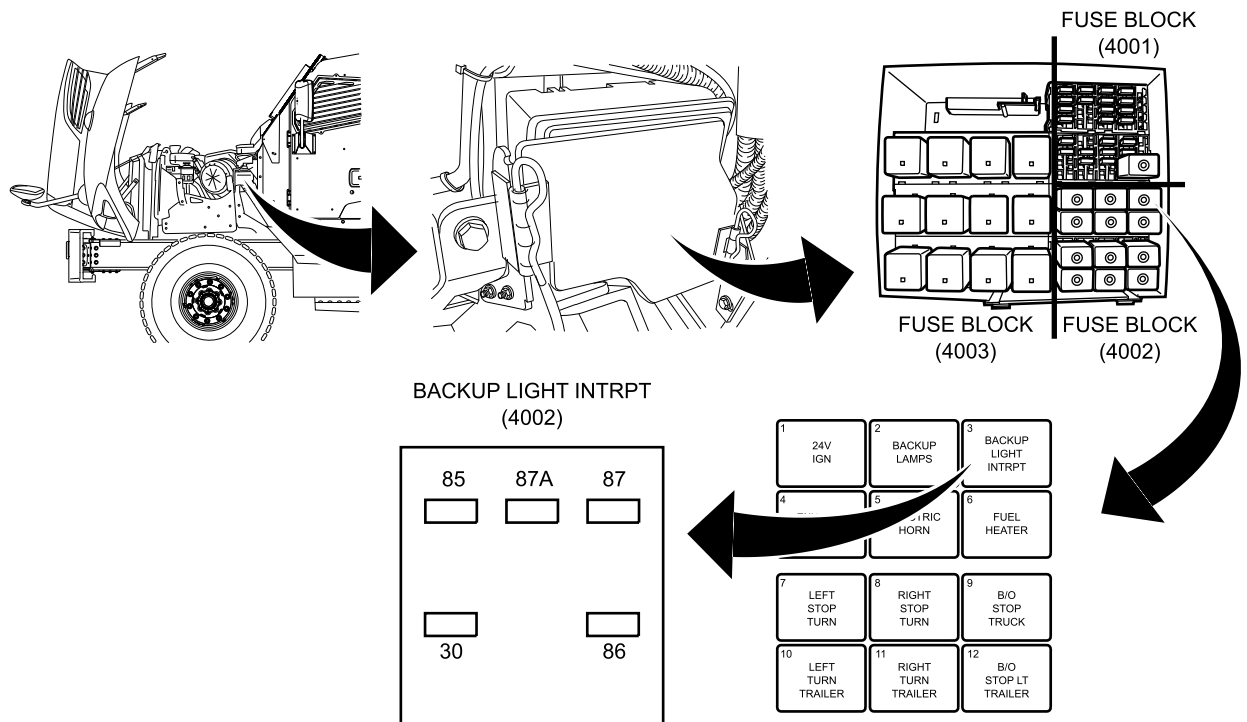
YES Go to Step 57.
NO Go to next step.

STEP

8. Have assistant shift transmission to NEUTRAL (N).
9. Turn engine OFF (TM 9-2355-106-10).
10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

11. Remove BACKUP LIGHT INTRPT relay. Refer to Figure 1. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605309

Figure 1. Left Engine Compartment Area.

12. Install jumper wire between relay socket terminals 30 and 87. Refer to Figure 1.
13. Turn MAIN POWER switch ON (TM 9-2355-106-10).
14. Start engine (TM 9-2355-106-10).
15. Have assistant shift transmission to REVERSE (R).

CONDITION/INDICATION

Do backup lights turn on?

DECISION

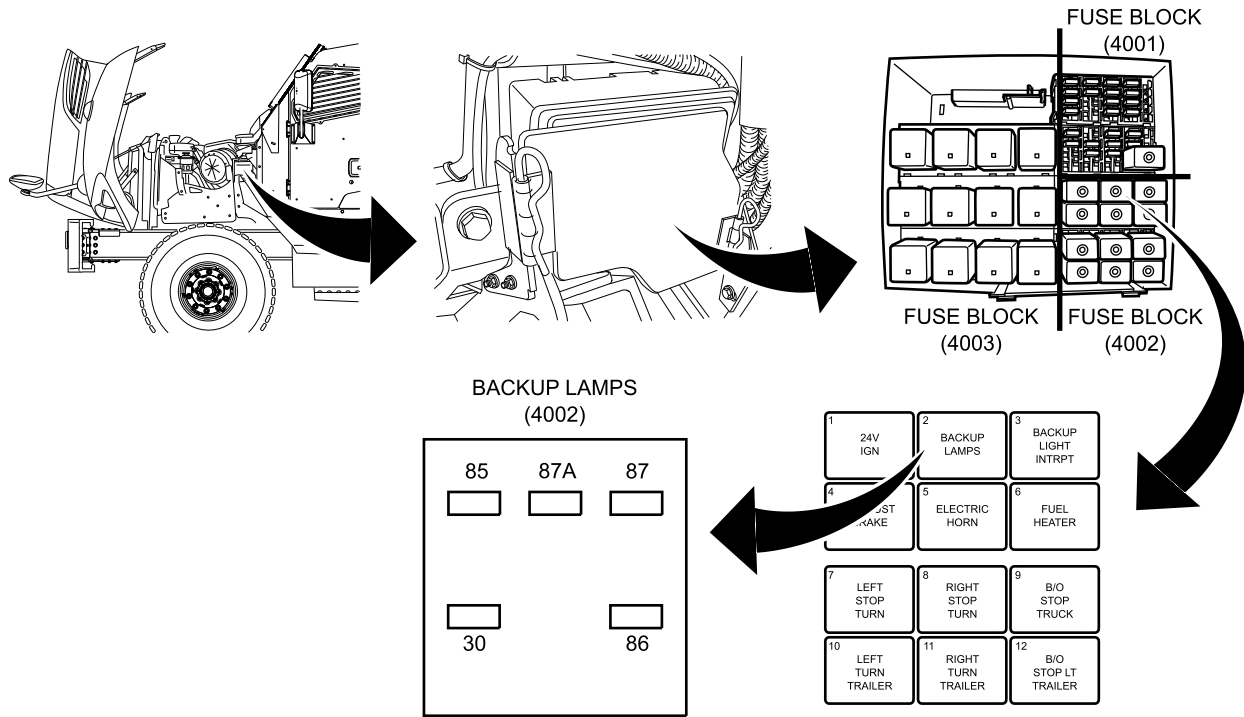
YES Go to Step 65.
 NO Go to next step.

STEP

16. Have assistant shift transmission to NEUTRAL (N).

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

17. Turn engine OFF (TM 9-2355-106-10).
18. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
19. Remove BACKUP LAMPS relay. Refer to Figure 2. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605308

Figure 2. Left Engine Compartment Area.

20. Install jumper wire between relay socket terminals 30 and 87. Refer to Figure 2.
21. Turn MAIN POWER switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Do backup lights turn on?

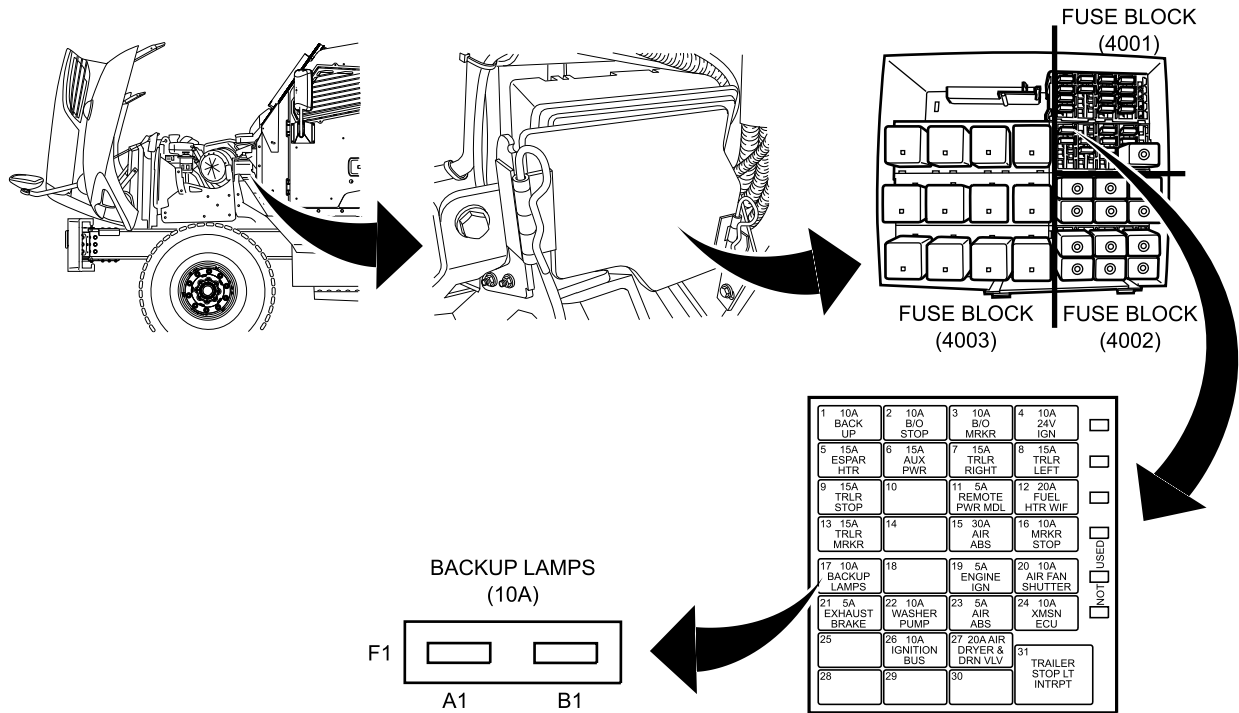
DECISION

NO Go to Step 41.
 YES Go to next step.

STEP

22. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
23. Remove and inspect BACKUP LAMPS fuse. Refer to Figure 3. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605388

Figure 3. Left Engine Compartment Area.

CONDITION/INDICATION

Is fuse blown?

DECISION

YES Go to Step 87.
NO Go to next step.

STEP

24. Turn MAIN POWER switch ON (TM 9-2355-106-10).
25. Turn ignition switch ON (TM 9-2355-106-10).
26. Measure DC voltage between both fuse socket terminals A1 and B1, and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V on at least one terminal?

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).

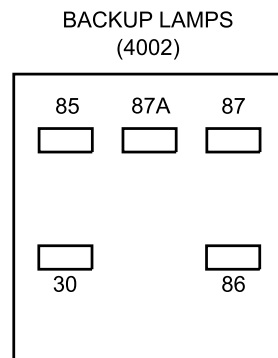
YES Install BACKUP LAMPS fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Go to next step.

STEP

27. Turn MAIN POWER switch ON (TM 9-2355-106-10).

28. Turn ignition switch ON (TM 9-2355-106-10).

29. Measure DC voltage between backup lamps relay terminal 86 and ground with multimeter. Refer to Figure 4.



B230605435

Figure 4. Backup Lamps Relay Terminals.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 88.

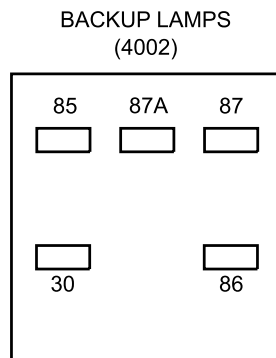
YES Go to next step.

STEP

30. Start engine (TM 9-2355-106-10).

31. Have assistant shift transmission to REVERSE (R) (TM 9-2355-106-10).

32. Measure DC voltage between BACKUP LAMPS relay terminal 86 and terminal 85 with multimeter. Refer to Figure 5.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230605435

Figure 5. Backup Lamps Relay Terminals.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to next step.
YES Go to Step 86.

STEP

33. Have assistant shift transmission to NEUTRAL (N) (TM 9-2355-106-10).
34. Turn engine OFF (TM 9-2355-106-10).
35. Remove left engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
36. Remove air cleaner. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

37. Disconnect harness connector 4705F1 from 4705F2. Refer to Figure 6.

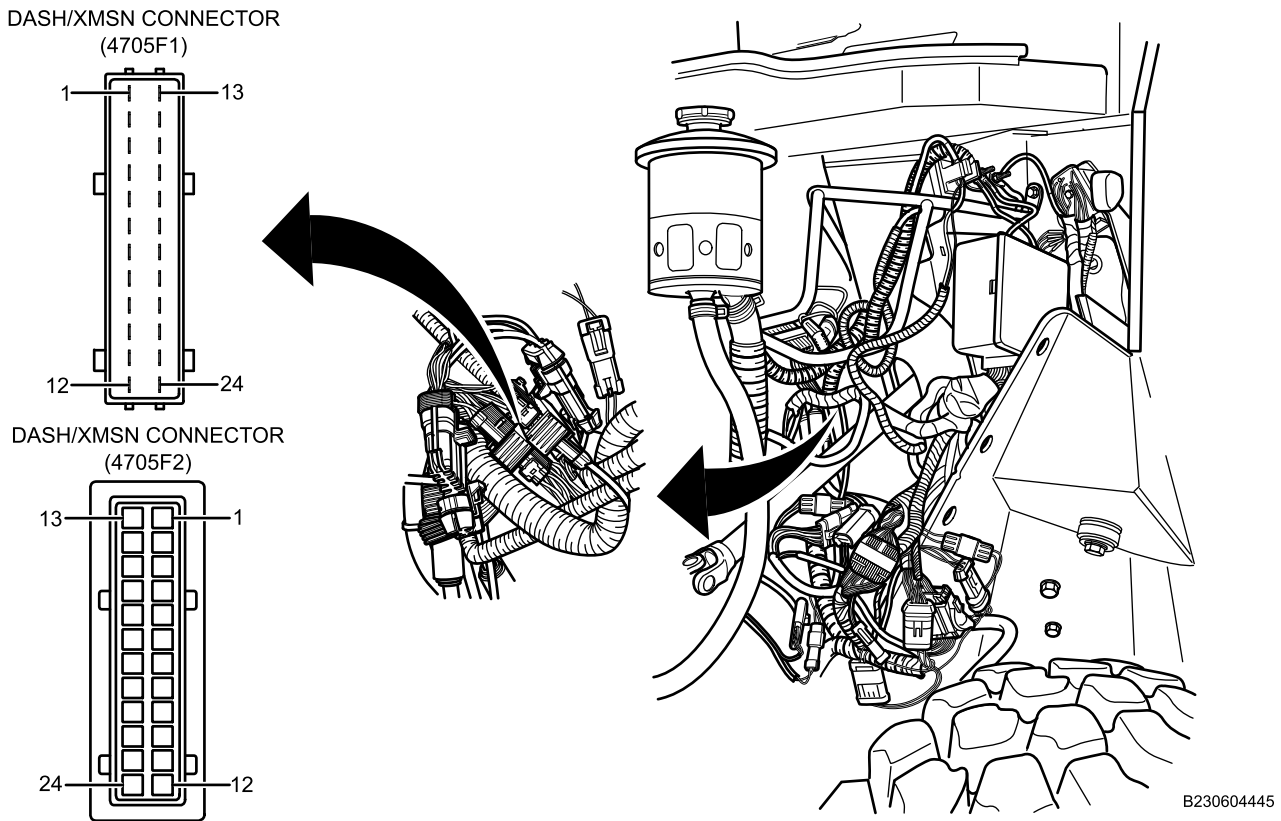
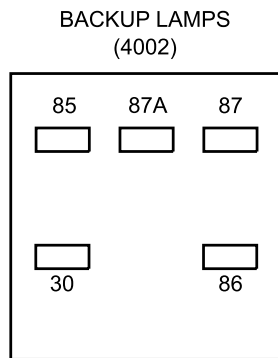


Figure 6. Left Engine Compartment Area.

38. With assistant, measure resistance between connector 4705F1 terminal 13 and BACKUP LAMPS relay terminal 85 with multimeter. Refer to Figure 6 and Figure 7.



B230605435

Figure 7. BACKUP LAMPS Relay Terminals.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to next step.
- NO Go to Step 88.

STEP

- 39. Disconnect Transmission Control Module (TCM) connector. Refer to Transmission Control Module and Brace Removal and Installation (WP 0453). Refer to Figure 8.

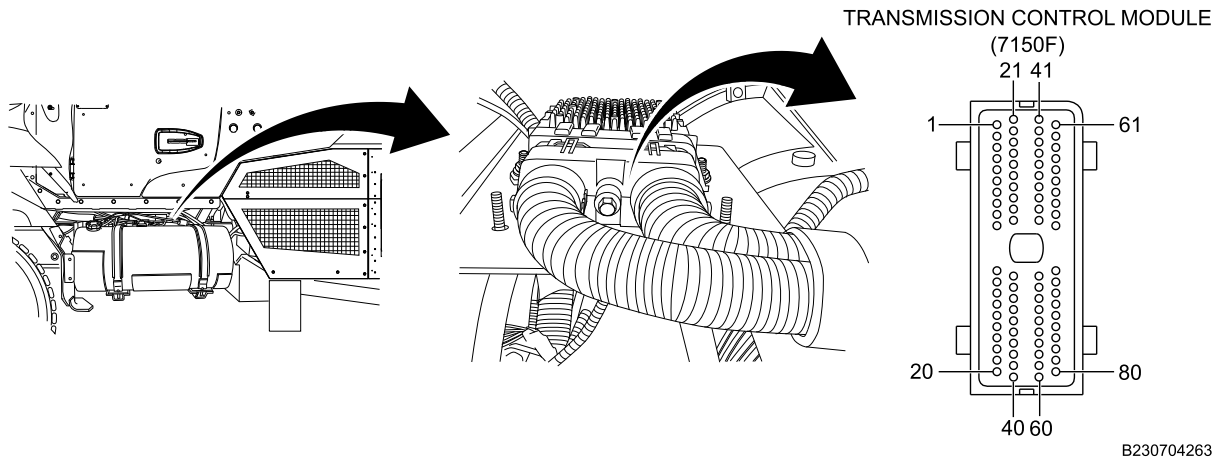


Figure 8. Center Underbody Area.

- 40. With assistance measure resistance between connector Transmission Control Module (TCM) connector terminal 65 and connector 4705F2 terminal 13. Refer to Figure 8 and Figure 9.

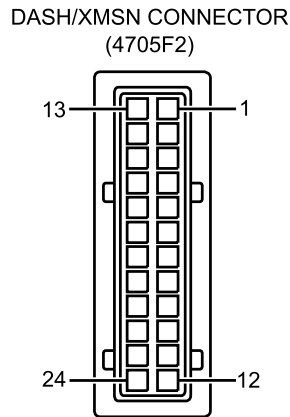


Figure 9. Connector 4705F2.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

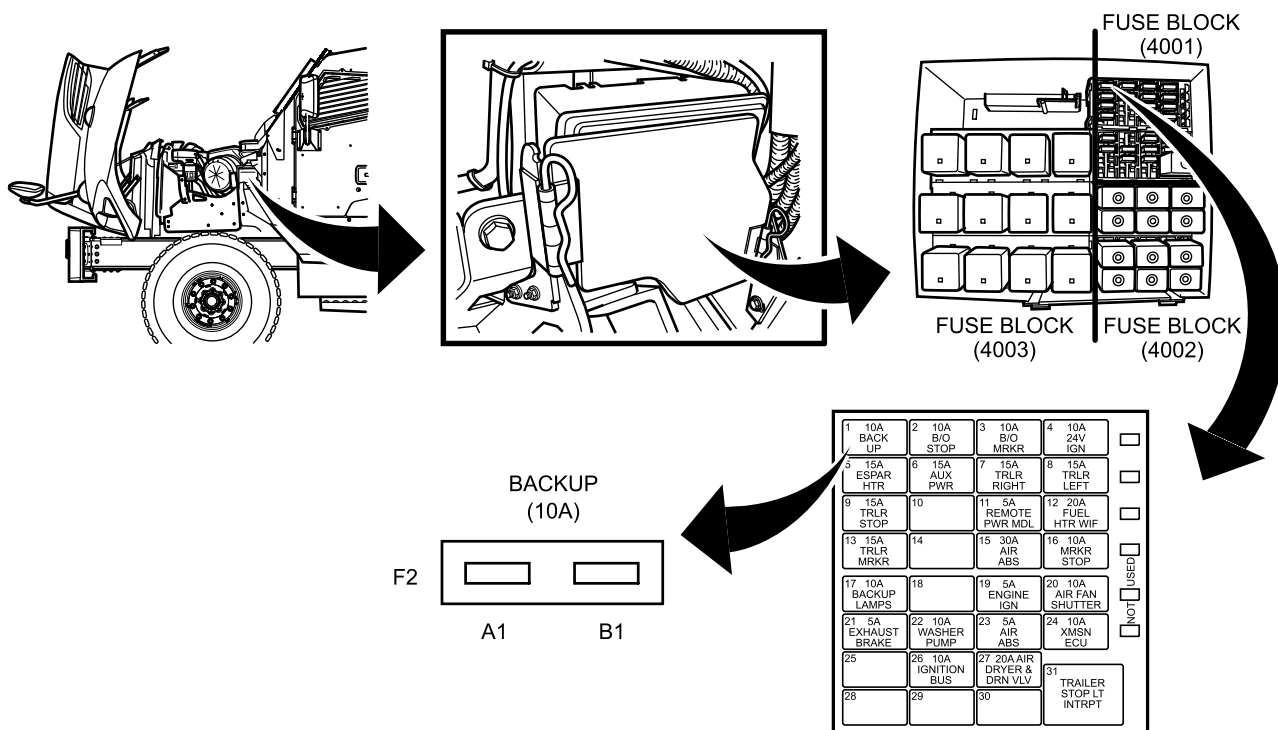
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 90.
NO Go to Step 89.

STEP

41. Remove and inspect BACKUP fuse. Refer to Figure 10. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605375

Figure 10. Left Engine Compartment Area.

CONDITION/INDICATION

Is fuse blown?

DECISION

YES Go to Step 76.
NO Go to next step.

STEP

- 42. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 43. Measure DC voltage between both fuse socket terminals A1 and B1, and ground with multimeter. Refer to Figure 10.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read between 21V and 27V on at least one terminal?

DECISION

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).

YES Install BACKUP fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Go to next step.

STEP

- 44. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 45. Disconnect connector 9714 from connector 9700. Refer to Figure 11.

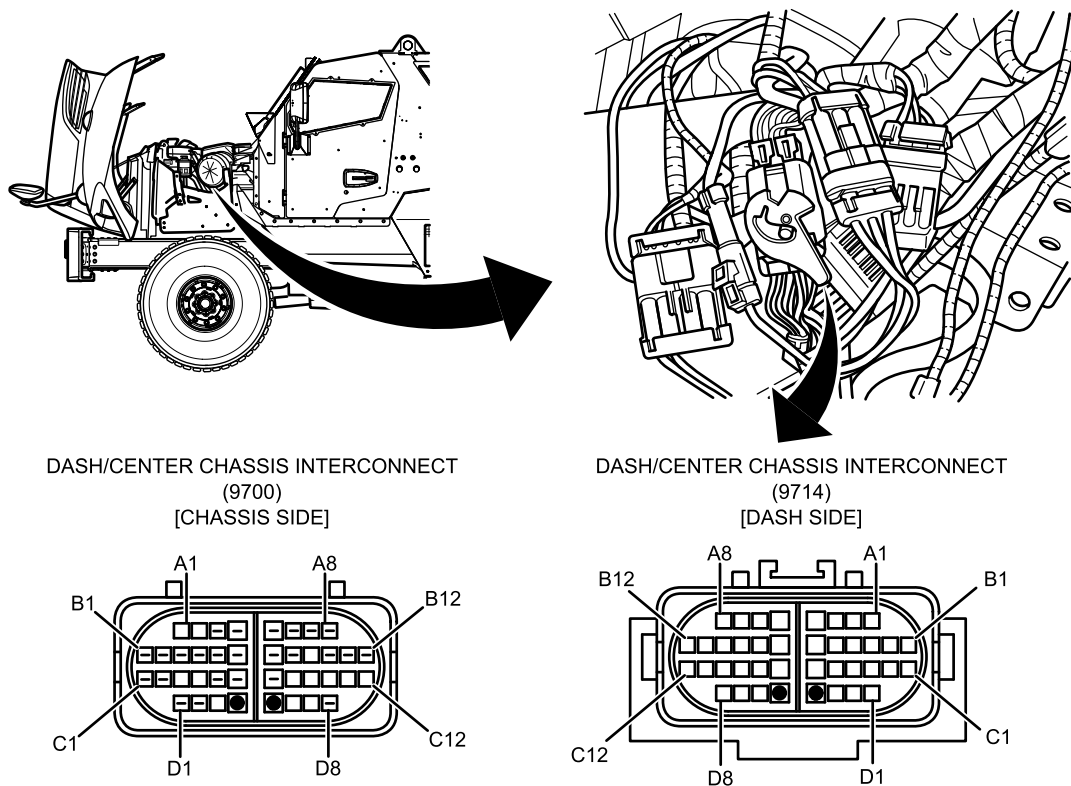


Figure 11. Left Engine Compartment Area.

- 46. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 47. Measure DC voltage between connector 9714 terminal A4 and terminal C6 with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

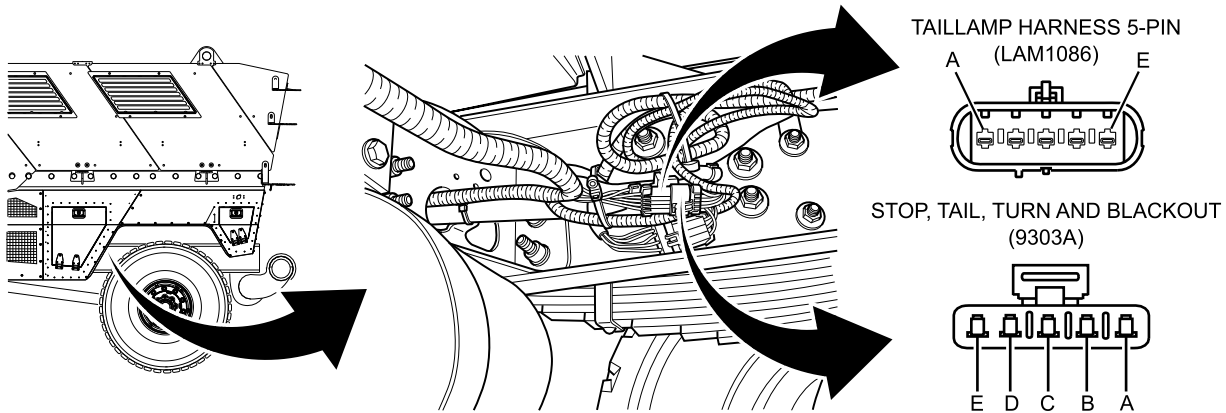
DECISION

NO Go to Step 88.

YES Go to next step.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

48. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
49. Connect connector 9714 to connector 9700.
50. Disconnect connector 9303A from connector LAM1086. Refer to Figure 12.



B230605061

Figure 12. Left Rear Frame Area.

51. Turn MAIN POWER switch ON (TM 9-2355-106-10).
52. Measure DC voltage between connector 9303A terminal A and terminal E with multimeter. Refer to Figure 12.

CONDITION/INDICATION

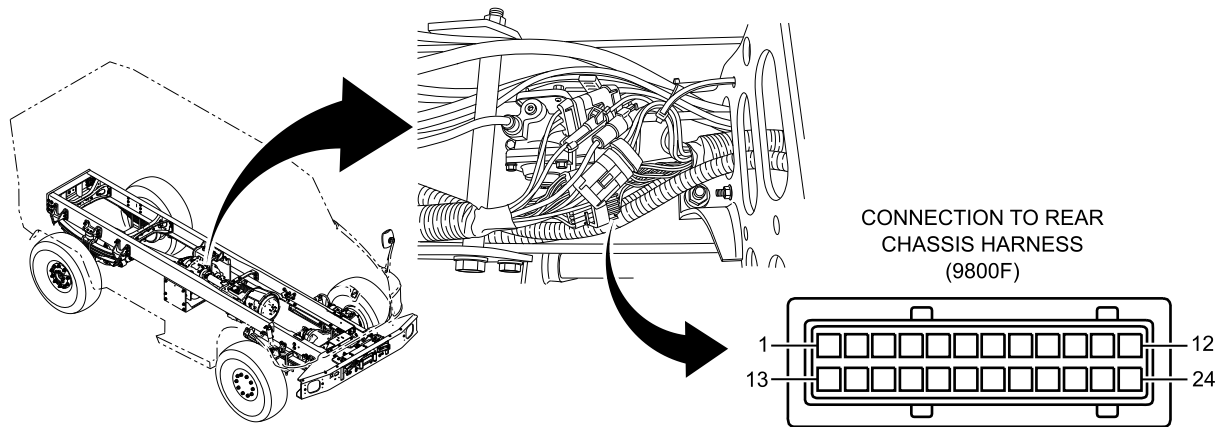
Does multimeter read between 21V and 27V?

DECISION

YES Go to Step 91.
NO Go to next step.

STEP

53. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
54. Disconnect connector 9800F. Refer to Figure 13.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230605036

Figure 13. Center Rear Frame Area.

55. Turn MAIN POWER switch ON (TM 9-2355-106-10).

56. Measure DC voltage between connector 9800F terminal 1 and terminal 12 with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

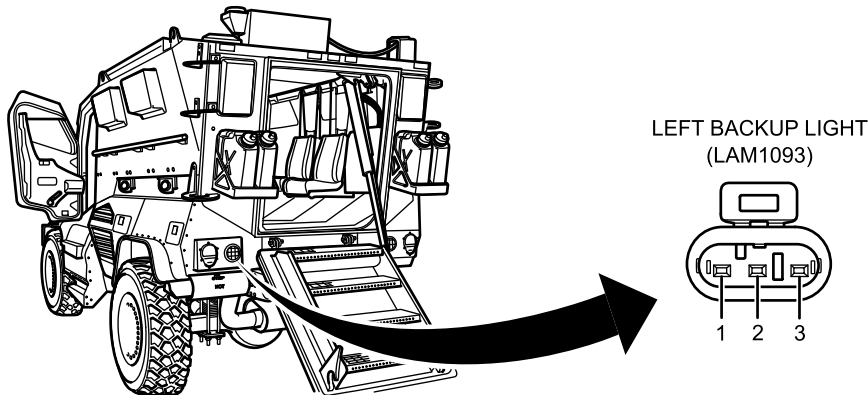
DECISION

YES Go to Step 92.

NO Go to Step 93.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

57. Have assistant shift transmission to NEUTRAL (N) (TM 9-2355-106-10).
58. Turn engine OFF (TM 9-2355-106-10).
59. Disconnect inoperative backup light connector LAM1093 or LAM1094 (LAM1093 shown, LAM1094 similar). Refer to Figure 14. Refer to Backup Light Assembly Removal and Installation (WP 0382).



B230605857

Figure 14. Left Rear Vehicle Area.

60. Turn MAIN POWER switch ON (TM 9-2355-106-10).
61. Start engine (TM 9-2355-106-10).
62. Press SER DRIVE button on MVLS, then press ENTER within 5 seconds (TM 9-2355-106-10).
63. Have assistant shift transmission to REVERSE (R) (TM 9-2355-106-10).
64. Measure DC voltage between inoperative backup light connector terminal 1 and terminal 3 with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

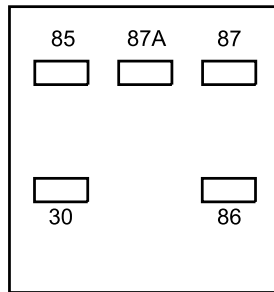
DECISION

- YES Go to Step 94.
 NO Go to Step 91.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

65. Have assistant shift transmission to NEUTRAL (N) (TM 9-2355-106-10).
66. Press SER DRIVE button on MVLS, then press ENTER within 5 seconds (TM 9-2355-106-10).
67. Measure DC voltage between BACKUP LIGHT INTRPT relay terminal 86 and ground with multimeter. Refer to Figure 15.

BACKUP LIGHT INTRPT
(4002)



B230605436

Figure 15. Backup Light Intrpt Relay Terminals.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

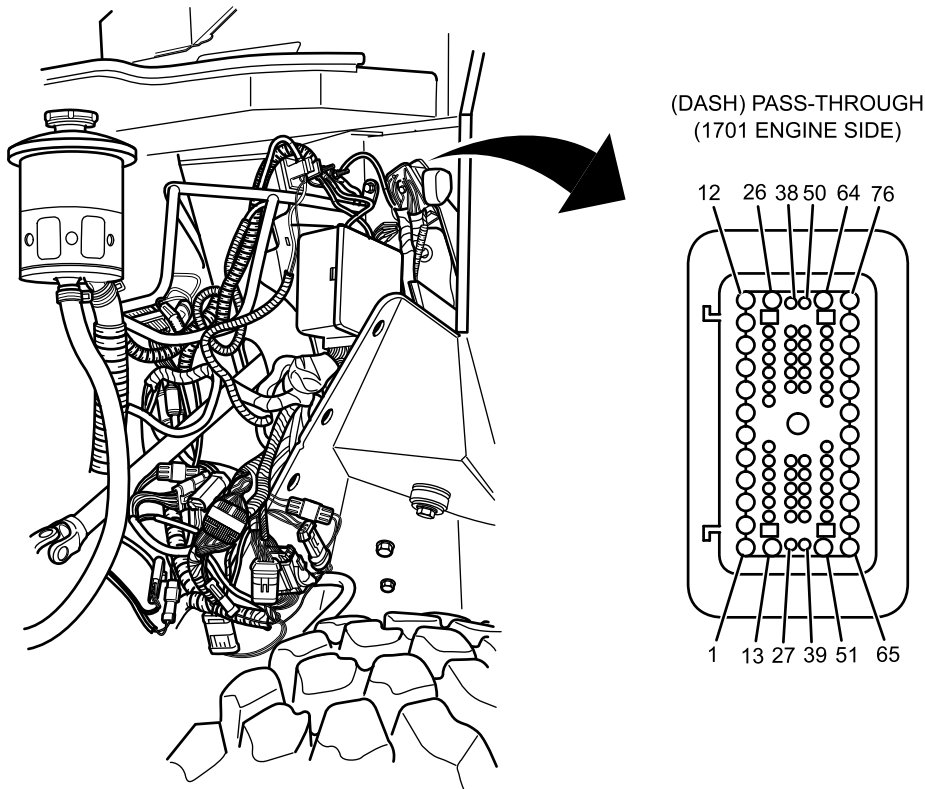
YES Go to Step 73.
NO Go to next step.

STEP

68. Turn engine OFF (TM 9-2355-106-10).
69. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

70. Disconnect connector 1701. Refer to Figure 16.

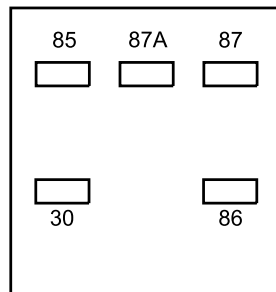


B230604025

Figure 16. Left Engine Compartment Area.

71. With assistant, measure resistance between connector 1701 (engine side) terminal 27 and BACKUP LIGHT INTRPT relay terminal 86 with multimeter. Refer to Figure 16 and Figure 17.

BACKUP LIGHT INTRPT
(4002)



B230605436

Figure 17. Backup Light Intrpt Relay Terminals.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 88.

STEP

72. Measure resistance between BACKUP LIGHT INTRPT relay terminal 86 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Refer to Master Vehicle Light Switch (MVLS) Troubleshooting Procedures (WP 0092).

NO Go to Step 88.

STEP

73. Turn ignition switch OFF (TM 9-2355-106-10).

74. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

75. Measure resistance between BACKUP LIGHT INTRPT relay terminal 85 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

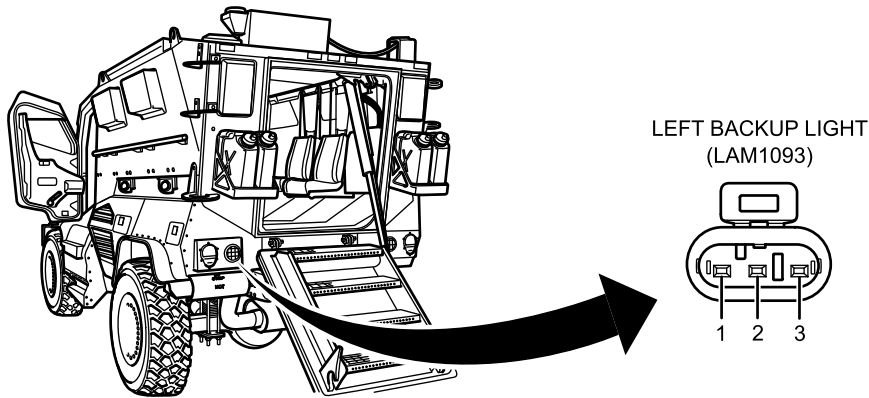
DECISION

YES Go to Step 95.

NO Go to Step 88.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

76. Disconnect backup light connectors LAM1093 and LAM1094 (LAM1093 shown, LAM1094 similar). Refer to Figure 18. Refer to Backup Light Assembly Removal and Installation (WP 0382).



B230605857

Figure 18. Rear Vehicle Area.

77. Measure resistance between connector LAM1093 terminal 3 and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

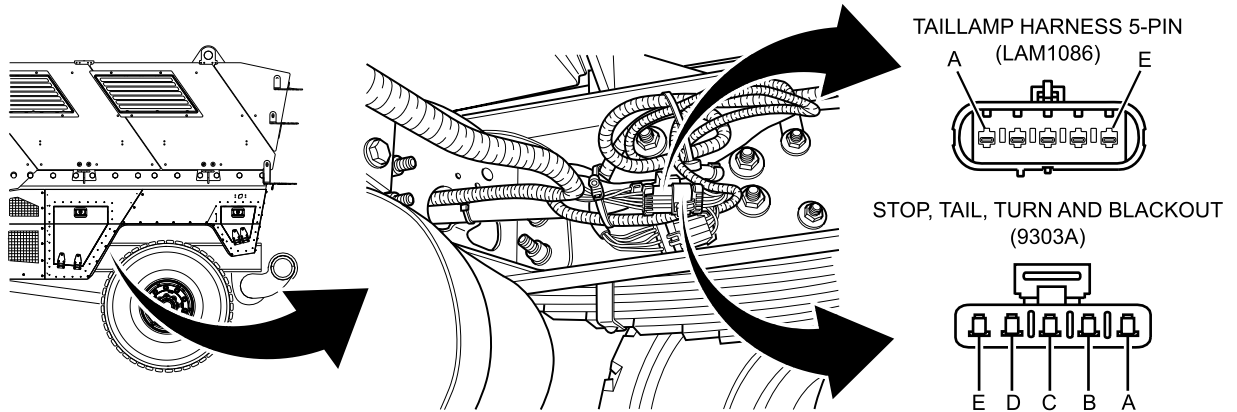
Does multimeter read OL?

DECISION

YES Go to Step 85.
NO Go to next step.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

78. Disconnect connector 9303A from connector LAM1086. Refer to Figure 19.



B230605061

Figure 19. Left Rear Frame Area.

79. Measure resistance between connector 9303A terminal A and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

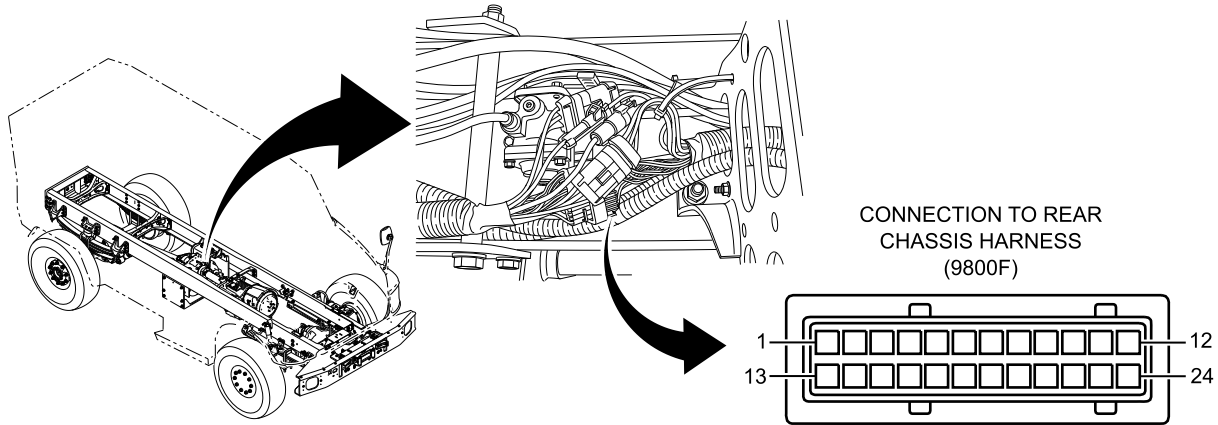
Does multimeter read OL?

DECISION

YES Go to Step 91.
NO Go to next step.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

80. Disconnect connector 9800F. Refer to Figure 20.



B230605036

Figure 20. Center Rear Frame Area.

81. Measure resistance between connector 9800F terminal 1 and ground with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

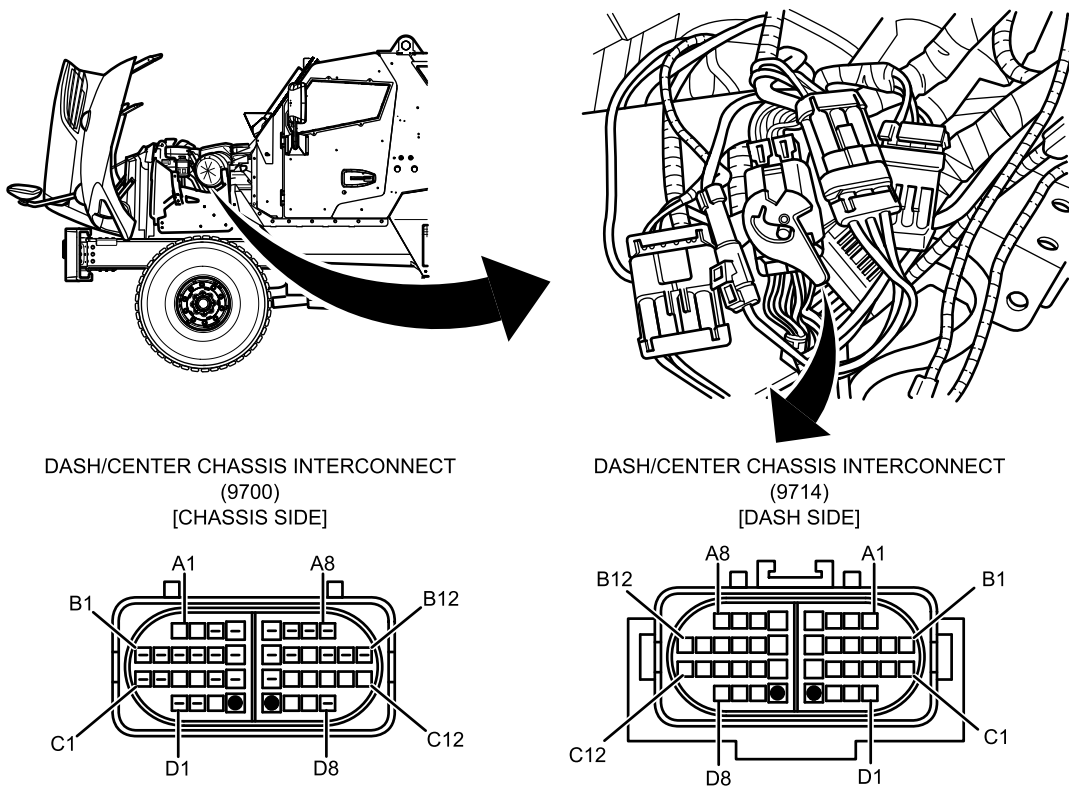
YES Go to Step 92.
NO Go to next step.

STEP

82. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

83. Disconnect connector 9714 from connector 9700. Refer to Figure 21.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605635

Figure 21. Left Engine Compartment Area.

84. Measure resistance between connector 9714 terminal A4 and ground with multimeter. Refer to Figure 21.

CONDITION/INDICATION

Does multimeter read OL?

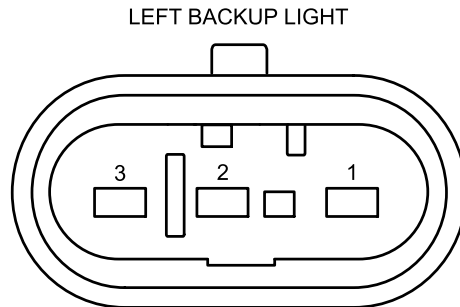
DECISION

YES Go to Step 93.

NO Go to Step 88.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

85. Measure resistance between left backup light connector terminal 1 and terminal 3 with multimeter. Refer to Figure 22.



B230605872

Figure 22. Left Rear Backup Light.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 96.

NO Go to Step 97.

MALFUNCTION

- 86. BACKUP LAMPS RELAY is faulty.

ACTION

Replace BACKUP LAMPS RELAY. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 87. Power Distribution Center (PDC) harness is faulty.

ACTION

Replace PDC harness. Replace BACKUP LAMPS fuse. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 88. Power Distribution Center (PDC) harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 89. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 90. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Unit and Brace Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 91. Taillamp harness is faulty.

ACTION

Replace taillamp harness. Refer to Taillamp Harness Removal and Installation (WP 0384). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 92. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 93. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

BACKUP LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 94. Backup light is faulty.

ACTION

Replace backup light. Refer to Backup Light Assembly Removal and Installation (WP 0382). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 95. BACKUP LIGHT INTRPT relay is faulty.

ACTION

Replace BACKUP LIGHT INTRPT relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 96. Right backup light is faulty.

ACTION

Replace right backup light. Refer to Backup Light Assembly Removal and Installation (WP 0382). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 97. Left backup light is faulty.

ACTION

Replace left backup light. Refer to Backup Light Assembly Removal and Installation (WP 0382). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0452
WP 0579
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0092
WP 0303
WP 0305
WP 0301
WP 0300
WP 0299
WP 0306
WP 0319
WP 0735

Equipment Condition

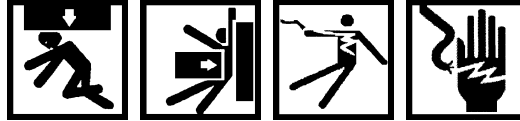
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Instrument Panel (IP) Center Closeout Removed
(WP 0579)

Drawings Required

WP 0789, Figure 51

This procedure covers the following symptoms:

- Instrument panel lights are inoperative.
- Power mirror switch light is inoperative.
- 24-volt meter light is inoperative.
- Ether start switch light is inoperative.
- Shift selector module light is inoperative.
- Fuel fired heater control light is inoperative.
- Power mirror switch light is inoperative.
- Switch pack light is inoperative.
- Electronic Gauge Cluster (EGC) lights are inoperative.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**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 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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Select SER. DRIVE on the Master Vehicle Light Switch (MVLS) (TM 9-2355-106-10). Within 5 seconds, press ENTER.
4. Select PANEL DIM or PANEL BRT. from MVLS.

CONDITION/INDICATION

Do all instrument panel lights fail to illuminate?

DECISION

YES Go to Step 14.
NO Go to next step.

STEP

5. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does power mirror switch light fail to illuminate?

DECISION

YES Go to Step 73.

NO Go to next step.

STEP

6. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Does 24-volt meter light fail to illuminate?

DECISION

YES Go to Step 82.

NO Go to next step.

STEP

7. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Does ether start switch light fail to illuminate?

DECISION

YES Go to Step 91.

NO Go to next step.

STEP

8. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Does shift selector module light fail to illuminate?

DECISION

YES Go to Step 100.

NO Go to next step.

STEP

9. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Does fuel fired heater control light fail to illuminate?

DECISION

YES Go to Step 108.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

10. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Do switch pack lights fail to illuminate?

DECISION

YES Go to Step 116.
NO Go to next step.

STEP

11. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.

CONDITION/INDICATION

Do EGC lights fail to illuminate?

DECISION

YES Go to Step 124.
NO Go to next step.

STEP

12. Observe instrument panel lights when SER. DRIVE and PANEL DIM or PANEL BRT. have been selected.
13. Operate PANEL DIM and PANEL BRT control (TM 9-2355-106-10).

CONDITION/INDICATION

Do lights fail to change brightness?

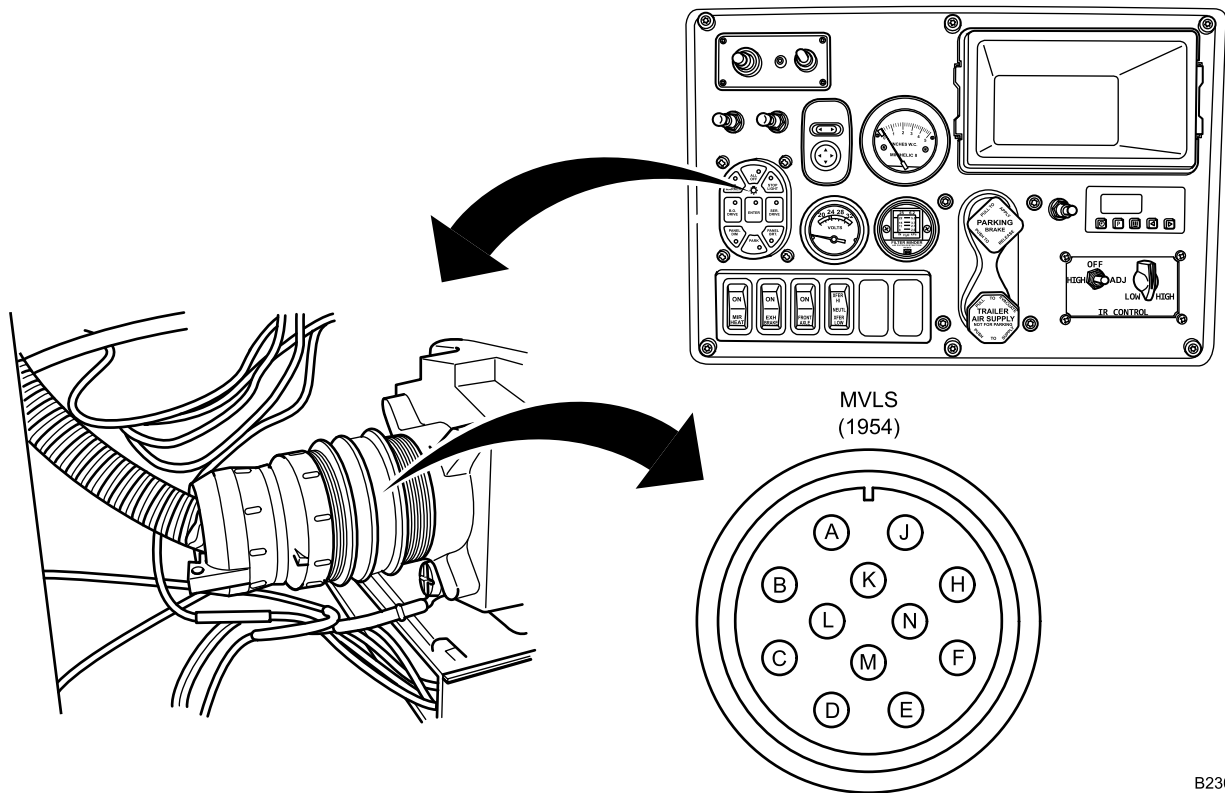
DECISION

YES Go to Master Vehicle Light Switch (MVLS) Troubleshooting Procedure (WP 0092).
NO Malfunction is not present at this time.

STEP

14. Turn ignition switch OFF (TM 9-2355-106-10).
15. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
16. Disconnect MVLS connector 1954. Refer to Master Vehicle Light Switch (MVLS) Removal and Installation (WP 0303).
17. Measure resistance between connector 1954 terminal B and ground with multimeter. Refer to Figure 1.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 1. MVLS Connector in IP Center.

CONDITION/INDICATION

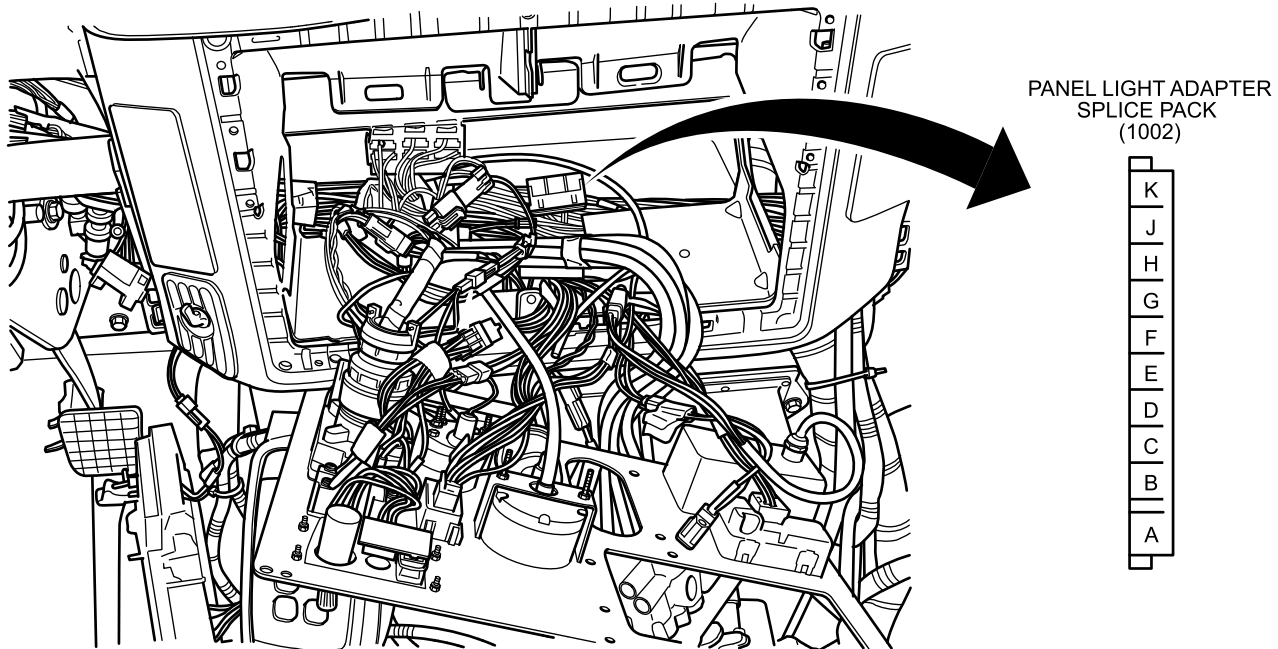
Does multimeter read less than 0.8 ohms?

DECISION

YES Go to Step 28.
 NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

18. Connect MVLS connector 1954.
19. Disconnect panel light feed bus bar 1002. Refer to Figure 2.



B230604572

Figure 2. Panel Light Feed Bus Bar in IP Center.

20. Turn MAIN POWER switch ON (TM 9-2355-106-10).
21. Turn ignition switch ON (TM 9-2355-106-10).
22. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.
23. Measure DC voltage between bus bar 1002 terminal D and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

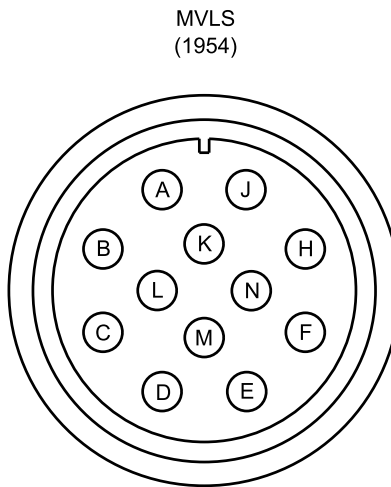
Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

- YES Go to Step 139.
NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

24. Turn ignition switch OFF (TM 9-2355-106-10).
25. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
26. Disconnect MVLS connector 1954.
27. Measure resistance between connector 1954 terminal B and bus bar 1002 terminal D with multimeter. Refer to Figure 3 and Figure 2.



B230603184

Figure 3. Connector 1954.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

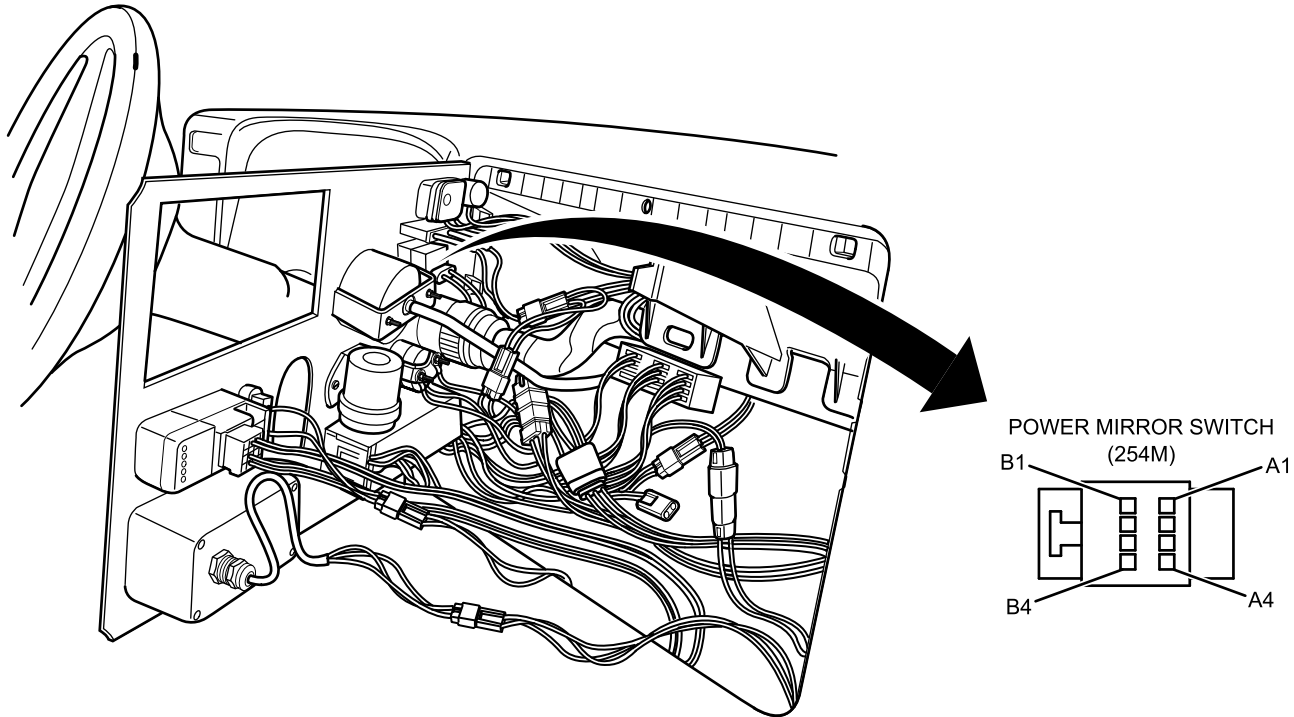
DECISION

YES Go to Master Vehicle Light Switch (MVLS) Troubleshooting Procedure (WP 0092).
NO Go Step 139.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Connect MVLS connector 1954.
29. Disconnect power mirror switch connector. Refer to Figure 4.



B230604747

Figure 4. Power Mirror Switch Connector in IP Center.

30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
31. Turn ignition switch ON (TM 9-2355-106-10).
32. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

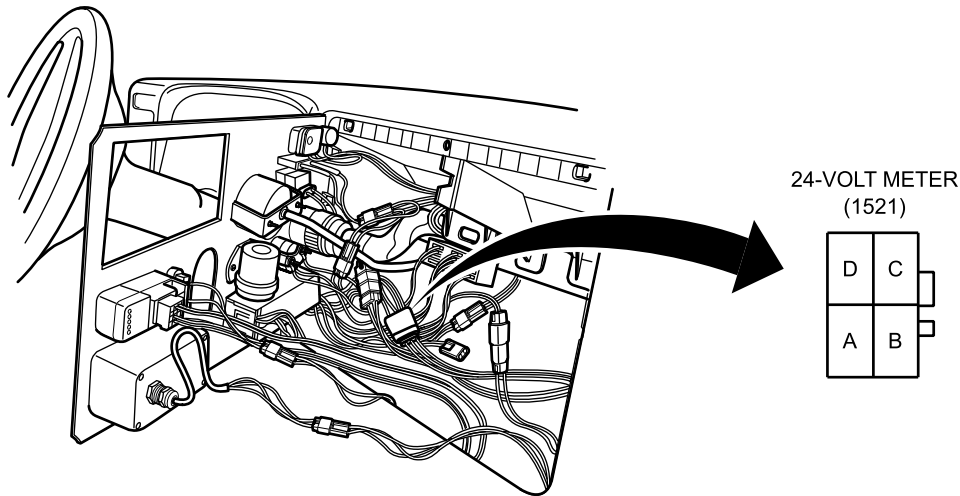
Do rest of panel lights illuminate with component disconnected?

DECISION

- YES Go to Step 132.
 NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

33. Turn ignition switch OFF (TM 9-2355-106-10).
34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
35. Reconnect component from previous step.
36. Disconnect 24-volt meter connector. Refer to Figure 5.



B230605224

Figure 5. 24-Volt Meter Connector in IP Center.

37. Turn MAIN POWER switch ON (TM 9-2355-106-10).
38. Turn ignition switch ON (TM 9-2355-106-10).
39. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

Do rest of panel lights illuminate with component disconnected?

DECISION

YES Go to Step 133.
NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 40. Turn ignition switch OFF (TM 9-2355-106-10).
- 41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 42. Reconnect component from previous step.
- 43. Disconnect ether start switch connector. Refer to Figure 6.

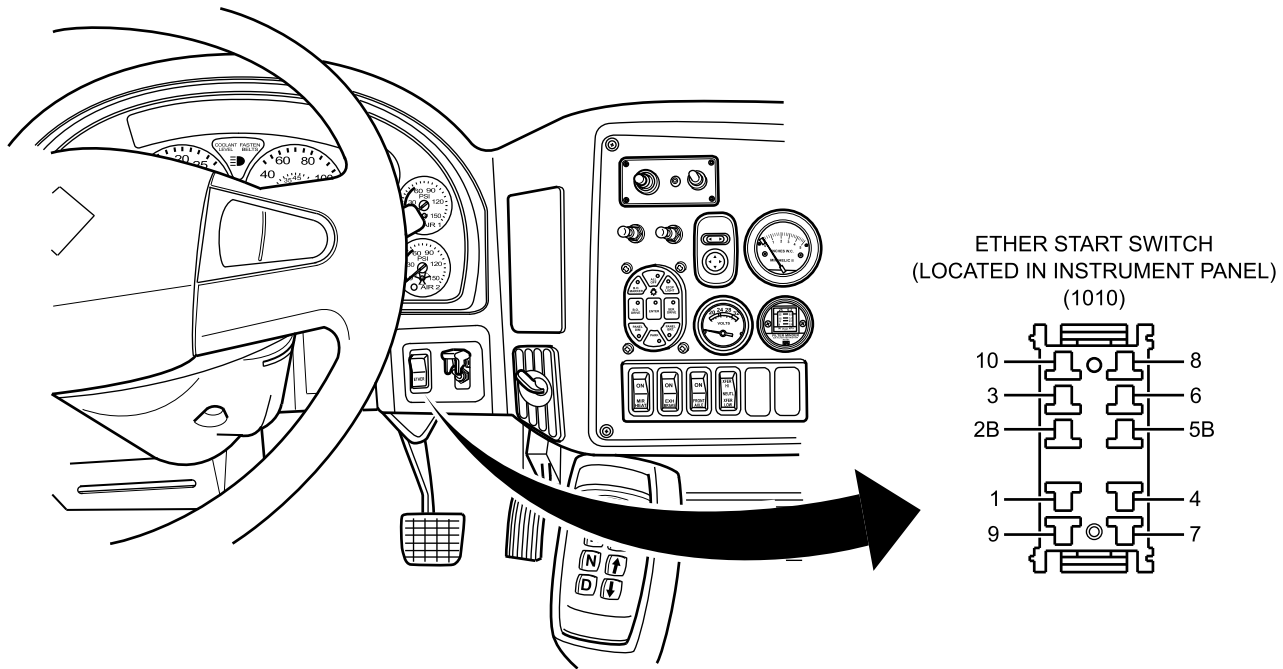


Figure 6. Ether Start Switch Connector in Left Side IP.

- 44. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 45. Turn ignition switch ON (TM 9-2355-106-10).
- 46. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

Do rest of panel lights illuminate with component disconnected?

DECISION

- YES Go to Step 134.
- NO Go to next step.

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INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

47. Remove shift control. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452).
48. Reconnect component from previous step.
49. Disconnect shift selector module connector. Refer to Figure 7.

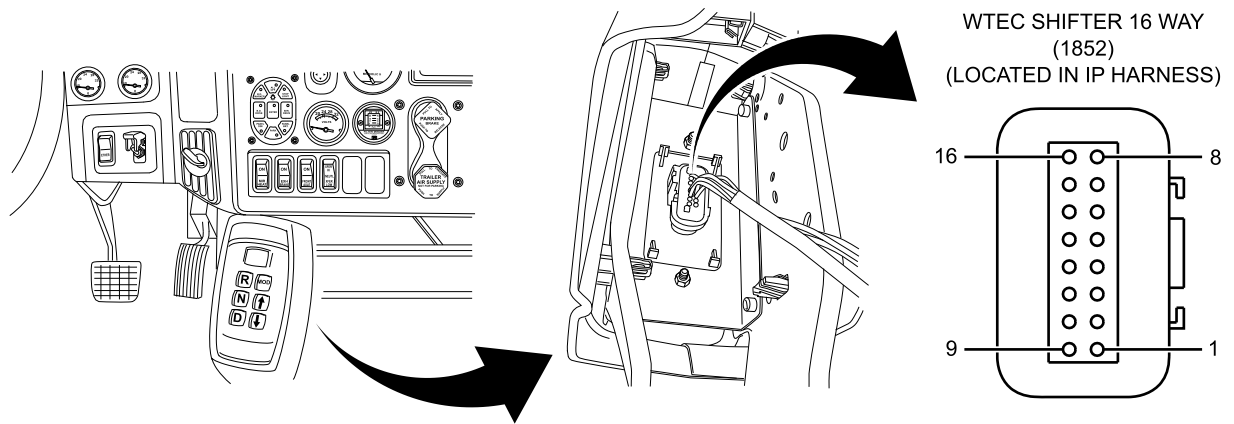


Figure 7. Shift Selector Module Connector in IP Center.

50. Turn MAIN POWER switch ON (TM 9-2355-106-10).
51. Turn ignition switch ON (TM 9-2355-106-10).
52. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

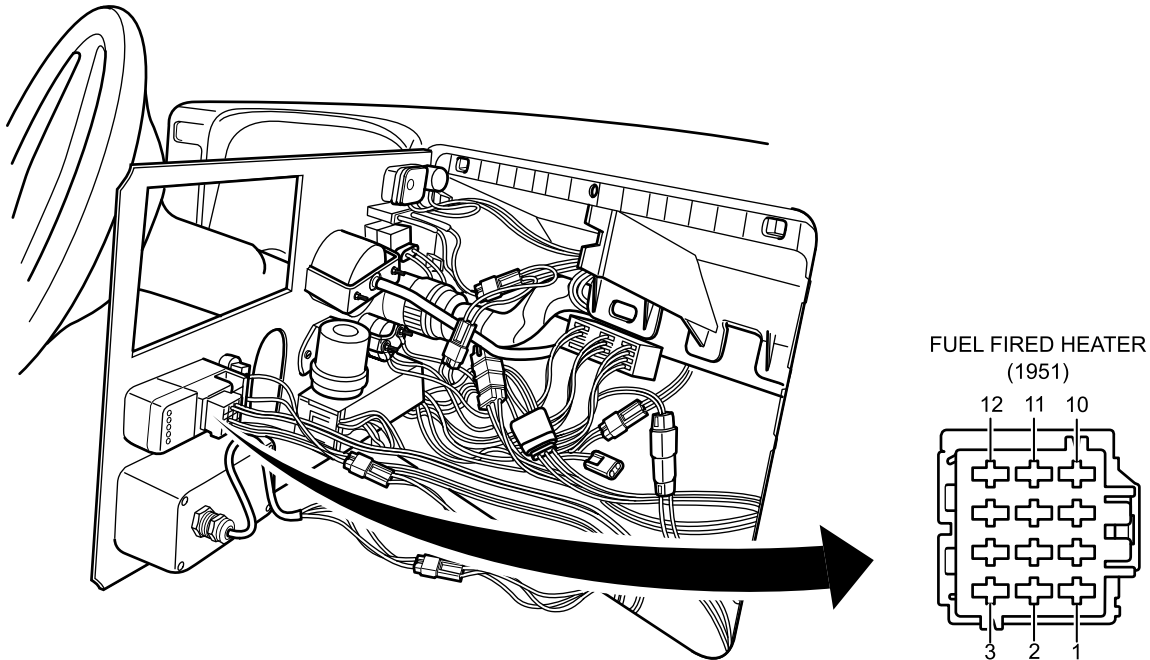
Do rest of panel lights illuminate with component disconnected?

DECISION

YES Go to Step 135.
NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

53. Turn ignition switch OFF (TM 9-2355-106-10).
54. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
55. Reconnect component from previous step.
56. Disconnect fuel fired heater control connector. Refer to Figure 8.



B230605225

Figure 8. Fuel Fired Heater Control in IP Center.

57. Turn MAIN POWER switch ON (TM 9-2355-106-10).
58. Turn ignition switch ON (TM 9-2355-106-10).
59. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

Do rest of panel lights illuminate with component disconnected?

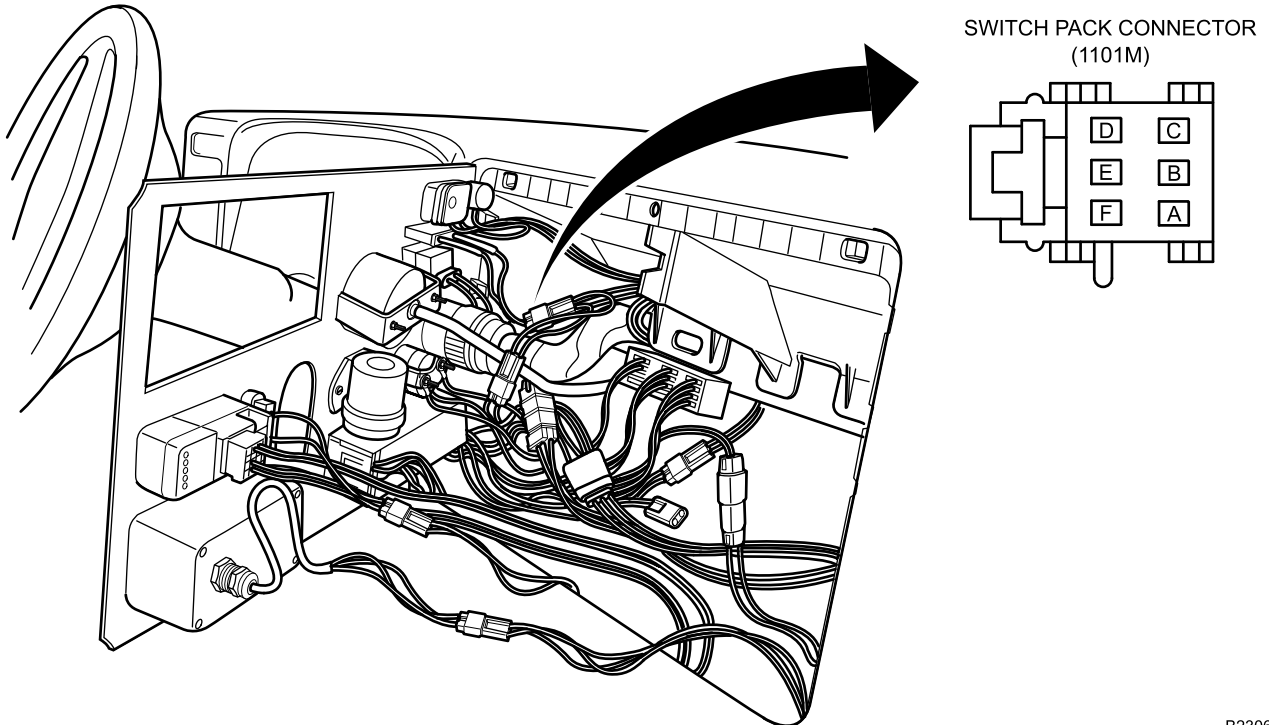
DECISION

YES Go to Step 136.

NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

60. Turn ignition switch OFF (TM 9-2355-106-10).
61. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
62. Reconnect component from previous step.
63. Disconnect switch pack connector. Refer to Figure 9.



B230605226

Figure 9. Switch Pack Connector in IP Center.

64. Turn MAIN POWER switch ON (TM 9-2355-106-10).
65. Turn ignition switch ON (TM 9-2355-106-10).
66. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

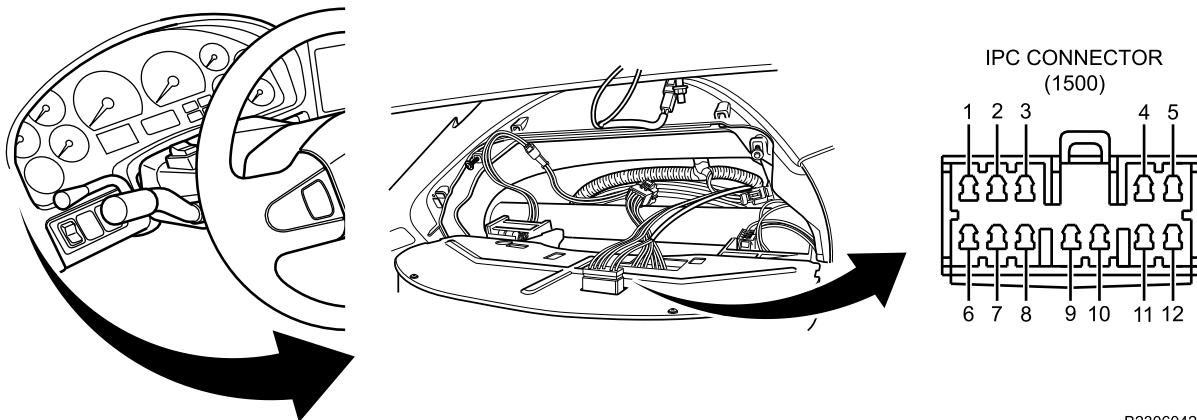
Do rest of panel lights illuminate with component disconnected?

DECISION

YES Go to Step 137.
NO Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

67. Remove IP cluster to gain access to connector 1500. Refer to Instrument Panel Cluster (IPC) Removal and Installation (WP 0297).
68. Reconnect component from previous step.
69. Disconnect cluster connector. Refer to Figure 10.



B230604255

Figure 10. Cluster Connector in Left Side IP.

70. Turn MAIN POWER switch ON (TM 9-2355-106-10).
71. Turn ignition switch ON (TM 9-2355-106-10).
72. Select SER. DRIVE on the MVLS (TM 9-2355-106-10). Within 5 seconds, press ENTER.

CONDITION/INDICATION

Do rest of panel lights illuminate with component disconnected?

DECISION

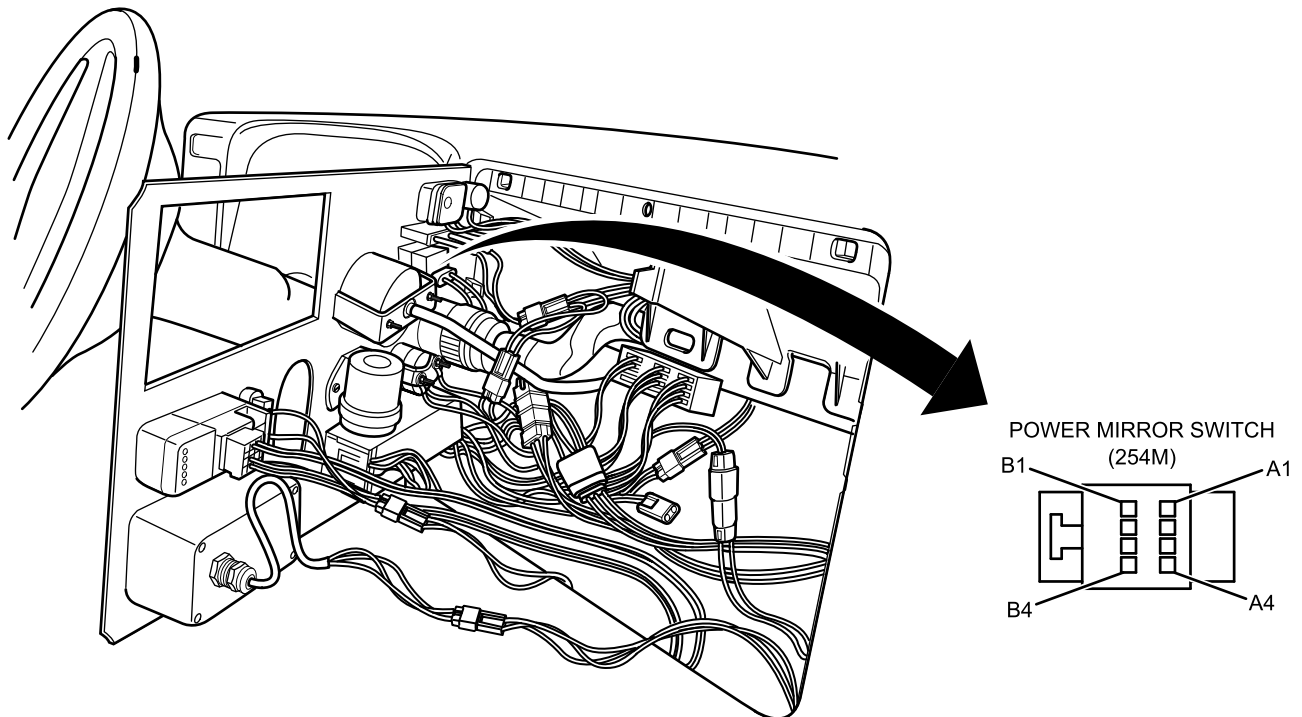
YES Go to Step 138.
 NO Go to Step 139.

STEP

73. Turn ignition switch OFF (TM 9-2355-106-10).
74. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

75. Disconnect power mirror switch connector 254M. Refer to Figure 11.



B230604747

Figure 11. Power Mirror Switch Connector in IP Center.

76. Turn MAIN POWER switch ON (TM 9-2355-106-10).

77. Turn ignition switch ON (TM 9-2355-106-10).

78. Measure DC voltage between connector 254M terminal A1 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

NO Go to Step 139.
YES Go to next step.

STEP

79. Turn ignition switch OFF (TM 9-2355-106-10).

80. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

81. Measure resistance between connector 254M terminal A4 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

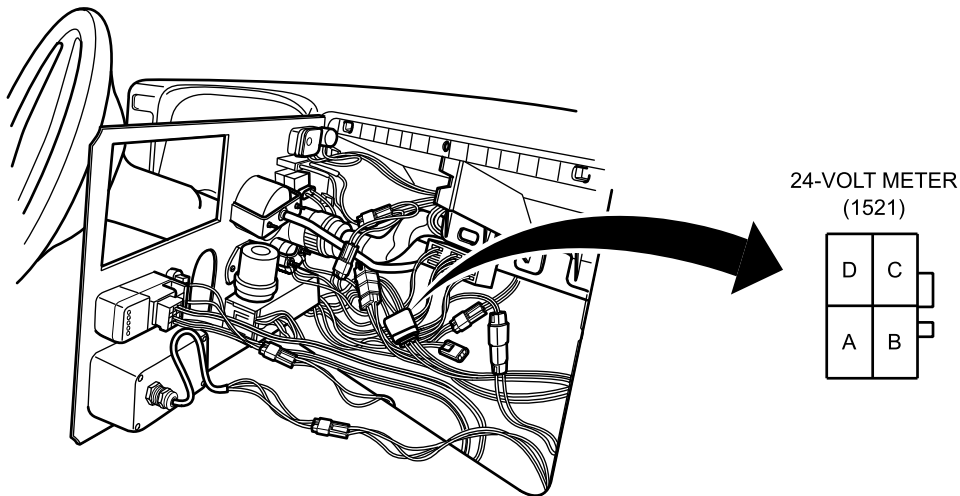
INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 132.

NO Go to Step 139.

STEP

82. Turn ignition switch OFF (TM 9-2355-106-10).
83. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
84. Disconnect 24-volt meter connector 1521. Refer to Figure 12.



B230605224

Figure 12. 24-Volt Meter Connector in IP Center.

85. Turn MAIN POWER switch ON (TM 9-2355-106-10).
86. Turn ignition switch ON (TM 9-2355-106-10).
87. Measure DC voltage between connector 1521 terminal D and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

NO Go to Step 139.

YES Go to next step.

STEP

88. Turn ignition switch OFF (TM 9-2355-106-10).
89. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
90. Measure resistance between connector 1521 terminal B and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

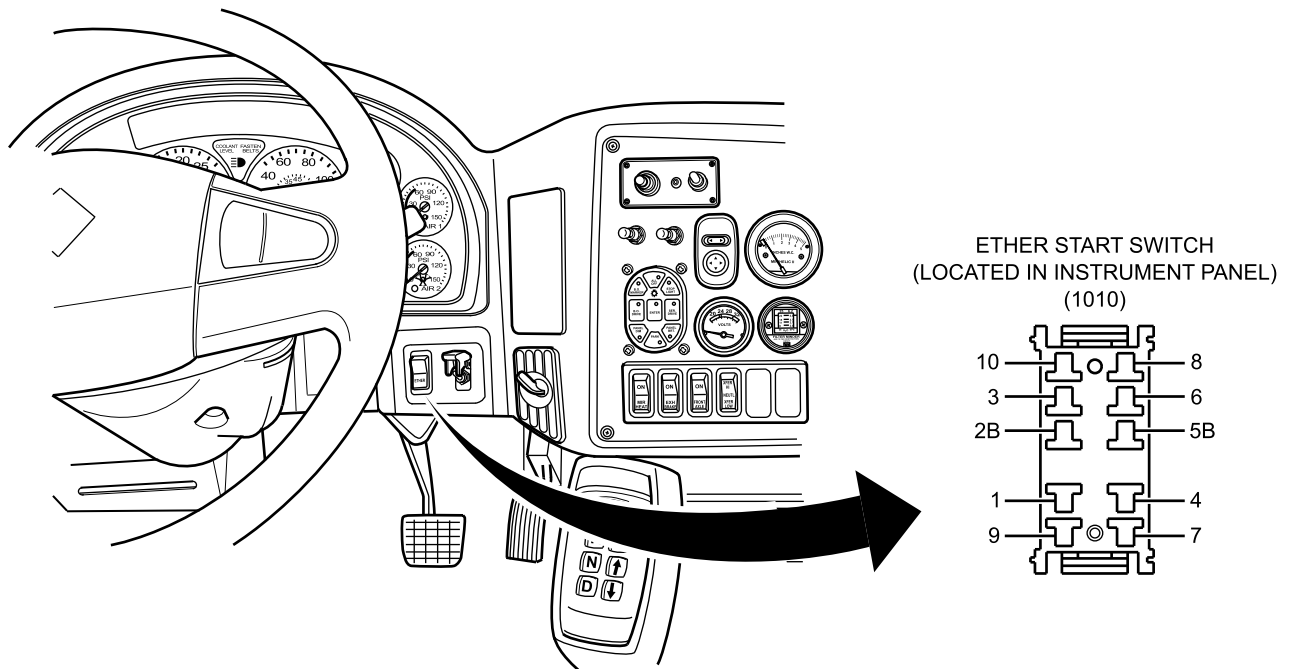
INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 133.

NO Go to Step 139.

STEP

91. Turn ignition switch OFF (TM 9-2355-106-10).
92. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
93. Disconnect ether start switch connector 1010. Refer to Figure 13.



B230605073

Figure 13. Ether Start Switch Connector in Left Side IP.

94. Turn MAIN POWER switch ON (TM 9-2355-106-10).
95. Turn ignition switch ON (TM 9-2355-106-10).
96. Measure DC voltage between connector 1010 terminal 8 and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

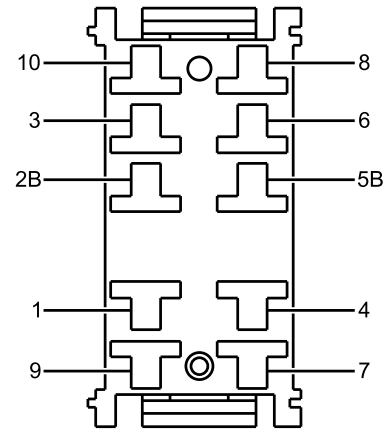
NO Go to Step 139.

YES Go to next step.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

97. Turn ignition switch OFF (TM 9-2355-106-10).
98. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
99. Measure resistance between connector 1010 terminal 10 and ground with multimeter. Refer to Figure 14.

EITHER START SWITCH (1010)
(LOCATED IN INSTRUMENT PANEL)



B230603775

Figure 14. Connector 1010.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 134.
NO Go to Step 139.

STEP

100. Remove shift control to gain access to connector 1852. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452).

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

101. Disconnect shift selector module connector 1852. Refer to Figure 15.

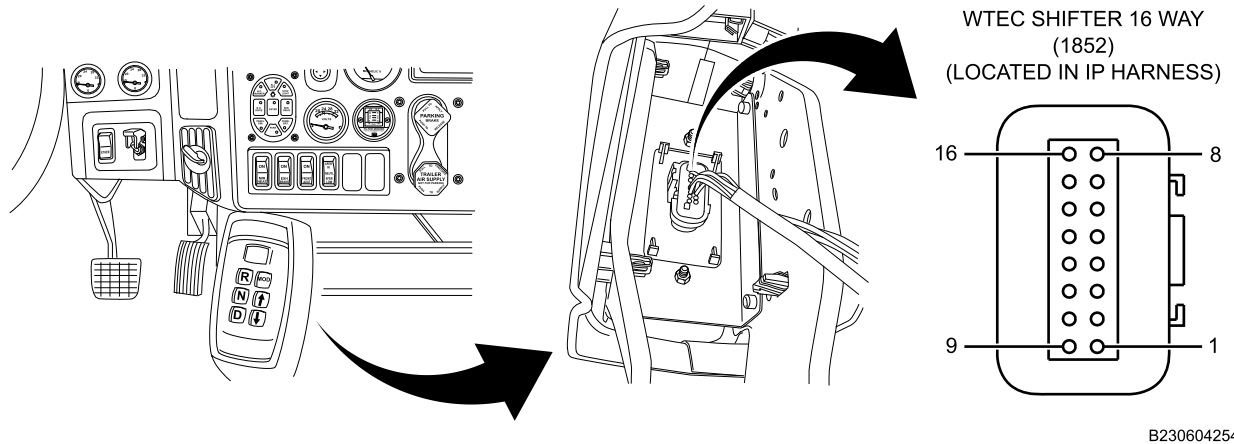


Figure 15. Shift Selector Module Connector in IP Center.

102. Turn MAIN POWER switch ON (TM 9-2355-106-10).

103. Turn ignition switch ON (TM 9-2355-106-10).

104. Measure DC voltage between connector 1852 terminal 3 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

NO Go to Step 139.
YES Go to next step.

STEP

105. Turn ignition switch OFF (TM 9-2355-106-10).

106. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

107. Measure resistance between connector 1852 terminal 5 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

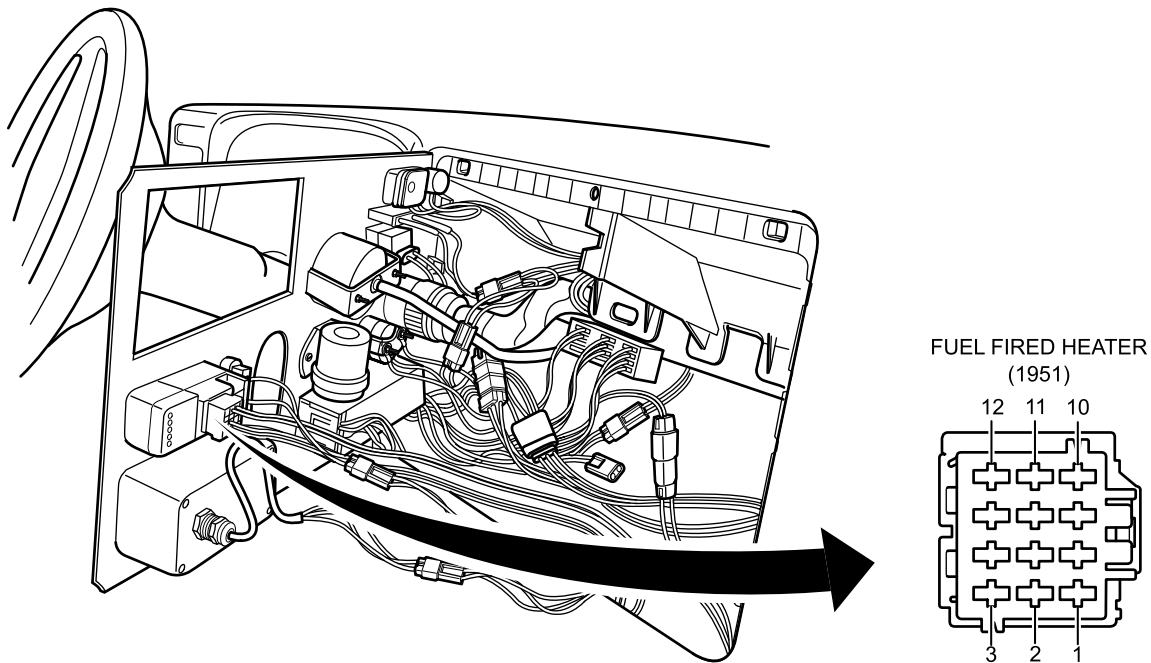
YES Go to Step 135.
NO Go to Step 139.

STEP

108. Remove center Instrument Panel (IP) trim panel to gain access to connector 1951. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).

109. Disconnect fuel fired heater control connector 1951. Refer to Figure 16.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605225

Figure 16. Fuel Fired Heater Control in IP Center.

110. Turn MAIN POWER switch ON (TM 9-2355-106-10).

111. Turn ignition switch ON (TM 9-2355-106-10).

112. Measure DC voltage between connector 1951 terminal 1 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

NO Go to Step 139.

YES Go to next step.

STEP

113. Turn ignition switch OFF (TM 9-2355-106-10).

114. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

115. Measure resistance between connector 1951 terminal 12 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

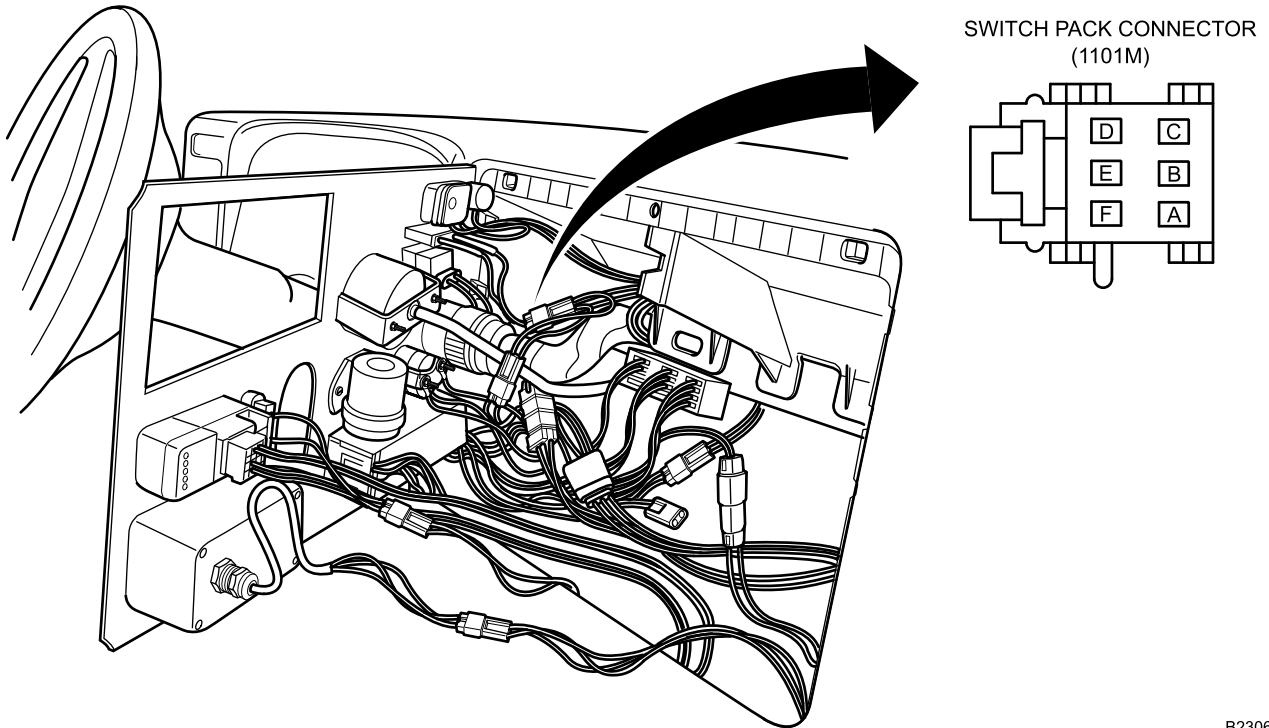
DECISION

YES Go to Step 136.

NO Go to Step 139.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

116. Remove center Instrument Panel (IP) trim panel to gain access to connector 1101M. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
117. Disconnect switch pack connector 1101M. Refer to Figure 17.



B230605226

Figure 17. Switch Pack Connector in IP Center.

118. Turn MAIN POWER switch ON (TM 9-2355-106-10).
119. Turn ignition switch ON (TM 9-2355-106-10).
120. Measure DC voltage between connector 1101M terminal C and ground with multimeter. Refer to Figure 17.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

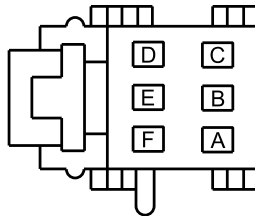
DECISION

NO Go to Step 139.
YES Go to next step.

STEP

121. Turn ignition switch OFF (TM 9-2355-106-10).
122. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
123. Measure resistance between connector 1101M terminal A and ground with multimeter. Refer to Figure 18.

SWITCH PACK CONNECTOR
(1101M)



B230603873

Figure 18. Connector 1101M.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

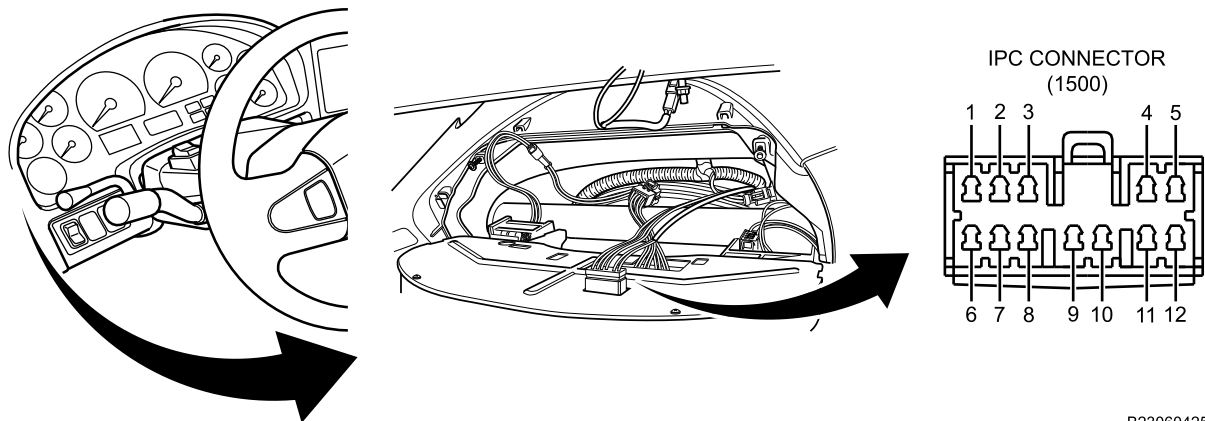
YES Go to Step 137.
NO Go to Step 139.

STEP

124. Remove IP cluster to gain access to connector 1500. Refer to Instrument Panel Cluster (IPC) Removal and Installation (WP 0297).

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

125. Disconnect EGC connector 1500. Refer to Figure 19.



B230604255

Figure 19. Cluster Connector in Left Side IP.

126. Turn MAIN POWER switch ON (TM 9-2355-106-10).

127. Turn ignition switch ON (TM 9-2355-106-10).

128. Measure DC voltage between connector 1500 terminal 1 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read either between 3.5V and 6.5V with PANEL DIM selected or between 10.5V and 13.5V with PANEL BRT selected?

DECISION

NO Go to Step 139.

YES Go to next step.

STEP

129. Turn ignition switch OFF (TM 9-2355-106-10).

130. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

131. Measure resistance between connector 1500 terminal 7 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 138.

NO Go to Step 139.

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 132. Power mirror switch is faulty.

ACTION

Replace power mirror switch. Refer to Mirror Remote Control Switch Removal and Installation (WP 0306). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 133. 24-volt meter bulb is faulty.

ACTION

Replace 24-volt meter bulb. Refer to 24-Volt Gauge Bulb Removal and Installation (WP 0305). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 134. Ether start switch is faulty.

ACTION

Replace ether start switch. Refer to Ether Start Switch Removal and Installation (WP 0300). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 135. Shift selector module is faulty.

ACTION

Replace shift selector module. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 136. Fuel fired heater control is faulty.

ACTION

Replace fuel fired heater control. Refer to Fuel Fired Heater Timer Control Removal and Installation (WP 0735). Return vehicle to service.

END OF TEST

INSTRUMENT PANEL (IP) LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 137. Switch pack is faulty.

ACTION

Replace switch pack. Refer to Rocker Switch Removal and Installation (WP 0301). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 138. EGC bulb is faulty.

ACTION

Replace faulty EGC bulb(s). Refer to Instrument Panel Light Bulb Removal and Installation (WP 0299). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 139. Instrument panel harness is faulty.

ACTION

Replace instrument panel harness. Refer to Instrument Panel Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
FLASH-TO-PASS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0324

WP 0353

WP 0565

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0068

WP 0092

WP 0097

WP 0303

WP 0318

WP 0319

WP 0323

Drawings Required

WP 0789, Figure 52

WP 0789, Figure 51

DIAGNOSTIC TROUBLE CODES AND SYMPTOMS

This procedure covers the following symptoms:

- Turn signal switch does not activate flash-to-pass feature.

TROUBLESHOOTING PROCEDURE**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.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Press SER. DRIVE on Master Vehicle Light Switch (MVLS) and then press ENTER within 5 seconds (TM 9-2355-106-10).
4. Activate high-beam driving lights while observing driving lights (TM 9-2355-106-10).

CONDITION/INDICATION

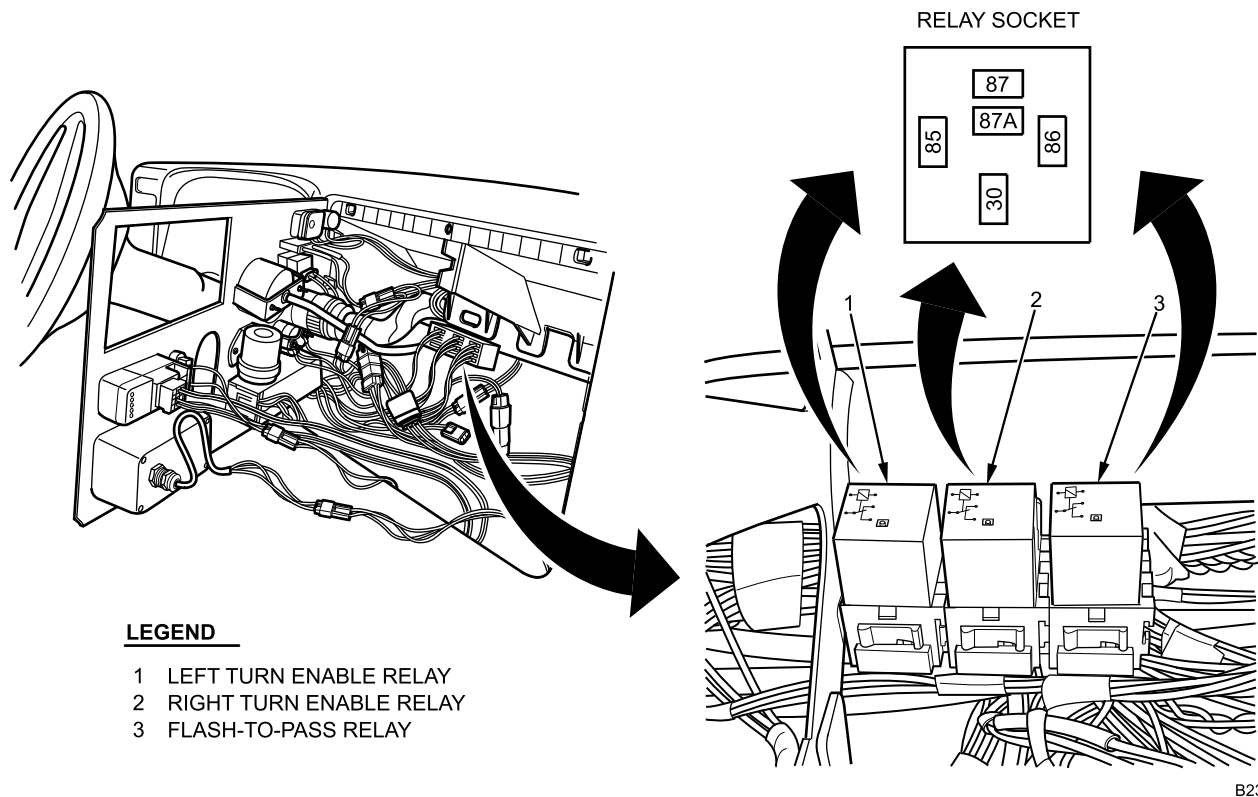
Are high-beam driving lights inoperative?

DECISION

YES Go to Service Driving Lights Troubleshooting Procedure (WP 0097).
NO Go to next step.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Remove flash-to-pass relay. Refer to Instrument Panel Center Relay Removal and Installation (WP 0318). Refer to Figure 1.



B230605138

Figure 1. Flash-to-Pass Relay in Center Instrument Panel (IP).

6. Turn MAIN POWER switch ON (TM 9-2355-106-10).
7. Turn ignition switch ON (TM 9-2355-106-10).
8. Press SER. DRIVE on MVLS and then press ENTER within 5 seconds (TM 9-2355-106-10).
9. Measure DC voltage between relay socket terminal 86 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 30.
YES Go to next step.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

10. Turn ignition switch OFF (TM 9-2355-106-10).
11. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
12. Measure resistance between relay socket terminal 85 and ground with multimeter. Refer to Figure 2.

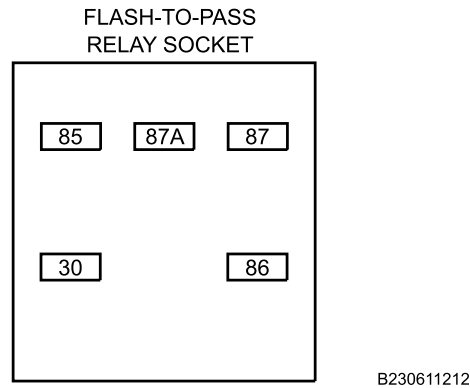


Figure 2. Flash-to-Pass Relay in Center IP.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 43.
YES Go to next step.

STEP

13. Turn MAIN POWER switch ON (TM 9-2355-106-10).
14. Turn ignition switch ON (TM 9-2355-106-10).
15. Press SER. DRIVE on MVLS and then press ENTER within 5 seconds (TM 9-2355-106-10).
16. Measure DC voltage between relay socket terminal 30 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

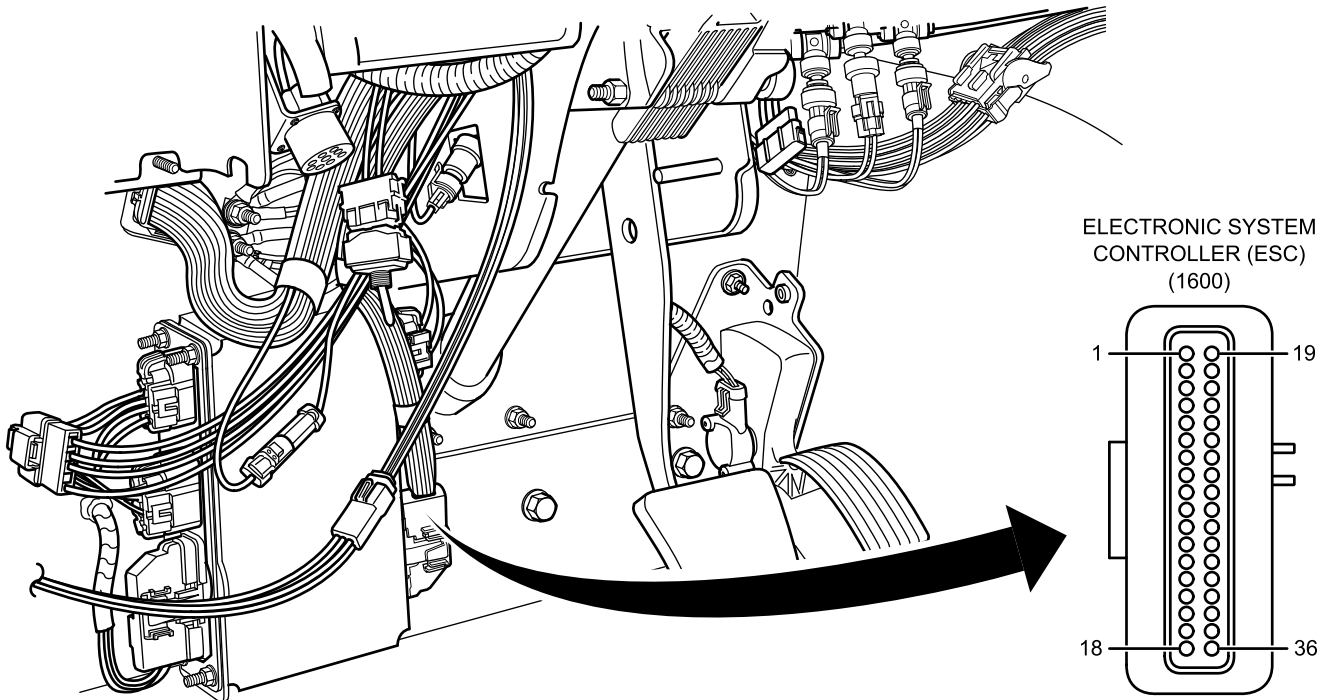
NO Go to Step 34.
YES Go to next step.

STEP

17. Turn ignition switch OFF (TM 9-2355-106-10).
18. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

19. Disconnect ESC connector 1600. Refer to Figure 3.



B230603692

Figure 3. Electronic System Controller (ESC) Connectors Under Left IP.

20. Have assistant activate flash-to-pass with turn signal lever (TM 9-2355-106-10).

21. Measure resistance between connector relay socket terminal 87 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 39.

YES Go to next step.

STEP

22. Have assistant activate flash-to-pass with turn signal lever (TM 9-2355-106-10).

23. Measure resistance between relay socket terminal 87 and ESC connector 1600 terminal 3 with multimeter. Refer to Figure 3. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to Step 47.
 NO Go to next step.

STEP

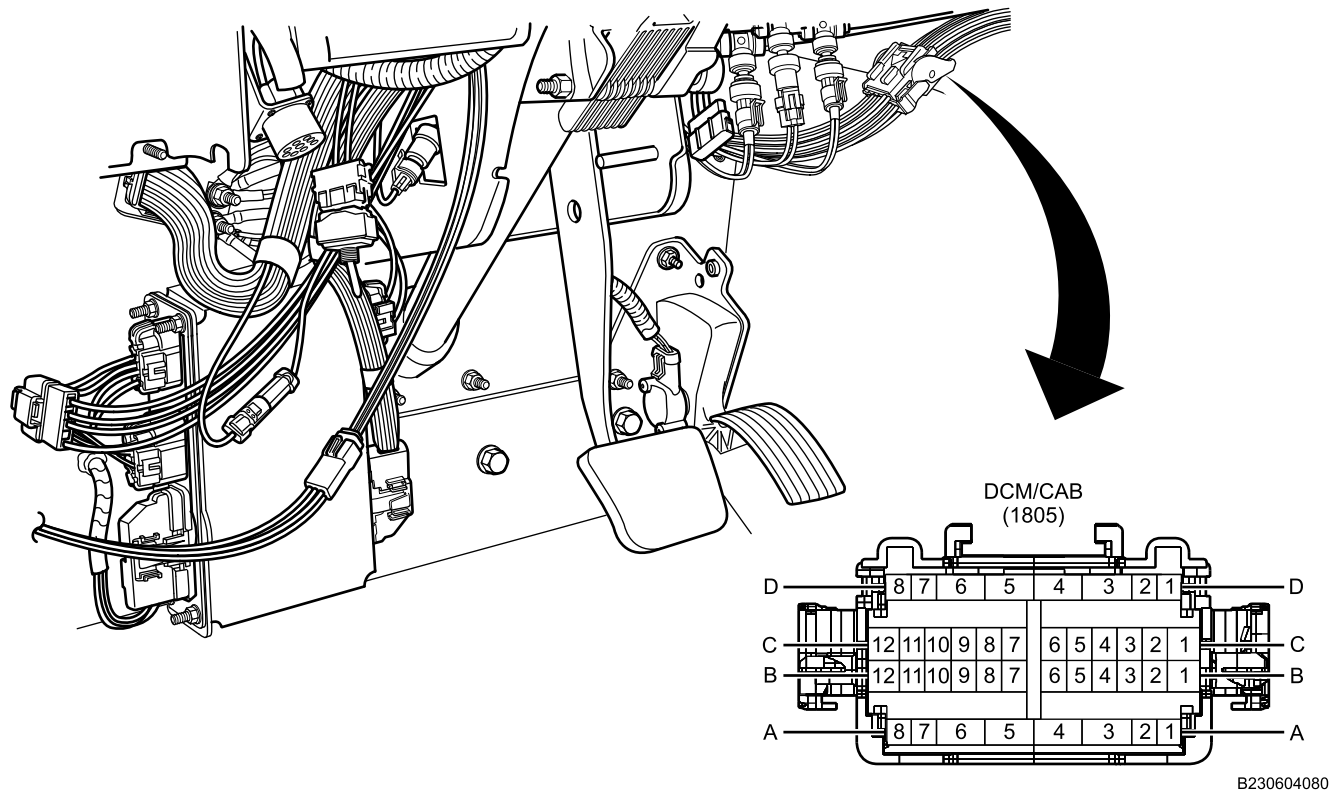


Figure 4. Steering Column/IP Harness Connector Under Center IP.

24. Disconnect steering column/IP harness connector 1805/1800. Refer to Figure 4.
25. Have assistant activate flash-to-pass with turn signal lever (TM 9-2355-106-10).
26. Measure resistance between connector 1805 terminals A8 and A4 with multimeter. Refer to Figure 4.

CONDITION/INDICATION

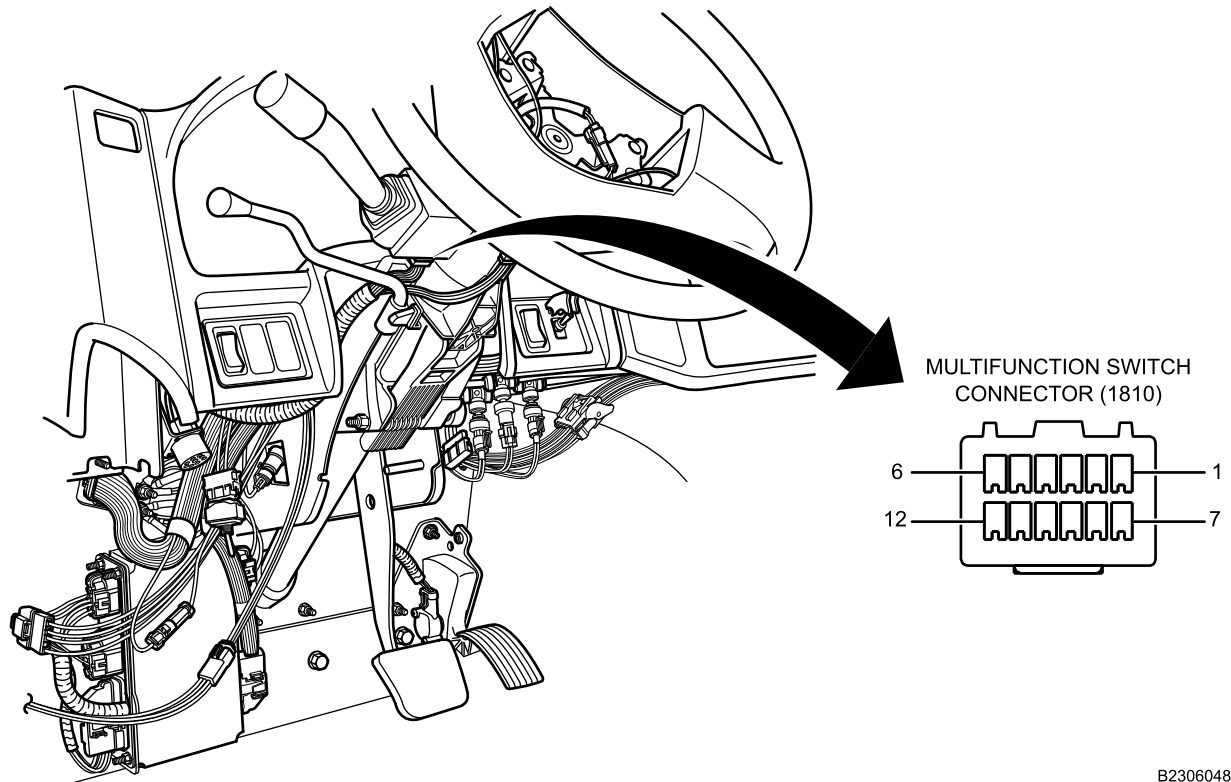
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 42.
 NO Go to next step.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

27. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).
 28. Disconnect turn signal switch connector 1810. Refer to Figure 5.



B230604808

Figure 5. Turn Signal Switch Connector on Steering Column.

29. Measure resistance between the following pairs of connector 1805 and connector 1810 terminals with multimeter. Refer to Figure 4 and Figure 5.
- 1805 terminal A4 and 1810 terminal 7
 - 1805 terminal A8 and 1810 terminal 4

CONDITION/INDICATION

Does multimeter read less than 5 ohms for either test?

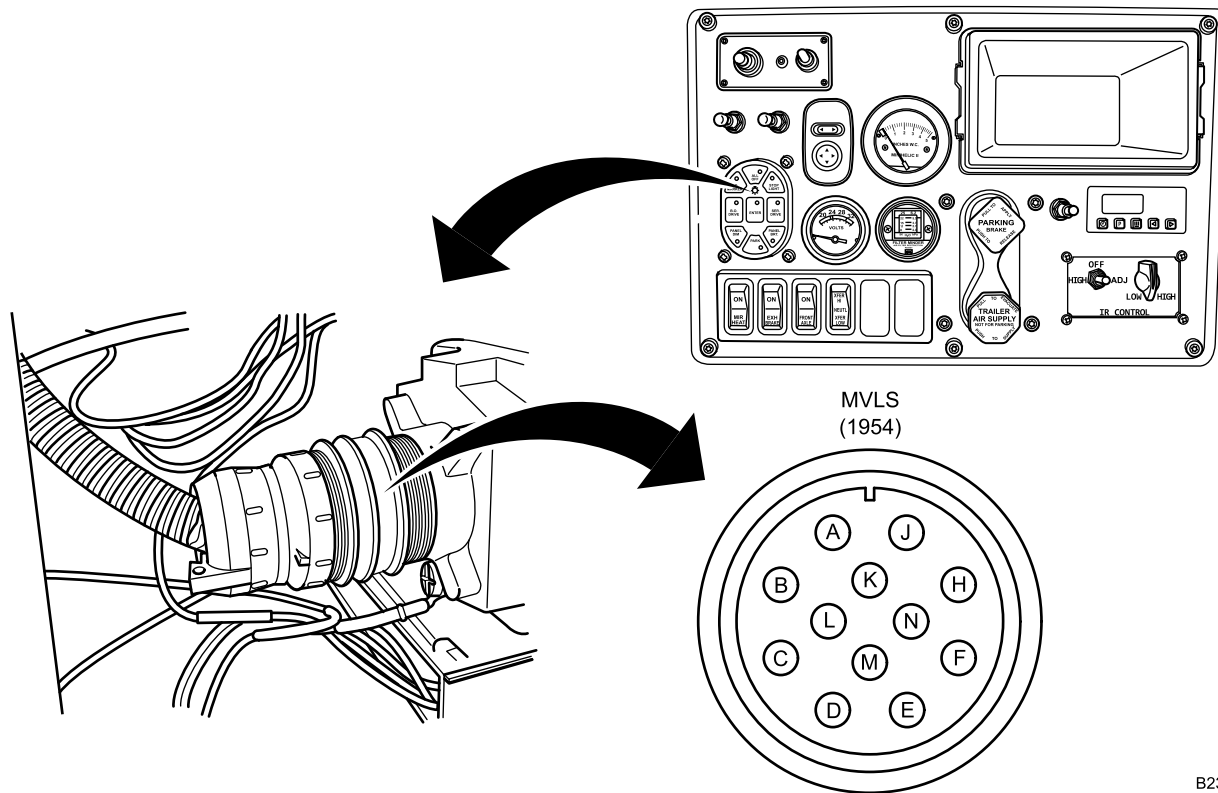
DECISION

YES Go to Step 46.
 NO Go to Step 44.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

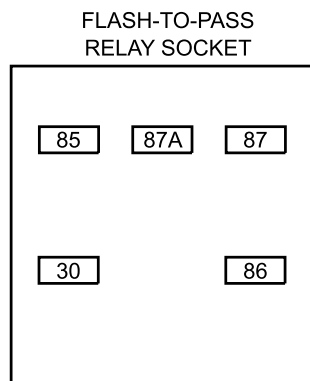
30. Turn ignition switch OFF (TM 9-2355-106-10).
31. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
32. Disconnect MVLS connector 1954. Refer to Master Vehicle Light Switch (MVLS) Removal and Installation (WP 0303). Refer to Figure 6.



B230604571

Figure 6. MVLS Connector in Center IP.

33. Measure resistance between relay socket terminal 86 and MVLS connector 1954 terminal J with multimeter. Refer to Figure 6 and Figure 7.



B230611212

Figure 7. Flash-to-Pass Relay in Center IP.

CONDITION/INDICATION

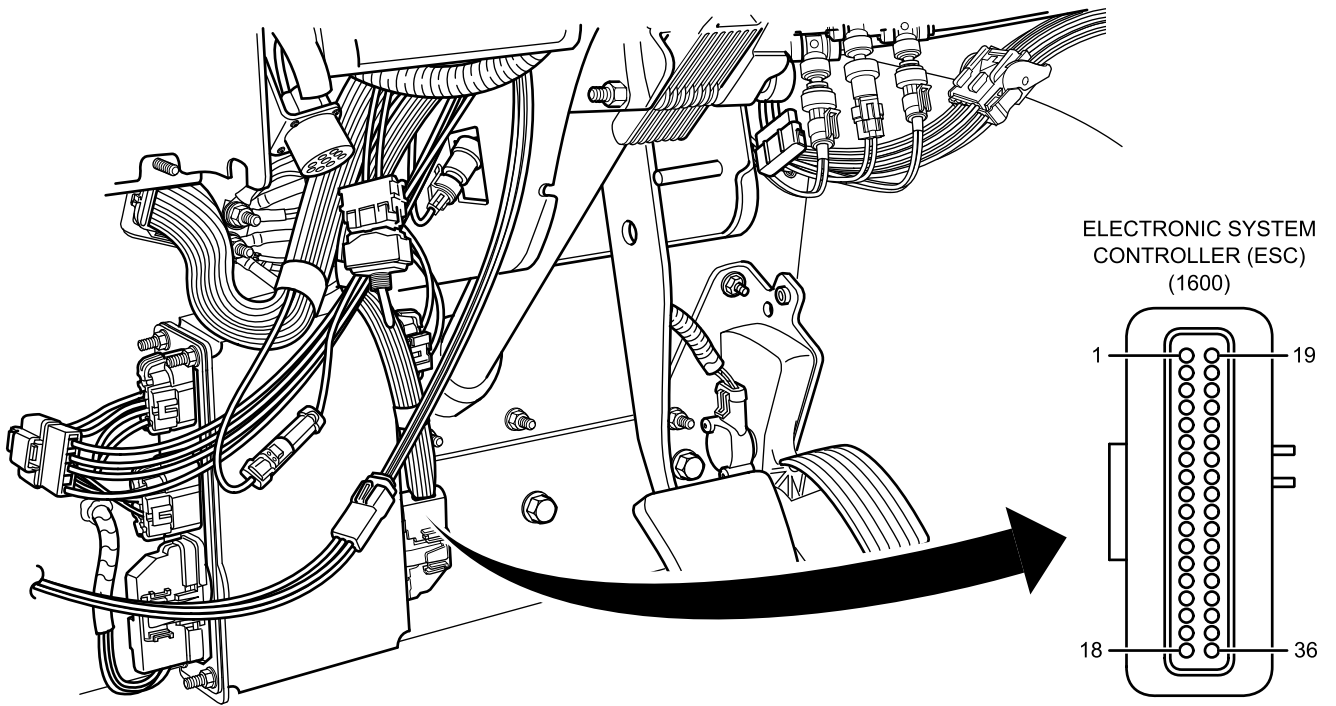
Does multimeter read less than 5 ohms?

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Master Vehicle Light Switch (MVLS) Troubleshooting Procedures (WP 0092).
NO Go to Step 43.

STEP

34. Turn ignition switch OFF (TM 9-2355-106-10).
35. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
36. Disconnect ESC connector 1600. Refer to Figure 8.



B230603692

Figure 8. ESC Connectors Under Left Side IP.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

37. Measure resistance between relay socket terminal 30 and ground with multimeter. Refer to Figure 9.

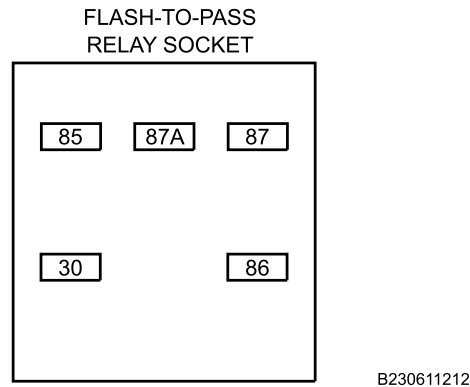


Figure 9. Flash-to-Pass Relay in Center IP.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

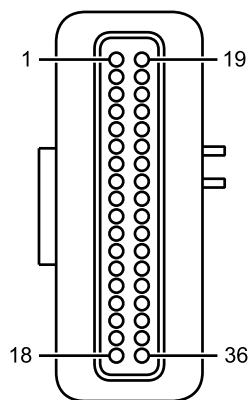
DECISION

YES Go to Step 43.
NO Go to next step.

STEP

38. Measure resistance between relay socket terminal 30 and ESC connector 1600 terminal 21 with multimeter. Refer to Figure 9 and Figure 10.

ELECTRONIC SYSTEM CONTROLLER (ESC)
(1600)



B230603176

Figure 10. Connector 1600.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

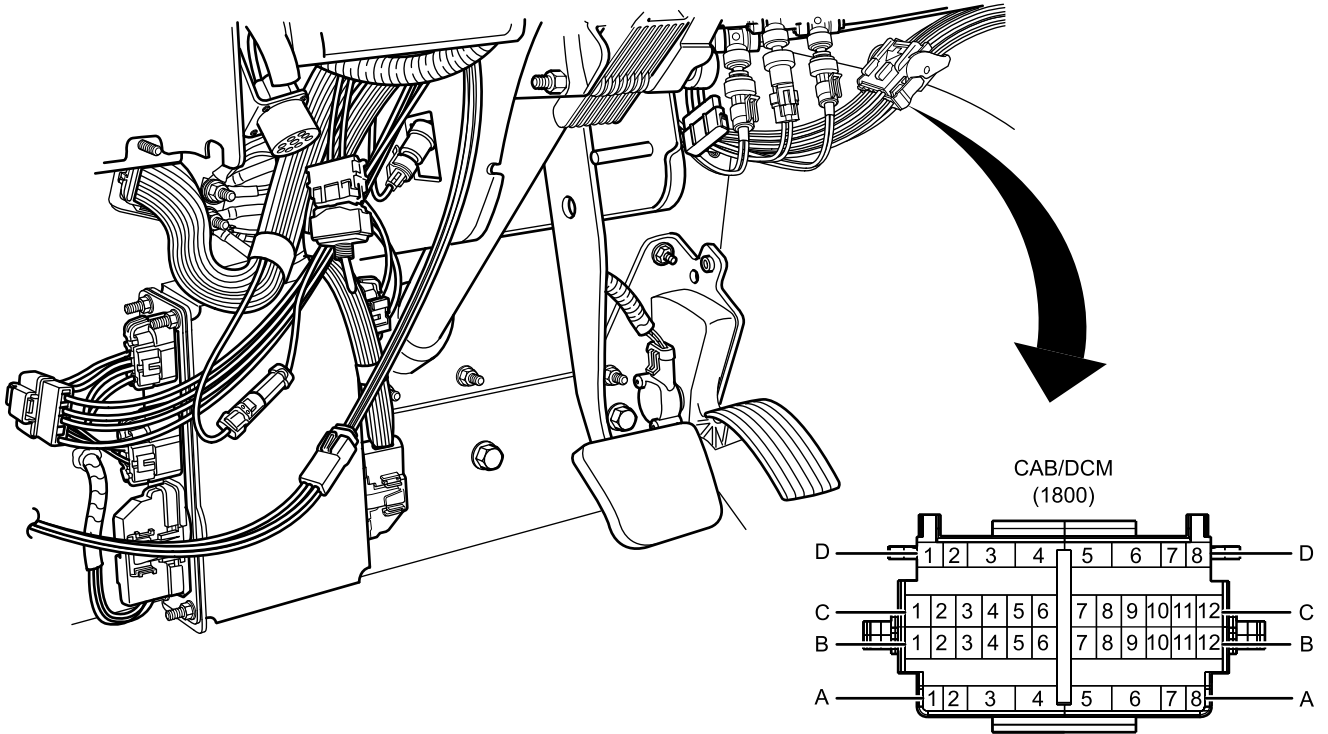
FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to Step 45.
- NO Go to Step 43.

STEP

39. Disconnect steering column/IP harness connector 1800/1805. Refer to Figure 11.



B230603796

Figure 11. Steering Column/IP Harness Connector Under Center IP.

40. Measure resistance between connector 1800 terminal A8 and ground and 1800 terminal A4 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for either terminal?

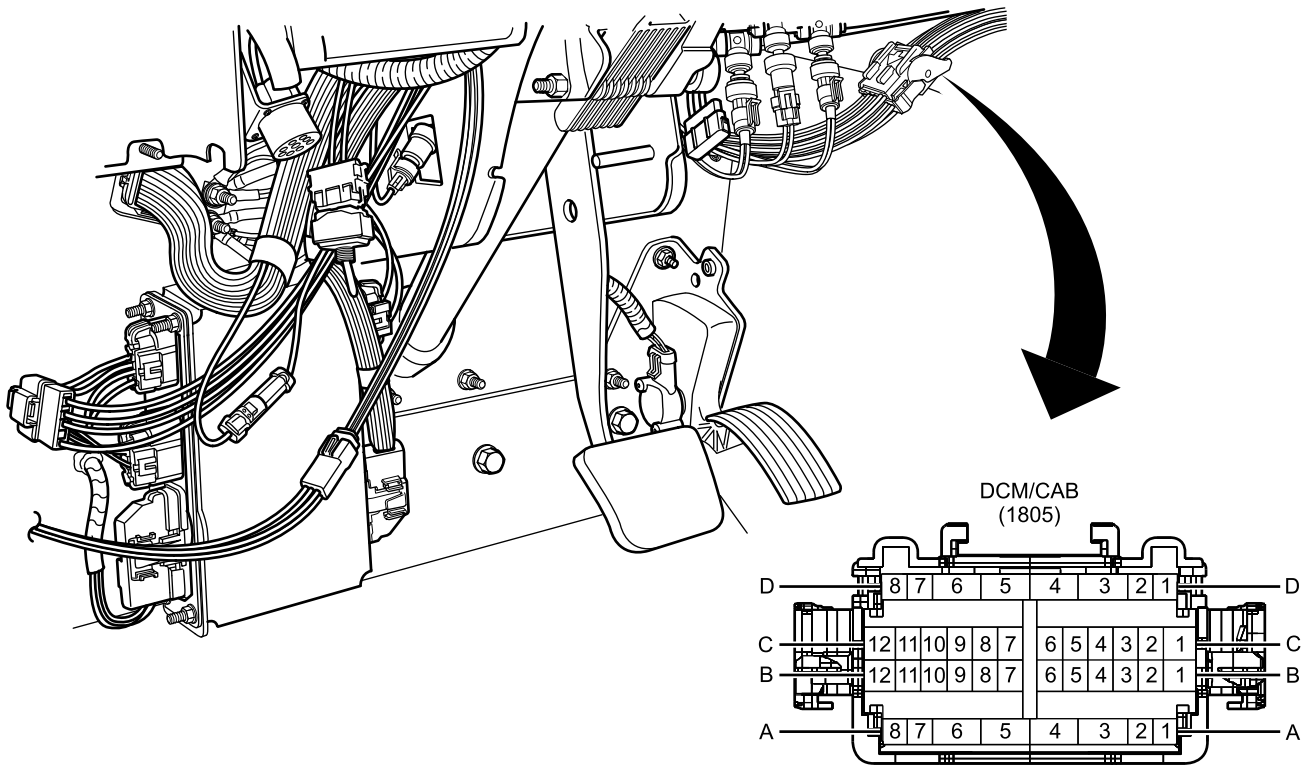
DECISION

- YES Go to Step 43.
- NO Go to next step.

STEP

41. Measure resistance between connector 1805 terminal A8 and ground and 1805 terminal A4 and ground with multimeter. Refer to Figure 12.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604080

Figure 12. Steering Column/IP Harness Connector Under Center IP.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for either terminal?

DECISION

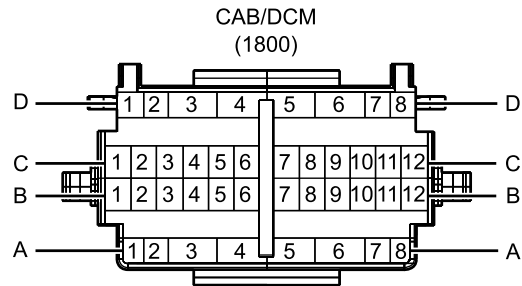
YES Go to Step 44.

NO Go to Step 46.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

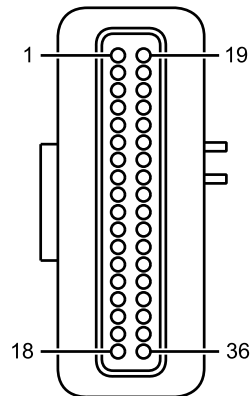
42. Measure resistance between connector 1800 terminal A4 and ESC connector 1600 terminal 3 with multimeter. Refer to Figure 13 and Figure 14.



B230603802

Figure 13. Connector 1800.

ELECTRONIC SYSTEM CONTROLLER (ESC)
(1600)



B230603176

Figure 14. Connector 1600.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Electronic System Controller (ESC) Troubleshooting Procedure (WP 0068).
NO Go to Step 43.

MALFUNCTION

- 43. Instrument panel wiring harness is faulty.

FLASH-TO-PASS TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace instrument panel wiring harness. Refer to Instrument Panel Wiring Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 44. Steering column wiring harness is faulty.

ACTION

Replace steering column wiring harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 45. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 46. Turn signal switch is faulty.

ACTION

Replace turn signal switch. Refer to Multifunction Turn Signal Switch Assembly Removal and Installation (WP 0323). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 47. Flash-to-pass relay is faulty.

ACTION

Replace flash-to-pass relay. Refer to Instrument Panel Center Relay Removal and Installation (WP 0318). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
CRUISE CONTROL OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0067

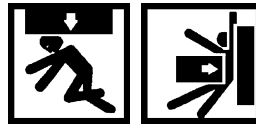
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0006
WP 0011
WP 0057
WP 0168

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Determine if any of the following systems are malfunctioning:

- Antilock Brake System (ABS)
- Brake switch
- Drivetrain data link

CONDITION/INDICATION

Other systems malfunctioning.

CORRECTIVE ACTION

Identify and repair condition causing several features to be inoperative. Refer to Vehicle Troubleshooting Symptom Index (WP 0005) or Engine Diagnostic Trouble Code (DTC) Index (WP 0006).

1. Connect Maintenance Support Device (MSD) to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. With MSD, operate cruise control switch while observing cruise control switch inputs on MSD.

Cruise control switches are not functioning properly.

Refer to Speed Control Command Switches (SCCS) Troubleshooting Procedure (WP 0057).

1. With MSD, verify brake switches are not active inputs to Electronic System Controller (ESC) with brake pedal not pressed.

MSD shows one or more brake switches active when brake pedal is not pressed.

CRUISE CONTROL OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Refer to Brake Switch Circuits Troubleshooting Procedure (WP 0168).

1. With MSD, verify cruise commands from ESC to Engine Control Module (ECM).

Cruise control command messages from ESC to ECM not being transmitted.

Refer to Multiplexing Data Link Troubleshooting Procedure (WP 0067).

END OF WORK PACKAGE

FIELD MAINTENANCE

ELECTRIC HORNS OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0111
WP 0112
WP 0333
WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK) (WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0011
WP 0108
WP 0109
WP 0110

Drawings Required

WP 0789, Figure 20

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.

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

ELECTRIC HORNS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**STEP**

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).
4. Firmly push horn pad on steering wheel (TM 9-2355-106-10).

CONDITION/INDICATION

Horns are on without pressing horn pad.

CORRECTIVE ACTION

Refer to Electric Horns Sound Without Pressing Horn Pad Troubleshooting (WP 0112).

CONDITION/INDICATION

Only one horn does not operate.

CORRECTIVE ACTION

Refer to Single Horn Fault Troubleshooting (WP 0108).

1. Turn ignition switch OFF (TM 9-2355-106-10).
2. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
3. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
4. Turn MAIN POWER switch ON (TM 9-2355-106-10).
5. Turn ignition switch ON (TM 9-2355-106-10).
6. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).
7. With MSD, determine if Electronic System Controller (ESC) is receiving horn switch input when horn pad is pressed.

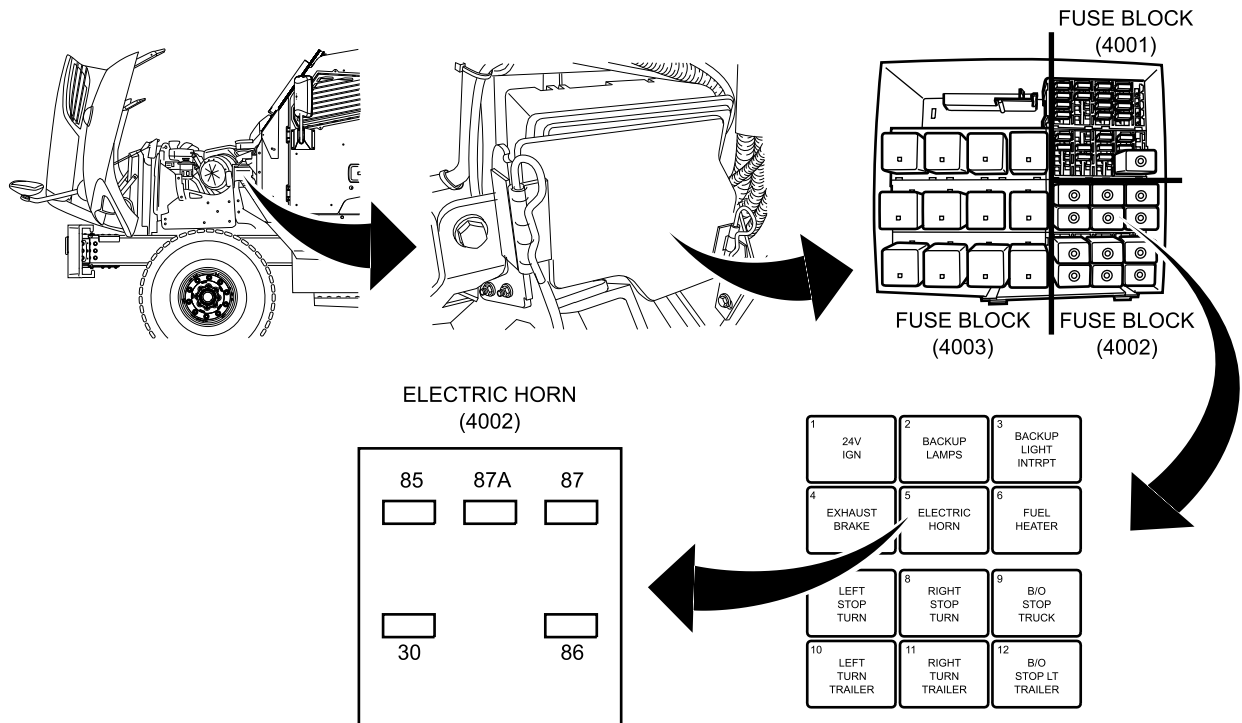
ESC is not receiving horn switch input.

Refer to Electric Horns Switch Troubleshooting (WP 0109).

1. Turn ignition switch OFF (TM 9-2355-106-10).
2. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

ELECTRIC HORNS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

3. Remove ELECTRIC HORN relay from underhood power distribution center. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333) and Figure 1.



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Figure 1. Left Engine Compartment Area.

4. Turn MAIN POWER switch ON (TM 9-2355-106-10).
5. Turn ignition switch ON (TM 9-2355-106-10).
6. Put MVLS in PARK mode (TM 9-2355-106-10).
7. Measure DC voltage between ELECTRIC HORN relay socket terminals 86 and 85 with multimeter. Refer to Figure 1.

Multimeter reads less than 11.5V.

Refer to Master Vehicle Light Switch (MVLS) Horn Enable Circuit Troubleshooting (WP 0110).

1. Turn ignition switch OFF (TM 9-2355-106-10).
2. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
3. Connect jumper wire between ELECTRIC HORN RELAY socket terminals 30 and 87. Refer to Figure 1.
4. Turn MAIN POWER switch ON (TM 9-2355-106-10).
5. Turn ignition switch ON (TM 9-2355-106-10).
6. Put MVLS in PARK mode (TM 9-2355-106-10).

ELECTRIC HORNS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

7. Firmly push horn pad on steering wheel (TM 9-2355-106-10).

Horns operate with jumper wire installed.

Replace ELECTRIC HORN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

Horns do not operate with jumper wire installed.

Remove jumper wire from ELECTRIC HORN relay socket and proceed to Horn Circuit Troubleshooting (WP 0111).

END OF WORK PACKAGE

FIELD MAINTENANCE

SINGLE ELECTRIC HORN FAULT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0107
WP 0402

WP 0424

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 20

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the horn system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Electric Horns Operational Checkout Procedure (WP 0107) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**STEP****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.

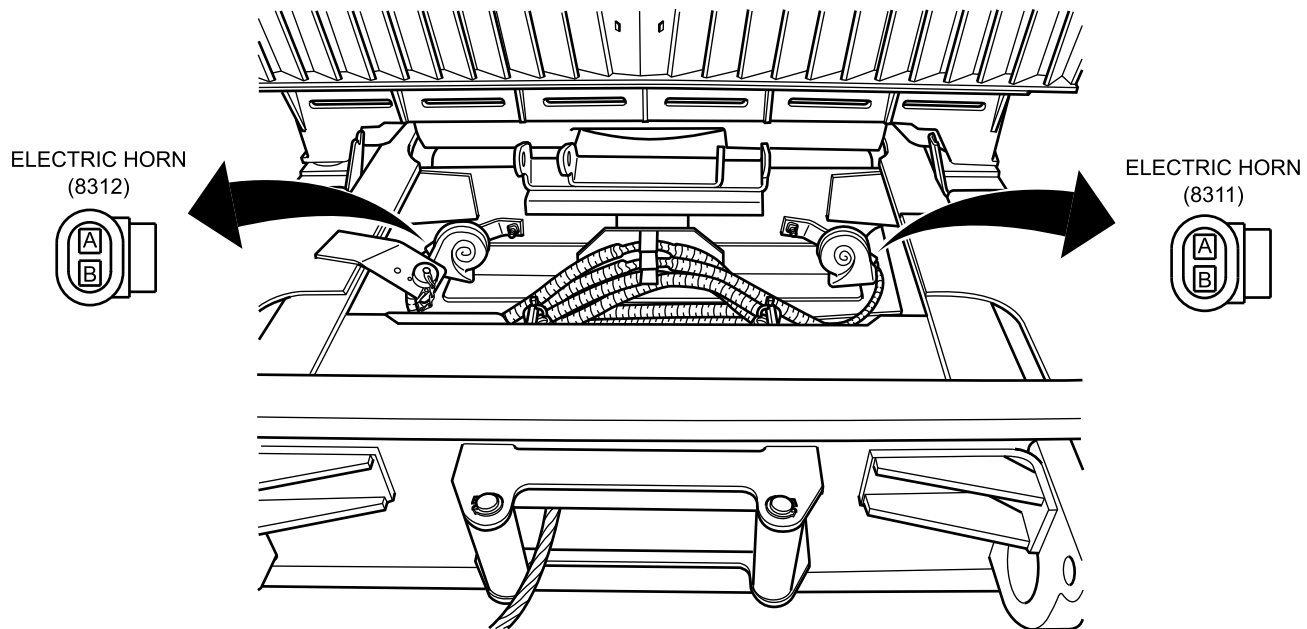
SINGLE ELECTRIC HORN FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. If right side horn does not operate, disconnect connector 8312 from horn. Refer to Figure 1.



B230603739

Figure 1. Vehicle Front Area.

2. If left side horn does not operate, disconnect connector 8311 from horn. Refer to Figure 1.
3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).

NOTE

Use step 6 for right horn; step 7 for left horn.

6. If right side horn does not operate, measure DC voltage between connector 8312 terminals A and B with a multimeter while maintainer firmly pushes horn pad on steering wheel (TM 9-2355-106-10). Refer to Figure 1.
7. If left side horn does not operate, measure DC voltage between connector 8311 terminals A and B with a multimeter while maintainer firmly pushes horn pad on steering wheel (TM 9-2355-106-10). Refer to Figure 1.

SINGLE ELECTRIC HORN FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 11.5V?

DECISION

NO Go to Step 8.
YES Go to Step 9.

MALFUNCTION

- 8. Horn is faulty.

ACTION

Replace horn. Refer to Electric Horns Removal and Installation (WP 0402). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 9. Harness is faulty.

ACTION

Replace harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0534
WP 0565
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0107
WP 0319
WP 0324
WP 0325
WP 0353
WP 0403

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 20

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the horn system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Electric Horns Operational Checkout Procedure (WP 0107) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**STEP****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.

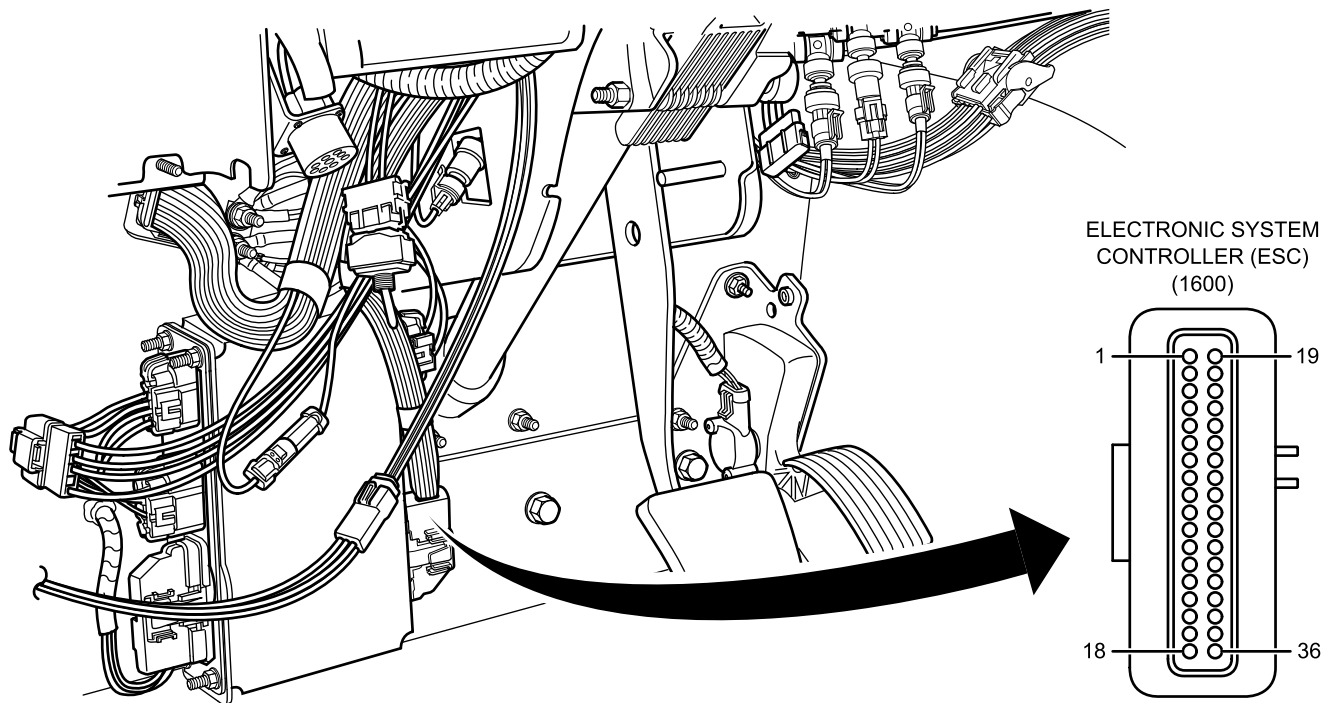
ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 1600. Refer to Figure 1.



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Figure 1. Driver Controls Area.

2. Measure resistance between connector 1600 terminals 3 and 13 with multimeter while firmly pushing horn button assembly on steering wheel (TM 9-2355-106-10). Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to next step.
YES Go to Step 19.

STEP

3. Disconnect connector 1805. Refer to Figure 2.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

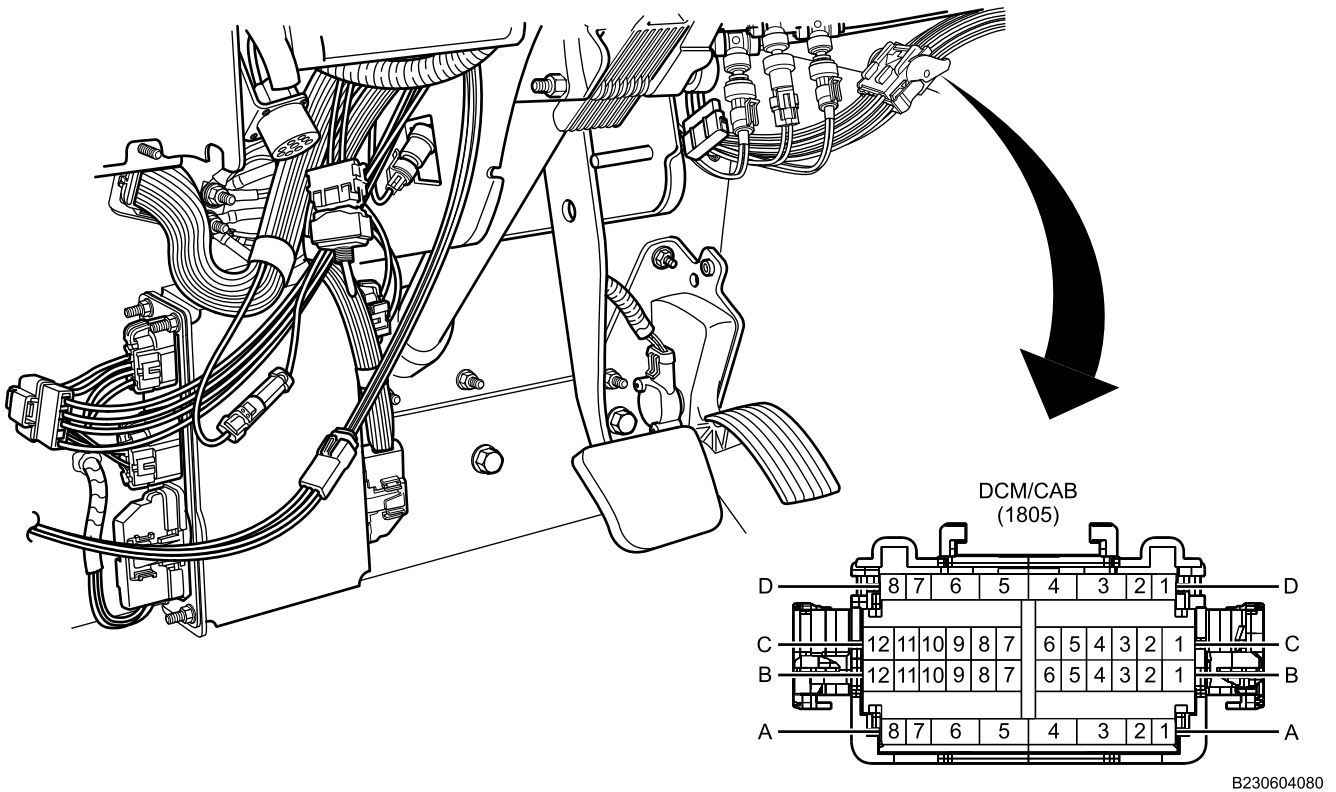


Figure 2. Driver Controls Area.

4. Measure resistance between connector 1805 terminals A4 and B10 with multimeter while firmly pushing horn button assembly on steering wheel (TM 9-2355-106-10). Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to next step.
 YES Go to Step 31.

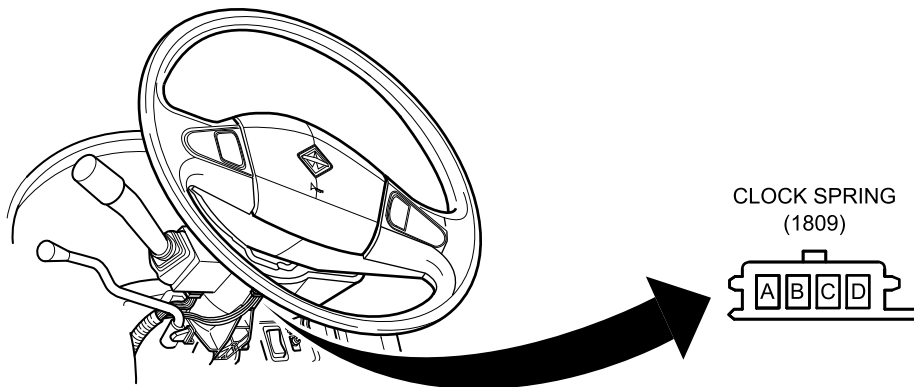
ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).

CAUTION

Do not use excessive force to disconnect clock spring connector from clock spring. Gently pry on connector locking tab to disconnect connector. Failure to comply may cause damage to clock spring.

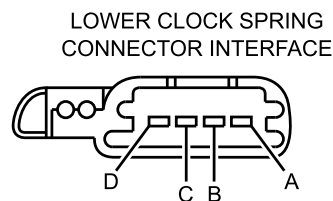
6. Disconnect connector 1809. Refer to Figure 3.



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Figure 3. Driver Controls Area.

7. With assistant, measure resistance between lower clock spring connector interface terminals A and D while firmly pushing horn button assembly on steering wheel (TM 9-2355-106-10). Refer to Figure 4.



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Figure 4. Lower Clock Spring Connector Interface.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

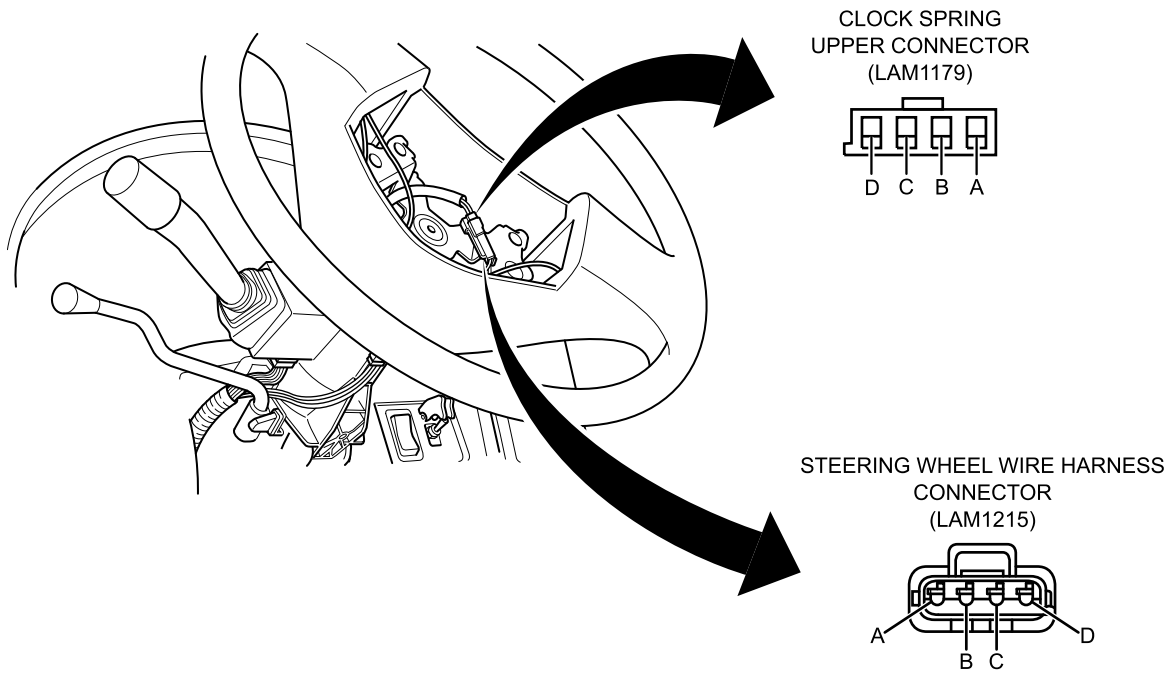
NO Go to next step.
YES Go to Step 32.

STEP

8. Remove horn button assembly. Refer to Horn Button Assembly Removal and Installation (WP 0403).

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

9. Disconnect connector LAM1179 from connector LAM1215. Refer to Figure 5.

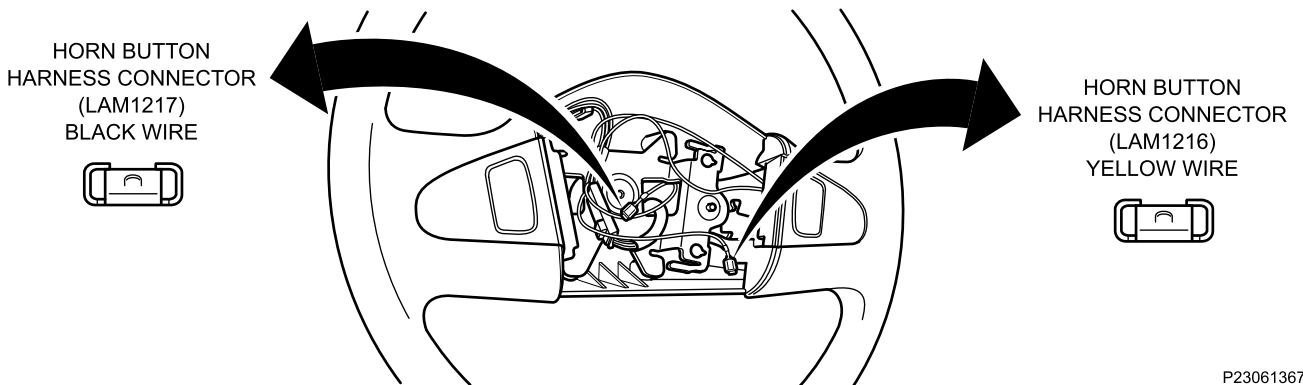


P230613675

Figure 5. Driver Controls Area.

10. Connect a jumper wire between connector LAM1215 terminals A and D. Refer to Figure 5.

11. Measure resistance between connector LAM1216 and connector LAM1217 with multimeter. Refer to Figure 6.



P230613673

Figure 6. Steering Wheel Area.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 33.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Remove jumper wire from connector LAM1215. Refer to Figure 7.

STEERING WHEEL WIRE HARNESS CONNECTOR
(LAM1215)

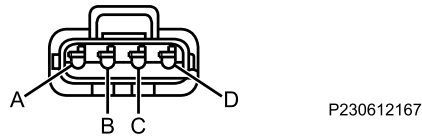
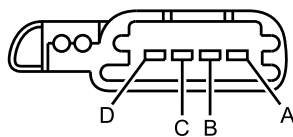


Figure 7. Connector LAM1215.

13. Connect a jumper wire between connector LAM1179 terminals A and D. Refer to Figure 9.
14. Measure resistance between lower clock spring connector interface terminals A and D with multimeter. Refer to Figure 8.

LOWER CLOCK SPRING
CONNECTOR INTERFACE



P230612876

Figure 8. Lower Clock Spring Connector Interface.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

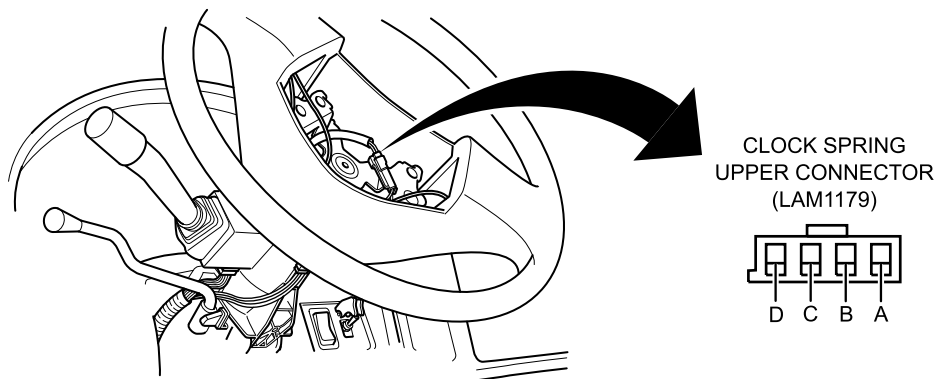
YES Go to Step 29.
NO Go to Step 30.

STEP

15. Remove horn button assembly from steering wheel. Refer to Horn Button Assembly Removal and Installation (WP 0403).

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

16. Disconnect connector LAM1179. Refer to Figure 9.



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Figure 9. Driver Controls Area.

17. Connect a jumper wire between connector LAM1179 terminals A and D. Refer to Figure 9.

18. Measure resistance between lower clock spring connector interface terminals A and D with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

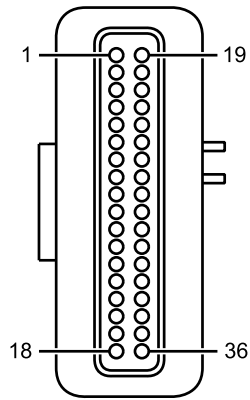
DECISION

NO Go to Step 30.
 YES Go to Step 29.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

19. Measure resistance between connector 1600 terminal 13 and ground with multimeter. Refer to Figure 10.

ELECTRONIC SYSTEM CONTROLLER (ESC)
(1600)



B230603176

Figure 10. Connector 1600.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to next step.

YES Go to Step 28.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

20. Disconnect connector 1805. Refer to Figure 11.

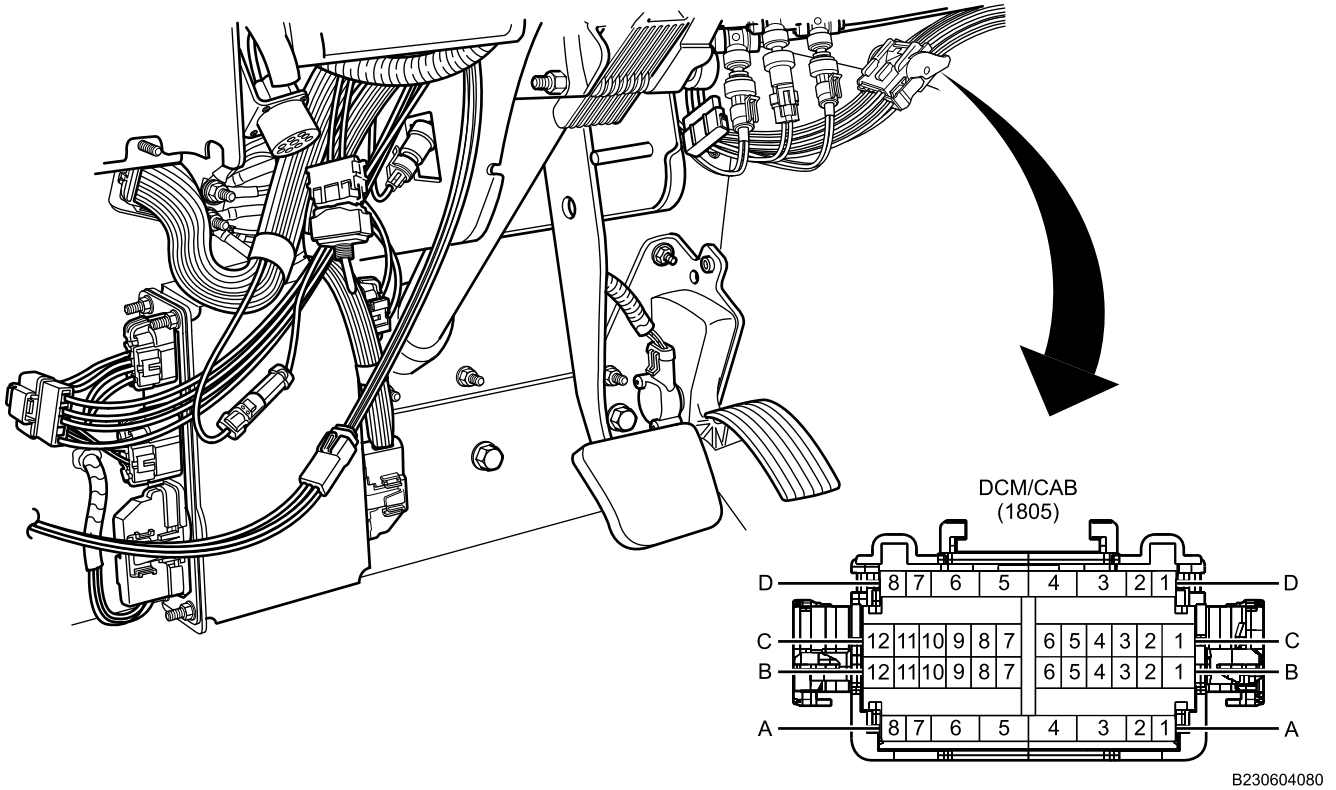


Figure 11. Driver Controls Area.

21. Measure resistance between connector 1805 terminal B10 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

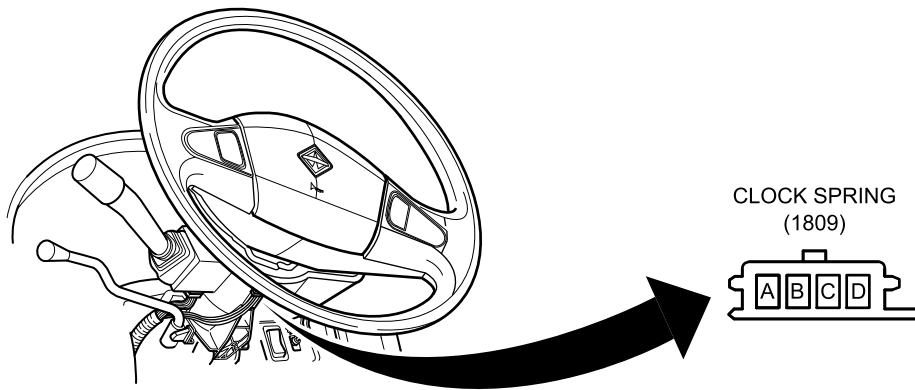
NO Go to next step.
 YES Go to Step 31.

STEP

22. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

23. Disconnect lower clock spring connector 1809. Refer to Figure 12.



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Figure 12. Driver Controls Area.

24. Measure resistance between connector 1809 terminal D and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

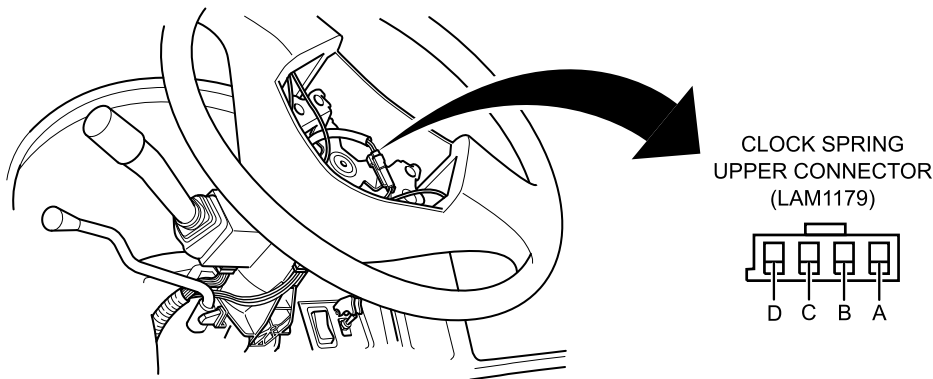
Does multimeter read OL?

DECISION

NO Go to next step.
 YES Go to Step 32.

STEP

25. Remove horn button assembly from steering wheel. Refer to Horn Button Assembly Removal and Installation (WP 0403).
 26. Disconnect connector LAM1179. Refer to Figure 13.



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Figure 13. Driver Controls Area.

27. Measure resistance between connector 1809 terminal D and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 30.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

YES Go to Step 29.

MALFUNCTION

- 28. Electronic System Controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 29. Horn button assembly is faulty.

ACTION

Replace horn button assembly. Refer to Horn Button Assembly Removal and Installation (WP 0403). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 30. Clock spring is faulty.

ACTION

Replace clock spring. Refer to Steering Wheel and Clock Spring Removal and Installation (WP 0534). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 31. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 32. Harness is faulty.

ACTION

Replace harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return vehicle to service.

ELECTRIC HORNS SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 33. Harness is faulty.

ACTION

Replace harness. Refer to Steering Wheel Wire Harness Removal and Installation (WP 0325).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0107
WP 0303
WP 0319
WP 0333
WP 0335

Drawings Required

WP 0789, Figure 20

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the horn system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Electric Horns Operational Checkout Procedure (WP 0107) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE

STEP

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.

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.

CAUTION

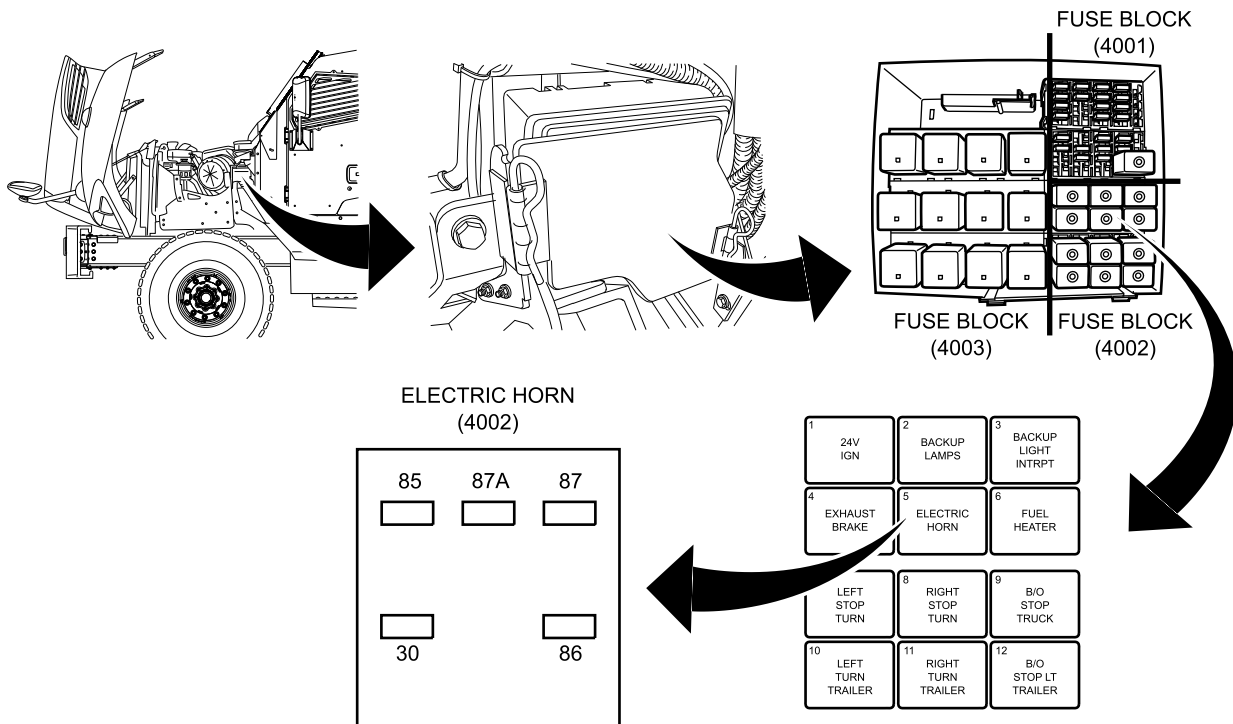
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

MASTER VEHICLE LIGHT SWITCH (MVL) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Remove ELECTRIC HORN relay from underhood power distribution center (WP 0333). Refer to Figure 1.



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Figure 1. Left Engine Compartment Area.

2. Measure resistance between ELECTRIC HORN relay socket terminal 85 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 11.
 YES Go to Step 3.

MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

3. Disconnect connector 1701. Refer to Figure 2.

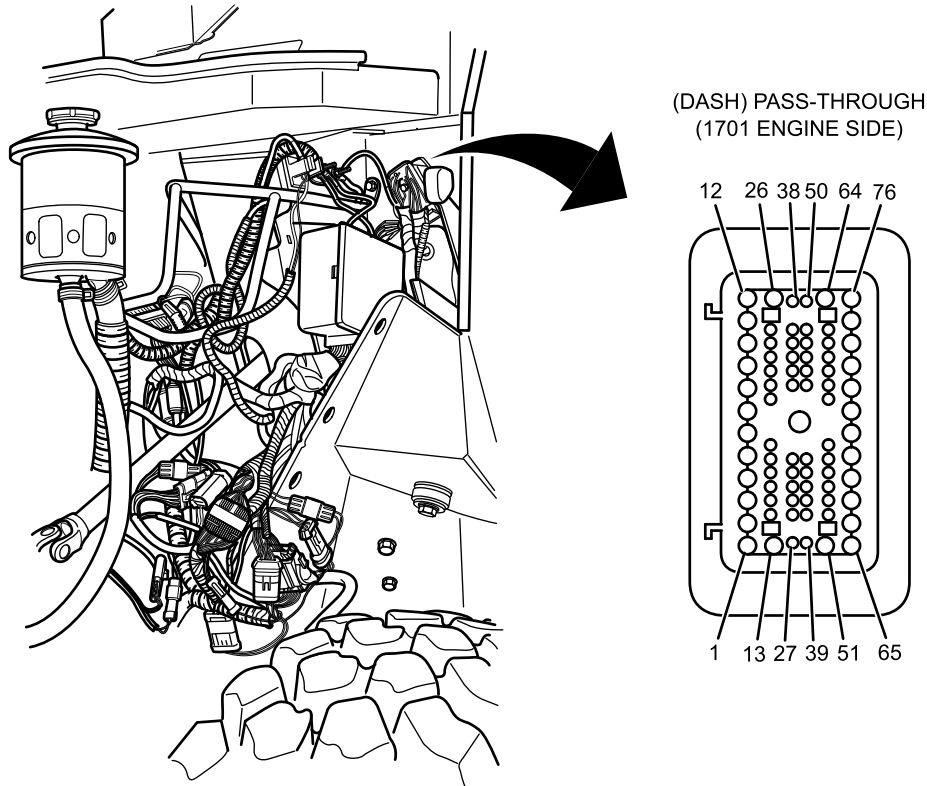


Figure 2. Left Side Engine Compartment Area.

4. Measure resistance between ELECTRIC HORN relay socket terminal 86 and connector 1701 (engine side) terminal 27 with multimeter. Refer to Figure 1 and Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 11.
 YES Go to Step 5.

B230604025

MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Measure resistance between ELECTRIC HORN relay socket terminal 86 and ground with multimeter. Refer to Figure 3.

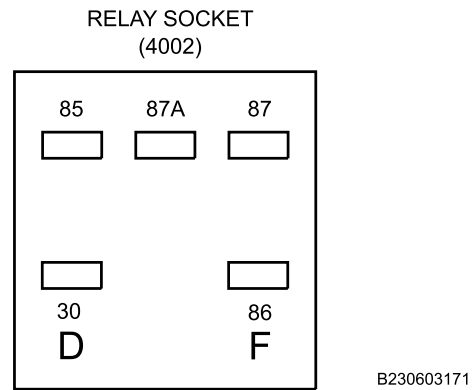


Figure 3. ELECTRIC HORN Relay Socket.

CONDITION/INDICATION

Does multimeter read OL?

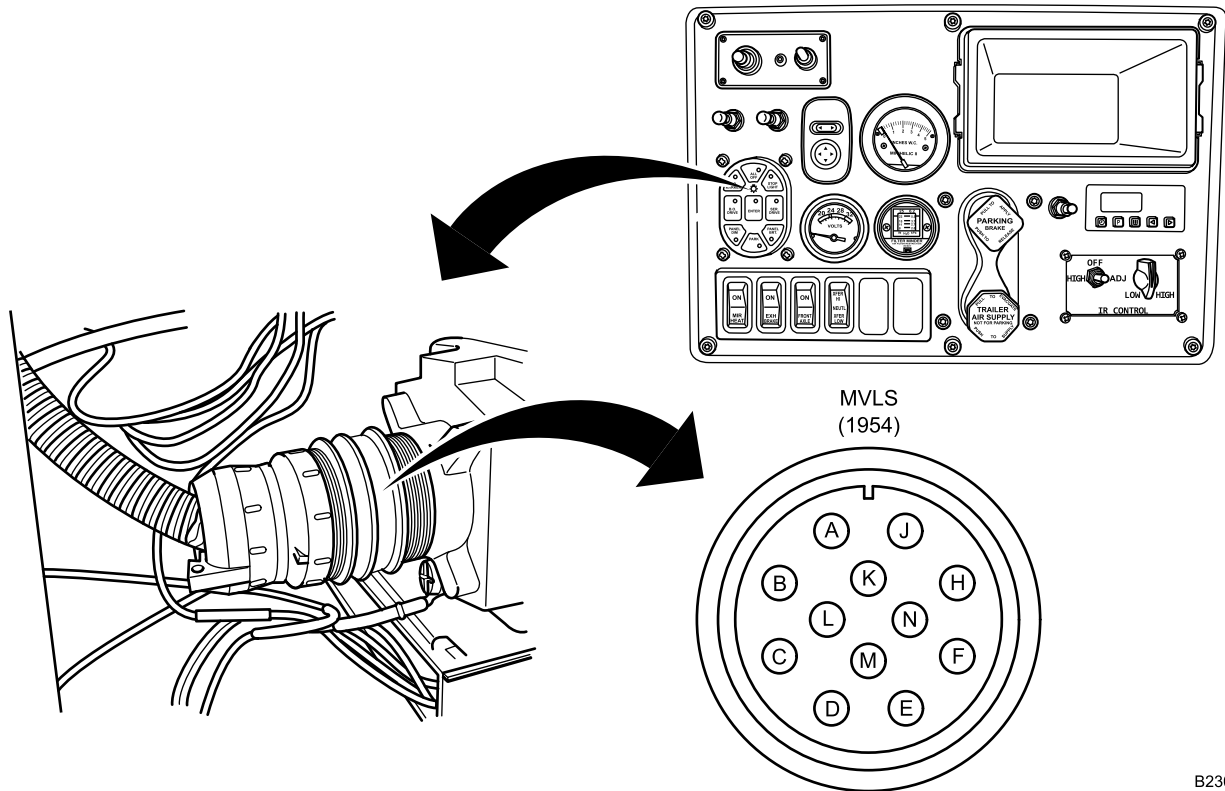
DECISION

NO Go to Step 11.
YES Go to Step 6.

MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

6. Remove MVLS. Refer to Master Vehicle Light Switch (MVLS) Removal and Installation (WP 0303). Refer to Figure 4.

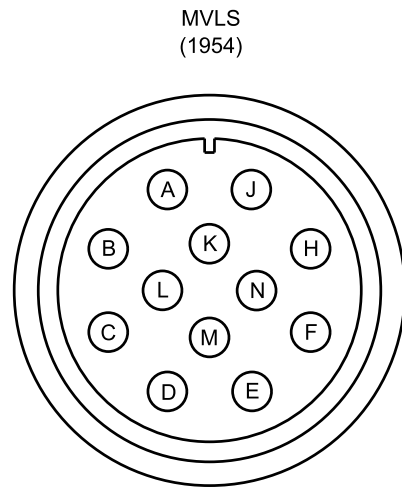


B230604571

Figure 4. Center Instrument Panel Area.

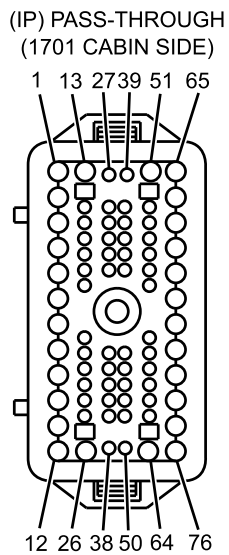
MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

7. Measure resistance between connector 1954 terminal J and connector 1701 terminal 27 with multimeter. Refer to Figure 5 and Figure 6.



B230603184

Figure 5. Connector 1954.



B230603874

Figure 6. Instrument Panel (IP) Pass-Through Connector 1701.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 10.
YES Go to Step 8.

MASTER VEHICLE LIGHT SWITCH (MVLS) HORN ENABLE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

8. Measure resistance between connector 1701 terminal 27 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 10.

YES Go to Step 9.

MALFUNCTION

- 9. MVLS troubleshooting required.

ACTION

Refer to Master Vehicle Light Switch (MVLS) Troubleshooting Procedure (WP 0092).

END OF TEST**MALFUNCTION**

- 10. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 11. Harness is faulty.

ACTION

Replace harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0424
WP 0597
WP 0598
WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0107
WP 0333
WP 0335
WP 0353
WP 0402

Drawings Required

WP 0789, Figure 20

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the horn system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Electric Horns Operational Checkout Procedure (WP 0107) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**STEP****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.

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.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

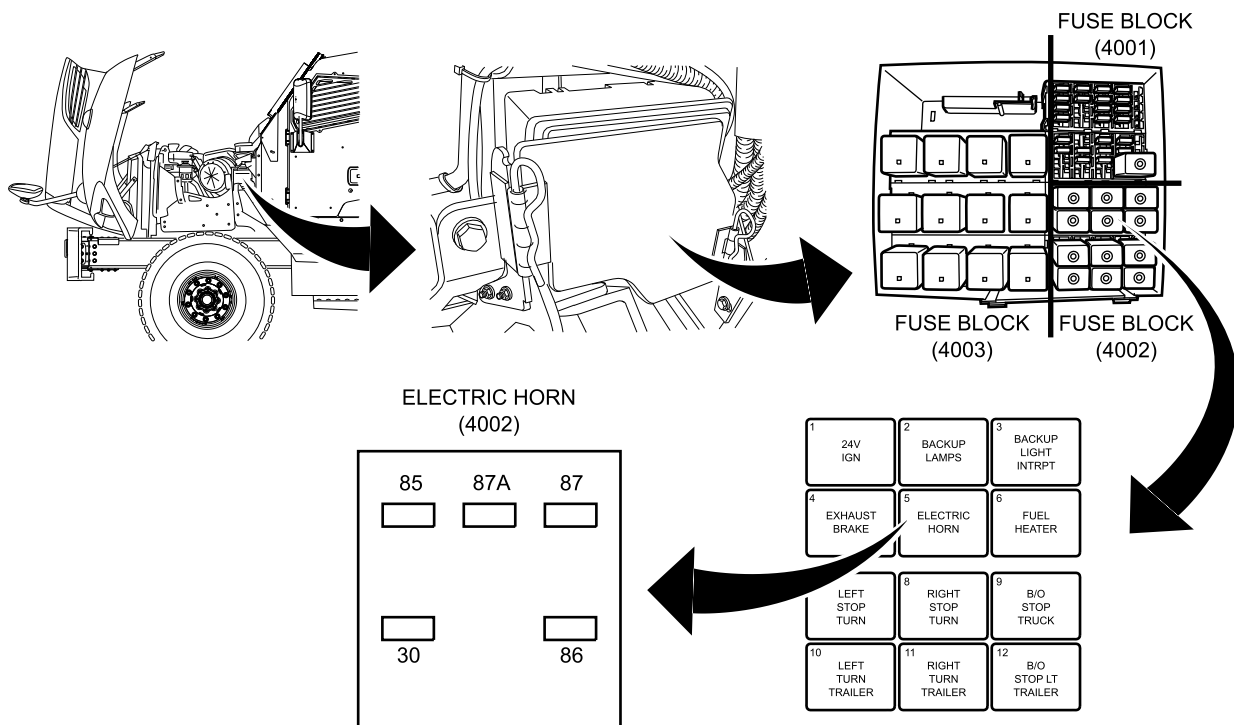
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

Remove cable lock straps as necessary to perform procedure. Note position and size of cable lock straps to aid installation.

Cable lock straps not shown in some illustrations for clarity.

1. Remove electric horn relay (TM 9-2355-106-10).
2. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).
3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between ELECTRIC HORN relay socket terminal 30 and ground with multimeter, while maintainer firmly pushes horn pad on steering wheel (TM 9-2355-106-10). Refer to Figure 1.



B230605311

Figure 1. Left Engine Compartment Area.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read more than 11.5V?

DECISION

YES Go to Step 11.

NO Go to Step 6.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Disconnect connector 4007. Refer to Figure 2.

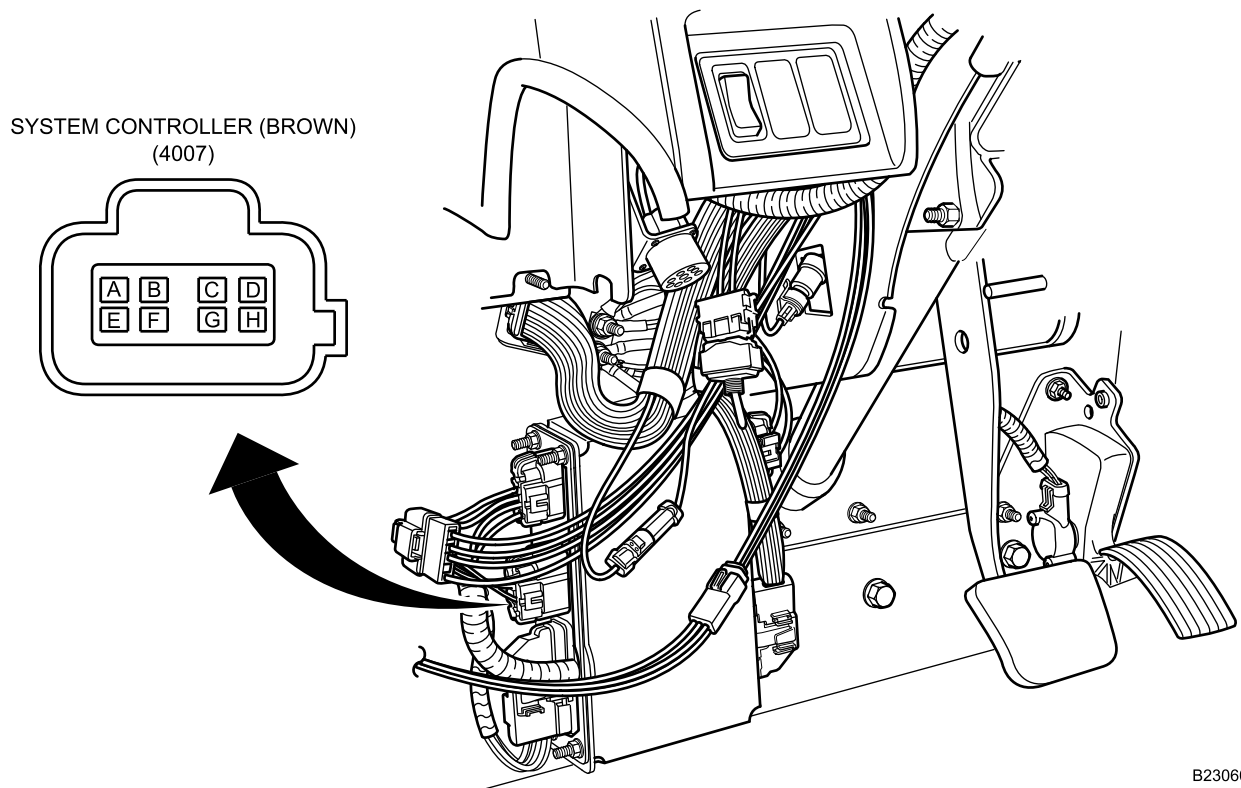


Figure 2. Driver Controls Area.

9. Measure resistance between connector 4007 terminal E and ELECTRIC HORN relay socket terminal 30 with multimeter. Refer to Figure 2 and Figure 1.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 26.
YES Go to Step 10.

STEP

10. Measure resistance between connector 4007 terminal E and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

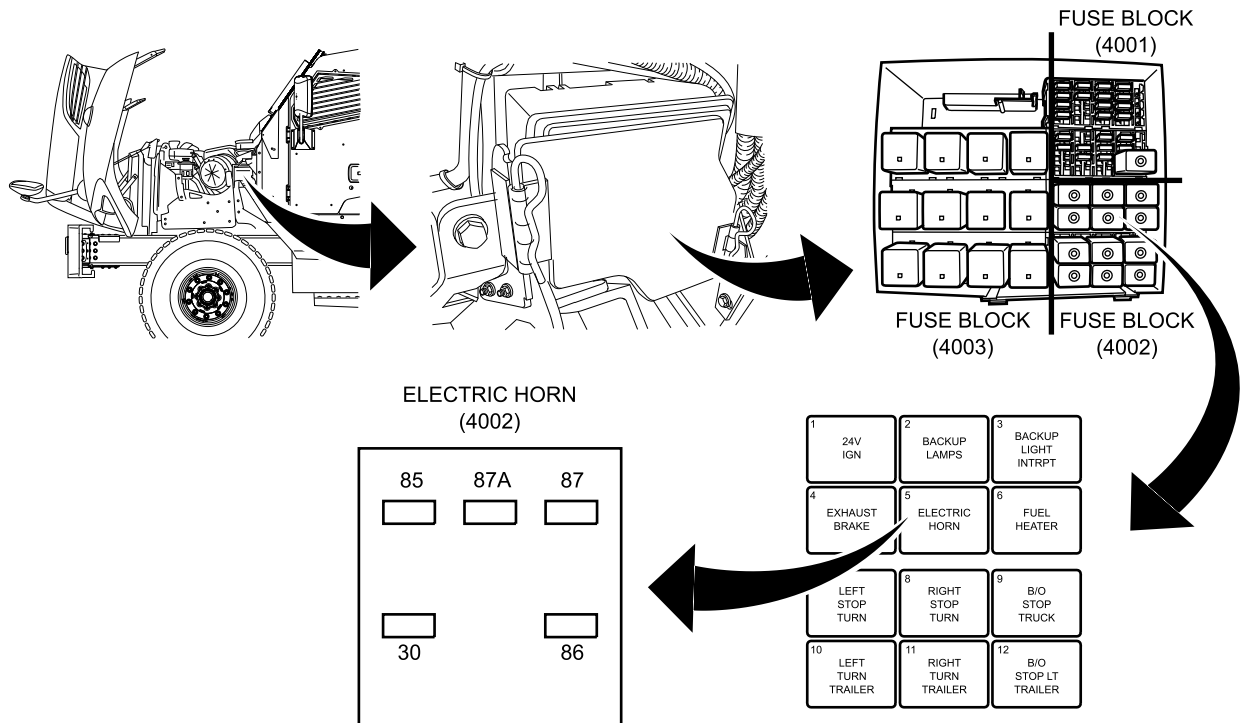
NO Go to Step 26.
YES Go to Step 24.

STEP**NOTE**

Remove cable lock straps if necessary to gain access to connector. Note location of cable lock straps to aid assembly.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

11. Install ELECTRIC HORN relay in underhood power distribution center. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 3.



B230605311

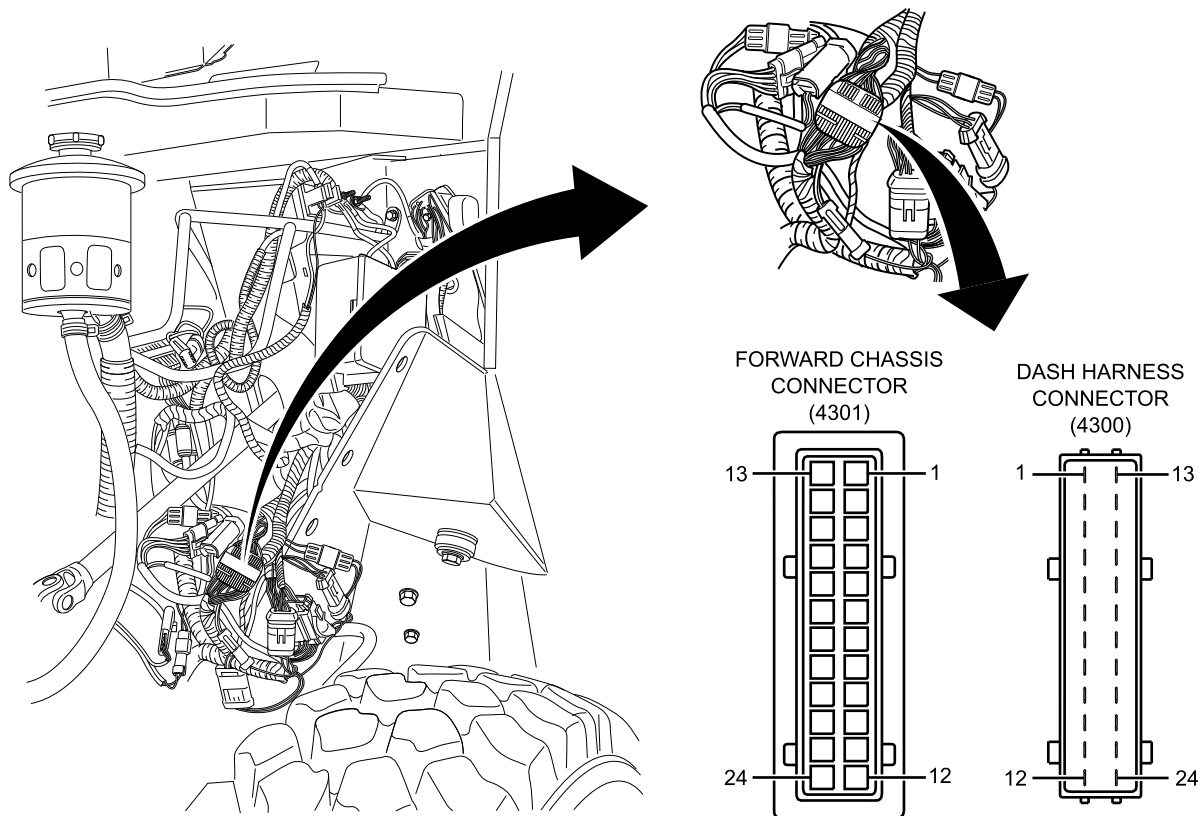
Figure 3. Left Engine Compartment Area.

12. Remove left engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
13. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Remove cable lock straps if necessary to gain access to connector. Note location of cable lock straps to aid assembly.

14. Disconnect connector 4300/4301. Refer to Figure 4.



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Figure 4. Left Side Engine Compartment Area.

15. Turn MAIN POWER switch ON (TM 9-2355-106-10).
16. Turn ignition switch ON (TM 9-2355-106-10).
17. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).
18. Measure DC voltage between connector 4301 terminals 10 and 13 with multimeter, while maintainer firmly pushes horn pad on steering wheel (TM 9-2355-106-10). Refer to Figure 4.

CONDITION/INDICATION

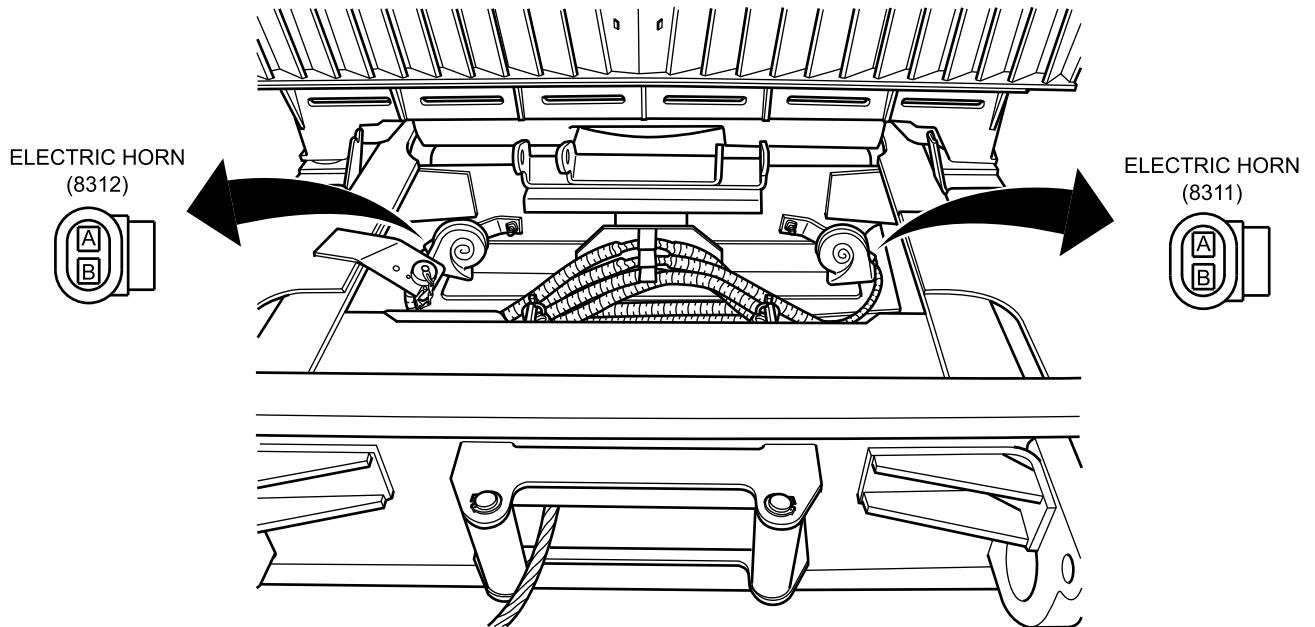
Does multimeter read more than 11.5V?

DECISION

NO Go to Step 26.
YES Go to Step 19.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

19. Turn ignition switch OFF (TM 9-2355-106-10).
20. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
21. Disconnect connectors 8311 and 8312. Refer to Figure 5.



B230603739

Figure 5. Vehicle Front Area.

22. Connect a jumper wire between connector 8311 terminals A and B. Refer to Figure 5.
23. Measure resistance between connector 4300 terminals 10 and 13 with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 27.
 NO Go to Step 25.

MALFUNCTION

- 24. Electronic System Controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

ELECTRIC HORNS CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 25. Harness is faulty.

ACTION

Replace harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 26. Harness is faulty.

ACTION

Replace harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 27. Horns are faulty.

ACTION

Replace horns. Refer to Electric Horn Removal and Installation (WP 0402). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0424
WP 0534
WP 0565
WP 0597
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0107
WP 0319
WP 0333
WP 0335
WP 0324
WP 0353
WP 0403

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 20

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the horn system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Electric Horns Operational Checkout Procedure (WP 0107) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

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.

ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

STEP

1. Remove horn button assembly. Refer to Horn Button Assembly Removal and Installation (WP 0403).
2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Put Master Vehicle Light Switch (MVLS) in PARK mode (TM 9-2355-106-10).

CONDITION/INDICATION

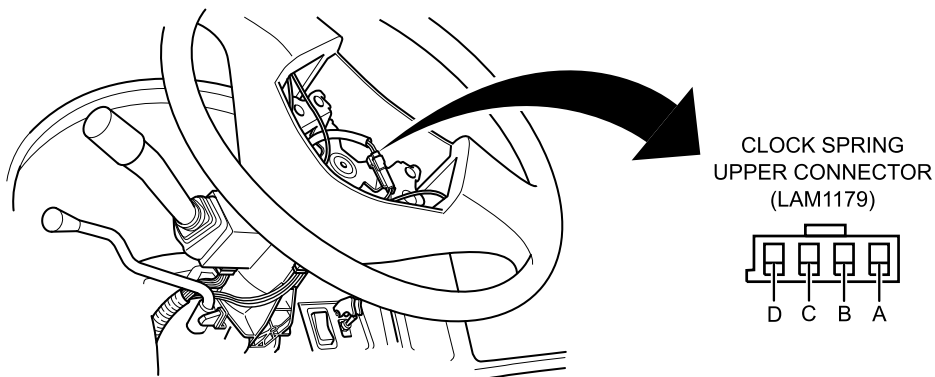
Do horns turn off?

DECISION

YES Go to Step 34.
NO Go to next step.

STEP

5. Disconnect connector LAM1179. Refer to Figure 1.



B230604082

Figure 1. Driver Controls Area.

CONDITION/INDICATION

Do horns turn off?

DECISION

YES Go to Step 36.
NO Go to next step.

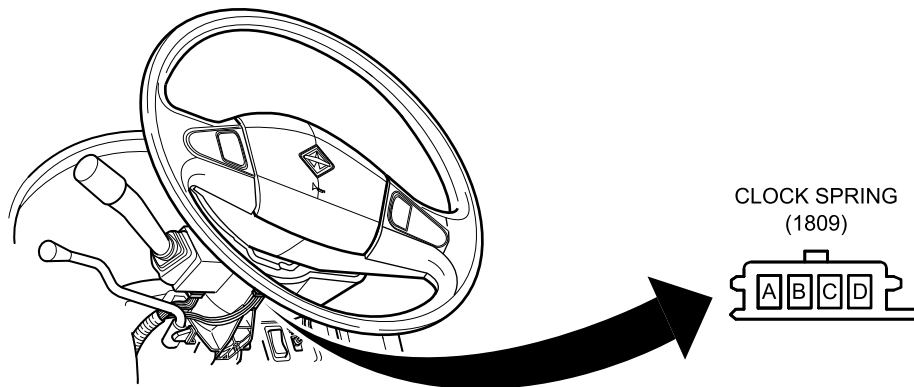
**ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

6. Remove steering column cover. Refer to Steering Column Covers Removal and Installation (WP 0565).

CAUTION

Do not use excessive force to disconnect clock spring connector from clock spring. Gently pry on connector locking tab to disconnect connector. Failure to comply may cause damage to clock spring.

7. Disconnect connector 1809. Refer to Figure 2.



B230604081

Figure 2. Driver Controls Area.

CONDITION/INDICATION

Do horns turn off?

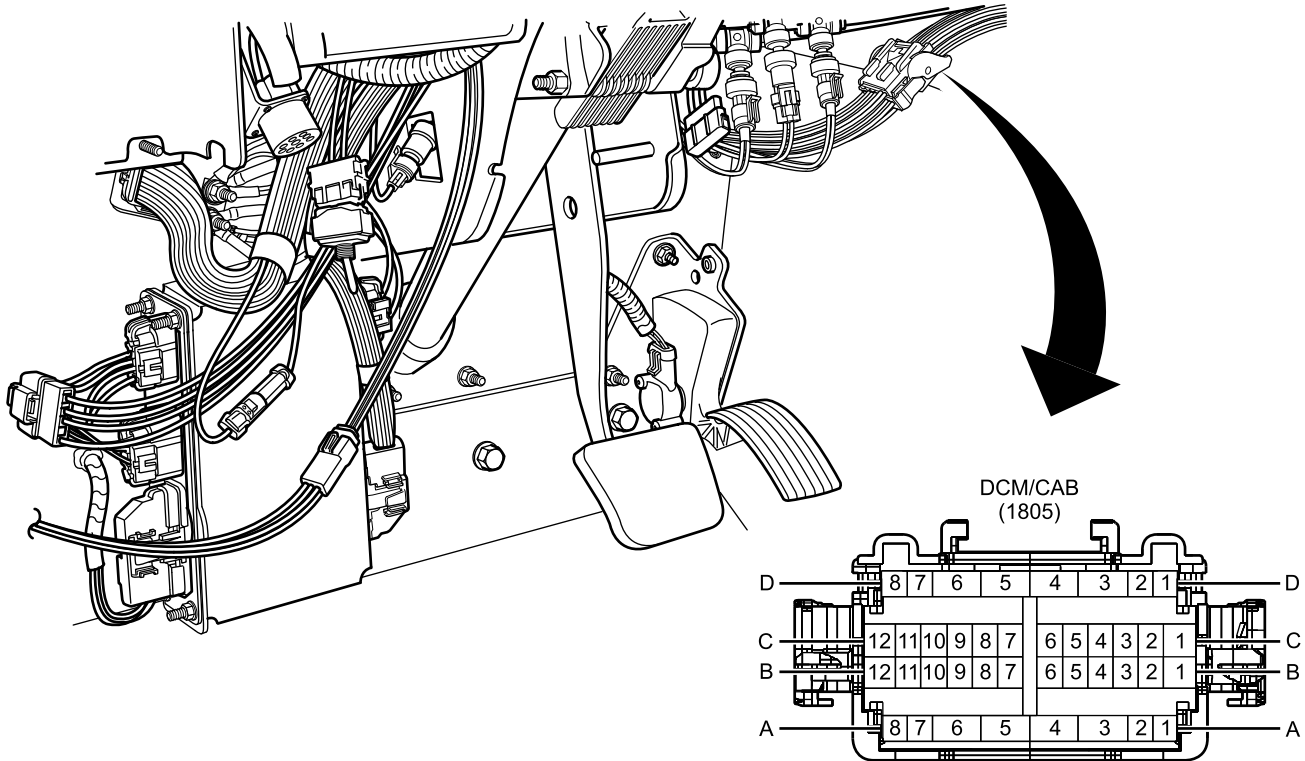
DECISION

NO Go to Step 8.
YES Go to Step 33.

ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

8. Disconnect connector 1805. Refer to Figure 3.



B230604080

Figure 3. Driver Controls Area.

CONDITION/INDICATION

Do horns turn off?

DECISION

NO Go to Step 9.
 YES Go to Step 29.

ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

9. Turn ignition switch OFF (TM 9-2355-106-10).
10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
11. Disconnect connector 1600. Refer to Figure 4.

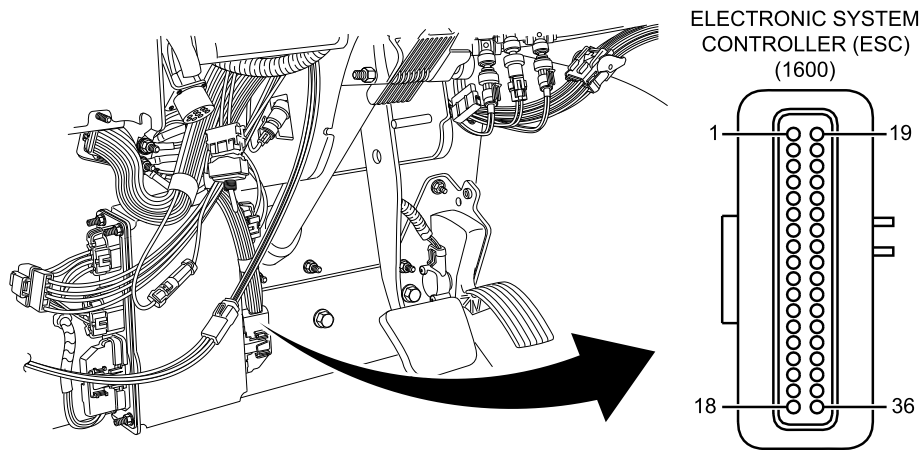


Figure 4. Driver Controls Area.

12. Measure resistance between connector 1600 terminal 13 and ground. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 30.
 YES Go to Step 13.

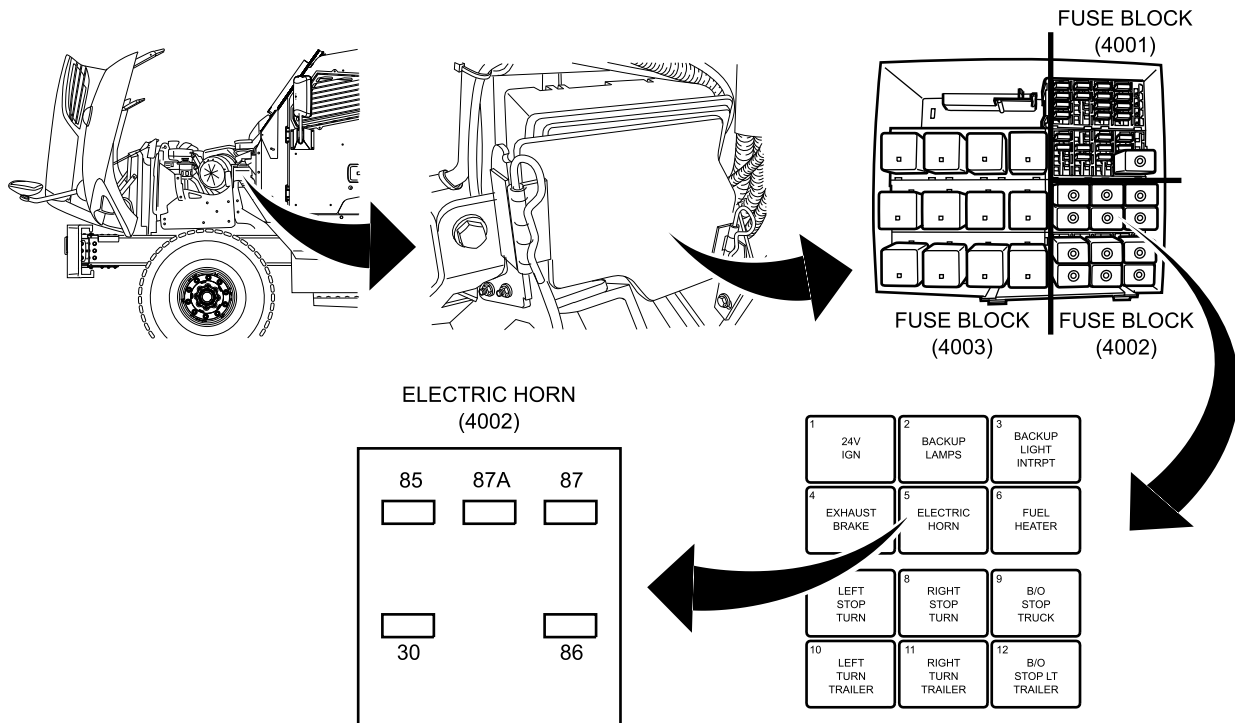
STEP

13. Connect connector 1600.
14. Connect connector 1805.
15. Connect connector 1809.
16. Install lower steering column cover. Refer to Steering Column Covers Removal and Installation (WP 0565).
17. Connect connector LAM1179.
18. Install horn button assembly. Refer to Refer to Horn Button Assembly Removal and Installation (WP 0403).
19. Turn MAIN POWER switch ON (TM 9-2355-106-10).
20. Turn ignition switch ON (TM 9-2355-106-10).
21. Put MVLS in PARK mode (TM 9-2355-106-10).

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ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)

22. Remove ELECTRIC HORN relay from underhood power distribution center. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 5.



B230605311

Figure 5. Left Engine Compartment Area.

CONDITION/INDICATION

Do horns turn off?

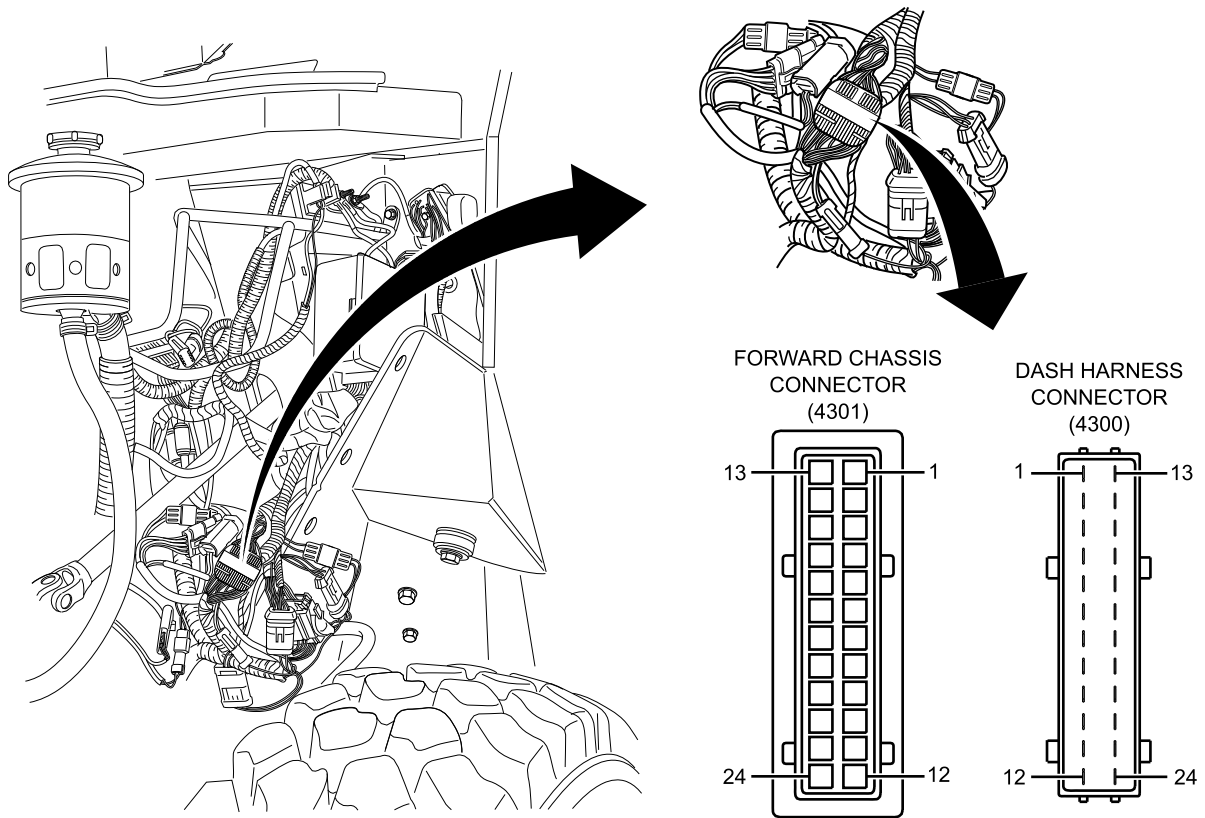
DECISION

NO Go to Step 23.
 YES Go to Step 25.

STEP

23. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
 24. Disconnect connector 4300/4301. Refer to Figure 6.

ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 6. Left Side Engine Compartment Area.

CONDITION/INDICATION

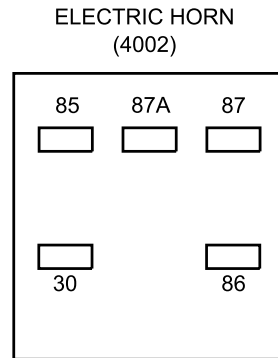
Do horns turn off?

DECISION

NO Go to Step 31.
 YES Go to Step 28.

**ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

25. Measure DC voltage between ELECTRIC HORN relay socket terminal 30 and ground. Refer to Figure 7.



B230605438

Figure 7. ELECTRIC HORN Relay Socket.

CONDITION/INDICATION

Does multimeter read more than 0V?

DECISION

NO Go to Step 35.
YES Go to Step 26.

ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Disconnect connector 4007. Refer to Figure 8.

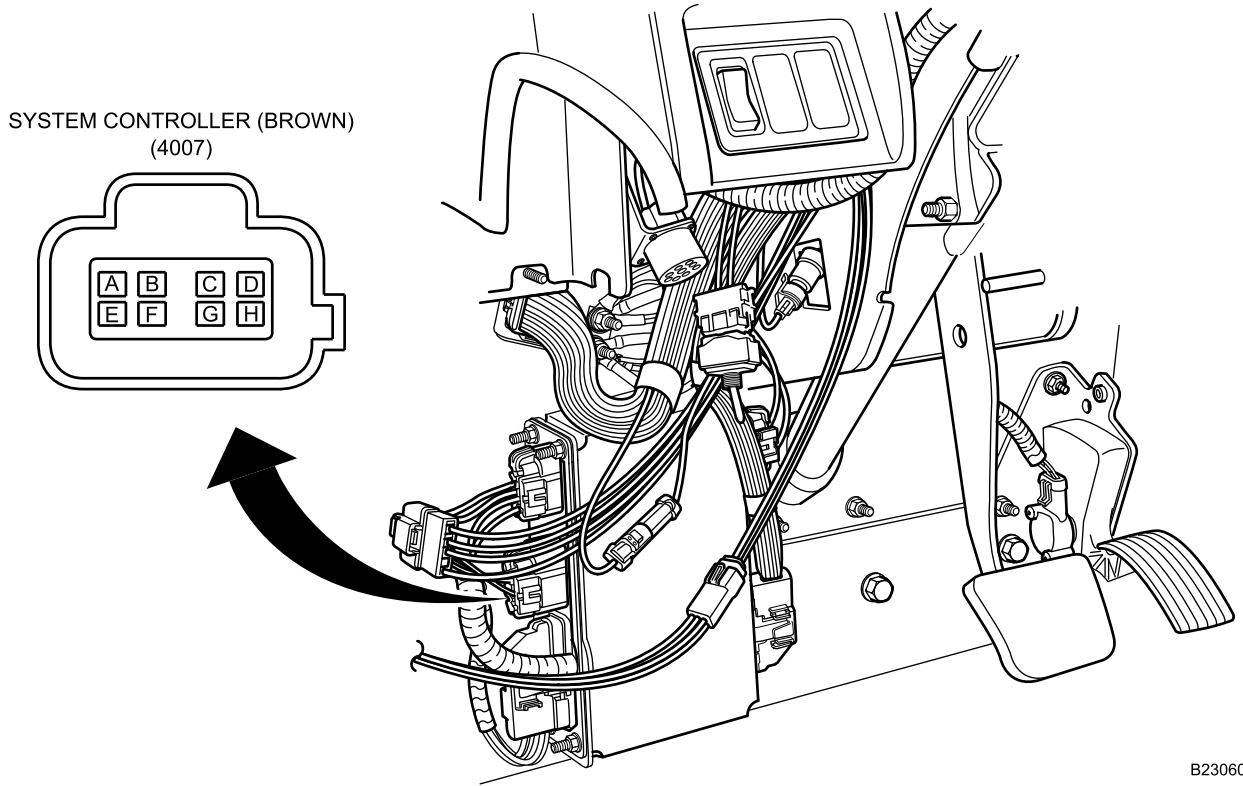


Figure 8. Driver Controls Area.

27. Measure DC voltage between ELECTRIC HORNS relay socket terminal 30 and ground. Refer to Figure 9.

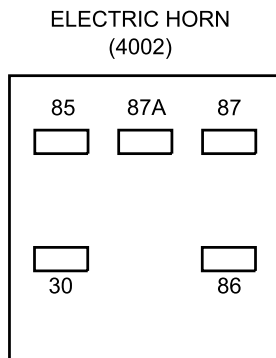


Figure 9. ELECTRIC HORN Relay Socket.

**ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE -
(CONTINUED)****CONDITION/INDICATION**

Does multimeter read more than 0V?

DECISION

NO Go to Step 32.
YES Go to Step 28.

MALFUNCTION

- 28. Harness is faulty.

ACTION

Replace harness. Refer Power Distribution Center (PDC) Harness Removal and Installation (WP 0335).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 29. Harness is faulty.

ACTION

Replace harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return
vehicle to service.

END OF TEST**MALFUNCTION**

- 30. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle
to service.

END OF TEST**MALFUNCTION**

- 31. Harness is faulty.

ACTION

Replace harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle
to service.

END OF TEST**MALFUNCTION**

- 32. Electronic System Controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return
vehicle to service.

**ELECTRIC HORNS SOUND WITHOUT PRESSING HORN PAD TROUBLESHOOTING PROCEDURE -
(CONTINUED)****END OF TEST****MALFUNCTION**

- 33. Clock spring is faulty.

ACTION

Replace clock spring. Refer to Steering Wheel and Clock Spring Removal and Installation (WP 0534). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 34. Horn switch is faulty.

ACTION

Replace horn switch. Refer to Horn Button Assembly Removal and Installation (WP 0403). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 35. ELECTRIC HORN relay is faulty.

ACTION

Replace ELECTRIC HORN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 36. Harness is faulty.

ACTION

Replace harness. Refer to Steering Wheel Wire Harness Removal and Installation (WP 0325).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

WINDSHIELD WIPER AND WASHER OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Test Equipment

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0117

WP 0353

WP 0782

References

TM 9-2355-106-10
 TM 9-2355-106-23P
 WP 0011
 WP 0114
 WP 0115
 WP 0116

Equipment Condition

Parking brake set (TM 9-2355-106-10)
 Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
 Engine off (TM 9-2355-106-10)
 MAIN POWER switch off (TM 9-2355-106-10)
 Wheels chocked (TM 9-2355-106-10)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. With MSD, determine if ESC is receiving wiper switch inputs when wiper switch is in low speed and high speed positions, and when washer switch is turned on and off.

CONDITION/INDICATION

ESC is not receiving all wiper switch inputs.

CORRECTIVE ACTION

WINDSHIELD WIPER AND WASHER OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Refer to Windshield Wiper Switch Inputs to Electronic System Controller (ESC) Troubleshooting Procedure (WP 0115).

1. Turn windshield wiper switch to low speed position (TM 9-2355-106-10). Wipers should operate in low speed. Wipers do not operate in low speed.

Refer to Windshield Wiper Motor Circuit Troubleshooting Procedure (WP 0117).

1. Turn windshield wiper switch to high speed position (TM 9-2355-106-10). Wipers should operate in high speed. Wipers do not operate in high speed.

Refer to Windshield Wiper Motor Circuit Troubleshooting Procedure (WP 0117).

1. Turn windshield wiper switch to delay mode position (TM 9-2355-106-10). Wipers should operate in delay mode. Wipers do not operate in delay mode.

Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353).

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.

1. Open and secure hood (TM 9-2355-106-10).
2. Visually inspect windshield washer reservoir (TM 9-2355-106-10). Reservoir should not be empty.

Windshield washer reservoir is empty.

Fill reservoir with proper fluid (TM 9-2355-106-10).

1. Turn windshield washer switch ON (TM 9-2355-106-10). Washer fluid should squirt on windshield.
2. Turn windshield washer switch OFF (TM 9-2355-106-10). Washer fluid should stop squirting on windshield.

Windshield washers are not operating properly.

Refer to Windshield Washer Circuit Troubleshooting Procedure (WP 0114).

1. Turn windshield wiper switch to off position (TM 9-2355-106-10). Wipers should turn off with wiper blades in down position at bottom of windshield.

Wipers operate but do not park properly.

Refer to Windshield Wiper Park Circuit Troubleshooting Procedure (WP 0116).

1. Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0353
WP 0565
WP 0686
WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0113
WP 0324
WP 0319
WP 0333
WP 0335
WP 0323

Drawings Required

WP 0789, Figure 23

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the windshield wiper and washer system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Windshield Wiper and Washer Operational Checkout Procedure (WP 0113) before performing the tests in this troubleshooting procedure.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**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 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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Do washers operate without turning washer switch ON?

DECISION

YES Go to Step 21.
NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Turn ignition switch OFF (TM 9-2355-106-10).
4. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
5. Disconnect connector 4021. Refer to Figure 1.

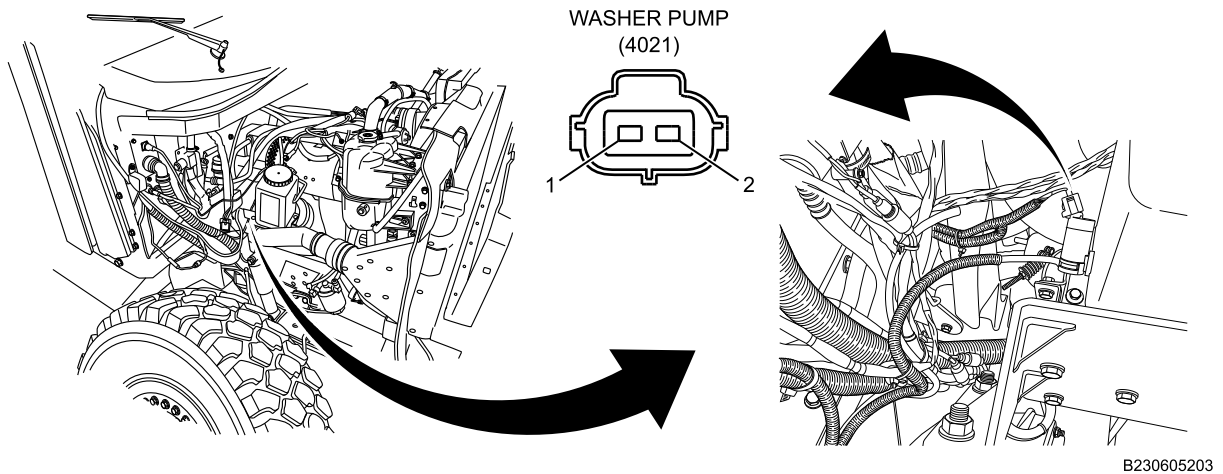


Figure 1. Right Side Engine Compartment Area.

6. Turn MAIN POWER switch ON (TM 9-2355-106-10).
7. Turn ignition switch ON (TM 9-2355-106-10).
8. Measure DC voltage between connector 4021 terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 11V?

DECISION

YES Go to next step.
NO Go to Step 26.

STEP

9. With assistant, measure DC voltage between connector 4021 terminals 1 and 2 with multimeter while windshield washer switch is held in the ON position (TM 9-2355-106-10). Refer to Figure 1.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read more than 11V?

DECISION

YES Go to Step 34.
 NO Go to next step.

STEP

10. Turn ignition switch OFF (TM 9-2355-106-10).
11. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
12. Disconnect connector 1600. Refer to Figure 2.

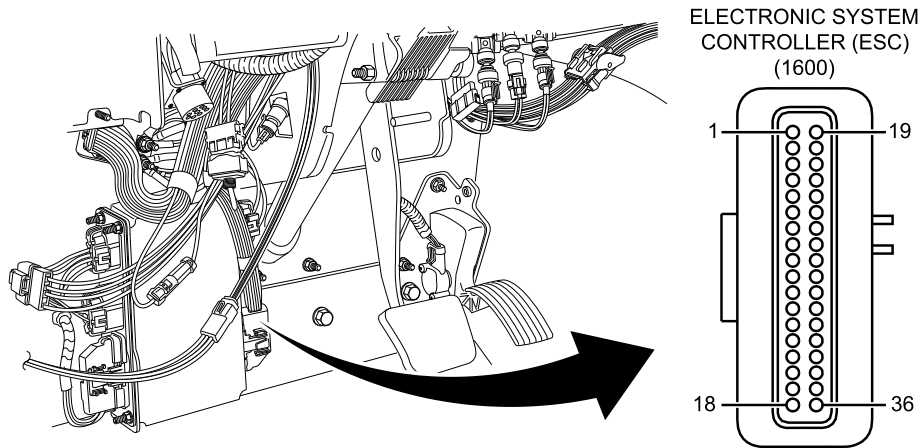
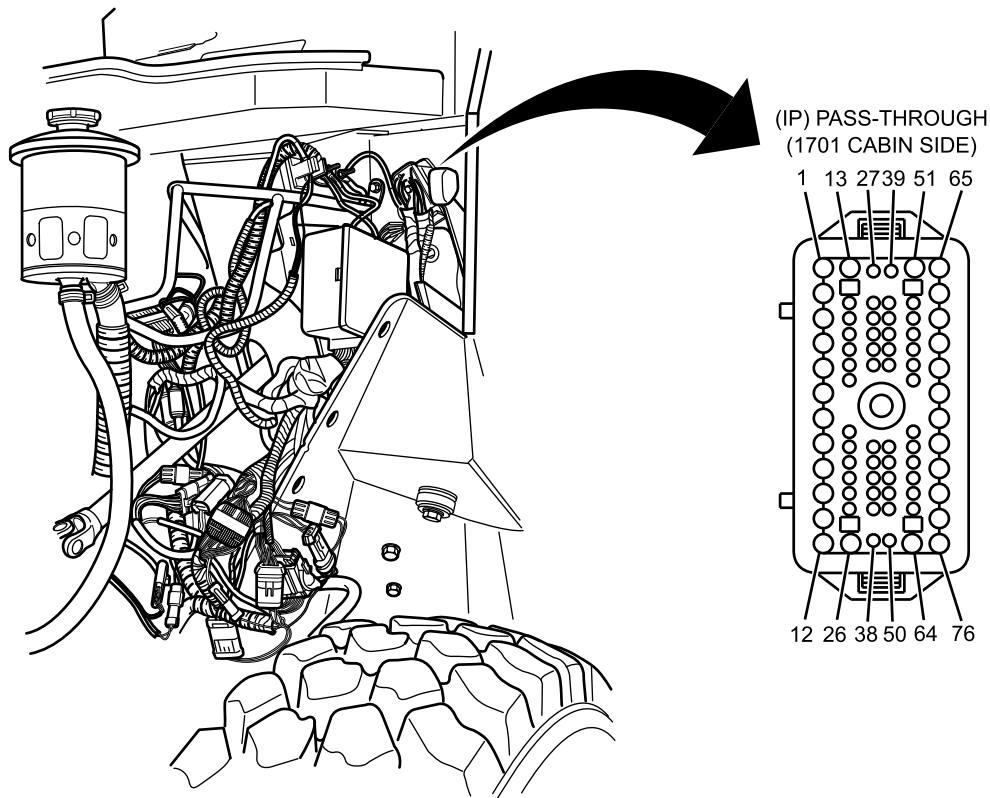


Figure 2. Driver Controls Area.

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WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

13. Disconnect harness connector from connector 1701. Refer to Figure 3.



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Figure 3. Left Side Engine Compartment Area.

14. With assistant, measure resistance between connector 1701 (cab side) terminal 30 and ground with multimeter while windshield washer switch is held in the ON position (TM 9-2355-106-10). Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

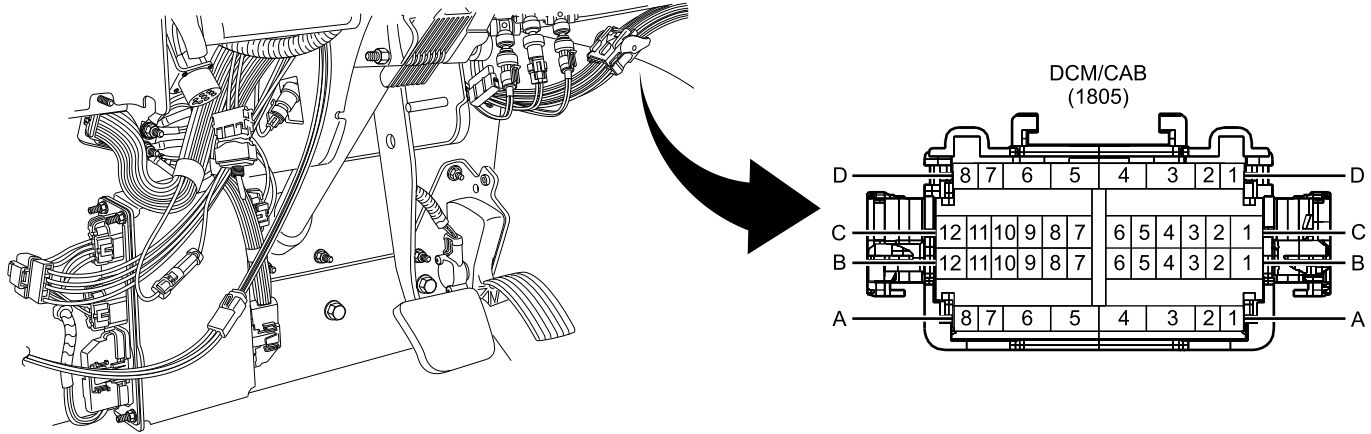
DECISION

YES Go to Step 32.
NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

15. Disconnect connector 1805. Refer to Figure 4.



B230604006

Figure 4. Left Side Instrument Panel (IP) Area.

16. Measure resistance between connector 1805 terminals A3 and A5 with multimeter while windshield washer switch is held in the ON position (TM 9-2355-106-10). Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

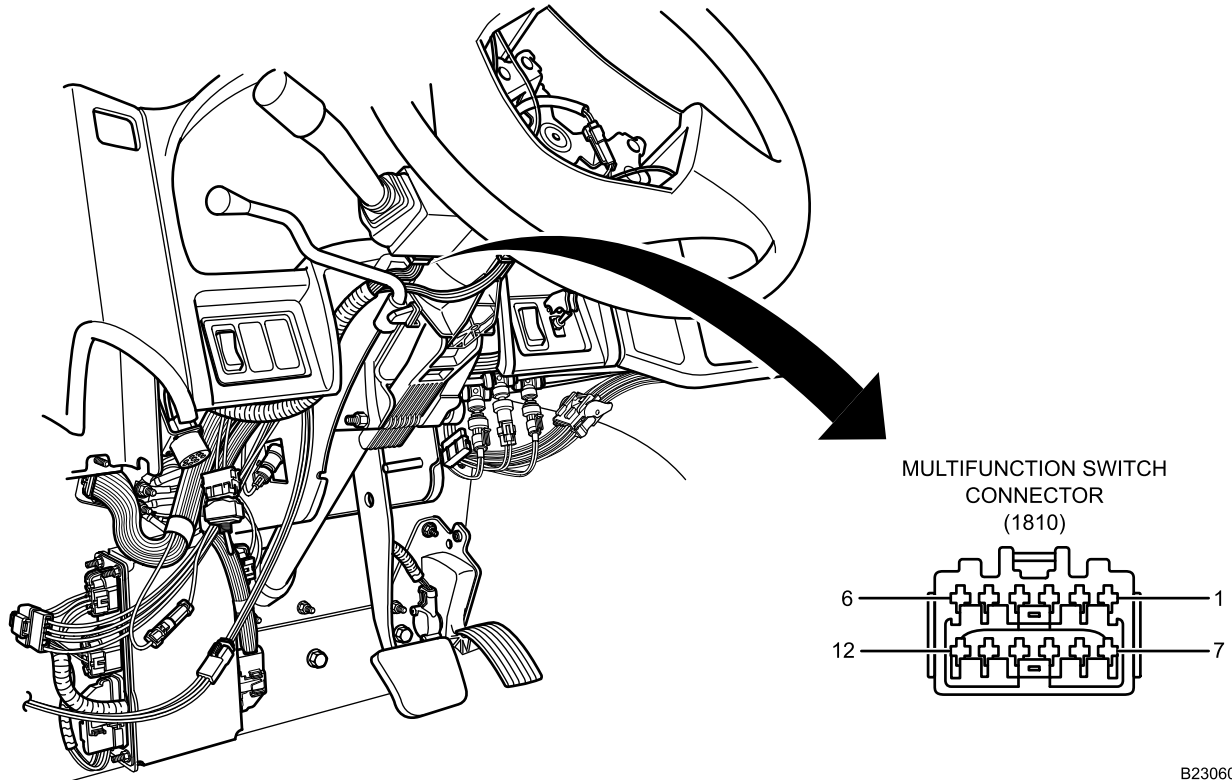
DECISION

YES Go to Step 31.

NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

17. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).
18. Disconnect connector 1810. Refer to Figure 5.



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Figure 5. Steering Column Area.

19. Connect jumper wire between connector 1810 terminals 6 and 12. Refer to Figure 5.
20. Measure resistance between connector 1800 terminals A3 and A5 with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 35.
NO Go to Step 33.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

21. Disconnect connector 1600. Refer to Figure 6.

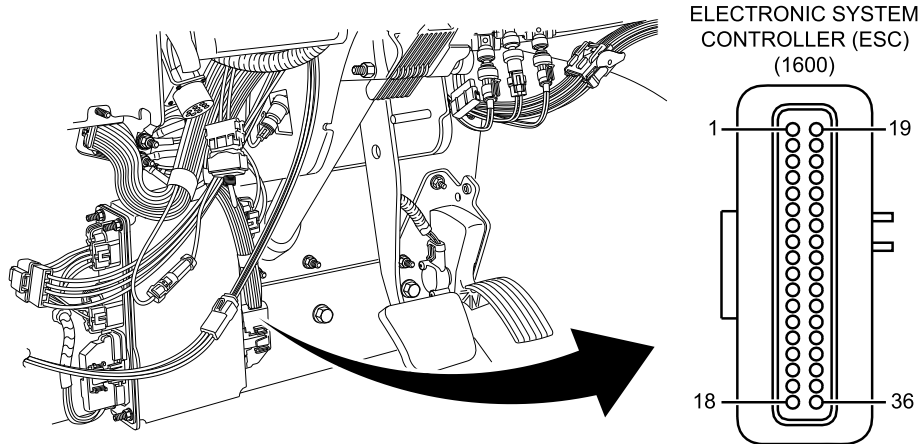


Figure 6. Driver Controls Area.

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CONDITION/INDICATION

Do windshield washers stop operating?

DECISION

YES Go to Step 30.
 NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

22. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).
23. Disconnect connector 1810. Refer to Figure 7.

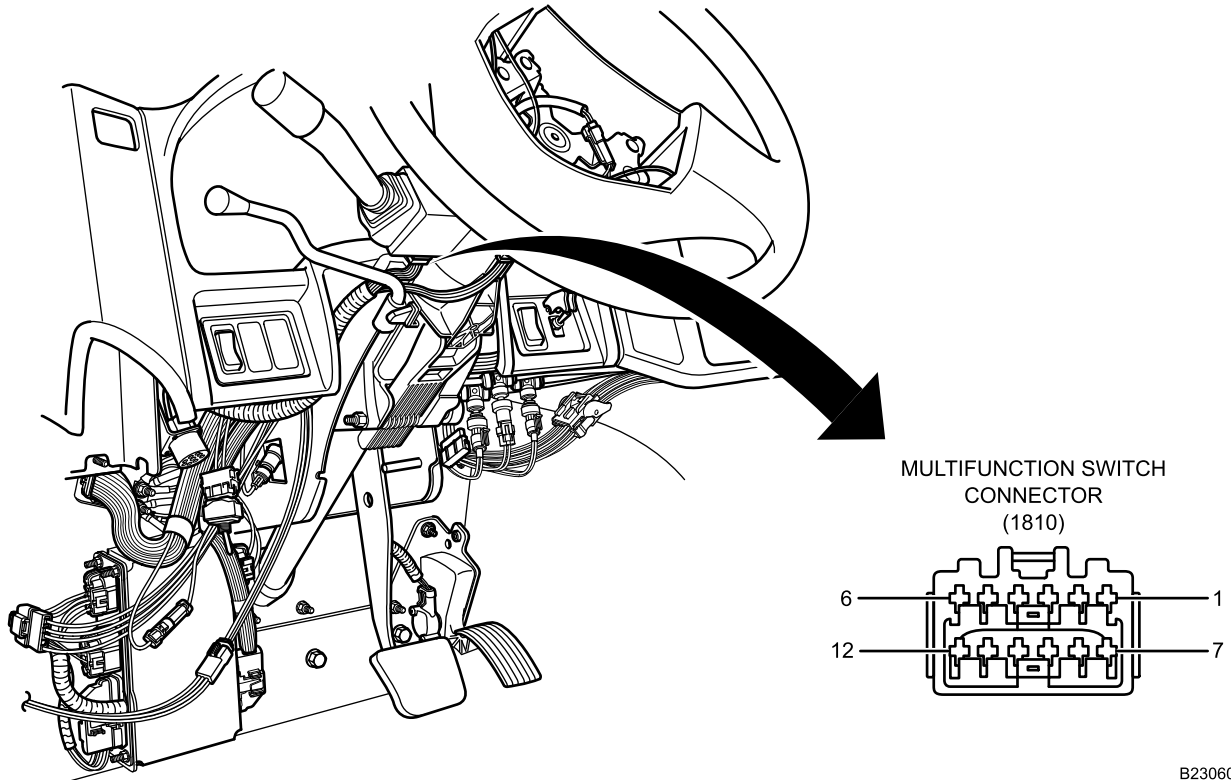


Figure 7. Steering Column Area.

B230605227

CONDITION/INDICATION

Do windshield washers stop operating?

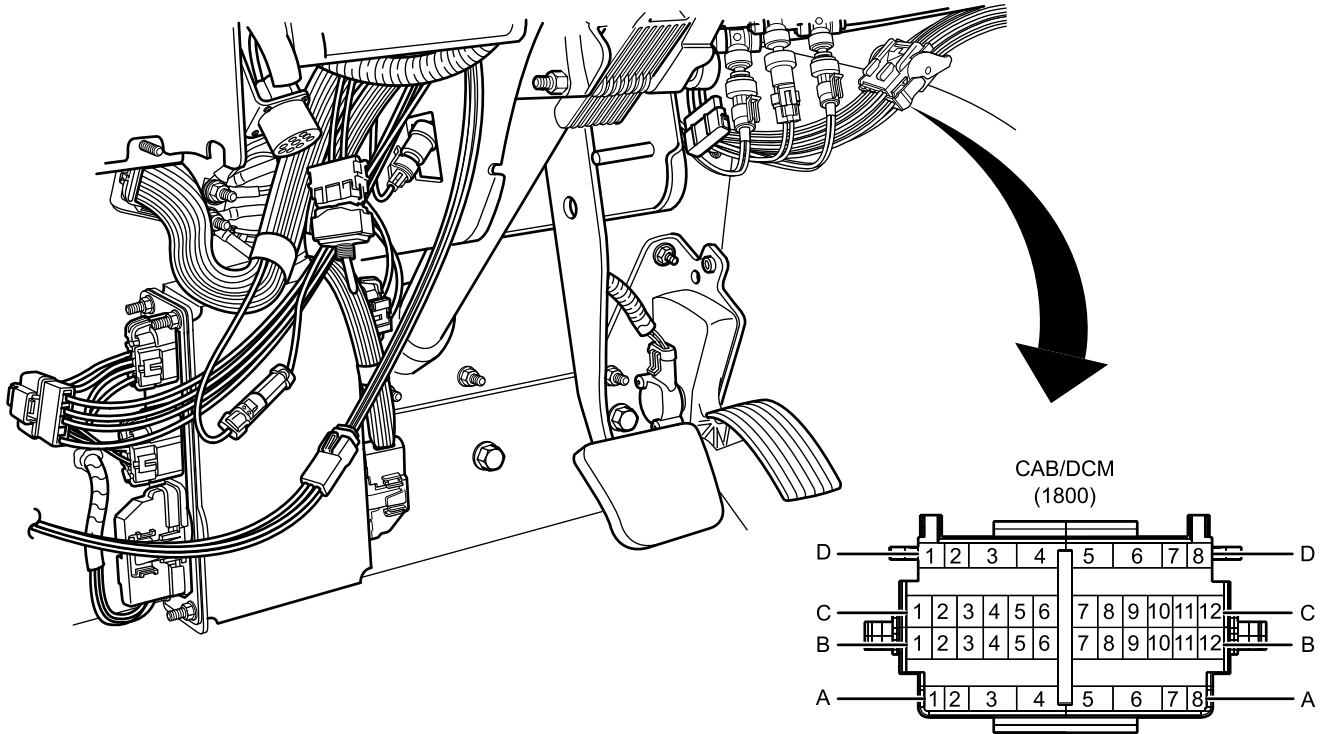
DECISION

YES Go to Step 35.
 NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

24. Disconnect connector 1800. Refer to Figure 8.



B230603796

Figure 8. Left Side Instrument Panel (IP) Area.

CONDITION/INDICATION

Do windshield washers stop operating?

DECISION

YES Go to Step 33.
 NO Go to next step.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

25. Disconnect connector 1701. Refer to Figure 9.

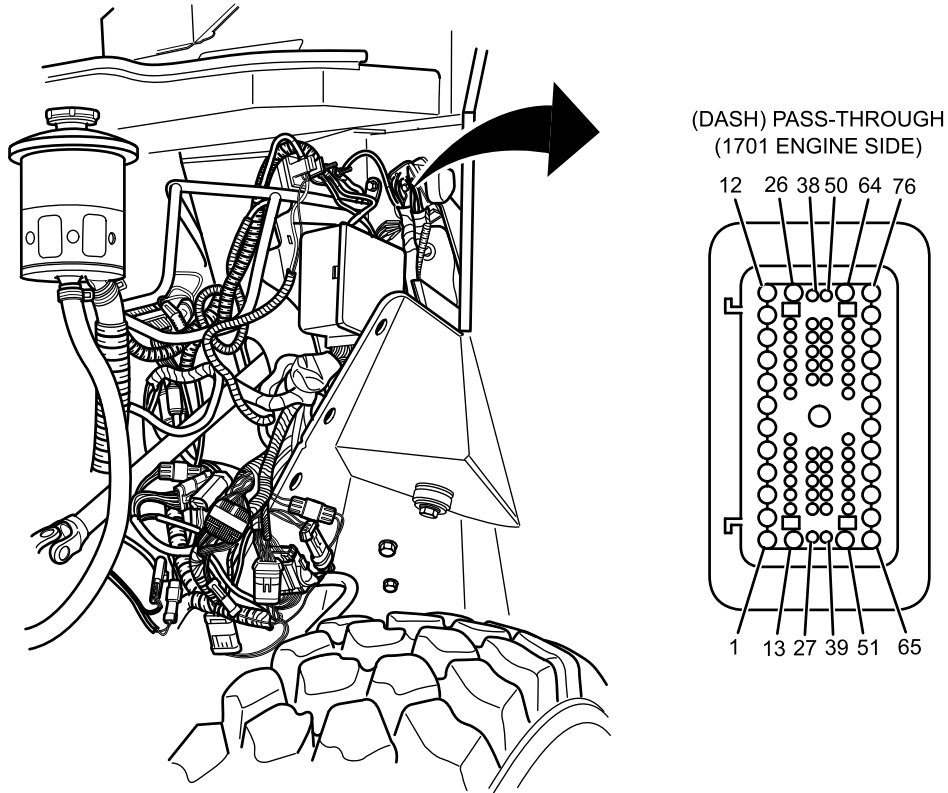


Figure 9. Left Side Engine Compartment Area.

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CONDITION/INDICATION

Do windshield washers stop operating?

DECISION

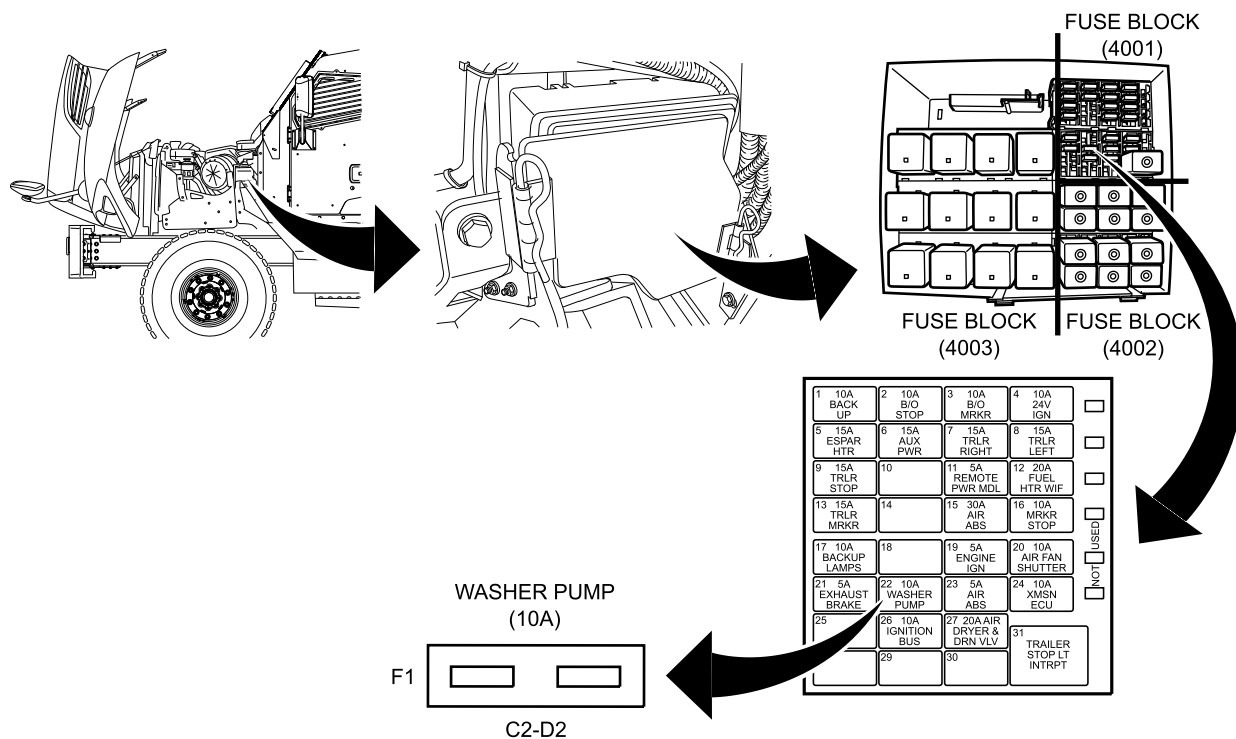
YES Go to Step 31.

NO Go to Step 32.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Remove and test 10-amp WASHER PUMP fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 10.



B230605392

Figure 10. Left Engine Compartment Area

CONDITION/INDICATION

Is 10-amp fuse blown?

DECISION

YES Go to next step.

NO Go to Step 32.

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

27. Replace blown 10-amp WASHER PUMP fuse with new 10-amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).
28. Turn MAIN POWER switch ON (TM 9-2355-106-10).
29. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did 10-amp WASHER PUMP fuse blow again?

DECISION

YES Go to Step 32.
NO Go to Step 34.

MALFUNCTION

- 30. Electronic System Controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 31. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 32. Harness is faulty.

ACTION

Replace harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST

WINDSHIELD WASHER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 33. Harness is faulty.

ACTION

Replace harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 34. Washer pump is faulty.

ACTION

Replace washer pump. Refer to Windshield Washer Reservoir and Pump Motor Assembly Removal and Installation (WP 0686). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 35. Wiper switch is faulty.

ACTION

Replace multifunction switch. Refer to Multifunction Turn Signal Switch Assembly Removal and Installation (WP 0323). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Steering column covers removed (WP 0565)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0113
WP 0319
WP 0323
WP 0324
WP 0353
WP 0565

Drawings Required

WP 0789, Figure 23

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the windshield wiper and washer system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Windshield Wiper and Washer Operational Checkout Procedure (WP 0113) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

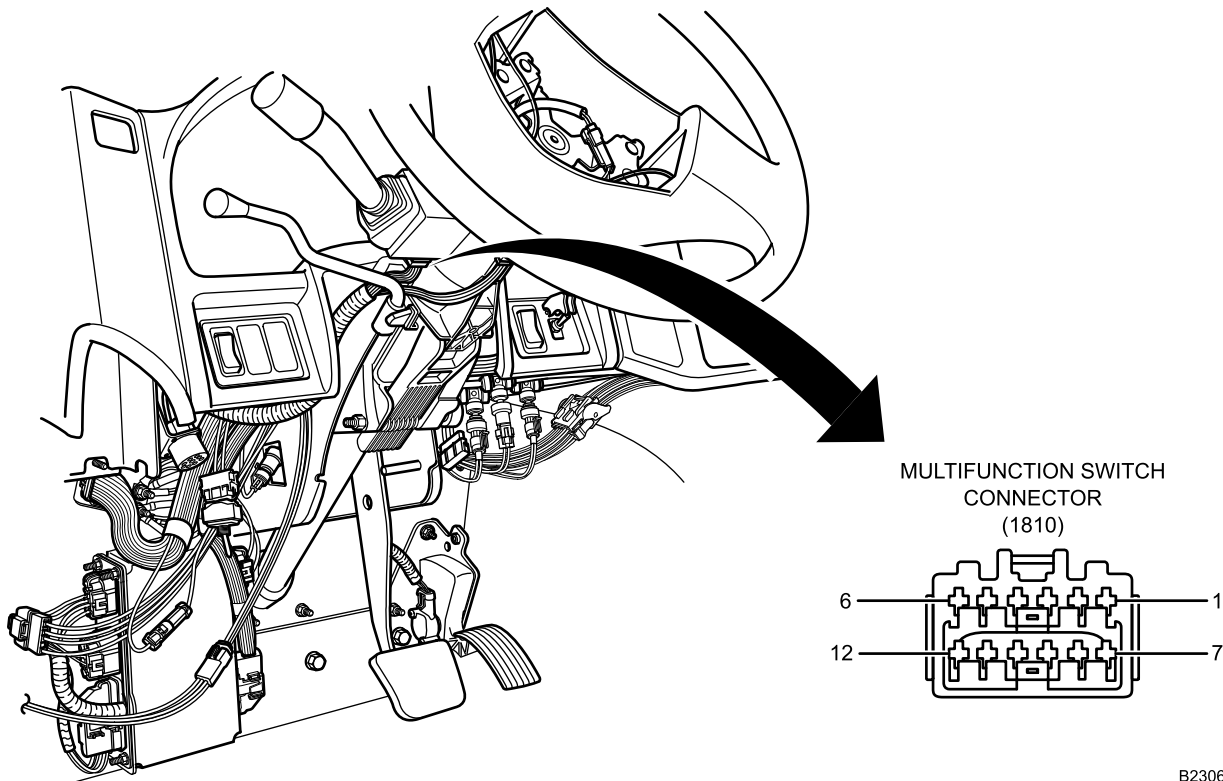
WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect connector 1810. Refer to Figure 1.



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Figure 1. Steering Column Area.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 1810 terminal 8 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 8.

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)****STEP**

5. Measure DC voltage between connector 1810 terminal 11 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 18.

STEP

6. Measure DC voltage between connector 1810 terminal 5 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 28.

STEP

7. Measure DC voltage between connector 1810 terminals 5 and 7 with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to Step 51.
NO Go to Step 38.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

10. Disconnect connector 1805 from connector 1800. Refer to Figure 2.

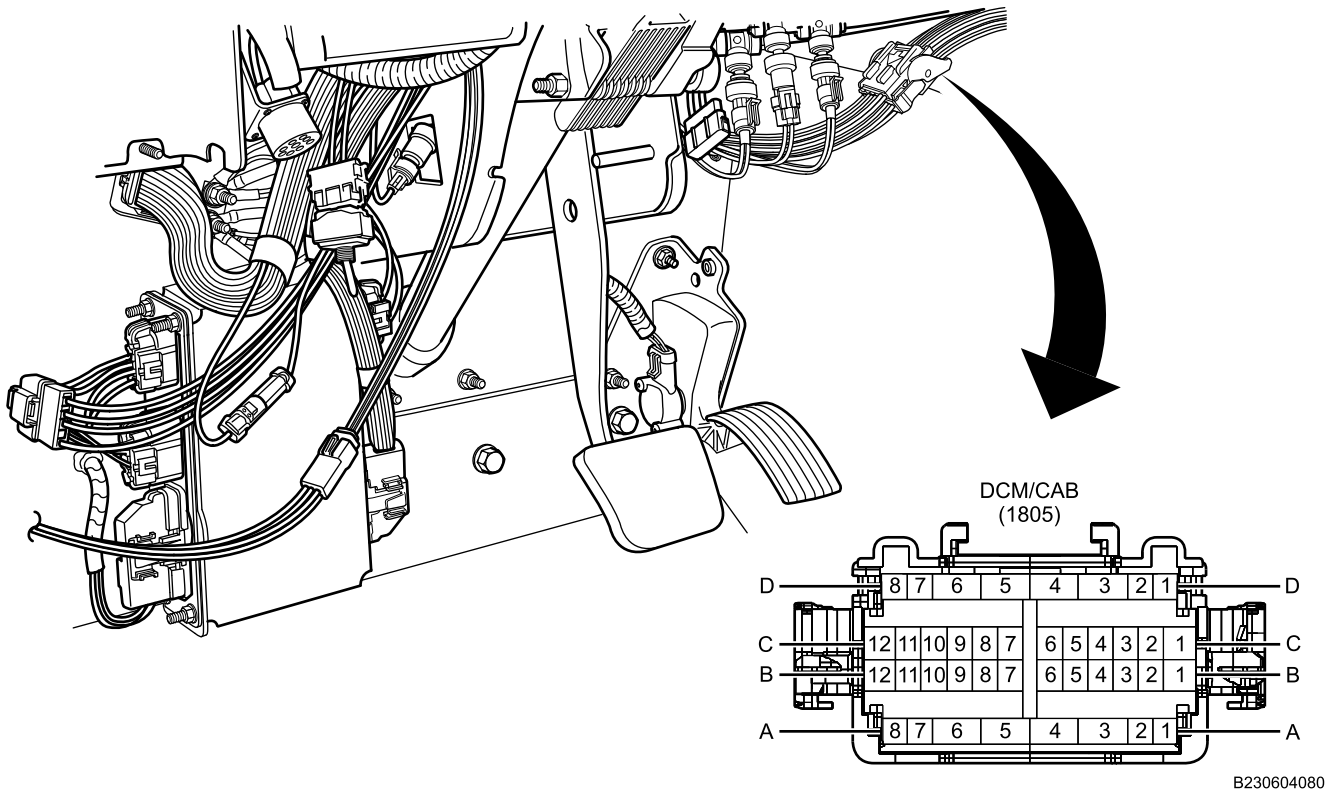
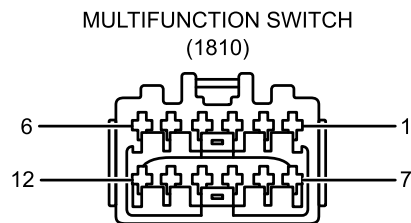


Figure 2. Driver Controls Area.

11. Measure resistance between connector 1805 terminal C9 and connector 1810 terminal 8 with multimeter. Refer to Figure 2 and Figure 3.



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Figure 3. Connector 1810.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 50.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

12. Measure resistance between connector 1810 terminal 8 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 50.

STEP

13. Measure resistance between connector 1810 terminal 8 and all other terminals on connector 1810 with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

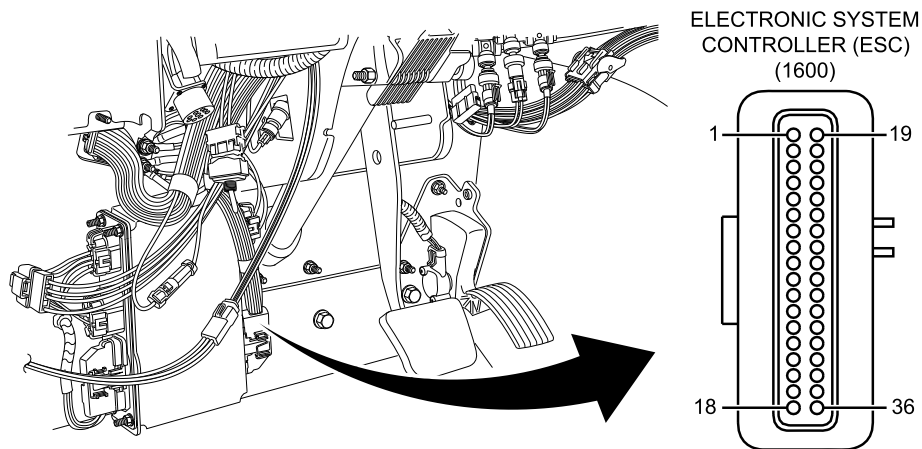
DECISION

YES Go to next step.

NO Go to Step 50.

STEP

14. Disconnect connector 1600 from ESC. Refer to Figure 4.



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Figure 4. Driver Controls Area.

15. Measure resistance between connector 1600 terminal 22 and connector 1800 terminal C9 with multimeter. Refer to Figure 4 and Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

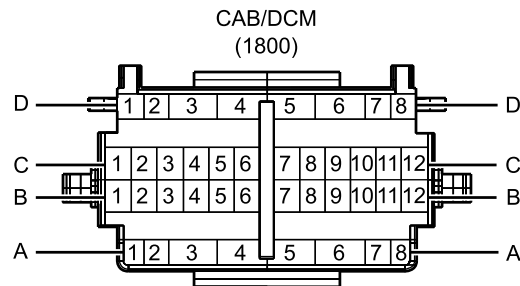
WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to next step.
NO Go to Step 49.

STEP

16. Measure resistance between connector 1800 terminal C9 and ground with multimeter. Refer to Figure 5.



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Figure 5. Connector 1800.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 49.

STEP

17. Measure resistance between connector 1800 terminal C9 and all other terminals on connector 1800 with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

YES Go to Step 48.
NO Go to Step 49.

STEP

18. Turn ignition switch OFF (TM 9-2355-106-10).
19. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

20. Disconnect connector 1805 from connector 1800. Refer to Figure 6.

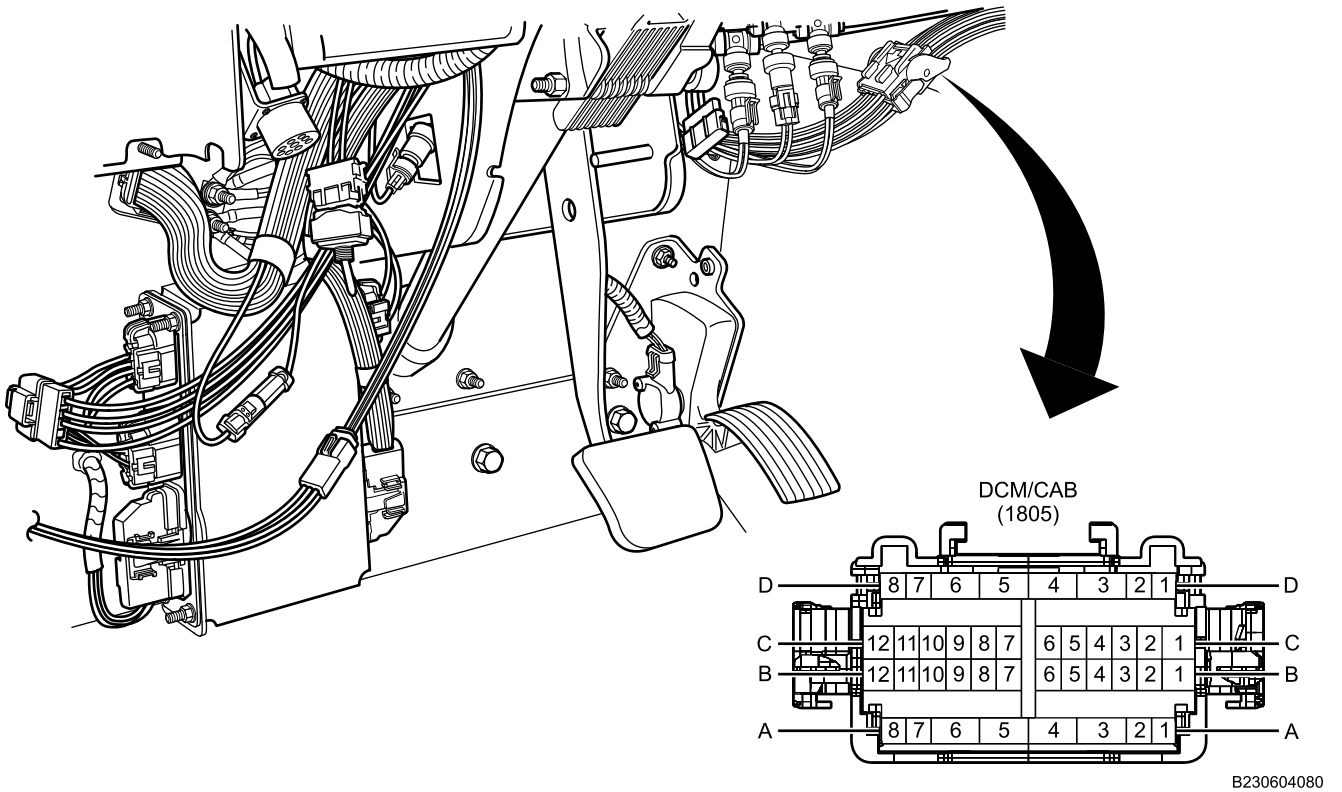
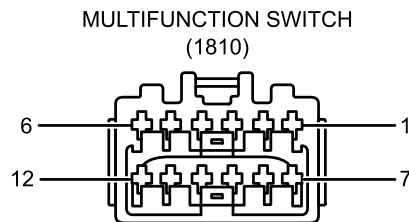


Figure 6. Driver Controls Area.

21. Measure resistance between connector 1805 terminal C1 and connector 1810 terminal 11 with multimeter. Refer to Figure 6 and Figure 7.



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Figure 7. Connector 1810.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

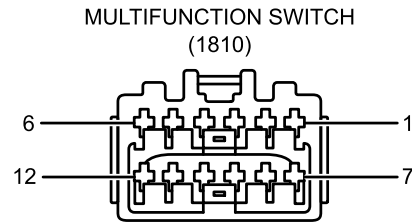
YES Go to next step.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 50.

STEP

22. Measure resistance between connector 1810 terminal 11 and ground with multimeter. Refer to Figure 8.



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Figure 8. Connector 1810.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 50.

STEP

23. Measure resistance between connector 1810 terminal 11 and all other terminals on connector 1810 with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

YES Go to next step.

NO Go to Step 50.

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

STEP

24. Disconnect connector 1600 from ESC. Refer to Figure 9.

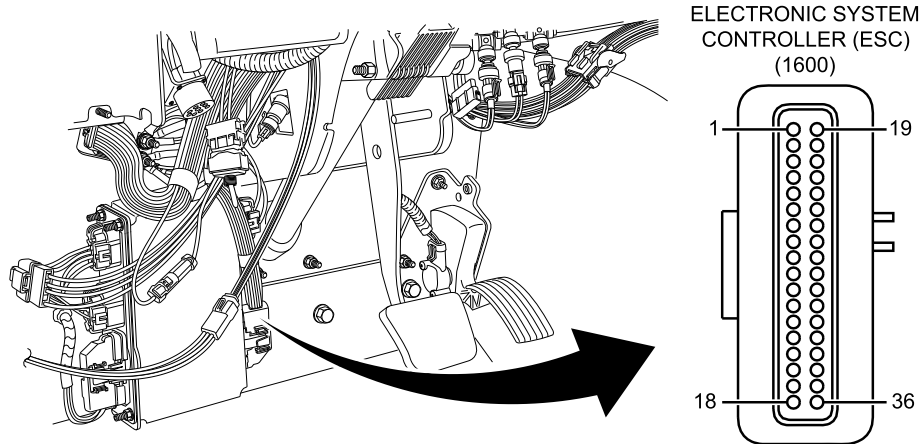
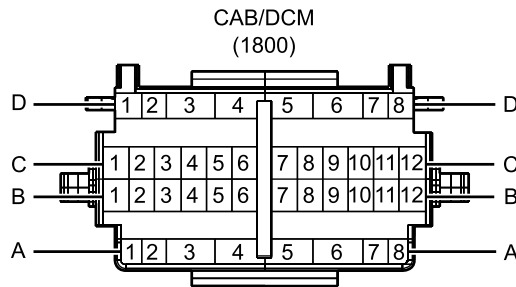


Figure 9. Driver Controls Area.

25. Measure resistance between connector 1600 terminal 23 and connector 1800 terminal C1 with multimeter. Refer to Figure 9 and Figure 10.



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Figure 10. Connector 1800.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

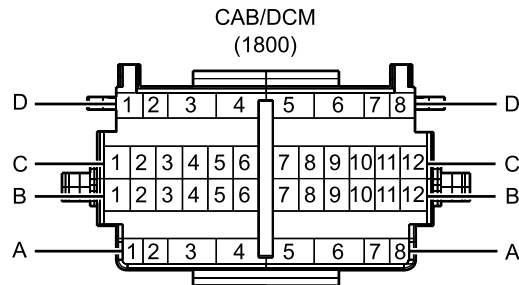
DECISION

YES Go to next step.
NO Go to Step 49.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Measure resistance between connector 1800 terminal C1 and ground with multimeter. Refer to Figure 11.



B230603802

Figure 11. Connector 1800.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 49.

STEP

27. Measure resistance between connector 1800 terminal C1 and all other terminals on connector 1800 with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

YES Go to Step 48.

NO Go to Step 49.

STEP

28. Turn ignition switch OFF (TM 9-2355-106-10).

29. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

30. Disconnect connector 1805 from connector 1800. Refer to Figure 12.

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

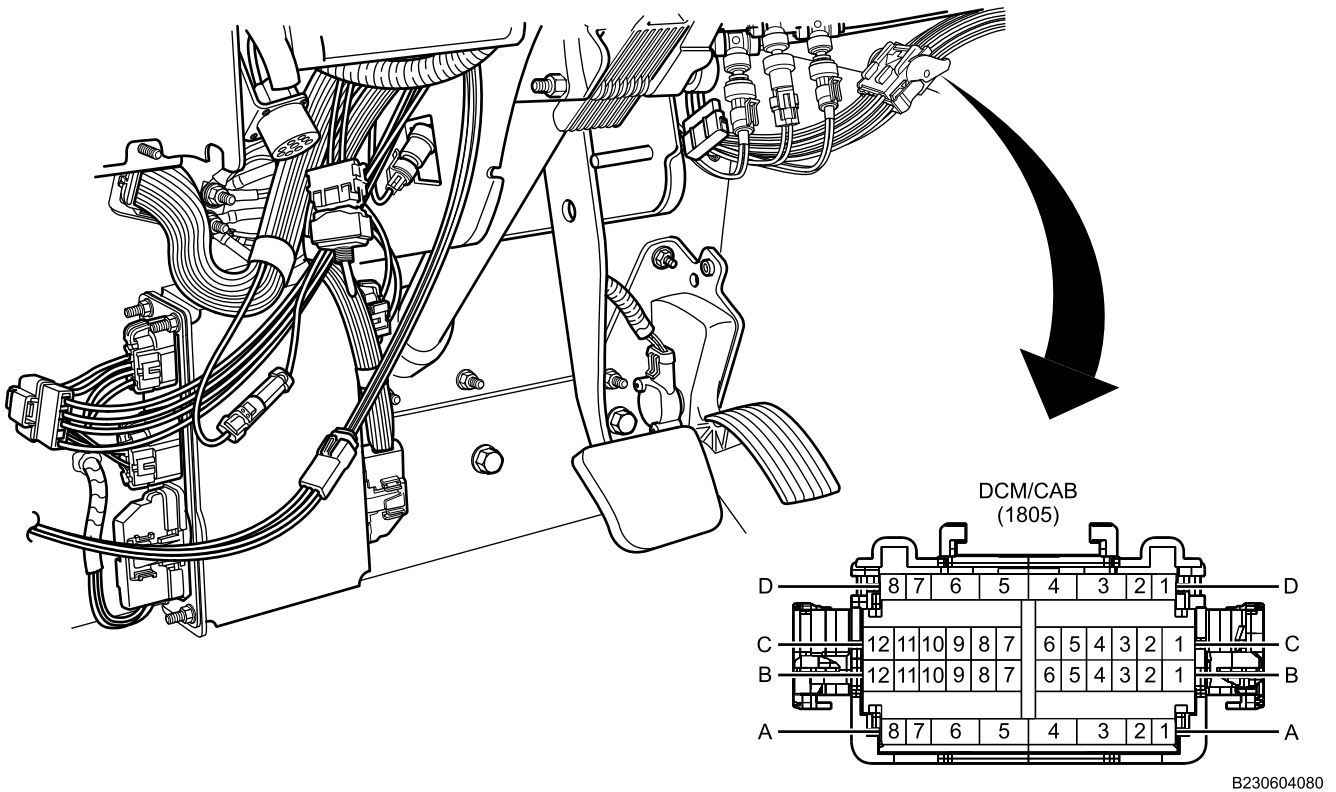
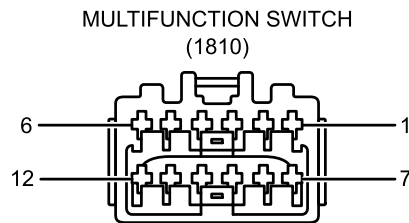


Figure 12. Driver Controls Area.

31. Measure resistance between connector 1805 terminal B1 and connector 1810 terminal 5 with multimeter. Refer to Figure 12 and Figure 13.



B230603876

Figure 13. Connector 1810.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

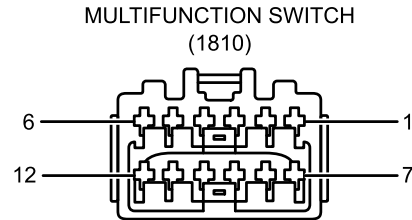
YES Go to next step.

NO Go to Step 50.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

32. Measure resistance between connector 1810 terminal 5 and ground with multimeter. Refer to Figure 14.



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Figure 14. Connector 1810.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 50.

STEP

33. Measure resistance between connector 1810 terminal 5 and all other terminals on connector 1810 with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

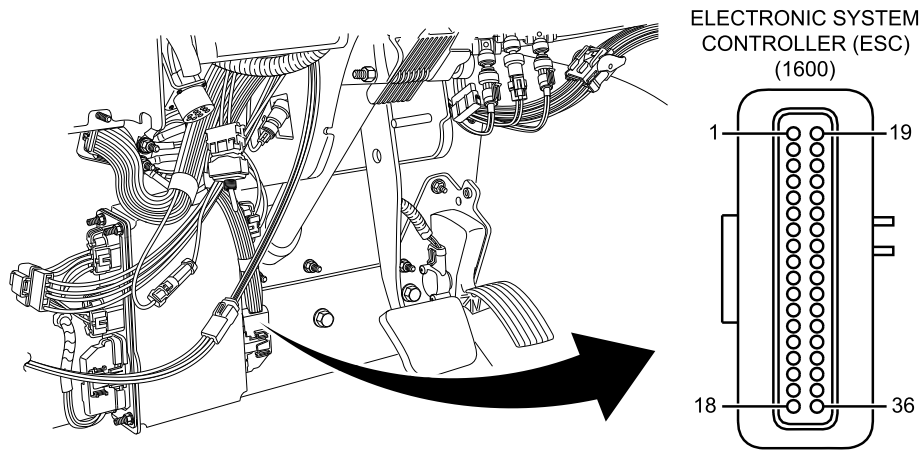
DECISION

YES Go to next step.
NO Go to Step 50.

STEP

34. Disconnect connector 1600 from ESC. Refer to Figure 15.

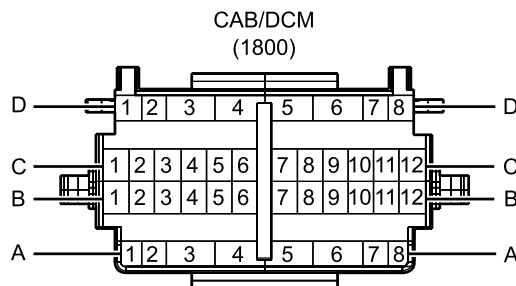
**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**



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Figure 15. Driver Controls Area.

35. Measure resistance between connector 1600 terminal 24 and connector 1800 terminal B1 with multimeter. Refer to Figure 15 and Figure 16.



B230603802

Figure 16. Connector 1800.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 49.

STEP

36. Measure resistance between connector 1800 terminal B1 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

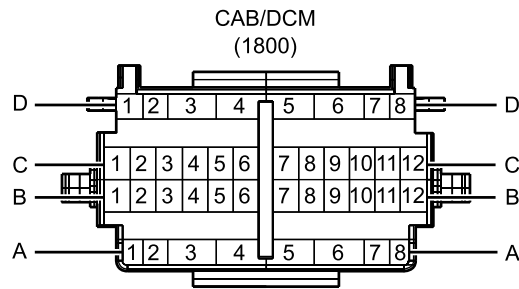
YES Go to next step.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 49.

STEP

37. Measure resistance between connector 1800 terminal B1 and all other terminals on connector 1800 with multimeter. Refer to Figure 17.



B230603802

Figure 17. Connector 1800.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

YES Go to Step 48.

NO Go to Step 49.

STEP

38. Turn ignition switch OFF (TM 9-2355-106-10).

39. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

40. Disconnect connector 1805 from connector 1800. Refer to Figure 18.

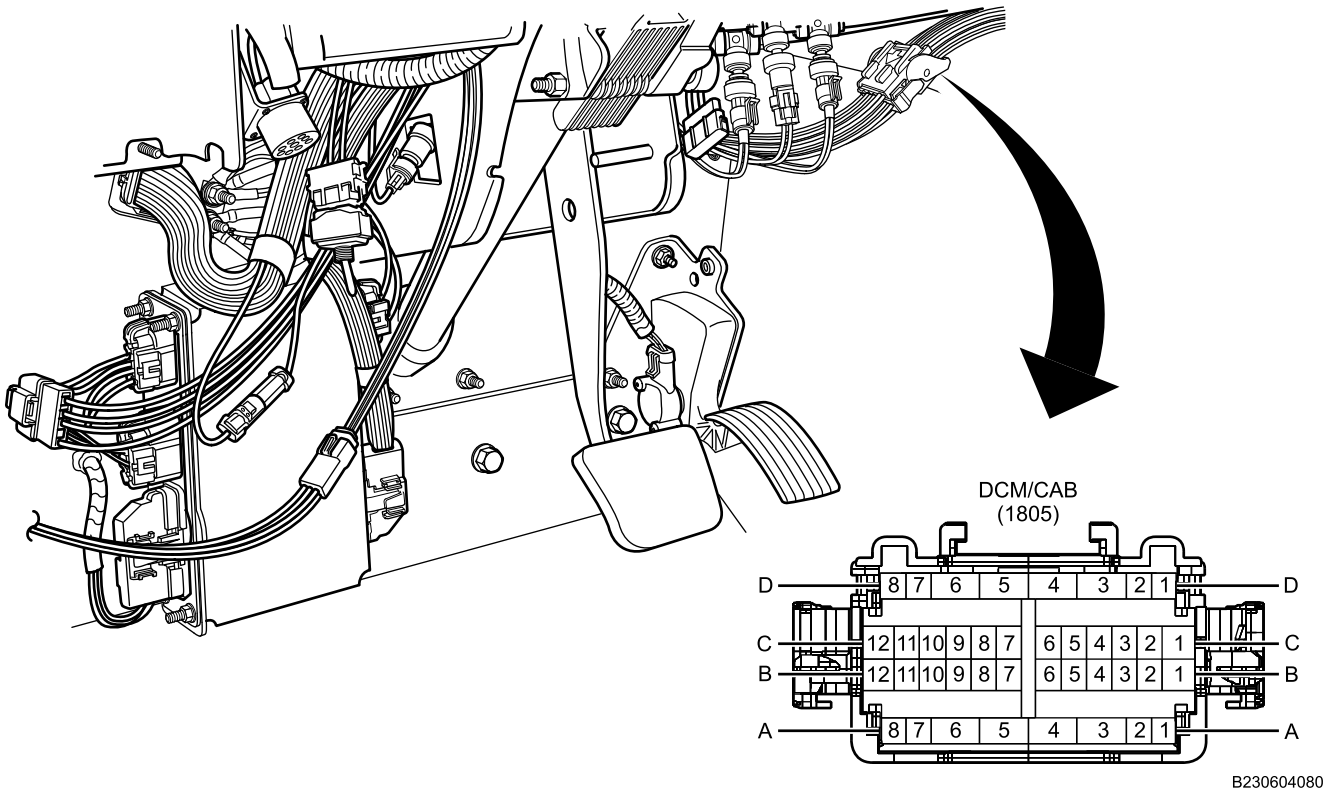
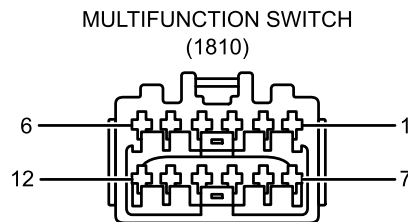


Figure 18. Driver Controls Area.

41. Measure resistance between connector 1805 terminal A4 and connector 1810 terminal 7 with multimeter. Refer to Figure 18 and Figure 19.



B230603876

Figure 19. Connector 1810.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

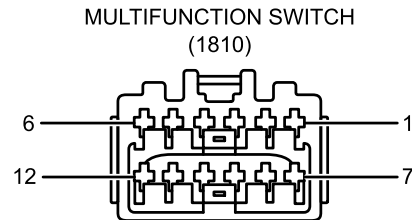
YES Go to next step.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 50.

STEP

42. Measure resistance between connector 1810 terminal 7 and ground with multimeter. Refer to Figure 20.



B230603876

Figure 20. Connector 1810.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 50.

STEP

43. Measure resistance between connector 1810 terminal 7 and all other terminals on connector 1810 with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

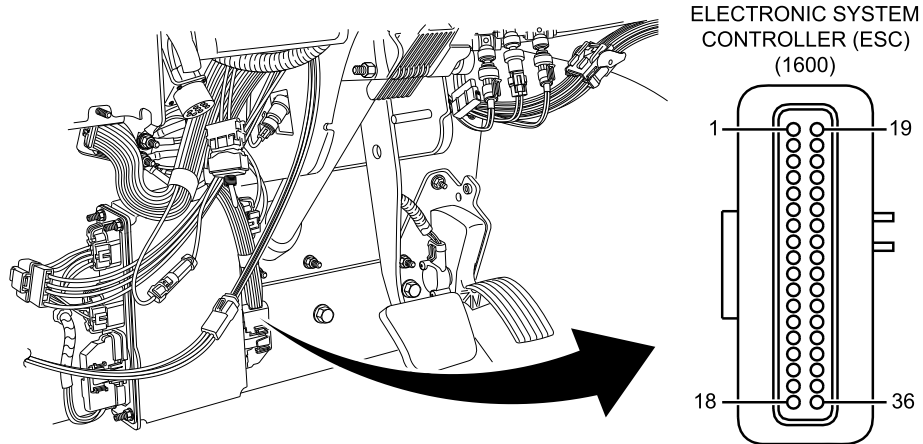
YES Go to next step.

NO Go to Step 50.

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

STEP

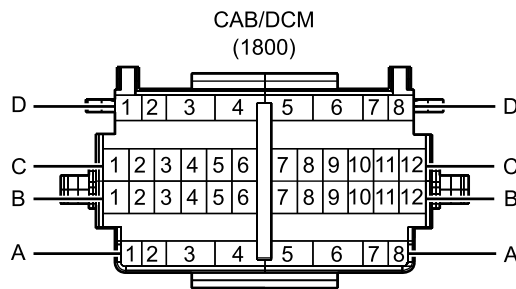
44. Disconnect connector 1600 from ESC. Refer to Figure 21.



B230603692

Figure 21. Driver Controls Area.

45. Measure resistance between connector 1600 terminal 3 and connector 1800 terminal A4 with multimeter. Refer to Figure 21 and Figure 22.



B230603802

Figure 22. Connector 1800.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

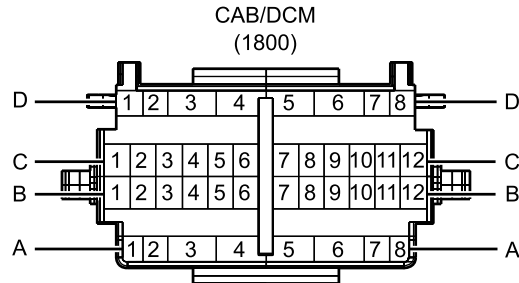
YES Go to next step.

NO Go to Step 49.

WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

46. Measure resistance between connector 1800 terminal A4 and ground with multimeter. Refer to Figure 23.



B230603802

Figure 23. Connector 1800.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 49.

STEP

47. Measure resistance between connector 1800 terminal A4 and all other terminals on connector 1800 with multimeter. Refer to Figure 23.

CONDITION/INDICATION

Does multimeter read OL at each terminal?

DECISION

YES Go to Step 48.

NO Go to Step 49.

MALFUNCTION

- 48. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST

MALFUNCTION

- 49. Harness is faulty.

ACTION

Replace harness. Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

**WINDSHIELD WIPER SWITCH INPUTS TO ELECTRONIC SYSTEM CONTROLLER (ESC)
TROUBLESHOOTING PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 50. Harness is faulty.

ACTION

Replace harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 51. Wiper switch is faulty.

ACTION

Replace multifunction switch. Refer to Multifunction Turn Signal Switch Assembly Removal and Installation (WP 0323). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Harness, relay breakout (WP 0795, Item 51)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0113
WP 0333
WP 0335
WP 0353
WP 0684
WP 0689

WP 0782

Equipment Condition

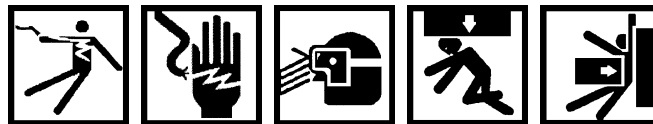
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 23

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the windshield wiper and washer system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Windshield Wiper and Washer Operational Checkout Procedure (WP 0113) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

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.

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove four bolts (Figure 1, Item 2) and flat washers (Figure 1, Item 3) from wiper motor cover (Figure 1, Item 1) and remove cover.

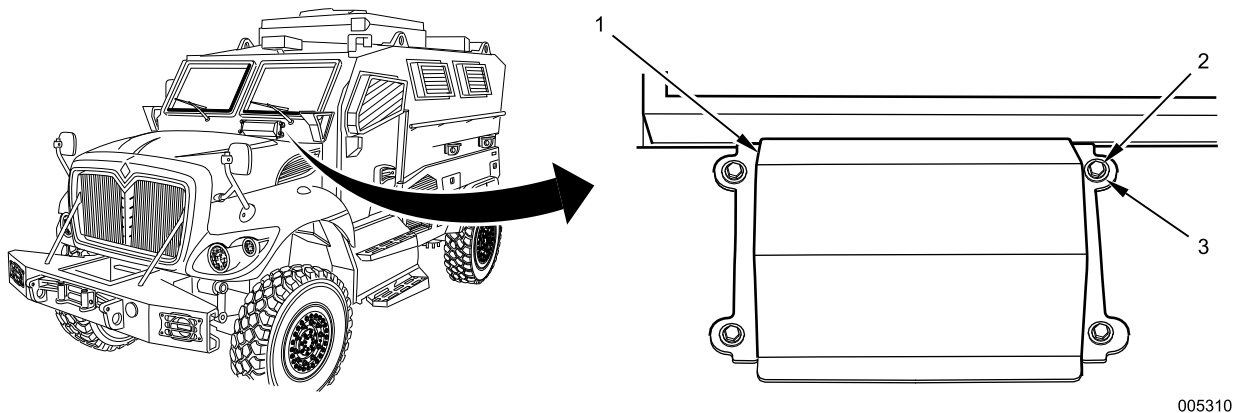


Figure 1. Windshield Wiper Motor Cover.

2. Disconnect connector LAM1176. Refer to Figure 2.

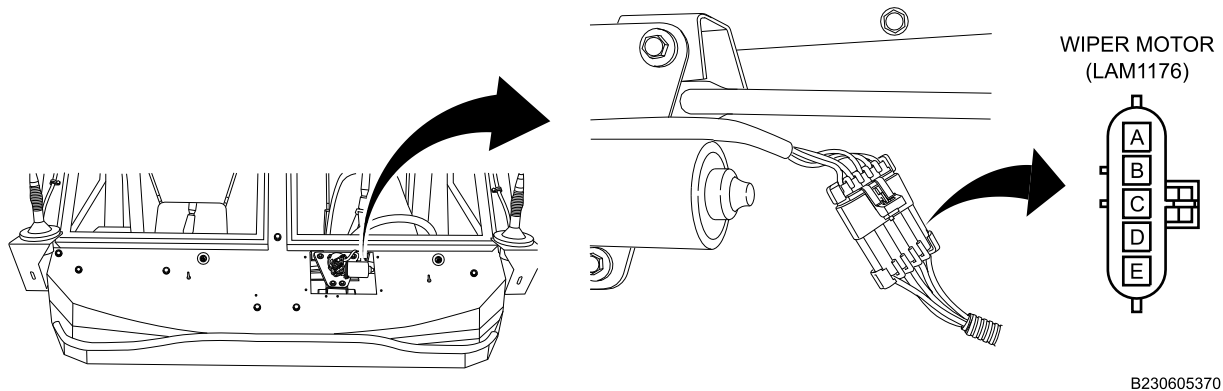


Figure 2. Bottom Exterior of Windshield Area.

3. Measure resistance between connector LAM1176 terminals B and E with multimeter. Refer to Figure 2.

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

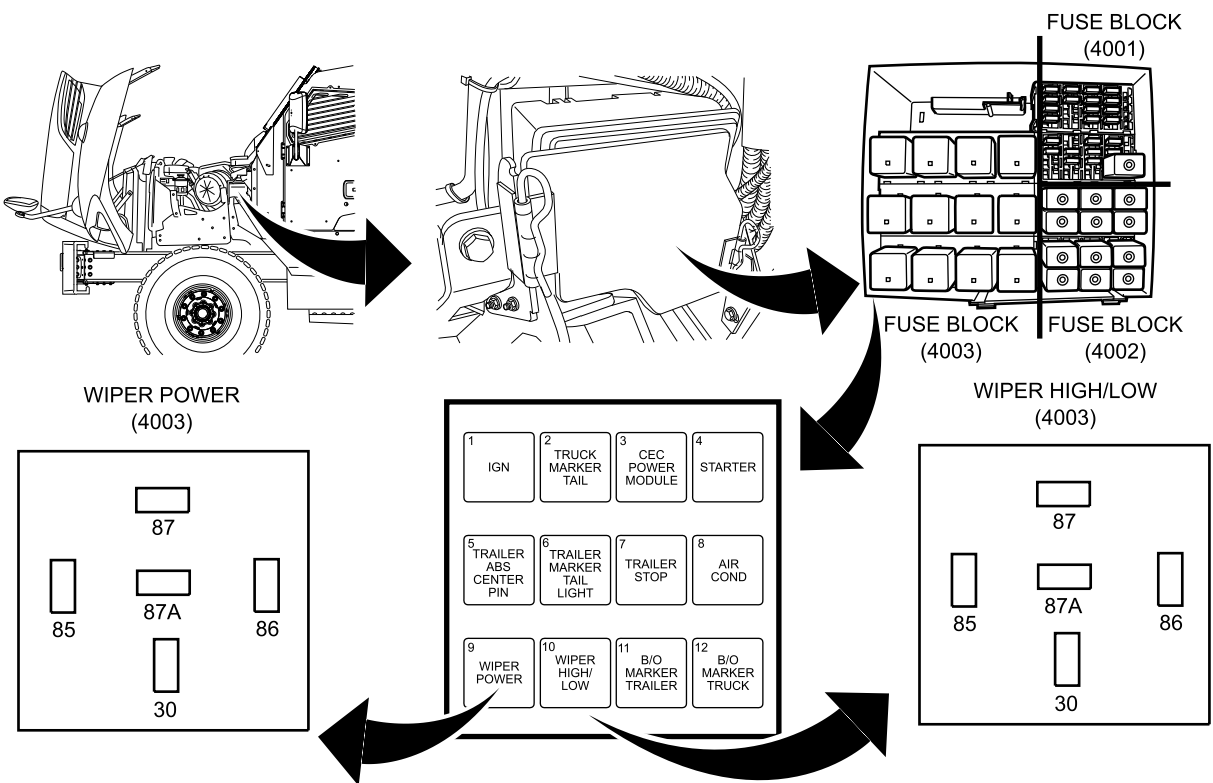
Does multimeter read less than 1 ohm?

DECISION

YES Go to Step 17.
NO Go to next step.

STEP

4. Remove WIPER POWER relay and WIPER HIGH/LOW relay from underhood power distribution center. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 3.

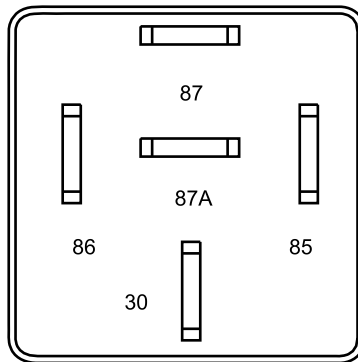


B230611670

Figure 3. WIPER POWER and WIPER HIGH/LOW Relays Location.

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

5. Measure resistance between WIPER POWER relay terminals 87A and 30 with multimeter. Refer to Figure 4. Note multimeter reading.



B230605608

Figure 4. WIPER POWER Relay.

6. Repeat resistance measurement for WIPER HIGH/LOW relay. Note multimeter reading.

CONDITION/INDICATION

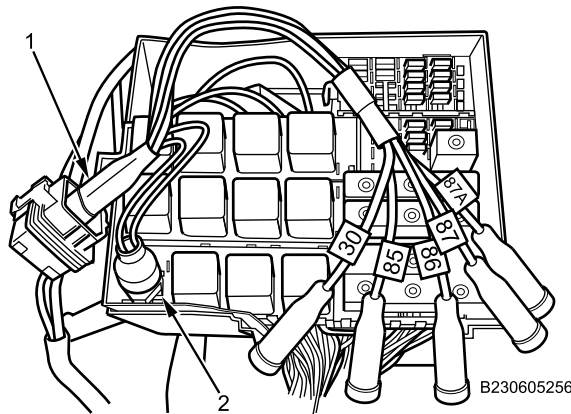
Did multimeter read more than 1 ohm for either relay?

DECISION

YES Go to Step 16.
 NO Go to next step.

STEP

7. Install relay breakout harness (Figure 5, Item 1) on WIPER POWER relay socket (Figure 5, Item 2).



B230605256

Figure 5. Relay Breakout Harness Installation.

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

8. Measure resistance between connector LAM1176 terminal B and relay breakout harness terminal 87A with multimeter. Refer to Figure 6 and Figure 5.

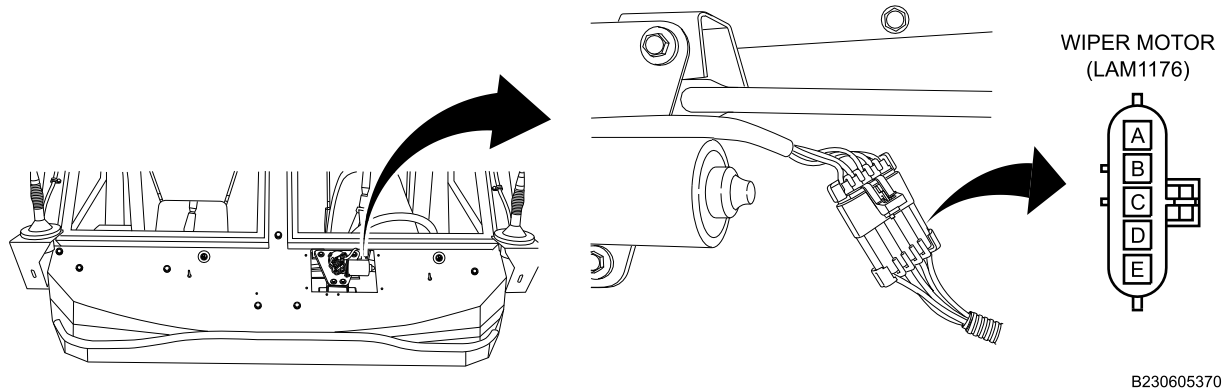


Figure 6. Bottom Exterior of Windshield Area.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 15.

STEP

9. Measure resistance between relay breakout harness terminal 87A and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 12.

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

10. Disconnect connector 4004. Refer to Figure 7.

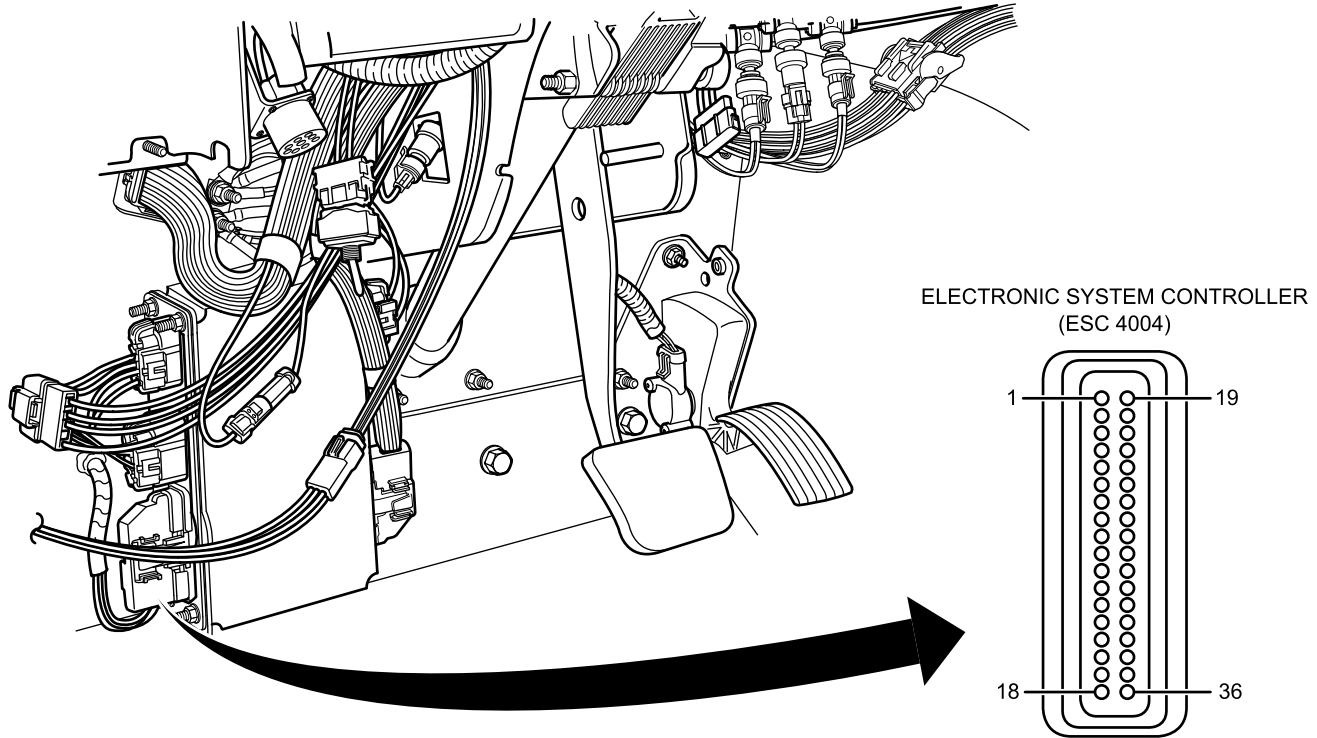


Figure 7. Left Side Instrument Panel (IP) Near Floor Area.

11. Measure resistance between relay breakout harness terminal 85 and ground with multimeter. Refer to Figure 8.

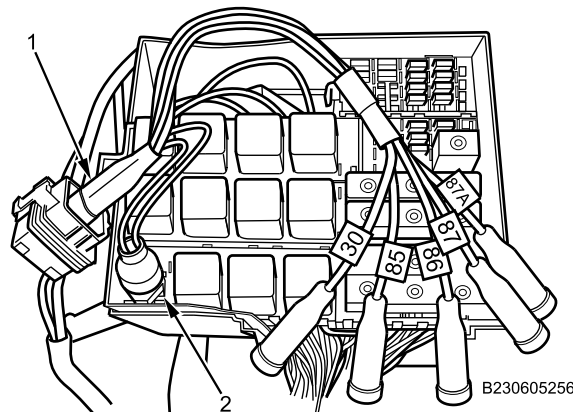


Figure 8. Relay Breakout Harness Installation.

CONDITION/INDICATION

Does multimeter read OL?

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 14.

NO Go to Step 15.

STEP

12. Disconnect connector 4015. Refer to Figure 9.

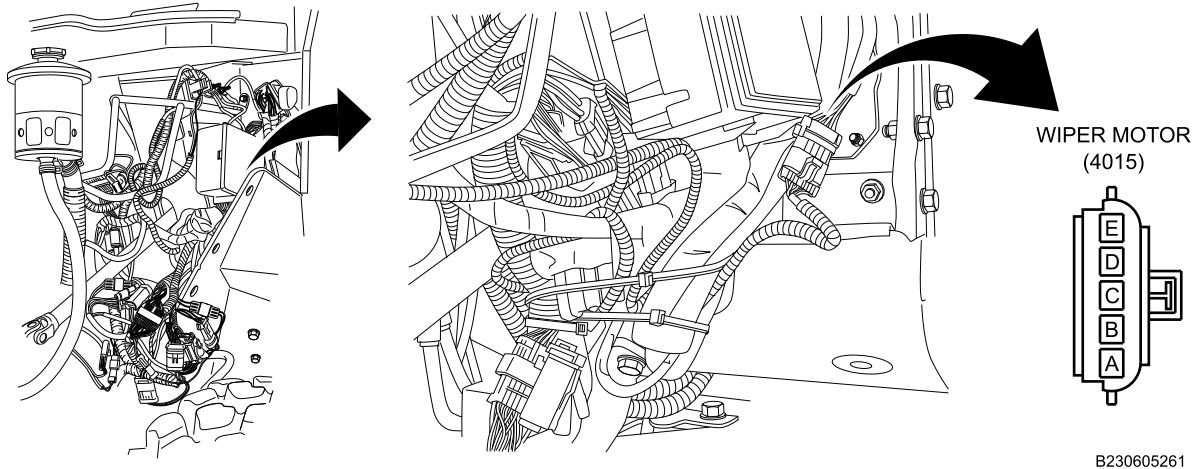


Figure 9. Left Side Engine Compartment Area.

13. Measure resistance between connector 4015 terminal B and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 18.

NO Go to Step 15.

MALFUNCTION

- 14. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST

WINDSHIELD WIPER PARK CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 15. Harness is faulty.

ACTION

Replace harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 16. Relay is faulty.

ACTION

Replace relay that measured more than 1 ohm. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 17. Wiper motor is faulty.

ACTION

Replace wiper motor. Refer to Windshield Wiper Motor, Transmission, Bracket, and Linkage Assembly Removal and Installation (WP 0684). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 18. Harness is faulty.

ACTION

Replace harness. Refer to Windshield Wiper Motor Harness Removal and Installation (WP 0689). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Harness, relay breakout (WP 0795, Item 51)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0113
WP 0333
WP 0335
WP 0353
WP 0684
WP 0689

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Wiper switch off (TM 9-2355-106-10)

Drawings Required

(WP 0789, Figure 23)

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the windshield wiper and washer system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Windshield Wiper and Washer Operational Checkout Procedure (WP 0113) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

CAUTION

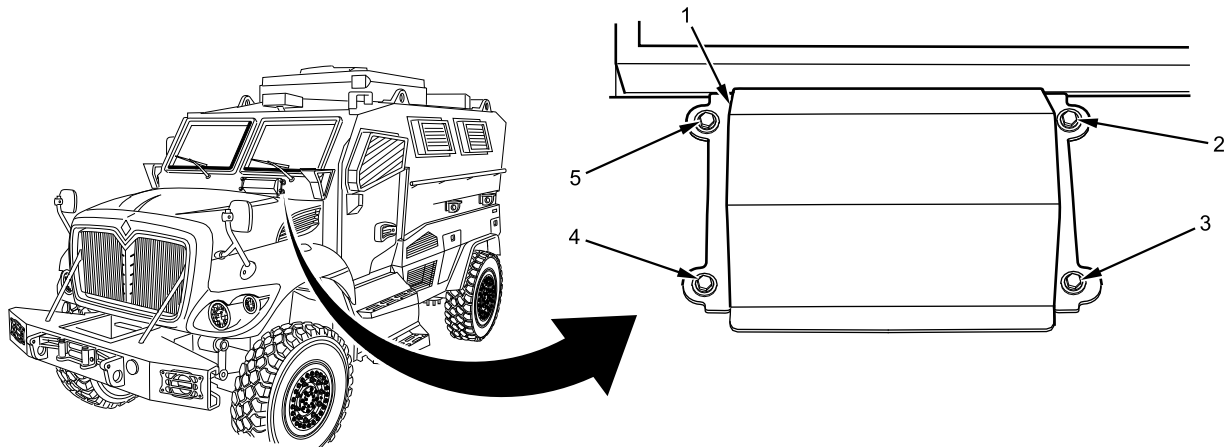
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

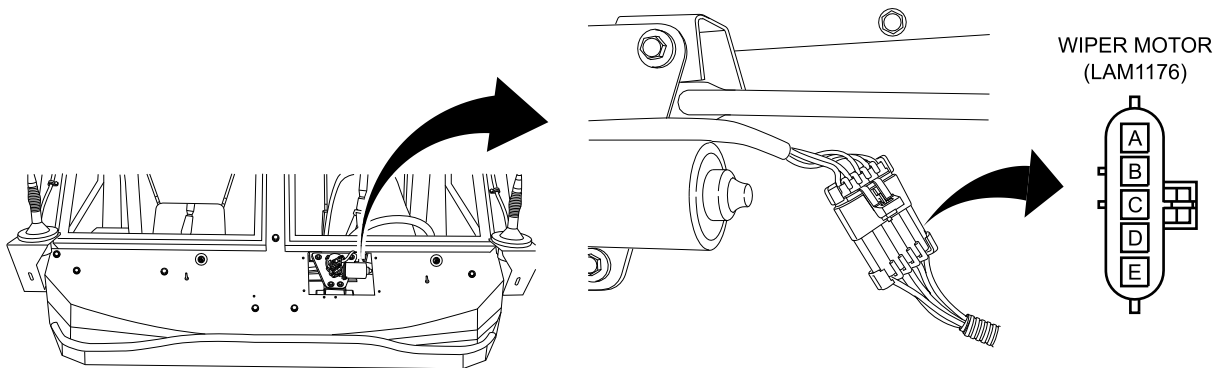
1. Remove four bolts and flat washers (Figure 1, Item 2 through 5) from wiper motor cover (Figure 1, Item 1) and remove cover.



B230605330

Figure 1. Windshield Wiper Motor Cover.

2. Disconnect connector LAM1176. Refer to Figure 2.



B230605370

Figure 2. Bottom Exterior of Windshield Area.

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector LAM1176 terminal A and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to next step.
NO Go to Step 11.

STEP

6. Measure DC voltage between connector LAM1176 terminals A and C with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 24.

STEP

7. Place wiper switch in low speed position (TM 9-2355-106-10).
8. Measure DC voltage between connector LAM1176 terminal E and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 28.

STEP

9. Place wiper switch in high speed position (TM 9-2355-106-10).
10. Measure DC voltage between connector LAM1176 terminal D and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

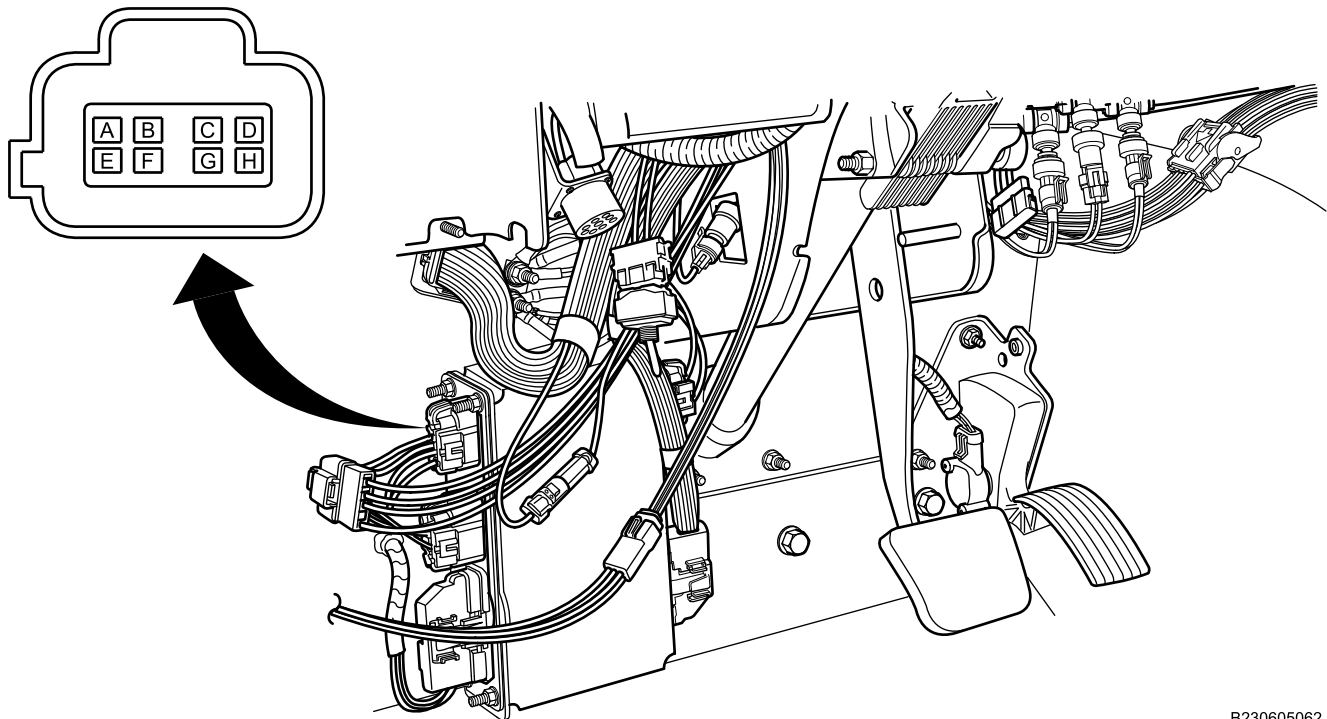
DECISION

YES Go to Step 76.
NO Go to Step 56.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

11. Turn ignition switch OFF (TM 9-2355-106-10).
12. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
13. Disconnect connector 4008. Refer to Figure 3.

SYSTEM CONTROLLER (BLUE)
(4008)

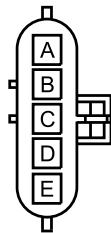


B230605062

Figure 3. Left Side Instrument Panel Near Floor Area.

14. Measure resistance between connector 4008 terminal F and connector LAM1176 terminal A with multimeter. Refer to Figure 3 and Figure 4.

WIPER MOTOR
(LAM1176)



B230604525

Figure 4. Connector LAM1176.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

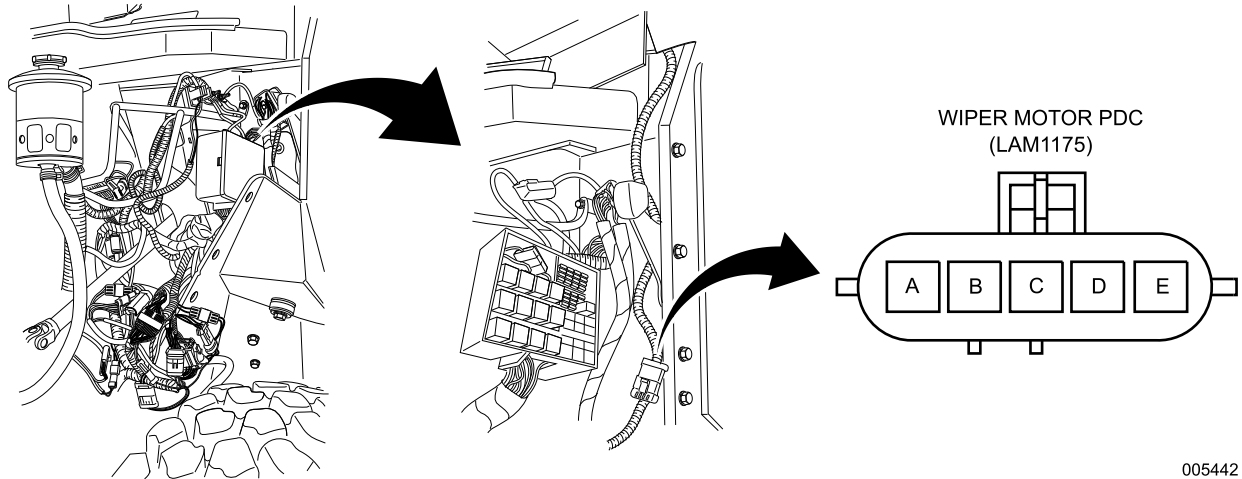
YES Go to Step 18.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

15. Disconnect connector LAM1175 from wiper motor. Refer to Figure 5.



005442

Figure 5. Left Side Engine Compartment Area.

16. Measure resistance between connector LAM1175 terminal A and connector LAM1176 terminal A with multimeter. Refer to Figure 5 and Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

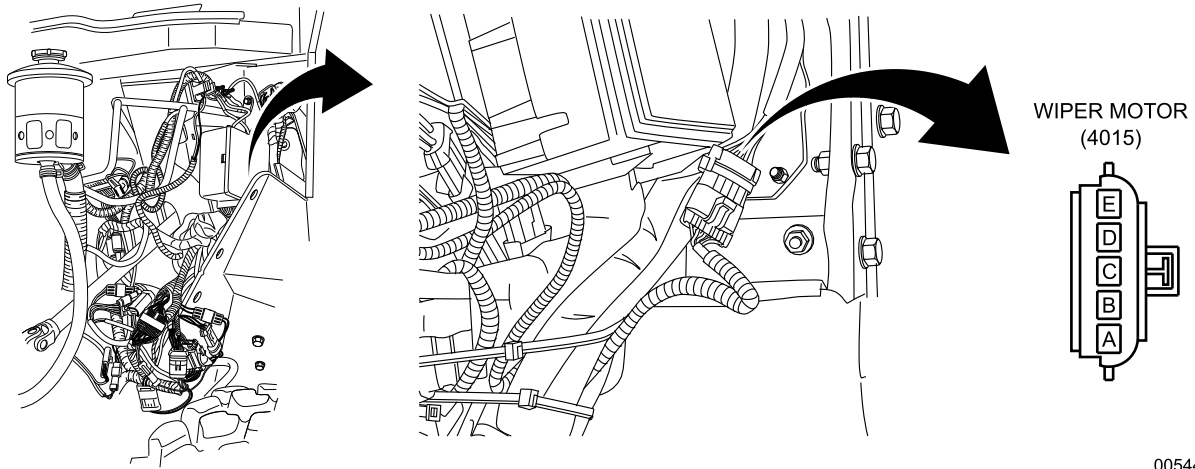
YES Go to next step.

NO Go to Step 77.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

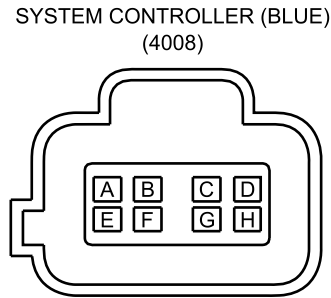
STEP

17. Measure resistance between connector 4015 terminal A and connector 4008 terminal F with multimeter. Refer to Figure 6 and Figure 7.



005441

Figure 6. Left Side Engine Compartment Area.



B230603832

Figure 7. Connector 4008.

CONDITION/INDICATION

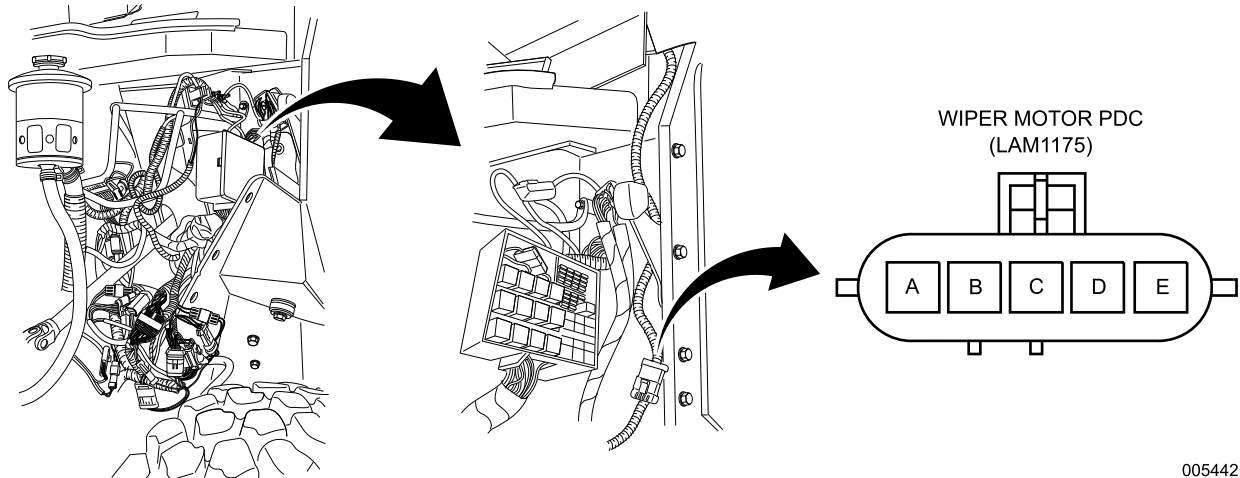
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 72.
 NO Go to Step 74.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

18. Disconnect connector LAM1175 from wiper motor. Refer to Figure 8.



005442

Figure 8. Left Side Engine Compartment Area.

19. Measure resistance between connector LAM1175 terminal A and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 77.

STEP

20. Measure resistance between connector LAM1175 terminal A and all other terminals on connector LAM1175 with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read OL for each terminal?

DECISION

YES Go to next step.
NO Go to Step 77.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

21. Disconnect connector 4004. Refer to Figure 9.

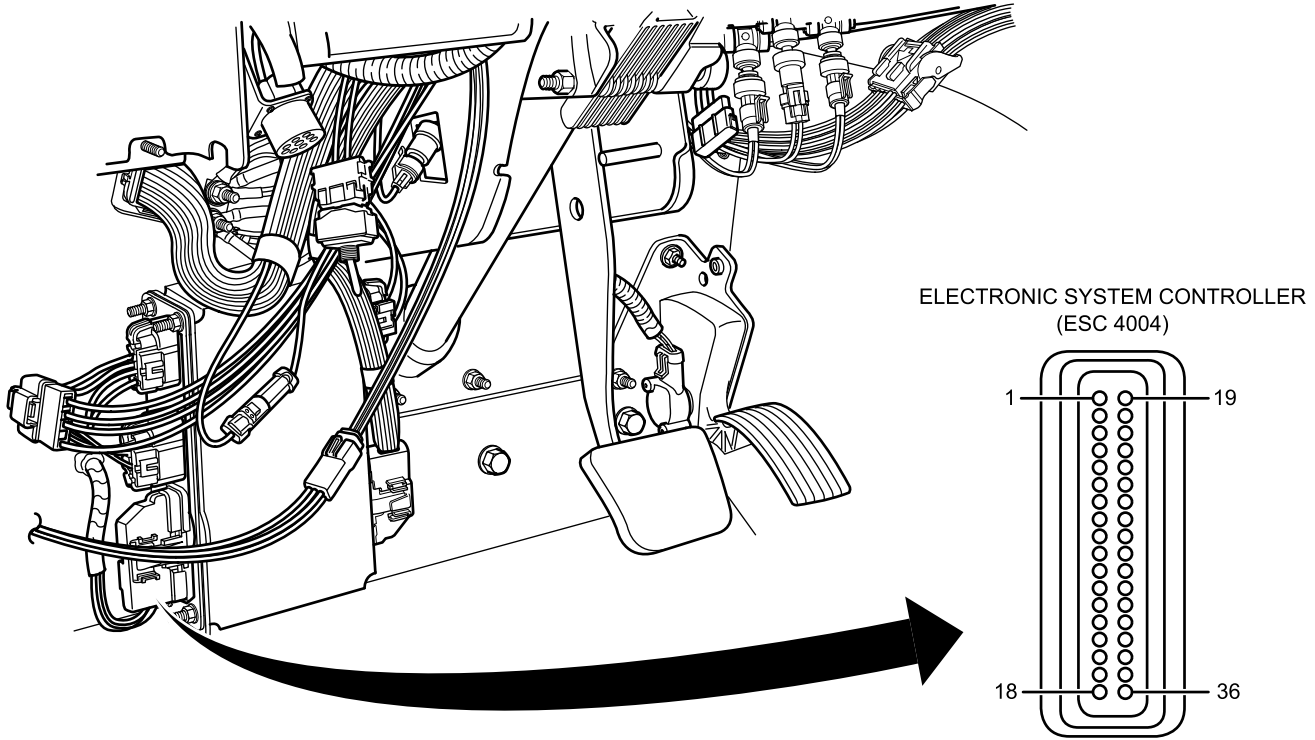


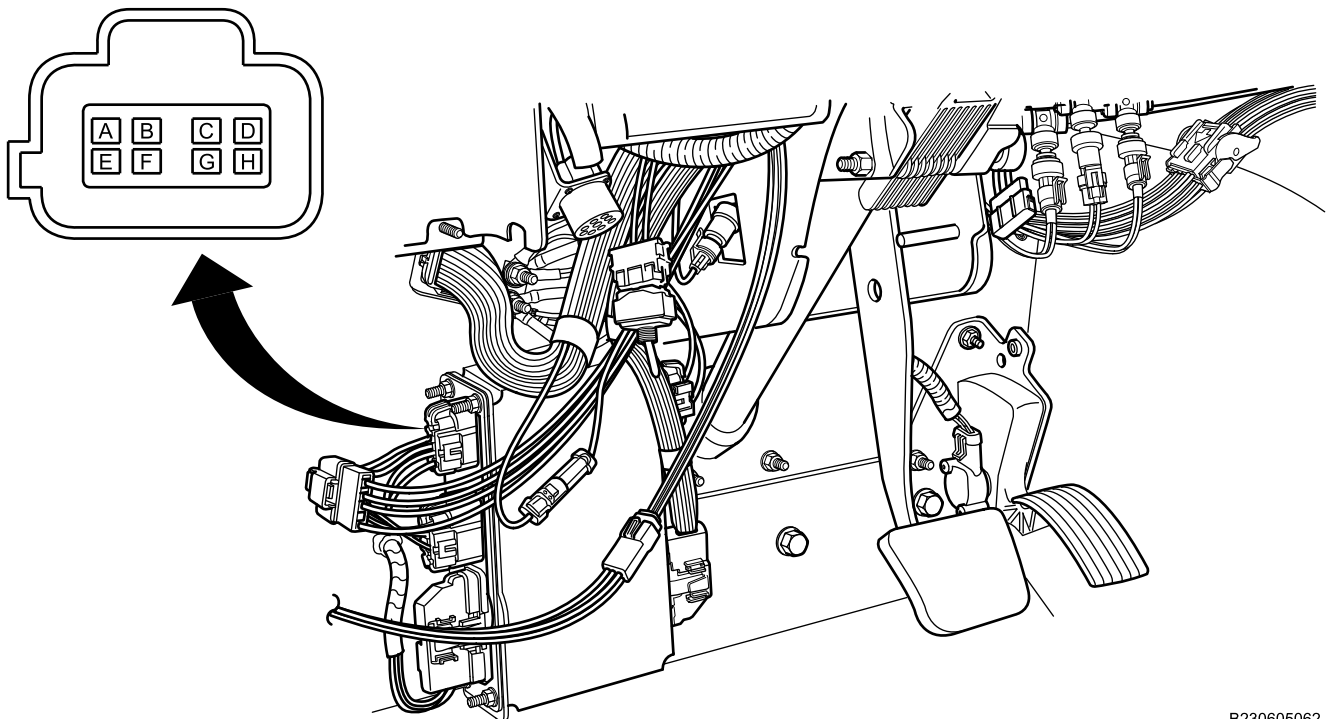
Figure 9. Left Side IP Near Floor Area.

22. Measure resistance between connector 4008 terminal F and ground with multimeter. Refer to Figure 10.

B230604421

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

SYSTEM CONTROLLER (BLUE)
(4008)



B230605062

Figure 10. Left Side IP Near Floor Area.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 74.

STEP

23. Measure resistance between connector 4008 terminal F and all other terminals on connector 4008. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read OL for all terminals?

DECISION

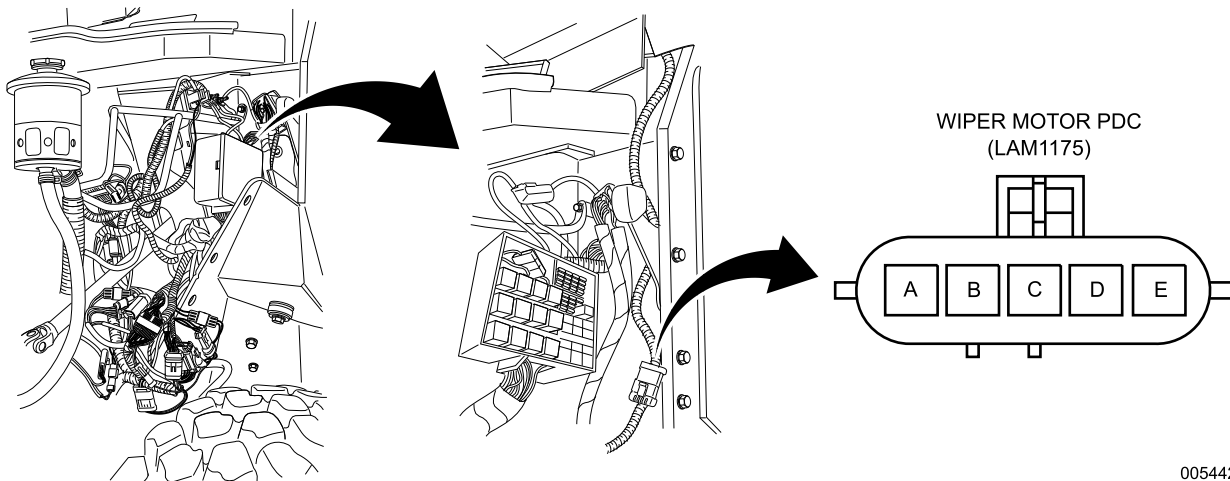
YES Go to Step 72
NO Go to Step 74.

STEP

24. Turn ignition switch OFF (TM 9-2355-106-10).
25. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

26. Disconnect connector LAM1175 from wiper motor. Refer to Figure 11.

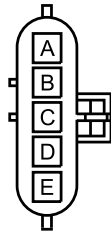


005442

Figure 11. Left Side Engine Compartment Area.

27. Measure resistance between connector LAM1175 terminal C and connector LAM1176 terminal C with multimeter. Refer to Figure 11 and Figure 12.

WIPER MOTOR
(LAM1176)



B230604525

Figure 12. Connector LAM1176.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

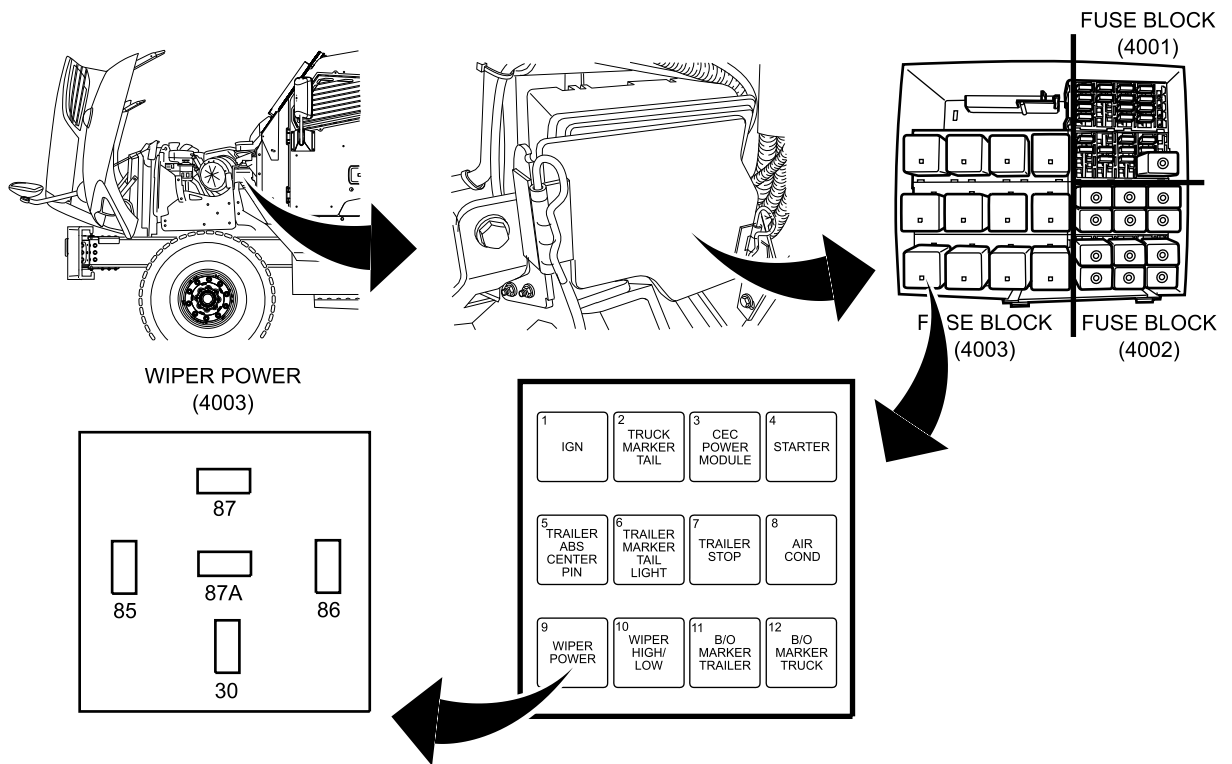
YES Go to Step 74.

NO Go to Step 77.

STEP

28. Remove WIPER POWER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 13.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605356

Figure 13. Left Engine Compartment Area.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

29. Install relay breakout harness (Figure 14, Item 1) on WIPER POWER relay socket (Figure 14, Item 2) , and install WIPER POWER relay (Figure 14, Item 3) on relay breakout harness.

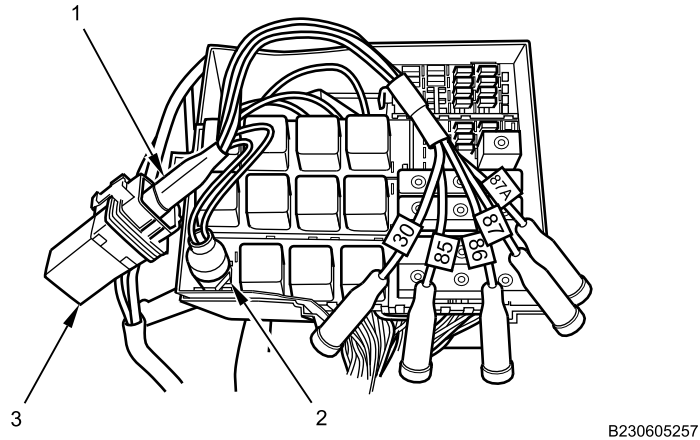


Figure 14. WIPER POWER Relay Breakout Harness Installation.

30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 31. Turn ignition switch ON (TM 9-2355-106-10).
 32. Measure DC voltage between relay breakout harness terminal 87 and ground with multimeter. Note multimeter reading. Refer to Figure 14.
 33. Measure DC voltage between relay breakout harness terminal 86 and ground with multimeter. Note multimeter reading. Refer to Figure 14.

CONDITION/INDICATION

Did multimeter read more than 10.5V for both measurements?

DECISION

YES Go to next step.
 NO Go to Step 74.

STEP

34. Ensure wiper switch is in low speed position (TM 9-2355-106-10).
 35. Measure DC voltage between relay breakout harness terminals 85 and 87 with multimeter. Refer to Figure 15.

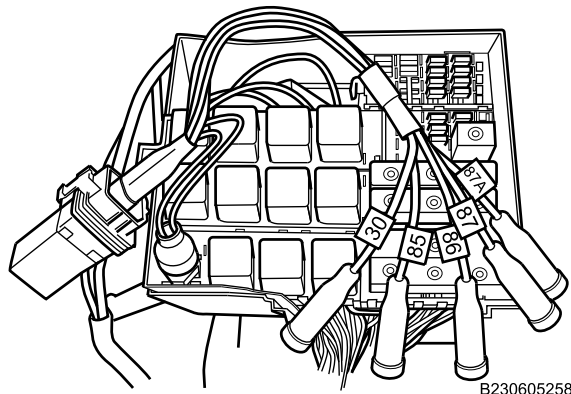


Figure 15. WIPER POWER Relay Breakout Harness.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.

NO Go to Step 52.

STEP

36. Measure DC voltage between relay breakout harness terminal 30 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.

NO Go to Step 75.

STEP

37. Turn ignition switch OFF (TM 9-2355-106-10).

38. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

39. Remove relay breakout harness (Figure 14, Item 1) from WIPER POWER relay socket (Figure 14, Item 2).

40. Install WIPER POWER relay in WIPER POWER relay socket in Power Distribution Center (PDC). Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

41. Remove WIPER HIGH/LOW relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 16.

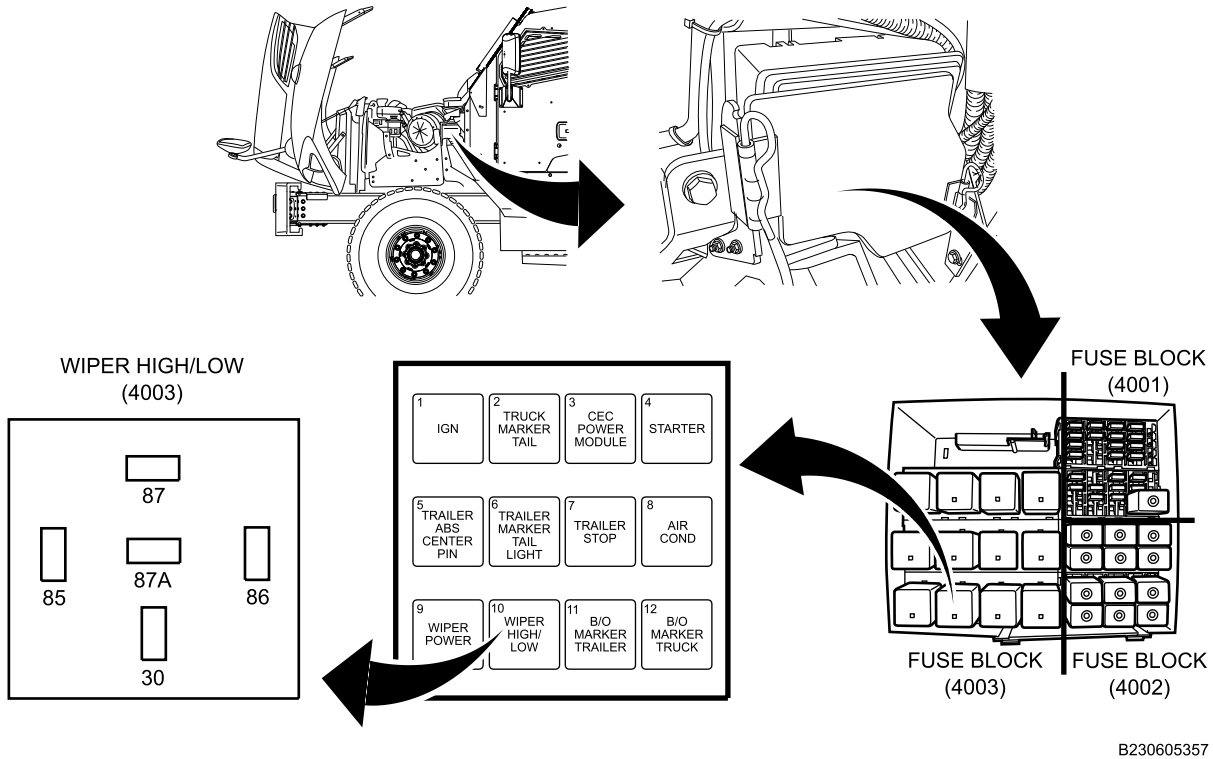


Figure 16. Left Engine Compartment Area.

42. Install relay breakout harness (Figure 17, Item 1) on WIPER HIGH/LOW relay socket (Figure 17, Item 2), and install WIPER HIGH/LOW relay (Figure 17, Item 3) on relay breakout harness.

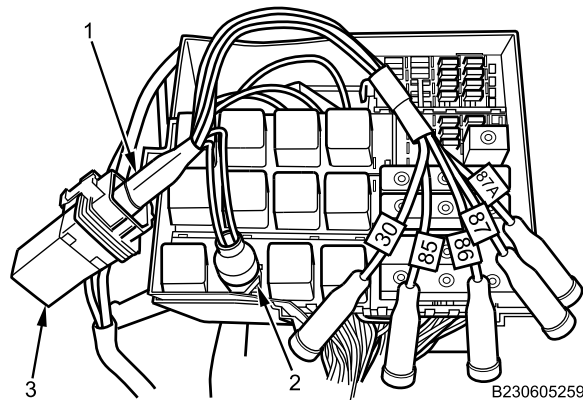


Figure 17. WIPER HIGH/LOW Relay Breakout Harness Installation.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

43. Turn MAIN POWER switch ON (TM 9-2355-106-10).
44. Turn ignition switch ON (TM 9-2355-106-10).
45. Ensure wiper switch is in low speed position (TM 9-2355-106-10).
46. Measure DC voltage between relay breakout harness terminal 30 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 74.

STEP

47. Measure DC voltage at relay breakout harness terminal 87A and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

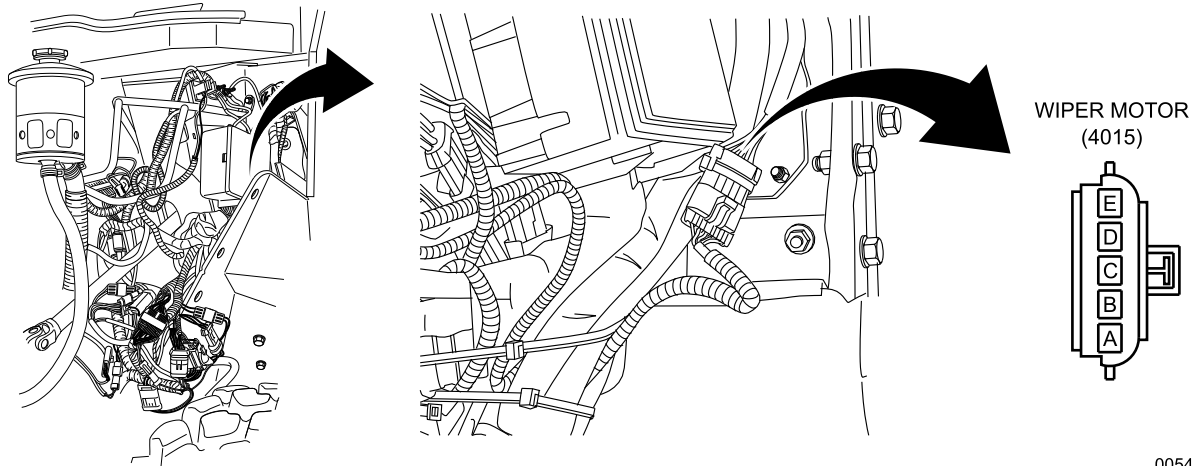
YES Go to next step.
NO Go to Step 73.

STEP

48. Turn ignition switch OFF (TM 9-2355-106-10).
49. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

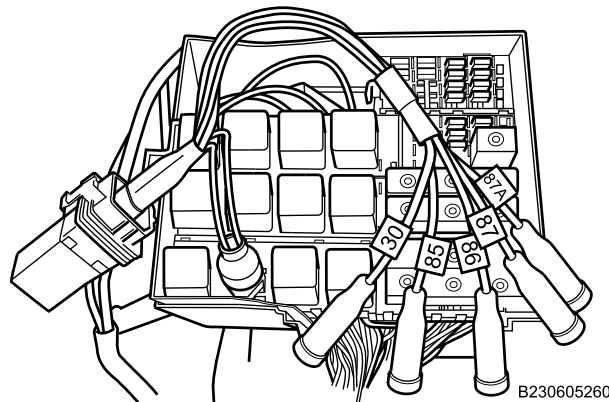
50. Disconnect connector 4015. Refer to Figure 18.



005441

Figure 18. Left Side Engine Compartment Area.

51. Measure resistance between connector 4015 terminal E and relay breakout harness terminal 87A with multimeter. Refer to Figure 18 and Figure 19.



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Figure 19. WIPER HIGH/LOW Relay Breakout Harness.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.

NO Go to Step 74.

STEP

52. Turn ignition switch OFF (TM 9-2355-106-10).
53. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
54. Disconnect connector 4004. Refer to Figure 20.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

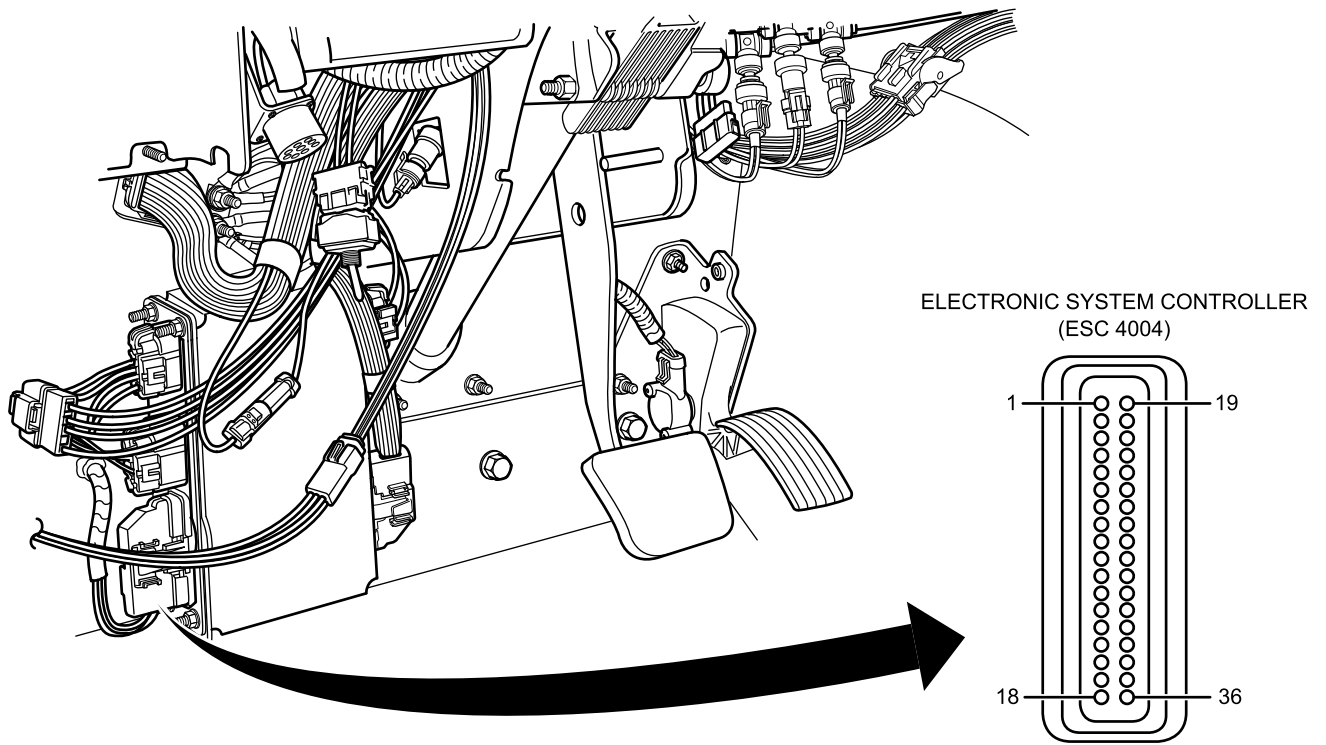


Figure 20. Left Side IP Near Floor Area.

55. Measure resistance between connector 4004 terminal 29 and relay breakout harness terminal 85 with multimeter. Refer to Figure 20 and Figure 19.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

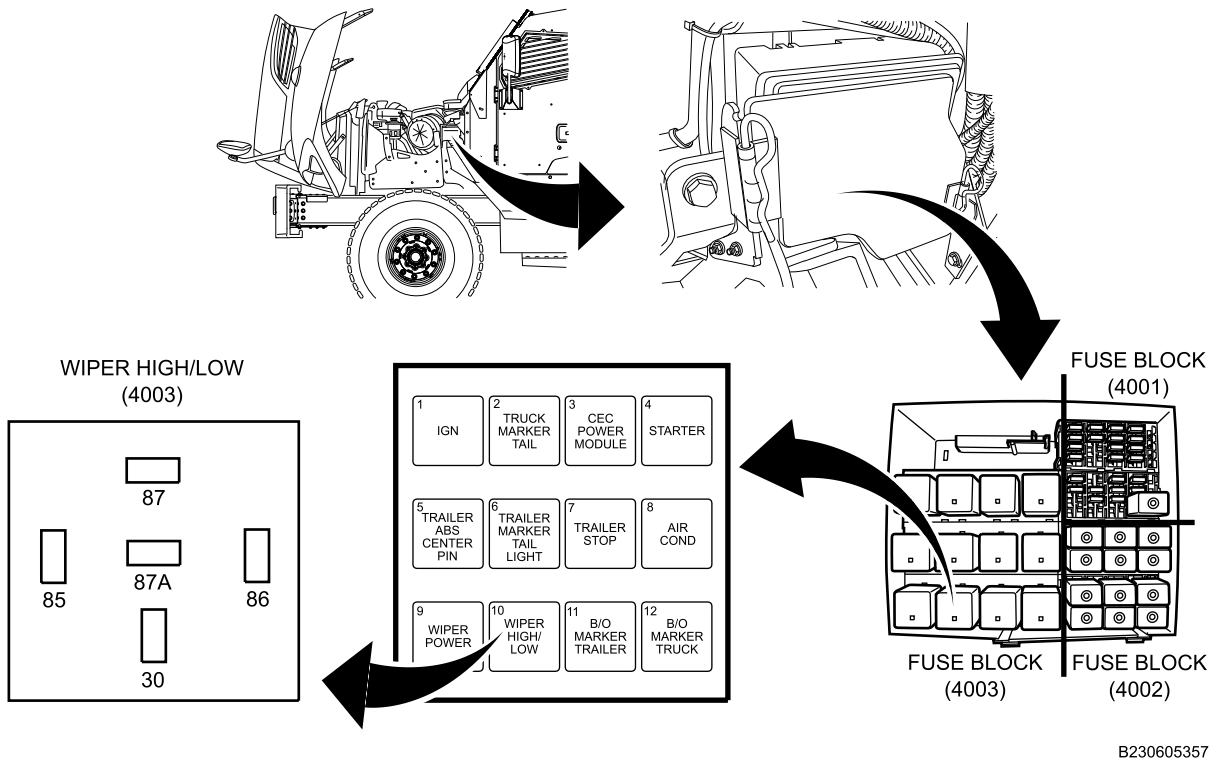
YES Go to Step 72.
 NO Go to Step 74.

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WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

56. Remove WIPER HIGH/LOW relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 21.



B230605357

Figure 21. Left Engine Compartment Area.

57. Install relay breakout harness (Figure 22, Item 1) on WIPER HIGH/LOW relay socket (Figure 22, Item 2), and install WIPER HIGH/LOW relay (Figure 22, Item 3) on relay breakout harness.

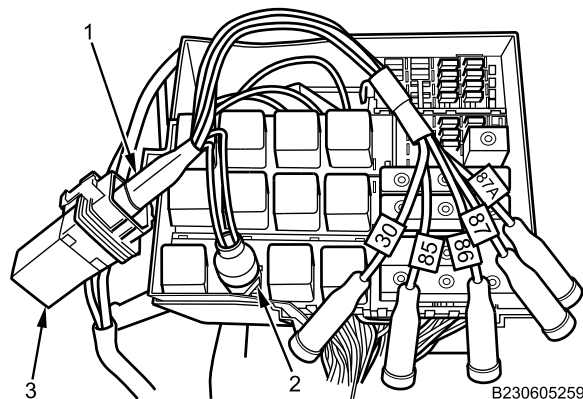


Figure 22. WIPER HIGH/LOW Relay Breakout Harness Installation.

- 58. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 59. Turn ignition switch ON (TM 9-2355-106-10).
- 60. Ensure wiper switch is in high speed position (TM 9-2355-106-10).

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

61. Measure DC voltage between relay breakout harness terminal 86 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 74.

STEP

62. Measure DC voltage between relay breakout harness terminals 85 and 86 with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 68.

STEP

63. Measure DC voltage between relay breakout harness terminal 87 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

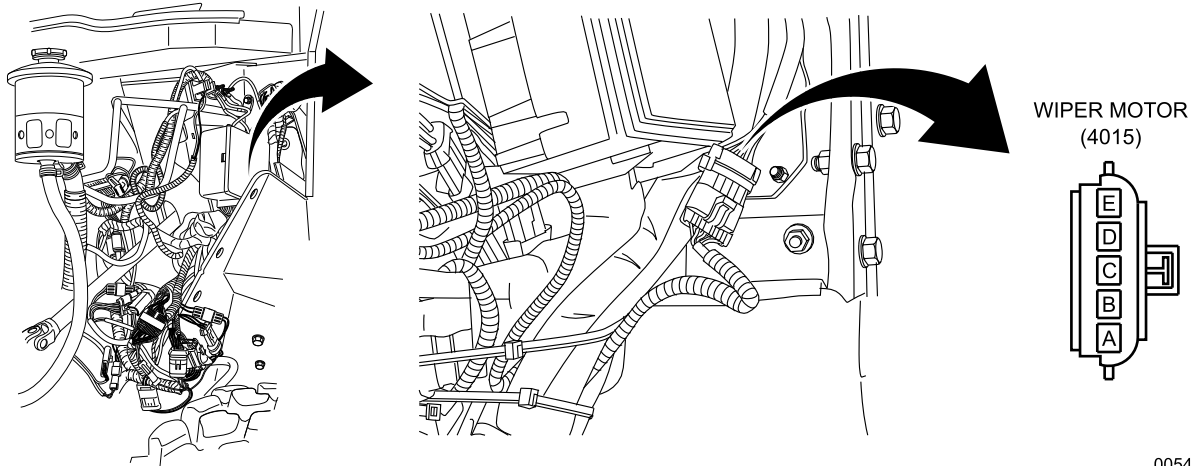
Does multimeter read more than 10.5V?

DECISION

YES Go to next step.
NO Go to Step 73.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

64. Turn ignition switch OFF (TM 9-2355-106-10).
65. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
66. Disconnect connector 4015. Refer to Figure 23



005441

Figure 23. Left Side Engine Compartment Area.

67. Measure resistance between relay breakout harness terminal 87 and connector 4015 terminal D with multimeter. Refer to Figure 23 and Figure 25.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.
 NO Go to Step 74.

STEP

68. Turn ignition switch OFF (TM 9-2355-106-10).
69. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
70. Disconnect connector 4004. Refer to Figure 24.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

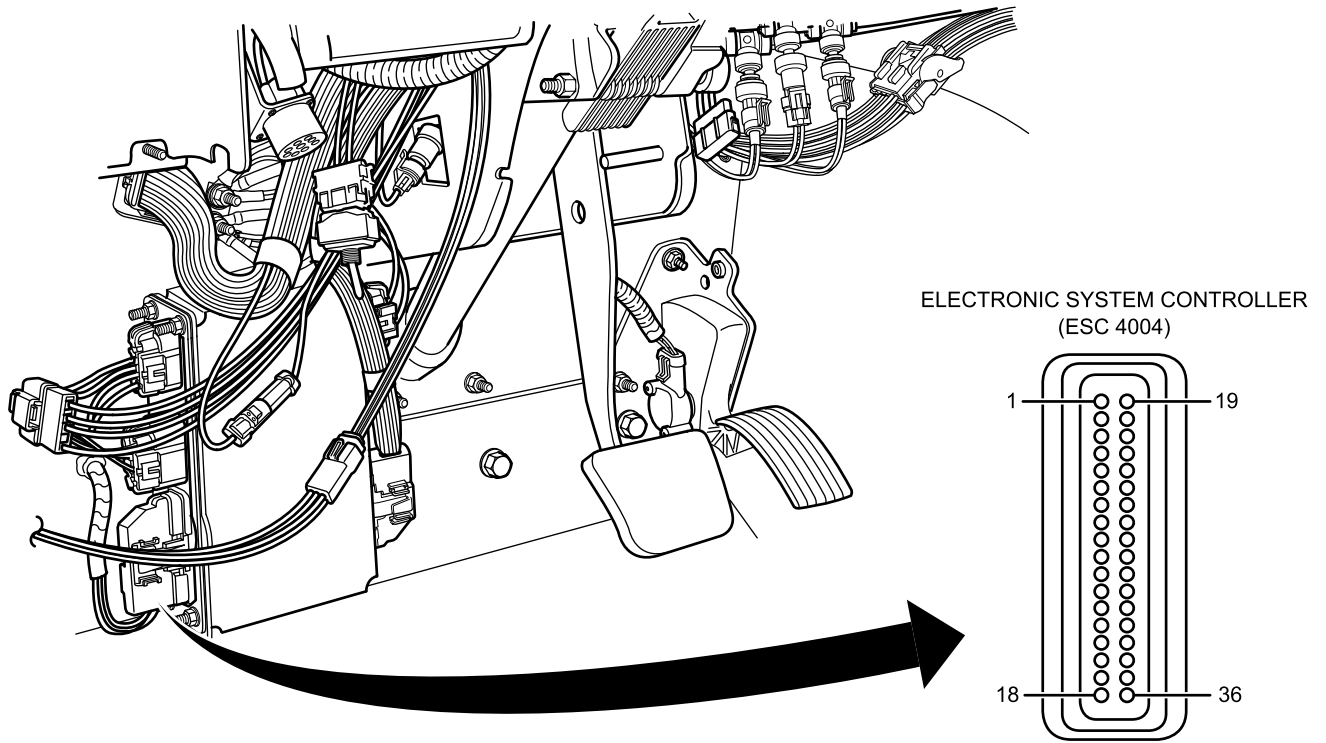


Figure 24. Left Side IP Near Floor Area.

71. Measure resistance between relay breakout harness terminal 85 and connector 4004 terminal 20 with multimeter. Refer to Figure 24 and Figure 25.

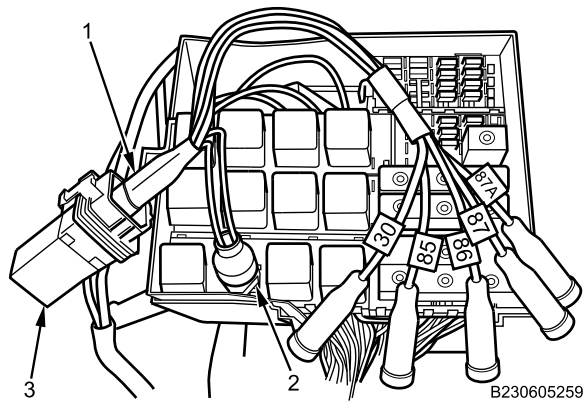


Figure 25. WIPER HIGH/LOW Relay Breakout Harness Installation.

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 72.

NO Go to Step 74.

MALFUNCTION

- 72. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 73. WIPER HIGH/LOW relay is faulty.

ACTION

Replace WIPER HIGH/LOW relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 74. Harness is faulty.

ACTION

Replace harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 75. WIPER POWER relay is faulty.

ACTION

Replace WIPER POWER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST

WINDSHIELD WIPER MOTOR CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 76. Wiper motor is faulty.

ACTION

Replace wiper motor. Refer to Windshield Wiper Motor, Transmission, Bracket, and Linkage Assembly Removal and Installation (WP 0684). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 77. Harness is faulty.

ACTION

Replace harness. Refer to Windshield Wiper Motor Harness Removal and Installation (WP 0689). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**NATO CONNECTOR TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Gloves, rubber (WP 0795, Item 38)

WP 0672

WP 0782

Materials/Parts

Goggles, industrial (WP 0795, Item 20)
Faceshield, industrial (WP 0795, Item 16)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0404
WP 0421
WP 0450
WP 0604
WP 0606

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Battery box armor door removed (WP 0604)
Batteries disconnected (WP 0404)
Air conditioning (A/C) condenser panel removed
(WP 0672)
Right side rear belly armor plate removed
(WP 0606)

Drawings RequiredWP 0789, Figure 47

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

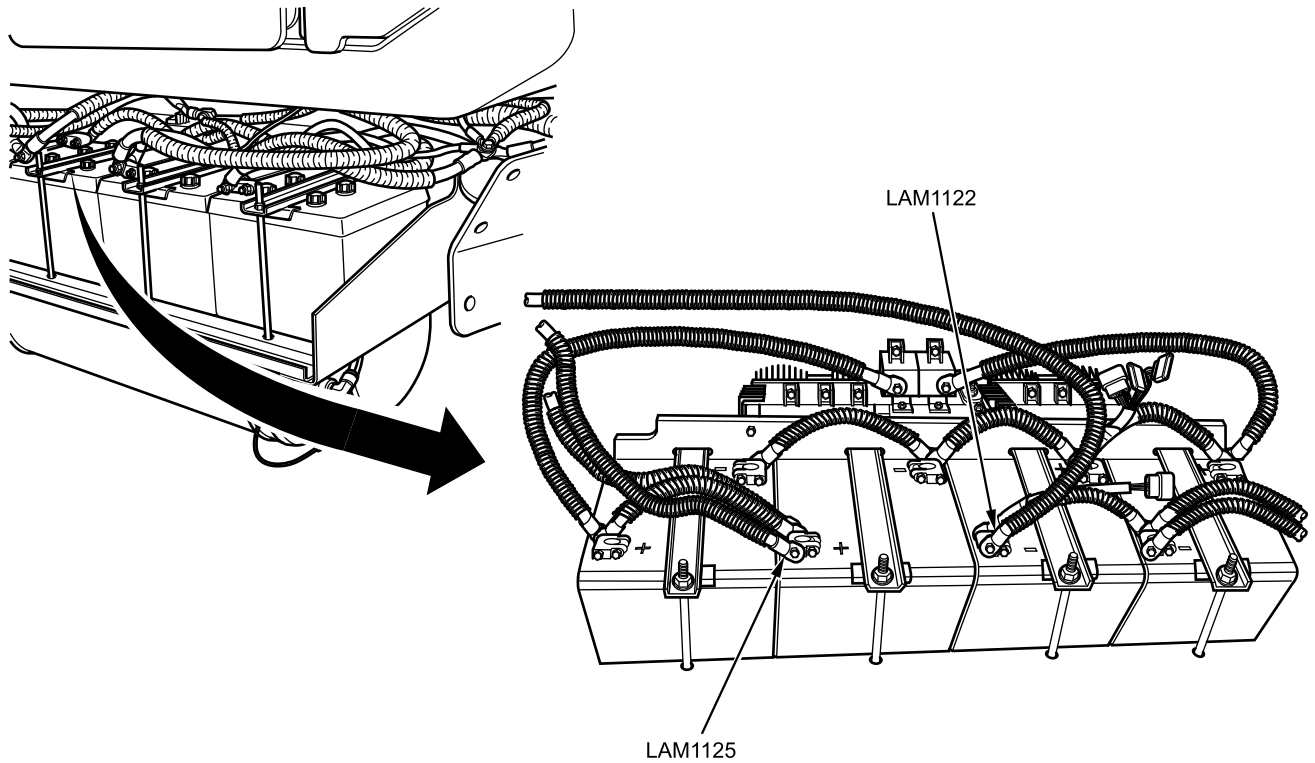
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

Cables attached to NATO connector are described as BLUE or BLACK. BLUE cables are RED with BLUE conduit and with BLUE tape at or near the cable eyelet. BLACK are BLACK cables without BLUE tape.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

1. Remove BLACK cable terminal LAM1122 from battery. Refer to Figure 1.



B230605121

Figure 1. Battery Box.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

2. Remove cable terminals LAM1081 and LAM1083 from NATO connector. Refer to Figure 2.

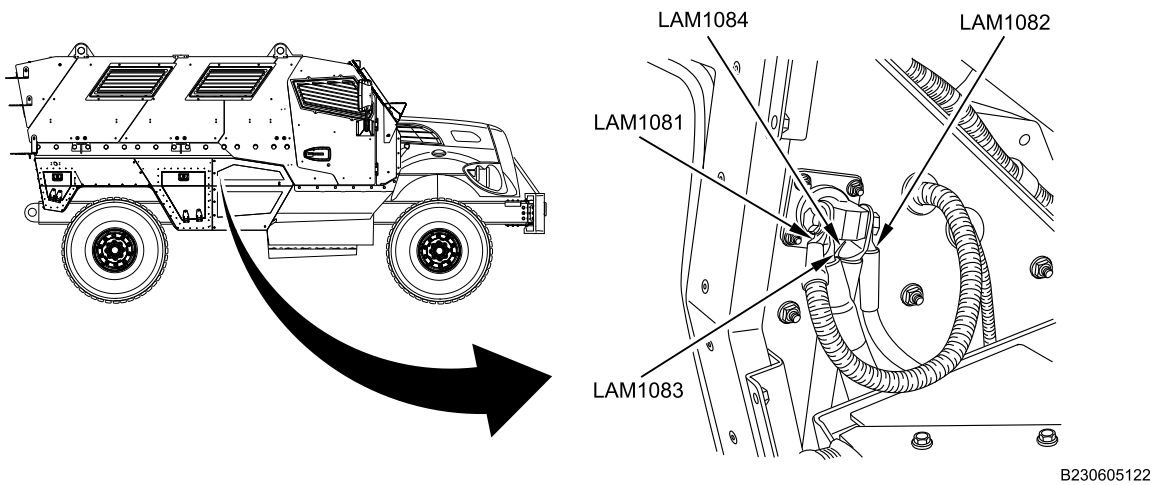


Figure 2. Right Side of Forward Stowage Box.

3. Remove cable terminals LAM1084 and LAM1082 from NATO connector. Refer to Figure 2.
4. Visually inspect cable for damage and corrosion.

CONDITION/INDICATION

Does visual inspection indicate damage or corrosion?

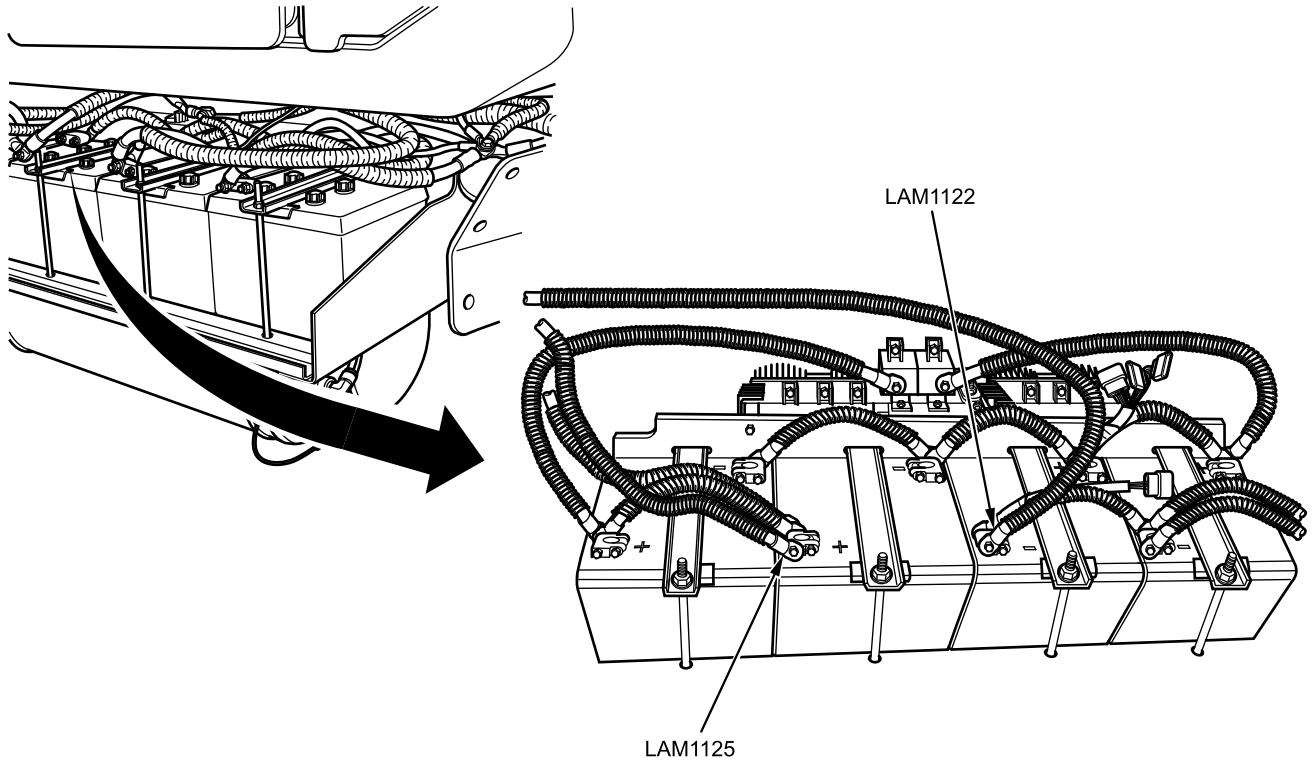
DECISION

YES Go to Step 11.
NO Go to next step.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

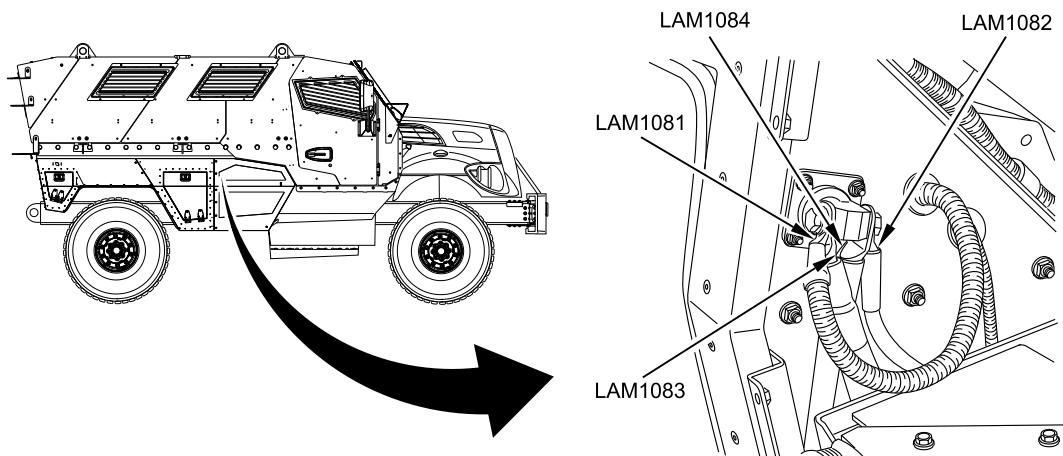
STEP

5. Measure resistance between BLACK cable terminals LAM1122 and LAM1084 with multimeter. Refer to Figure 3 and Figure 4.



B230605121

Figure 3. NATO Cables at Battery Box.



B230605122

Figure 4. Behind NATO Connector.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read more than 5 ohms?

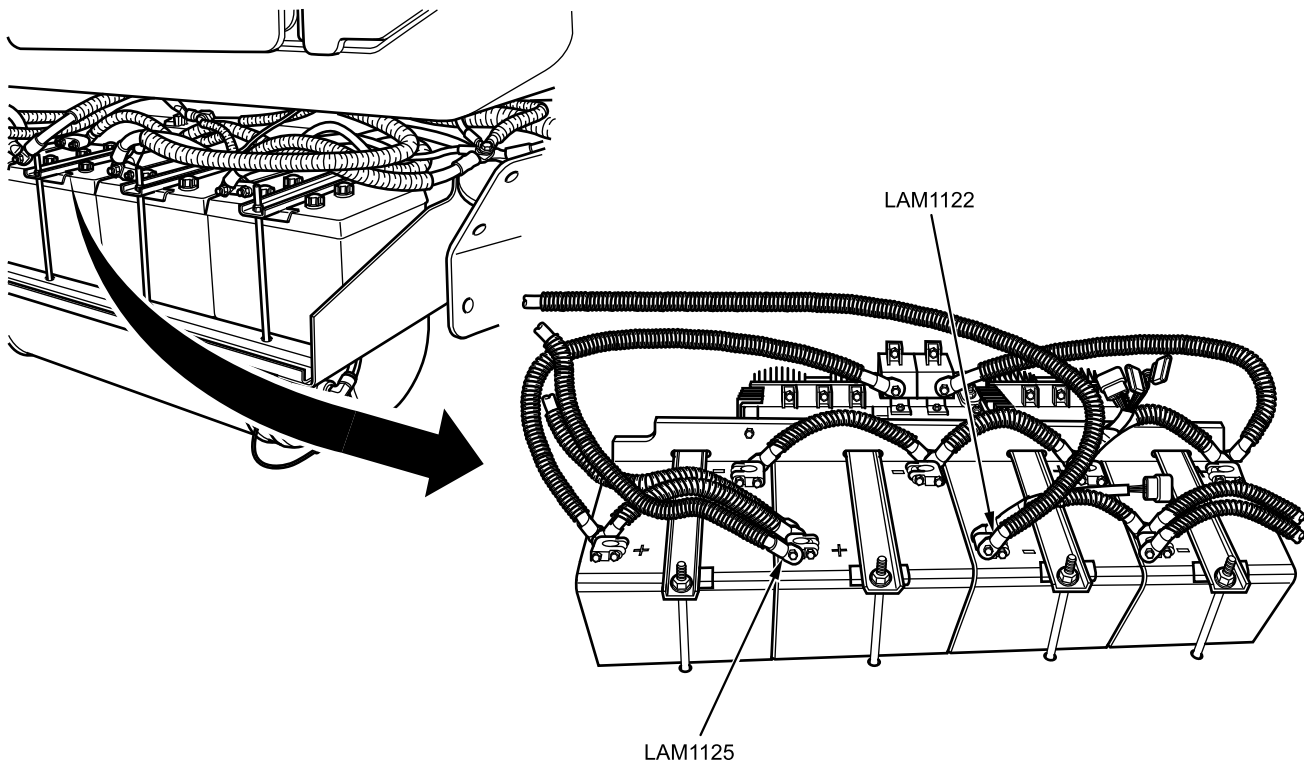
DECISION

YES Go to Step 11.

NO Go to next step.

STEP

6. Remove BLUE cable between battery positive terminal LAM1125. Refer to Figure 5.



B230605121

Figure 5. NATO Cables at Battery Box.

7. Visually inspect BLUE cable for indications of damage and corrosion.
8. Measure resistance between BLUE cable terminals LAM1125 and LAM1083 with multimeter. Refer to Figure 5 and Figure 6.

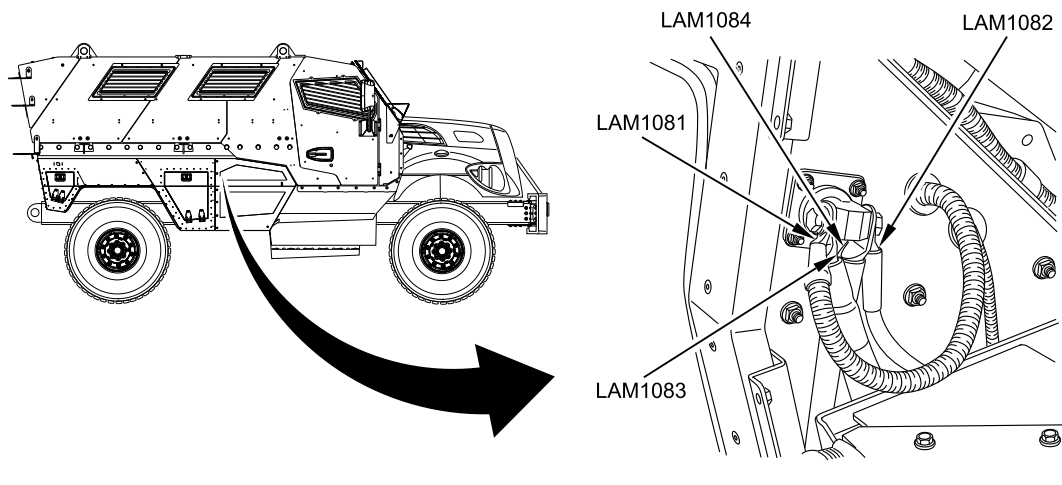
NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 6. Right Side of Forward Stowage Box.

CONDITION/INDICATION

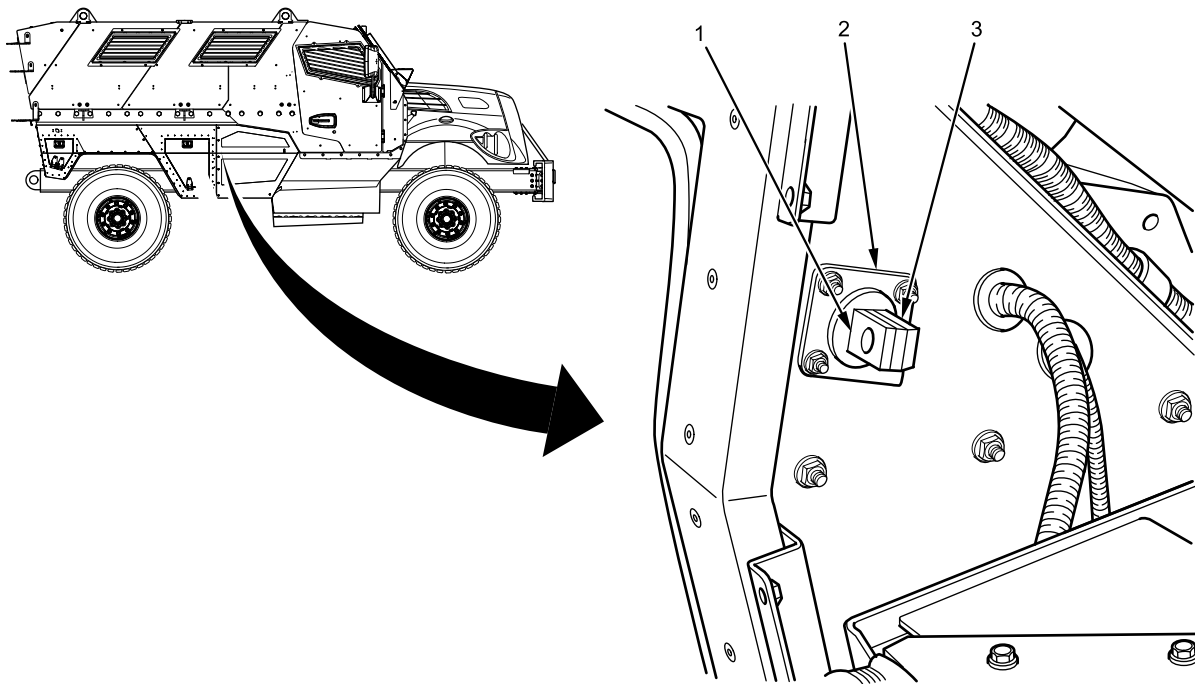
Does multimeter read more than 5 ohms or cable visual inspection indicates damage or corrosion?

DECISION

YES Go to Step 11.
NO Go to next step.

STEP

9. Visually inspect NATO connector (Figure 7, Item 2) for damage and corrosion.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230605123

Figure 7. NATO Connector.

CONDITION/INDICATION

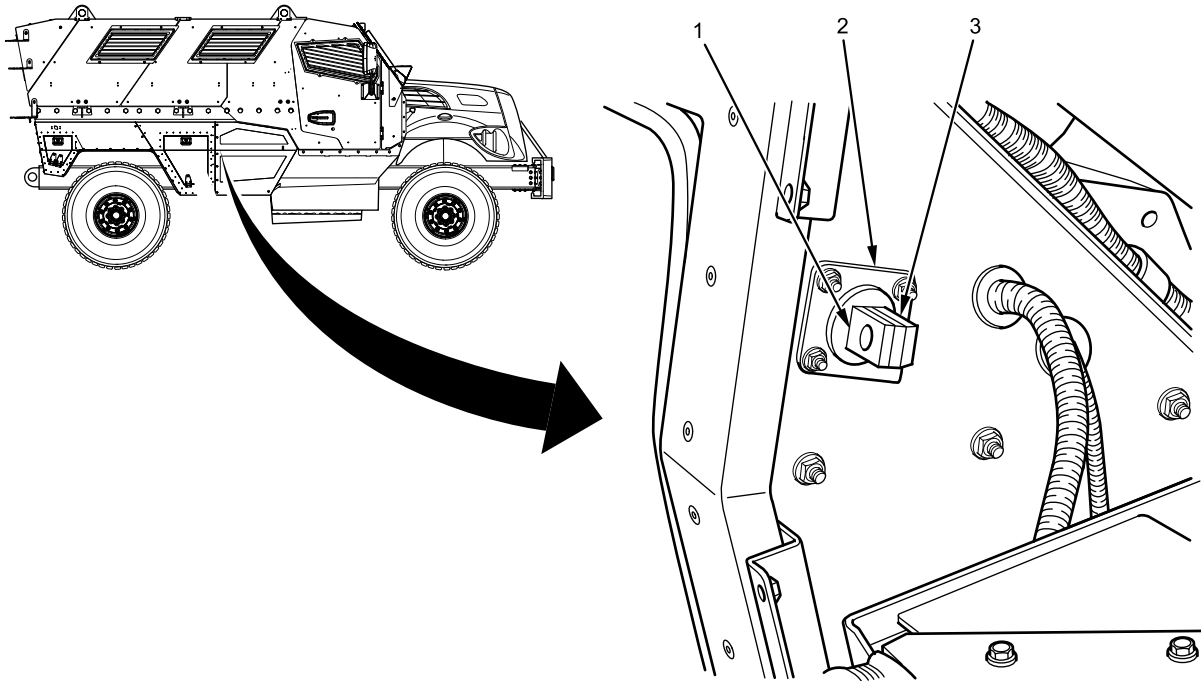
Does NATO connector (Figure 7, Item 2) have damage or corrosion?

DECISION

YES Go to Step 12.
NO Go to next step.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

10. Measure resistance between NATO connector (Figure 8, Item 2) terminals (Figure 8, Item 1 and 3) with multimeter.



B230605123

Figure 8. NATO Connector.

CONDITION/INDICATION

Does Multimeter read OL?

DECISION

NO Go to Step 12.

YES Return vehicle to service.

MALFUNCTION

- 11. Faulty harness.

ACTION

Replace NATO harness. Refer to NATO Jump Start Cables Removal and Installation (WP 0450).

END OF TEST**MALFUNCTION**

- 12. Faulty connector.

NATO CONNECTOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace NATO connector. Refer to NATO Jump Start Connector Removal and Installation (WP 0421).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

110V INVERTER TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0352
WP 0447
WP 0345
WP 0328
WP 0435
WP 0449
WP 0450
WP 0451
WP 0672

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Air conditioning (A/C) condenser panel removed (WP 0672)
All 110V AC accessories unplugged from 110V outlet (TM 9-2355-106-10)
110V inverter power switch on (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 47

TROUBLESHOOTING PROCEDURE

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Inspect 110V outlet Ground Fault Circuit Interrupter (GFCI) button (TM 9-2355-106-10).

CONDITION/INDICATION

Is 110V outlet GFCI button tripped?

DECISION

NO Go to Step 5.
YES Go to next step.

STEP

3. Reset 110V outlet GFCI button (TM 9-2355-106-10).
4. Inspect 110V outlet Ground Fault Circuit Interrupter (GFCI) button (TM 9-2355-106-10).

CONDITION/INDICATION

Is 110V outlet GFCI button tripped?

DECISION

YES Go to Step 30.
NO Go to Step 41.

STEP

5. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)

6. Measure DC voltage between terminals LAM1075 and LAM1076 and ground with multimeter. Refer to Figure 1.

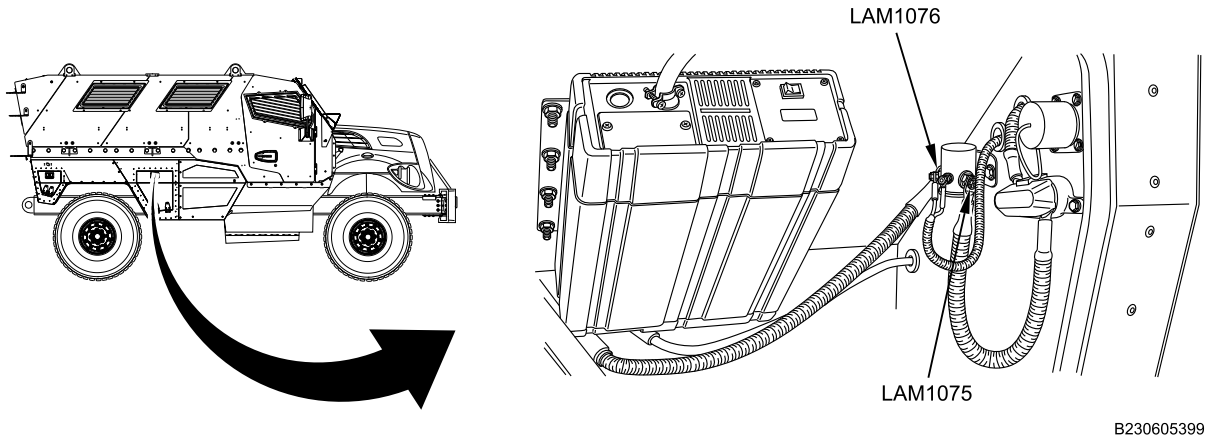


Figure 1. Right Front Stowage Box.

CONDITION/INDICATION

Does multimeter read between 21V and 27V for only one test?

DECISION

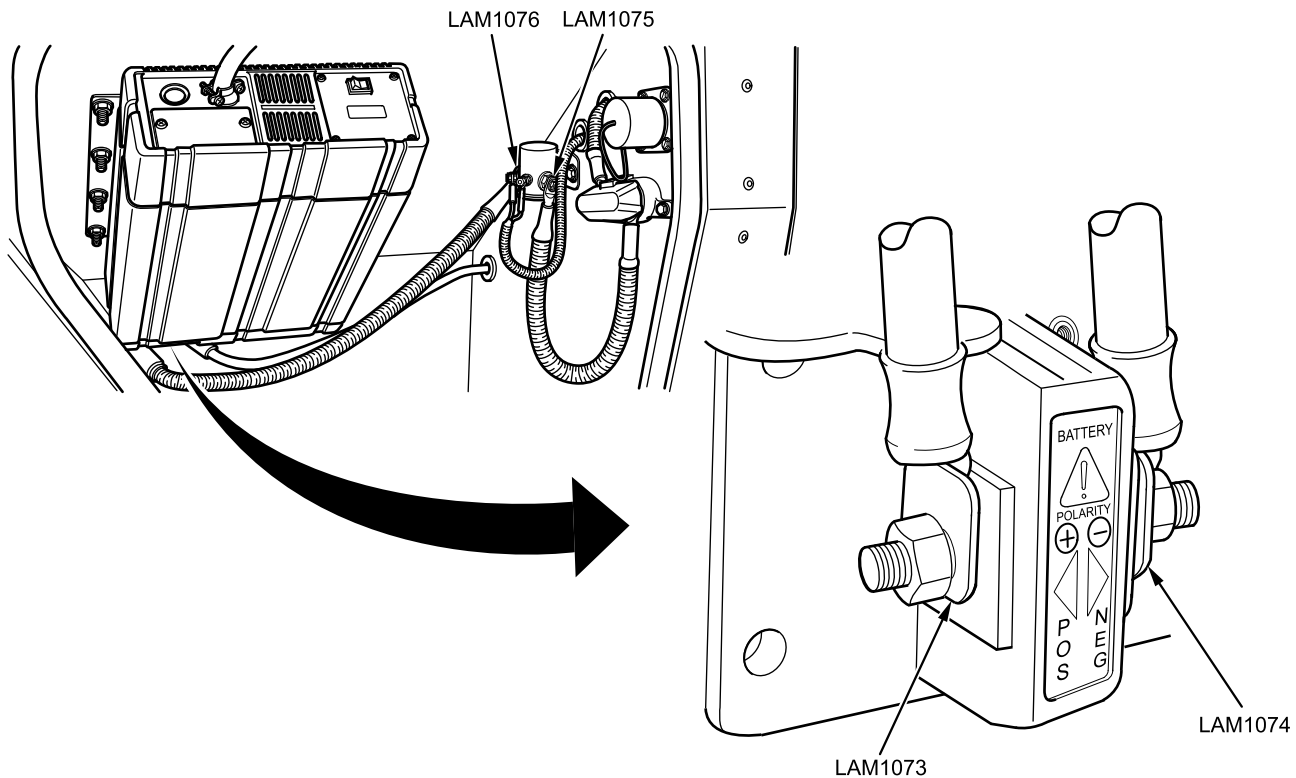
NO Go to Step 17
YES Go to next step.

STEP

7. Turn MAIN POWER switch ON (TM 9-2355-106-10).

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)

8. Measure DC voltage between terminals LAM1075 and LAM1076 and ground with multimeter. Refer to Figure 2.



B230611573

Figure 2. Terminals LAM1076, LAM1075, LAM1074, and LAM1073.

CONDITION/INDICATION

Does multimeter read between 21V and 27V for each test?

DECISION

NO Go to Step 15.
YES Go to next step.

STEP

9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Remove inverter. Refer to Inverter Removal and Installation (WP 0352).
11. Disconnect terminals LAM1076 and LAM1073. Refer to Figure 2.
12. Measure resistance between terminals LAM1076 and LAM1073 with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 36.
YES Go to next step.

STEP

13. Measure resistance between terminal LAM1074 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 20.
NO Go to next step.

STEP

14. Measure resistance between terminals LAM1074 and LAM1082 with multimeter. Refer to Figure 2 and Figure 3.

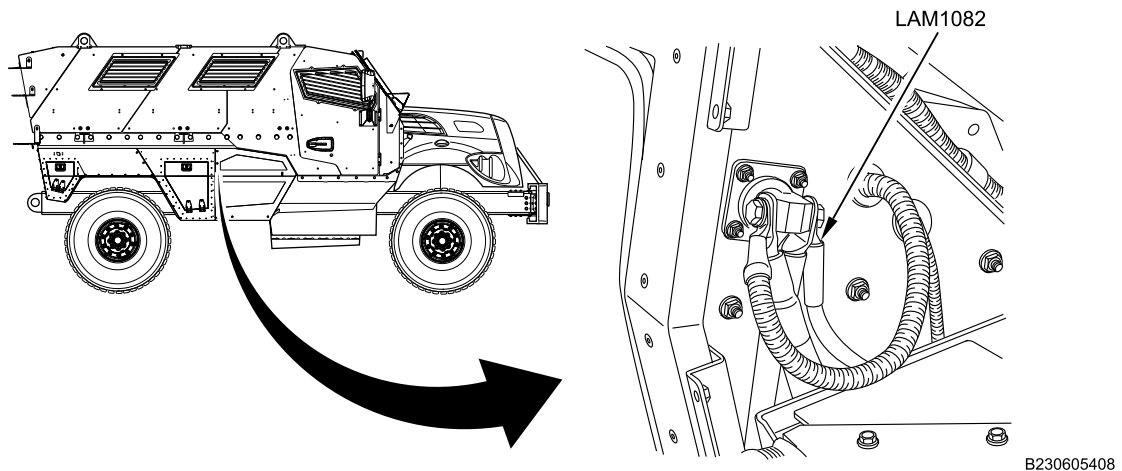


Figure 3. Right Side of Right Front Stowage Box.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 38.
NO Go to Step 37.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

15. Measure DC voltage between terminal LAM1079 and ground with multimeter. Refer to Figure 4.

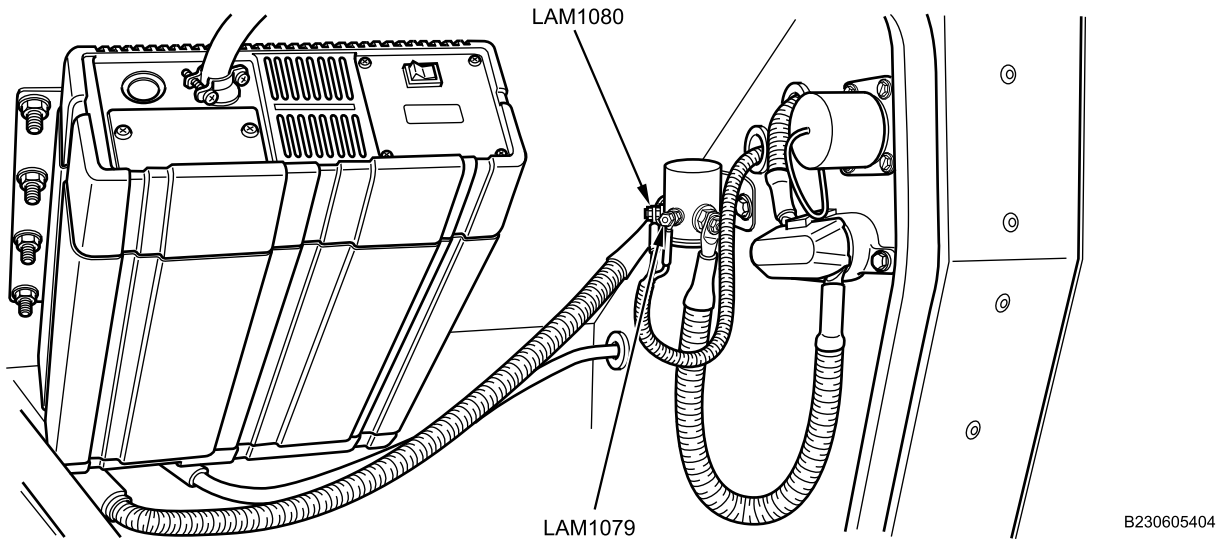


Figure 4. Terminal LAM1079.

CONDITION/INDICATION

Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

NO Go to Step 32.
 YES Go to next step.

STEP

16. Measure voltage between terminals LAM1079 and LAM1080 with multimeter. Refer to Figure 4.

CONDITION/INDICATION

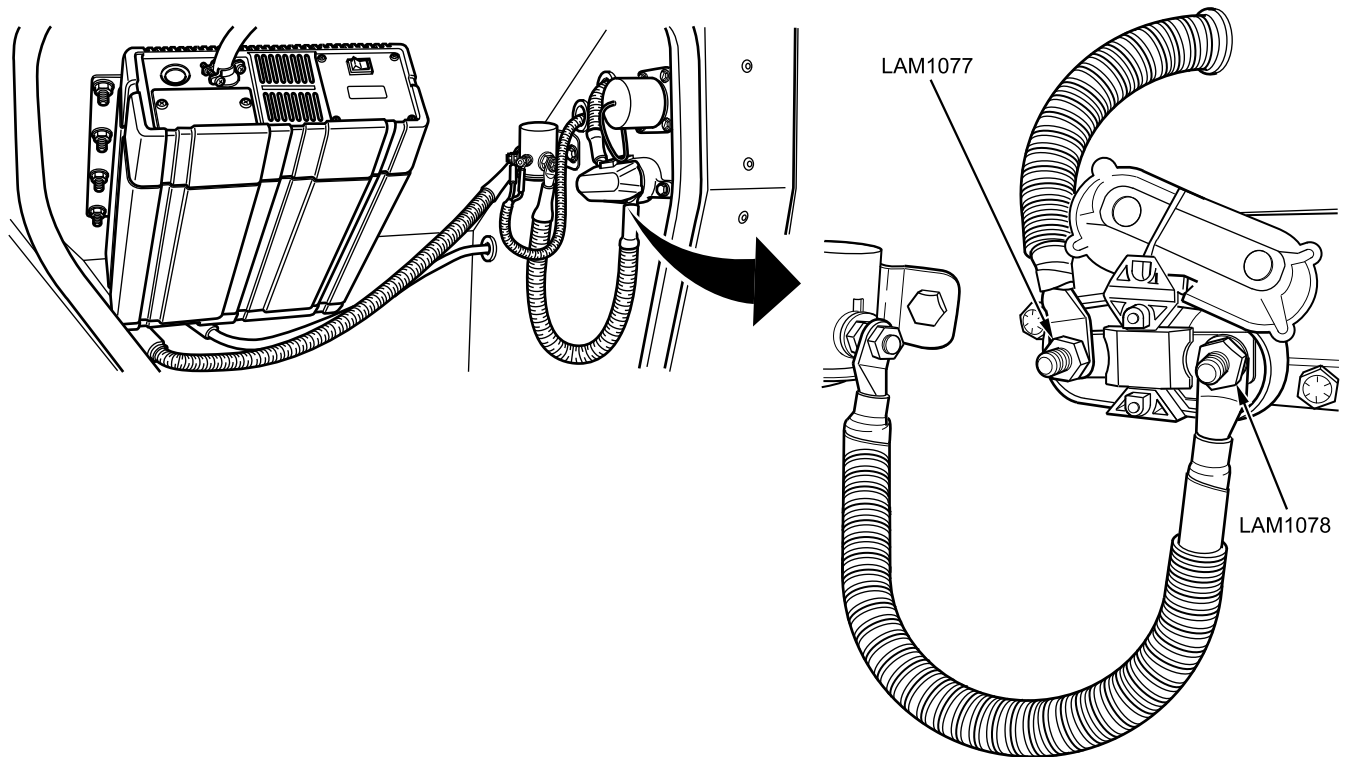
Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

YES Go to Step 35.
 NO Go to Step 32.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

17. Measure DC voltage between terminals LAM1077 and LAM1078 and ground with multimeter. Refer to Figure 5.



B230605405

Figure 5. Terminals LAM1077 and LAM1078.

CONDITION/INDICATION

Does multimeter read between 21V and 27V for each test?

DECISION

YES Go to Step 39.
NO Go to next step.

STEP

18. Refer to results from Step 17.

CONDITION/INDICATION

Does multimeter read between 21V and 27V for either test?

DECISION

YES Go to Step 40.
NO Go to next step.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

19. Measure DC voltage between terminal LAM1081 and ground with multimeter. Refer to Figure 6.

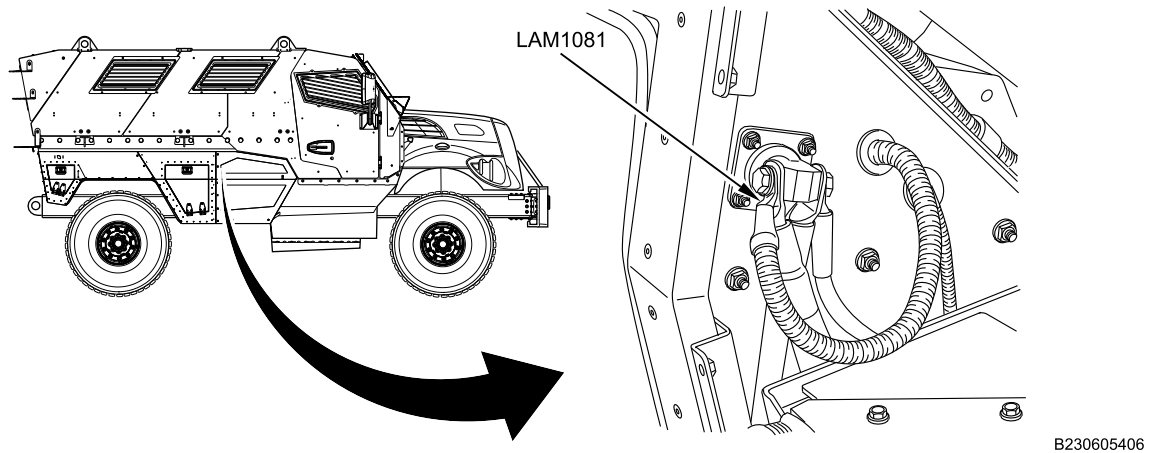


Figure 6. Right Side of Right Front Stowage Box.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

YES Go to Step 33.

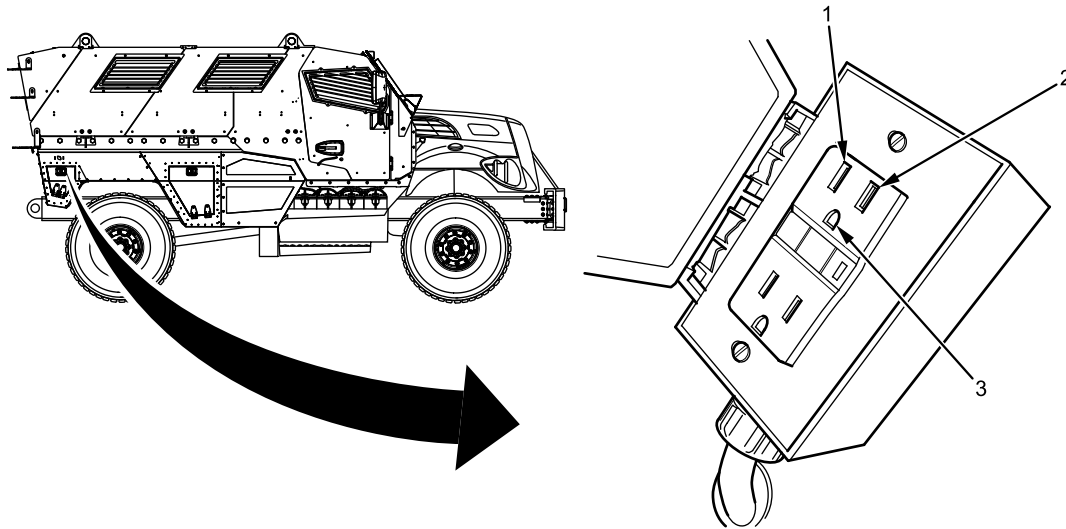
NO Go to Step 34.

STEP**NOTE**

Make sure wire ends of 110V harness that were removed from inverter are not touching each other or stowage bin.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)

20. Measure resistance between each outlet terminal (Figure 7, Item 1, 2, and 3) and chassis ground with multimeter.



B230605407

Figure 7. Right Rear Stowage Box.

CONDITION/INDICATION

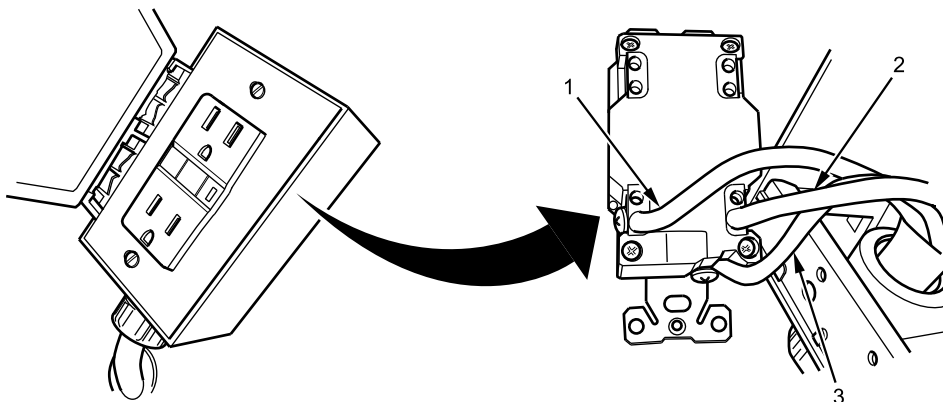
Does multimeter read OL for each measurement?

DECISION

YES Go to Step 23.
NO Go to next step.

STEP

21. Disconnect wires from outlet box. Refer to 110V Cover, Outlet, and Box Removal and Installation (WP 0328).
22. Measure resistance between each 110V harness wire (Figure 8, Item 1, 2, and 3) and ground with multimeter.



B230611575

Figure 8. 110V Harness Wires.

CONDITION/INDICATION

Does multimeter read OL for each measurement?

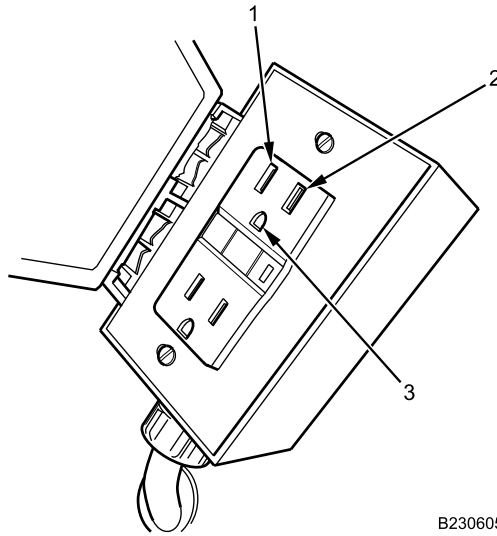
110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 30.

NO Go to Step 31.

STEP

23. Measure resistance between neutral (Figure 9, Item 1) and ground (Figure 9, Item 3), ground and hot (Figure 9, Item 2), and neutral and hot outlet terminals with multimeter.



B230605201

Figure 9. 110V Outlet Box.

CONDITION/INDICATION

Does multimeter read OL for each measurement?

DECISION

YES Go to Step 26.

NO Go to next step.

STEP

24. Disconnect wires for outlet box. Refer to 110V Cover, Outlet, and Box Removal and Installation (WP 0328).
25. Measure resistance between neutral (Figure 9, Item 1) and ground (Figure 9, Item 3), ground and hot (Figure 9, Item 2), and neutral and hot outlet terminals with multimeter.

CONDITION/INDICATION

Does multimeter read OL for each measurement?

DECISION

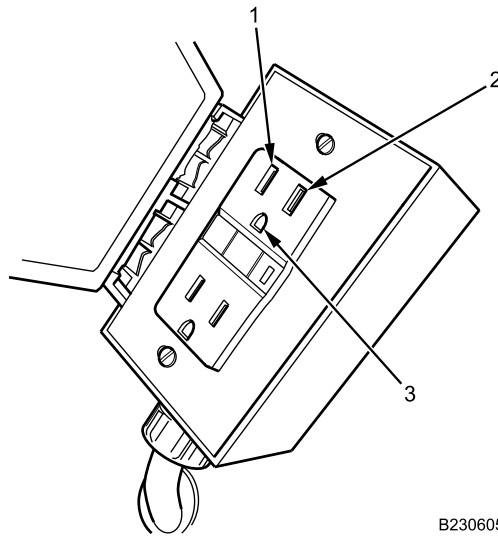
YES Go to Step 31.

NO Go to Step 30.

STEP

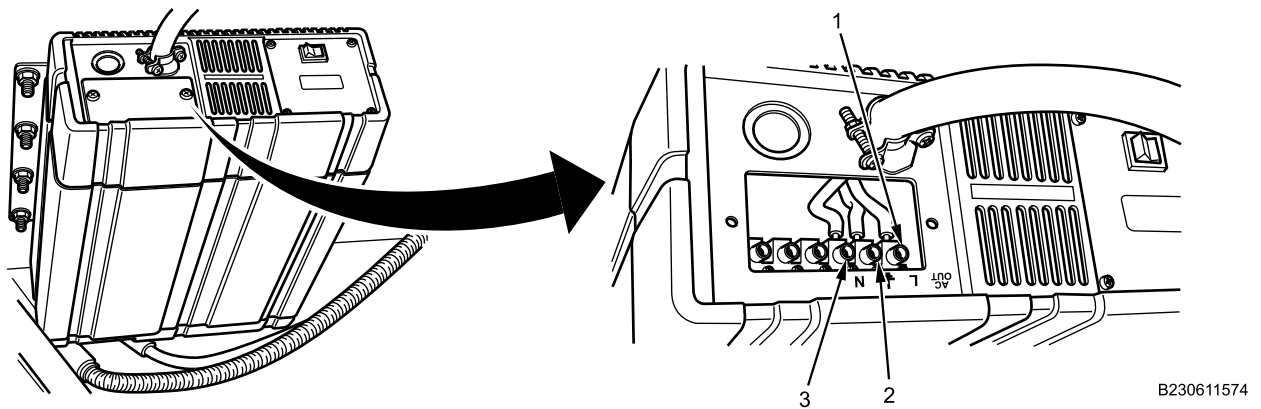
26. Measure resistance between outlet hot terminal (Figure 10, Item 2) and BLACK wire (Figure 11, Item 1) at inverter, outlet neutral terminal (Figure 10, Item 1) and WHITE wire (Figure 11, Item 3) at inverter, outlet ground terminal (Figure 10, Item 3) and GREEN wire (Figure 11, Item 2) at inverter, with multimeter.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605201

Figure 10. 110V Outlet Box.



B230611574

Figure 11. 110V Harness Wires.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each measurement?

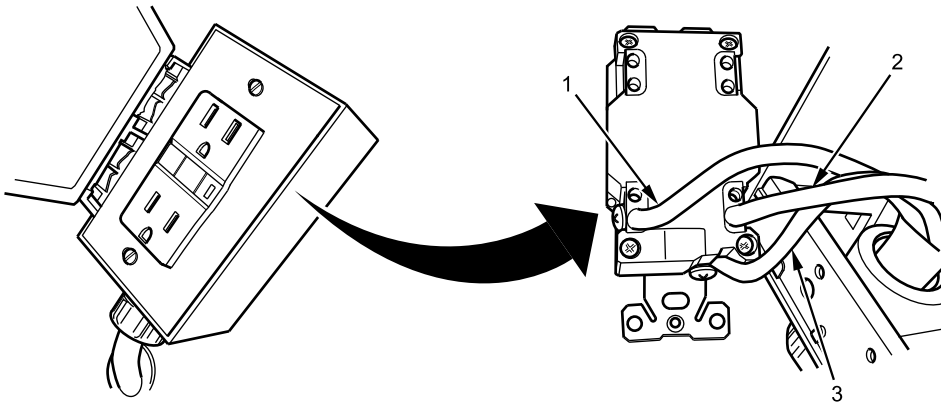
DECISION

YES Go to Step 29.

NO Go to next step.

STEP

27. Disconnect wires for outlet box. Refer to 110V Cover, Outlet, and Box Removal and Installation (WP 0328).
28. Measure resistance between each WHITE, BLACK, and GREEN wire (Figure 12, Item 1, 2, and 3) of 110V harness with multimeter.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230611575

Figure 12. 110V Harness Wires.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each measurement?

DECISION

YES Go to Step 30.

NO Go to Step 31.

MALFUNCTION

- 29. Faulty inverter.

ACTION

Replace inverter. Refer to 110V Inverter Removal and Installation (WP 0352). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 30. Faulty 110V outlet.

ACTION

Replace 110V outlet. Refer to 110V Cover, Outlet, and Box Removal and Installation (WP 0328). Return vehicle to service.

END OF TEST

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 31. Faulty harness.

ACTION

Replace 110V harness. Refer to 110V Outlet Harness Removal and Installation (WP 0435).

END OF TEST**MALFUNCTION**

- 32. Faulty harness.

ACTION

Replace inverter disconnect switch solenoid harness. Refer to Inverter Disconnect Switch Solenoid Harness Removal and Installation (WP 0345). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 33. Faulty cable.

ACTION

Replace NATO to megafuse cable. Refer to Inverter and MAIN POWER Switch Solenoid Cables Removal and Installation (WP 0451).

END OF TEST**MALFUNCTION**

- 34. Faulty cable.

ACTION

Replace battery feed to NATO cable. Refer to NATO Jump Start Cables Removal and Installation (WP 0450).

END OF TEST**MALFUNCTION**

- 35. Faulty 110V inverter battery disconnect switch solenoid.

ACTION

Replace 110V inverter battery disconnect switch solenoid. Refer to 110V Inverter Battery Disconnect Switch Solenoid Removal and Installation (WP 0447). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 36. Faulty cable.

110V INVERTER TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace inverter to 110V battery disconnect switch cable. Refer to Inverter and Battery Disconnect Switch Solenoid Cables Removal and Installation (WP 0451). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 37. Faulty cable.

ACTION

Replace negative inverter to NATO cable. Refer to Inverter and Battery Disconnect Switch Solenoid Cables Removal and Installation (WP 0451). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 38. Faulty cable.

ACTION

Replace negative battery to NATO cable. Refer to NATO Jump Start Cables Removal and Installation (WP 0450).

END OF TEST**MALFUNCTION**

- 39. Faulty cable.

ACTION

Replace fuse to solenoid cable. Refer to Inverter and Battery Disconnect Switch Solenoid Cables Removal and Installation (WP 0451). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 40. Faulty megafuse.

ACTION

Replace megafuse and inverter. Refer to Inverter Megafuse and Holder Removal and Installation (WP 0449) and 110V Inverter Removal and Installation (WP 0352). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 41. Fault is intermittent or was caused by a fault in equipment plugged into 110V outlet.

ACTION

Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

BATTERY EQUALIZER TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Test Equipment

Meter, clamp-on (WP 0795, Item 72)

WP 0349

WP 0350

WP 0782

Tools and Special ToolsGeneral Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)**Equipment Condition**

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Exterior battery box armor door removed
(WP 0604)**Materials/Parts**

Goggles, industrial (WP 0794, Item 20)

Face shield, industrial (WP 0794, Item 16)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0032

WP 0406

Drawings Required

WP 0789, Figure 4

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.

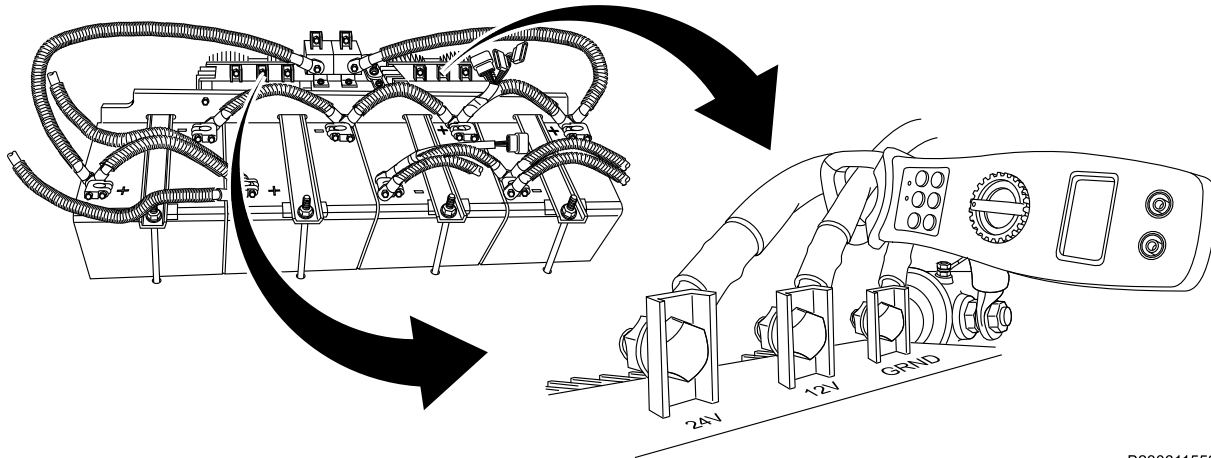
Use extreme caution when testing or working on or around electrical circuits. Always assume that electrical circuits are live. Electrical shock can occur upon contact with voltage high enough to cause current flow through muscles or nerves. On Direct Current (DC) systems, generally 1 milliamp of current 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.

BATTERY EQUALIZER TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Connect clamp-on ammeter around 12V cable of either battery equalizer. Refer to Figure 1.



B230611552

Figure 1. Battery Equalizer.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Turn headlights ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does ammeter read more than 3 amps?

DECISION

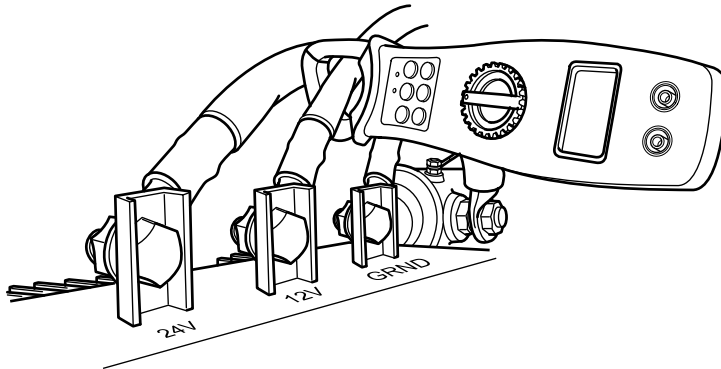
NO Go to Step 14.
YES Go to next step.

STEP

5. Turn ignition switch OFF (TM 9-2355-106-10).
6. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
7. Disconnect battery cables. Refer to Battery Cables Removal and Installation (WP 0406).
8. Remove 12V cable from battery equalizer in previous test. Refer to Equalizer Cables Removal and Installation (WP 0349).
9. Connect battery cables. Refer to Battery Cables Removal and Installation (WP 0406).

BATTERY EQUALIZER TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Connect clamp-on ammeter around 12V cable of connected battery equalizer. Refer to Figure 2.



B230611553

Figure 2. Battery Equalizer.

11. Turn MAIN POWER switch ON (TM 9-2355-106-10).
12. Turn ignition switch ON (TM 9-2355-106-10).
13. Turn headlights ON (TM 9-2355-106-10).

CONDITION/INDICATION

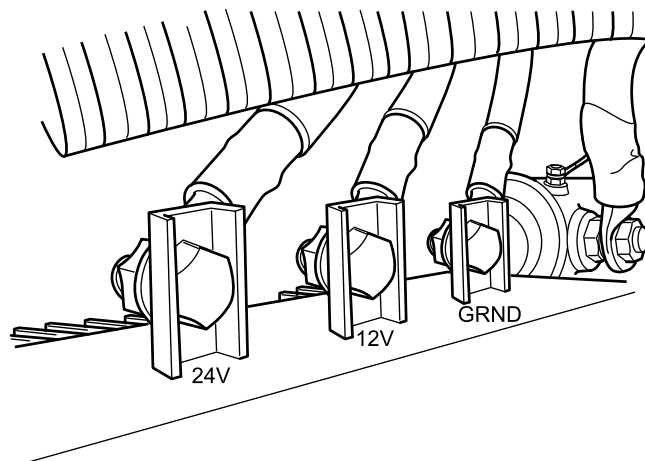
Does ammeter read more than 3 amps?

DECISION

YES Go to Battery Power Troubleshooting Procedure (WP 0032).
NO Go to next step.

STEP

14. Measure DC voltage between battery equalizer 24V and 12V terminals with multimeter. Refer to Figure 3.



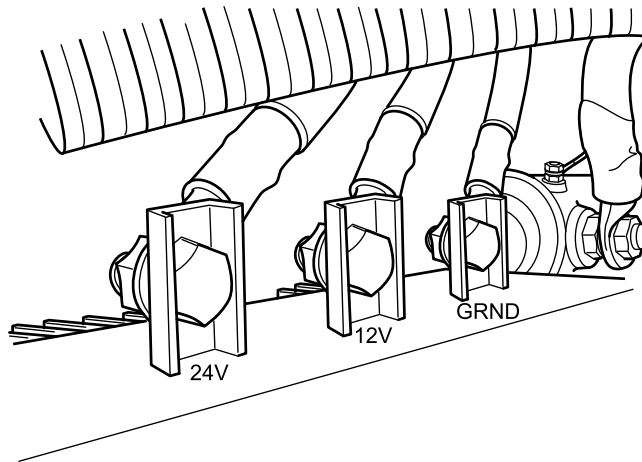
B230604661

Figure 3. Battery Equalizer Connections.

15. Record voltage reading.

BATTERY EQUALIZER TROUBLESHOOTING PROCEDURE - (CONTINUED)

16. Subtract 0.6V from recorded reading and label "calculated voltage".
 17. Measure DC voltage between battery equalizer 12V terminal and ground with multimeter. Refer to Figure 4.



B230604661

Figure 4. Battery Equalizer Connections.

18. Observe multimeter and ammeter.

CONDITION/INDICATION

Does ammeter read more than 3 amps after multimeter reads less than calculated voltage?

DECISION

YES Go to Battery Power Troubleshooting Procedure (WP 0032).
 NO Go to next step.

STEP

19. Inspect cables connected to battery equalizer for indications of damage and corrosion.

CONDITION/INDICATION

Does inspection indicate cable damage or corrosion?

DECISION

YES Go to Step 20.
 NO Go to Step 21.

BATTERY EQUALIZER TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 20. Battery equalizer cable is faulty.

ACTION

Replace battery equalizer cable. Refer to Equalizer Cables Removal and Installation (WP 0349). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. Battery equalizer is faulty.

ACTION

Replace battery equalizer. Refer to Battery Equalizer Removal and Installation (WP 0350). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0655

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0069

WP 0317

WP 0319

WP 0353

WP 0580

Drawings Required

WP 0789, Figure 21

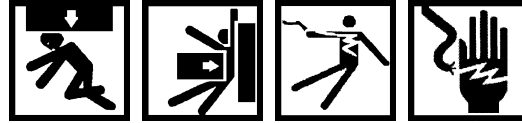
WP 0789, Figure 12

WP 0789, Figure 14

DIAGNOSTIC TROUBLE CODES AND SYMPTOMS.

This procedure covers the following symptoms:

- Left heated windshield is inoperative.
- Right heated windshield is inoperative.
- Left and right heated windshield are inoperative.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)**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 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.

CAUTION

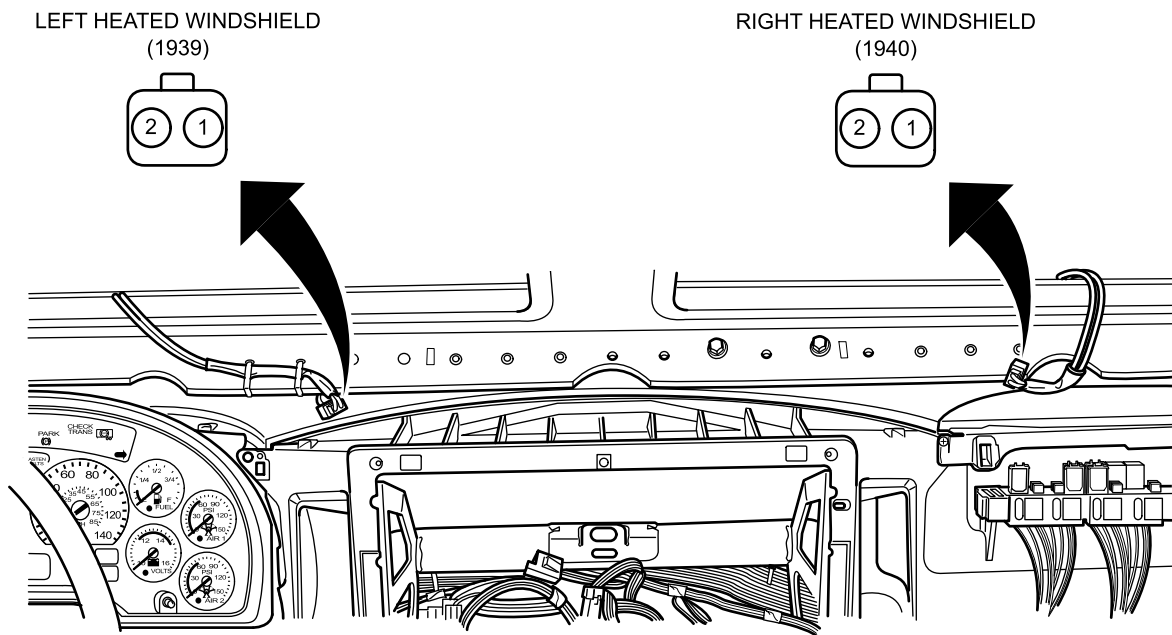
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect left heated windshield connector 1939. Refer to Figure 1.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230604643

Figure 1. Heated Windshield Connectors Under Left and Right Windshields.

2. Disconnect right heated windshield connector 1940. Refer to Figure 1.
3. Measure resistance between connector 1939 terminal 2 and ground with multimeter. Refer to Figure 1.
4. Measure resistance between connector 1940 terminal 2 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

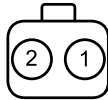
Does multimeter read less than 5 ohms for each test?

DECISION

NO Go to Step 69.
 YES Go to next step.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

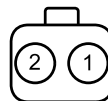
5. Turn MAIN POWER switch ON (TM 9-2355-106-10).
6. Turn ignition switch ON (TM 9-2355-106-10).
7. Turn heated mirrors and windshields ON (TM 9-2355-106-10).
8. Measure DC voltage between connector 1939 terminals 1 and 2 with multimeter. Refer to Figure 2.

LEFT HEATED WINDSHIELD
(1939)

B230603909

Figure 2. Connector 1939.

9. Measure DC voltage between connector 1940 terminals 1 and 2 with multimeter. Refer to Figure 3.

RIGHT HEATED WINDSHIELD
(1940)

B230603910

Figure 3. Connector 1940.

CONDITION/INDICATION

Does multimeter read between 21.0 volts and 27.0 volts for each test?

DECISION

YES Go to Step 68.
NO Go to next step.

STEP

10. Recall results from Step 8.

CONDITION/INDICATION

Does multimeter read between 21.0 volts and 27.0 volts for connector 1939?

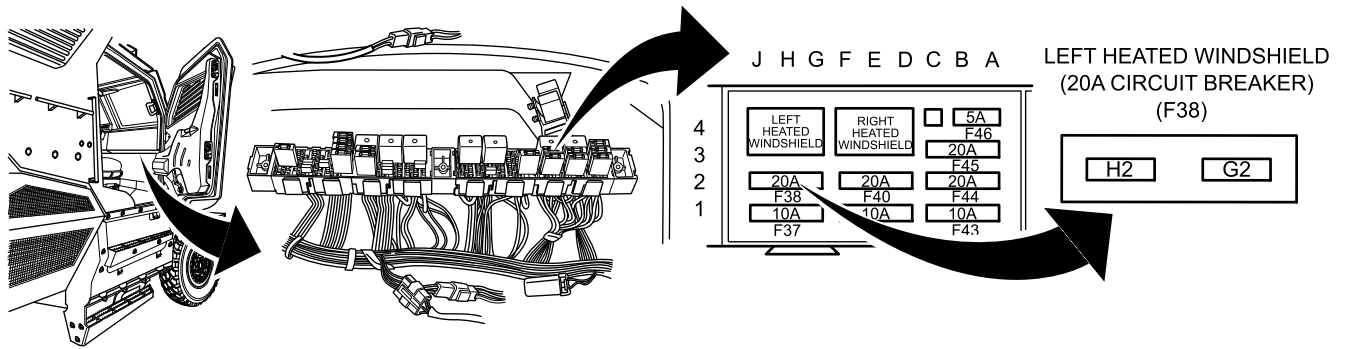
DECISION

YES Go to Step 41.
NO Go to next step.

STEP

11. Remove instrument panel right side closeout. Refer to Instrument Panel (IP) Right Side Closeout Removal and Installation (WP 0580).
12. Inspect circuit breaker F38. Refer to Figure 4.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605523

Figure 4. Circuit Breaker F38 at Right Side IP.

CONDITION/INDICATION

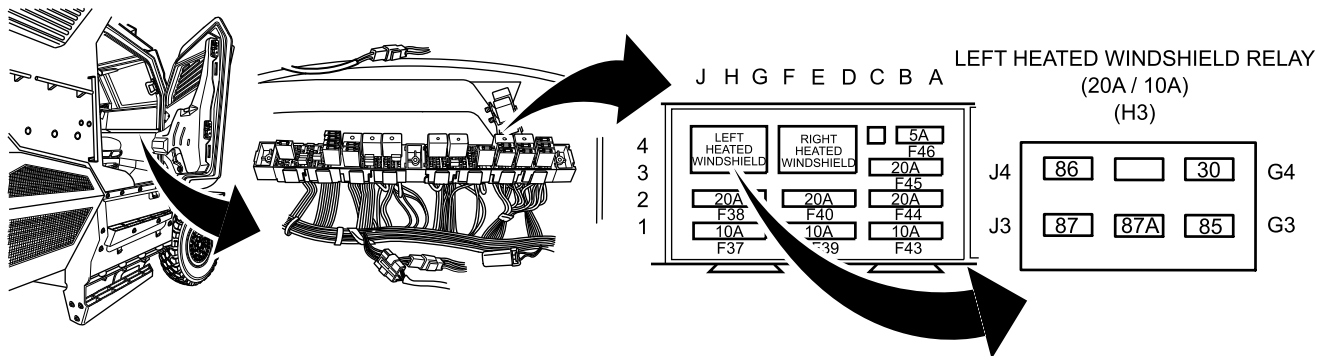
Is button on circuit breaker F38 popped up?

DECISION

YES Go to Step 24.
NO Go to next step.

STEP

13. Remove left heated windshield relay. Refer to Figure 5.



B230605530

Figure 5. Left Heated Windshield Relay Socket at Right Side IP.

14. Turn MAIN POWER switch ON (TM 9-2355-106-10).
15. Turn ignition switch ON (TM 9-2355-106-10).
16. Turn heated mirrors and windshields ON (TM 9-2355-106-10).
17. Measure DC voltage between LEFT HEATED WINDSHIELD relay socket terminal 86 and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

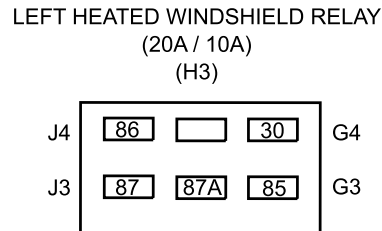
Does multimeter read between 10.5 volts and 13.5 volts?

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 30.
 YES Go to next step.

STEP

18. Measure DC voltage between LEFT HEATED WINDSHIELD relay socket terminal 30 and ground with multimeter. Refer to Figure 6.



B230605561

Figure 6. Left Heated Windshield Relay Socket.

CONDITION/INDICATION

Does multimeter read between 21.0 volts and 27.0 volts?

DECISION

NO Go to Step 69.
 YES Go to next step.

STEP

19. Turn heated mirrors and windshield OFF (TM 9-2355-106-10).
 20. Turn ignition switch OFF (TM 9-2355-106-10).
 21. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 22. Measure resistance between LEFT HEATED WINDSHIELD relay socket terminal 85 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

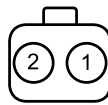
NO Go to Step 69.
 YES Go to next step.

STEP

23. Measure resistance between LEFT HEATED WINDSHIELD relay socket terminal 87 and connector 1939 terminal 1 with multimeter. Refer to Figure 6. Refer to Figure 7.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

LEFT HEATED WINDSHIELD
(1939)



B230603909

Figure 7. Connector 1939.

CONDITION/INDICATION

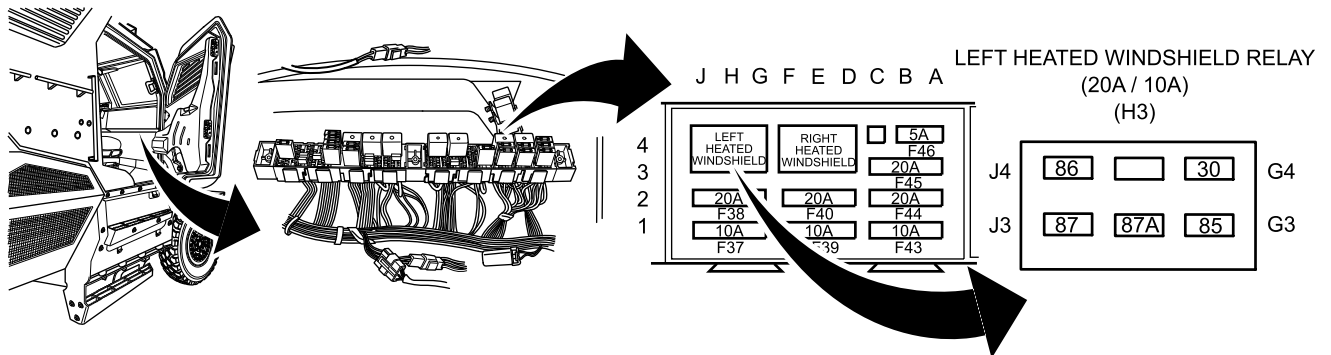
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 69.
YES Go to Step 71.

STEP

24. Turn heated mirrors and windshield OFF (TM 9-2355-106-10).
25. Turn ignition switch OFF (TM 9-2355-106-10).
26. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
27. Remove LEFT HEATED WINDSHIELD relay. Refer to Figure 8.



B230605530

Figure 8. Left Heated Windshield Relay Socket at Right Side IP.

28. Measure resistance between connector 1939 terminal 1 and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

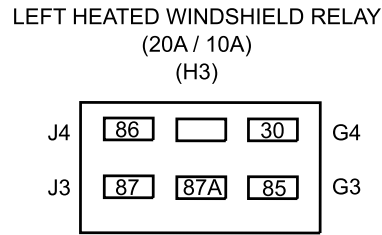
DECISION

NO Go to Step 69.
YES Go to next step.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

29. Measure resistance between LEFT HEATED WINDSHIELD relay socket terminal 30 and ground with multimeter. Refer to Figure 9.



B230605561

Figure 9. Left Heated Windshield Relay Socket.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 69.
YES Go to Step 71.

STEP

30. Connect the MSD to the vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).

31. Turn heated mirrors and windshields ON and OFF while observing ESC inputs with MSD (TM 9-2355-106-10).

CONDITION/INDICATION

Does ESC receive input from switch?

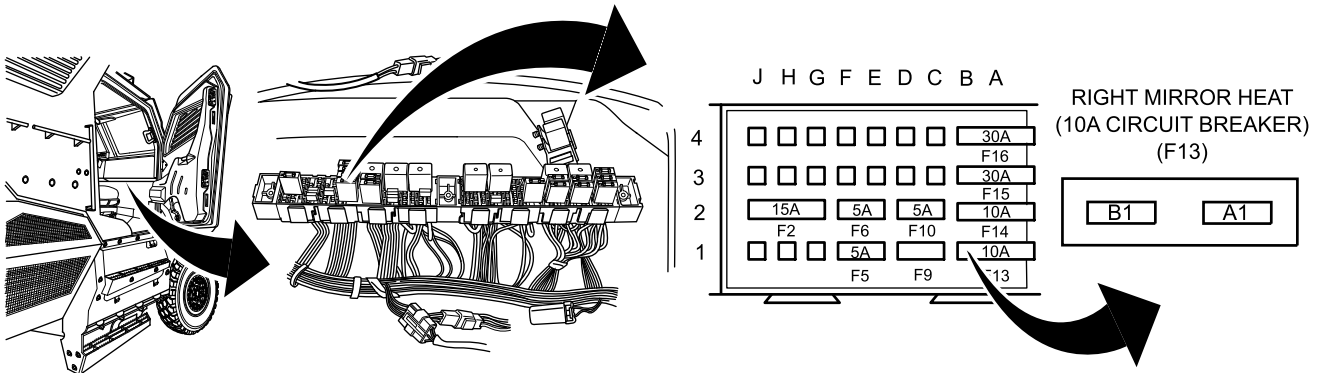
DECISION

NO Go to Switch Pack Modules Troubleshooting Procedure (WP 0069).
YES Go to next step.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

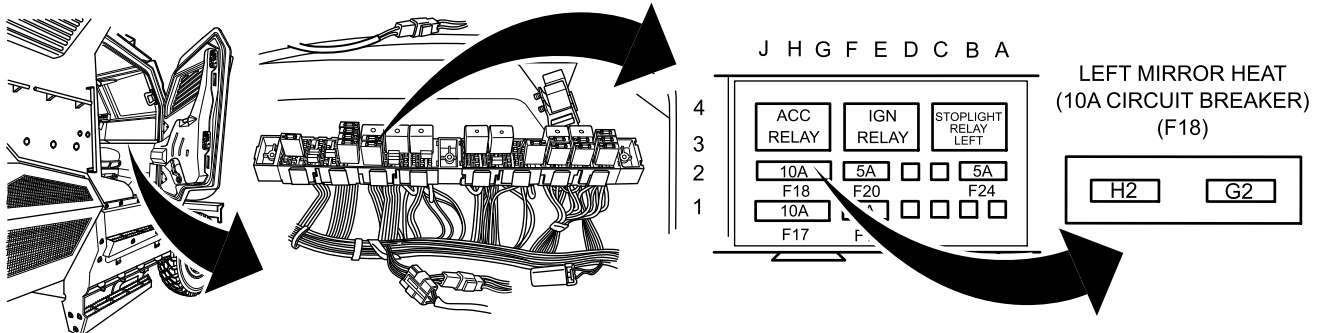
- 32. Turn heated mirrors and windshield OFF (TM 9-2355-106-10).
- 33. Turn ignition switch OFF (TM 9-2355-106-10).
- 34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 35. Remove circuit breaker F13. Refer to Figure 10.



B230605505

Figure 10. Circuit Breaker F13 at Right Side IP.

- 36. Remove circuit breaker F18. Refer to Figure 11.

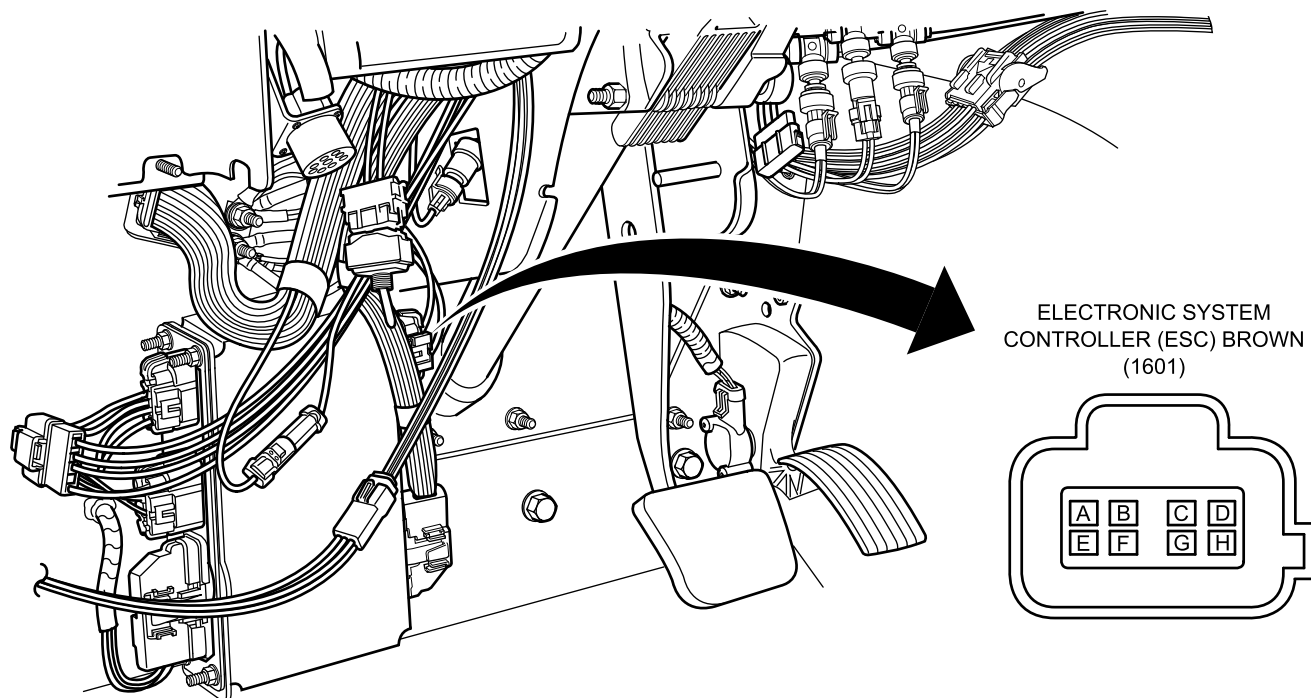


B230605510

Figure 11. Circuit Breaker F18 at Right Side IP.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

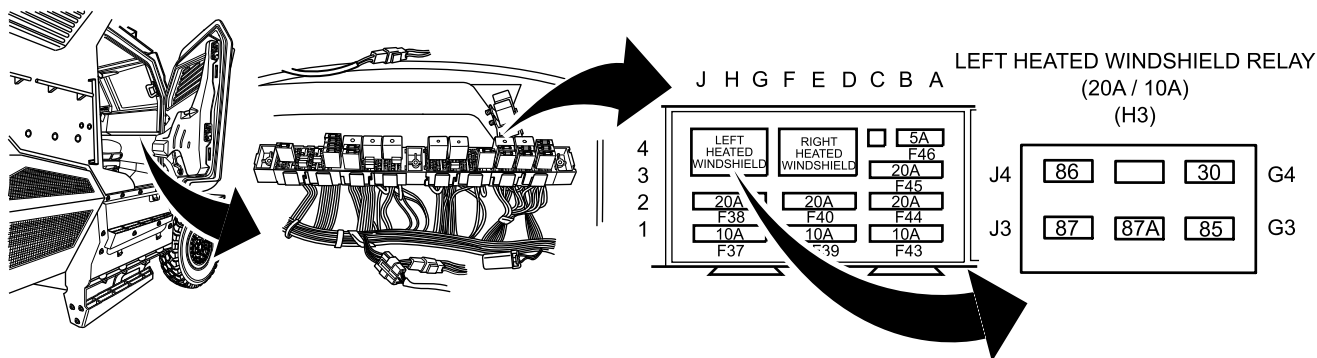
37. Disconnect ESC 1601 connector. Refer to Figure 12.



B230604644

Figure 12. ESC 1601 Connector Under Steering Column.

38. Measure resistance between LEFT HEATED WINDSHIELD relay socket terminal 86 and ground with multimeter. Refer to Figure 13.



B230605530

Figure 13. Left Heated Windshield Relay Socket at Right Side IP.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

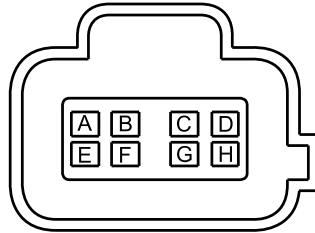
NO Go to Step 69.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

YES Go to next step.

STEP

ELECTRONIC SYSTEM CONTROLLER (ESC) BROWN
(1601)



B230603824

Figure 14. Connector 1601.

39. Measure resistance between LEFT HEATED WINDSHIELD relay socket terminal 86 and connector 1601 terminal G with multimeter. Refer to Figure 13. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 69.
YES Go to next step.

STEP

40. Measure resistance between connector 1601 terminal G and all other connector 1601 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read OL for each test?

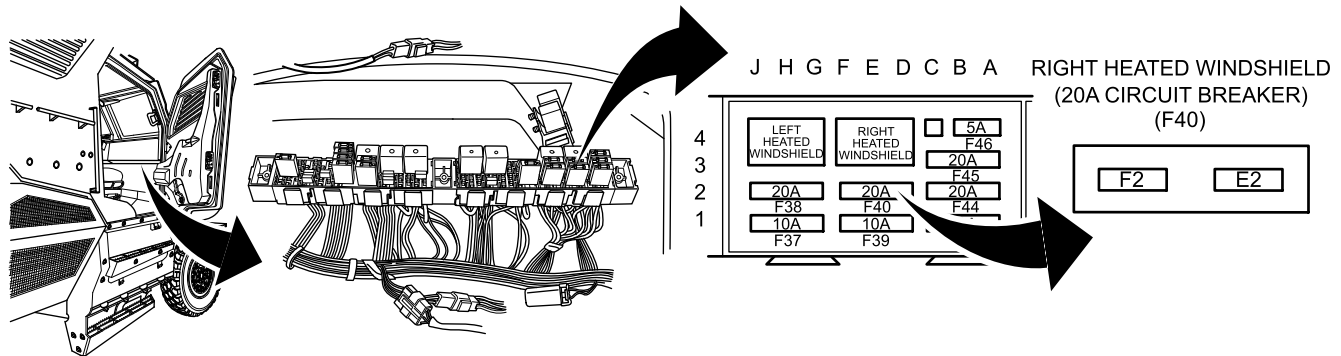
DECISION

YES Go to Step 70.
NO Go to Step 69.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 41. Remove IP right side closeout. Refer to Instrument Panel (IP) Right Side Closeout Removal and Installation (WP 0580).
- 42. Inspect circuit breaker F40. Refer to Figure 15.



B230605525

Figure 15. Circuit Breaker F40 at Right Side IP.

CONDITION/INDICATION

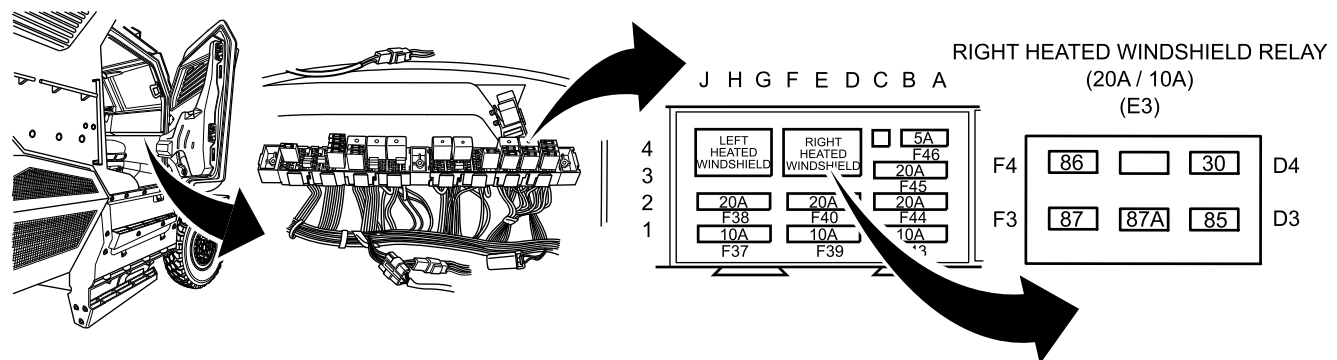
Is button on circuit breaker F40 popped up?

DECISION

- YES Go to Step 54.
- NO Go to next step.

STEP

- 43. Remove RIGHT HEATED WINDSHIELD relay. Refer to Figure 16.



B230605531

Figure 16. Right Heated Windshield Relay Socket at Right Side IP.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

44. Turn MAIN POWER switch ON (TM 9-2355-106-10).
45. Turn ignition switch ON (TM 9-2355-106-10).
46. Turn heated mirrors and windshields ON (TM 9-2355-106-10).
47. Measure DC voltage between RIGHT HEATED WINDSHIELD relay socket terminal 86 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

NO Go to Step 57.
YES Go to next step.

STEP

48. Measure DC voltage between RIGHT HEATED WINDSHIELD relay socket terminal 30 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read between 21.0 volts and 27.0 volts?

DECISION

NO Go to Step 69.
YES Go to next step.

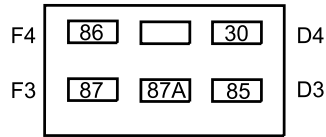
STEP

49. Turn heated mirrors and windshield OFF (TM 9-2355-106-10).
50. Turn ignition switch OFF (TM 9-2355-106-10).
51. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

52. Measure resistance between RIGHT HEATED WINDSHIELD relay socket terminal 85 and ground with multimeter. Refer to Figure 17.

RIGHT HEATED WINDSHIELD RELAY
(20A / 10A)
(E3)



B230605562

Figure 17. Right Heated Windshield Relay Socket.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

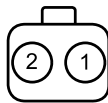
DECISION

NO Go to Step 69.
YES Go to next step.

STEP

53. Measure resistance between RIGHT HEATED WINDSHIELD relay socket terminal 87 and connector 1940 terminal 1 with multimeter. Refer to Figure 17. Refer to Figure 18.

RIGHT HEATED WINDSHIELD
(1940)



B230603910

Figure 18. Connector 1940.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

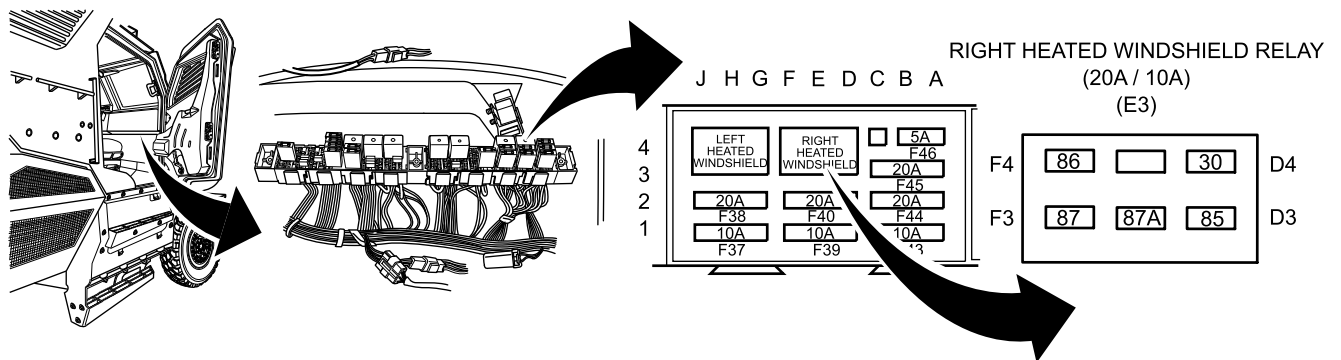
DECISION

NO Go to Step 69.
YES Go to Step 72.

STEP

54. Remove RIGHT HEATED WINDSHIELD relay. Refer to Figure 19.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605531

Figure 19. Right Heated Windshield Relay Socket at Right Side IP.

55. Measure resistance between connector 1940 terminal 1 and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 69.
YES Go to next step.

STEP

56. Measure resistance between RIGHT HEATED WINDSHIELD relay socket terminal 30 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 69.
YES Go to Step 72.

STEP

57. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
58. Turn heated mirrors and windshields ON and OFF while observing ESC inputs with MSD (TM 9-2355-106-10).

CONDITION/INDICATION

Does ESC receive input from switch?

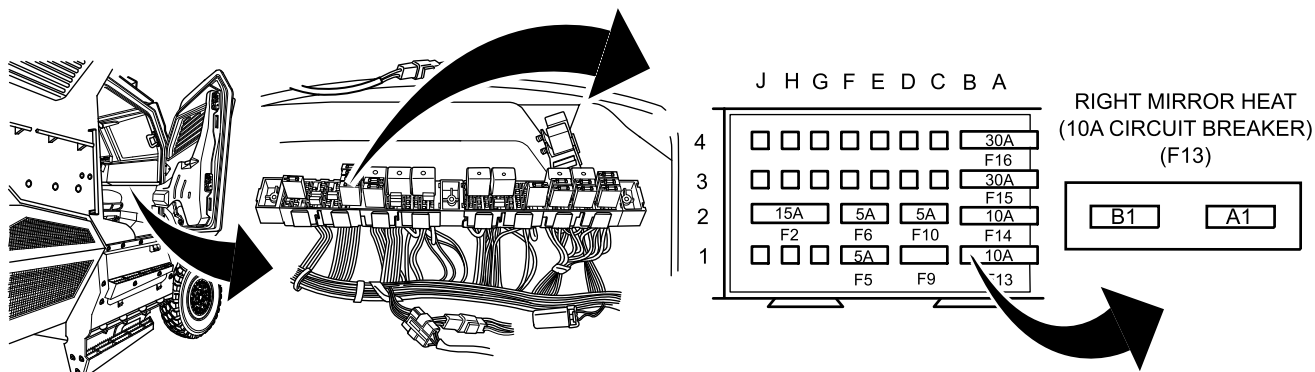
DECISION

NO Go to Switch Pack Modules Troubleshooting Procedure (WP 0069).
YES Go to next step.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

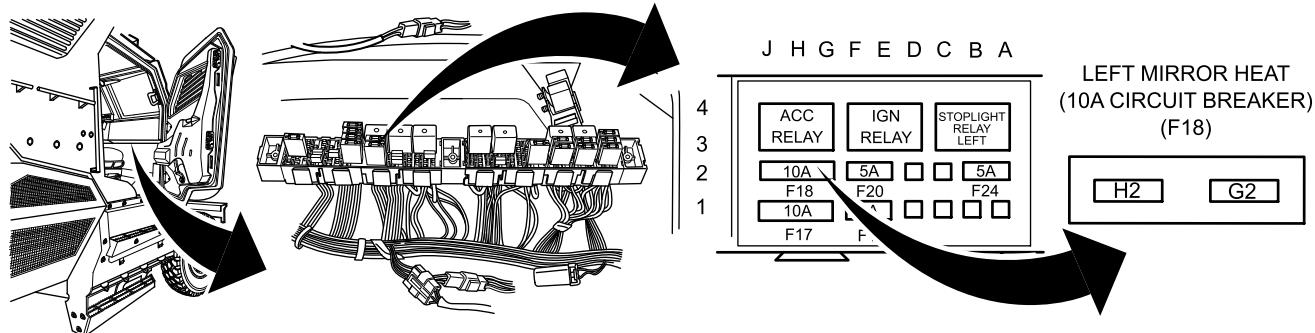
- 59. Turn heated mirrors and windshield OFF (TM 9-2355-106-10).
- 60. Turn ignition switch OFF (TM 9-2355-106-10).
- 61. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 62. Remove circuit breaker F13. Refer to Figure 20.



B230605505

Figure 20. Circuit Breaker F13 at Right Side IP.

- 63. Remove circuit breaker F18. Refer to Figure 21.

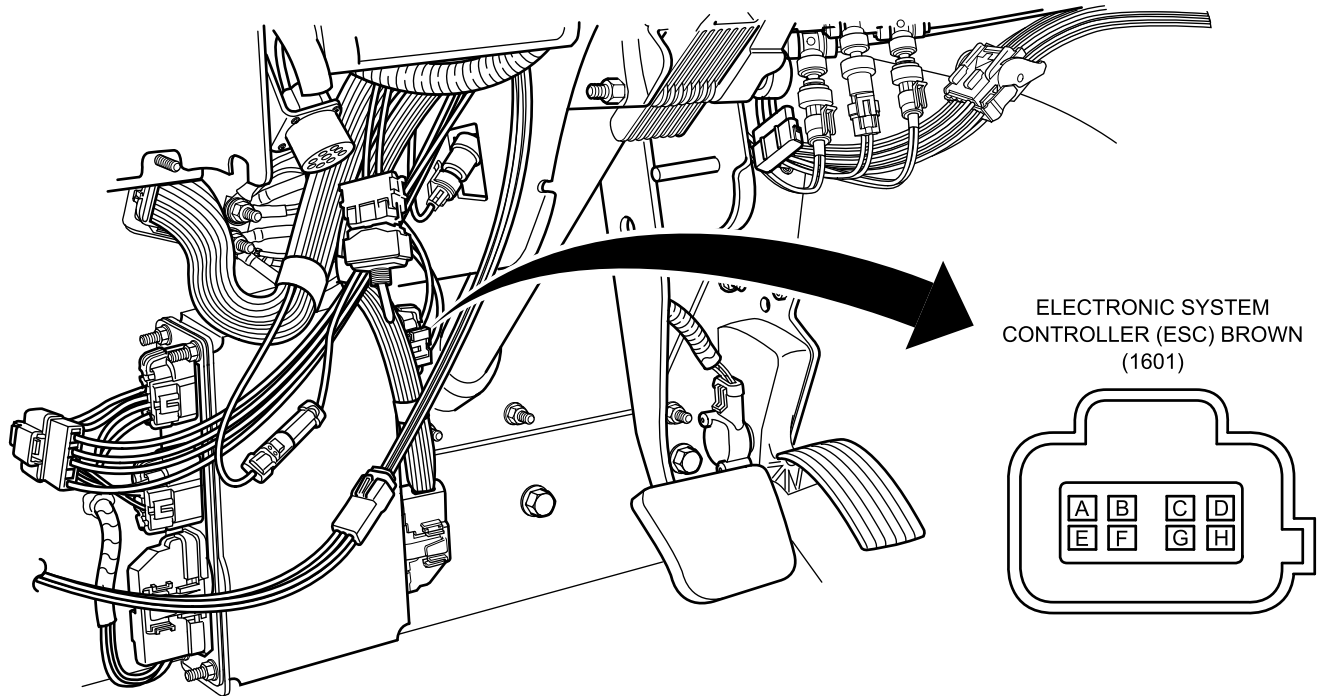


B230605510

Figure 21. Circuit Breaker F18 at Right Side IP.

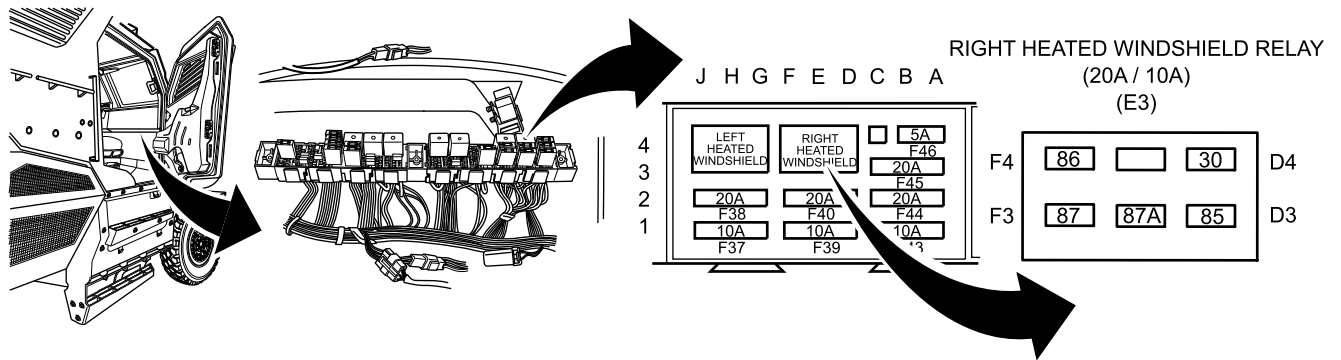
HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)

64. Disconnect ESC connector 1601. Refer to Figure 22.



B230604644

Figure 22. ESC 1601 Connector Under Steering Column.



B230605531

Figure 23. Right Heated Windshield Relay Socket at Right Side IP.

65. Measure resistance between RIGHT HEATED WINDSHIELD relay terminal 86 and ground with multimeter. Refer to Figure 23.

CONDITION/INDICATION

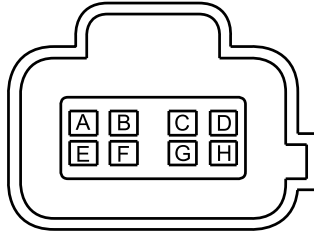
Does multimeter read OL?

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 69.
 YES Go to next step.

STEP

ELECTRONIC SYSTEM CONTROLLER (ESC) BROWN
 (1601)



B230603824

Figure 24. ESC Connector 1601.

66. Measure resistance between RIGHT HEATED WINDSHIELD relay socket terminal 86 and connector 1601 terminal G with multimeter. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 69.
 YES Go to next step.

STEP

67. Measure resistance between connector 1601 terminal G and all other connector 1601 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 70.
 NO Go to Step 69.

MALFUNCTION

- 68. Windshield is faulty.

ACTION

Replace windshield. Refer to Windshield Armor Glass Removal and Installation (WP 0655). Return vehicle to service.

HEATED WINDSHIELD TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 69. Instrument panel wiring harness is faulty.

ACTION

Replace instrument panel wiring harness. Refer to Instrument Panel Wiring Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 70. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 71. Left heated windshield relay is faulty.

ACTION

Replace left heated windshield relay. Refer to Instrument Panel Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 72. Right heated windshield relay is faulty.

ACTION

Replace right heated windshield relay. Refer to Instrument Panel Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
SPOTLIGHT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0365
WP 0437
WP 0581
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0011
WP 0059
WP 0317
WP 0319
WP 0336
WP 0313
WP 0363
WP 0364

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 66

TROUBLESHOOTING PROCEDURE**STEP****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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Remove center Instrument Panel (IP) trim panel to gain access to connector LAM1002. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
2. Disconnect spotlight control harness connector LAM1002 from instrument panel. Refer to Figure 1.

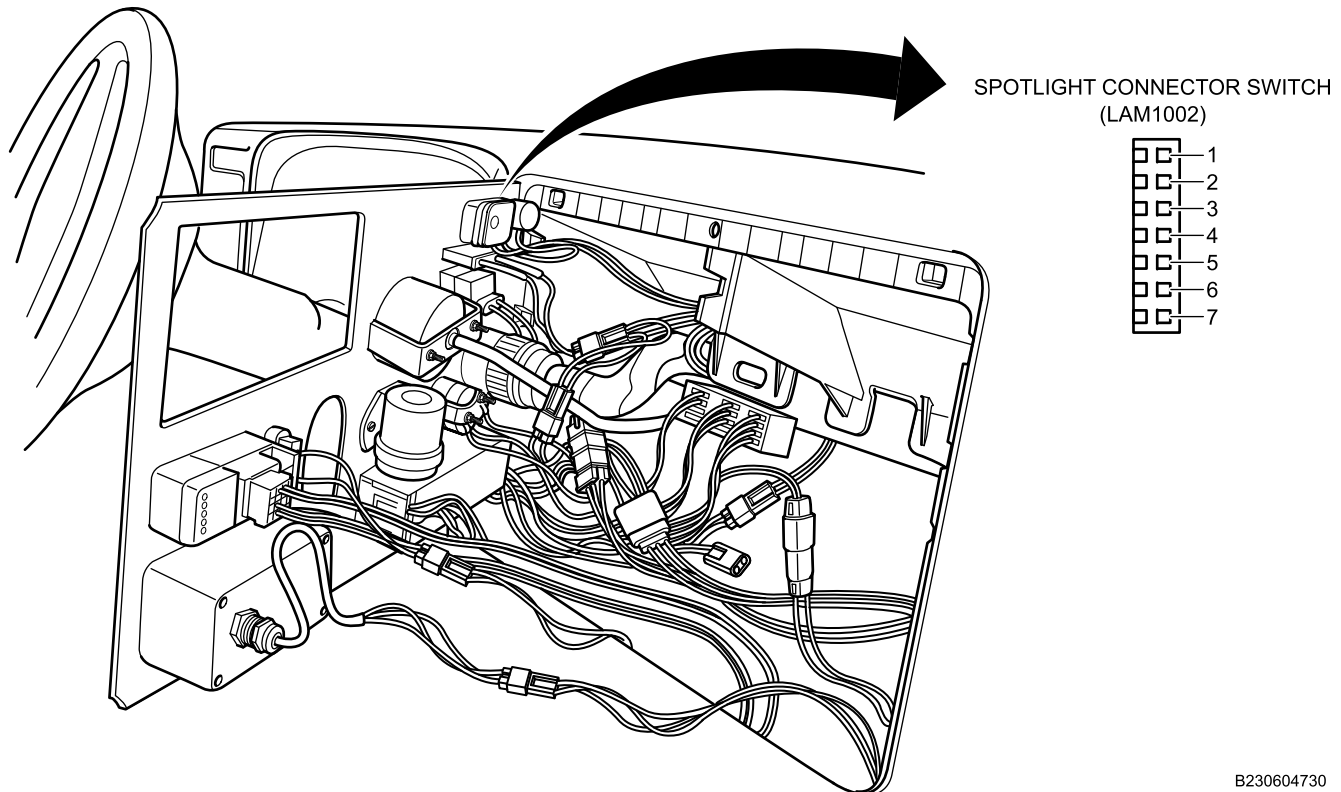


Figure 1. IP Spotlight Control Connector.

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Measure DC voltage between ground and each of the following connector LAM1002 terminals with multimeter. Refer to Figure 1.
 - 2
 - 4
 - 5
 - 6
 - 7

CONDITION/INDICATION

Does multimeter read between 0.70V and 0.75V for each test?

DECISION

NO Go to Step 7.
YES Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Measure DC voltage between connector LAM1002 terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 5.0V and 6.0V?

DECISION

NO Go to Step 7.
 YES Go to next step.

STEP

6. Measure DC voltage between connector LAM1002 terminal 3 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

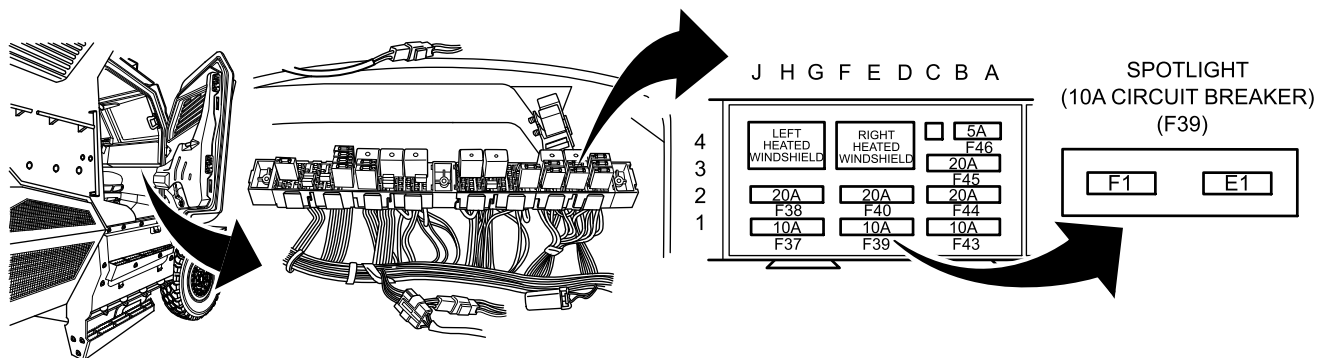
Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 41.
 YES Go to next step.

STEP

7. Remove cabin fuse and relay cover. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).
8. Remove and inspect fuse F39. Refer to Figure 2. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).



B230605524

Figure 2. Fuse F39.

CONDITION/INDICATION

Is fuse F39 open?

DECISION

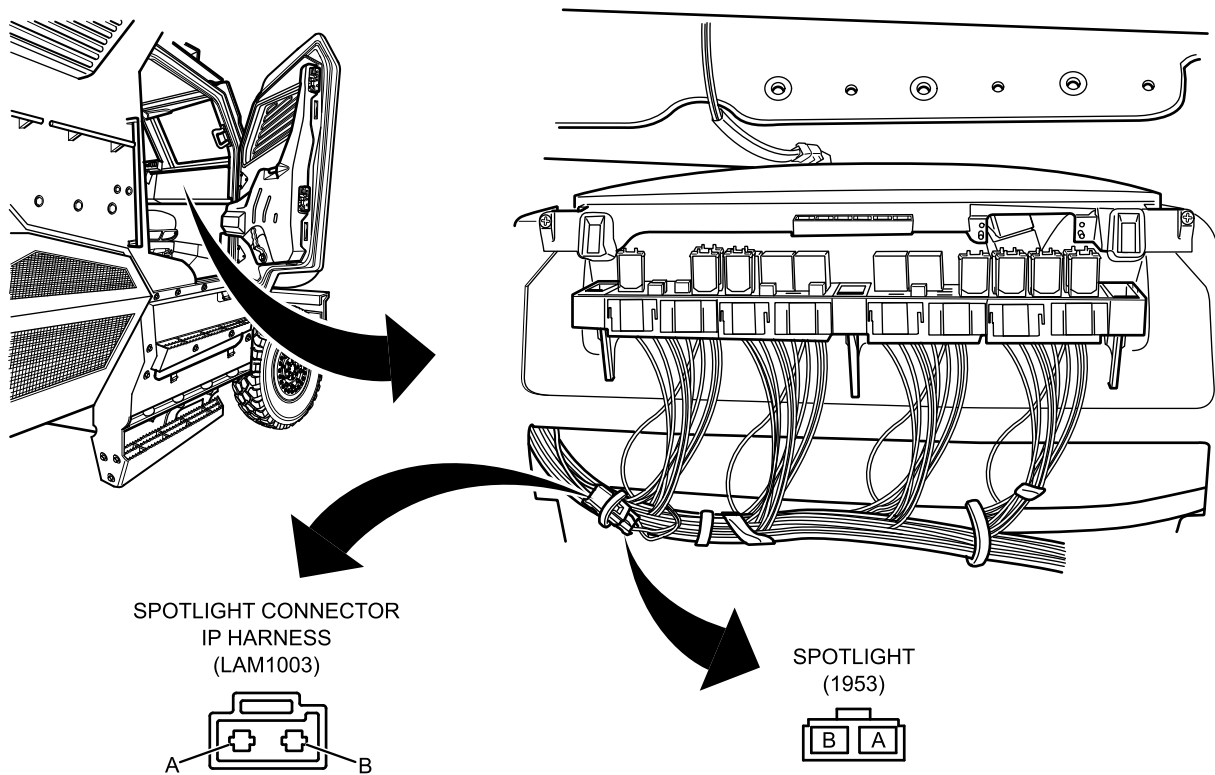
YES Go to Step 11.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

9. Disconnect spotlight IP harness connector 1953/LAM1003. Refer to Figure 3.



B230604731

Figure 3. Spotlight IP Harness Connector.

10. Measure DC voltage between connector 1953 terminals A and B with multimeter. Refer to Figure 3.

CONDITION/INDICATION

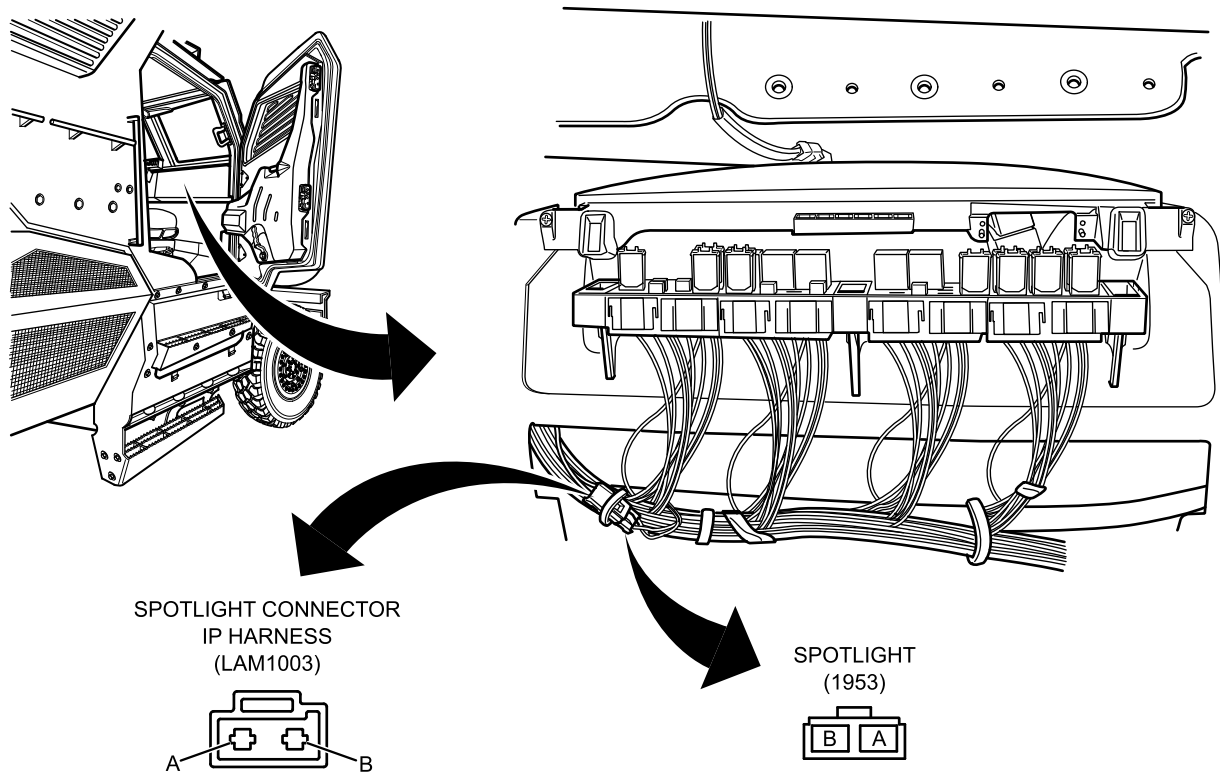
Does multimeter read between 21V and 27V?

DECISION

YES Go to Step 21.
NO Go to Step 44.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

11. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
12. Disconnect spotlight IP harness connector 1953/LAM1003. Refer to Figure 4.



B230604731

Figure 4. Spotlight IP Harness Connector.

13. Measure resistance between connector 1953 terminal A and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

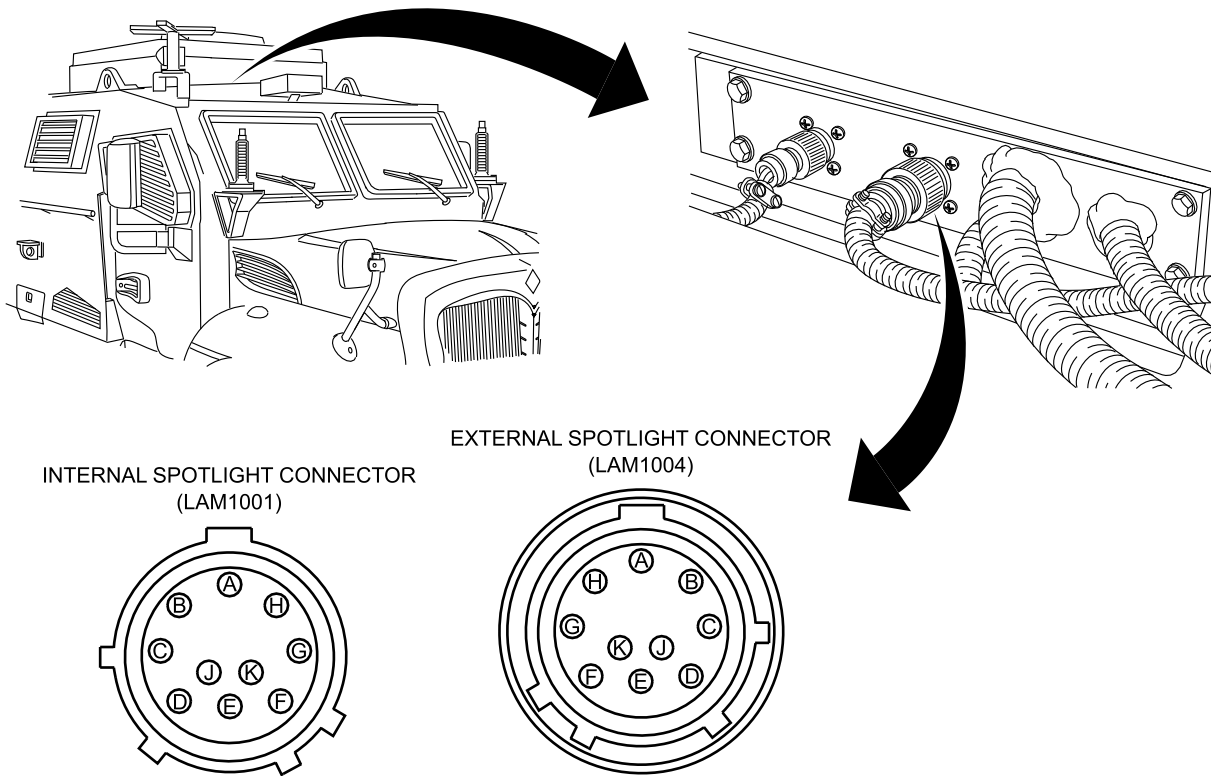
NO Go to Step 44.
 YES Go to next step.

STEP

14. Connect connector 1953/LAM1003. Refer to Figure 4.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

15. Disconnect spotlight pass-through roof connector LAM1001/LAM1004. Refer to Figure 5.



B230604732

Figure 5. Spotlight Pass-Through Roof Connectors.

16. Measure resistance between connector LAM1001 terminal J and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

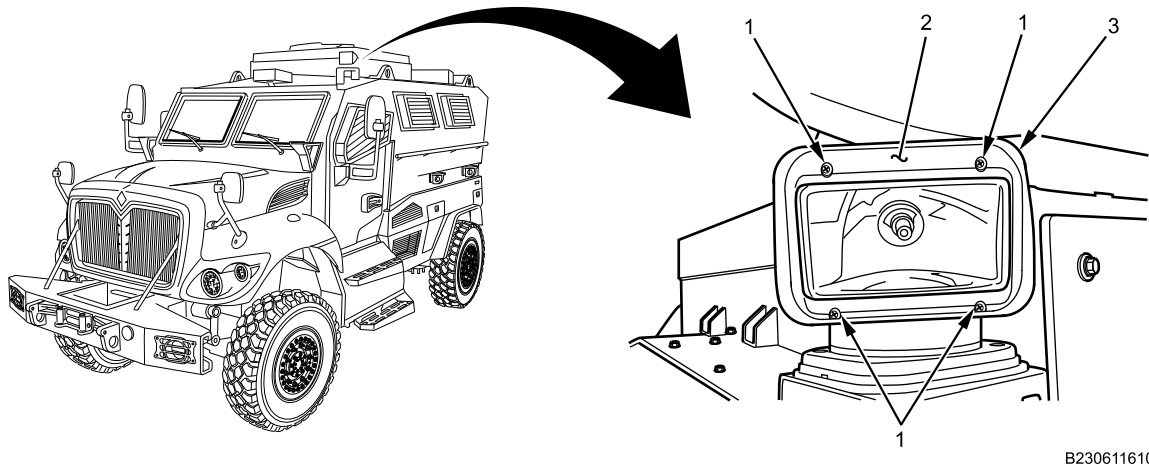
NO Go to Step 42.
 YES Go to next step.

STEP

17. Connect connector LAM1001/LAM1004. Refer to Figure 5.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

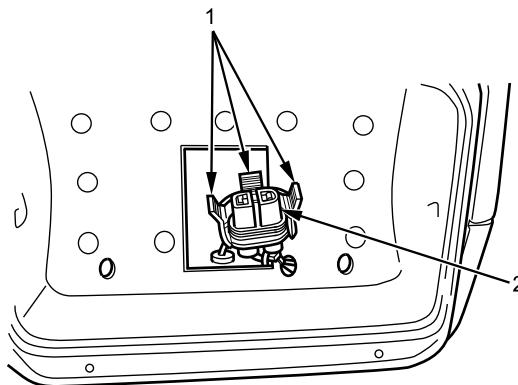
18. Remove four screws (Figure 6, Item 1) securing spotlight bezel (Figure 6, Item 2) to spotlight housing (Figure 6, Item 3).



B230611610

Figure 6. Spotlight Bezel Removal.

19. Release three locking tabs (Figure 7, Item 1) and disconnect spotlight bulb connector (Figure 7, Item 2).

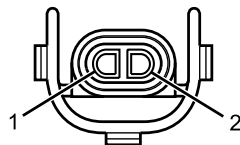


B230603243

Figure 7. Spotlight Bulb Connector.

20. Measure resistance between spotlight bulb connector terminal 1 and ground with multimeter. Refer to Figure 8.

SPOTLIGHT BULB CONNECTOR



B230611605

Figure 8. Spotlight Bulb Connector.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

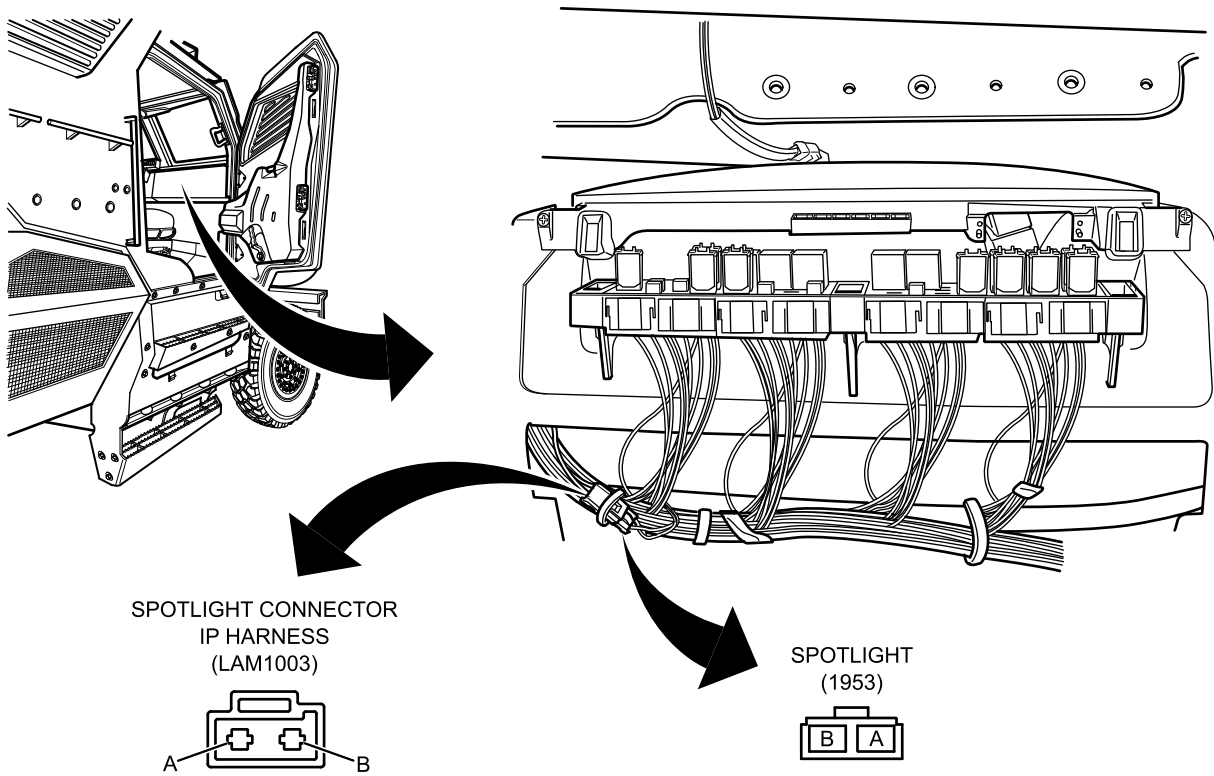
Does multimeter read OL?

DECISION

YES Go to Step 45.
 NO Go to Step 43.

STEP

21. Connect connector 1953/LAM1003. Refer to Figure 9.

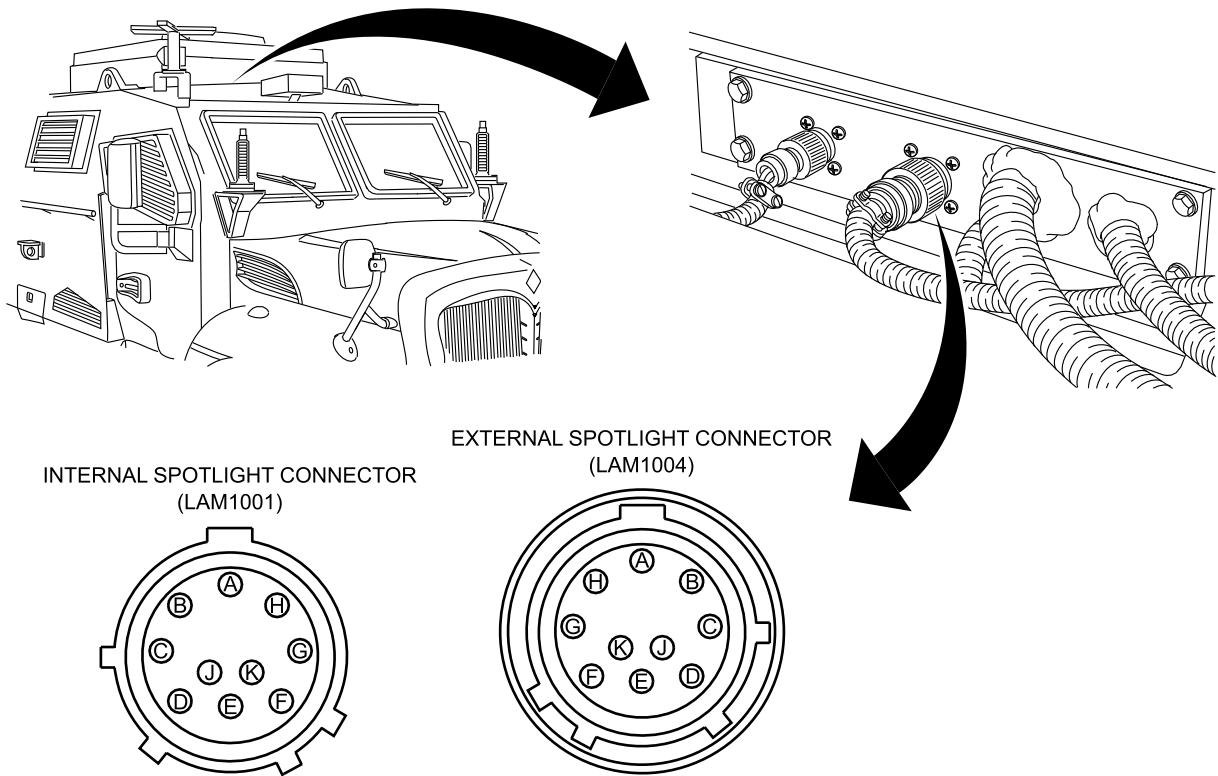


B230604731

Figure 9. Spotlight IP Harness Connector.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

22. Disconnect pass-through roof connection LAM1001/LAM1004. Refer to Figure 10.



B230604732

Figure 10. Spotlight Pass-Through Roof Connectors.

23. Measure DC voltage between connector LAM1001 terminal J and K with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

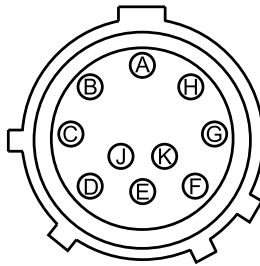
NO Go to Step 42.
YES Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

24. Turn ignition switch OFF (TM 9-2355-106-23).
25. Measure resistance between ground and the following connector LAM1001 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 11.

- A
- B
- C
- D
- E
- F
- G

INTERNAL SPOTLIGHT CONNECTOR
(LAM1001)



B230604091

Figure 11. Connector LAM1001.

CONDITION/INDICATION

Does multimeter read OL for each test?

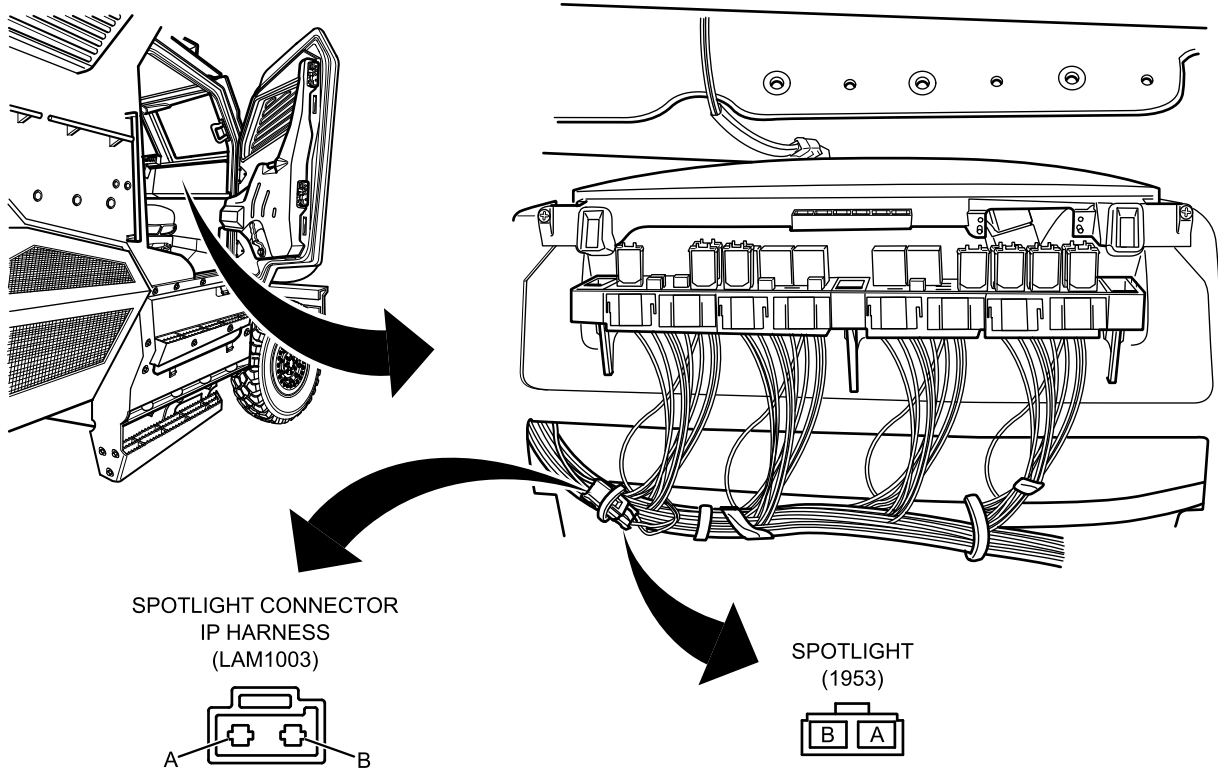
DECISION

NO Go to Step 42.
YES Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Disconnect spotlight connector 1953/LAM1003. Refer to Figure 12.

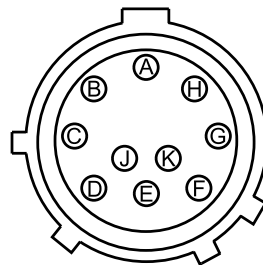


B230604731

Figure 12. Spotlight IP Harness Connector.

27. Measure resistance between each connector LAM1001 terminal and all other connector LAM1001 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 13.

INTERNAL SPOTLIGHT CONNECTOR (LAM1001)



B230604091

Figure 13. Connector LAM1001.

CONDITION/INDICATION

Does multimeter read OL for each test?

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 42.
 YES Go to next step.

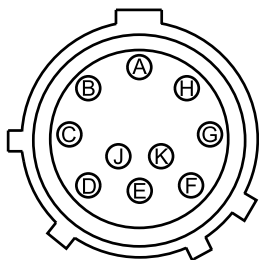
STEP

28. Measure resistance between the pairs of connector LAM1001 and LAM1002 terminals shown in Table 1. Multimeter should read less than 5 ohms for each test. Refer to Figure 14.

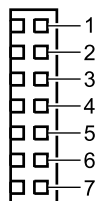
Table 1. Connector LAM1001 and LAM1002 Terminal Pairs.

LAM1001 Terminals	LAM1002 Terminals
A	7
B	6
C	4
D	5
E	1
F	3
G	2

INTERNAL SPOTLIGHT CONNECTOR
(LAM1001)



SPOTLIGHT CONNECTOR SWITCH
(LAM1002)



B230611601

Figure 14. Connectors LAM1001 and LAM1002.

CONDITION/INDICATION

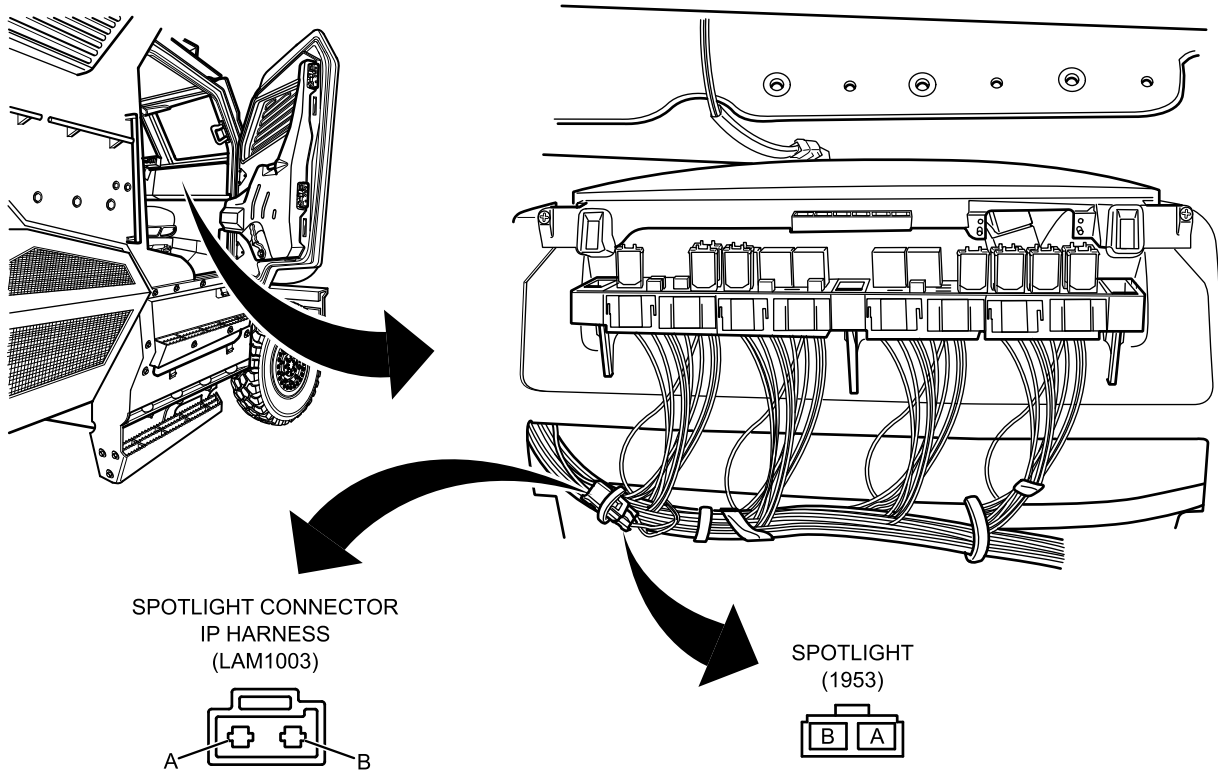
Does multimeter read less than 5 ohms for each test?

DECISION

NO Go to Step 42.
 YES Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

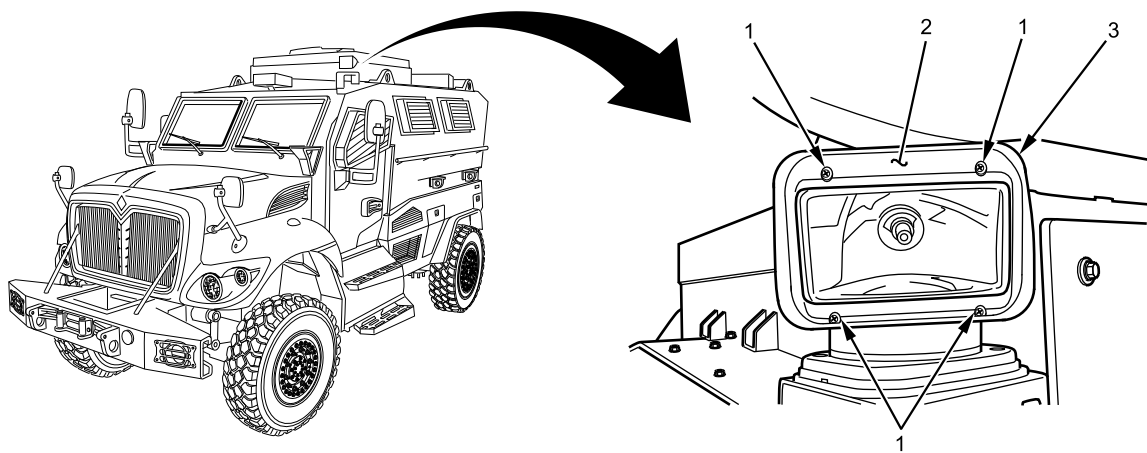
STEP



B230604731

Figure 15. Spotlight IP Harness Connector.

29. Connect connector 1953/LAM1003. Refer to Figure 15.
30. Remove four screws (Figure 16, Item 1) securing spotlight bezel (Figure 16, Item 2) to spotlight housing (Figure 16, Item 3).

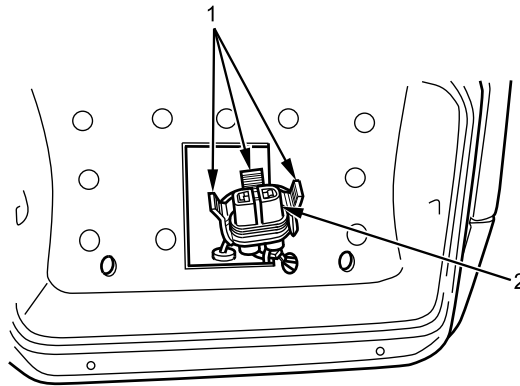


B230611610

Figure 16. Spotlight Bezel Removal.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

31. Release three locking tabs (Figure 17, Item 1) and disconnect spotlight bulb connector (Figure 17, Item 2).

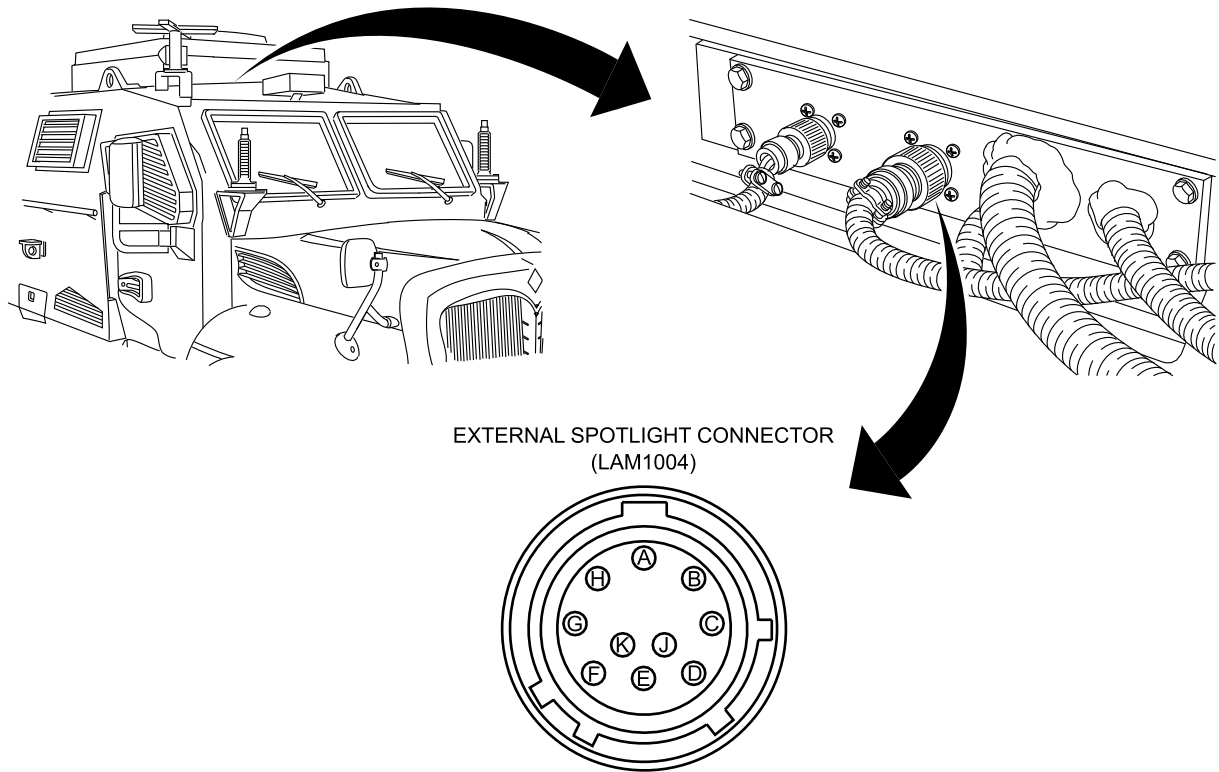


B230603243

Figure 17. Spotlight Bulb Connector.

32. Measure resistance between ground and the following connector LAM1004 terminals with multimeter. Refer to Figure 18. Multimeter should read OL for each test.

- A
- B
- C
- D
- E
- F
- G

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

EXTERNAL SPOTLIGHT CONNECTOR
(LAM1004)

B230611602

Figure 18. Spotlight Pass-Through Roof Connectors.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

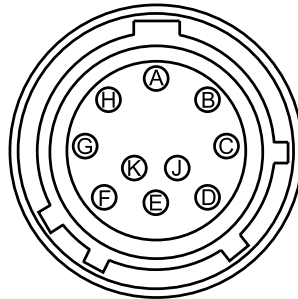
YES Go to Step 43.
NO Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

33. Measure resistance between each connector LAM1004 terminal and all other connector LAM1004 terminals with multimeter. Refer to Figure 19.

EXTERNAL SPOTLIGHT CONNECTOR
(LAM1004)



B230604094

Figure 19. Connector LAM1004.

CONDITION/INDICATION

Does multimeter read OL for each test?

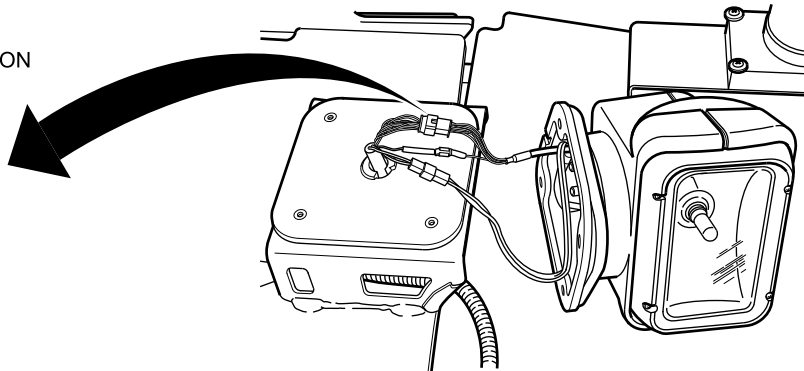
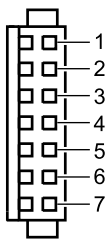
DECISION

NO Go to Step 43.
YES Go to next step.

STEP

34. Remove spotlight from bracket. Refer to Spotlight Removal and Installation (WP 0363).
35. Disconnect connector LAM1005. Refer to Figure 20.

SPOTLIGHT CONNECTION
(LAM1005)



B230611607

Figure 20. Top of Spotlight Mount.

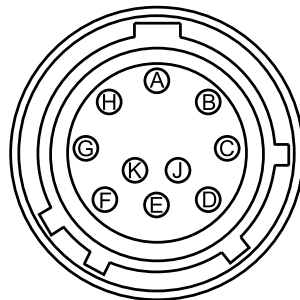
SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

36. Measure resistance between the pairs of connector LAM1004 and LAM1005 terminals shown in Table 2. Refer to Figure 21 and Figure 22. Multimeter should read less than 5 ohms for each test.

Table 2. Connector LAM1004 and LAM1005 Terminal Pairs.

LAM1004 Terminals	LAM1005 Terminals
A	7
B	6
C	5
D	4
E	3
F	2
G	1

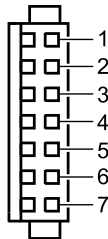
EXTERNAL SPOTLIGHT CONNECTOR
(LAM1004)



B230604094

Figure 21. Connector LAM1004.

SPOTLIGHT CONNECTION
(LAM1005)



B230604095

Figure 22. LAM1005.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

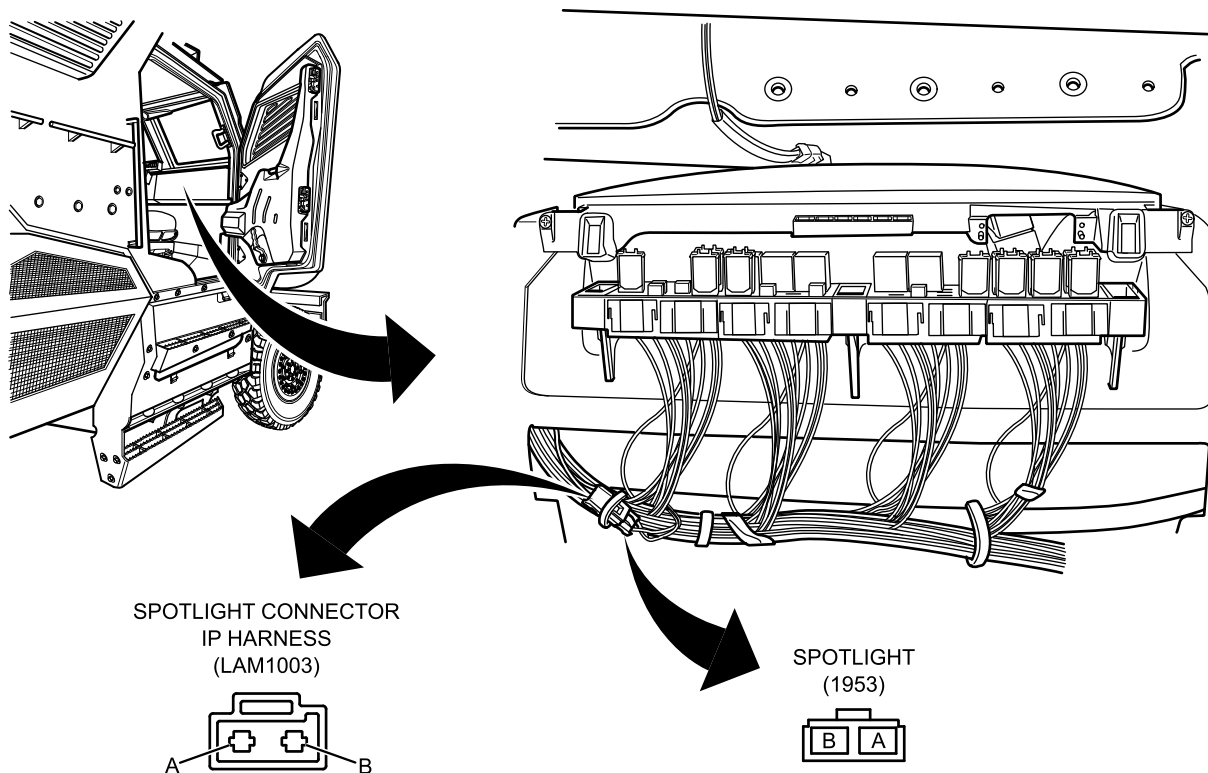
DECISION

NO Go to Step 43.
YES Go to next step.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

37. Connect connector 1953/LAM1003. Refer to Figure 23.

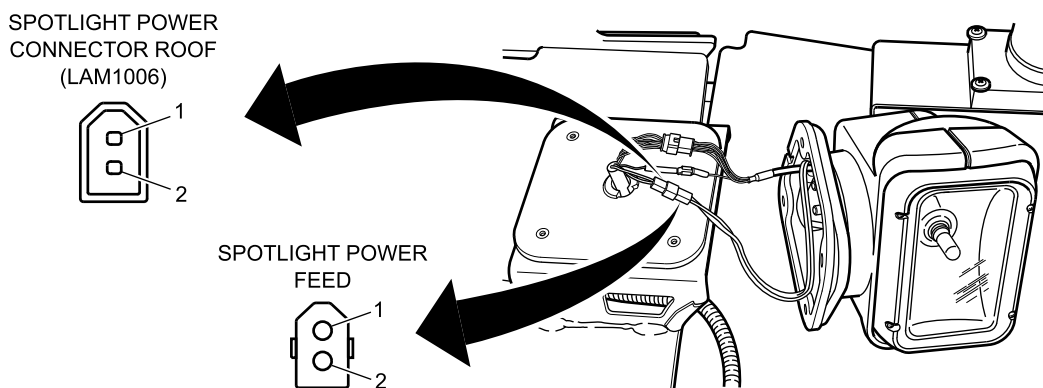


B230604731

Figure 23. Spotlight IP Harness Connector.

38. Turn MAIN POWER switch ON (TM 9-2355-106-10).

39. Disconnect connectors LAM1006 and spotlight power feed. Refer to Figure 24.



B230611606

Figure 24. Top of Spotlight Mount.

40. Measure DC voltage between spotlight power connector LAM1006 terminals 1 and 2 with multimeter. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 43.
YES Go to Step 45.

MALFUNCTION

- 41. Spotlight control is faulty.

ACTION

Replace spotlight control. Refer to Spotlight Control Removal and Installation (WP 0313). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 42. Spotlight interior wiring harness is faulty.

ACTION

Replace spotlight interior wiring harness. Refer to Spotlight Interior Wiring Harness Removal and Installation (WP 0365). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 43. Spotlight exterior wiring harness is faulty.

ACTION

Replace spotlight exterior wiring harness. Refer to Spotlight Exterior Wiring Harness Removal and Installation (WP 0364). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 44. IP harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 45. Spotlight is faulty.

ACTION

Replace spotlight. Refer to Spotlight Removal and Installation (WP 0363). Return vehicle to service.

SPOTLIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

END OF TEST

END OF WORK PACKAGE

FIELD MAINTENANCE

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Maintenance Support Device (MSD) (WP 0795, Item
70)

WP 0306

WP 0069

WP 0782

Personnel Required

Maintainer (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0011
WP 0682
WP 0314
WP 0319

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Instrument Panel (IP) center closeout removed
(WP 0579)

Drawings Required

Schematic (WP 0789, Figure 21)

TROUBLESHOOTING PROCEDURE

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Turn mirror heat switch ON (TM 9-2355-106-10).
4. Touch center of both left and right mirror glass. Center of mirror glass should become warmer to touch within 3 minutes.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Do both left and right mirror glass become warmer to touch?

DECISION

NO Go to Step 78.
YES Go to next step.

STEP

5. Operate up/down and left/right controls for each mirror.

CONDITION/INDICATION

Does up/down or left/right control operate for either left or right mirror?

DECISION

NO Go to Step 24.
YES Go to next step.

STEP

6. Recall results of Step 5.

CONDITION/INDICATION

Do up/down and left/right controls for the right mirror operate correctly?

DECISION

NO Go to Step 18.
YES Go to next step.

STEP

7. Turn mirror heater switch OFF (TM 9-2355-106-10).
8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector LAM1008. Refer to Figure 1.

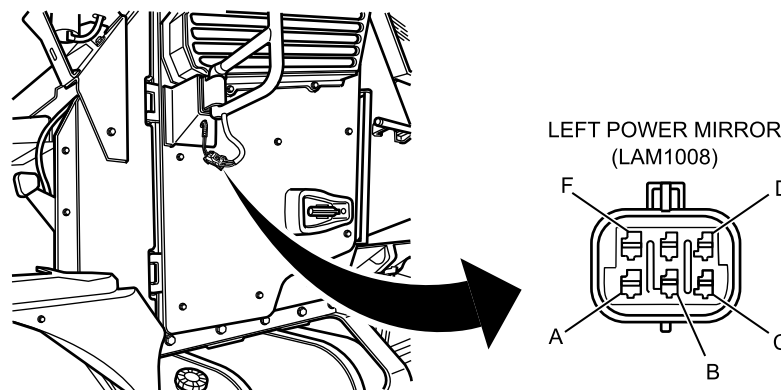


Figure 1. Left Power Mirror.

11. Turn MAIN POWER switch ON (TM 9-2355-106-10).

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

12. Turn ignition switch ON (TM 9-2355-106-10).
13. Select left mirror using mirror rocker switch (TM 9-2355-106-10).
14. Measure DC voltage between connector LAM1008 terminals A and B with multimeter. Refer to Figure 1.
15. Operate left/right control while observing multimeter. Multimeter should read between 10.5V and 13.5V. Polarity of voltage should alternate between positive and negative as control is operated.

CONDITION/INDICATION

Does multimeter read positive and negative voltage as control is operated?

DECISION

NO Go to Step 66.
YES Go to next step.

STEP

16. Measure DC voltage between connector LAM1008 terminals B and C with multimeter. Refer to Figure 1.
17. Operate left mirror up/down control while observing multimeter. Multimeter should read between 10.5V and 13.5V. Polarity of voltage should alternate between positive and negative as control is operated.

CONDITION/INDICATION

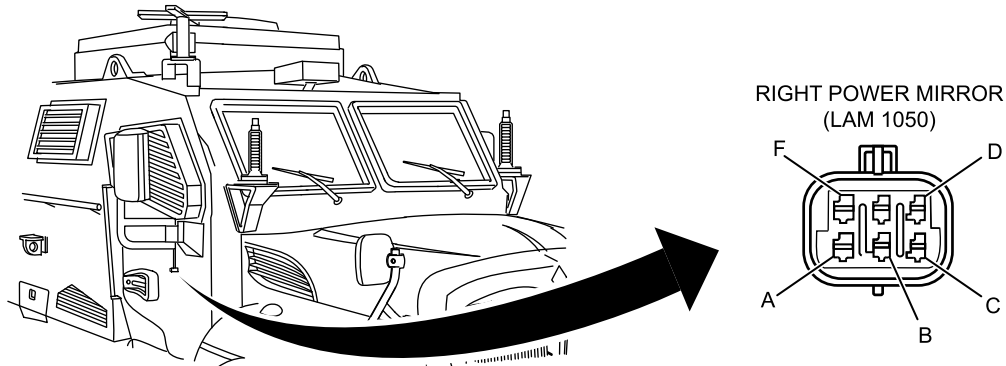
Does multimeter read positive and negative voltage as control is operated?

DECISION

NO Go to Step 66.
YES Go to Step 122.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

18. Disconnect connector LAM1050. Refer to Figure 2.

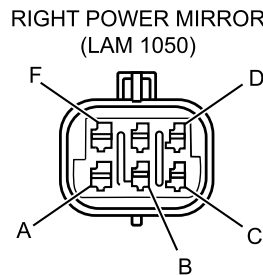


B230604749

Figure 2. Right Power Mirror.

19. Select right mirror using mirror rocker switch (TM 9-2355-106-10).

20. Measure DC voltage between connector LAM1050 terminals A and B with multimeter. Refer to Figure 3.



B230604140

Figure 3. Connector LAM1050.

21. Operate right mirror left/right control while observing multimeter. Multimeter should read between 10.5V and 13.5V. Polarity of voltage should alternate between positive and negative as control is operated.

CONDITION/INDICATION

Does multimeter read positive and negative voltage as control is operated?

DECISION

NO Go to Step 72.
YES Go to next step.

STEP

22. Measure DC voltage between connector LAM1050 terminals B and C with multimeter. Refer to Figure 3.

23. Operate right mirror up/down control while observing multimeter. Multimeter should read between 10.5V and 13.5V. Polarity of voltage should alternate between positive and negative as control is operated.

CONDITION/INDICATION

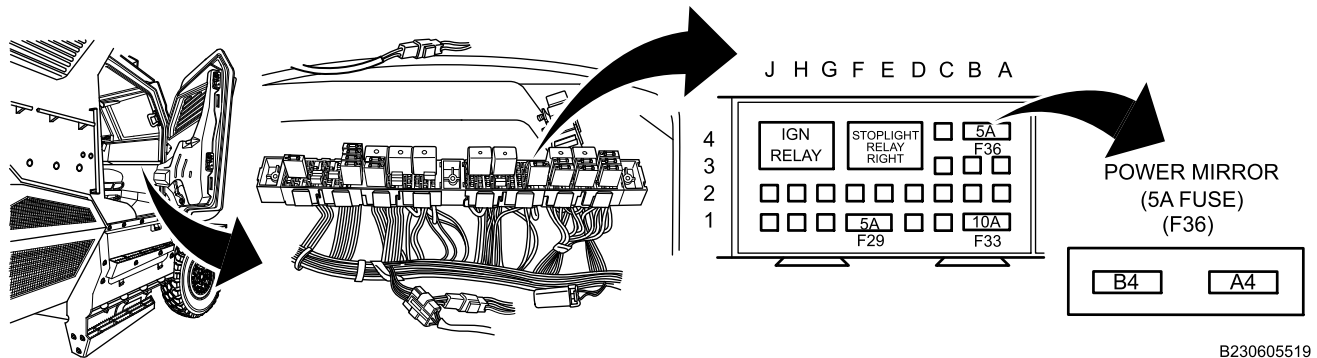
Does multimeter read positive and negative voltage as control is operated?

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 72.
 YES Go to Step 122.

STEP

24. Turn ignition switch OFF (TM 9-2355-106-10).
25. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
26. Remove and inspect fuse F36. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Refer to Figure 4.



B230605519

Figure 4. Fuse Block 1013.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 42.
 NO Go to next step.

STEP

27. Turn MAIN POWER switch ON (TM 9-2355-106-10).
28. Turn ignition switch ON (TM 9-2355-106-10).
29. Measure DC voltage between ground and fuse block terminals A4 and B4 with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V for either terminal?

DECISION

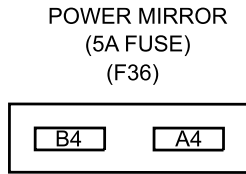
NO Go to Power Distribution Troubleshooting Procedure (WP 0059).
 YES Go to next step.

STEP

30. Turn ignition switch OFF (TM 9-2355-106-10).
31. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

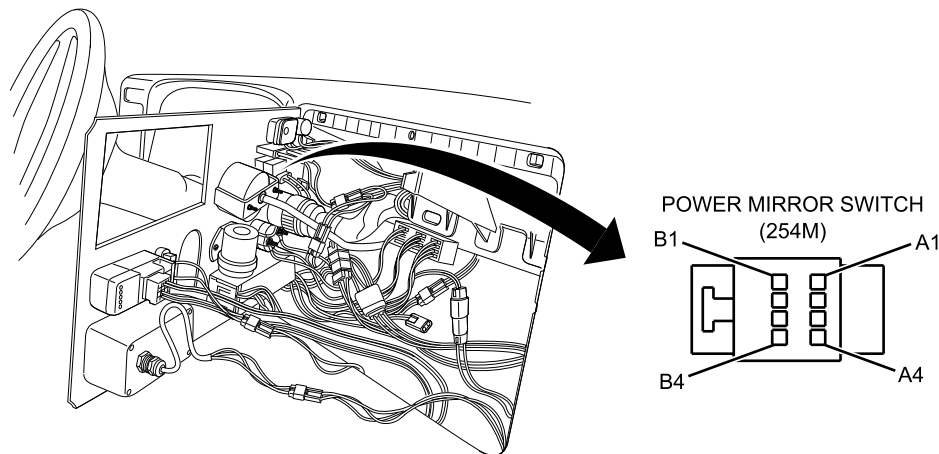
- 32. Install fuse F36. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Refer to Figure 5.



B230605550

Figure 5. Fuse Block 1013.

- 33. Disconnect connector 254M. Refer to Figure 6.
- 34. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 35. Turn ignition switch ON (TM 9-2355-106-10).
- 36. Measure DC voltage between connector 254M terminal A2 and ground with multimeter. Refer to Figure 6.



B230604747

Figure 6. Behind IP Center.

CONDITION/INDICATION

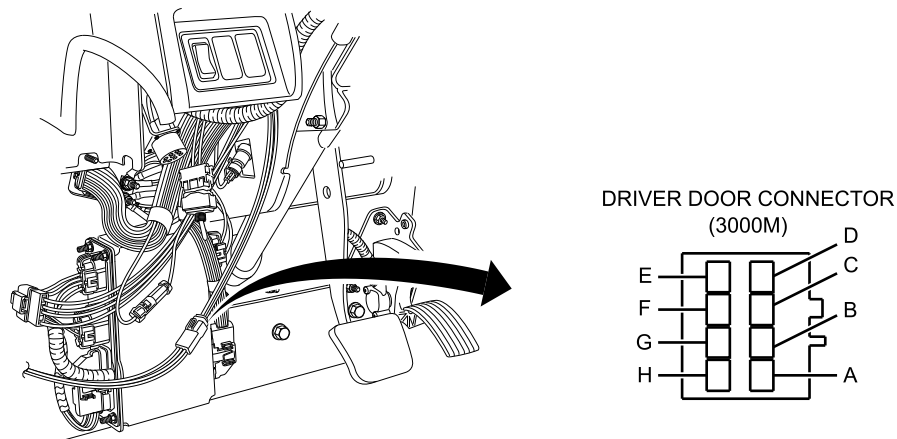
Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 126.
YES Go to next step.

STEP

- 37. Turn ignition switch OFF (TM 9-2355-106-10).
- 38. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 39. Disconnect connector 3000M. Refer to Figure 7.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230604751

Figure 7. Below Dash, Left of Steering Column.

40. Measure resistance between connector 3000M terminal B and connector 254M terminal A3 with multimeter. Refer to Figure 7. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 126.
YES Go to next step.

STEP

41. Measure resistance between connector 254M A4 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

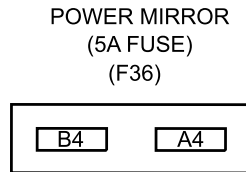
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 126.
YES Go to Step 127.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

42. Place mirror rocker switch in neutral position (TM 9-2355-106-10).
43. Measure resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 8.



B230605550

Figure 8. Fuse Block 1013.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 64.
NO Go to next step.

STEP

44. Select left mirror using mirror rocker switch (TM 9-2355-106-10).
45. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

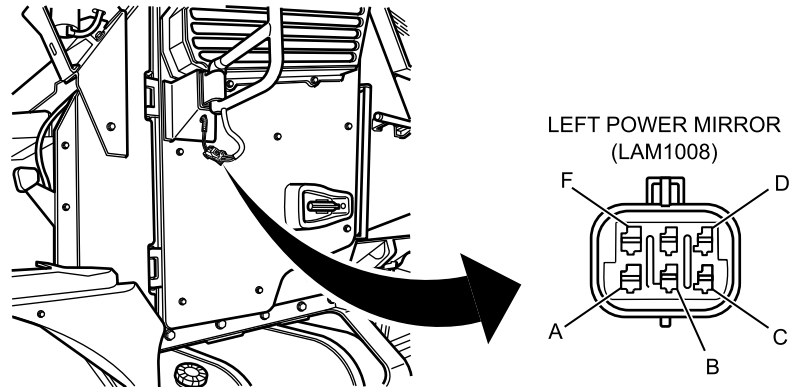
Does multimeter read less than 5 ohms for any test?

DECISION

NO Go to Step 57.
YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

46. Disconnect LAM1008. Refer to Figure 9.



B230604750

Figure 9. Left Power Mirror.

47. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for any test?

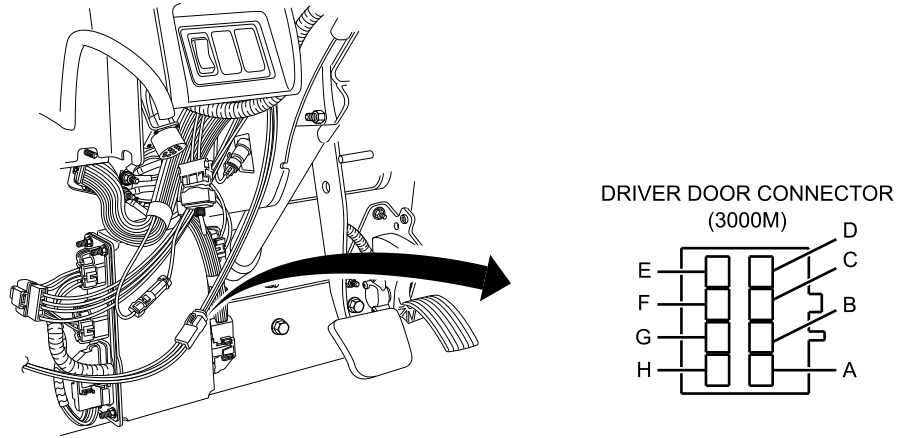
DECISION

NO Go to Step 122.
YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

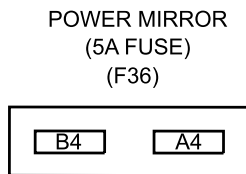
48. Disconnect connector 3000M. Refer to Figure 10.



B230604751

Figure 10. Below Dash, Left of Steering Column.

49. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 11.



B230605550

Figure 11. Fuse Block 1013.

CONDITION/INDICATION

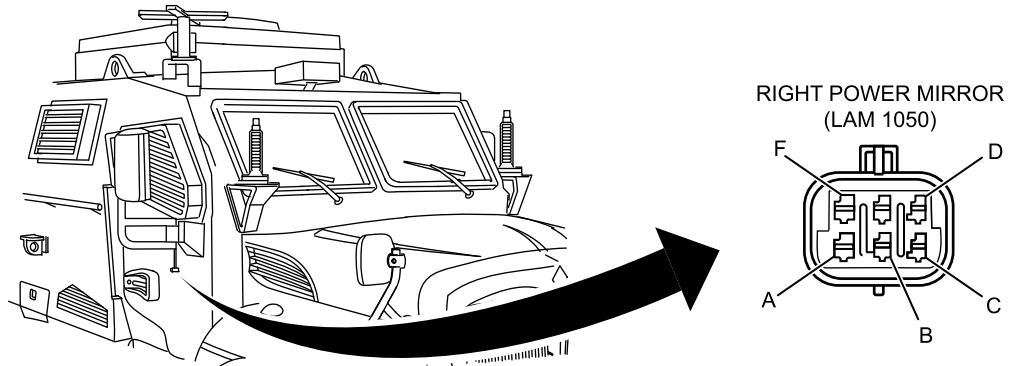
Does multimeter read less than 5 ohms for any test?

DECISION

NO Go to Step 124.
 YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

50. Disconnect connector LAM1050. Refer to Figure 12.



B230604749

Figure 12. Right Power Mirror.

51. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for any test?

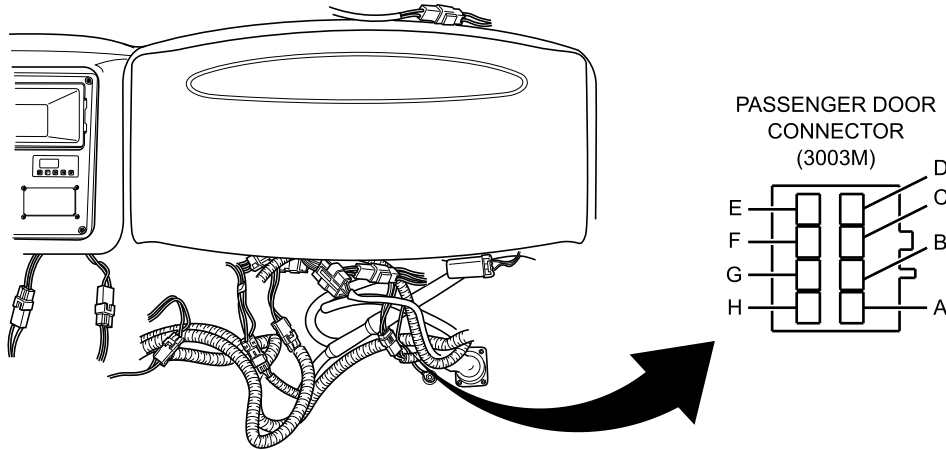
DECISION

NO Go to Step 123.
YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

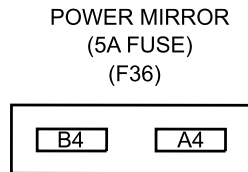
52. Disconnect connector 3003M. Refer to Figure 13.



B230604700

Figure 13. Below IP Fuse Block.

53. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 14.



B230605550

Figure 14. Fuse Block 1013.

CONDITION/INDICATION

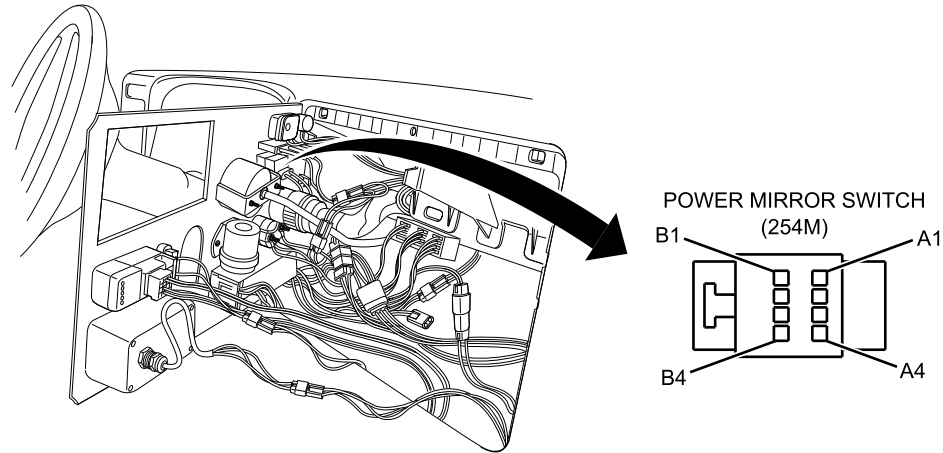
Does multimeter read less than 5 ohms for any test?

DECISION

NO Go to Step 125.
 YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

54. Disconnect connector 254M. Refer to Figure 15.



B230604747

Figure 15. Behind IP Center.

55. Measure resistance between ground and the following connector 254M terminals:

- A2
- A3
- B1
- B2
- B3
- B4

Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 126.
 YES Go to next step.

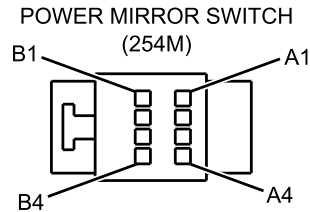
STEP

56. Measure resistance between the following connector 254M terminals:

- B3 and A2
- B3 and A3
- B3 and A4
- B3 and B1
- B1 and A2
- B1 and A3
- B1 and A4

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

- A4 and A2
 - A4 and A3
 - A2 and A3
- Refer to Figure 16.



B230603772

Figure 16. Connector 254M.

CONDITION/INDICATION

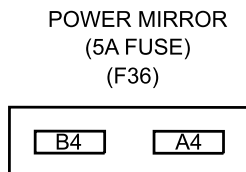
Does multimeter read less than 5 ohms for any test?

DECISION

NO Go to Step 127.
 YES Go to Step 126.

STEP

57. Select right mirror using mirror rocker switch (TM 9-2355-106-10).
58. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 17.



B230605550

Figure 17. Fuse Block 1013.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for any test?

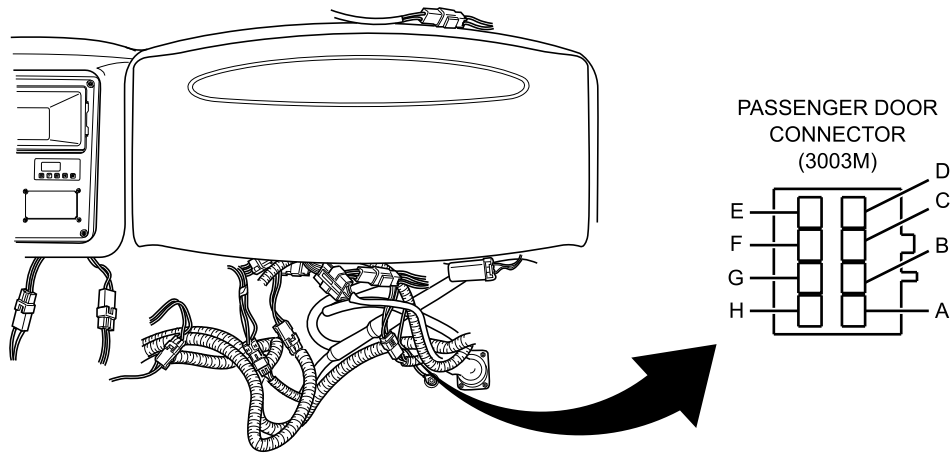
DECISION

NO Go to Step 123.
 YES Go to next step.

STEP

59. Disconnect connector 3003M. Refer to Figure 18.

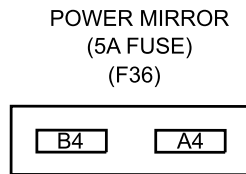
POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604700

Figure 18. Below IP Fuse Block.

60. Operate up/down and left/right controls while measuring resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 19.



B230605550

Figure 19. Fuse Block 1013.

CONDITION/INDICATION

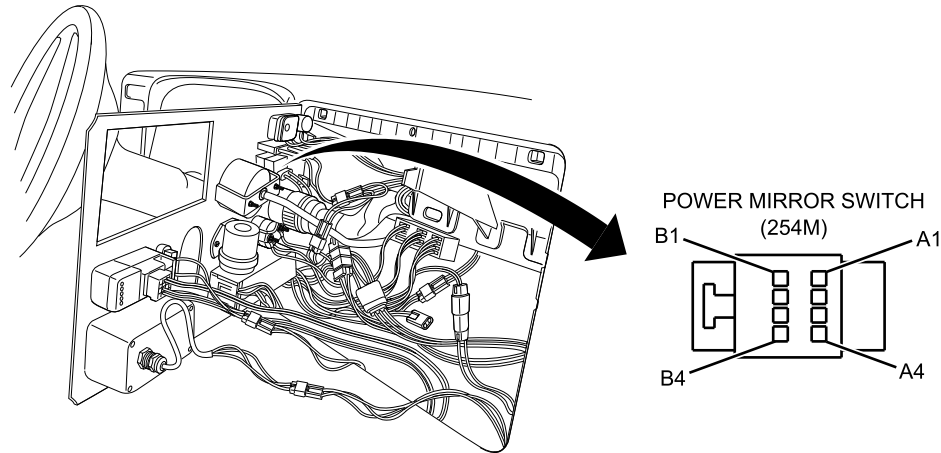
Does multimeter read less than 5 ohms for any test?

DECISION

- NO Go to Step 125.
- YES Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

61. Disconnect connector 254M. Refer to Figure 20.



B230604747

Figure 20. Behind IP Center.

62. Measure resistance between ground and the following connector 254M terminals:

- A2
- B2
- B4

Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 126.
YES Go to next step.

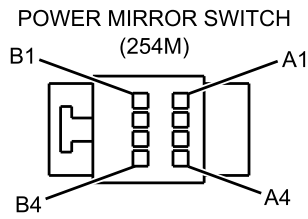
STEP

63. Measure resistance between the following connector 254M terminals:

- A2 and A3
- A2 and A4
- A2 and B2
- A2 and B4
- A3 and A4
- A3 and B2
- A3 and B4

Refer to Figure 21.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230603772

Figure 21. Connector 254M.

CONDITION/INDICATION

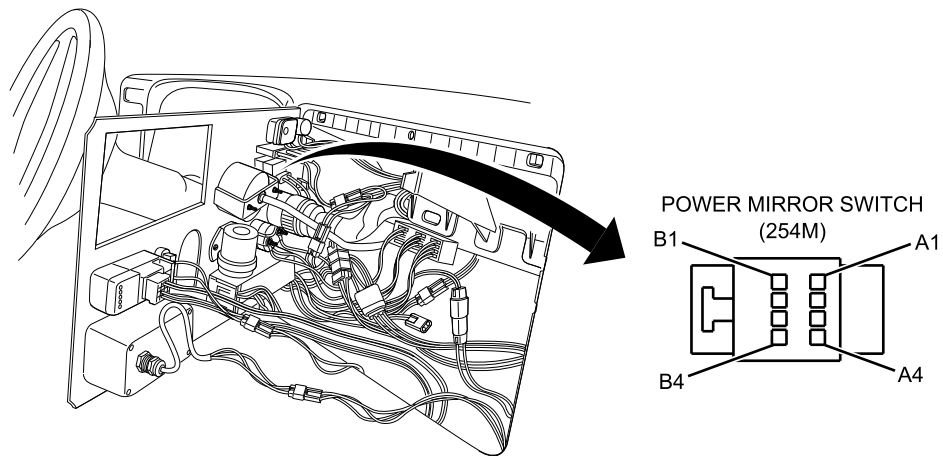
Does multimeter read OL for each test?

DECISION

NO Go to Step 126.
 YES Go to Step 127.

STEP

64. Disconnect connector 254M. Refer to Figure 22.

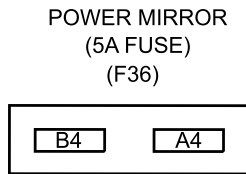


B230604747

Figure 22. Behind IP Center.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

65. Measure resistance between fuse block 1013 terminal B4 and ground with multimeter. Refer to Figure 23.



B230605550

Figure 23. Fuse Block 1013.

CONDITION/INDICATION

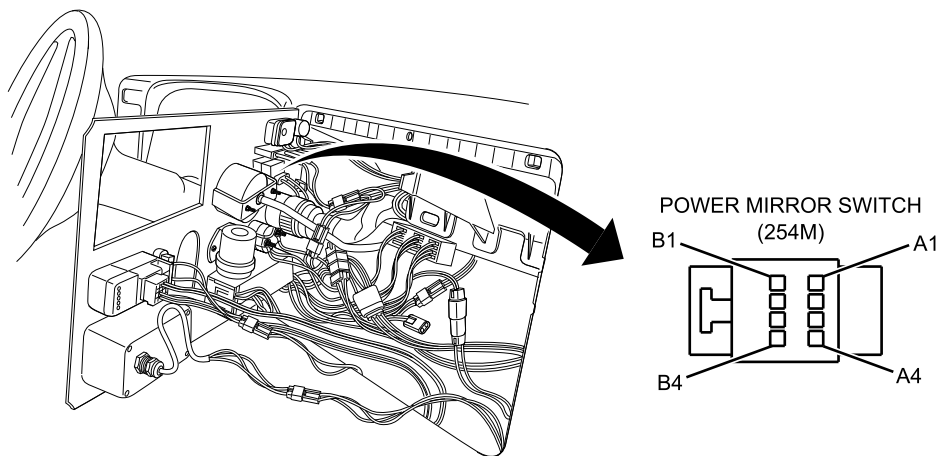
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 127.
YES Go to Step 126.

STEP

- 66. Turn ignition switch OFF (TM 9-2355-106-10).
- 67. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 68. Disconnect connector 254M. Refer to Figure 24.



B230604747

Figure 24. Behind IP Center.

69. Measure resistance between the following:

- Connector LAM1008 terminal A and connector 254M terminal B1
 - Connector LAM1008 terminal B and connector 254M terminal A3
 - Connector LAM1008 terminal C and connector 254M terminal B3
- Refer to Figure 25. Refer to Figure 24.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

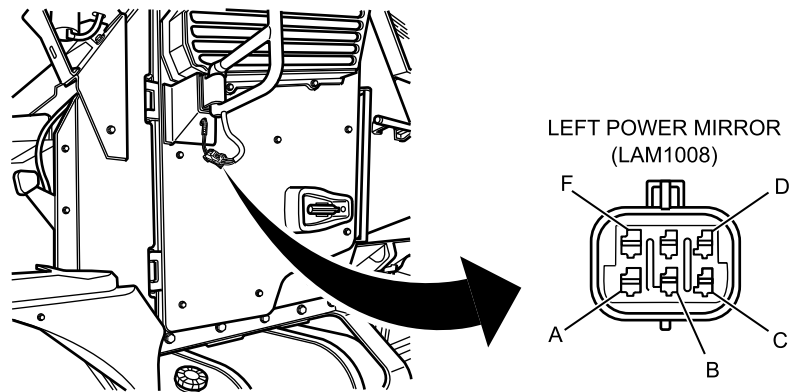


Figure 25. Left Power Mirror.

B230604750

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

DECISION

YES Go to Step 127.

NO Go to next step.

STEP

70. Disconnect connector 3000M. Refer to Figure 26.

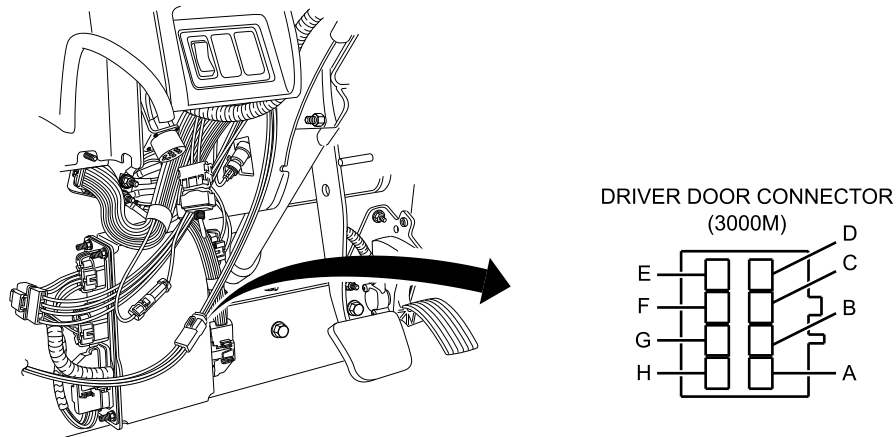


Figure 26. Below Dash, Left of Steering Column.

B230604751

71. Measure resistance between the following:

- Connector 3000M terminal A and connector 254M terminal B1
 - Connector 3000M terminal B and connector 254M terminal A3
 - Connector 3000M terminal C and connector 254M terminal B3
- Refer to Figure 26. Refer to Figure 24.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

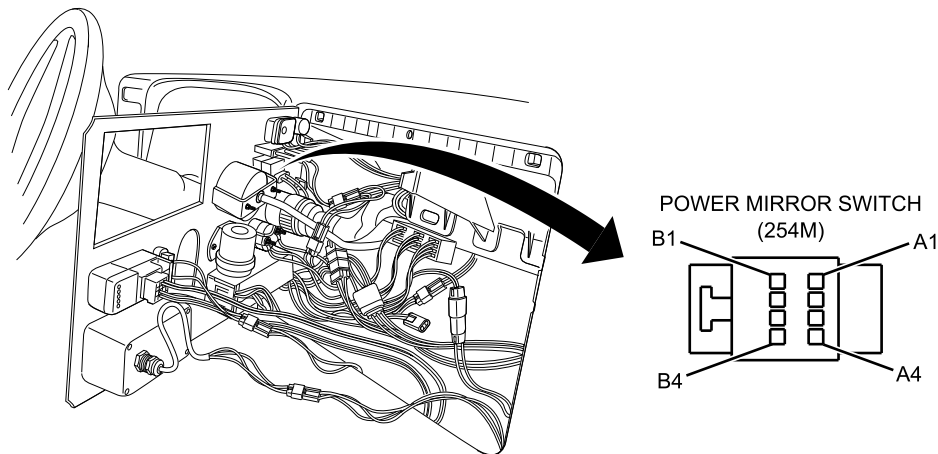
Does multimeter read less than 5 ohms for each test?

DECISION

NO Go to Step 126.
YES Go to Step 124.

STEP

72. Turn ignition switch OFF (TM 9-2355-106-10).
73. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
74. Disconnect connector 254M. Refer to Figure 27.



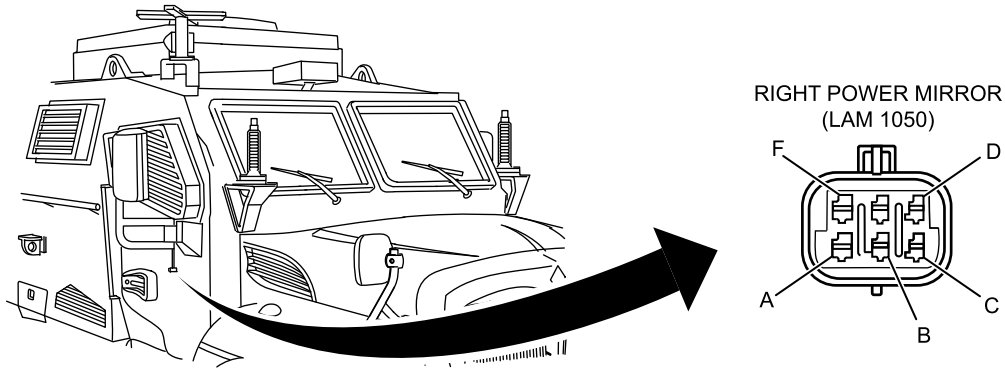
B230604747

Figure 27. Behind IP Center.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

75. Measure resistance between the following:

- Connector LAM1050 terminal A and connector 254M terminal B2
 - Connector LAM1050 terminal B and connector 254M terminal A3
 - Connector LAM1050 terminal C and connector 254M terminal B4
- Refer to Figure 28. Refer to Figure 27.



B230604749

Figure 28. Right Power Mirror.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

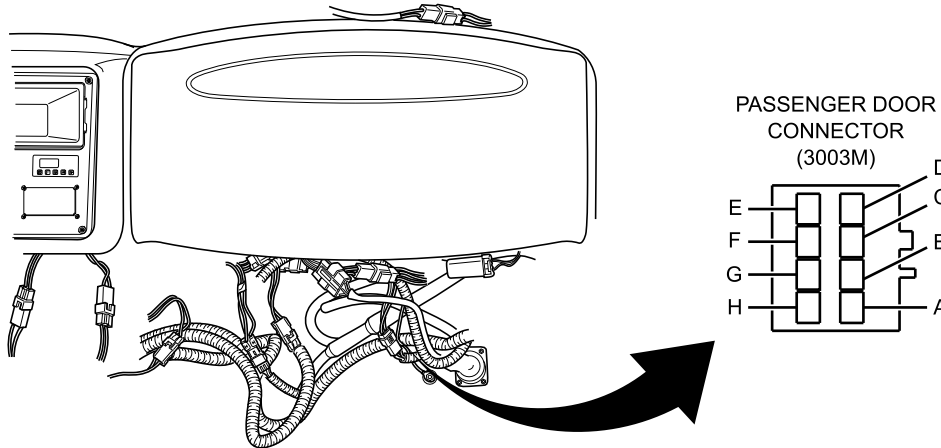
DECISION

YES Go to Step 127.
NO Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

76. Disconnect connector 3003M. Refer to Figure 29.

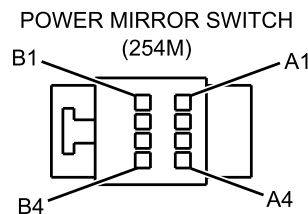


B230604700

Figure 29. Below IP Fuse Block.

77. Measure resistance between the following:

- Connector 3003M terminal A and connector 254M terminal B2
 - Connector 3003M terminal B and connector 254M terminal A3
 - Connector 3003M terminal C and connector 254M terminal B4
- Refer to Figure 29. Refer to Figure 30.



B230603772

Figure 30. Connector 254M.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

DECISION

- NO Go to Step 126.
- YES Go to Step 125.

STEP

78. Recall results of Step 4.

CONDITION/INDICATION

Does either left or right heater operate?

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 120.
 YES Go to next step.

STEP

79. Touch center of right mirror glass. Mirror glass should become warm to touch within 3 minutes.

CONDITION/INDICATION

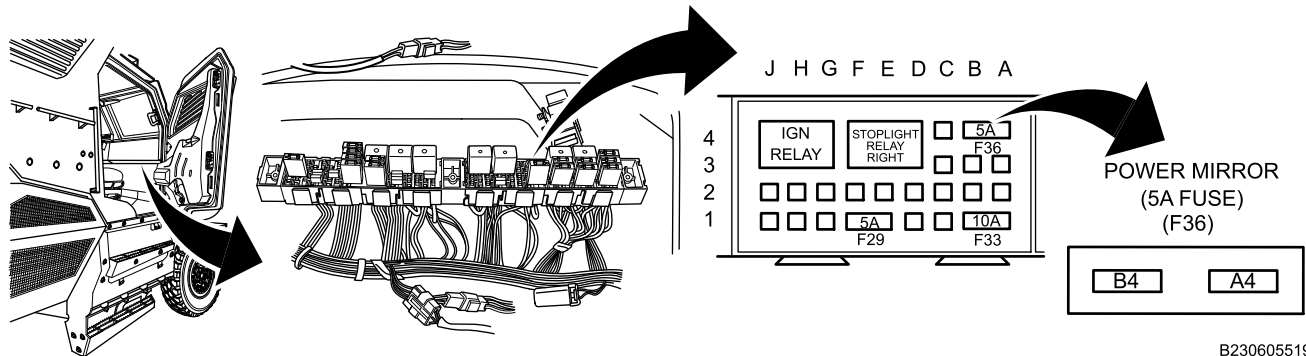
Does right mirror heater operate?

DECISION

NO Go to Step 96.
 YES Go to next step.

STEP

- 80. Turn ignition switch OFF (TM 9-2355-106-10).
- 81. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 82. Remove and inspect fuse F18. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Refer to Figure 31.



B230605519

Figure 31. Fuse Block 1012.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Is fuse open?

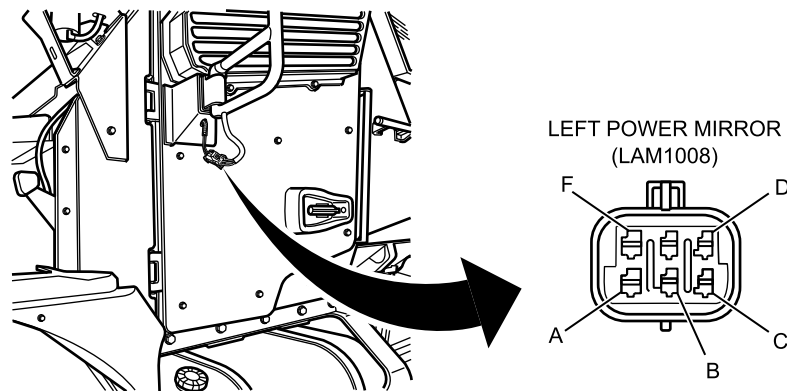
DECISION

YES Go to Step 112.

NO Go to next step.

STEP

83. Disconnect LAM1008. Refer to Figure 32.



B230604750

Figure 32. Left Power Mirror.

84. Install fuse F18. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).
85. Turn MAIN POWER switch ON (TM 9-2355-106-10).
86. Turn ignition switch ON (TM 9-2355-106-10).
87. Turn mirror heat switch ON (TM 9-2355-106-10).
88. Measure DC voltage between LAM1008 terminals D and F with multimeter. Refer to Figure 32.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read between 10.5V and 13.5V?

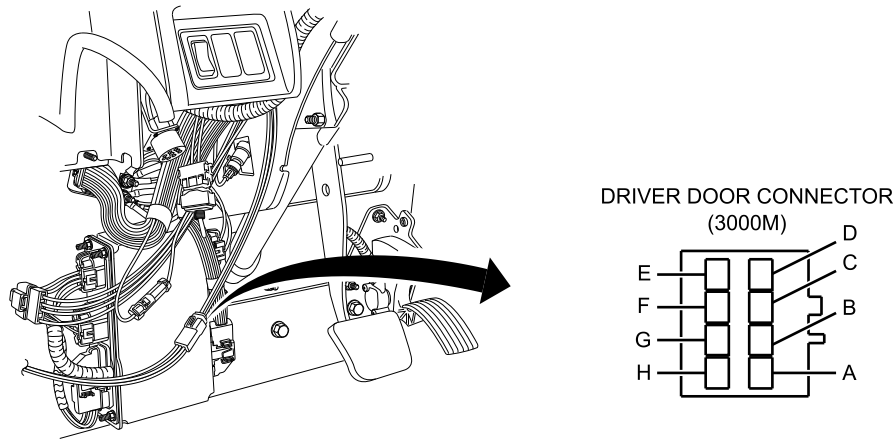
DECISION

YES Go to Step 122.

NO Go to next step.

STEP

89. Turn ignition switch OFF (TM 9-2355-106-10).
90. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
91. Disconnect connector 3000M. Refer to Figure 33.

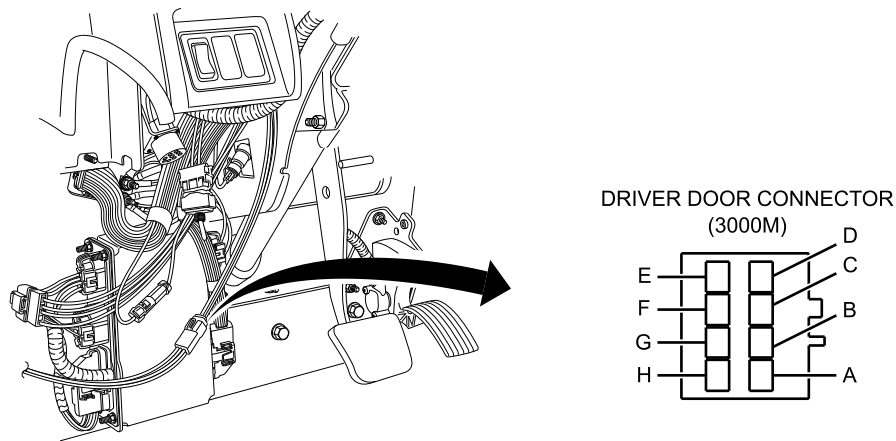


B230604751

Figure 33. Below Dash, Left of Steering Column.

92. Turn MAIN POWER switch ON (TM 9-2355-106-10).
93. Turn ignition switch ON (TM 9-2355-106-10).
94. Turn mirror heat switch ON (TM 9-2355-106-10).
95. Measure DC voltage between connector 3000M terminals D and H with multimeter. Refer to Figure 33.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604751

Figure 34. Below Dash, Left of Steering Column.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 124.

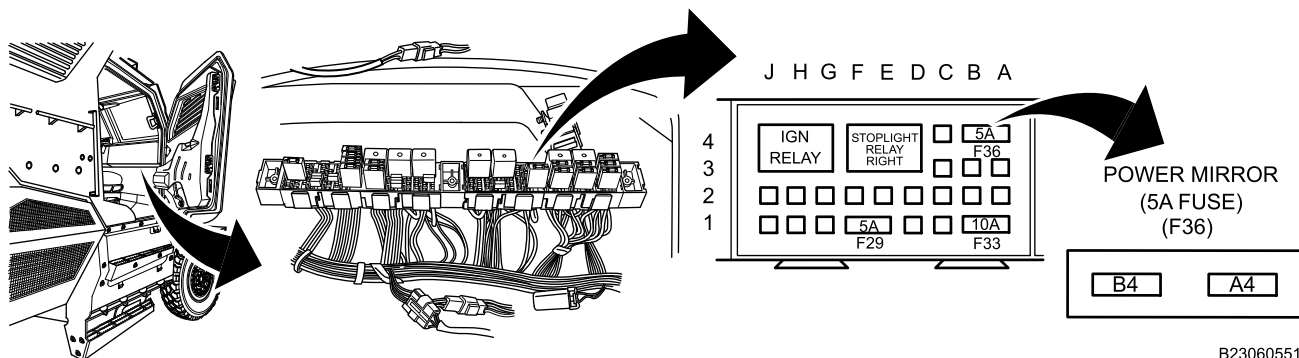
NO Go to Step 126.

STEP

96. Turn ignition switch OFF (TM 9-2355-106-10).

97. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

98. Remove and inspect fuse F13. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317). Refer to Figure 35.



B230605519

Figure 35. Fuse Block 1011.

CONDITION/INDICATION

Is fuse open?

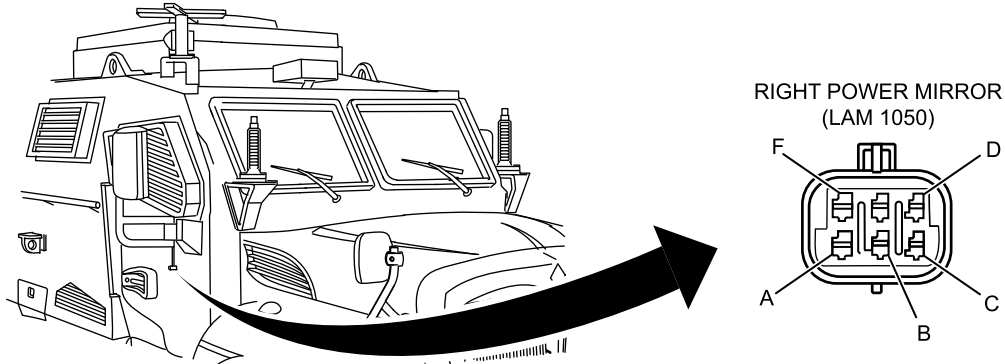
DECISION

YES Go to Step 116.

NO Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

99. Disconnect LAM1050. Refer to Figure 36.



B230604749

Figure 36. Right Power Mirror.

100. Install fuse F13. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).
101. Turn MAIN POWER switch ON (TM 9-2355-106-10).
102. Turn ignition switch ON (TM 9-2355-106-10).
103. Turn mirror heat switch ON (TM 9-2355-106-10).
104. Measure DC voltage between LAM1050 terminals D and F with multimeter. Refer to Figure 36.

CONDITION/INDICATION

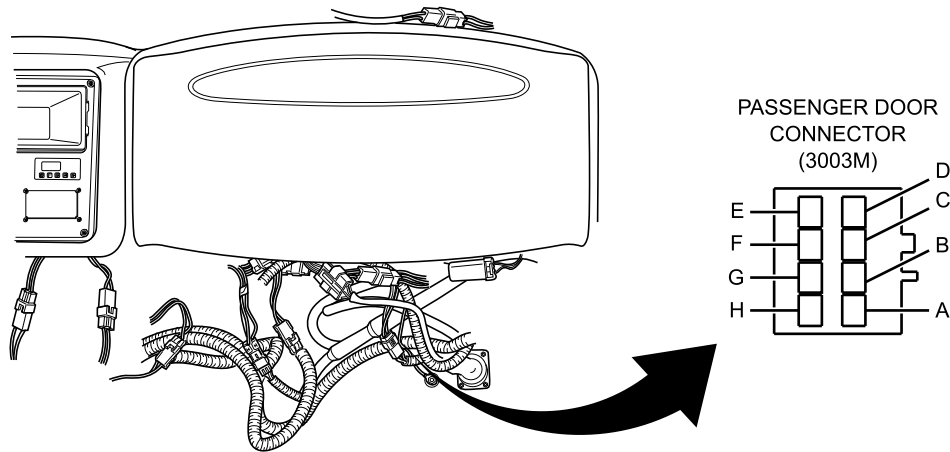
Does multimeter read between 10.5V and 13.5V?

DECISION

- YES Go to Step 123.
 NO Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

105. Turn ignition switch OFF (TM 9-2355-106-10).
106. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
107. Disconnect connector 3003M. Refer to Figure 37.



B230604700

Figure 37. Below IP Fuse Block.

108. Turn MAIN POWER switch ON (TM 9-2355-106-10).
109. Turn ignition switch ON (TM 9-2355-106-10).
110. Turn mirror heat switch ON (TM 9-2355-106-10).
111. Measure DC voltage between connector 3003M terminals D and H with multimeter. Refer to Figure 37.

CONDITION/INDICATION

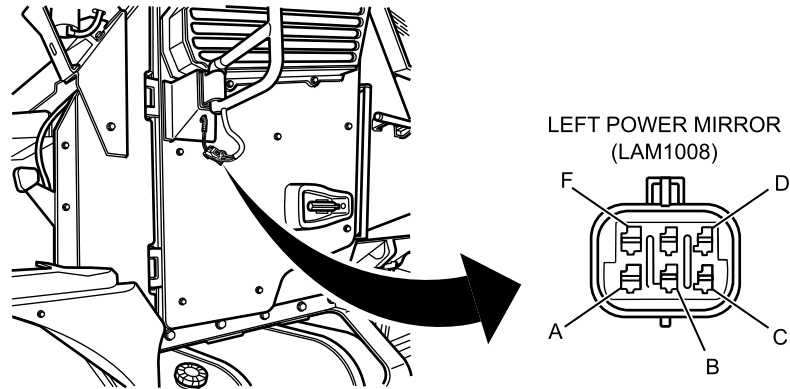
Does multimeter read between 10.5V and 13.5V?

DECISION

- YES Go to Step 125.
 NO Go to Step 126.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

112. Disconnect LAM1008. Refer to Figure 38.



B230604750

Figure 38. Left Power Mirror.

113. Measure resistance between LAM1008 terminal D and ground with multimeter. Refer to Figure 38.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

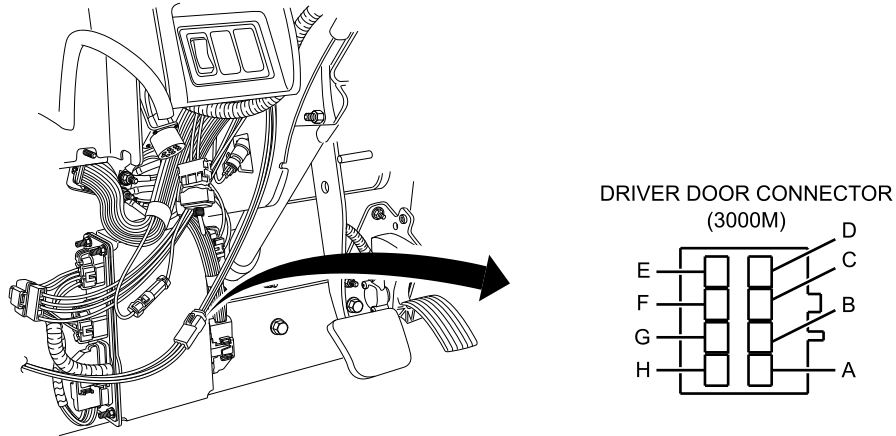
YES Go to Step 122.

NO Go to next step.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

114. Disconnect connector 3000M. Refer to Figure 39.



B230604751

Figure 39. Below Dash, Left of Steering Column.

115. Measure resistance between connector 3000M terminal D and ground with multimeter. Refer to Figure 39.

CONDITION/INDICATION

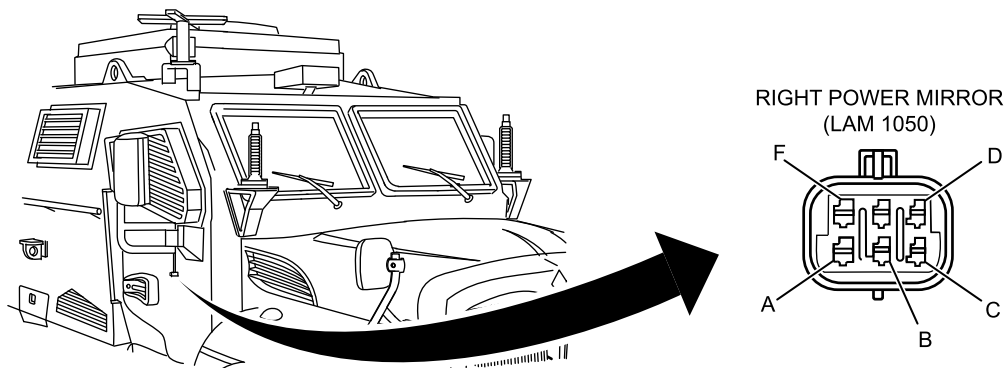
Does multimeter read OL?

DECISION

YES Go to Step 124.
NO Go to Step 126.

STEP

116. Disconnect LAM1050. Refer to Figure 40.



B230604749

Figure 40. Right Power Mirror.

117. Measure resistance between connector LAM1050 terminal D and ground with multimeter. Refer to Figure 40.

CONDITION/INDICATION

Does multimeter read OL?

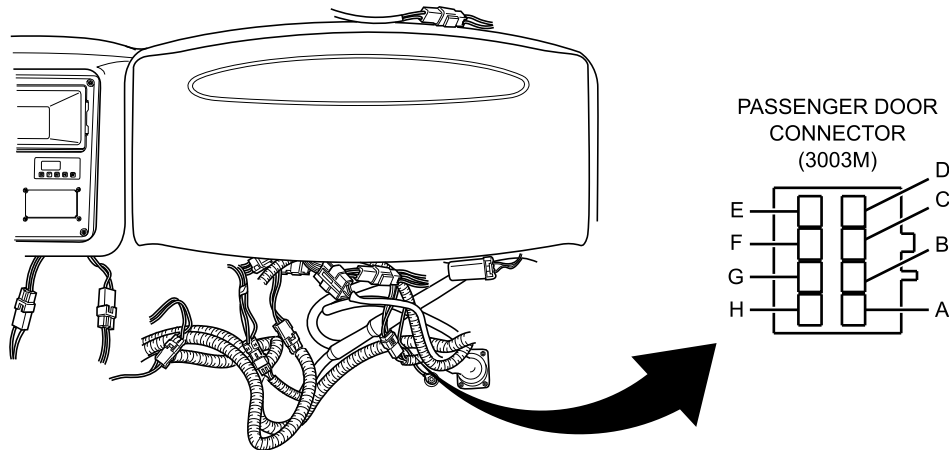
POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 123.

NO Go to next step.

STEP

118. Disconnect connector 3003M. Refer to Figure 41.



B230604700

Figure 41. Below IP Fuse Block.

119. Measure resistance between connector 3003M terminal D and ground with multimeter. Refer to Figure 41.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 125.

NO Go to Step 126.

STEP

120. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).

121. Verify Electronic System Controller (ESC) receives heater request from panel heater rocker switch with MSD.

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does ESC receive heater request from panel heater rocker switch?

DECISION

NO Go to Switch Pack Modules Troubleshooting Procedure (WP 0069).

YES Go to Step 126.

MALFUNCTION

- 122. Left door mirror is faulty.

ACTION

Replace left door mirror. Refer to Door Mounted Mirror Removal and Installation (WP 0682). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 123. Right door mirror is faulty.

ACTION

Replace right door mirror. Refer to Door Mounted Mirror Removal and Installation (WP 0682). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 124. Left door mirror harness is faulty.

ACTION

Replace right door mirror. Refer to Door Mounted Mirror Removal and Installation (WP 0314). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 125. Right door mirror harness is faulty.

ACTION

Replace right door mirror. Refer to Door Mounted Mirror Removal and Installation (WP 0314). Return vehicle to service.

END OF TEST

POWER/HEATED MIRROR TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 126. IP harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel Harness (IP) Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 127. Mirror remote control switch is faulty.

ACTION

Replace mirror remote control switch. Refer to Mirror Remote Control Switch Removal and Installation (WP 0306). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0127

WP 0128

WP 0129

WP 0130

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0131

WP 0132

Terminal Test Kit (WP 0795, Item 122)

WP 0429

WP 0431

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0125

WP 0126

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Lift cover and measure resistance between connector LAM1200 terminals M and N with multimeter. Refer to Figure 1.

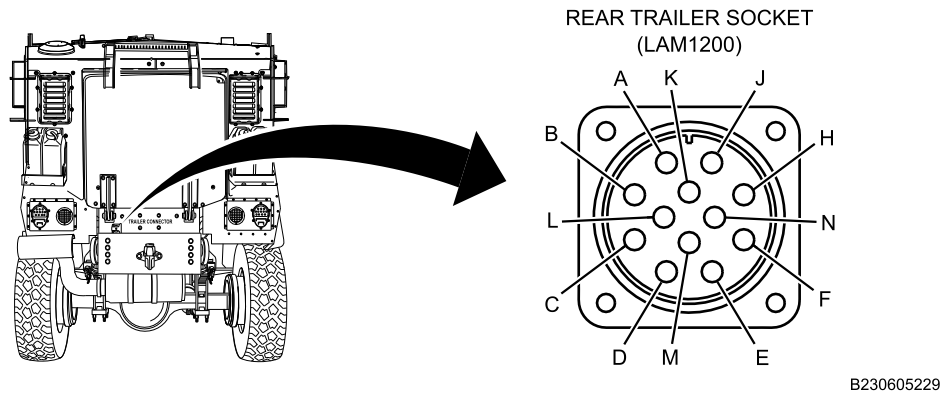


Figure 1. Lower Rear Body Panel.

CONDITION/INDICATION

Multimeter reads more than 5 ohms.

CORRECTIVE ACTION

Go to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

1. Measure resistance between connector LAM1200 terminals D and L with multimeter. Refer to Figure 1.

Multimeter reads more than 5 ohms.

Go to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

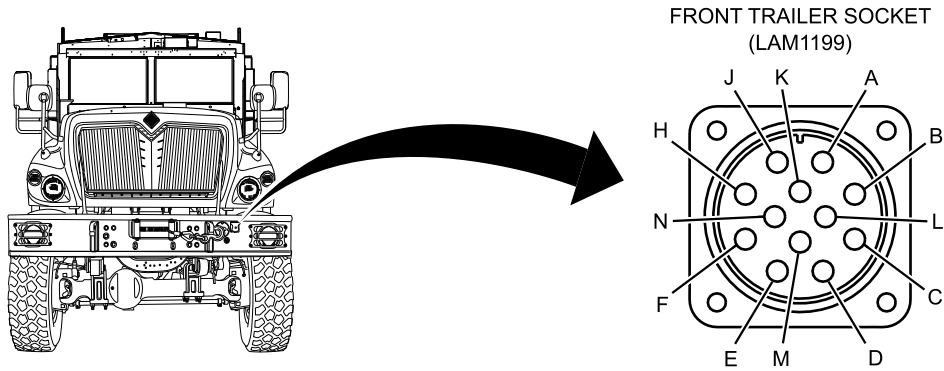
1. Measure resistance between connector LAM1200 terminal L and ground with multimeter. Refer to Figure 1.

Multimeter reads more than 5 ohms.

Go to Rear Trailer Connector Ground Circuit Troubleshooting Procedure (WP 0128). Return vehicle to service.

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Lift cover and measure resistance between connector LAM1199 terminals M and N with multimeter. Refer to Figure 2.



B230605228

Figure 2. Left Side Front Bumper.

Multimeter reads more than 5 ohms.

Go to Front Trailer Hookup Removal and Installation (WP 0429).

1. Measure resistance between front trailer connector LAM1199 terminals D and L with multimeter. Refer to Figure 2.

Multimeter reads more than 5 ohms.

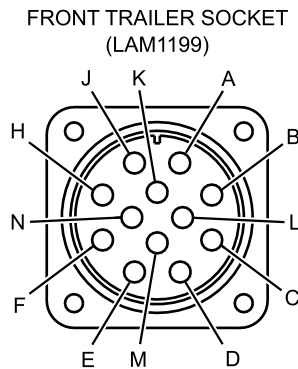
Go to Front Trailer Hookup Removal and Installation (WP 0429).

1. Measure resistance between connector LAM1199 terminal L and ground with multimeter. Refer to Figure 2.

Multimeter reads more than 5 ohms.

Go to Front Trailer Hookup Removal and Installation (WP 0429).

1. Measure resistance between connector LAM1199 terminals M and L with multimeter. Refer to Figure 3.



B230604548

Figure 3. Connector LAM1199.

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Multimeter does not read OL.

Go to Trailer Connector Brake Circuit Troubleshooting Procedure (WP 0132).

1. Connect jumper wire between connector LAM1200 terminals M and L. Refer to Figure 4.

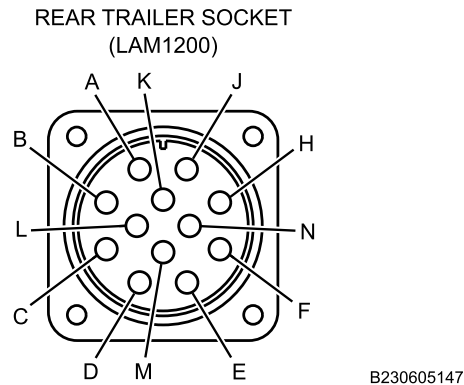


Figure 4. Connector LAM1200.

2. Measure resistance between connector LAM1199 terminals M and L with multimeter. Refer to Figure 5.

Multimeter reads more than 5 ohms.

Go to Trailer Connector Brake Circuit Troubleshooting Procedure (WP 0132).

1. Remove Jumper wire.
2. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 5.

Multimeter does not read OL.

Go to Trailer Connector Auxiliary Power Circuit Troubleshooting Procedure (WP 0131).

1. Connect jumper wire between connector LAM1200 terminals K and L. Refer to Figure 4.
2. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 5.

Multimeter reads more than 5 ohms.

Go to Trailer Connector Auxiliary Power Circuit Troubleshooting Procedure (WP 0131).

1. Remove jumper wire.
2. Measure resistance between connector LAM1200 terminals J and L with multimeter. Refer to Figure 4.

Multimeter reads more than 1 megaohm.

Go to Trailer Connector Right Service Signal Circuit Troubleshooting Procedure (WP 0127).

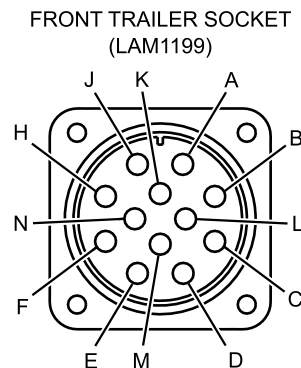
1. Connect jumper wire between connector LAM1200 terminals J and L. Refer to Figure 4.
2. Measure resistance between connector LAM1199 terminals J and L with multimeter. Refer to Figure 5.

Multimeter reads more than 5 ohms.

Go to Trailer Connector Right Service Signal Circuit Troubleshooting Procedure (WP 0127).

1. Remove jumper wire.
2. Measure resistance between connector LAM1199 terminals A and C and then between connector LAM1199 terminals A and H with multimeter. Refer to Figure 5.

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



B230604548

Figure 5. Connector LAM1199.

Multimeter reads more than 5 ohms for each test.

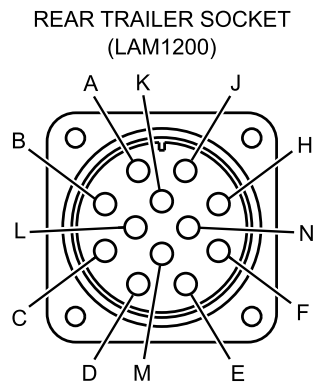
Go to Front Trailer Hookup Removal and Installation (WP 0429).

1. Measure resistance between connector LAM1199 terminals A and L with multimeter. Refer to Figure 5.

Multimeter reads more than 5 megaohms.

Go to Trailer Connector Left, Right, and Clearance Black Out (B/O) Circuit Troubleshooting Procedure (WP 0125).

1. Connect jumper wire between connector LAM1200 terminals terminals A and L. Refer to Figure 6.



B230605147

Figure 6. Connector LAM1200.

2. Measure resistance between connector LAM1199 terminals A and L with multimeter. Refer to Figure 5.

Multimeter reads more than 5 ohms.

Go to Trailer Connector Left, Right, and Clearance Black Out (B/O) Circuit Troubleshooting Procedure (WP 0125).

1. Remove jumper wire.
2. Measure resistance between connector LAM1199 terminals F and L with multimeter. Refer to Figure 5.

Multimeter does not read OL.

Go to Trailer Connector Stop Black Out (B/O) Circuit Troubleshooting Procedure (WP 0130).

1. Connect jumper wire between connector LAM1200 terminals F and L. Refer to Figure 6.
2. Measure resistance between connector LAM1199 terminals F and L with multimeter. Refer to Figure 5.

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Multimeter reads more than 5 ohms.

Go to Trailer Connector Stop Black Out (B/O) Circuit Troubleshooting Procedure (WP 0130).

1. Remove jumper wire.
2. Measure resistance between connector LAM1199 terminals E and L with multimeter. Refer to Figure 8.

Multimeter reads more than 1.5 megaohms.

Go to Trailer Connector Service Clearance Circuit Troubleshooting Procedure (WP 0129).

1. Connect jumper wire between connector LAM1200 terminals E and L. Refer to Figure 7.

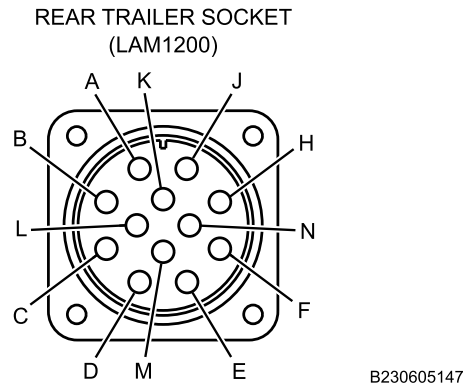


Figure 7. Connector LAM1200.

2. Measure resistance between connector LAM1199 terminals E and L with multimeter. Refer to Figure 8.

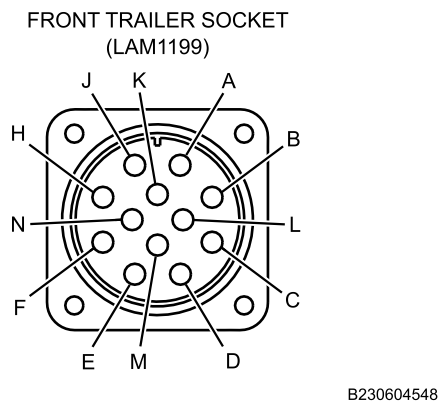


Figure 8. Connector LAM1199.

Multimeter reads more than 5 ohms.

Go to Trailer Connector Service Clearance Circuit Troubleshooting Procedure (WP 0129).

1. Remove jumper wire.
2. Measure resistance between connector LAM1199 terminals B and L with multimeter. Refer to Figure 8.

Multimeter does not read OL.

Go to Trailer Connector Left Service Signal Circuit Troubleshooting Procedure (WP 0126).

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Enable brake lights with Master Vehicle Light Switch (MVLS) switch (TM 9-2355-106-10).

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

4. Measure DC voltage between connector LAM1200 terminals M and L with multimeter. Refer to Figure 7.
5. With assistant, press brake pedal while reading multimeter.

Multimeter does not read between 21.0V and 27.0V.

Go to Trailer Connector Brake Circuit Troubleshooting Procedure (WP 0132).

1. Measure DC voltage between connector LAM1200 terminals K and L with multimeter. Refer to Figure 7.

Multimeter does not read between 10.5V and 13.5V.

Go to Trailer Connector Auxiliary Power Circuit Troubleshooting Procedure (WP 0131).

1. Turn right turn signal ON (TM 9-2355-106-10).
2. Measure DC voltage between connector LAM1200 terminals J and L with multimeter. Refer to Figure 7.

Multimeter does not read between 21.0V and 27.0V while turn signal flashes.

Go to Trailer Connector Right Service Signal Circuit Troubleshooting Procedure (WP 0127).

1. Turn blackout marker lights ON (TM 9-2355-106-10).
2. Measure DC voltage between connector LAM1200 terminals H and L with multimeter. Refer to Figure 7.

Multimeter does not read between 21.0V and 27.0V.

Go to Trailer Connector Left, Right, and Clearance Black Out (B/O) Circuit Troubleshooting Procedure (WP 0125).

1. Turn blackout stoplights ON (TM 9-2355-106-10).
2. Measure DC voltage between connector LAM1200 terminals F and L with multimeter. Refer to Figure 9.

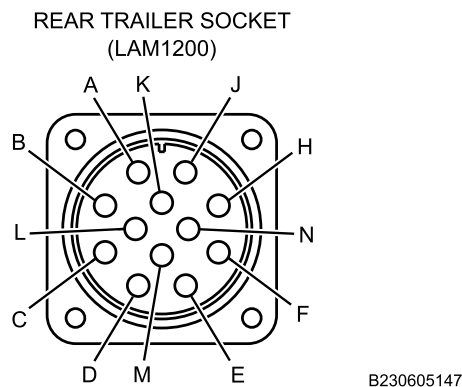


Figure 9. Connector LAM1200.

Multimeter does not read between 21.0V and 27.0V.

Go to Trailer Connector Stop Black Out (B/O) Circuit Troubleshooting Procedure (WP 0130).

1. Turn service lights ON (TM 9-2355-106-10).

TRAILER CONNECTOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

2. Measure DC voltage between LAM1200 terminals E and L with multimeter. Refer to Figure 10.

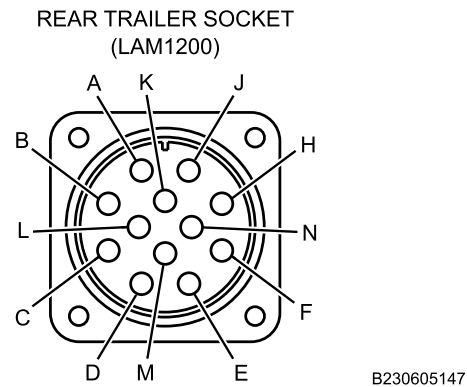


Figure 10. Connector LAM1200.

Multimeter does not read between 21.0V and 27.0V.

Go to Trailer Connector Service Clearance Circuit Troubleshooting Procedure (WP 0129).

1. Turn left turn signal ON (TM 9-2355-106-10).
2. Measure DC voltage between connector LAM1200 terminals B and L with multimeter. Refer to Figure 10.

Multimeter does not read between 21.0V and 27.0V while turn signal flashes.

Go to Trailer Connector Left Service Signal Troubleshooting Procedure (WP 0126).

END OF WORK PACKAGE

FIELD MAINTENANCE
**TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0257
WP 0333
WP 0335
WP 0336
WP 0429
WP 0431
WP 0426
WP 0517
WP 0597

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 64
WP 0789, Figure 65
WP 0789, Figure 59
WP 0789, Figure 55
WP 0789, Figure 60

TROUBLESHOOTING PROCEDURE
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.

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

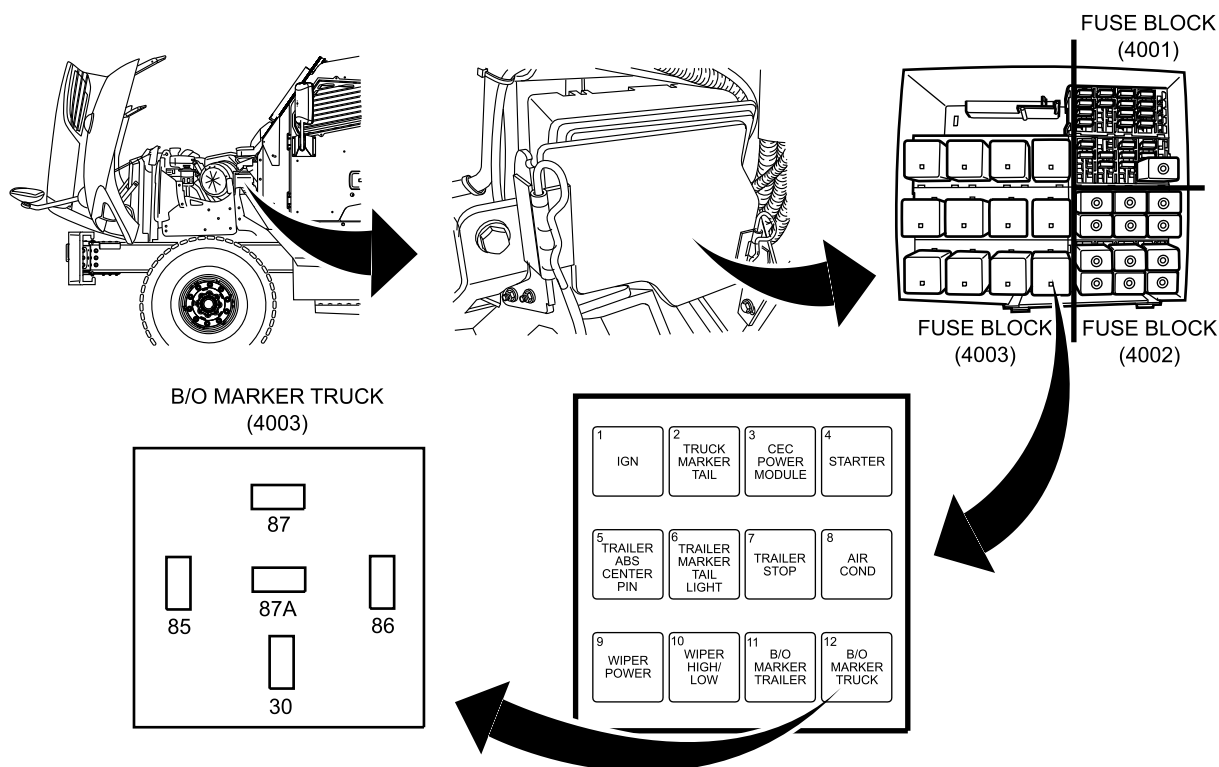
TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove B/O MARKER TRUCK relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 1.

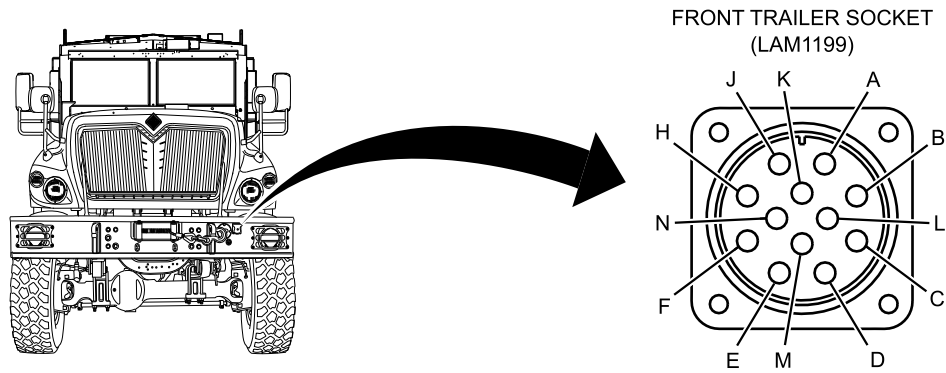


B230605359

Figure 1. Underhood Power Distribution Center (PDC).

2. Measure resistance between connector LAM1199 socket terminals A and L with multimeter. Refer to Figure 2.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605228

Figure 2. Left Side Front Bumper.

CONDITION/INDICATION

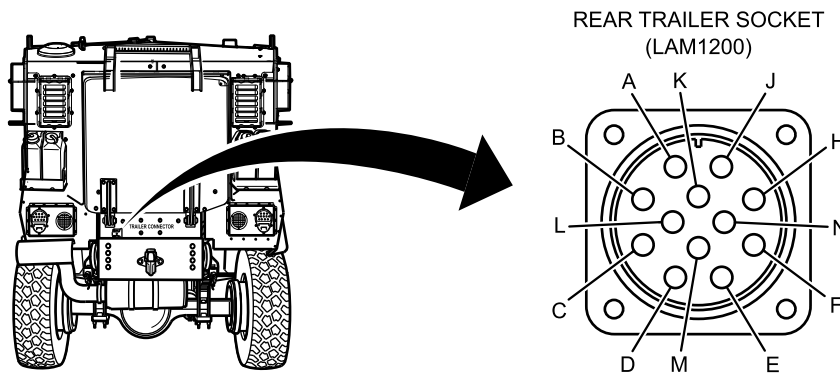
Does multimeter read OL?

DECISION

NO Go to Step 5.
YES Go to next step.

STEP

3. Connect jumper wire between connector LAM1200 socket terminals A and L. Refer to Figure 3.



B230605229

Figure 3. Lower Rear Body Panel.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

4. Measure resistance between connector LAM1199 terminals A and L with multimeter. Refer to Figure 4.

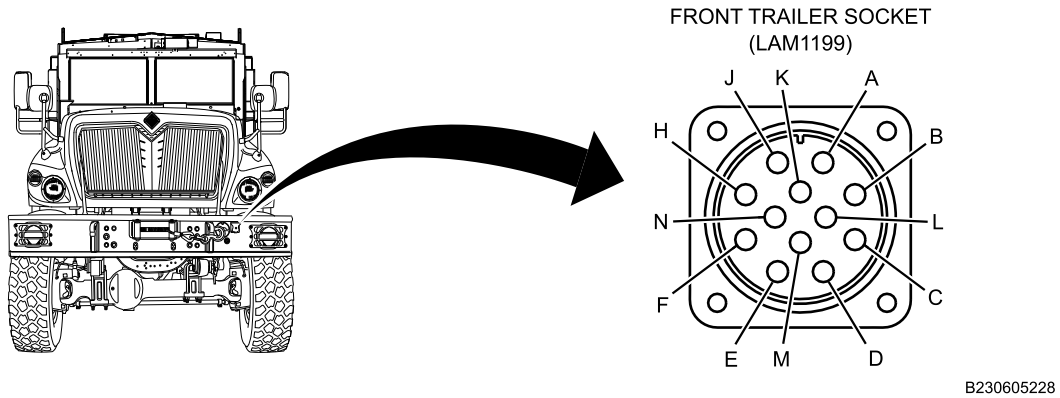


Figure 4. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read OL?

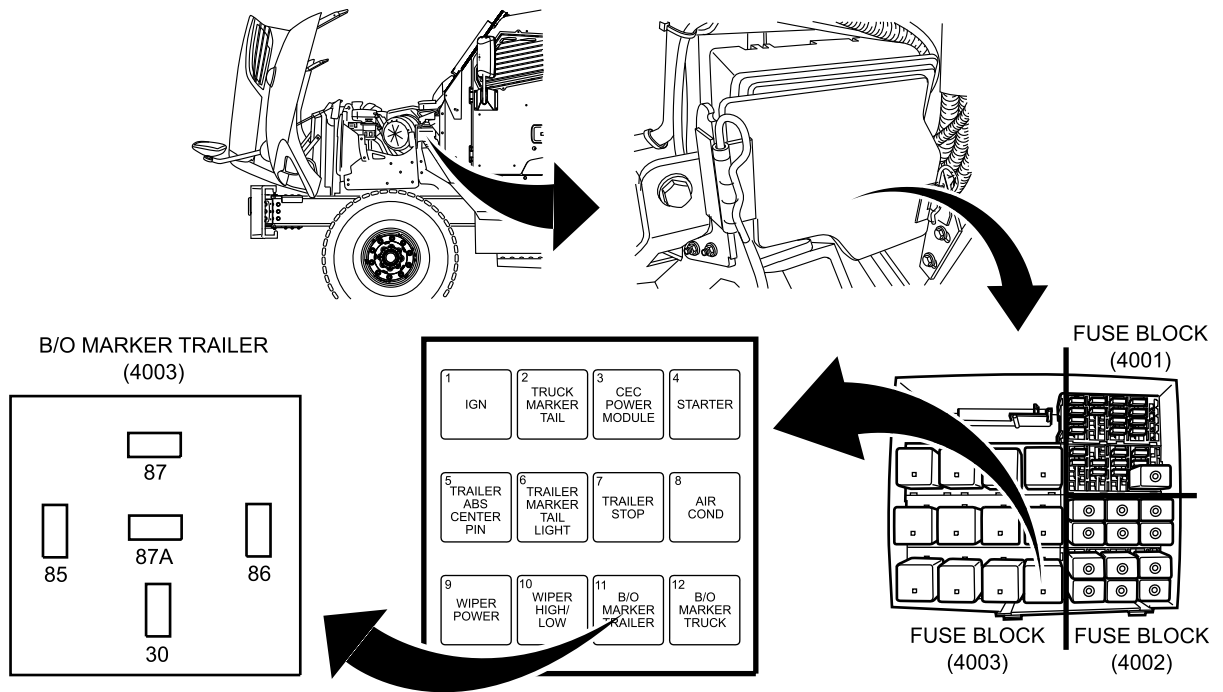
DECISION

NO Go to Step 15.
YES Go to Step 28.

STEP

5. Remove B/O MARKER TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 5.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605358

Figure 5. Engine Compartment Power Distribution Center (PDC).

6. Connect jumper wire between relay socket terminals 87A and 30. Refer to Figure 5.
7. Measure resistance between connector LAM1199 socket terminals A and L with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

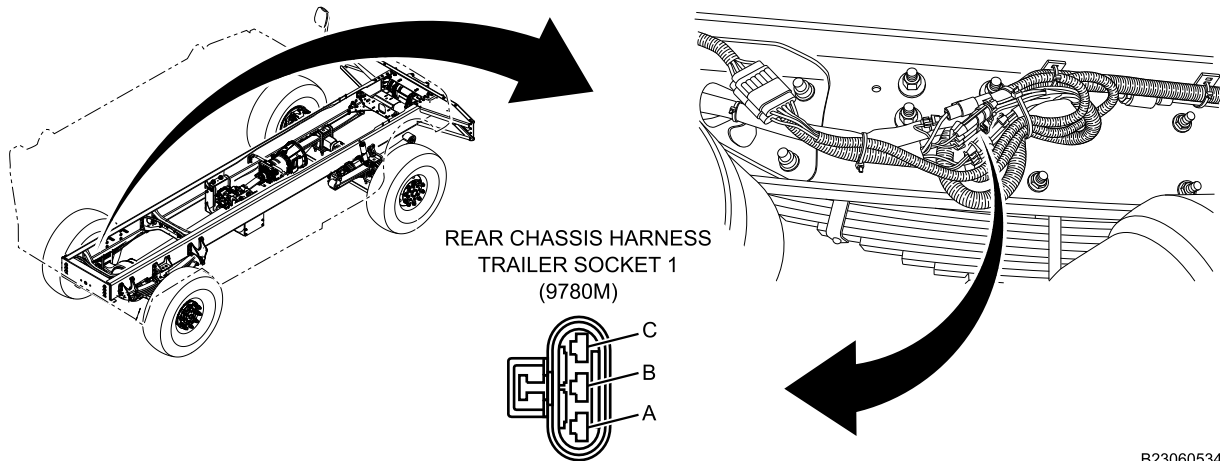
DECISION

- YES Go to Step 51.
- NO Go to next step.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

8. Disconnect connector 9780M (a three-wire connector containing RED, BROWN, and DARK BLUE wires). Refer to Figure 6.



B230605341

Figure 6. Left Rear Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

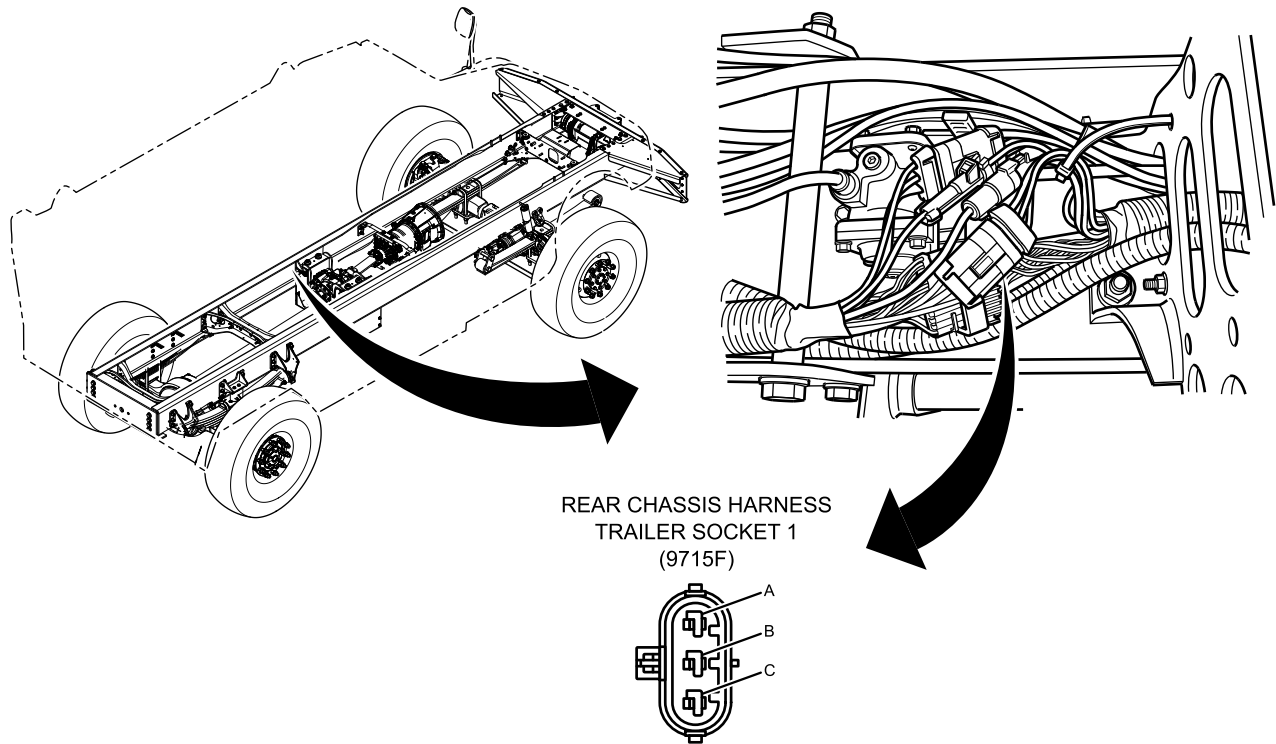
DECISION

YES Go to Step 50.
NO Go to next step.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

9. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
10. Disconnect connector 9715F. Refer to Figure 7.



B230605336

Figure 7. Left Side Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 46.
 NO Go to next step.

STEP

11. Remove left side engine armor plate. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
12. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
13. Disconnect connector 9715M (a three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 8.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

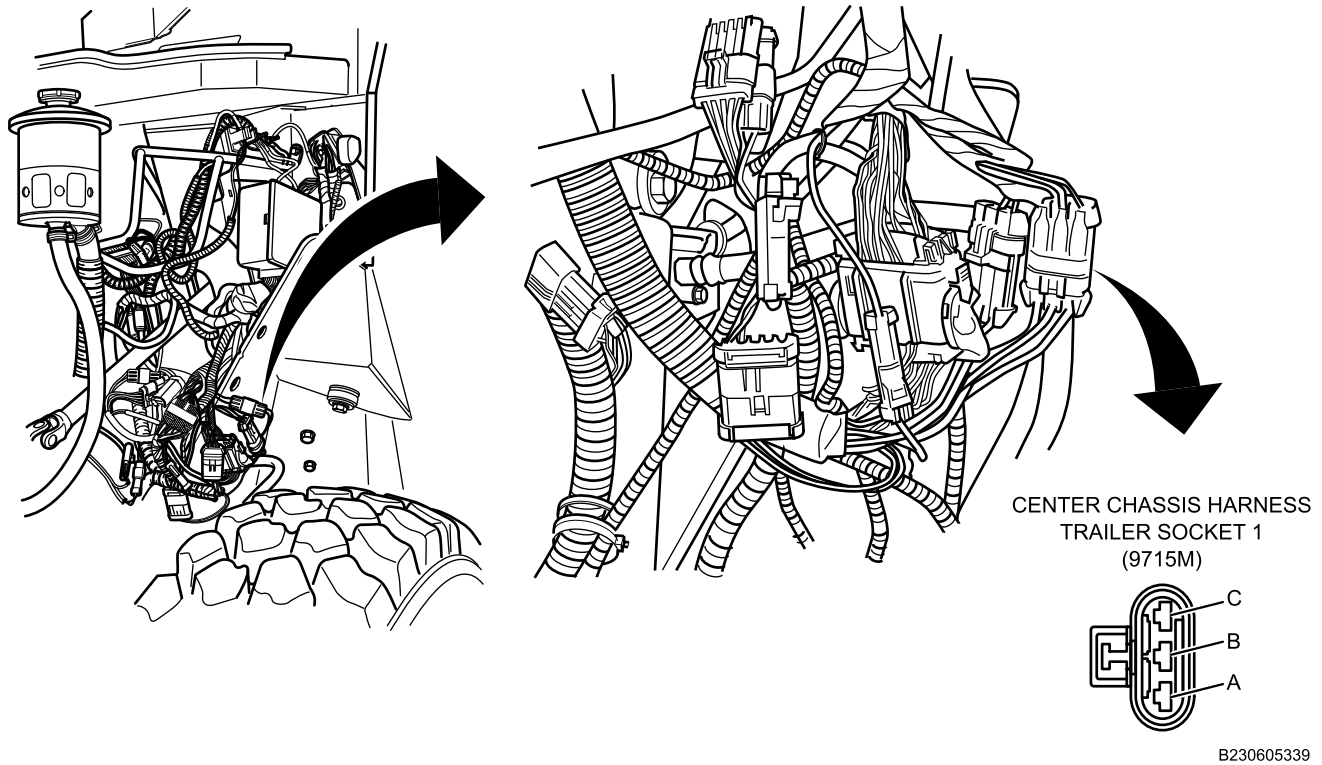


Figure 8. Engine Compartment Under Air Cleaner Housing.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 45.
 NO Go to next step.

STEP

14. Remove jumper wire from relay socket.

CONDITION/INDICATION

Does multimeter read OL?

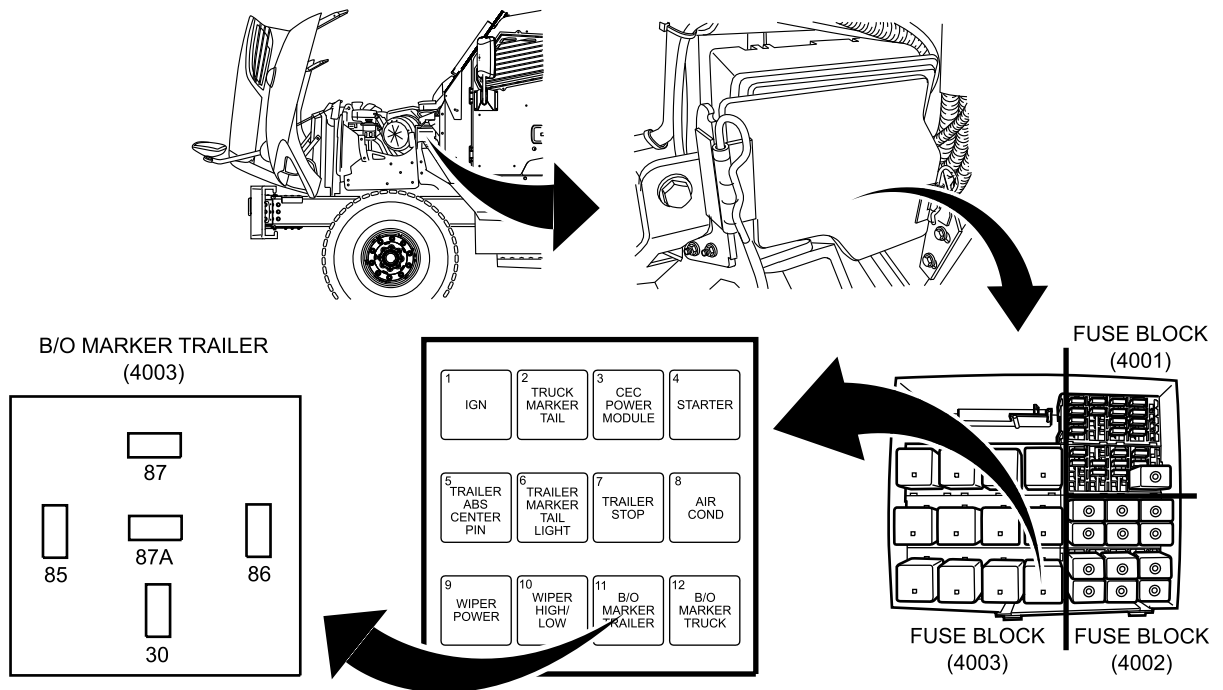
DECISION

YES Go to Step 47.
 NO Go to Step 49.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

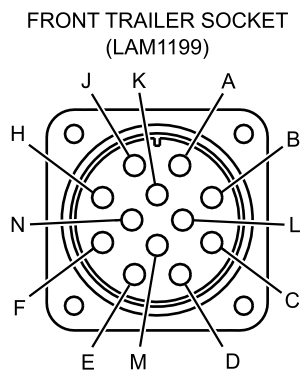
15. Remove B/O MARKER TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 9.



B230605358

Figure 9. Engine Compartment Power Distribution Center (PDC).

16. Connect jumper wire between relay socket terminals 87A and 30. Refer to Figure 9.



B230604548

Figure 10. Connector LAM1199.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

17. Measure resistance between connector LAM1199 terminals A and L with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 51.

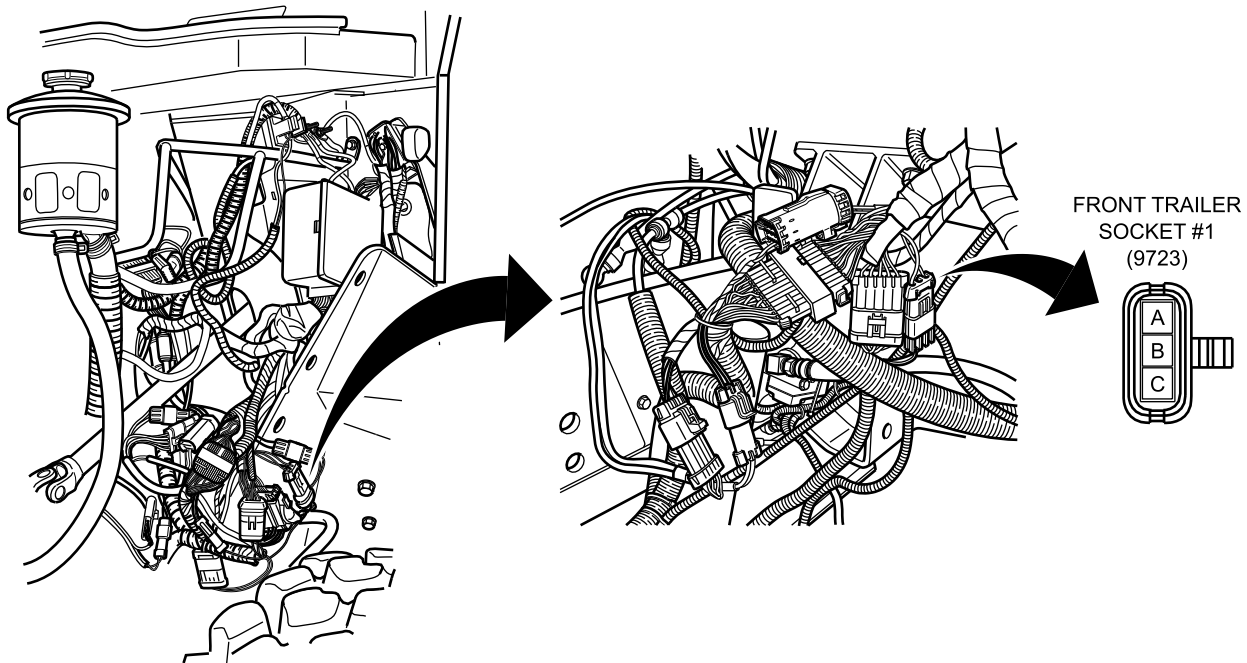
NO Go to next step.

STEP

18. Remove left side engine armor plate. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).

19. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).

20. Disconnect connector 9723 (three-cavity, two-wire connector containing GREEN and GRAY wires). Refer to Figure 11.



B230605305

Figure 11. Engine Compartment Under Air Cleaner Housing.

21. Measure resistance between connector 9723 terminal A and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

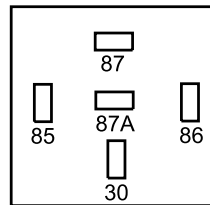
YES Go to Step 49.

NO Go to next step.

**TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

22. Remove jumper wire from relay socket.

B/O MARKER TRAILER
(4003)



B230611751

Figure 12. Relay Socket.

23. Measure resistance between relay socket terminal 30 and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 47.

NO Go to next step.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

24. Disconnect connector 9715M (a three-cavity, three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 13.

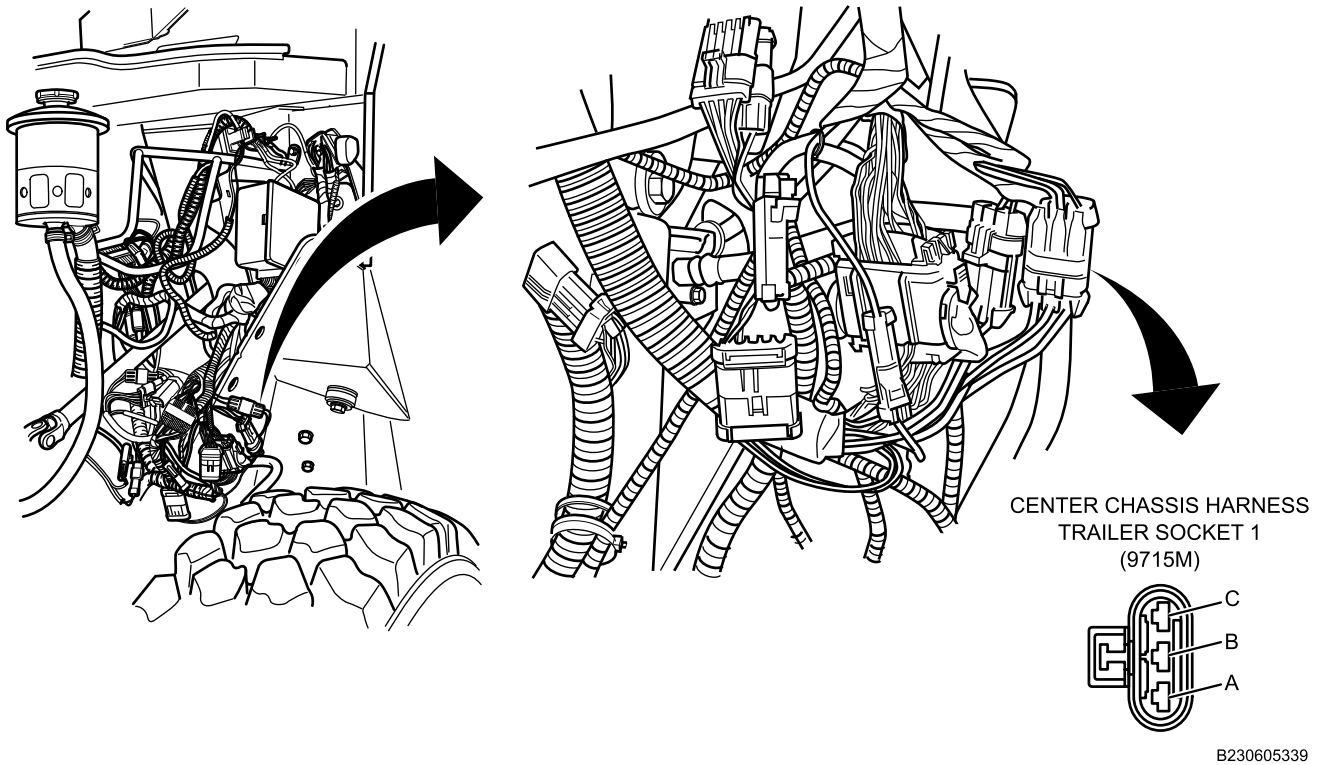


Figure 13. Engine Compartment Under Air Cleaner Housing.

25. Measure resistance between connector 9715M (rear socket side) terminal C and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 47.
NO Go to next step.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Disconnect connector 9780M (a three-cavity, three-wire connector containing RED, BROWN, and DARK BLUE wires). Refer to Figure 14.

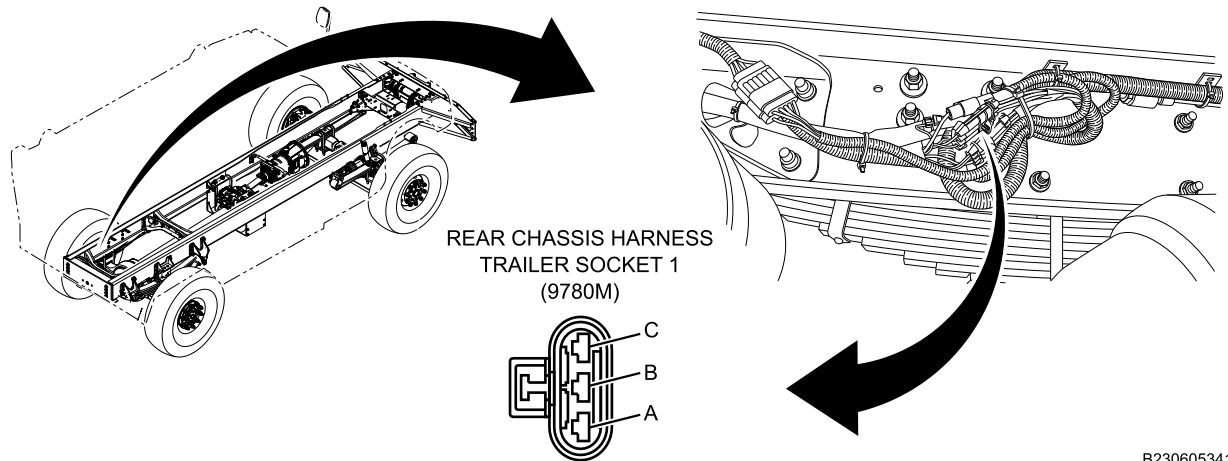


Figure 14. Left Rear Frame Rail.

27. Measure resistance between connector 9780M (rear socket side) terminal C and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

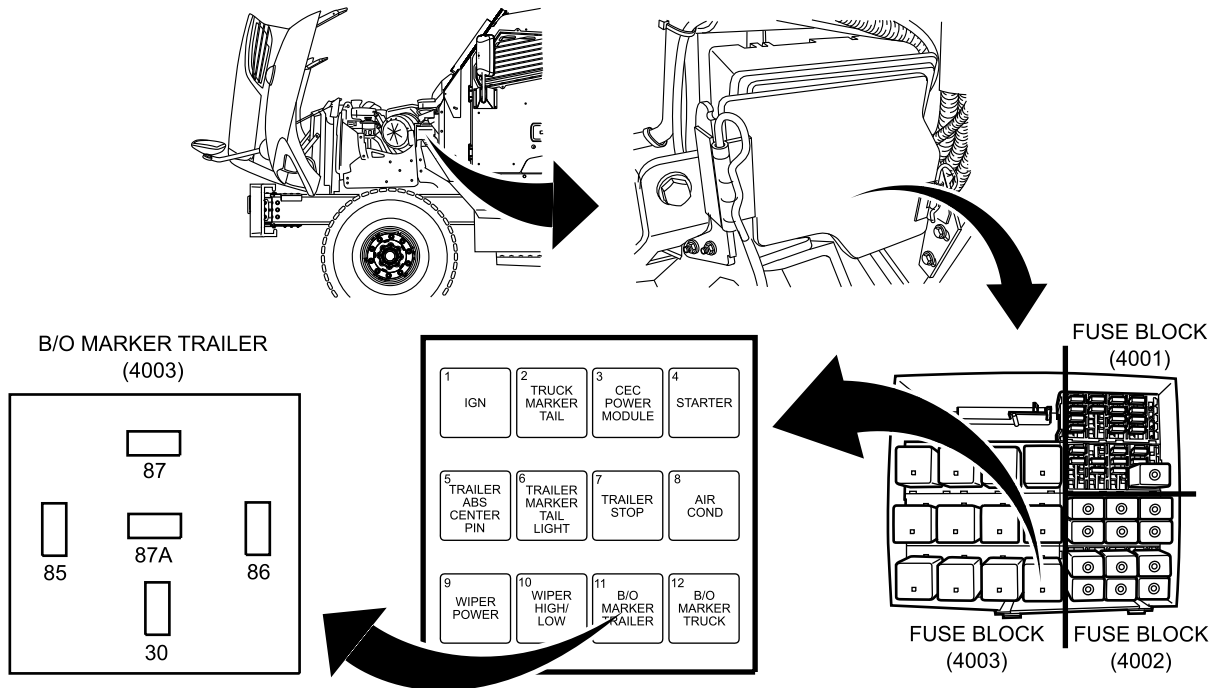
DECISION

YES Go to Step 46.
NO Go to Step 50.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Remove B/O MARKER TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 15.



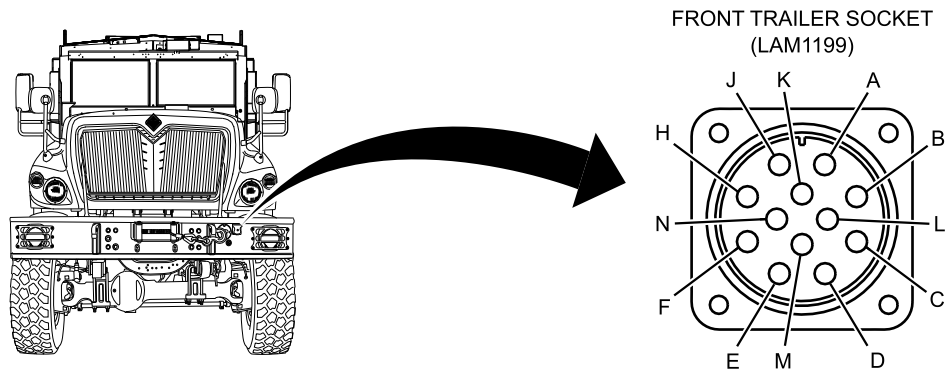
B230605358

Figure 15. Engine Compartment Power Distribution Center (PDC).

- 29. Connect jumper wire between relay socket terminals 87 and 30. Refer to Figure 15.
- 30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 31. Turn B/O marker lights ON (TM 9-2355-106-10).

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

32. Measure DC voltage between connector LAM1199 terminals H and L with multimeter. Refer to Figure 16.



B230605228

Figure 16. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

DECISION

NO Go to Step 50.
YES Go to next step.

STEP

33. Turn ignition switch OFF (TM 9-2355-106-10).
34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
35. Remove jumper wire.
36. Measure resistance between relay socket terminal 85 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

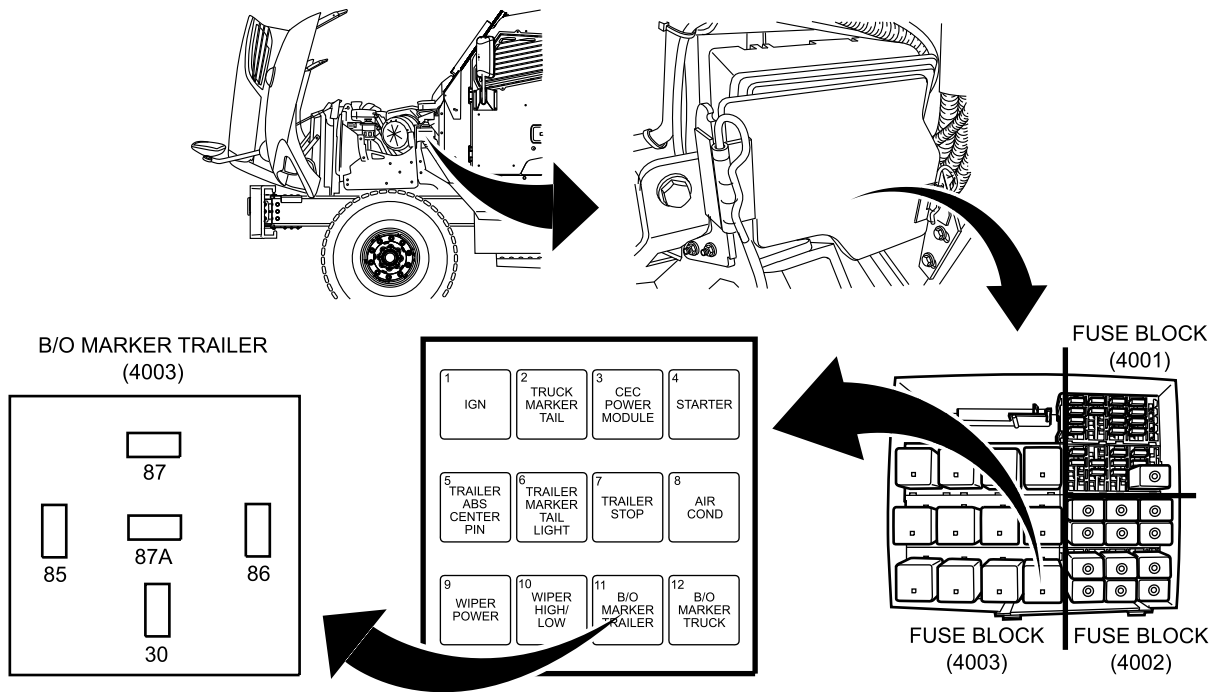
DECISION

NO Go to Step 40.
YES Go to next step.

STEP

37. Turn MAIN POWER switch ON (TM 9-2355-106-10).

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605358

Figure 17. Engine Compartment Power Distribution Center (PDC).

38. Turn ignition switch ON (TM 9-2355-106-10).
39. Measure DC voltage between relay socket terminal 86 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

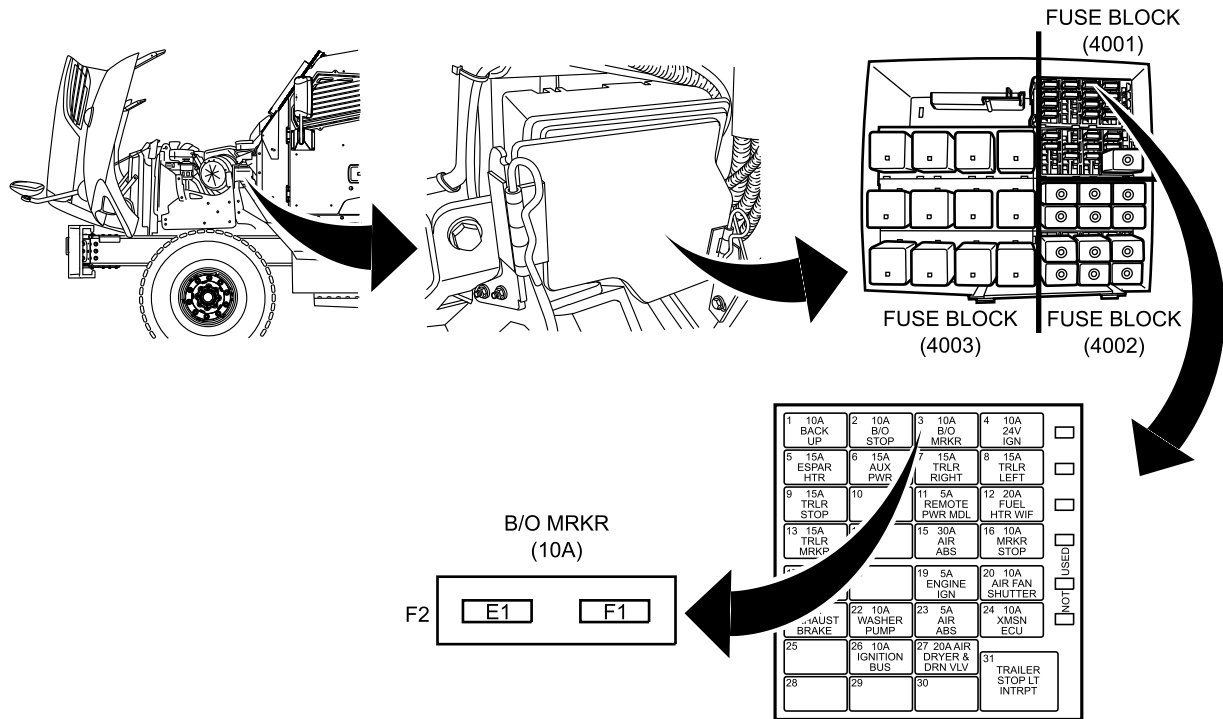
DECISION

- NO Go to Step 47.
- YES Go to Step 51.

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

40. Inspect B/O MRKR 10 amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 18.



B230605377

Figure 18. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 44.
NO Go to next step.

STEP

- 41. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 42. Turn ignition switch ON (TM 9-2355-106-10).
- 43. Measure DC voltage between each fuse socket terminal and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V for either test?

TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

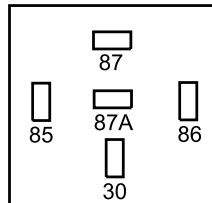
YES Go to Step 47.

NO Go to Step 48.

STEP

44. Measure resistance between relay socket terminal 87 and ground with multimeter. Refer to Figure 19.

B/O MARKER TRAILER
(4003)



B230611751

Figure 19. Relay Socket.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 47.

NO Go to Step 51.

MALFUNCTION

- 45. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426).
Return vehicle to service.

END OF TEST

MALFUNCTION

- 46. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST

MALFUNCTION

- 47. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335).
Return vehicle to service.

**TRAILER CONNECTOR LEFT, RIGHT, AND CLEARANCE BLACKOUT (B/O) CIRCUIT TROUBLESHOOTING
PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 48. Power distribution is faulty.

ACTION

Refer to Power Distribution Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 49. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 51. Relay is faulty.

ACTION

Replace relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0517
WP 0597
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0257
WP 0333
WP 0335
WP 0336
WP 0429
WP 0431
WP 0424

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

(WP 0789, Figure 59)

TROUBLESHOOTING PROCEDURE

STEP

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.

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.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

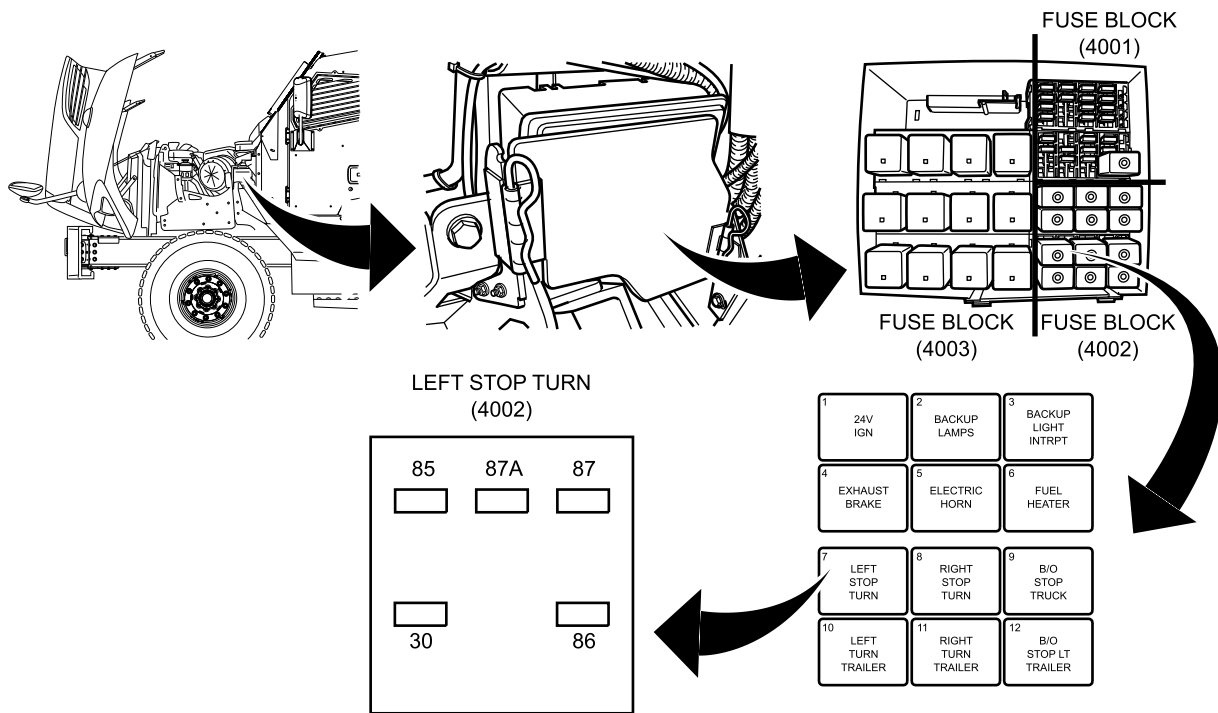
CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Remove LEFT STOP TURN relay. Refer to Figure 1. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605313

Figure 1. Engine Compartment Power Distribution Center (PDC).

2. Measure resistance between connector LAM1199 terminal B and ground with multimeter. Refer to Figure 2.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

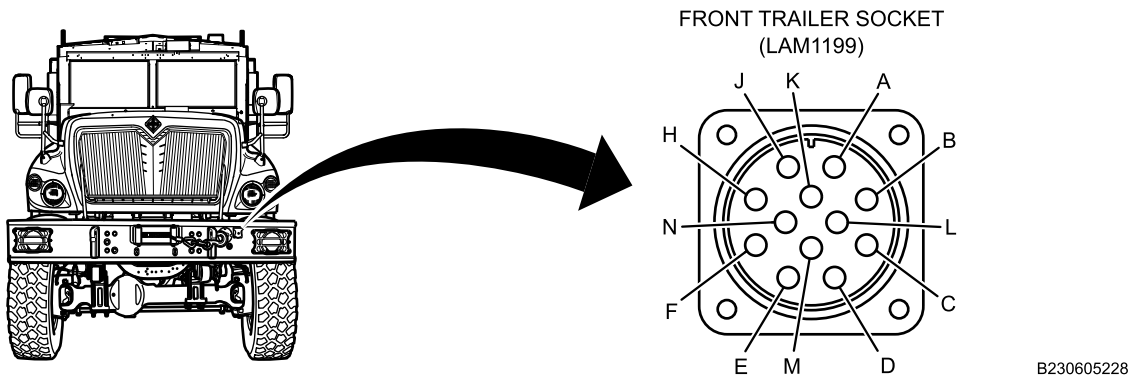


Figure 2. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 5.
YES Go to next step.

STEP

3. Connect jumper wire between connector LAM1200 socket terminal B and ground. Refer to Figure 3.

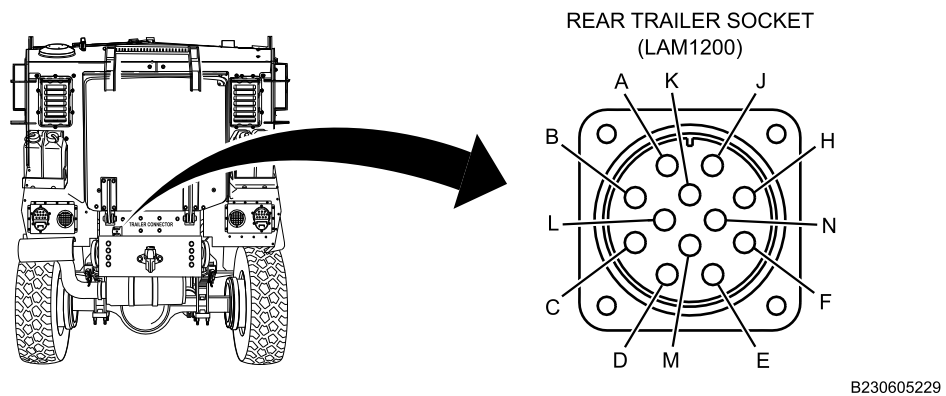


Figure 3. Lower Rear Body Panel.

4. Measure resistance between connector LAM1199 terminal B and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

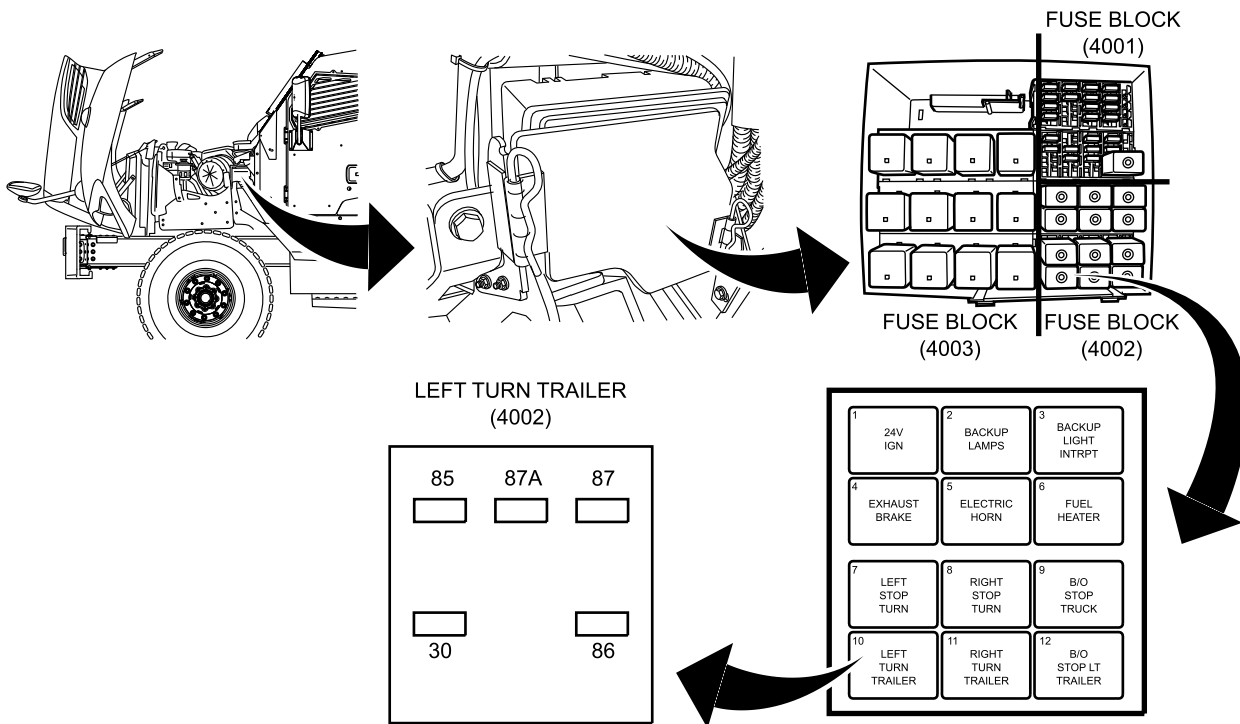
NO Go to Step 19.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

YES Go to Step 33.

STEP

5. Remove LEFT TURN TRAILER relay. Refer to Figure 4. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).

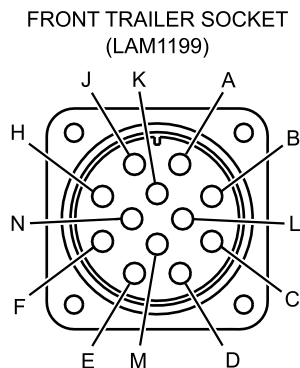


B230605316

Figure 4. Engine Compartment Power Distribution Center (PDC).

6. Connect a jumper wire between LEFT TURN TRAILER relay socket terminals 87A and 30. Refer to Figure 4.
7. Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 5.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604548

Figure 5. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read OL?

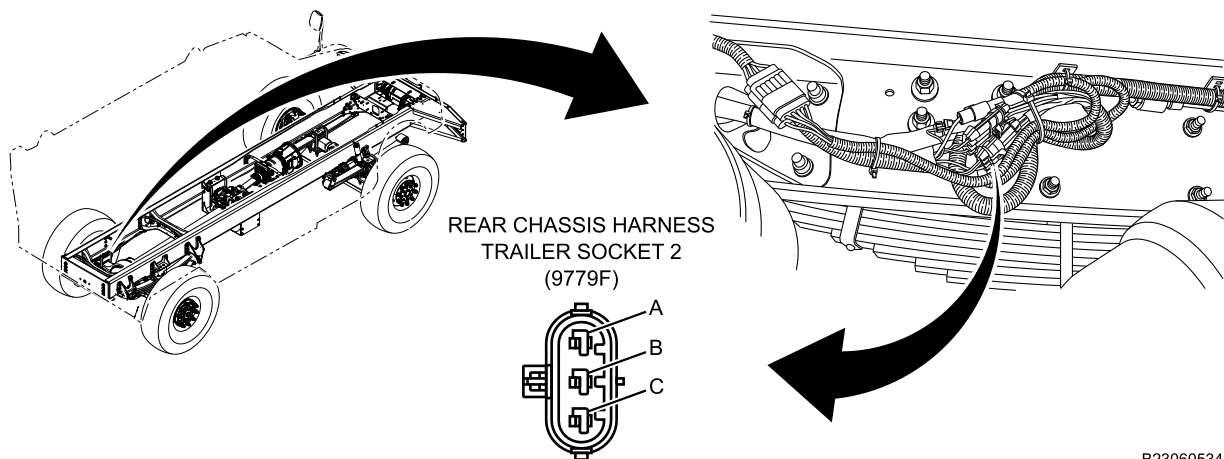
DECISION

YES Go to Step 53.

NO Go to next step.

STEP

- Disconnect connector 9779F (connector with YELLOW wire in cavity B). Refer to Figure 6.



B230605340

Figure 6. Left Rear Frame Rail.

- Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 5.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

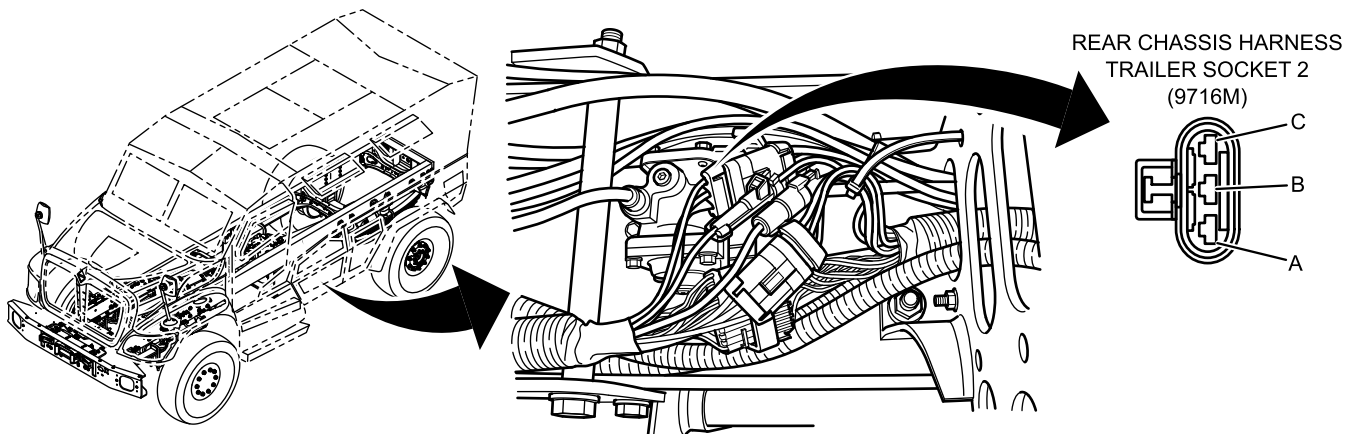
Does multimeter read OL?

DECISION

YES Go to Step 52.
NO Go to next step.

STEP

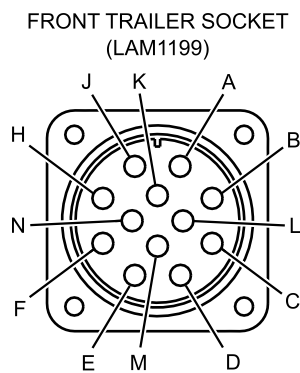
10. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
11. Disconnect connector 9716M (connector with YELLOW wire in cavity B). Refer to Figure 7.



B230605338

Figure 7. Left Side Frame Rail.

12. Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 8.



B230604548

Figure 8. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read OL?

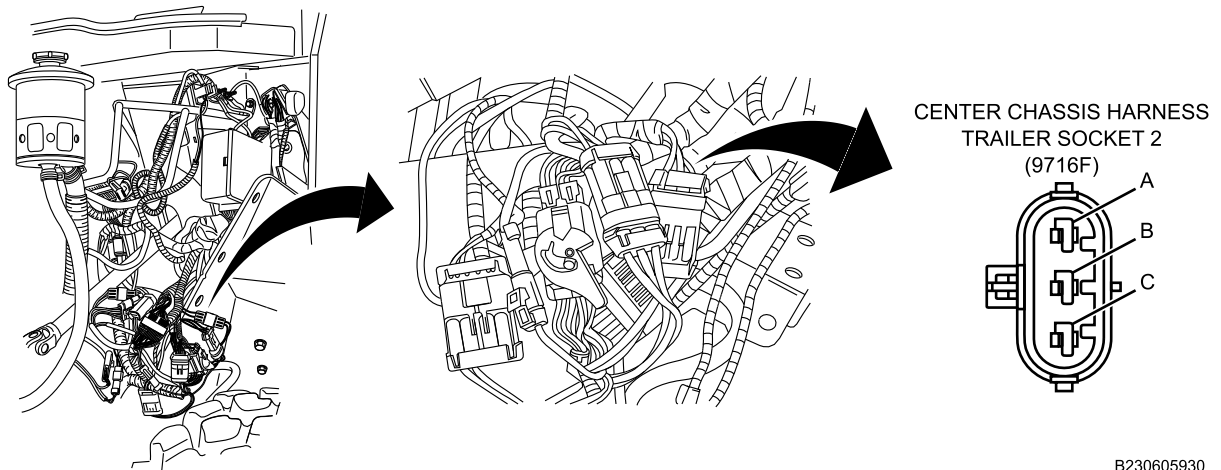
TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to Step 48.
NO Go to next step.

STEP

13. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
14. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
15. Disconnect connector 9716F (connector with YELLOW wire in cavity B). Refer to Figure 9.



B230605930

Figure 9. Engine Compartment Under Air Cleaner Assembly.

16. Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 47.
NO Go to next step.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

17. Disconnect connector 9724 (connector with 5 wires). Refer to Figure 10.

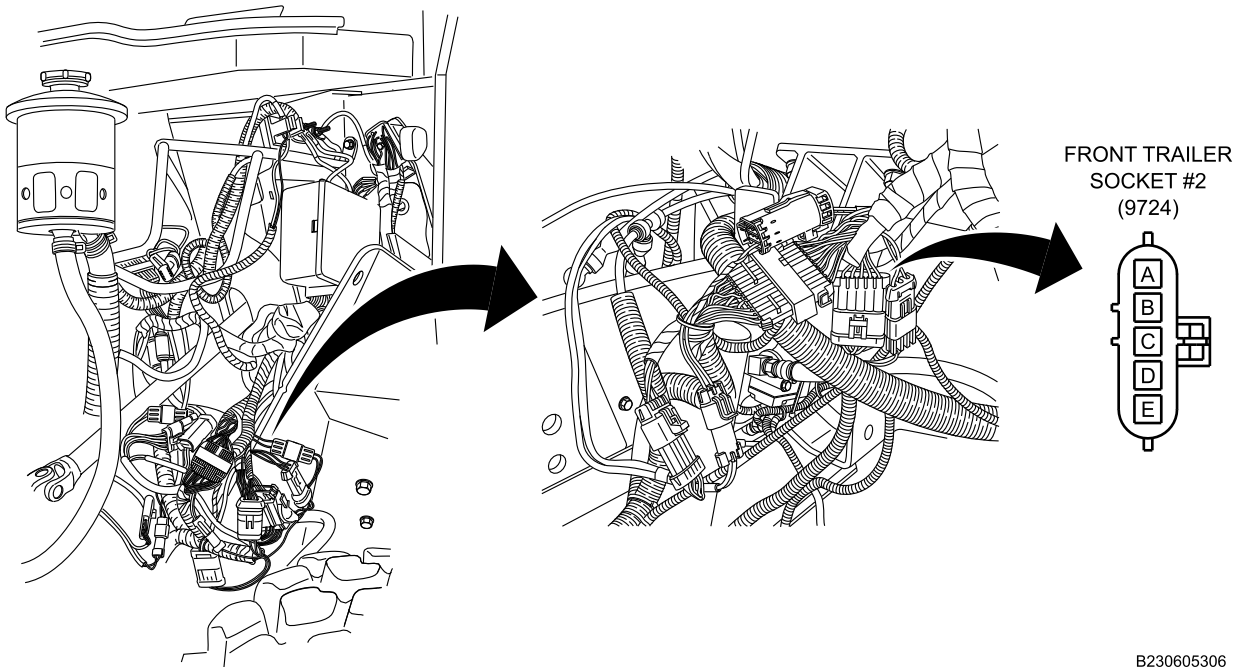
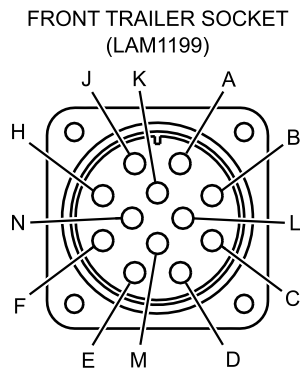


Figure 10. Engine Compartment Under Air Cleaner Housing.

18. Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 11.



B230604548

Figure 11. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read OL?

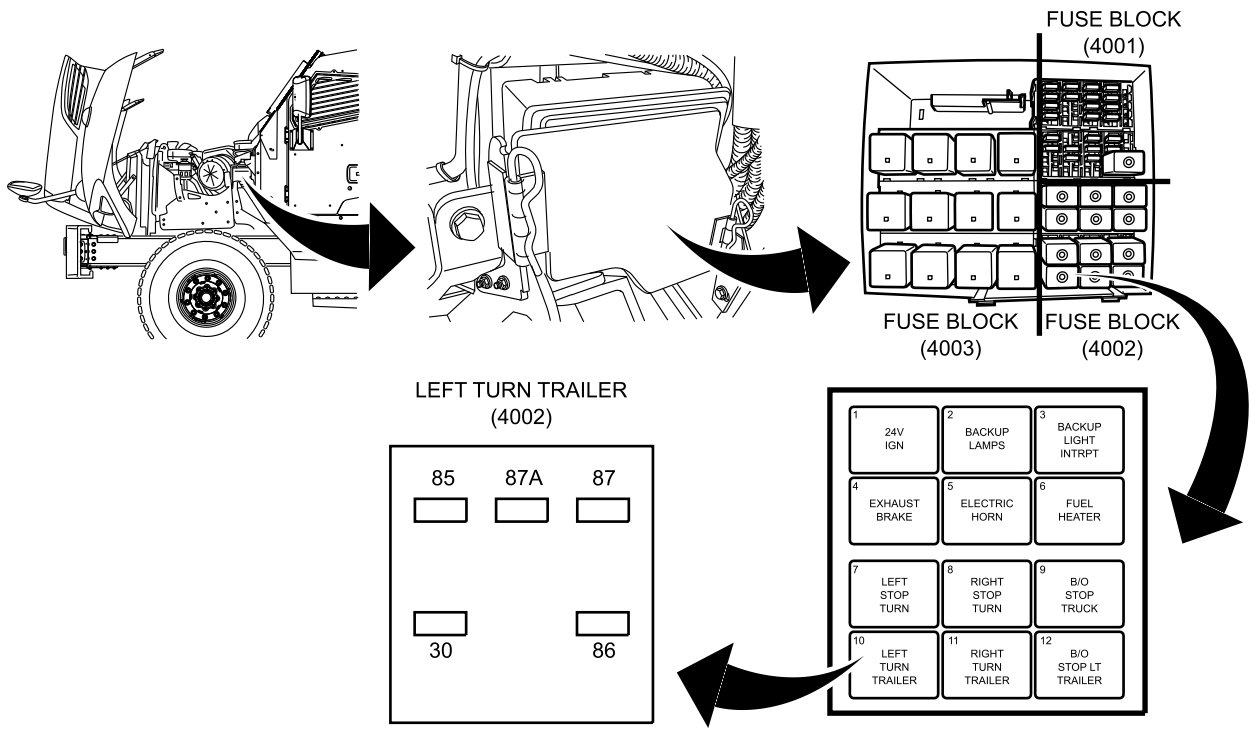
TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to Step 49.
- NO Go to Step 51.

STEP

- 19. Remove LEFT TURN TRAILER relay. Refer to Figure 12. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605316

Figure 12. Engine Compartment PDC.

- 20. Connect a jumper wire between LEFT TURN TRAILER relay socket terminals 87A and 30. Refer to Figure 12.
- 21. Measure resistance between connector LAM1199 socket terminal B and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

- YES Go to Step 53.
- NO Go to next step.

**TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

22. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
23. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
24. Disconnect connector 9724 (connector with 5 wires). Refer to Figure 13.

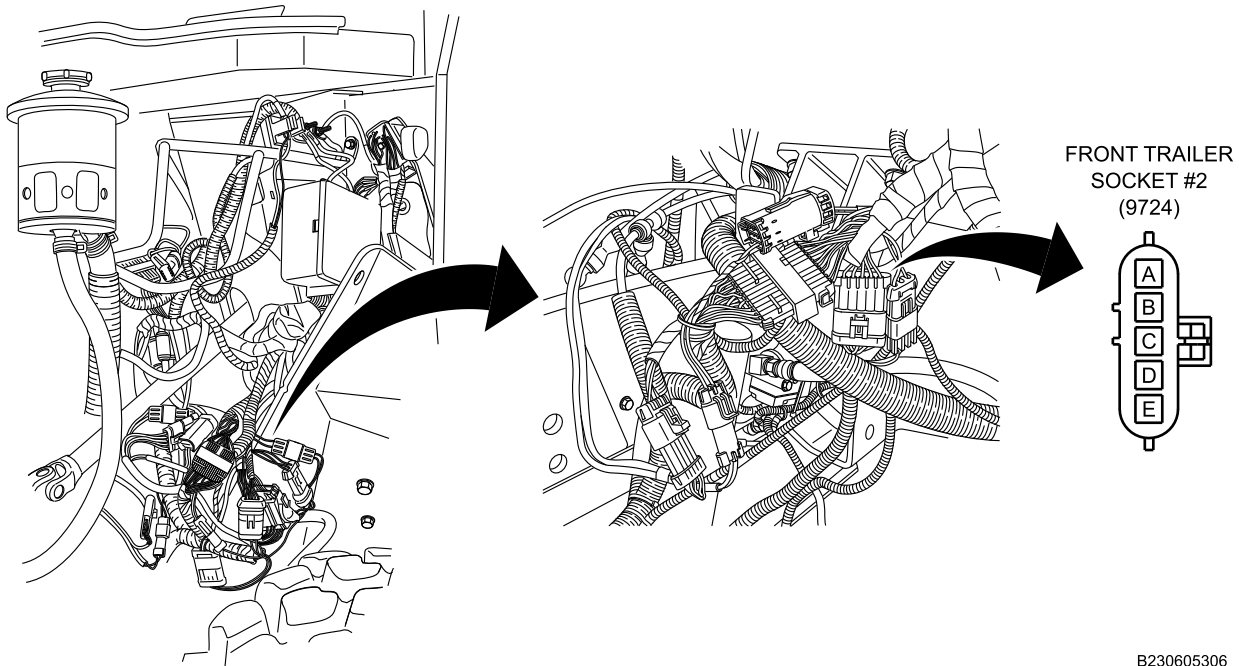


Figure 13. Engine Compartment Under Air Cleaner Housing.

25. Measure resistance between connector 9724 terminal B and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 51.
NO Go to next step.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Disconnect connector 9716F (connector with YELLOW wire in cavity B). Refer to Figure 14.

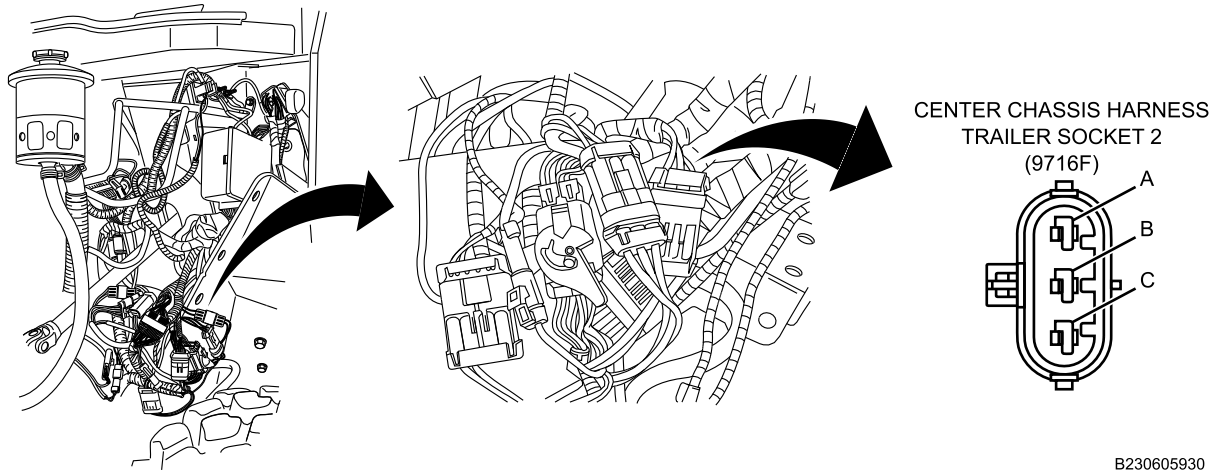


Figure 14. Engine Compartment Under Air Cleaner Assembly.

27. Measure resistance between connector 9716F terminal B and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

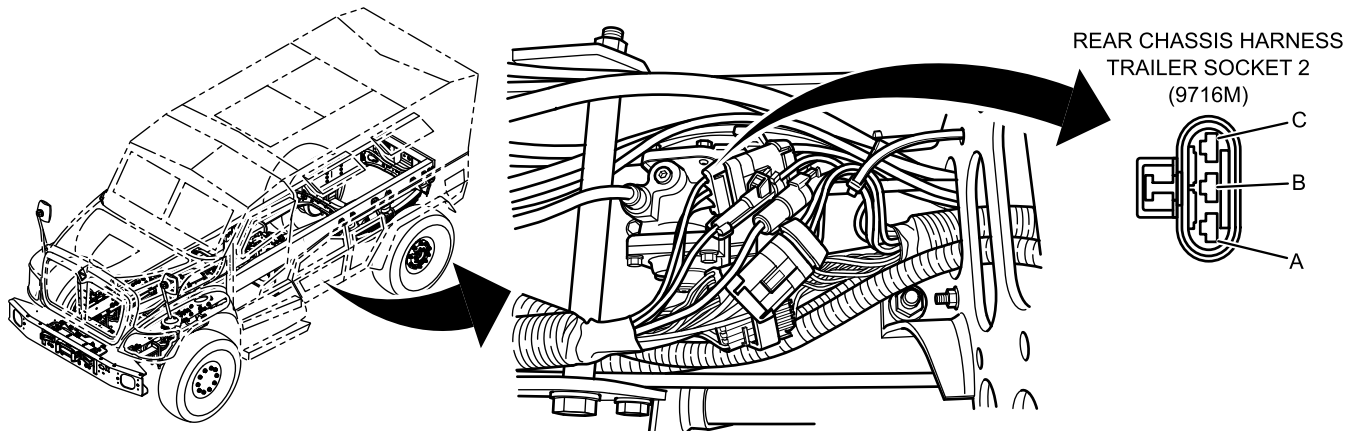
DECISION

YES Go to Step 49.
NO Go to next step.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
29. Disconnect connector 9716M (connector with YELLOW wire in cavity B). Refer to Figure 15.



B230605338

Figure 15. Left Side Frame Rail.

30. Measure resistance between connector 9716M terminal B and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 47.
NO Go to next step.

STEP

31. Disconnect connector LAM1211 (connector with YELLOW wire in cavity B). Refer to Figure 16.

**TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

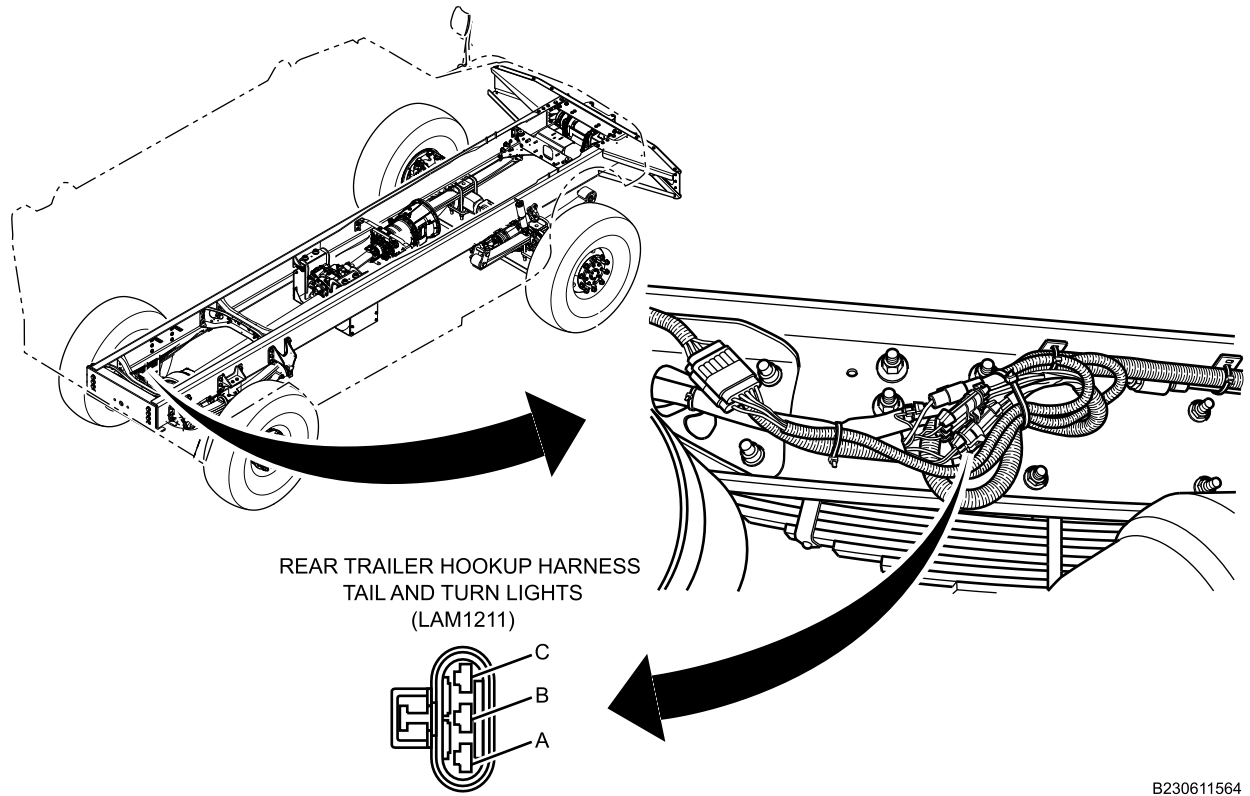


Figure 16. Left Rear Frame Rail.

32. Measure resistance between connector LAM1200 terminal B and ground with multimeter. Refer to Figure 17.

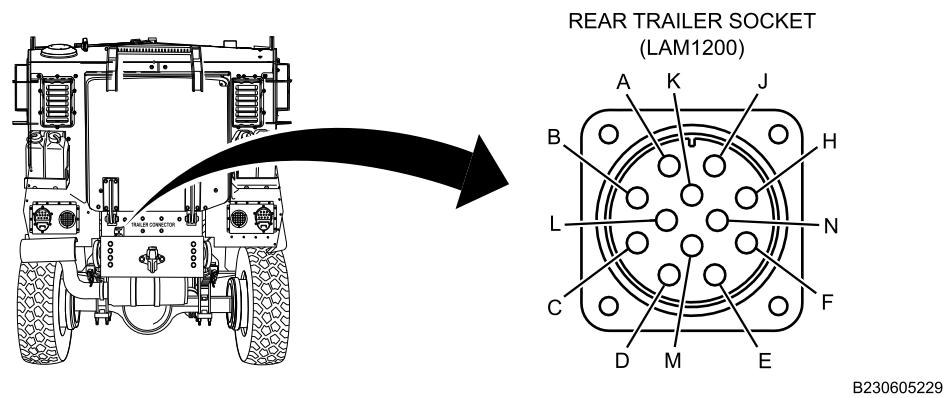


Figure 17. Lower Rear Body Panel.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

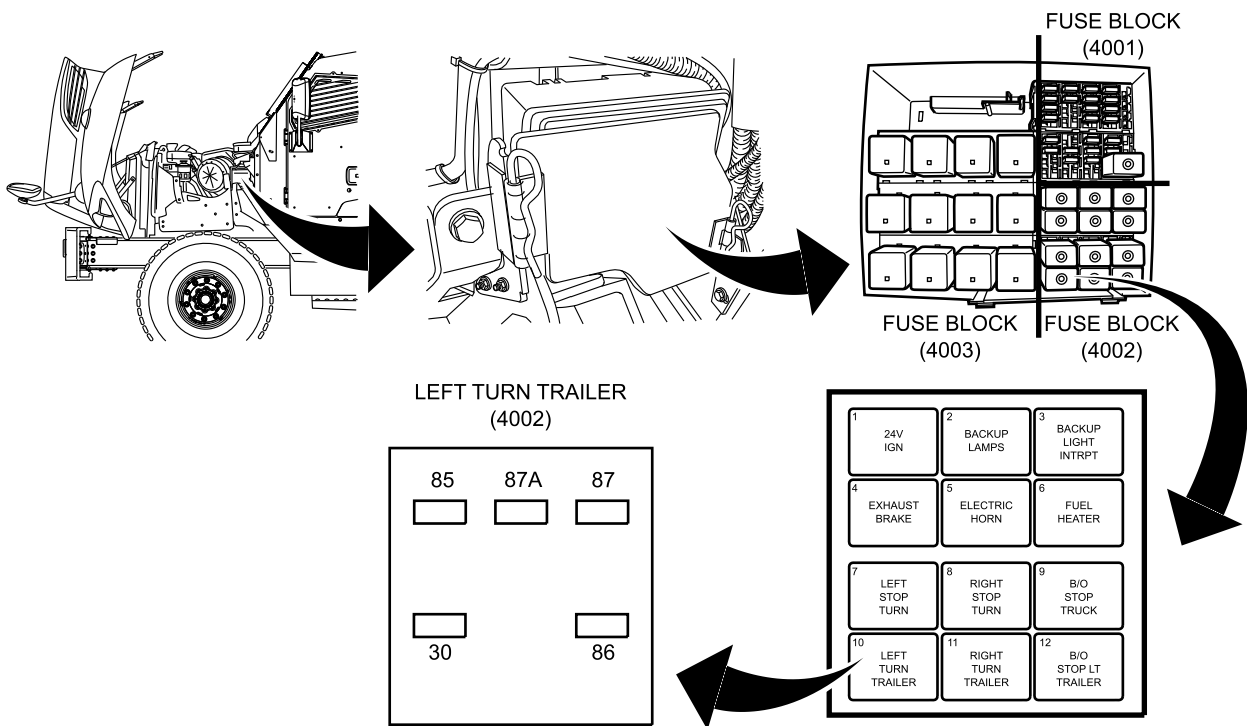
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 52.
NO Go to Step 48.

STEP

33. Remove LEFT TURN TRAILER relay. Refer to Figure 18. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



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Figure 18. Engine Compartment PDC.

**TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

34. Turn MAIN POWER switch ON (TM 9-2355-106-10).
35. Turn ignition switch ON (TM 9-2355-106-10).
36. Measure DC voltage between LEFT TURN TRAILER relay socket terminal 87 and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

DECISION

NO Go to Step 40.
YES Go to next step.

STEP

37. Turn ignition switch OFF (TM 9-2355-106-10).
38. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
39. Measure resistance between LEFT TURN TRAILER relay socket terminal 85 and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

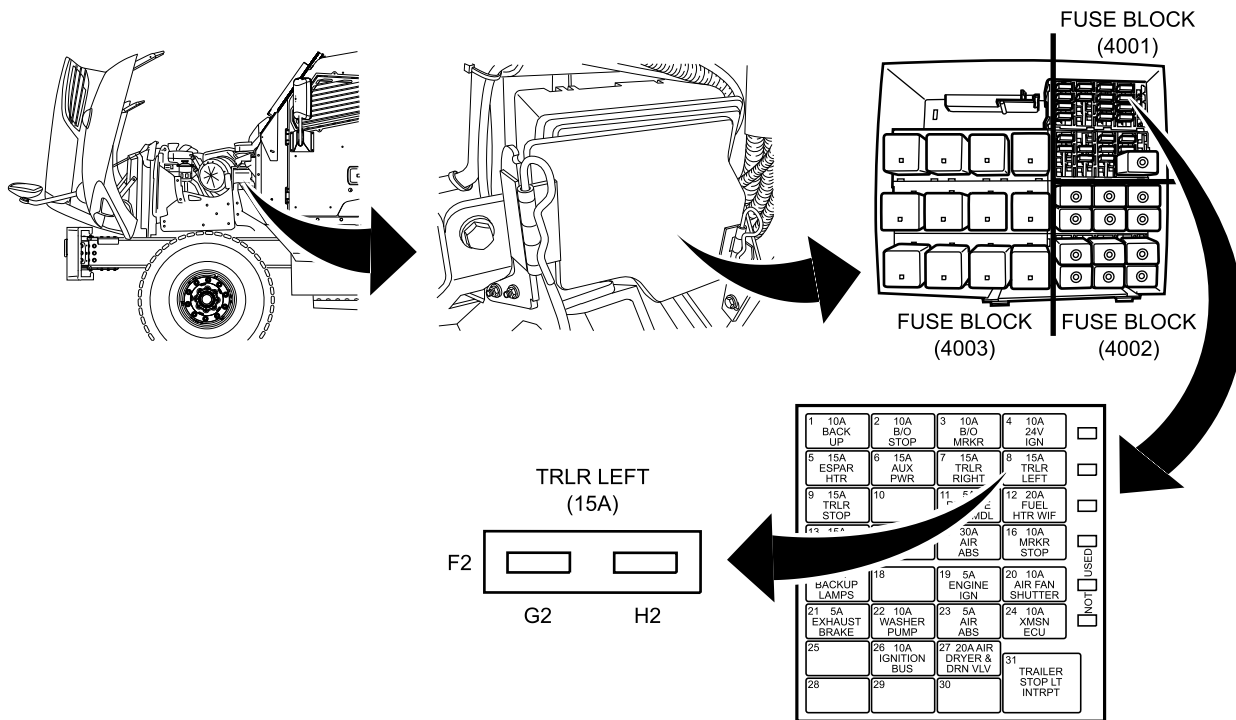
DECISION

NO Go to Step 49.
YES Go to Step 53.

TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 40. Turn ignition switch OFF (TM 9-2355-106-10).
- 41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 42. Remove and inspect TRLR LEFT fuse. Refer to Figure 19. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605382

Figure 19. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

- YES Go to Step 46.
- NO Go to next step.

STEP

- 43. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 44. Turn ignition switch ON (TM 9-2355-106-10).
- 45. Measure DC voltage between TRLR LEFT fuse socket terminal G2 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

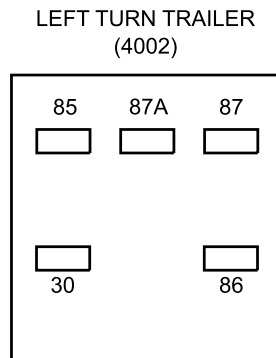
TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to Step 49.
NO Go to Step 50.

STEP

46. Measure resistance between LEFT TURN TRAILER relay socket terminal 87 and ground with multimeter.
Refer to (Figure 20).



B230605443

Figure 20. Left Turn Trailer Relay Socket.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 53.
NO Go to Step 49.

MALFUNCTION

- 47. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0424).
Return vehicle to service.

END OF TEST

**TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 48. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 49. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. Power distribution is faulty.

ACTION

Refer to Power Distribution Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 51. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 52. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST

**TRAILER CONNECTOR LEFT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 53. LEFT TURN TRAILER relay is faulty.

ACTION

Replace LEFT TURN TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0333
WP 0335
WP 0336
WP 0429
WP 0431
WP 0426
WP 0427
WP 0517
WP 0597

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

(WP 0789, Figure 64)
(WP 0789, Figure 65)
(WP 0789, Figure 59)
(WP 0789, Figure 55)
(WP 0789, Figure 60)

TROUBLESHOOTING PROCEDURE

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.

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.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

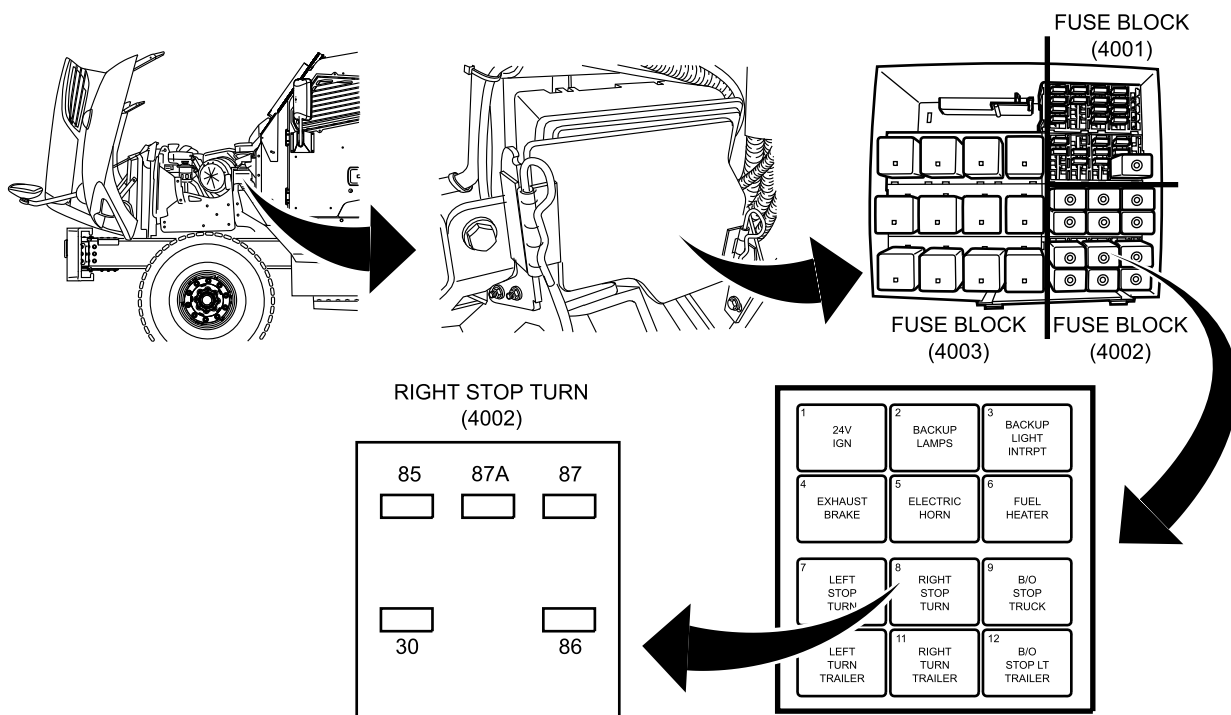
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove RIGHT STOP TURN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 1.

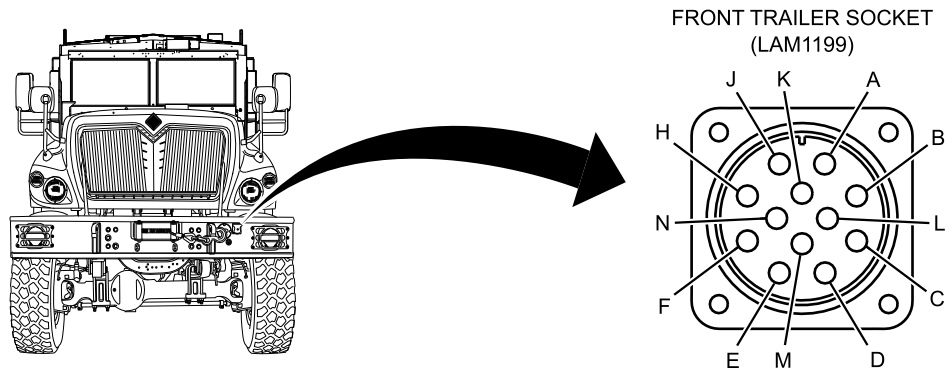


B230605314

Figure 1. Underhood Power Distribution Center (PDC).

2. Measure resistance between connector LAM1199 terminals J and L with multimeter. Refer to Figure 2.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605228

Figure 2. Left Side Front Bumper.

CONDITION/INDICATION

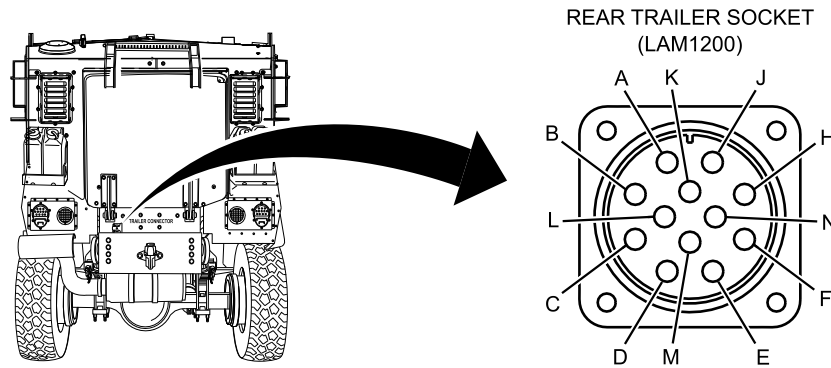
Does multimeter read OL?

DECISION

NO Go to Step 5.
YES Go to next step.

STEP

3. Connect jumper wire between connector LAM1200 socket terminals J and L. Refer to Figure 3.

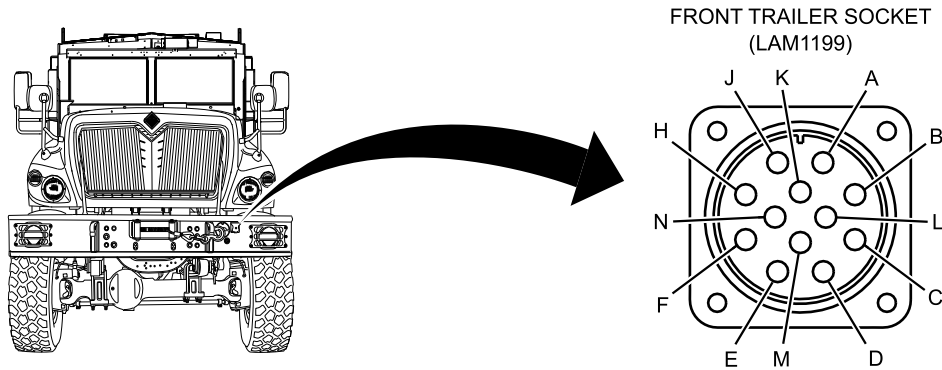


B230605229

Figure 3. Lower Rear Body Panel.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

4. Measure resistance between connector LAM1199 terminals J and L with multimeter. Refer to Figure 4.



B230605228

Figure 4. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

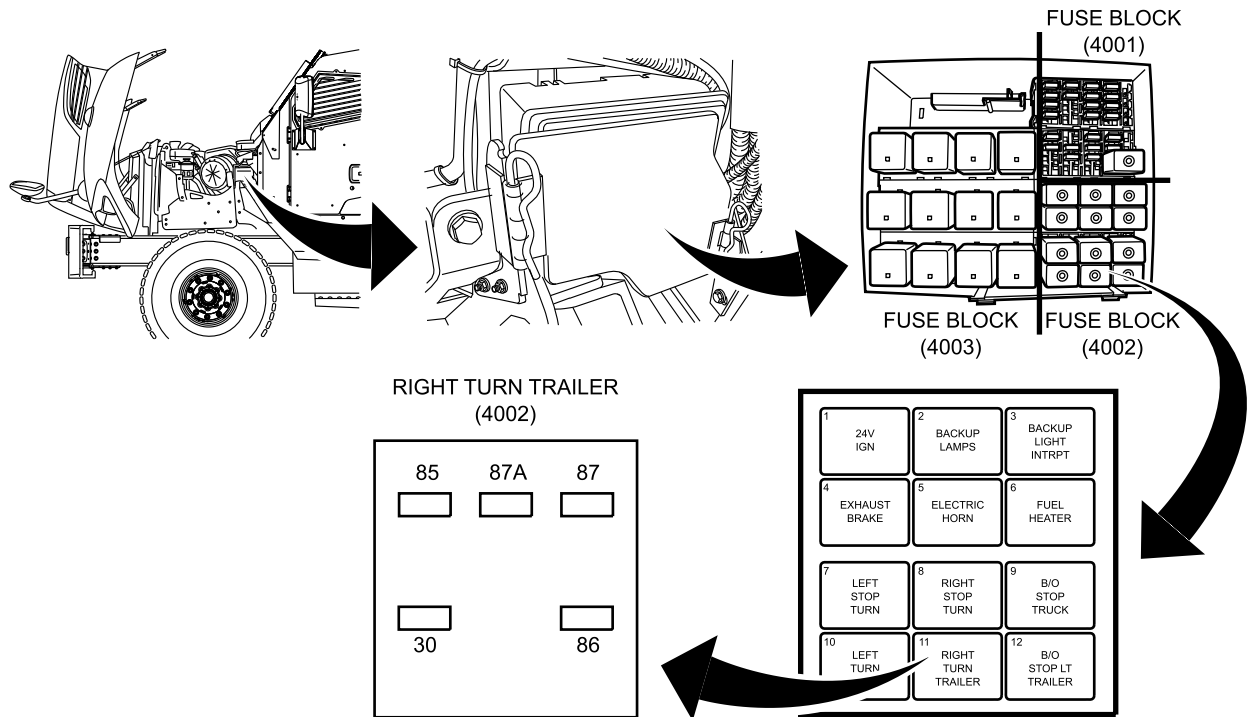
DECISION

NO Go to Step 15.
 YES Go to Step 28.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Remove RIGHT TURN TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 5.



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Figure 5. Engine Compartment PDC.

6. Connect a jumper wire between RIGHT TURN TRAILER relay socket terminals 87A and 30. Refer to Figure 5.
7. Measure resistance between front trailer socket terminals J and L with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 57.
 NO Go to next step.

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

8. Disconnect connector 9779F (three-wire connector containing BLACK, YELLOW, and LIGHT GREEN wires). Refer to Figure 6.

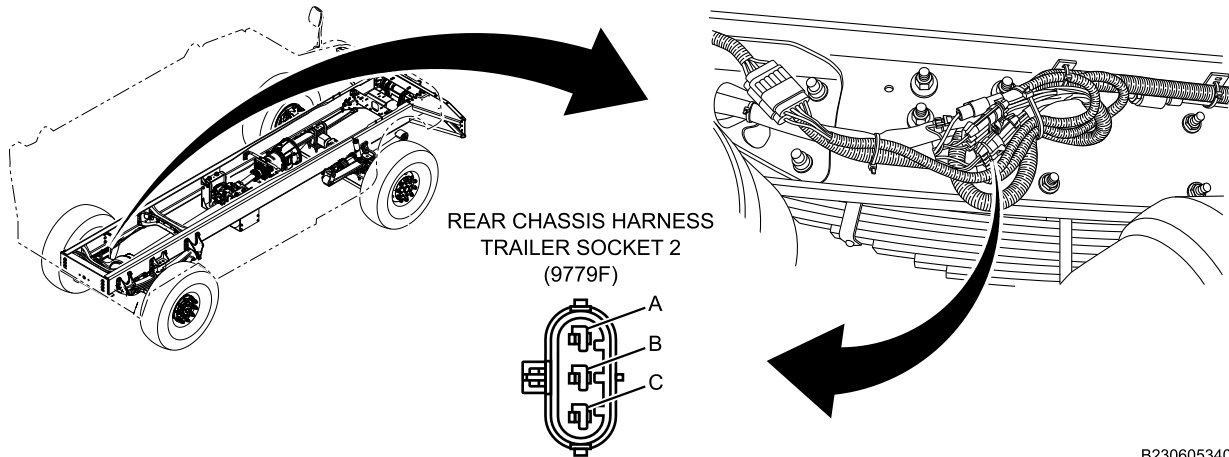


Figure 6. Left Rear Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

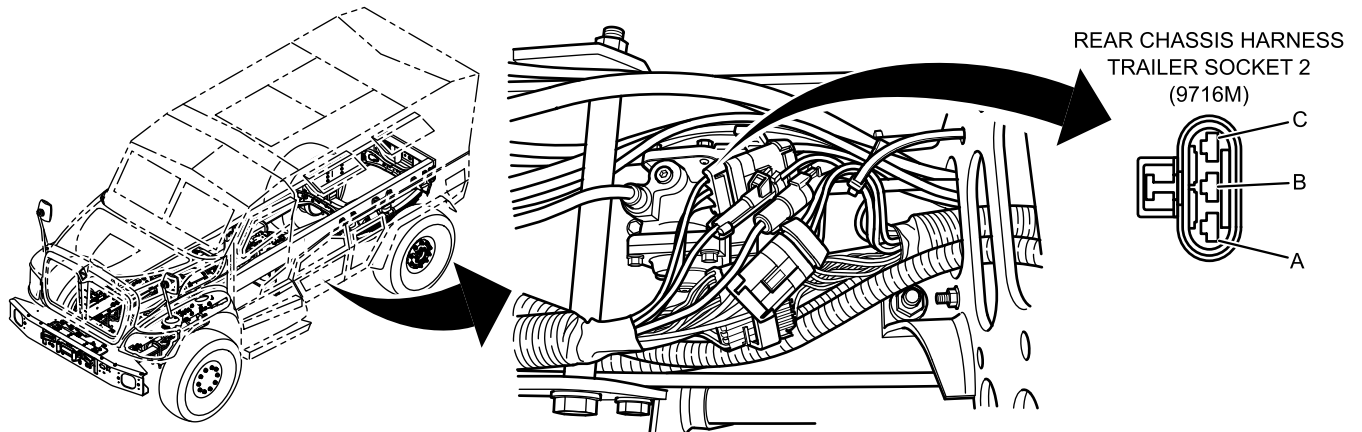
DECISION

YES Go to Step 56.
NO Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

9. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
10. Disconnect connector 9716M (three-wire connector containing BLACK, YELLOW, and LIGHT GREEN wires). Refer to Figure 7.



B230605338

Figure 7. Left Side Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

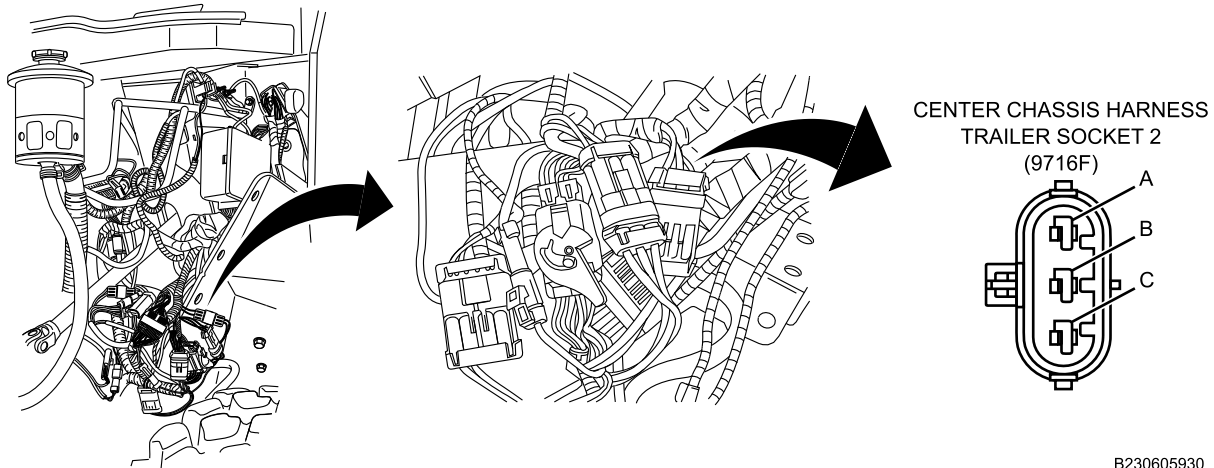
DECISION

YES Go to Step 52.
NO Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

11. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
12. Remove left side engine armor plate. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
13. Disconnect connector 9716F (three-wire connector containing BLACK, YELLOW, and LIGHT GREEN wires). Refer to Figure 8.



B230605930

Figure 8. Left Side Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 51.
NO Go to next step.

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

14. Disconnect connector 9724 (five-cavity connector containing five wires). Refer to Figure 9.

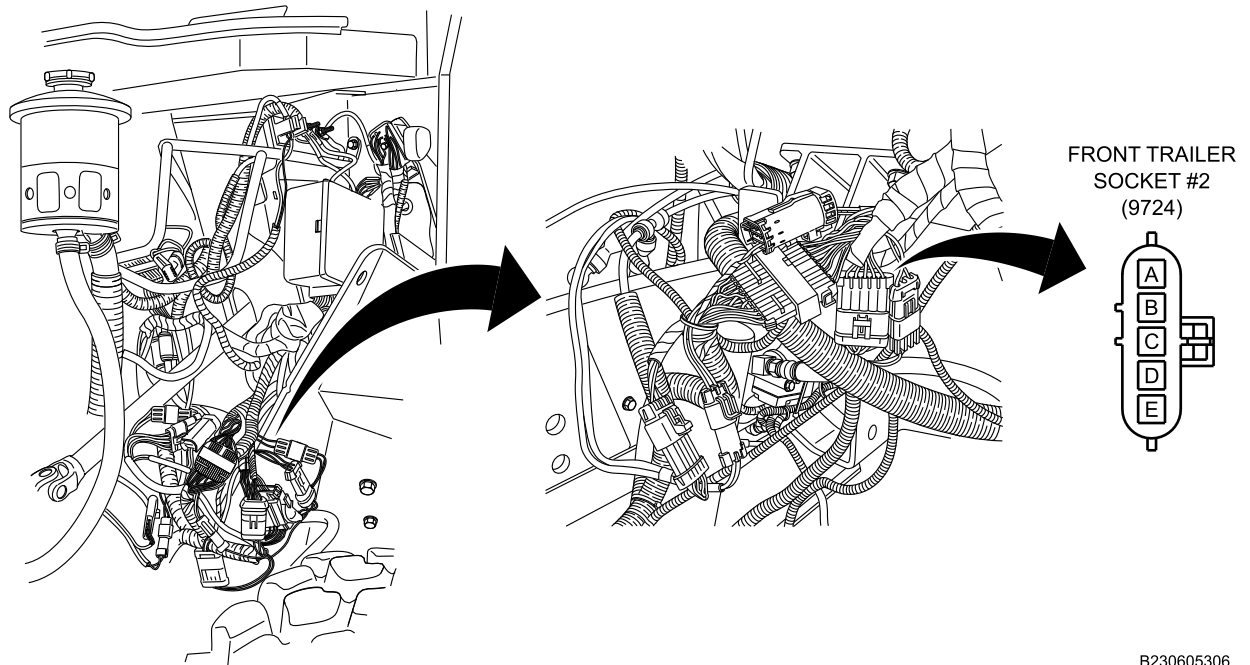


Figure 9. Engine Compartment Under Air Cleaner Housing.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

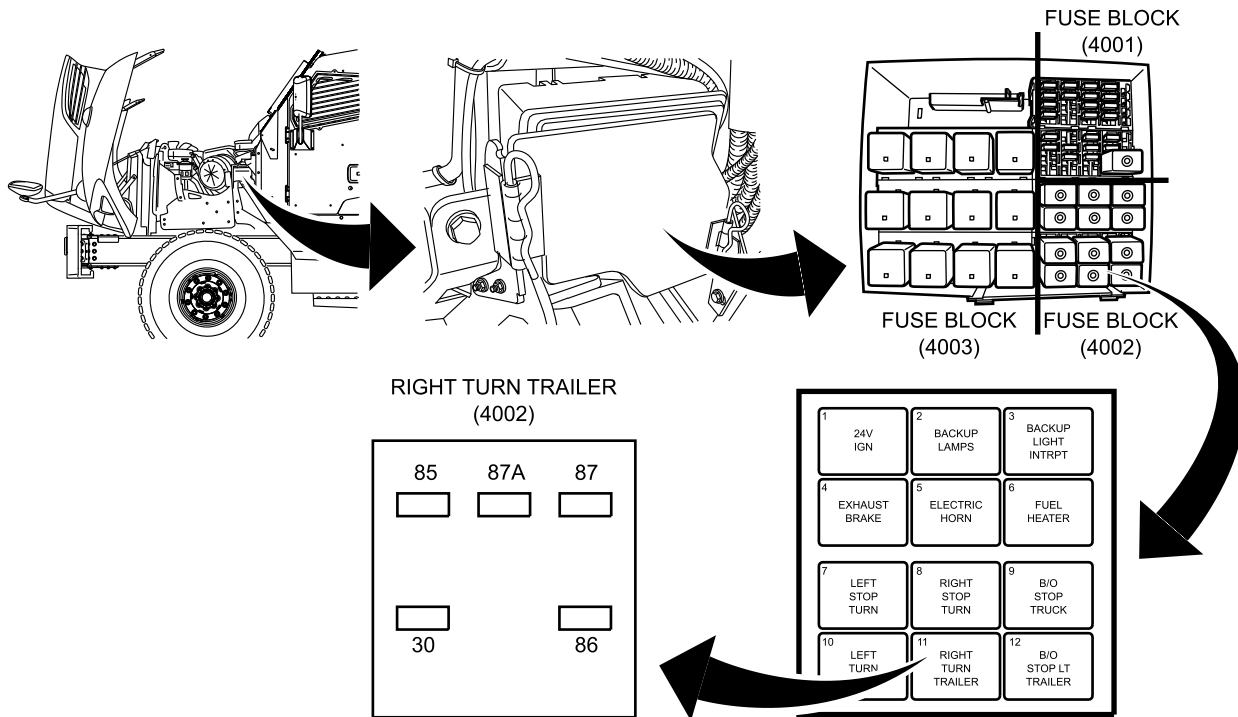
YES Go to Step 53.

NO Go to Step 55.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

15. Connect a jumper wire between RIGHT TURN TRAILER relay socket terminals 87A and 30. Refer to Figure 10.

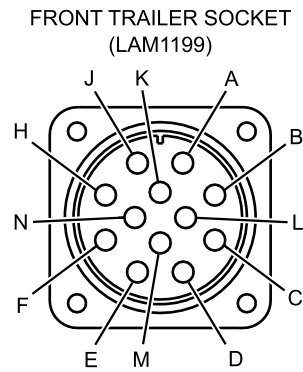


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Figure 10. Engine Compartment PDC.

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

16. Measure resistance between connector LAM1199 socket terminals J and L with multimeter. Refer to Figure 11.



B230604548

Figure 11. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 57.

NO Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

17. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
18. Remove left side engine armor plate. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
19. Disconnect connector 9724. Refer to Figure 12.

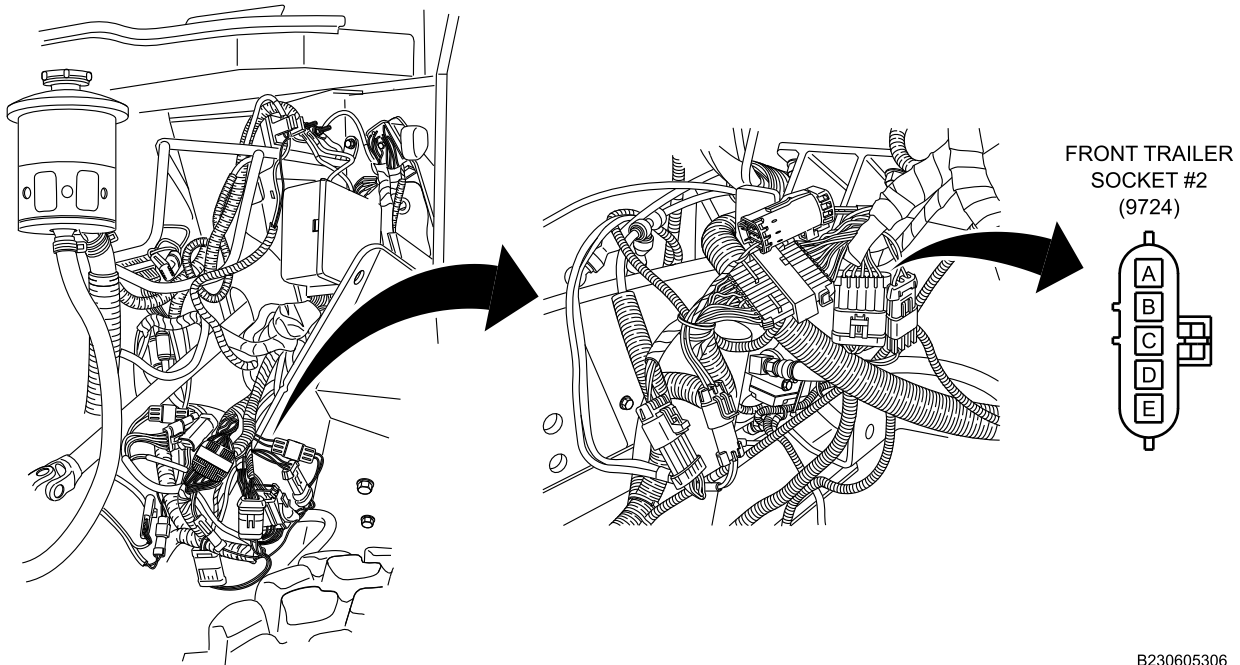


Figure 12. Engine Compartment Under Air Cleaner Housing.

20. Measure resistance between connector 9724 terminal C and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 55.
NO Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

21. Disconnect connector 9716F (three-wire connector containing BLACK, YELLOW, and LIGHT GREEN wires). Refer to Figure 13.

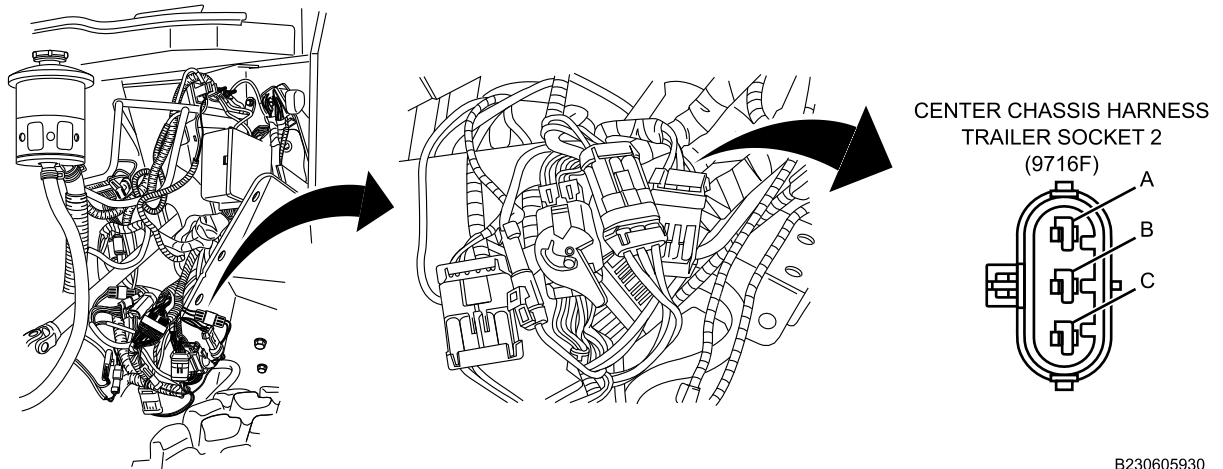


Figure 13. Left Side Frame Rail.

22. Measure resistance between connector 9716F terminal C and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 53.

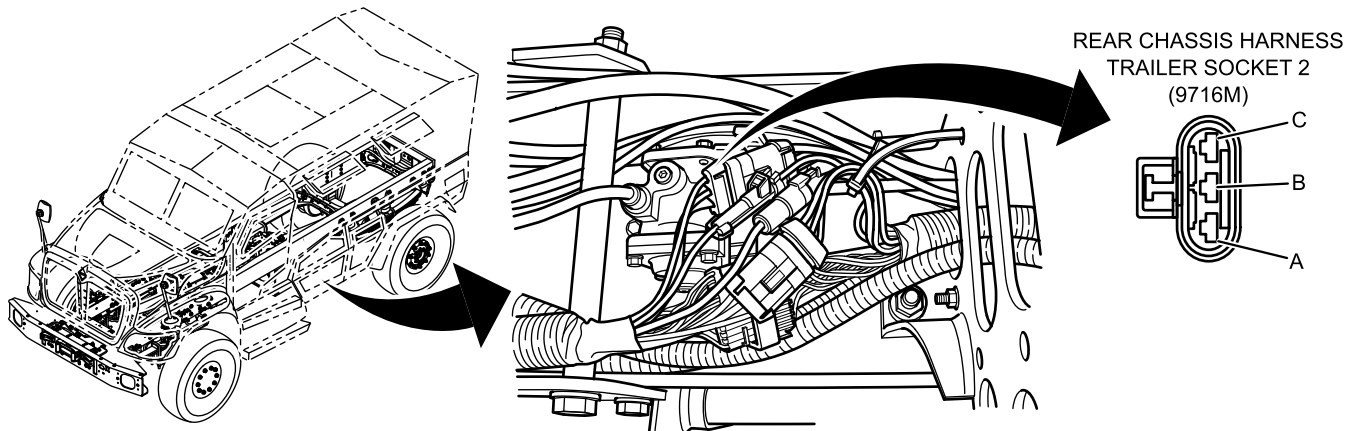
NO Go to next step.

B230605930

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

23. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
24. Disconnect connector 9716M. Refer to Figure 14.



B230605338

Figure 14. Left Side Frame Rail.

25. Measure resistance between connector 9716M terminal C and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 51.
NO Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

26. Disconnect connector 9779F. Refer to Figure 15.

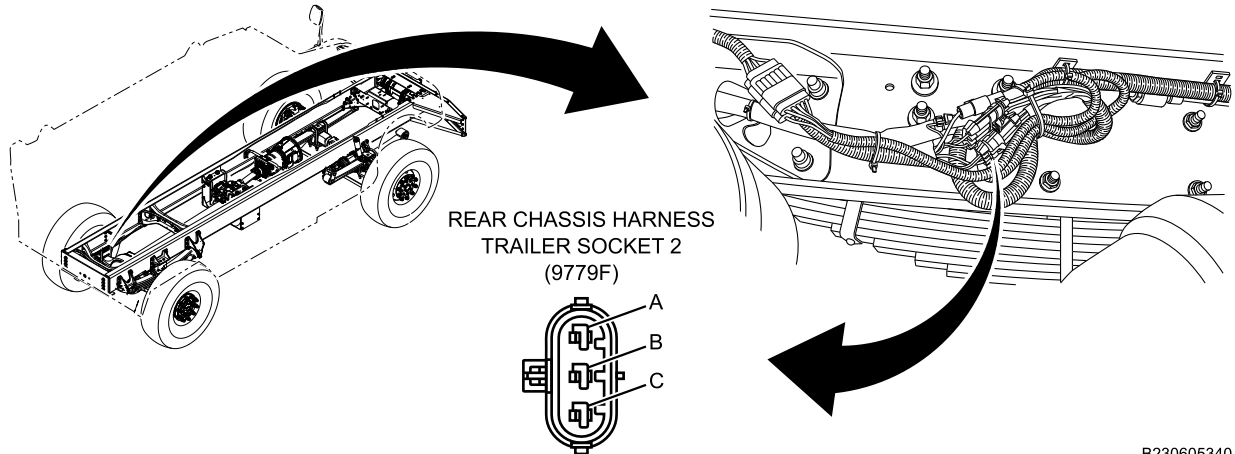


Figure 15. Left Rear Frame Rail.

27. Measure resistance between connector 9779F terminal C and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

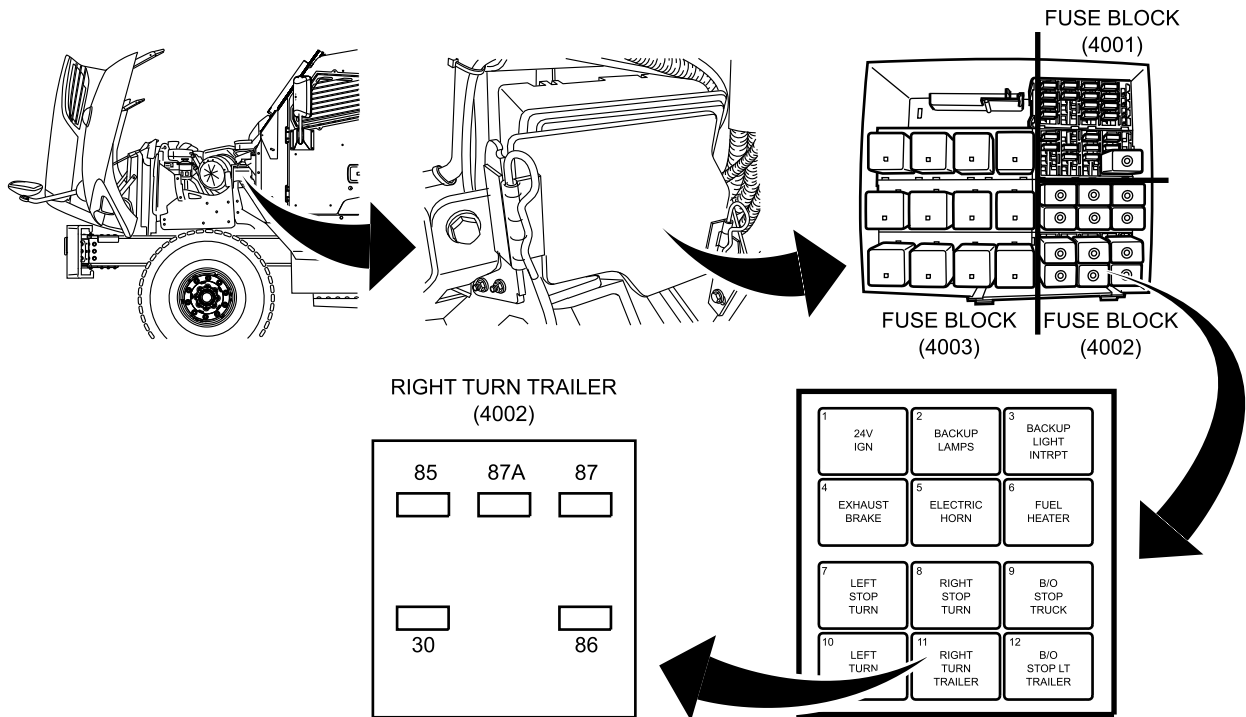
YES Go to Step 52.

NO Go to Step 56.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Remove RIGHT TURN TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 16.

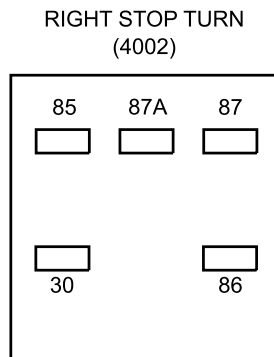


B230605317

Figure 16. Engine Compartment PDC.

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

29. Measure resistance between RIGHT TURN TRAILER relay socket terminal 87A and RIGHT STOP TURN relay socket terminal 87A with multimeter. Refer to Figure 16 and Figure 17.



B230605441

Figure 17. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 53.
YES Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

30. Remove jumper wire from connector LAM1200. Refer to Figure 18.

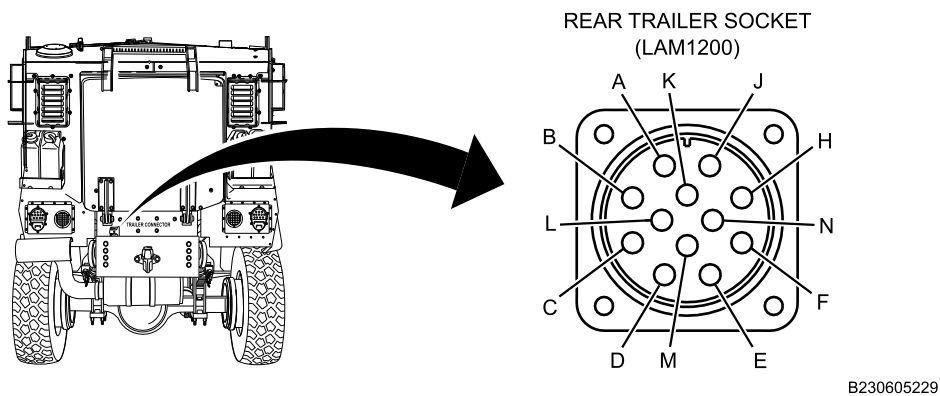


Figure 18. Lower Rear Body Panel.

31. Connect jumper wire between RIGHT TURN TRAILER relay socket terminals 87 and 30. Refer to Figure 19.

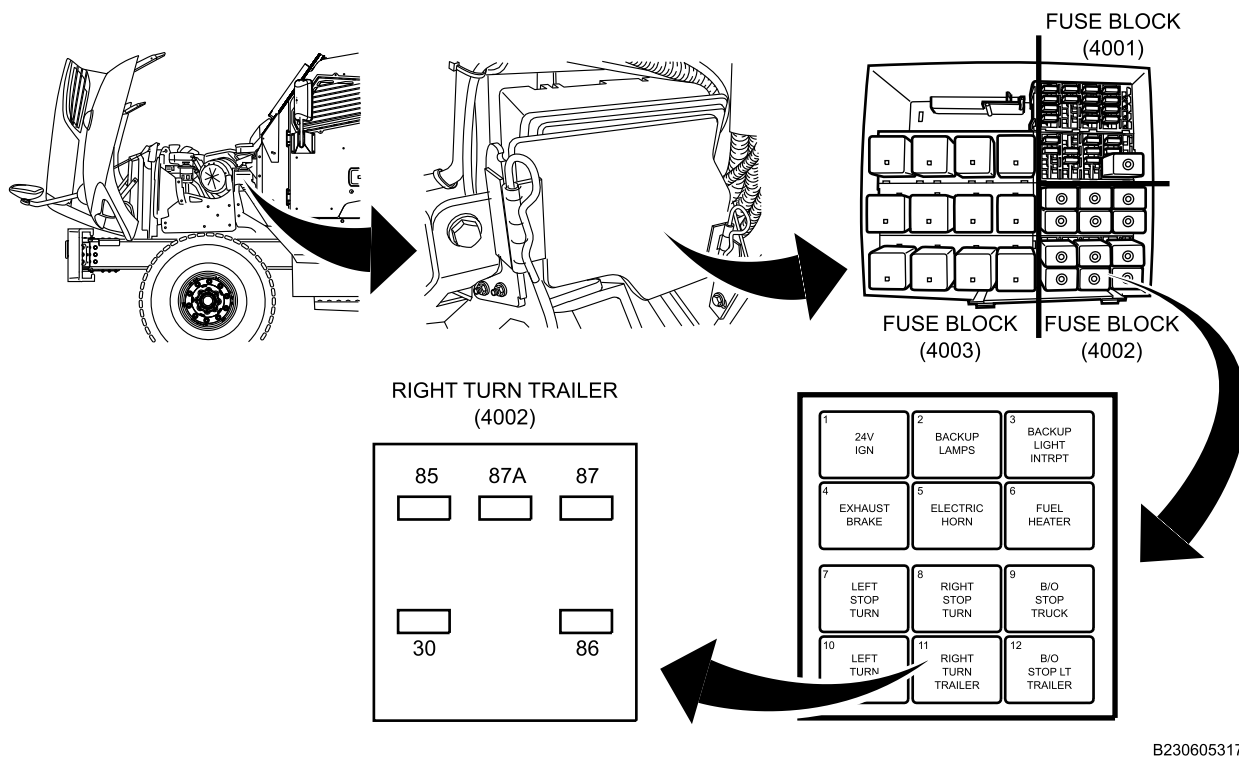


Figure 19. Engine Compartment PDC.

32. Turn MAIN POWER switch ON (TM 9-2355-106-10).

33. Turn ignition switch ON (TM 9-2355-106-10).

34. Enable SERVICE DRIVE lights on Master Vehicle Light Switch (MVLS) (TM 9-2355-106-10).

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

35. Measure DC voltage between connector LAM1200 terminal J and L with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter fluctuate while turn signal flashes?

DECISION

NO Go to Step 43.
YES Go to next step.

STEP

36. Turn ignition switch OFF (TM 9-2355-106-10).
37. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
38. Remove jumper wire from RIGHT TURN TRAILER relay socket terminals 87 and 30. Refer to Figure 19.
39. Measure resistance between socket terminal 85 and ground. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

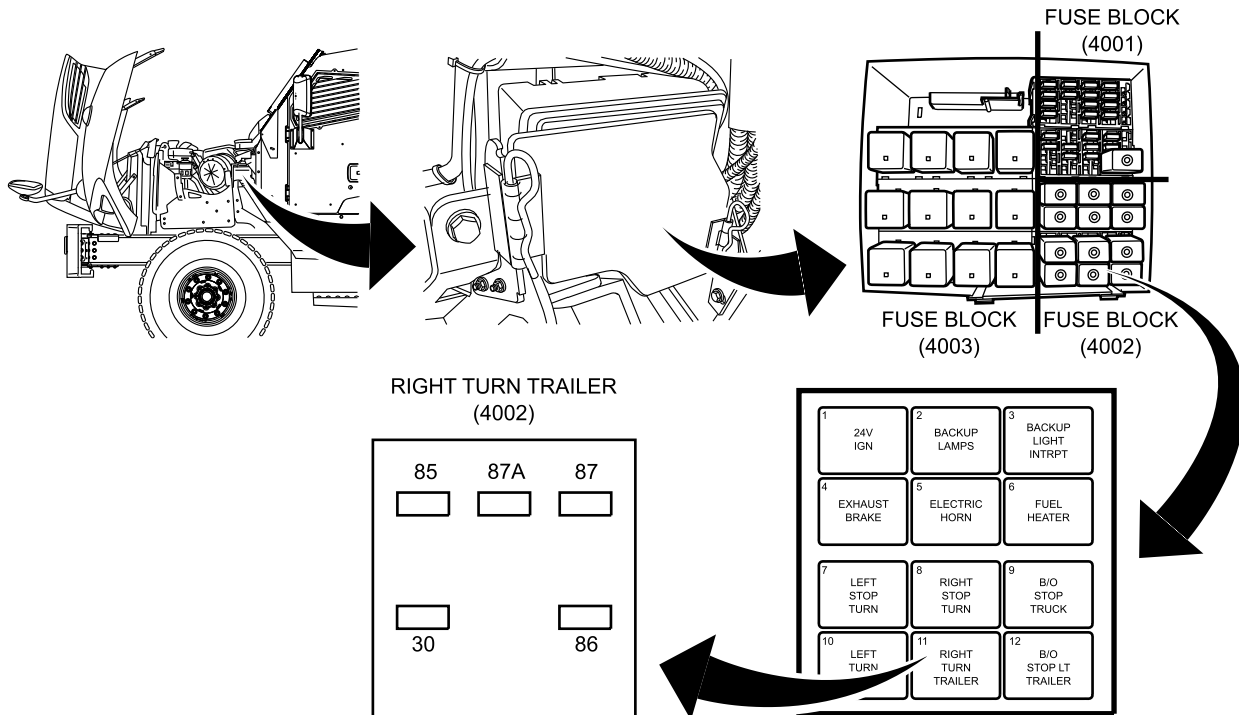
DECISION

NO Go to Step 53.
YES Go to next step.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 40. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 41. Turn ignition switch ON (TM 9-2355-106-10).
- 42. Measure DC voltage between relay socket terminal 86 and ground with multimeter. Refer to Figure 20.



B230605317

Figure 20. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

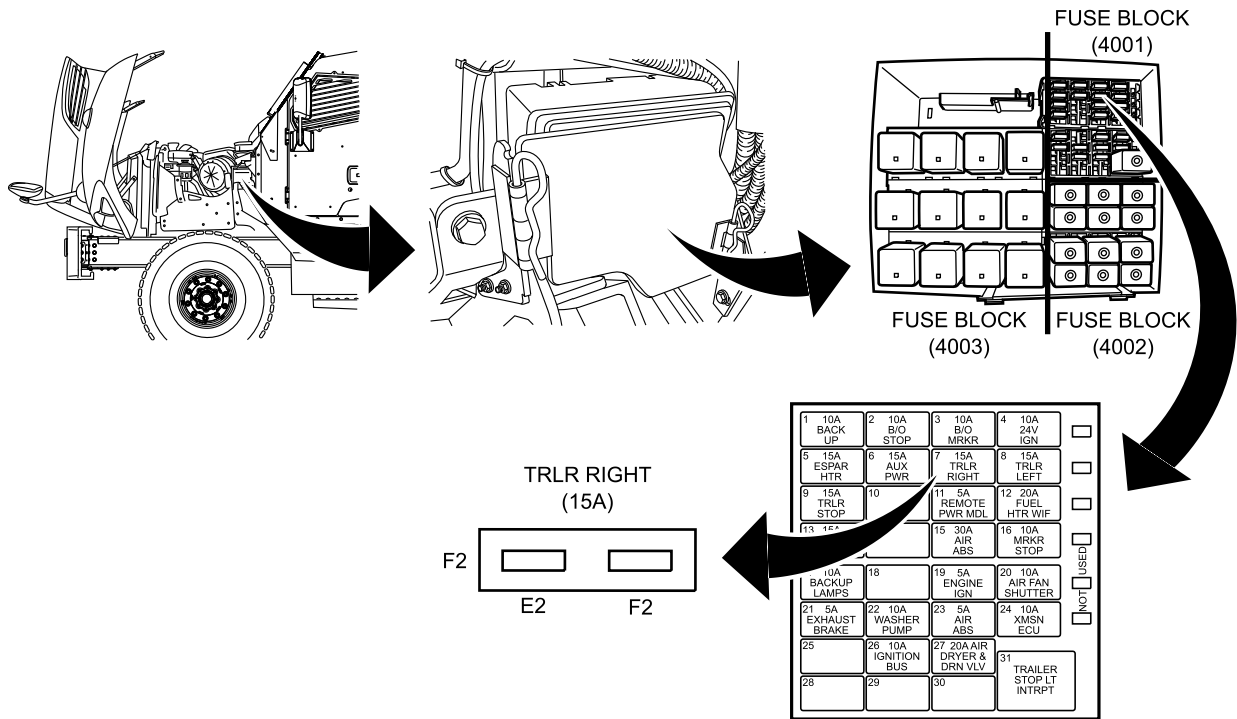
DECISION

- YES Go to Step 57.
- NO Go to Step 53.

STEP

- 43. Turn ignition switch OFF (TM 9-2355-106-10).
- 44. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 45. Remove jumper wire from RIGHT TURN TRAILER relay socket terminals 87 and 30. Refer to Figure 20.
- 46. Remove and visually inspect 15A TRLR RIGHT fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 21.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605381

Figure 21. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 50.
NO Go to next step.

STEP

- 47. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 48. Turn ignition switch ON (TM 9-2355-106-10).
- 49. Measure DC voltage between ground and fuse socket terminal E2 with multimeter. Refer to Figure 21.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

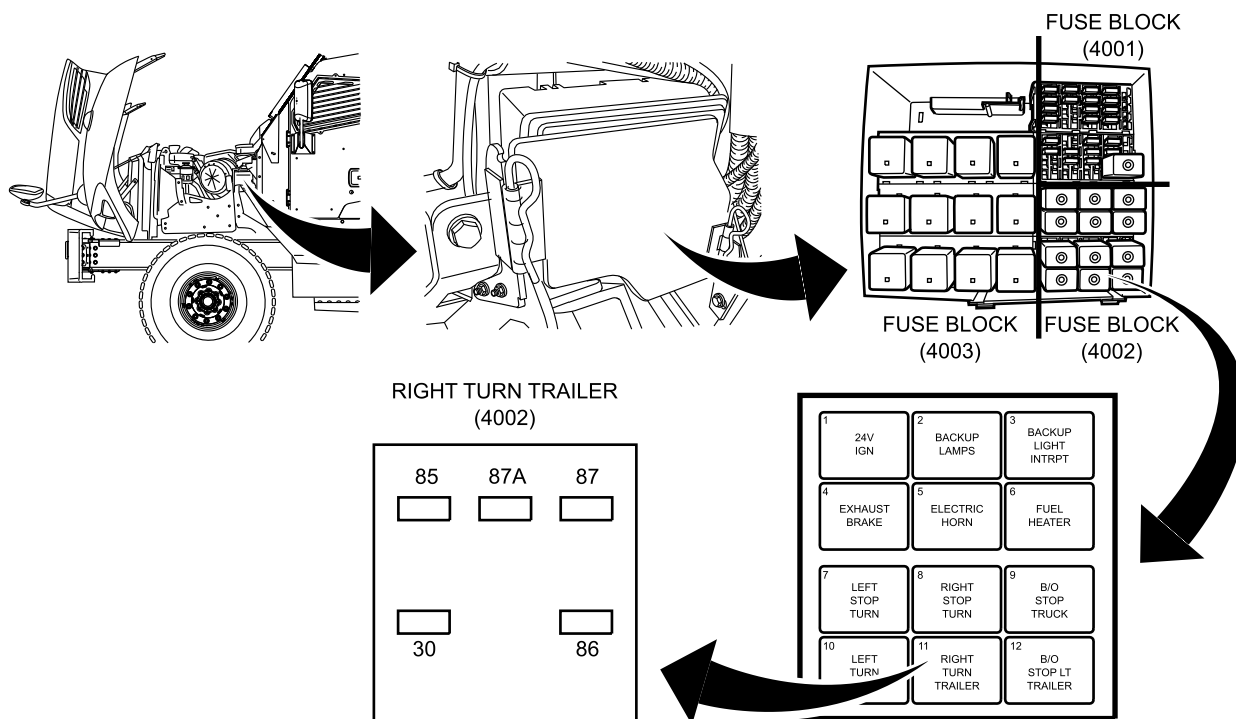
DECISION

YES Go to Step 53.
NO Go to Step 54.

TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

50. Measure resistance between RIGHT TURN TRAILER relay socket terminal 87 and ground with multimeter. Refer to Figure 22



B230605317

Figure 22. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 53.
NO Go to Step 57.

MALFUNCTION

- 51. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 52. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 53. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 54. Power Distribution Center (PDC) is faulty.

ACTION

Refer to Power Distribution Center (PDC) Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 55. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST

**TRAILER CONNECTOR RIGHT SERVICE SIGNAL CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 56. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 57. RIGHT TURN TRAILER relay is faulty.

ACTION

Replace RIGHT TURN TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
REAR TRAILER CONNECTOR GROUND CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0431
WP 0426
WP 0427
WP 0782

Drawings Required

WP 0789, Figure 64
WP 0789, Figure 65
WP 0789, Figure 59
WP 0789, Figure 55
WP 0789, Figure 60

Equipment Condition

Parking brake set (TM 9-2355-106-10)

TROUBLESHOOTING PROCEDURE**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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

REAR TRAILER CONNECTOR GROUND CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

1. Disconnect connector 9778F. This is a single-wire connector containing a WHITE wire. Refer to Figure 1.

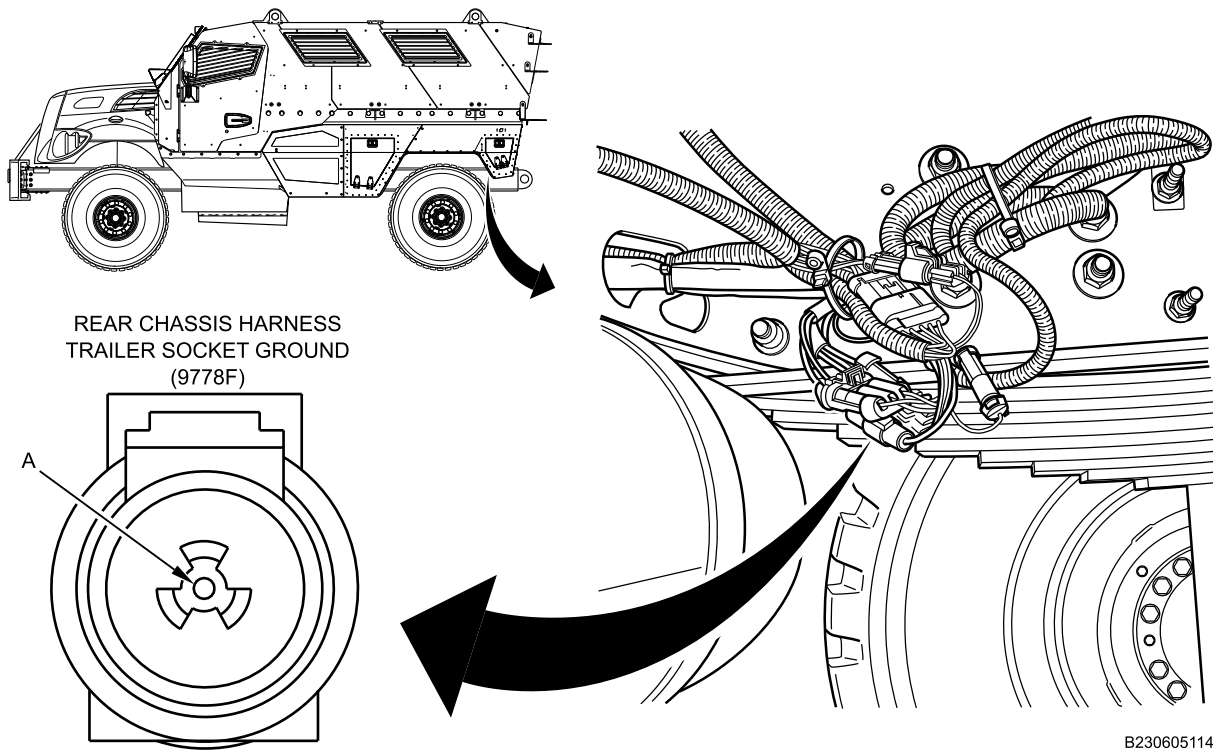


Figure 1. Left Rear Frame Rail.

2. Measure resistance between connector 9778F terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

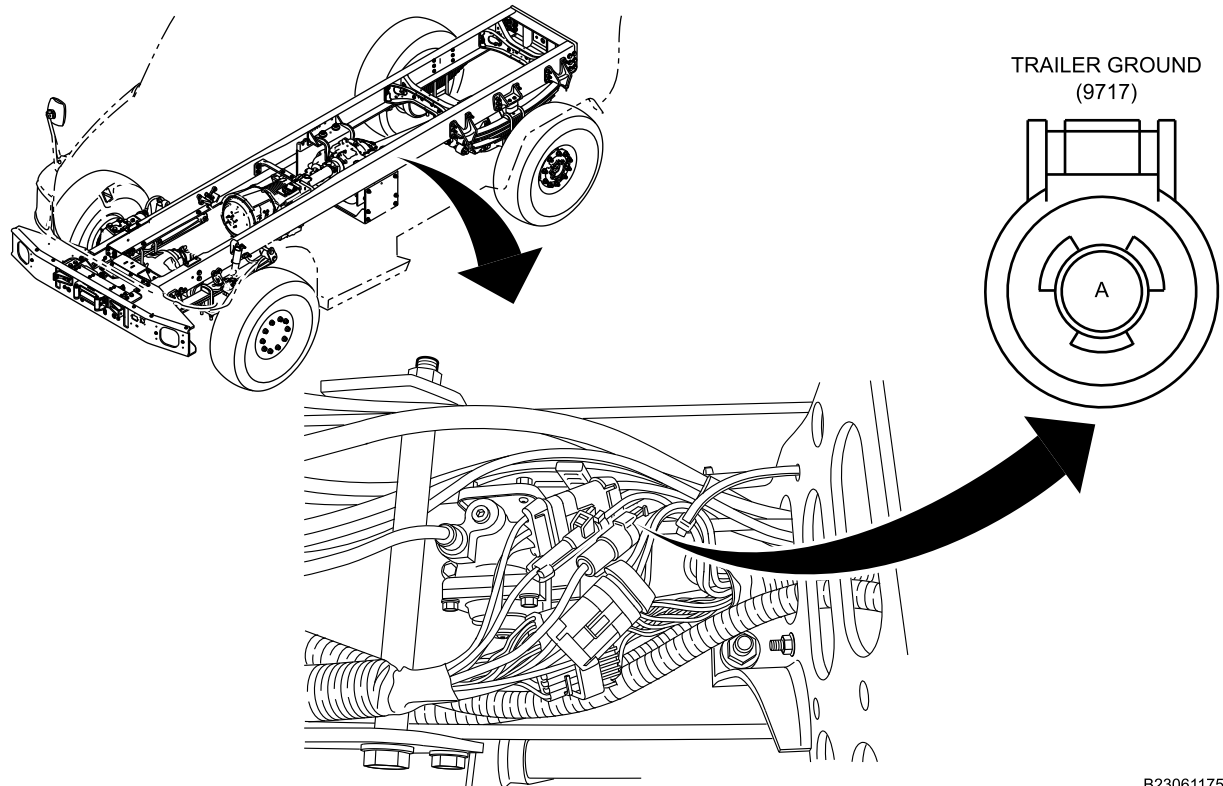
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 7.
YES Go to next step.

REAR TRAILER CONNECTOR GROUND CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
4. Disconnect connector 9717. Refer to Figure 2.



B230611752

Figure 2. Left Side Center Frame Rail.

5. Measure resistance between connector 9717 terminal A and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 6.
YES Go to Step 7.

REAR TRAILER CONNECTOR GROUND CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 6. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 7. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Harness Removal and Installation (WP 0431).
Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0431
WP 0424
WP 0517
WP 0598
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0080
WP 0059
WP 0257
WP 0333
WP 0335
WP 0353
WP 0429

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 59

TROUBLESHOOTING PROCEDURE

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.

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.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

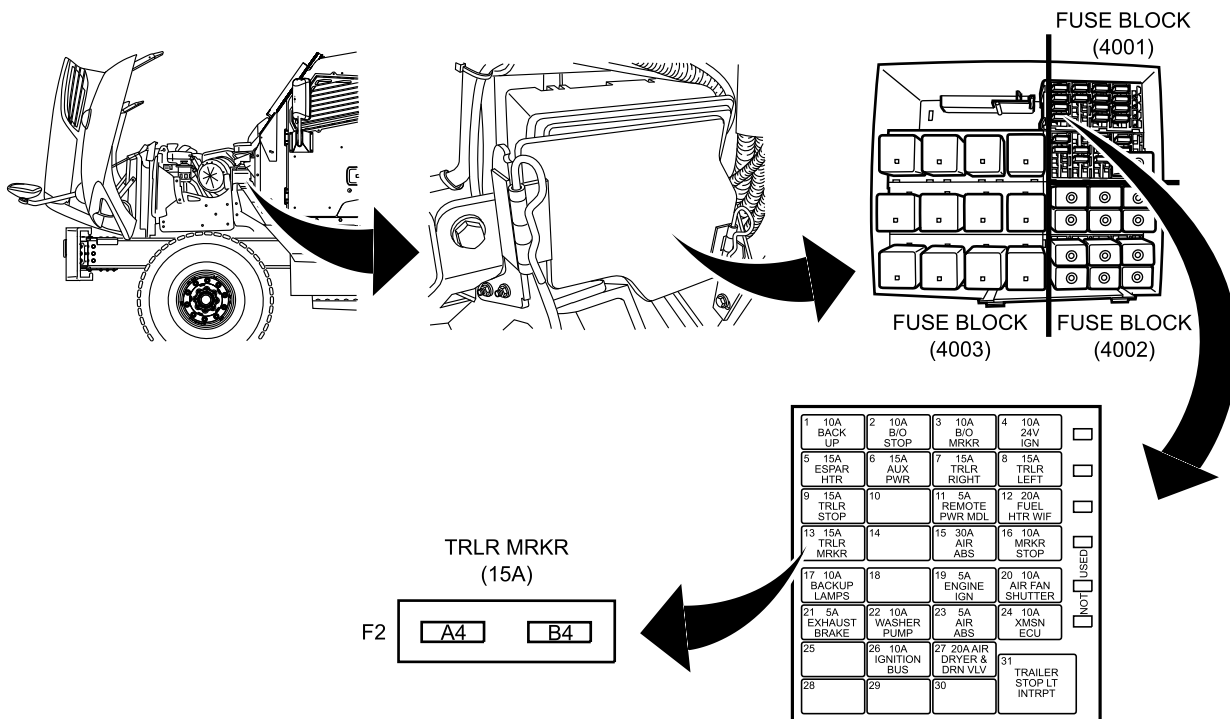
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove and inspect TRLR MRKR fuse. Refer to Figure 1. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605385

Figure 1. Engine Compartment Power Distribution Center (PDC).

CONDITION/INDICATION

Is TRLR MRKR fuse open?

DECISION

NO Go to Step 12.
 YES Go to next step.

STEP

2. Measure resistance between TRLR MRKR fuse socket terminal B4 and ground with multimeter. Refer to Figure 1.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 70.

NO Go to next step.

STEP

3. Disconnect connector 9779F (connector with black wire in cavity A). Refer to Figure 2.

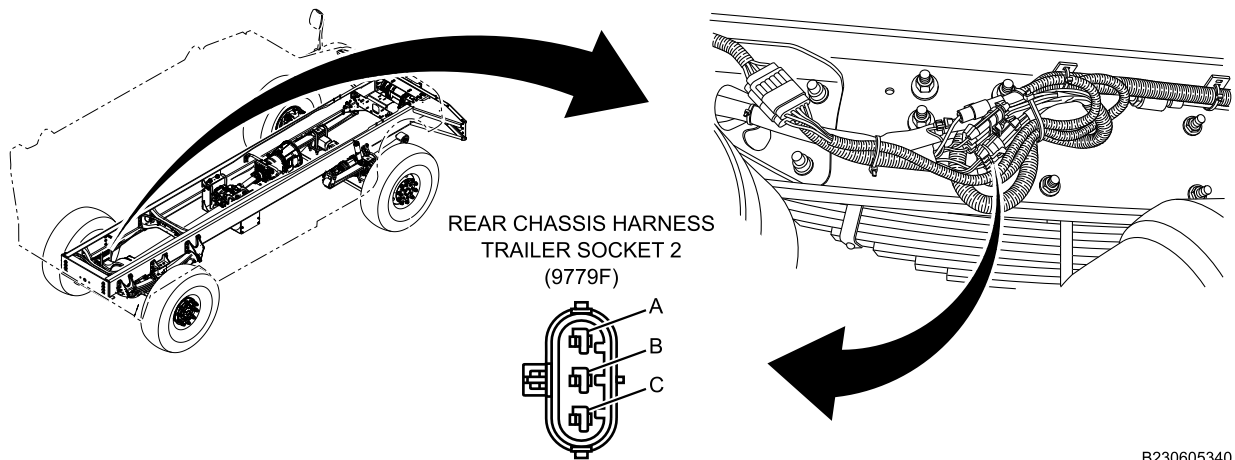


Figure 2. Left Rear Frame Rail.

4. Measure resistance between TRLR MRKR fuse socket terminal B4 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

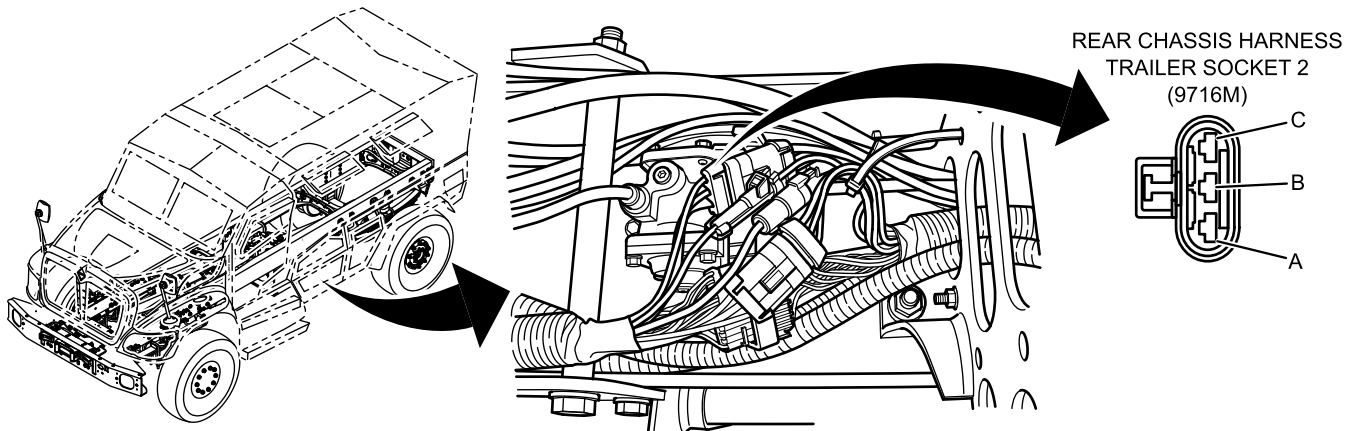
YES Go to Step 67.

NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

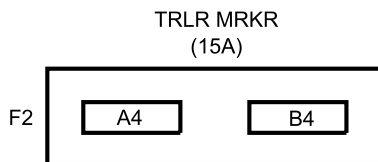
5. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
6. Disconnect connector 9716M (connector with black wire in cavity A). Refer to Figure 3.



B230605338

Figure 3. Left Side Frame Rail.

7. Measure resistance between TRLR MRKR fuse socket terminal B4 and ground with multimeter. Refer to Figure 4.



B230605421

Figure 4. TRLR MRKR Fuse Socket.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

- YES Go to Step 63.
- NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

8. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
9. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
10. Disconnect connector 9716F (connector with brown wire in cavity A). Refer to Figure 5.

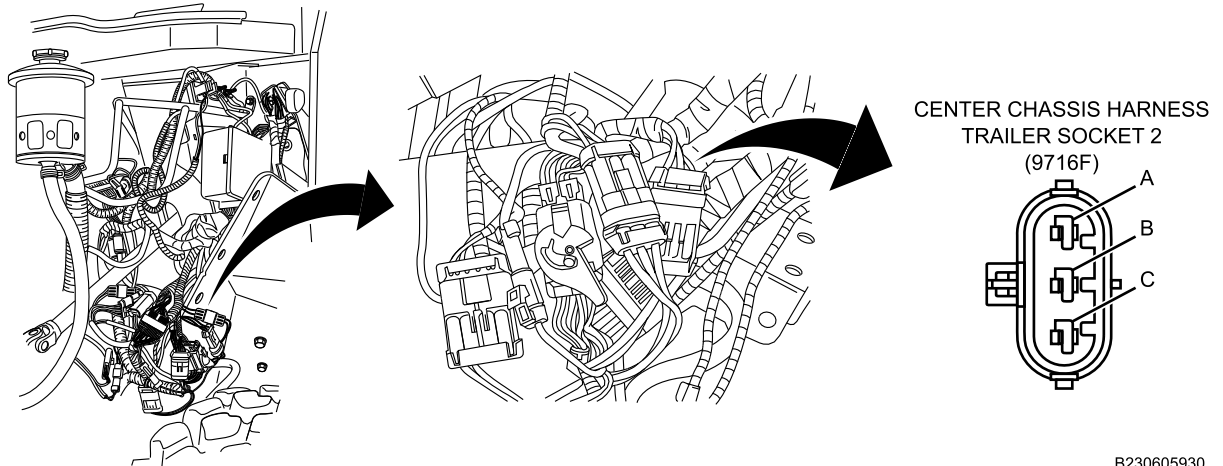


Figure 5. Engine Compartment Under Air Cleaner Assembly.

11. Measure resistance between TRLR MRKR fuse socket terminal B4 and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

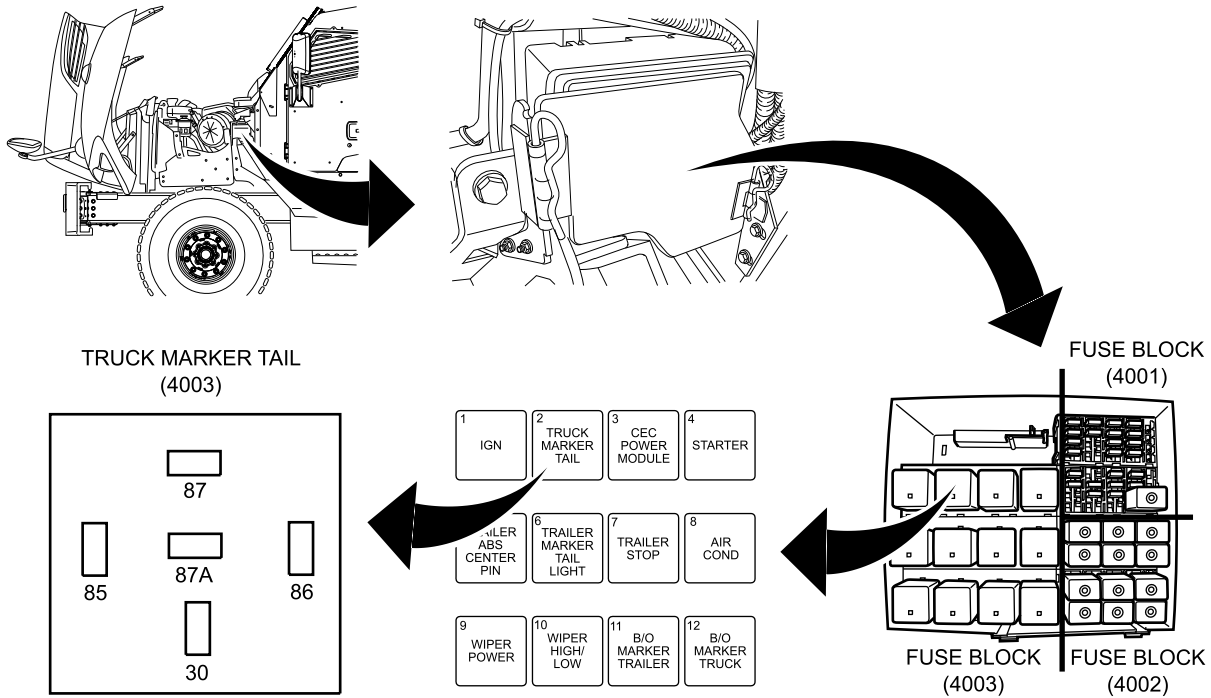
DECISION

YES Go to Step 62.
NO Go to Step 64.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

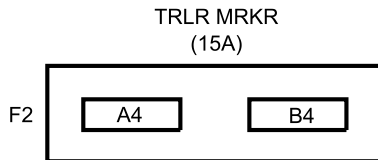
12. Remove TRUCK MARKER TAIL relay. Refer to Figure 6. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605349

Figure 6. Engine Compartment PDC.

13. Measure resistance between TRLR MRKR fuse socket terminal A4 and ground with multimeter. Refer to Figure 7.



B230605421

Figure 7. TRLR MRKR Fuse Socket.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 18.

NO Go to next step.

STEP

14. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
15. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
16. Disconnect connector 9724 (connector with 5 wires). Refer to Figure 8.

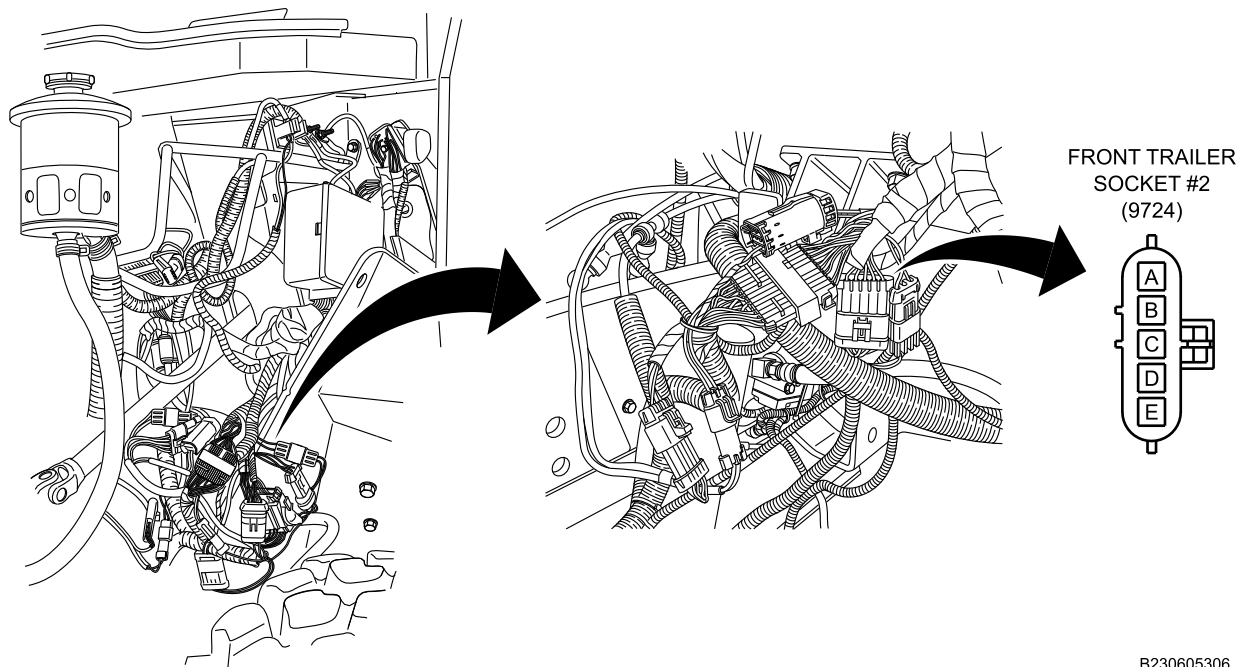


Figure 8. Engine Compartment Under Air Cleaner Housing.

17. Measure resistance between TRLR MRKR fuse socket terminal A4 and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

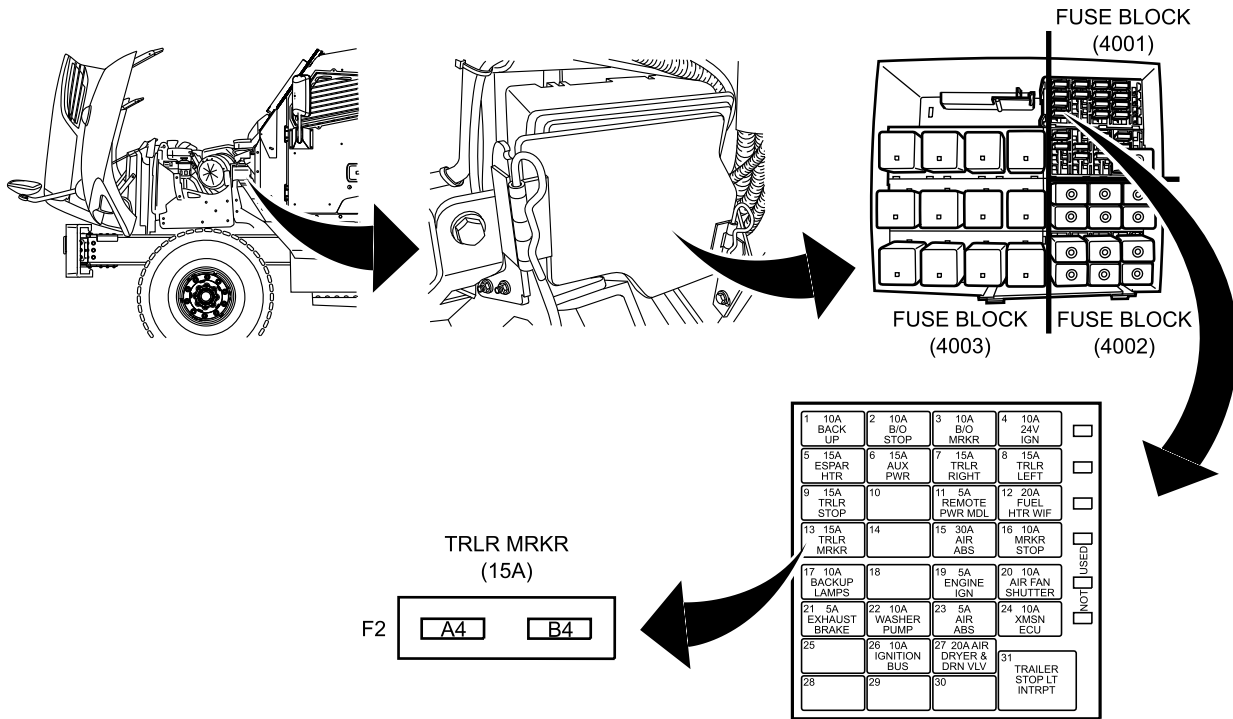
YES Go to Step 66.

NO Go to Step 64.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

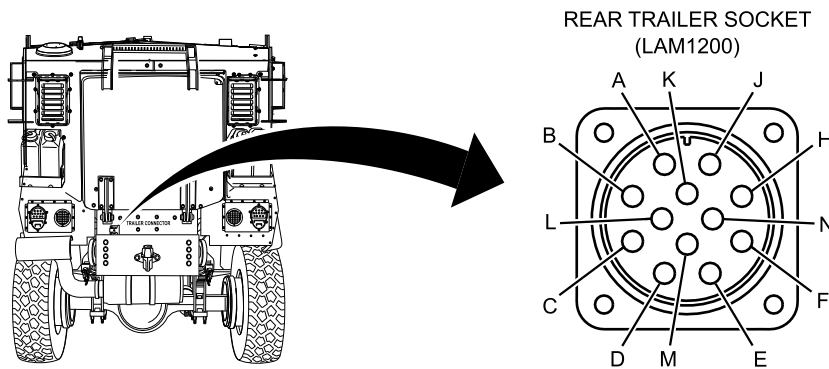
18. Install TRLR MRKR fuse. Refer to Figure 9. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605385

Figure 9. Engine Compartment PDC.

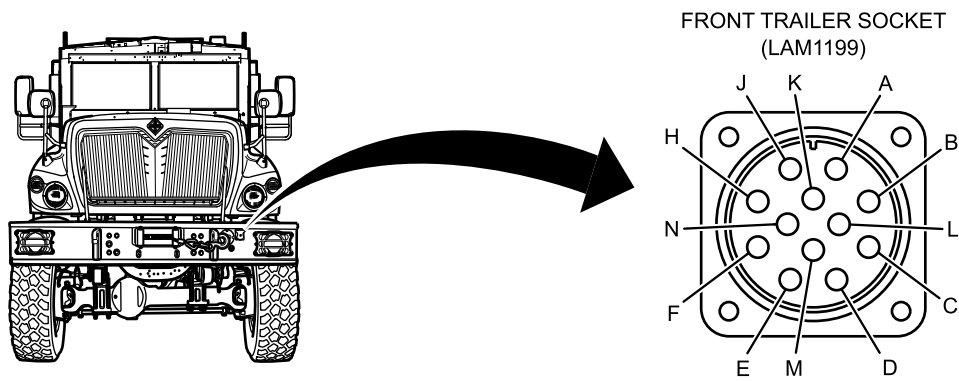
19. Connect jumper wire between connector LAM1200 socket terminals E and L. Refer to Figure 10.



B230605229

Figure 10. Lower Rear Body Panel.

20. Measure resistance between connector LAM1199 terminal E and ground with multimeter. Refer to Figure 11.

**TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

B230605228

Figure 11. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

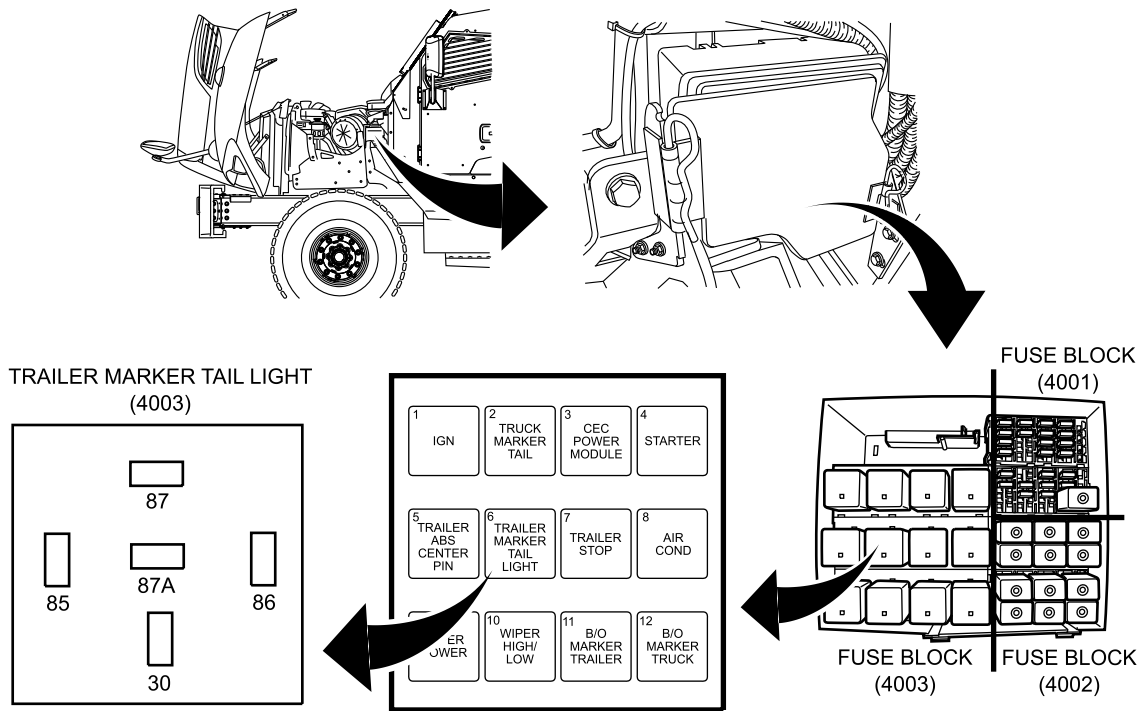
YES Go to Step 35.

NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

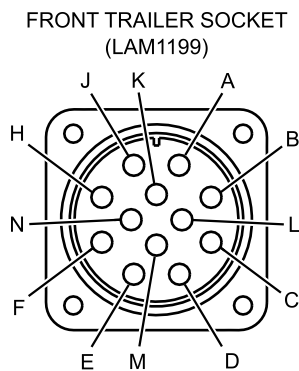
21. Remove TRAILER MARKER TAIL LIGHT relay. Refer to Figure 12. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605353

Figure 12. Engine Compartment PDC.

22. Connect a jumper wire between TRAILER MARKER TAIL LIGHT relay socket terminal 87A and TRAILER MARKER TAIL LIGHT relay socket terminal 30. Refer to Figure 12.
23. Measure resistance between connector LAM1199 socket terminals E and L with multimeter. Refer to Figure 13.



B230604548

Figure 13. Connector LAM1199.

**TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 68.
NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

24. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
25. Remove left engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
26. Disconnect connector 9724 (connector with 5 wires). Refer to Figure 14.

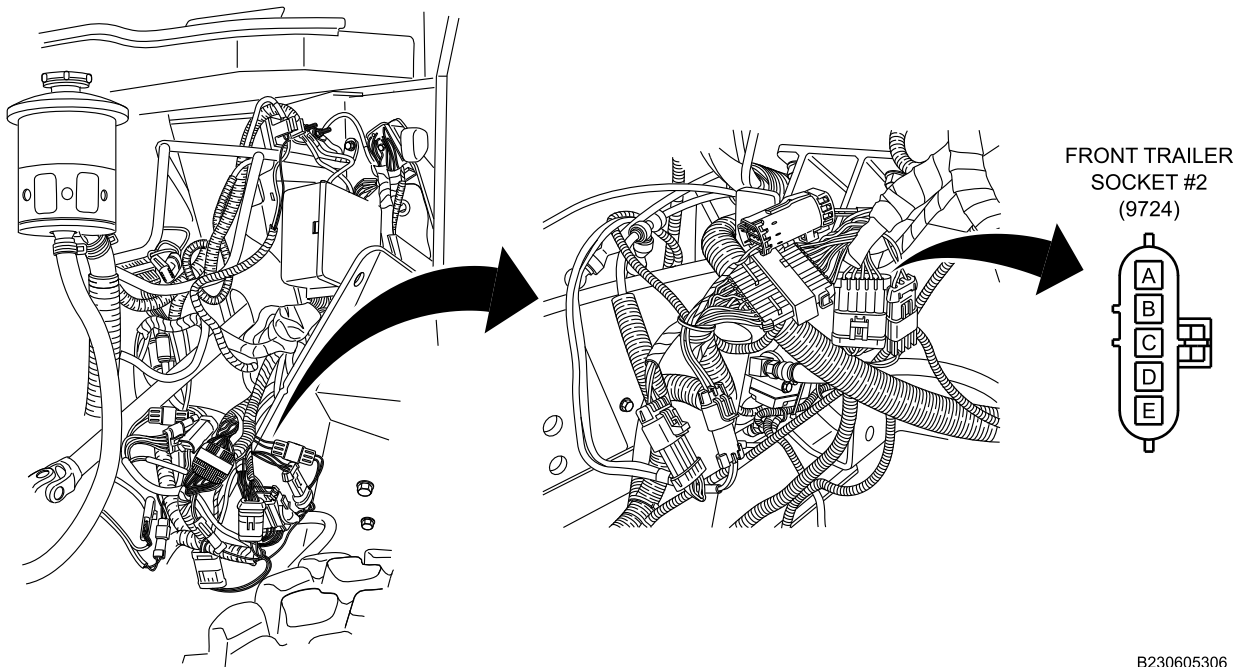


Figure 14. Engine Compartment Under Air Cleaner Housing.

27. Measure resistance between connector 9724 terminal A (vehicle side) and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 66.
NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Disconnect connector 9716F (connector with brown wire in cavity A). Refer to Figure 15.

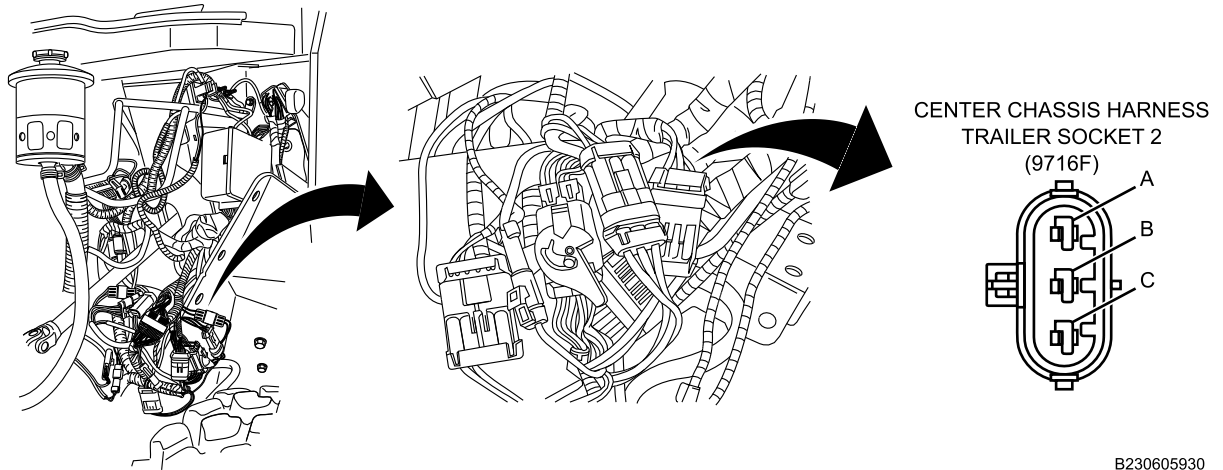


Figure 15. Engine Compartment Under Air Cleaner Assembly.

29. Measure resistance between connector 9716F terminal A and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

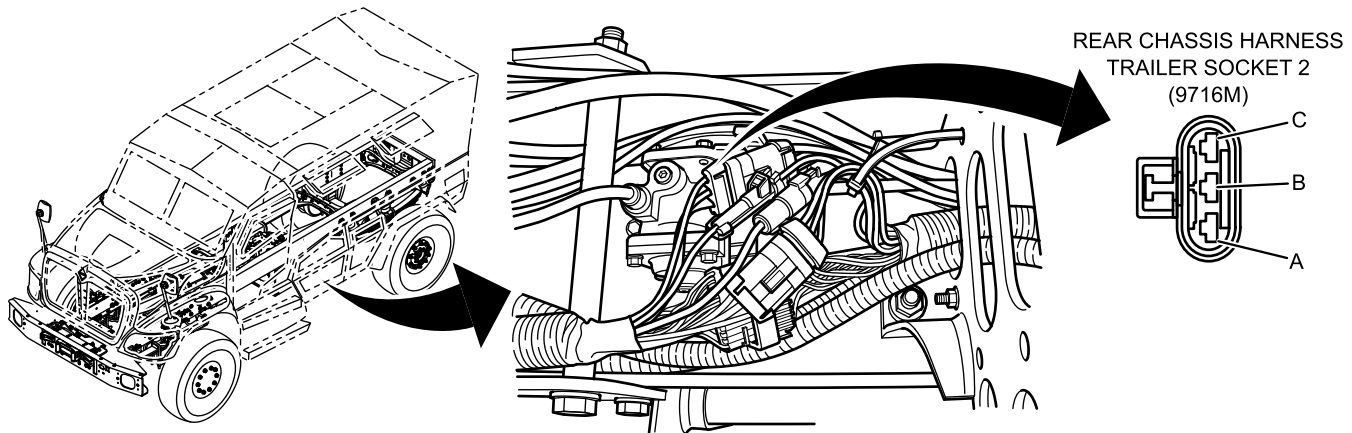
DECISION

YES Go to Step 64.
NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

30. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
31. Disconnect connector 9716M (connector with black wire in cavity A). Refer to Figure 16.



B230605338

Figure 16. Left Side Frame Rail.

32. Measure resistance between connector 9716M terminal A and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

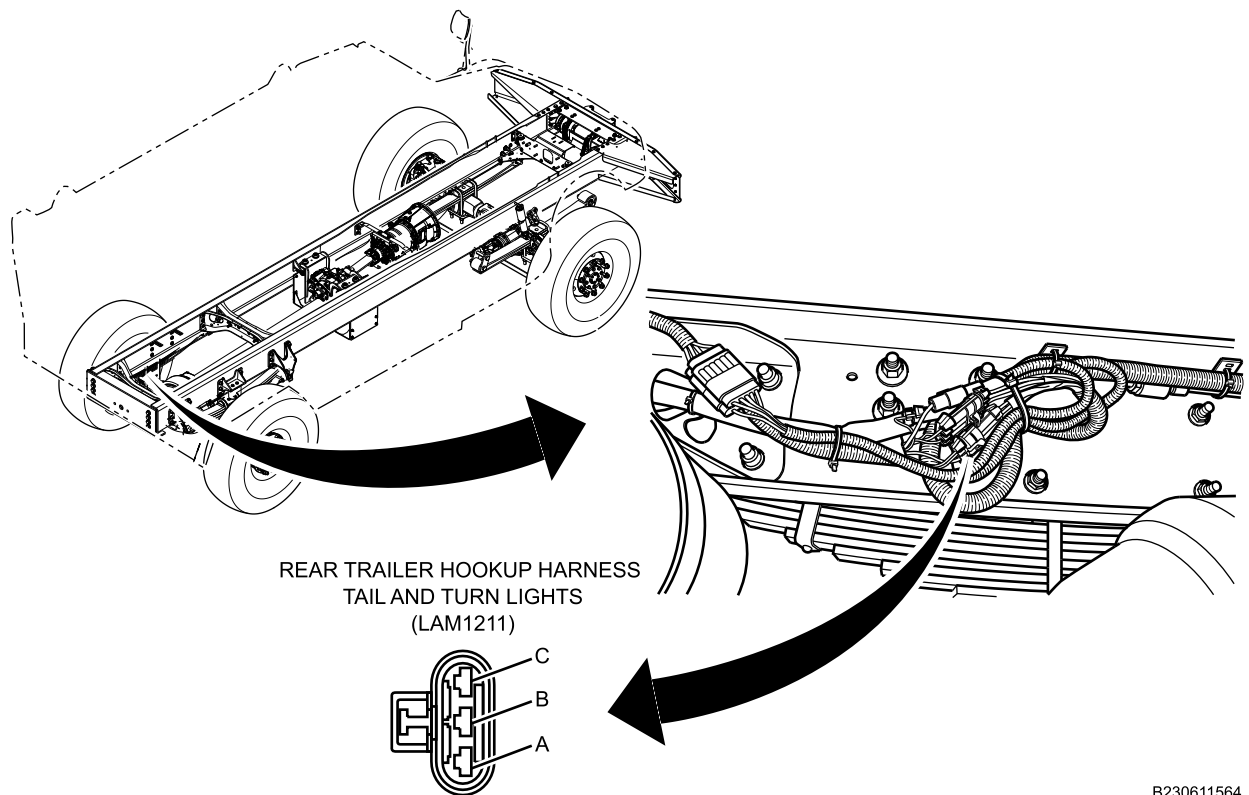
DECISION

YES Go to Step 62.
NO Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

33. Disconnect connector LAM1211 (connector with brown wire in cavity A). Refer to Figure 17.



B230611564

Figure 17. Left Rear Frame Rail.

34. Measure resistance between connector LAM1211 terminal A and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

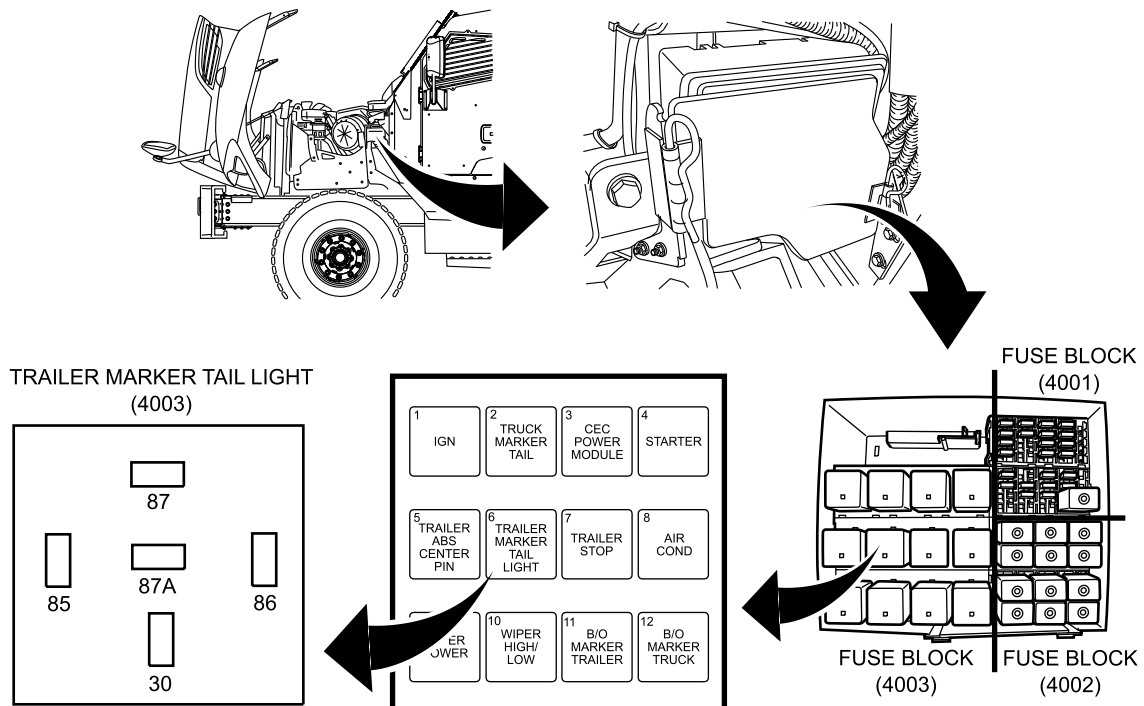
YES Go to Step 63.

NO Go to Step 67.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

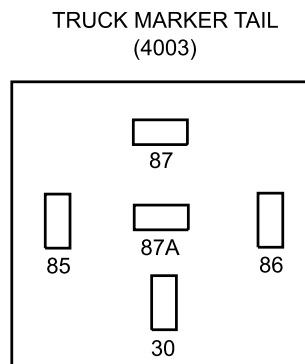
35. Remove TRAILER MARKER TAIL LIGHT relay. Refer to Figure 18. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



B230605353

Figure 18. Engine Compartment PDC.

36. Measure resistance between TRAILER MARKER TAIL LIGHT relay socket terminal 87A and TRUCK MRKR TAIL relay socket terminal 87A with multimeter. Refer to Figure 18 and Figure 19.



B230605447

Figure 19. TRUCK MRKR TAIL Relay Socket.

CONDITION/INDICATION

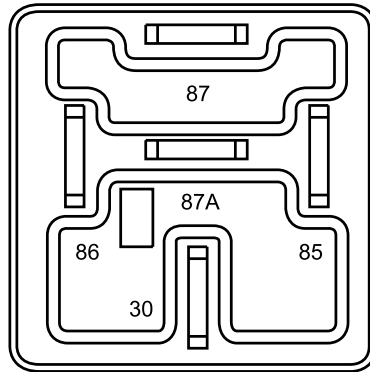
Does multimeter read less than 5 ohms?

**TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****DECISION**

NO Go to Step 64.
YES Go to next step.

STEP

37. Measure resistance between TRUCK MRKR TAIL relay terminal 87A (relay side) and TRUCK MRKR TAIL relay terminal 30 (relay side) with multimeter. Refer to Figure 20.



B230605608

Figure 20. TRUCK MRKR TAIL Relay Terminals.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

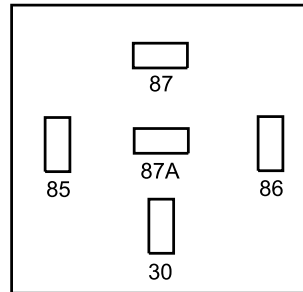
NO Go to Step 69.
YES Go to next step.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

38. Turn MAIN POWER switch ON (TM 9-2355-106-10).
39. Turn ignition switch ON (TM 9-2355-106-10).
40. Measure DC voltage between TRAILER MARKER TAIL LIGHT relay socket terminal 87 and ground with multimeter. Refer to Figure 21.

TRAILER MARKER TAIL LIGHT
(4003)



B230605450

Figure 21. TRAILER MARKER TAIL LIGHT Relay Socket Terminals.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

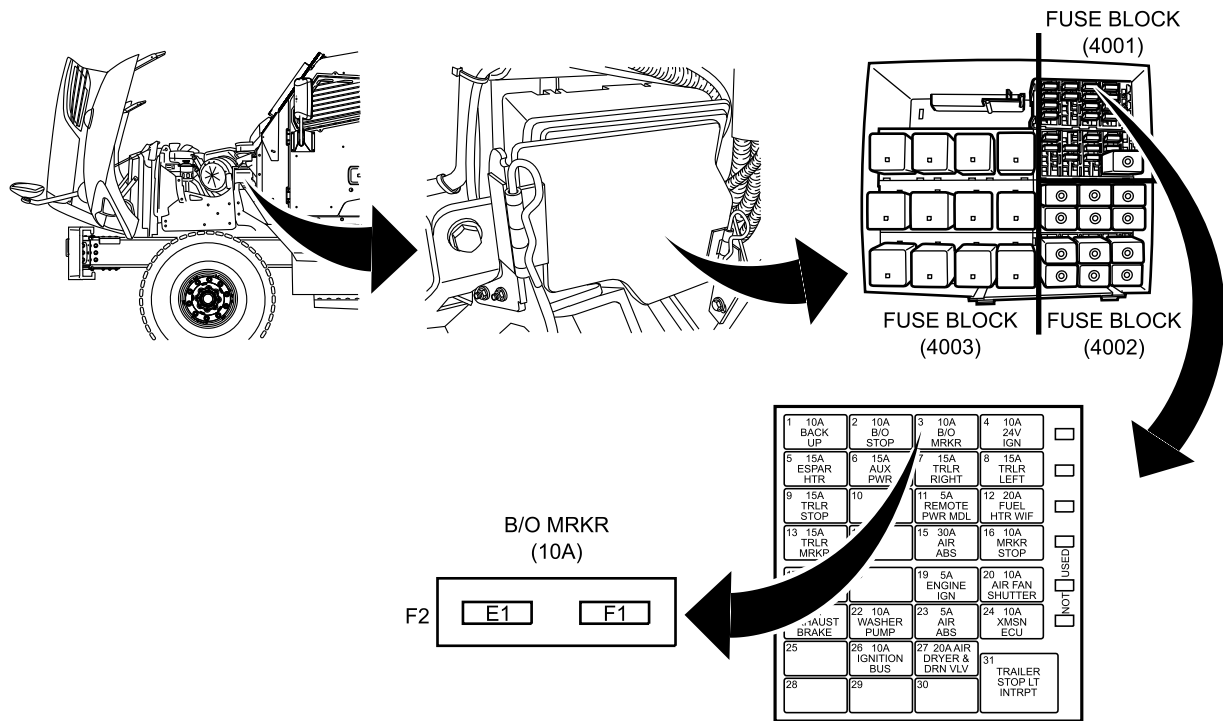
DECISION

YES Go to Step 47.
NO Go to next step.

STEP

41. Turn ignition switch OFF (TM 9-2355-106-10).
42. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
43. Remove B/O MRKR fuse. Refer to Figure 22. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605377

Figure 22. Engine Compartment PDC.

44. Turn MAIN POWER switch ON (TM 9-2355-106-10).
45. Turn ignition switch ON (TM 9-2355-106-10).
46. Measure DC voltage between B/O MRKR fuse socket terminal E1 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

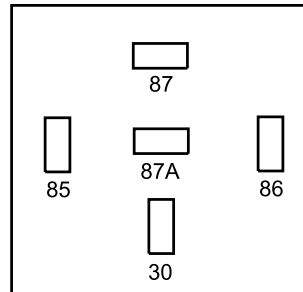
- NO Go to Step 65.
- YES Go to Step 64.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

47. Measure DC voltage between TRAILER MARKER TAIL LIGHT relay socket terminal 86 and ground with multimeter. Refer to Figure 23.

TRAILER MARKER TAIL LIGHT
(4003)



B230605450

Figure 23. TRAILER MARKER TAIL LIGHT Relay Socket.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

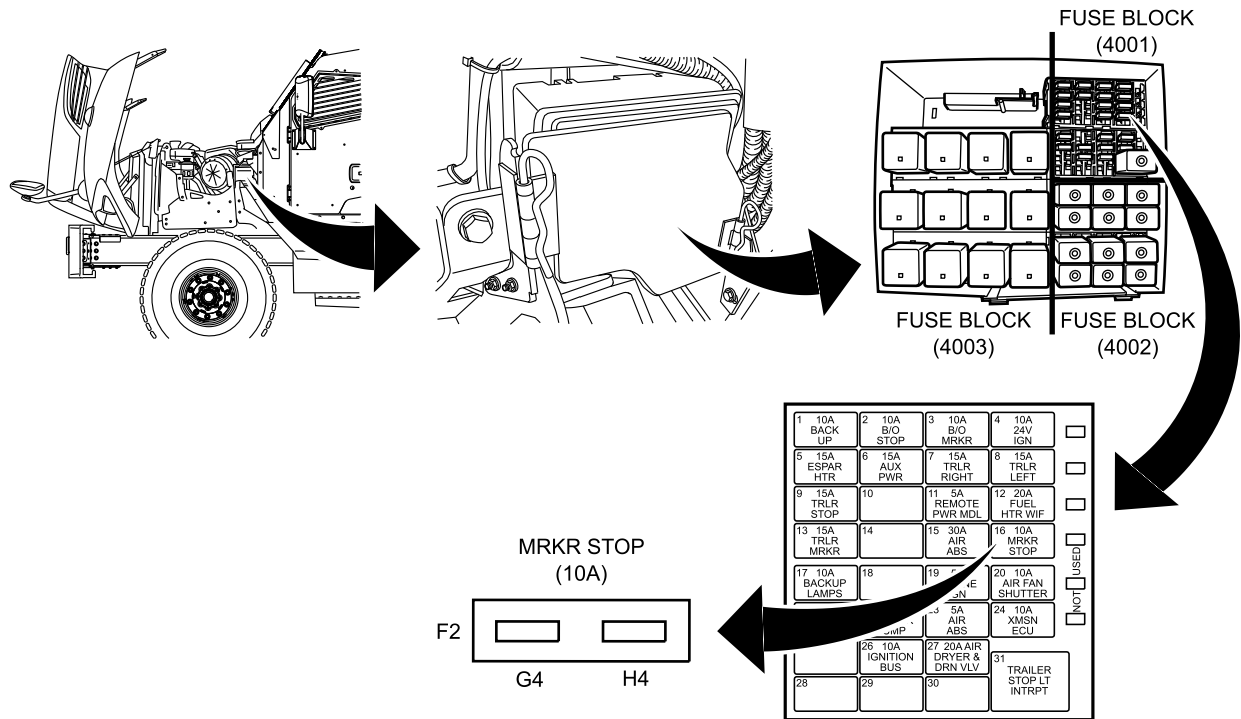
DECISION

YES Go to Step 54.
NO Go to next step.

STEP

48. Turn ignition switch OFF (TM 9-2355-106-10).
49. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
50. Remove and inspect MRKR STOP fuse. Refer to Figure 24. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605387

Figure 24. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 61.
NO Go to next step.

STEP

51. Turn MAIN POWER switch ON (TM 9-2355-106-10).
52. Turn ignition switch ON (TM 9-2355-106-10).
53. Measure DC voltage between MRKR STOP fuse socket terminal G4 and ground with multimeter. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

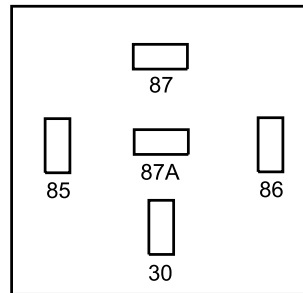
NO Go to Step 65.
YES Go to Step 64.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

54. Turn service lights ON (TM 9-2355-106-10).
55. Measure DC voltage between TRAILER MARKER TAIL LIGHT relay socket terminal 86 and TRAILER MARKER TAIL LIGHT relay socket terminal 85 with multimeter. Refer to Figure 25.

TRAILER MARKER TAIL LIGHT
(4003)



B230605450

Figure 25. TRAILER MARKER TAIL LIGHT Relay Socket.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

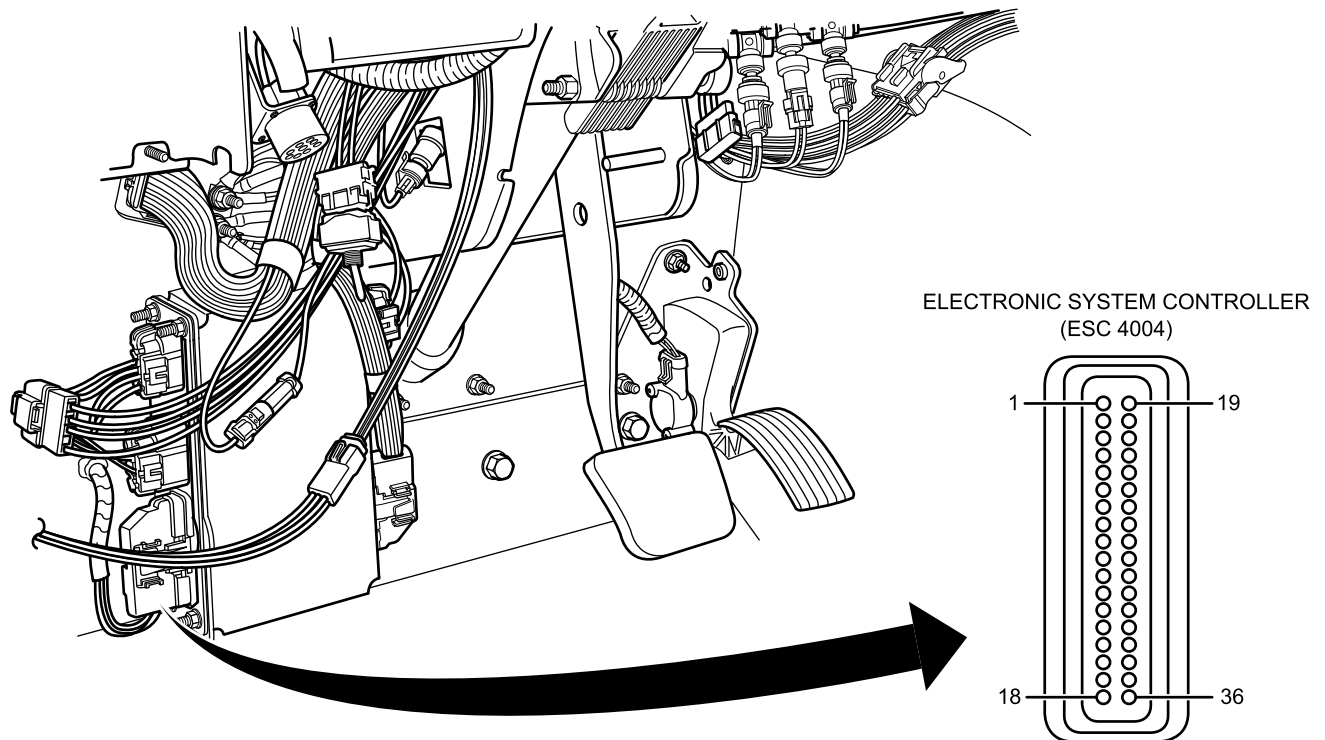
DECISION

- YES Go to Step 68.
NO Go to next step.

STEP

56. Turn ignition switch OFF (TM 9-2355-106-10).
57. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
58. Disconnect Electronic System Controller (ESC) connector 4004. Refer to Figure 26. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353).

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604421

Figure 26. Lower Left Side Dash.

59. With assistance, measure resistance between TRAILER MARKER TAIL LIGHT relay socket terminal 85 and ESC connector 4004 terminal 17 with multimeter. Refer to Figure 25 and Figure 26.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 64.
YES Go to next step.

STEP

60. Measure resistance between ESC connector 4004 terminal 17 and all other ESC connector 4004 terminals. Refer to Figure 26.

CONDITION/INDICATION

Does multimeter read OL for each test?

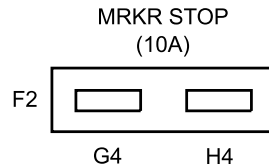
DECISION

NO Go to Step 64.
YES Go to Step 71.

TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

61. Measure resistance between MRKR STOP fuse socket terminal H4 and ground with multimeter. Refer to Figure 27.



B230605423

Figure 27. MRKR STOP Fuse Socket.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 68.
NO Go to Step 64.

MALFUNCTION

- 62. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST

MALFUNCTION

- 63. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST

MALFUNCTION

- 64. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

**TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****END OF TEST****MALFUNCTION**

- 65. Power distribution is faulty.

ACTION

Refer to Power Distribution Troubleshooting Procedure (WP 0080). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 66. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 67. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 68. TRAILER MARKER TAIL LIGHT relay is faulty.

ACTION

Replace TRAILER MARKER TAIL LIGHT relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 69. TRUCK MARKER TAIL relay is faulty.

ACTION

Replace TRUCK MARKER TAIL relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

**TRAILER CONNECTOR SERVICE CLEARANCE CIRCUIT TROUBLESHOOTING PROCEDURE -
(CONTINUED)****END OF TEST****MALFUNCTION**

- 70. TRLR MRKR fuse is faulty.

ACTION**NOTE**

Fuse was blown because a short to ground existed in the auxiliary trailer circuit. The short to ground is not present at this time. The short to ground may be intermittent or, if this vehicle was towing another vehicle, the short to ground may exist in the vehicle that was being towed.

Replace TRLR MRKR fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 71. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0257
WP 0333
WP 0335
WP 0336
WP 0429
WP 0431
WP 0426
WP 0427

WP 0594

WP 0782

Equipment Condition

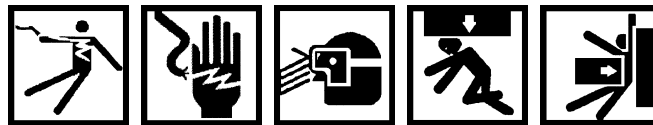
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Air cleaner assembly removed (WP 0257)

Drawings Required

WP 0789, Figure 64
WP 0789, Figure 65
WP 0789, Figure 59
WP 0789, Figure 55
WP 0789, Figure 60

TROUBLESHOOTING PROCEDURE

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.

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.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

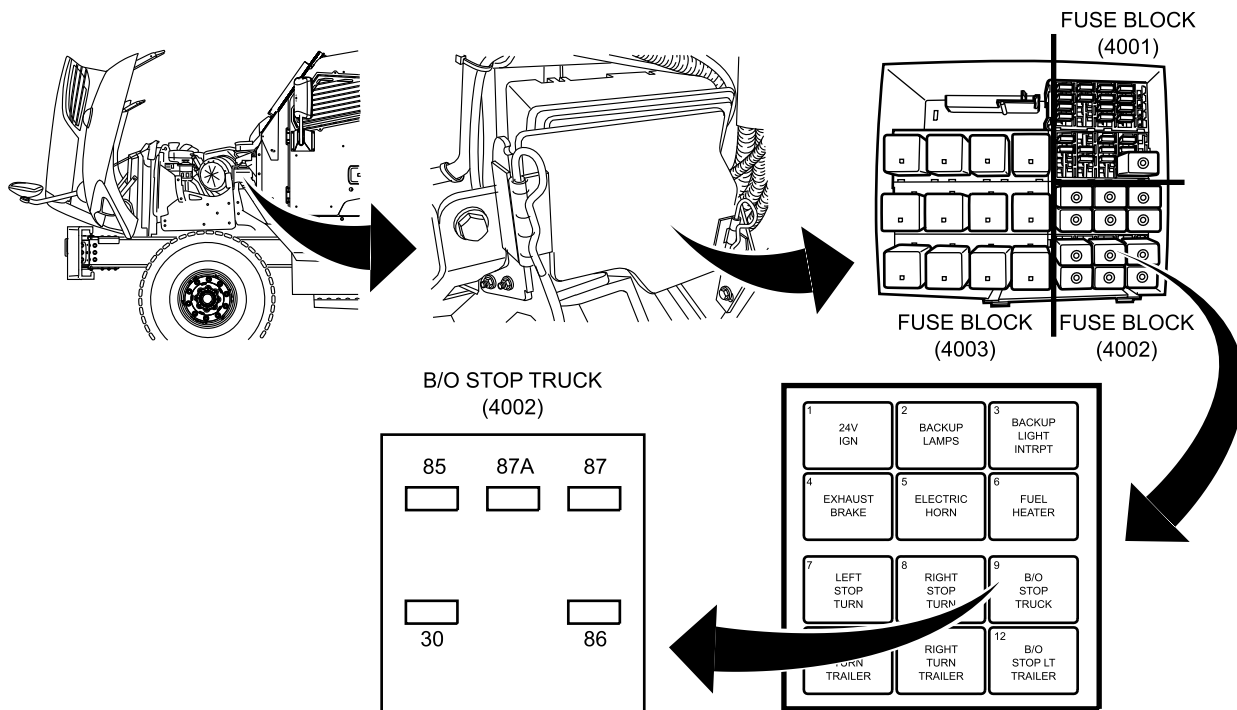
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove B/O STOP TRUCK relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 1.

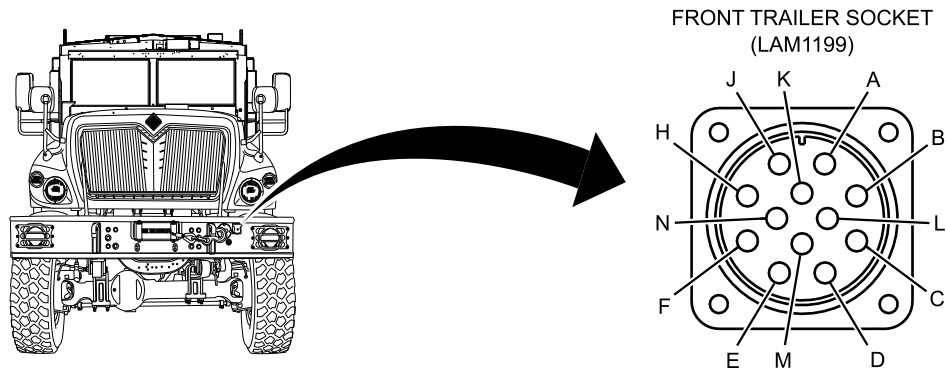


B230605315

Figure 1. Underhood Power Distribution Center (PDC).

2. Measure resistance between front trailer socket terminals F and L with multimeter. Refer to Figure 2.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605228

Figure 2. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read OL?

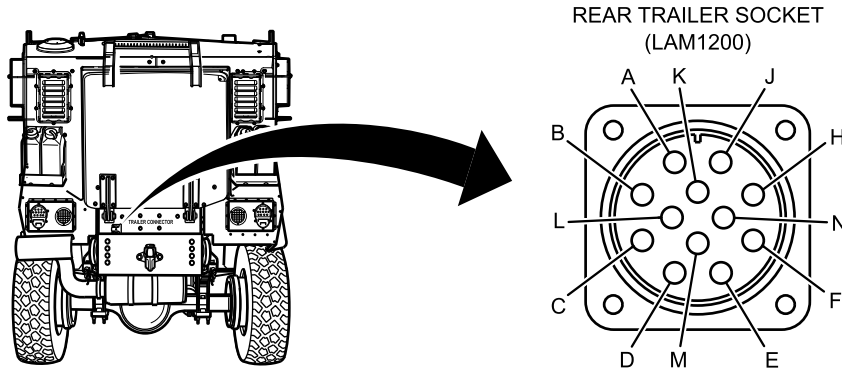
DECISION

NO Go to Step 5.
 YES Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

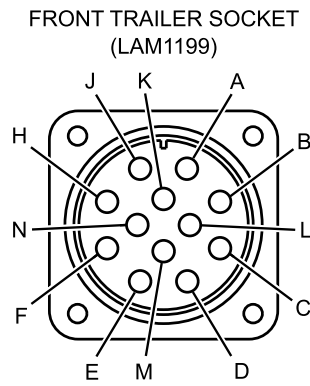
3. Connect a jumper wire between connector LAM1200 socket terminals F and L. Refer to Figure 3.



B230605229

Figure 3. Lower Rear Body Panel.

4. Measure resistance between front trailer socket terminals F and L with multimeter. Refer to Figure 4.



B230604548

Figure 4. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

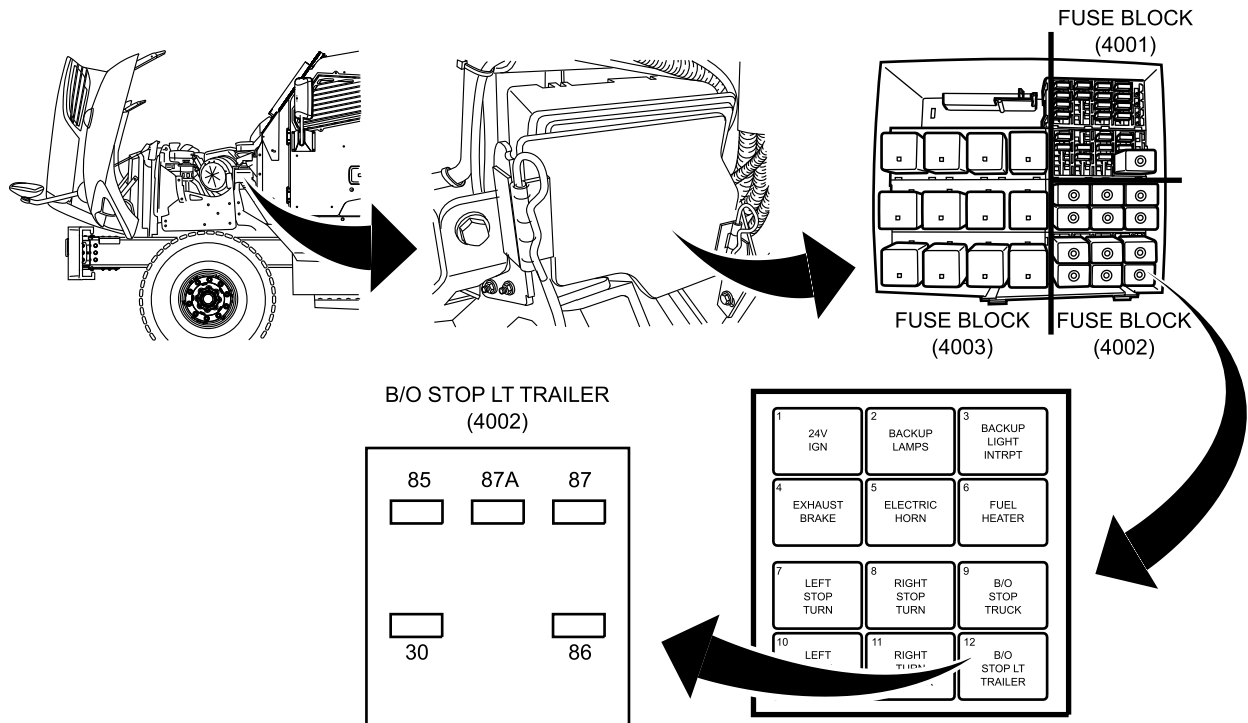
DECISION

NO Go to Step 14.
 YES Go to Step 26.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Remove B/O STOP LT TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 5.



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Figure 5. Engine Compartment PDC.

6. Connect a jumper wire between B/O STOP LT TRAILER relay socket terminals 87A and 30. Refer to Figure 5.
7. Measure resistance between front trailer socket terminals F and L with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

- YES Go to Step 55.
- NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

8. Disconnect connector 9780M. Refer to Figure 6.

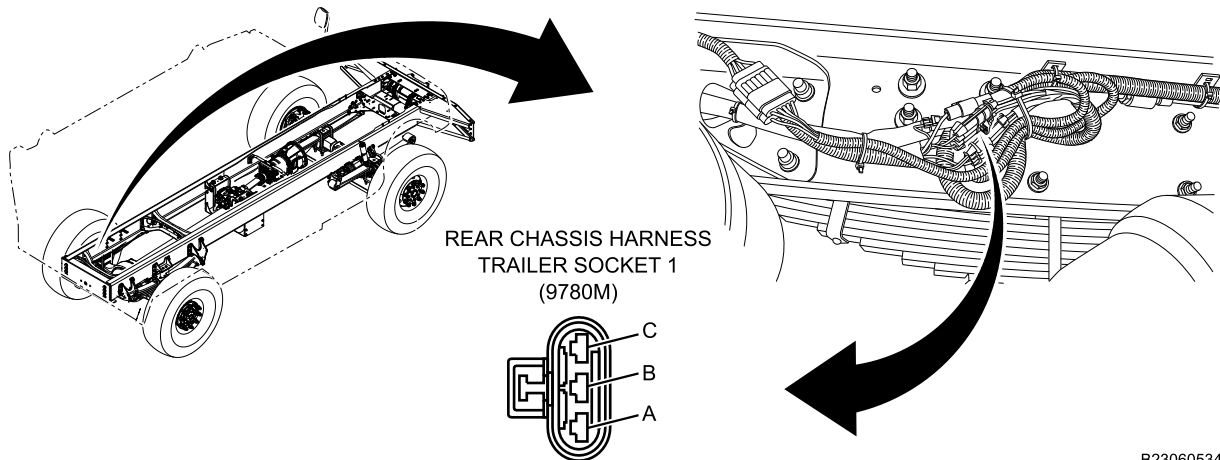


Figure 6. Left Rear Frame Rail Behind Air Dryer.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 54.
NO Go to next step.

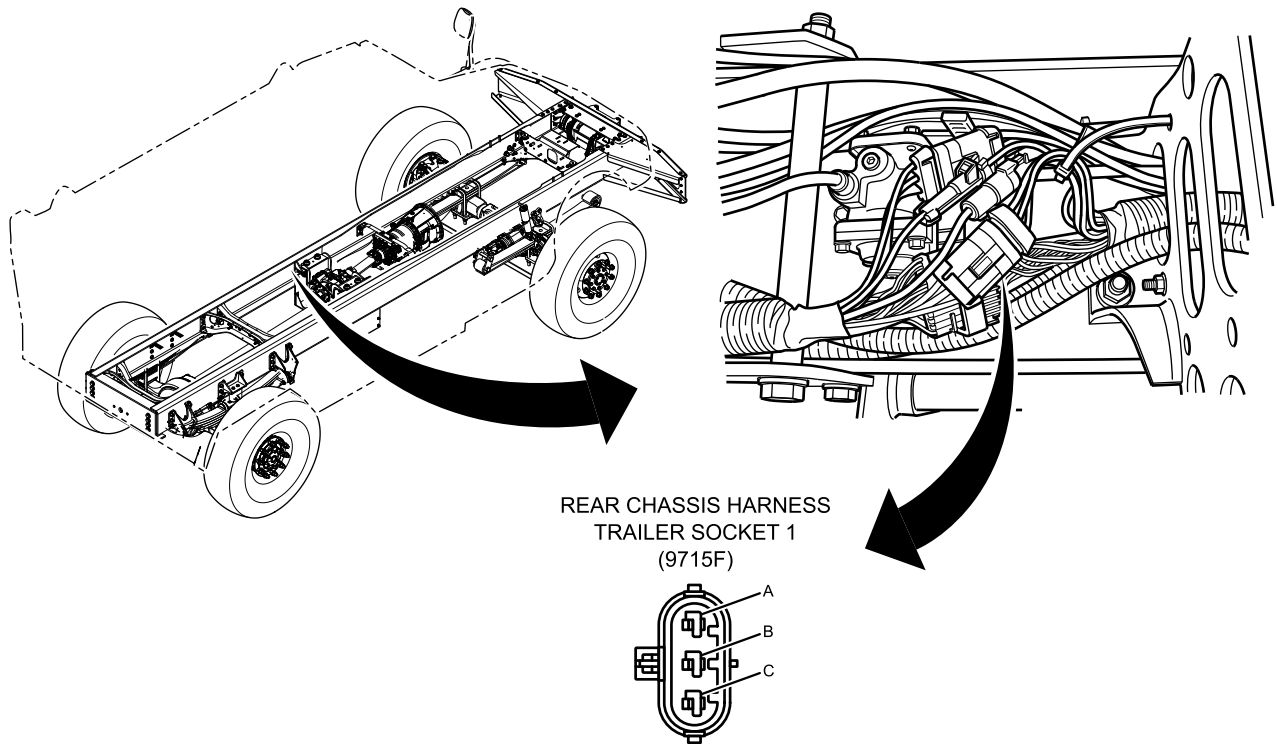
TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

NOTE

Air dryer has been removed to improve visibility of the connector harness.

9. Disconnect connector 9715F. Refer to Figure 7.



B230605336

Figure 7. Left Side Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 50.
NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

10. Remove left side engine armor plate. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0594).
11. Disconnect connector 9715M. Refer to Figure 8.

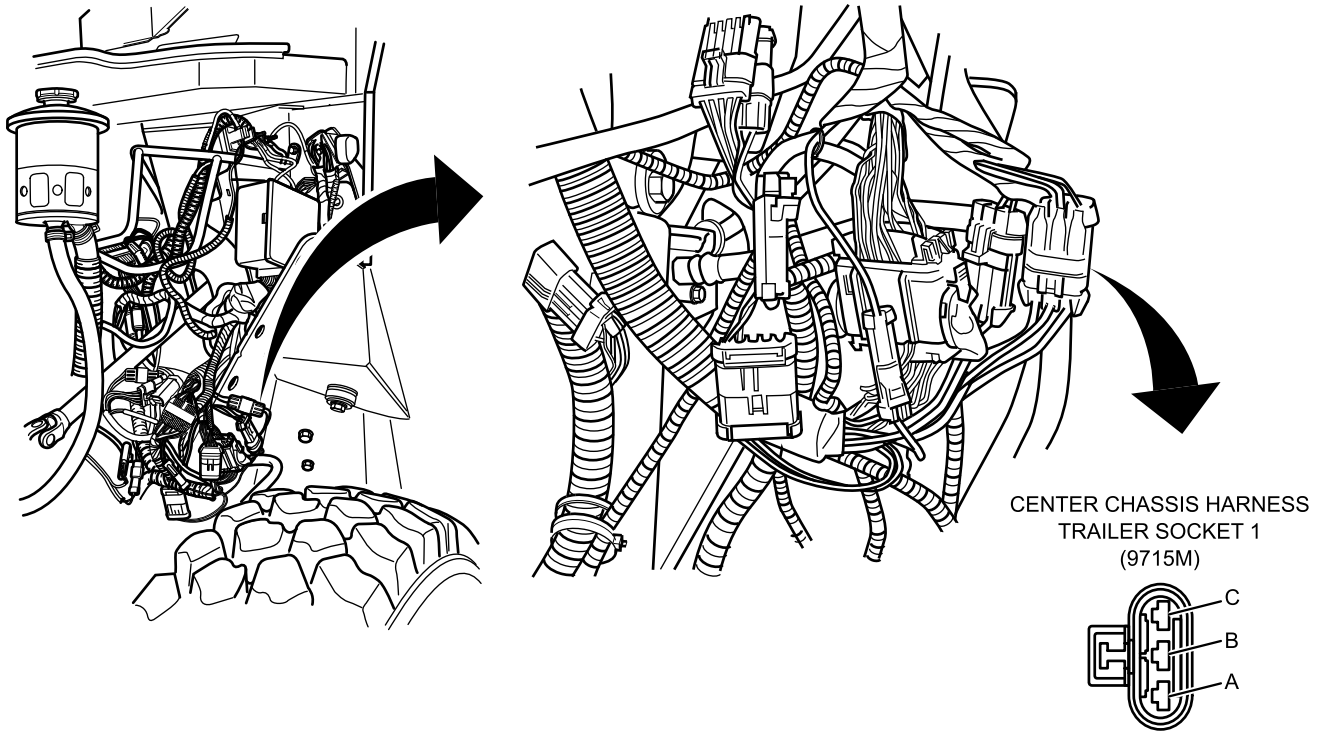


Figure 8. Engine Compartment Below PDC.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 49.
NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Remove jumper wire from B/O STOP LT TRAILER relay socket terminals 87a and 30.

CONDITION/INDICATION

Does multimeter read OL?

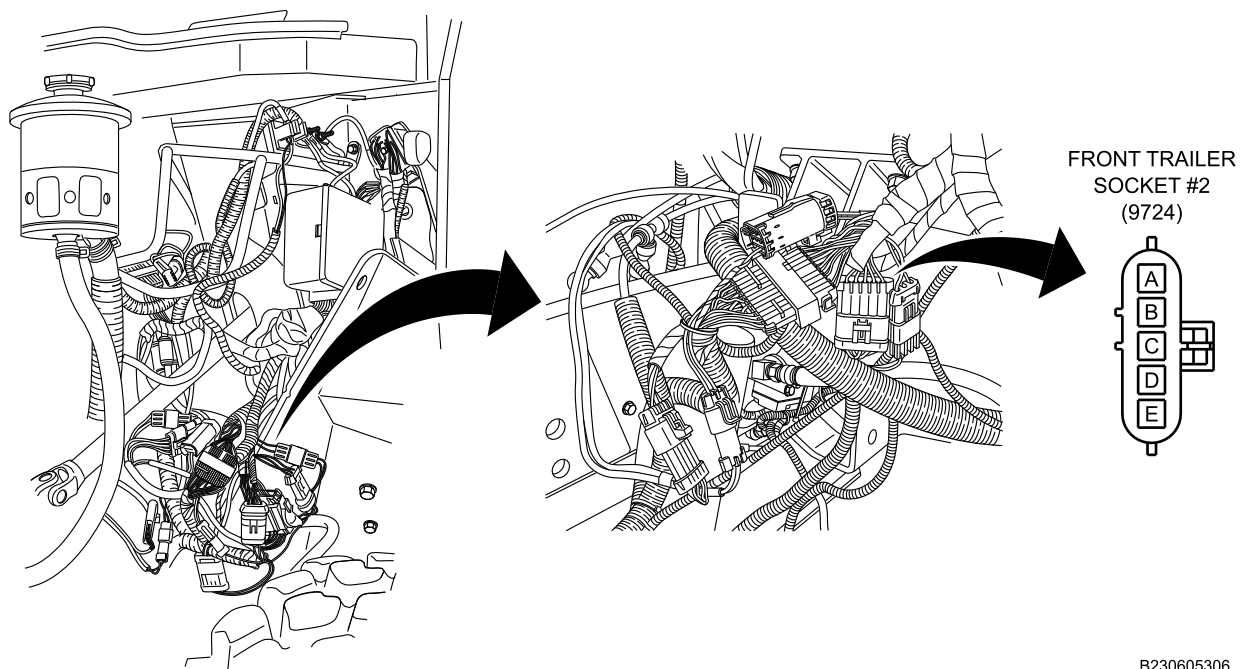
DECISION

YES Go to Step 51.

NO Go to next step.

STEP

13. Disconnect connector 9724. Refer to Figure 9.



B230605306

Figure 9. Engine Compartment Under Air Cleaner Housing.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

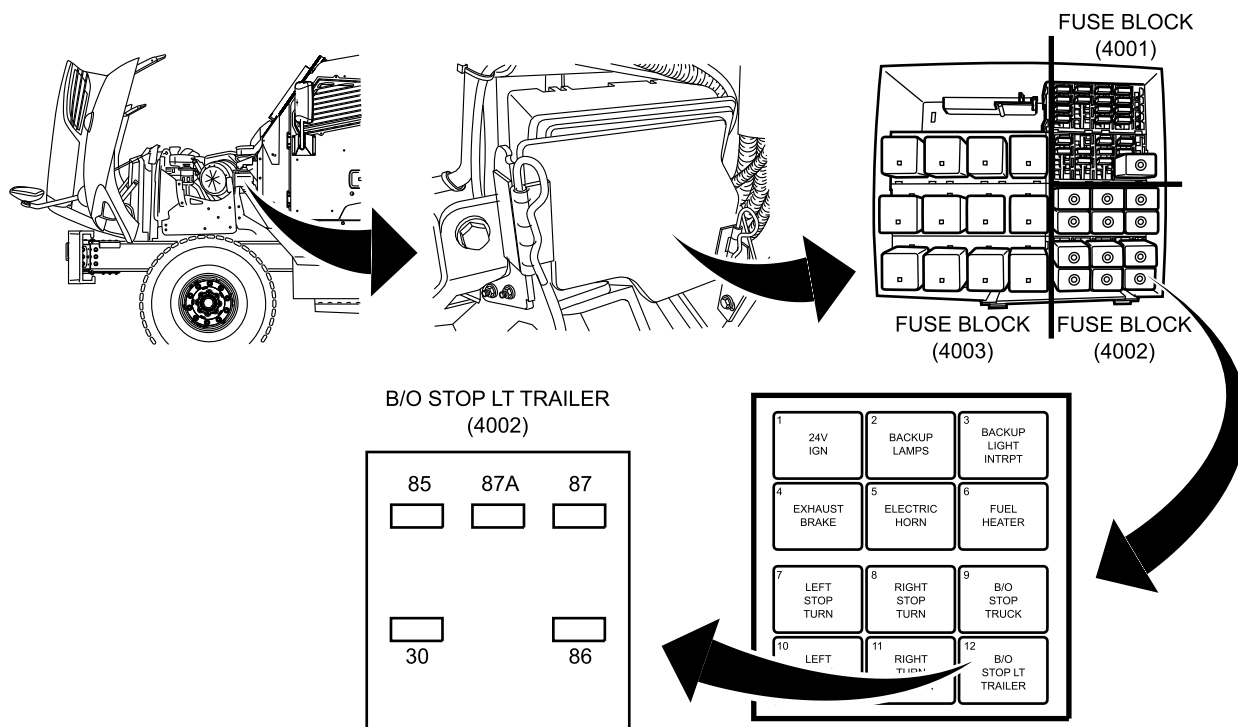
YES Go to Step 51.

NO Go to Step 53.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

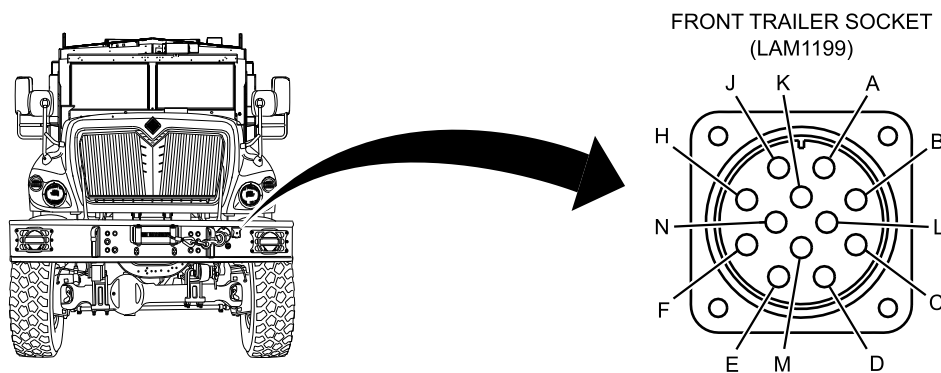
14. Remove B/O STOP LT TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 10.



B230605318

Figure 10. Engine Compartment PDC.

15. Connect a jumper wire between B/O STOP LT TRAILER relay socket terminals 87A and 30. Refer to Figure 10.
16. Measure resistance between front trailer socket terminals F and L with multimeter. Refer to Figure 11.



B230605228

Figure 11. Left Side Front Bumper.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 55.

NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

17. Disconnect connector 9724. Refer to Figure 12.

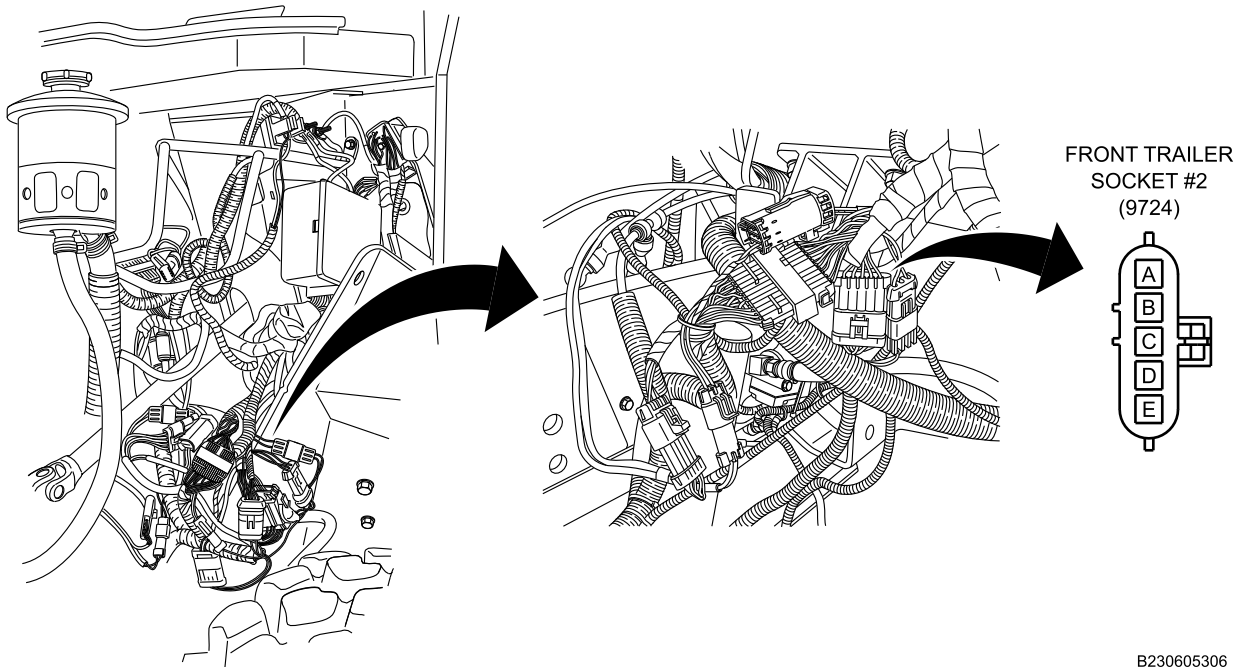


Figure 12. Engine Compartment Under PDC.

18. Measure resistance between connector 9724 terminal E and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 53.

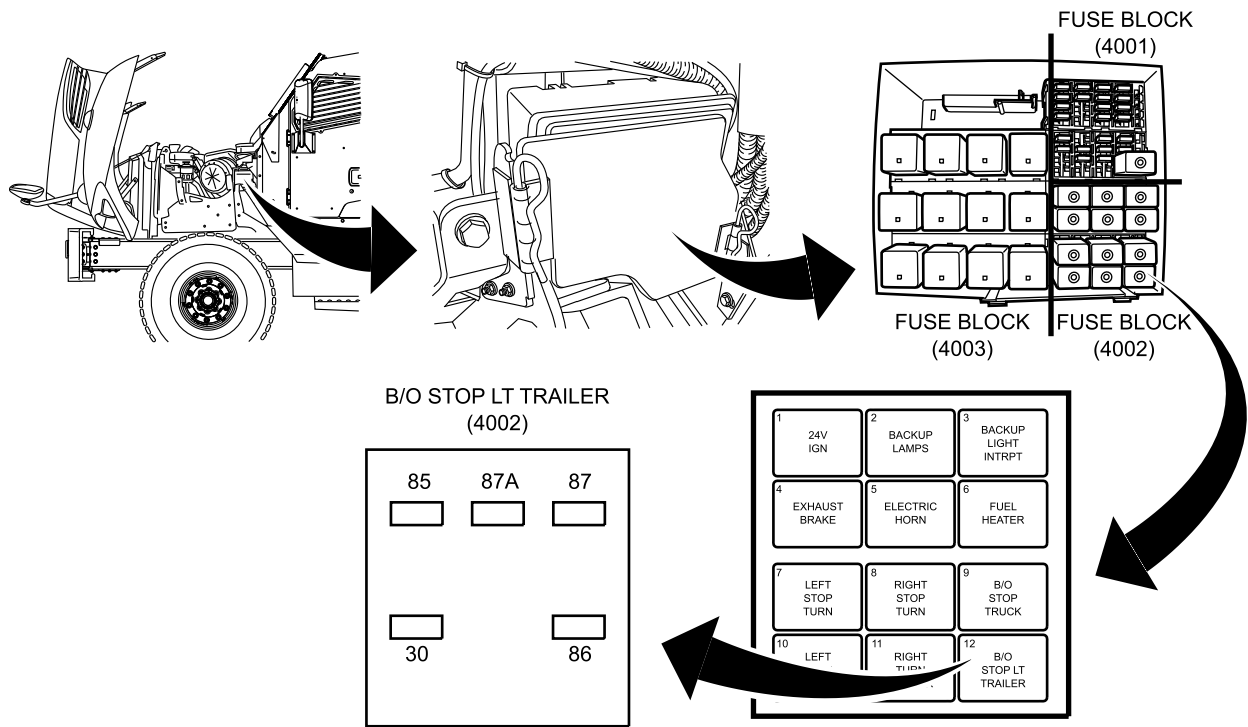
NO Go to next step.

STEP

19. Remove jumper wire from B/O STOP LT TRAILER relay socket.

20. Measure resistance between B/O STOP LT TRAILER relay socket terminal 30 and ground with multimeter. Refer to Figure 13.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605318

Figure 13. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

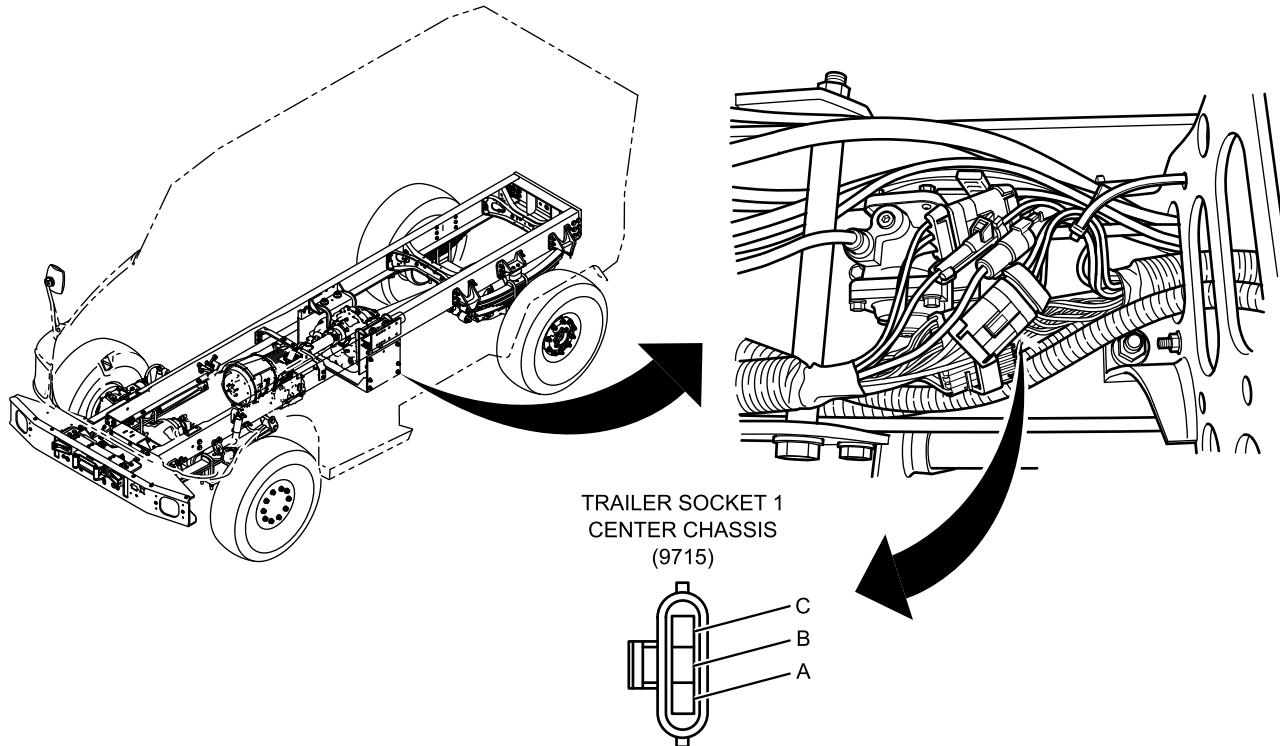
DECISION

YES Go to Step 51.
 NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

21. Disconnect connector 9715 from 9715F. Refer to Figure 14.



B230605335

Figure 14. Left Side Frame Rail.

22. Measure resistance between connector 9715 terminal B and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 51.

NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

23. Measure resistance between connector 9715F terminal B and ground with multimeter. Refer to Figure 15.

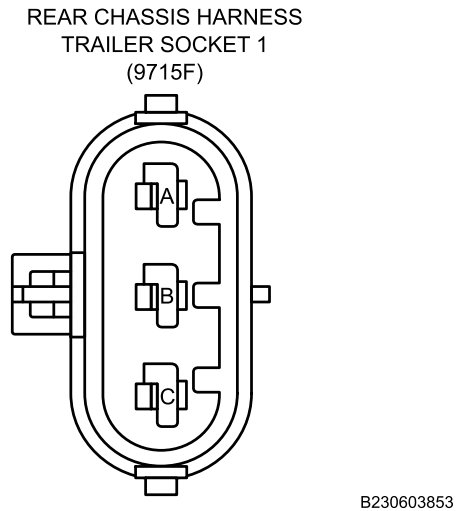


Figure 15. Connector 9715F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 49.
NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)
STEP

24. Disconnect connector 9780M. Refer to Figure 16.

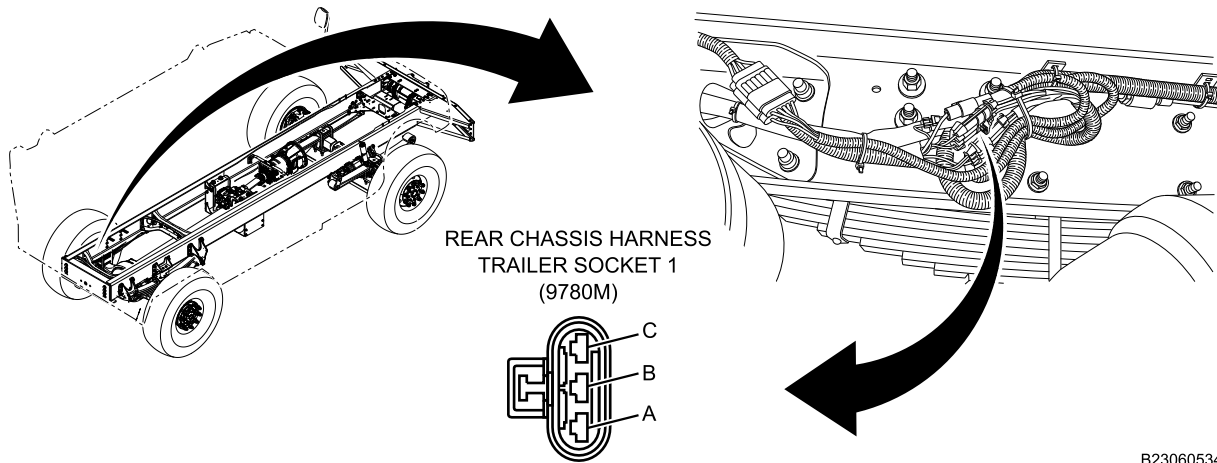


Figure 16. Left Side Frame Rail.

25. Measure resistance between connector 9780M terminal B and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

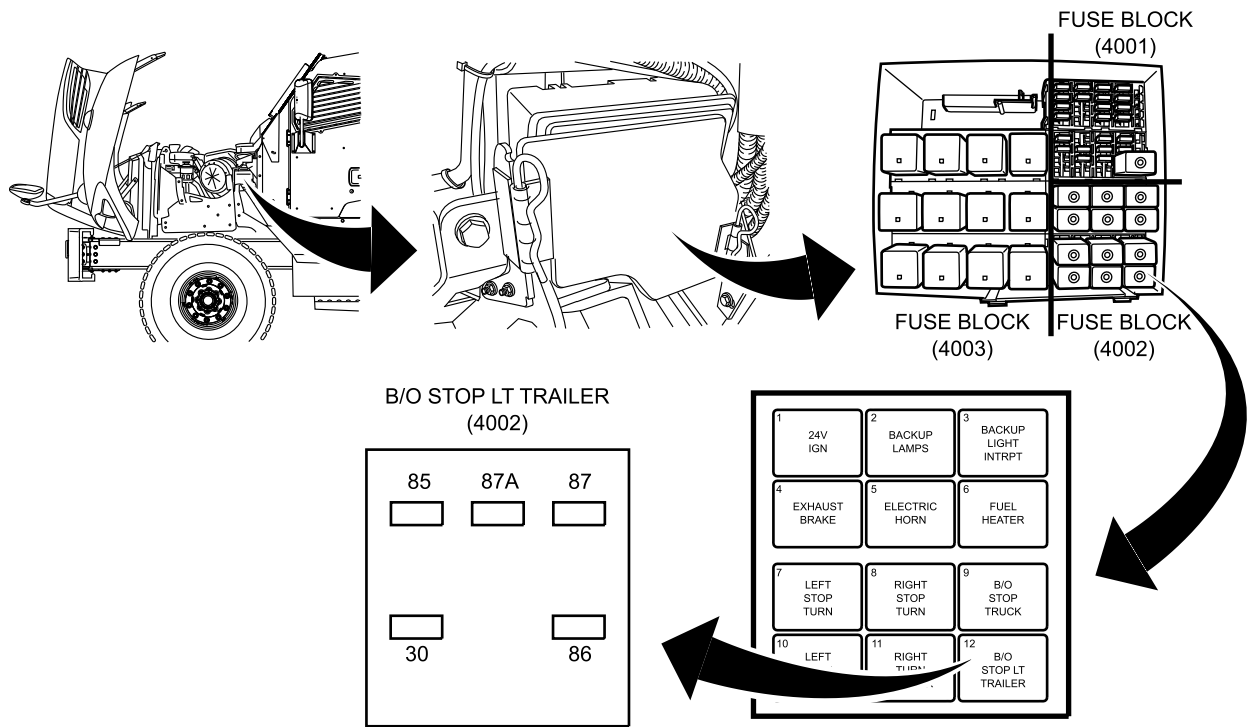
YES Go to Step 50.

NO Go to Step 54.

STEP

26. Remove B/O STOP LT TRAILER relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 17.

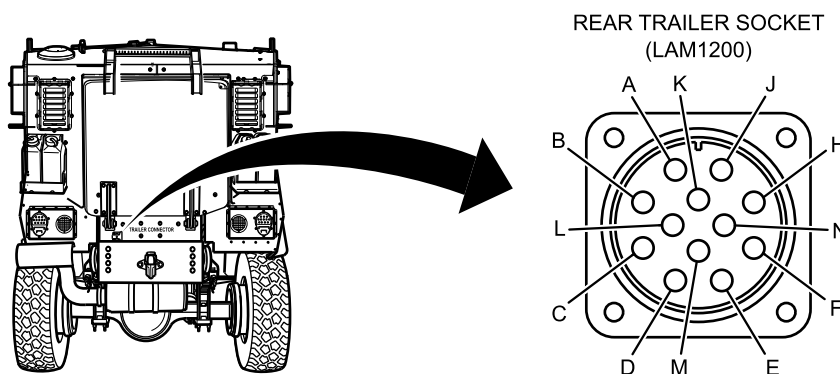
TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 17. Engine Compartment PDC.

27. Remove jumper wire from connector LAM1200. Refer to Figure 18.



B230605229

Figure 18. Lower Rear Body Panel.

- 28. Connect jumper wire between B/O STOP LT TRAILER relay socket terminal 87 and 30. Refer to Figure 17.
- 29. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 30. Turn ignition switch ON (TM 9-2355-106-10).
- 31. Measure DC voltage at connector LAM1200 between terminals F and L with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 41.
YES Go to next step.

STEP

32. Turn ignition switch OFF (TM 9-2355-106-10).
33. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
34. Measure resistance between B/O STOP LT TRAILER relay socket terminal 85 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

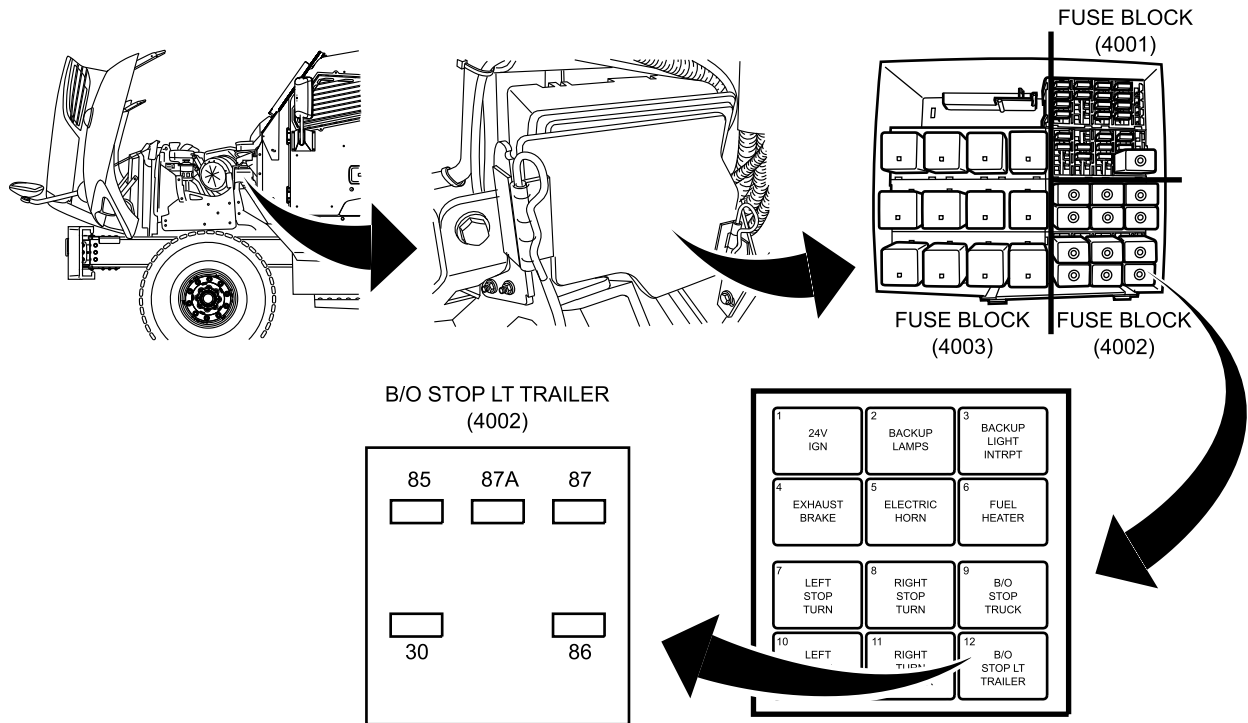
DECISION

NO Go to Step 51.
YES Go to next step.

STEP

35. Remove jumper wire from B/O STOP LT TRAILER relay socket terminals 87 and 30.
36. Turn MAIN POWER switch ON (TM 9-2355-106-10).
37. Turn ignition switch ON (TM 9-2355-106-10).
38. Select B.O. DRIVE on Master Vehicle Light Switch (MVLS) (TM 9-2355-106-10).
39. Have assistant press and hold brake pedal.
40. Measure DC voltage between relay socket terminal 86 and ground with multimeter. Refer to Figure 19.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 19. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

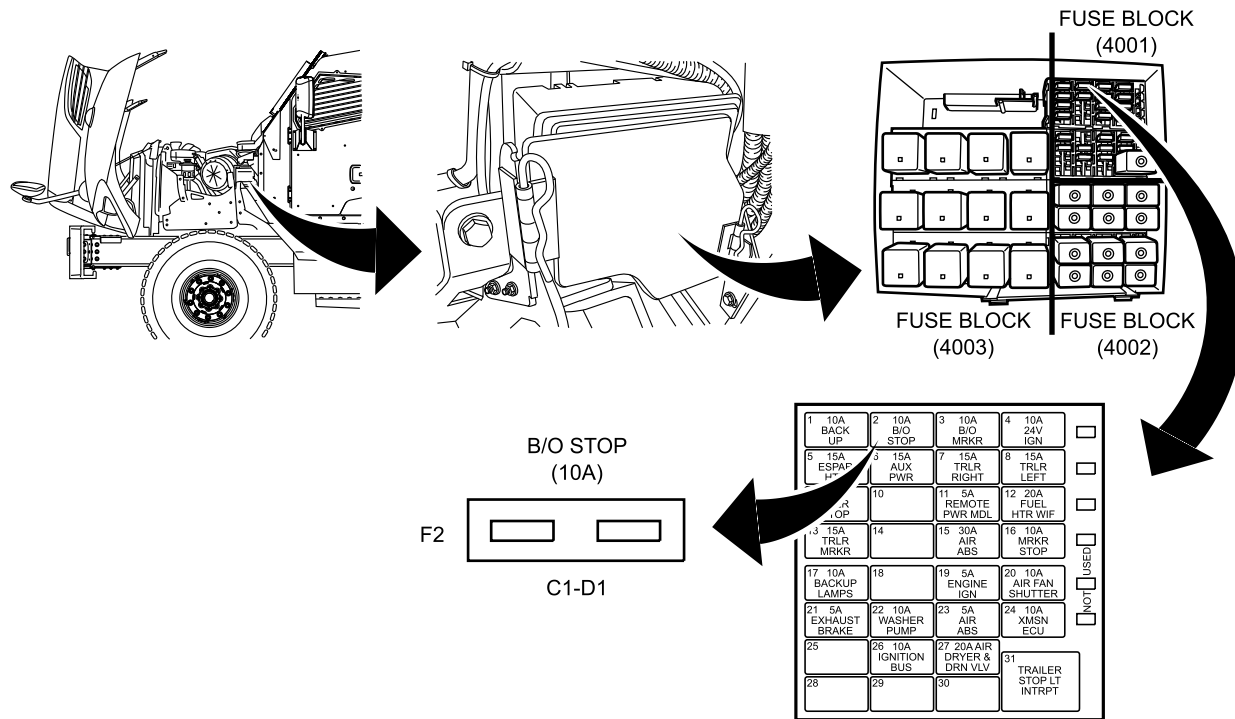
DECISION

NO Go to Step 51.
 YES Go to Step 55.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

41. Turn ignition switch OFF (TM 9-2355-106-10).
42. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
43. Remove jumper wire from B/O STOP LT TRAILER relay socket terminals 87 and 30.
44. Remove and visually inspect B/O STOP 10-amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 20.



B230605376

Figure 20. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

- YES Go to Step 48.
- NO Go to next step.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

45. Turn MAIN POWER switch ON (TM 9-2355-106-10).
46. Turn ignition switch ON (TM 9-2355-106-10).
47. Measure DC voltage between B/O STOP fuse socket terminal C1 and ground with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

DECISION

YES Go to Step 51.
NO Go to Step 52.

STEP

48. Measure resistance between B/O STOP LT TRAILER relay socket terminal 87 and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 55.
NO Go to Step 51.

MALFUNCTION

- 49. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 51. PDC harness is faulty.

TRAILER CONNECTOR STOP BLACKOUT CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 52. Power distribution is faulty.

ACTION

Refer to Power Distribution Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 53. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 54. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 55. Relay is faulty.

ACTION

Replace relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0597

WP 0598

WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0257
WP 0333
WP 0335
WP 0336
WP 0429
WP 0431
WP 0426

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 64
WP 0789, Figure 65
WP 0789, Figure 59
WP 0789, Figure 55
WP 0789, Figure 60

TROUBLESHOOTING PROCEDURE

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.

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.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

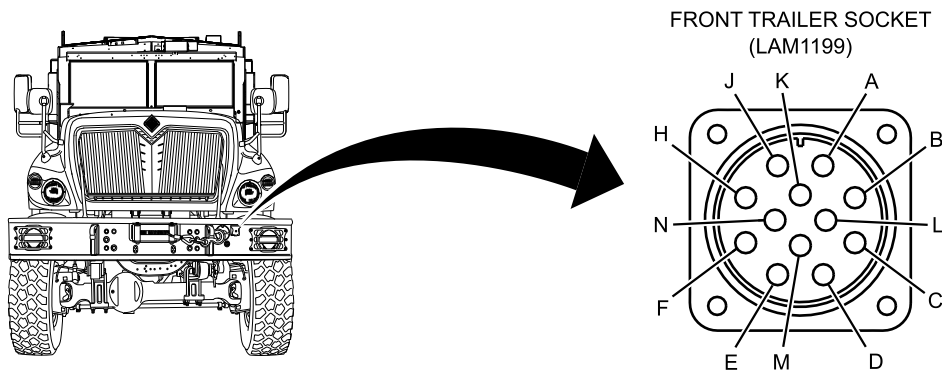
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 1.



B230605228

Figure 1. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 4.
YES Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

2. Connect a jumper wire between connector LAM1200 socket terminal K and L. Refer to Figure 2.

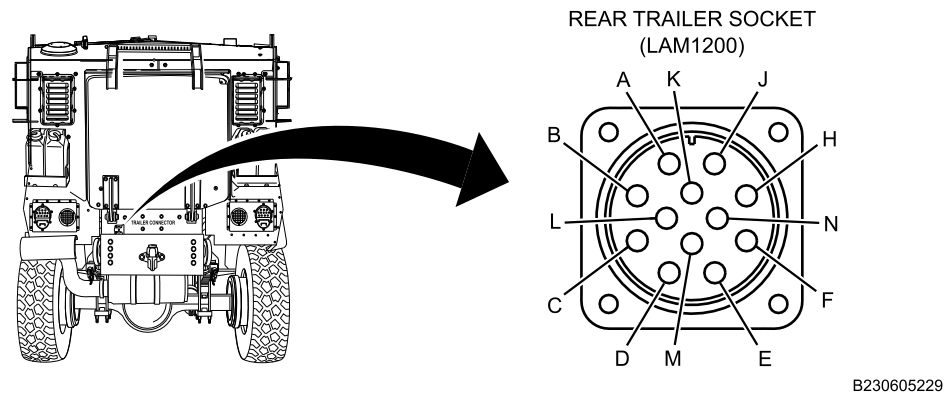


Figure 2. Lower Rear Body Panel.

3. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

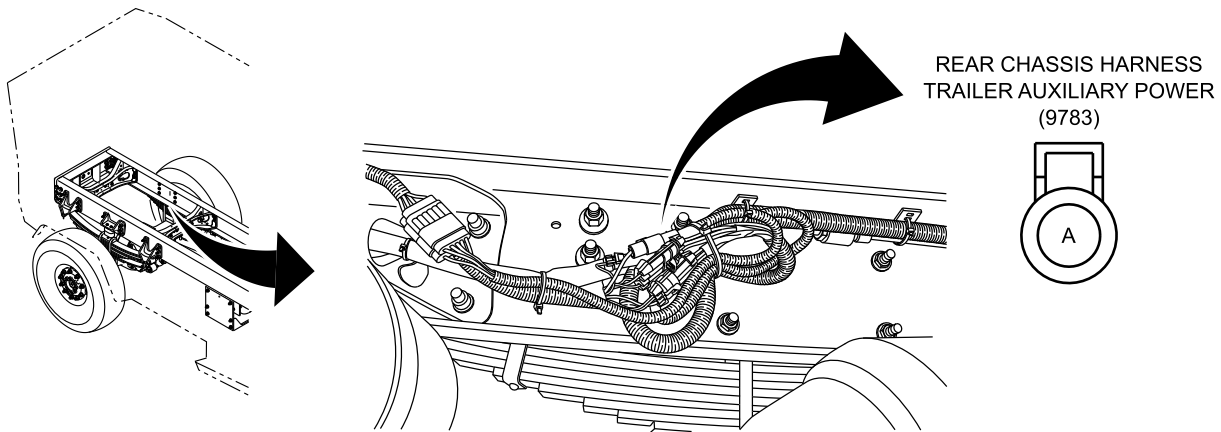
DECISION

NO Go to Step 25.
 YES Go to Step 6.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

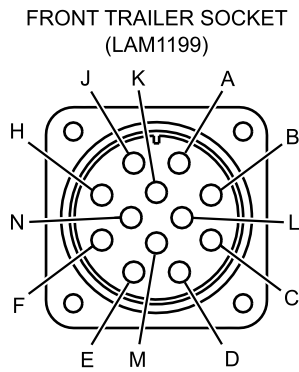
4. Disconnect connector 9783. Refer to Figure 3.



B230605679

Figure 3. Left Rear Frame Rail.

5. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 4.



B230604548

Figure 4. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 72.
 NO Go to Step 12.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

6. Remove jumper wire.
7. Turn MAIN POWER switch ON (TM 9-2355-106-10).
8. Turn ignition switch ON (TM 9-2355-106-10).
9. Enable brake lights with Master Vehicle Light Switch (MVLS) (TM 9-2355-106-10).
10. Measure DC voltage between rear trailer socket connector LAM1200 terminals K and L with multimeter. Refer to Figure 5.

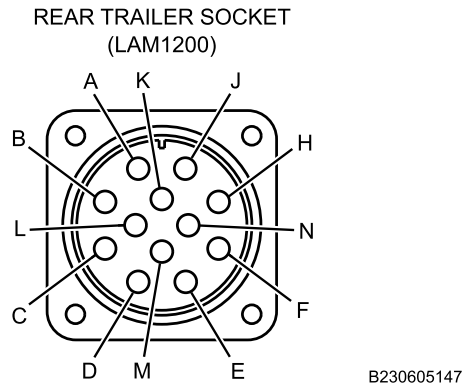


Figure 5. Connector LAM1200.

11. With assistant, press brake pedal while reading multimeter.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

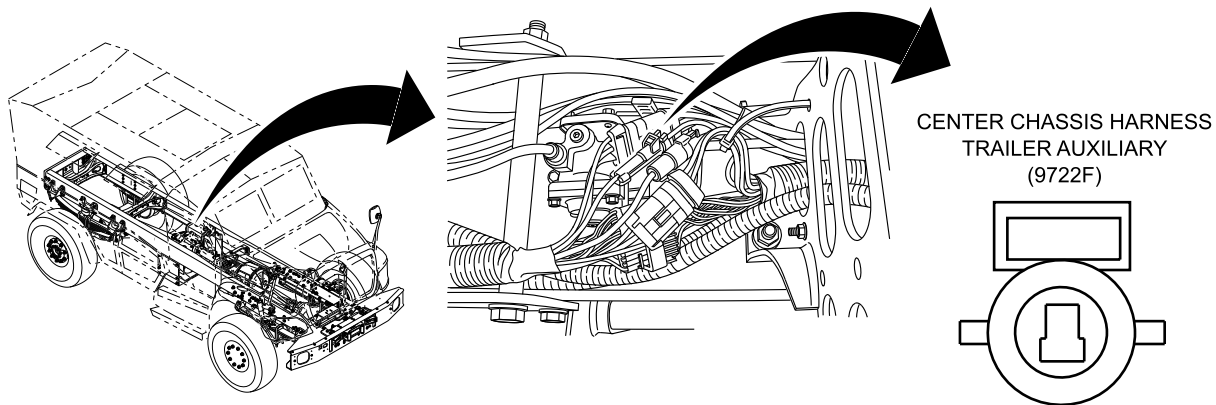
DECISION

NO Go to Step 38.
 YES Go to Step 74.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

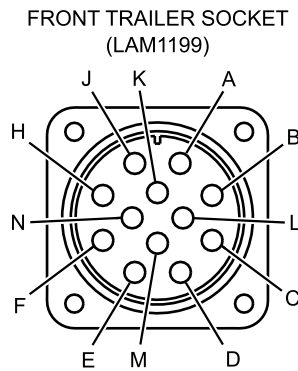
12. Remove left side engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
13. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
14. Disconnect connector 9722F. Refer to Figure 6.



B230605677

Figure 6. Engine Compartment Under Air Cleaner Assembly.

15. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 7.



B230604548

Figure 7. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 68.
 NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

16. Disconnect connector 9733P. Refer to Figure 8.

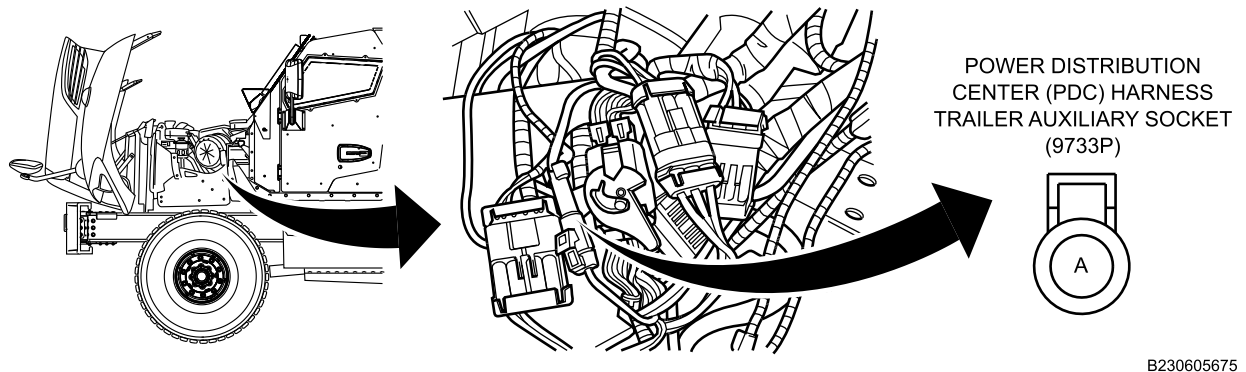


Figure 8. Engine Compartment Under Air Cleaner Assembly.

17. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read OL?

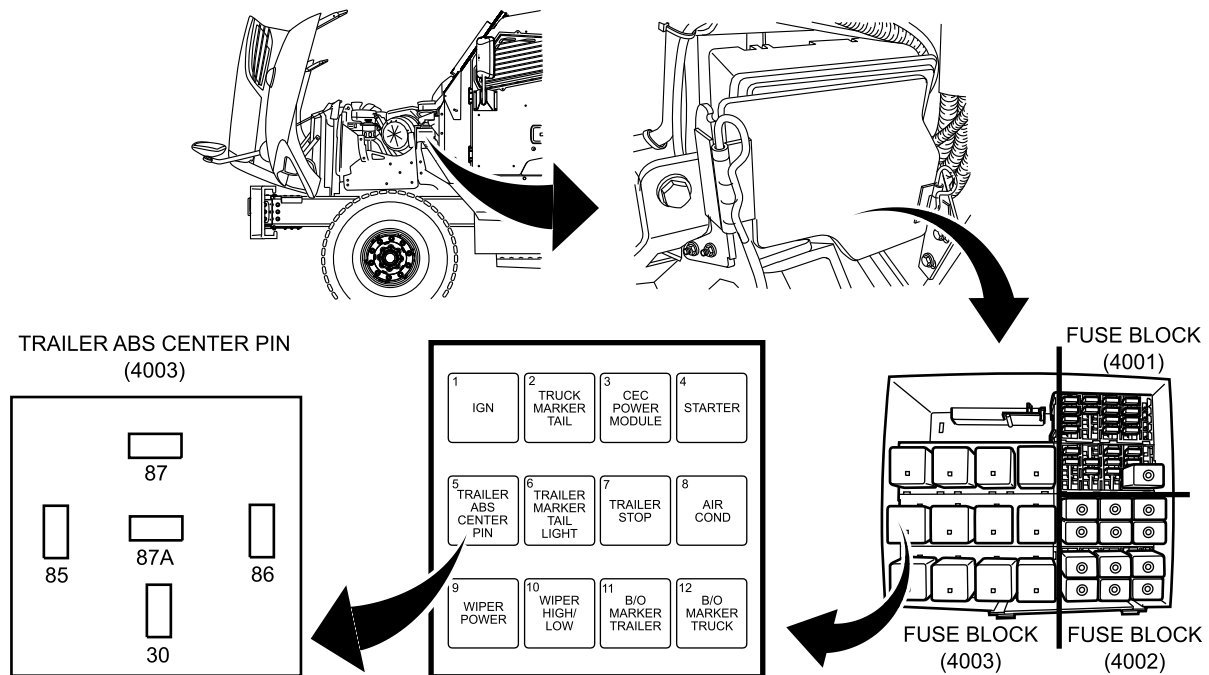
DECISION

YES Go to Step 67.
NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

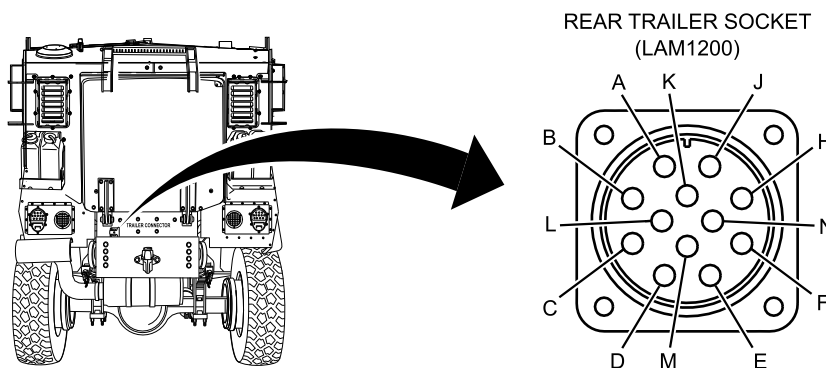
18. Remove TRAILER ABS CENTER PIN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 9.



B230605352

Figure 9. Engine Compartment Power Distribution Center (PDC).

19. Connect a jumper wire between TRAILER ABS CENTER PIN relay socket terminals 87A and 30. Refer to Figure 9.
20. Measure resistance between rear trailer socket terminals K and L with multimeter. Refer to Figure 10.



B230605229

Figure 10. Lower Rear Body Panel.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL?

DECISION

YES Go to Step 73.

NO Go to next step.

STEP

21. Remove jumper wire from TRAILER ABS CENTER PIN relay socket.
22. Measure resistance between rear trailer socket connector 1200 terminals K and L with multimeter. Refer to Figure 11.

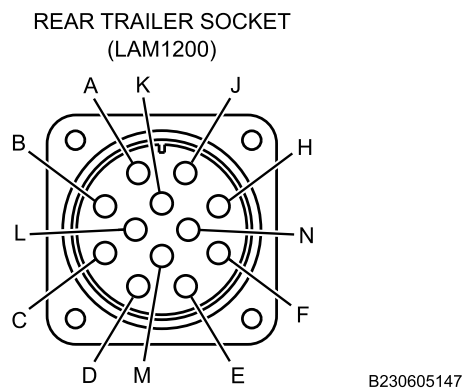


Figure 11. Connector 1200.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

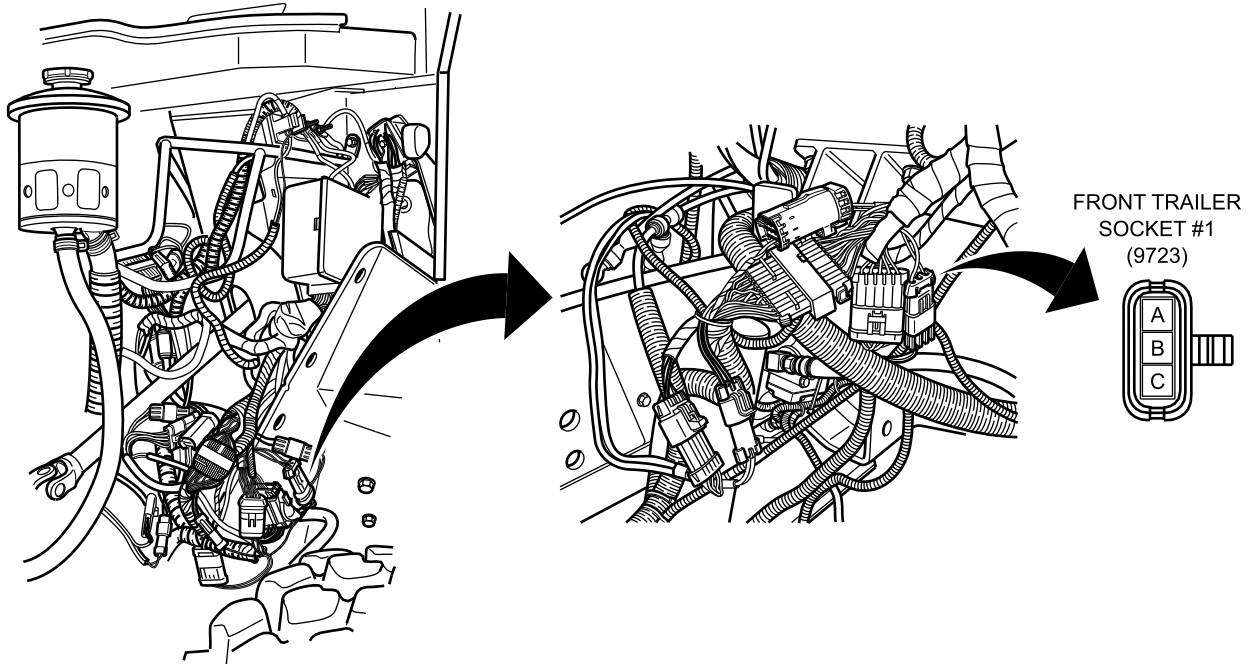
YES Go to Step 69.

NO Go to next step.

STEP

23. Disconnect connector 9723. Refer to Figure 12.

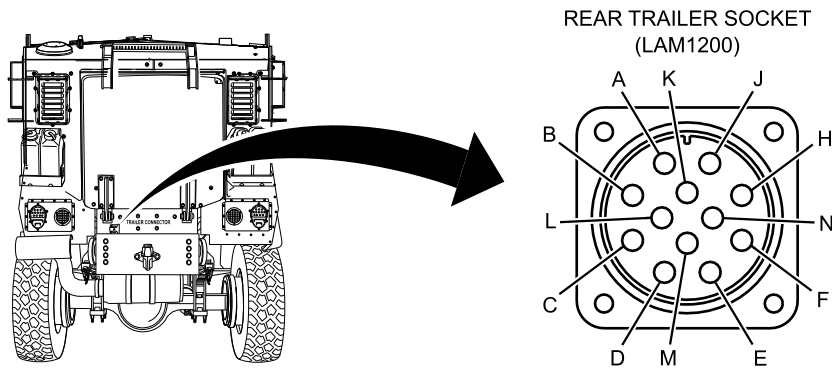
TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605305

Figure 12. Engine Compartment Under Air Cleaner Housing.

24. Measure resistance from rear trailer socket terminals K and L with multimeter. Refer to Figure 13.



B230605229

Figure 13. Lower Rear Body Panel.

CONDITION/INDICATION

Does multimeter read OL?

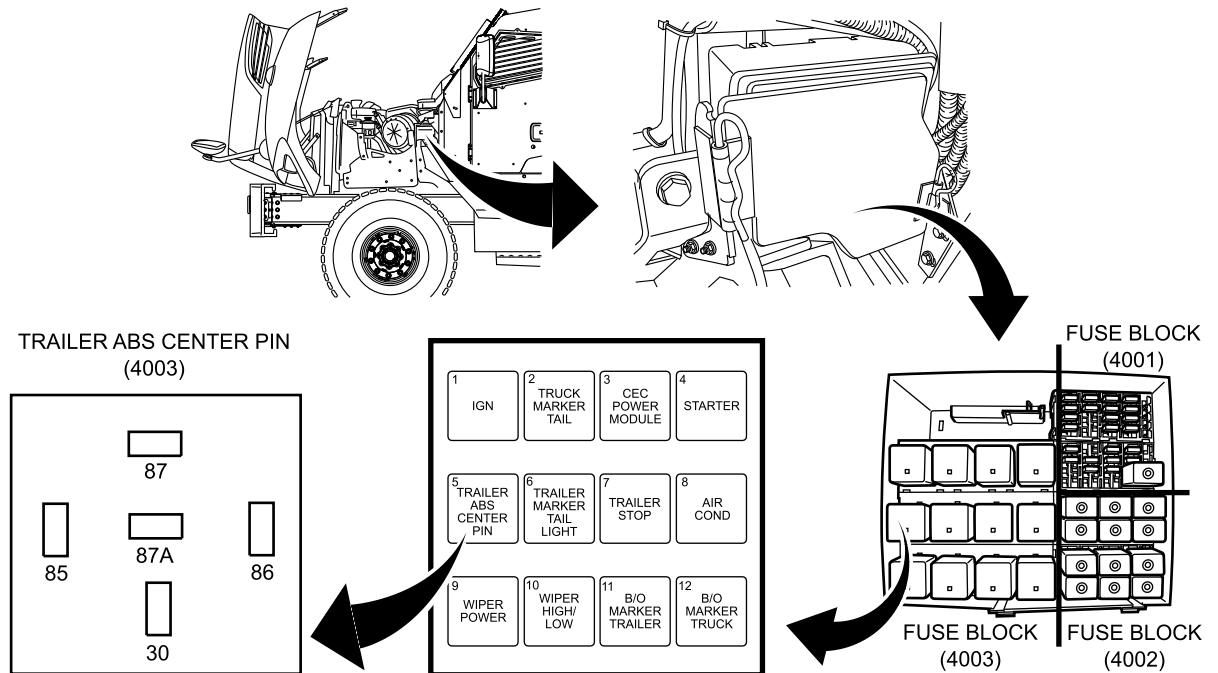
DECISION

YES Go to Step 69.
NO Go to Step 71.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

25. Remove TRAILER ABS CENTER PIN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 14.



B230605352

Figure 14. Engine Compartment Power Distribution Center (PDC).

26. Connect a jumper wire between TRAILER ABS CENTER PIN relay socket terminals 87A and 30. Refer to Figure 14.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

27. Measure resistance between connector LAM1199 terminals K and L with multimeter. Refer to Figure 15.

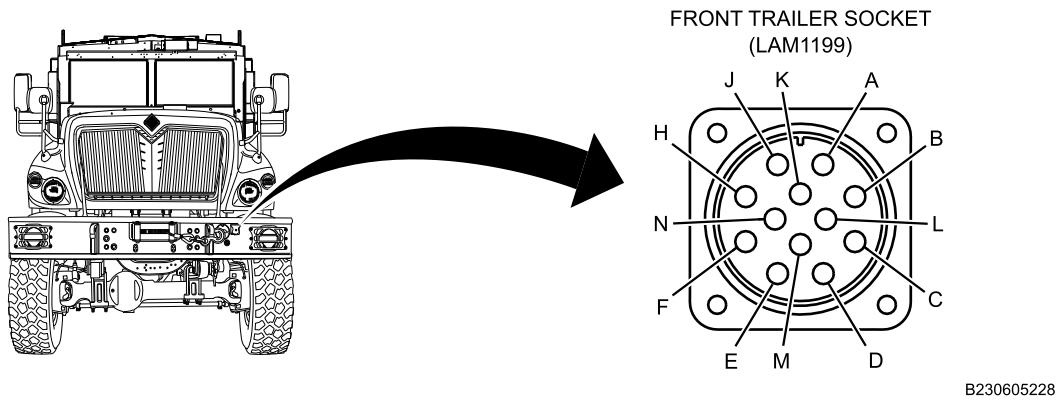


Figure 15. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

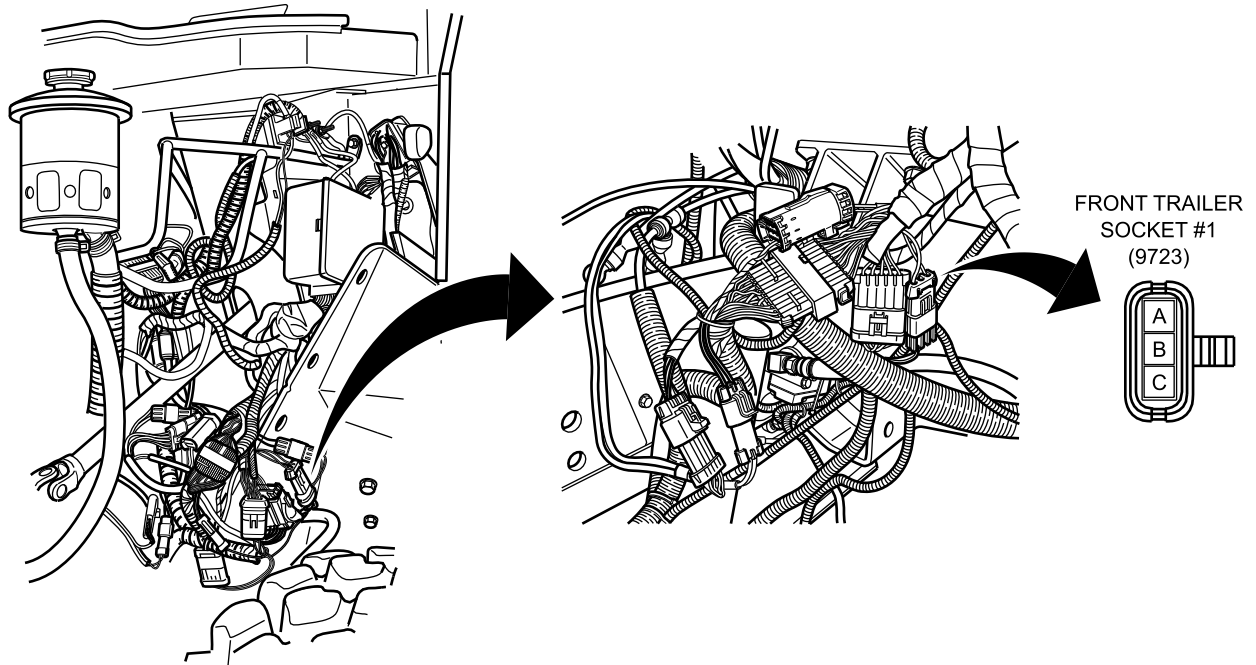
DECISION

YES Go to Step 73.

NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

28. Remove left side engine armor bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
29. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
30. Disconnect connector 9723. Refer to Figure 16.



B230605305

Figure 16. Engine Compartment Under Air Cleaner Housing.

31. Measure resistance from connector 9723 terminal C and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

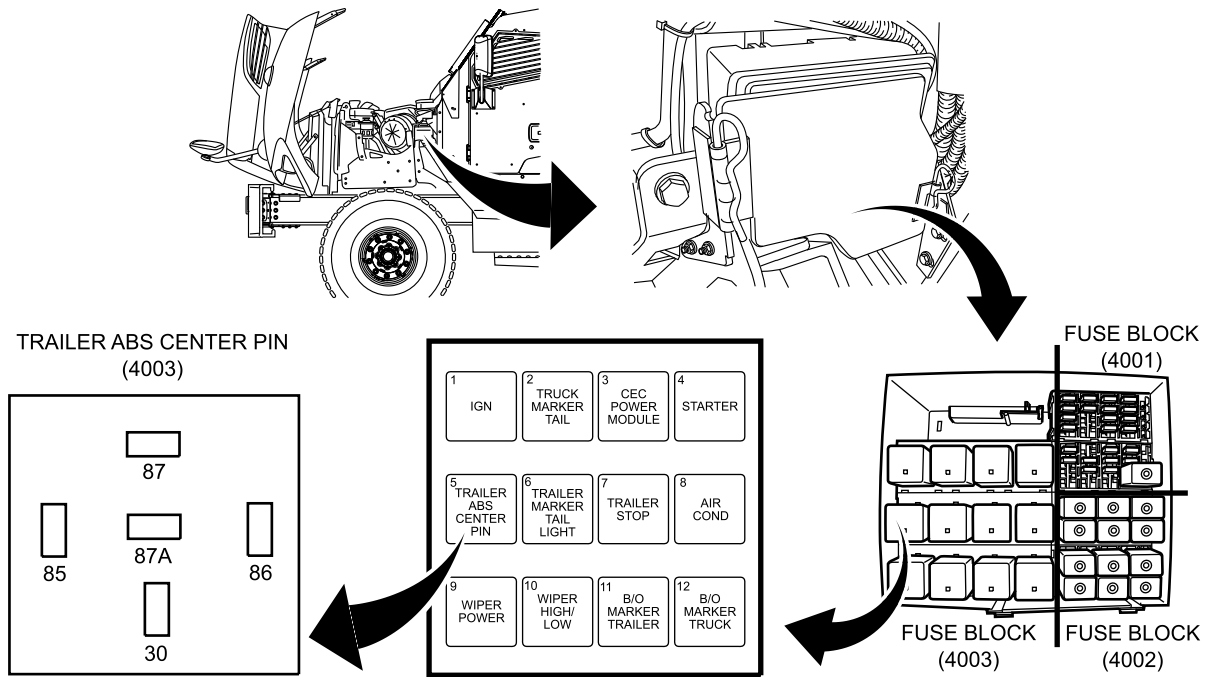
DECISION

YES Go to Step 71.
 NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

32. Remove jumper wire from TRAILER ABS CENTER PIN relay socket. Refer to Figure 17.



B230605352

Figure 17. Engine Compartment Power Distribution Center (PDC).

33. Measure resistance between TRAILER ABS CENTER PIN relay socket terminal 30 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 69.
 NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

34. Disconnect connector 9733P. Refer to Figure 18.

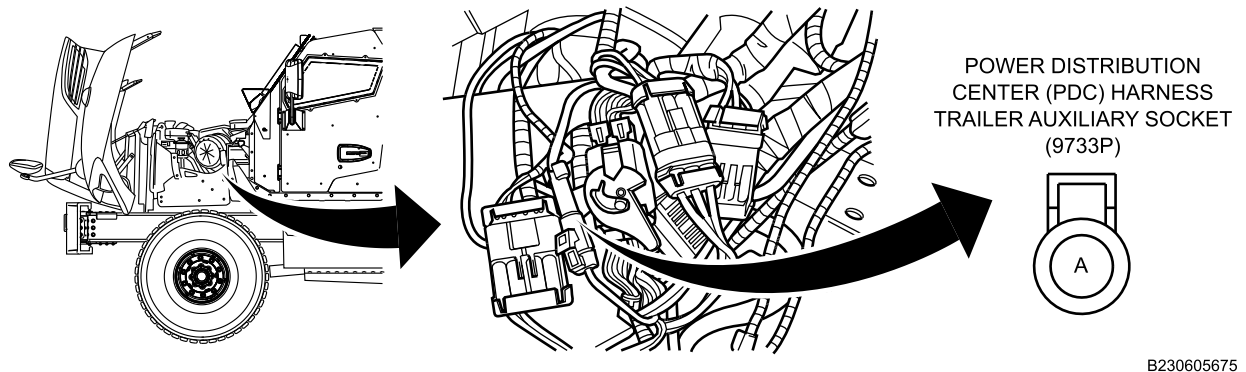


Figure 18. Engine Compartment Under Air Cleaner Assembly.

35. Measure resistance between connector 9733P terminal A and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

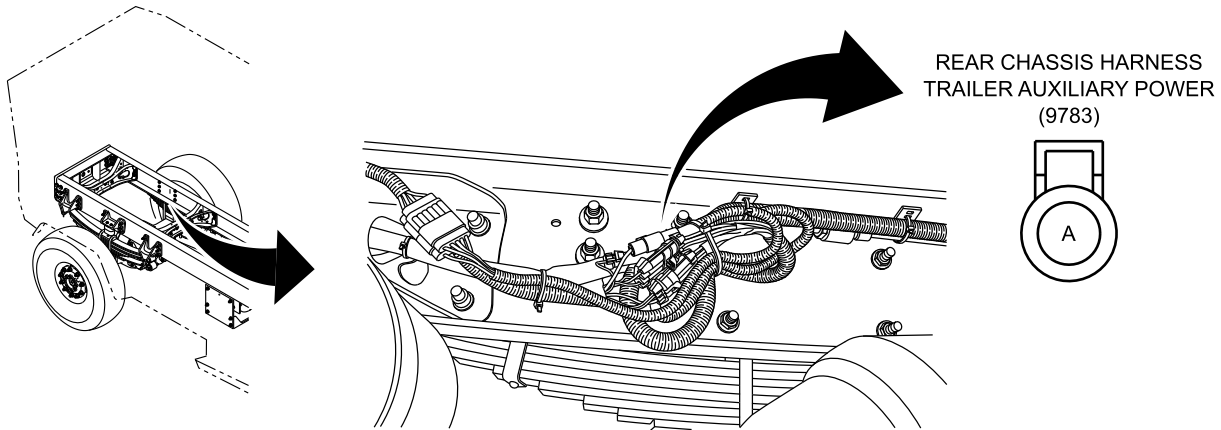
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 67.
NO Go to next step.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

36. Disconnect connector 9783. Refer to Figure 19.



B230605679

Figure 19. Rear Frame Rail.

37. Measure resistance between connector 9783 terminal A and ground with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

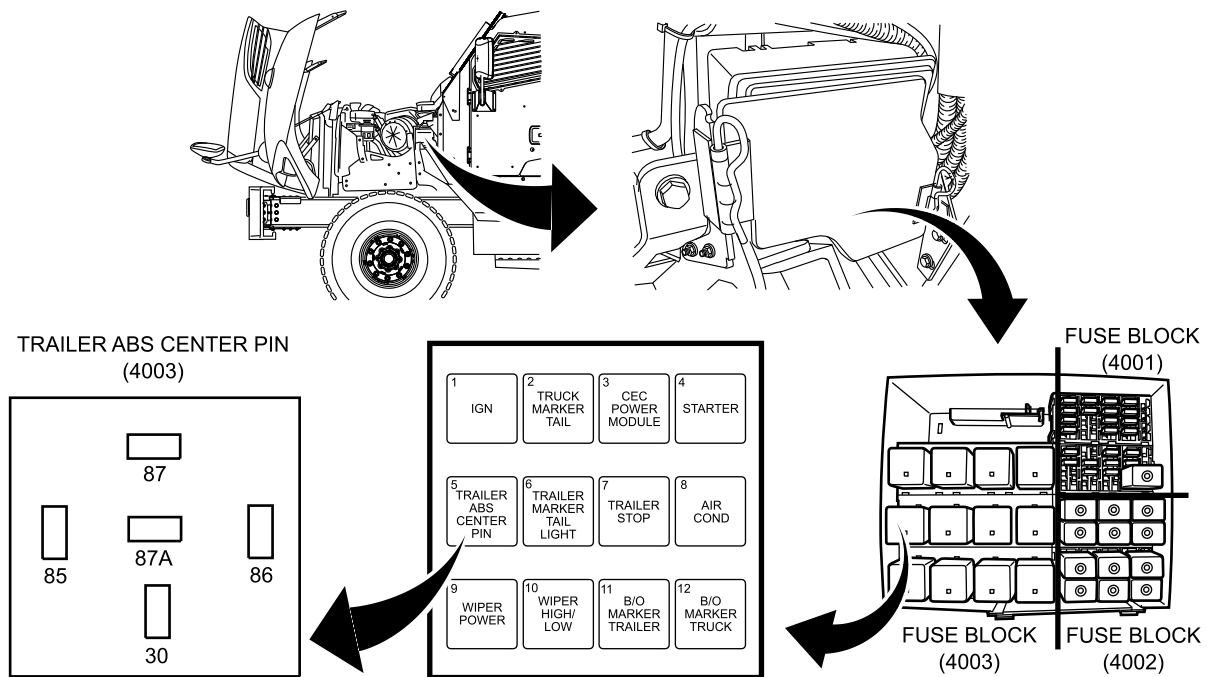
YES Go to Step 68.

NO Go to Step 72.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

38. Turn ignition switch OFF (TM 9-2355-106-10).
39. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
40. Remove TRAILER ABS CENTER PIN relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 20.



B230605352

Figure 20. Engine Compartment Power Distribution Center (PDC).

41. Connect jumper wire between TRAILER ABS CENTER PIN relay socket terminal 87 and 30. Refer to Figure 20.
42. Turn MAIN POWER switch ON (TM 9-2355-106-10).
43. Turn ignition switch ON (TM 9-2355-106-10).

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

44. Measure DC voltage between rear trailer socket connector LAM1200 terminals K and L with multimeter.
Refer to Figure 21.

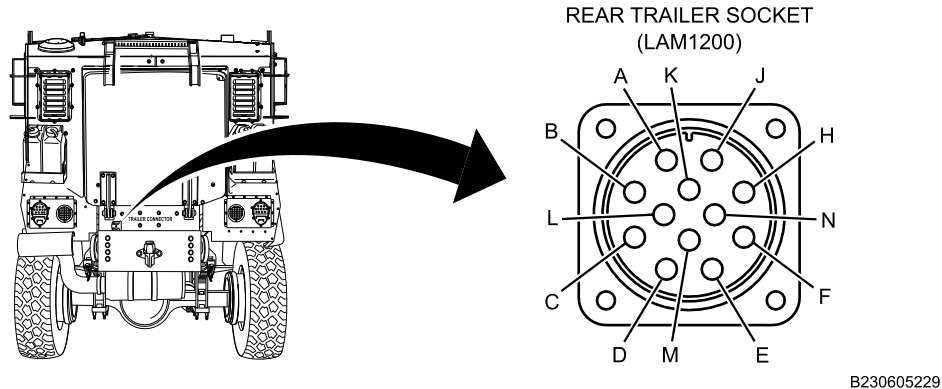


Figure 21. Lower Rear Body Panel.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

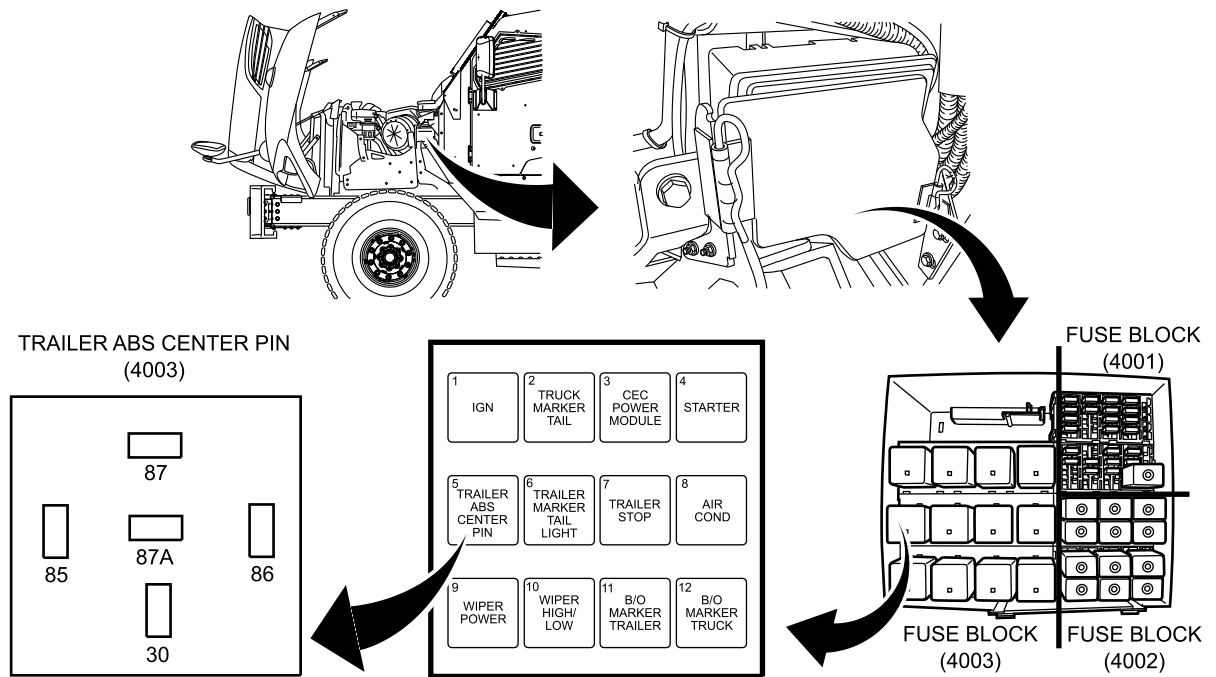
DECISION

NO Go to Step 58.
YES Go to next step.

STEP

45. Turn ignition switch OFF (TM 9-2355-106-10).
46. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
47. Remove jumper wire from TRAILER ABS CENTER PIN relay socket. Refer to Figure 22.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605352

Figure 22. Engine Compartment Power Distribution Center (PDC).

48. Measure resistance between TRAILER ABS CENTER PIN relay socket terminal 86 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 69.
 YES Go to next step.

STEP

- 49. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 50. Turn ignition switch ON (TM 9-2355-106-10).
- 51. Measure DC voltage between TRAILER ABS CENTER PIN relay socket terminal 85 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

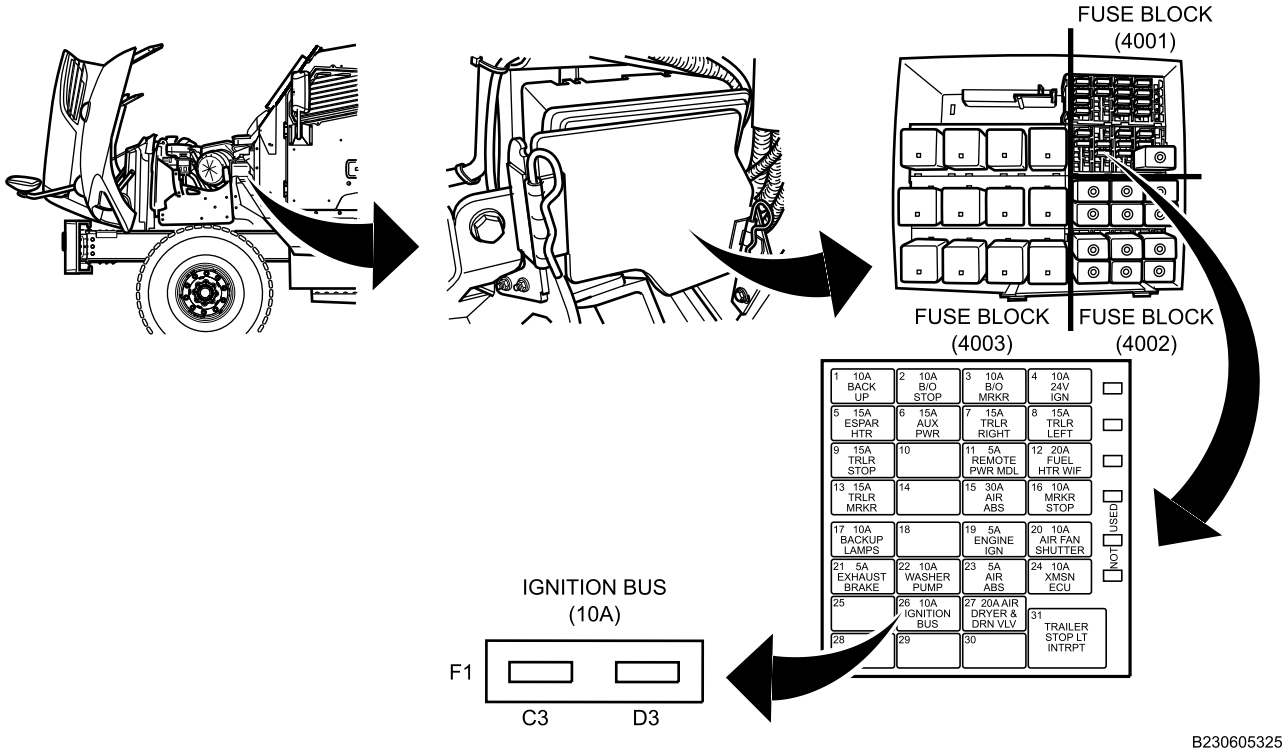
YES Go to Step 73.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

52. Turn ignition switch OFF (TM 9-2355-106-10).
53. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
54. Remove and inspect IGNITION BUS 10 amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 23.



B230605325

Figure 23. Engine Compartment PDC.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Is fuse open?

DECISION

YES Go to Step 65.

NO Go to next step.

STEP

55. Turn MAIN POWER switch ON (TM 9-2355-106-10).
56. Turn ignition switch ON (TM 9-2355-106-10).
57. Measure DC voltage between ground and each IGNITION BUS 10 amp fuse socket terminals C3 and D3 with multimeter. Refer to Figure 23.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V for each test?

DECISION

YES Go to Step 69.

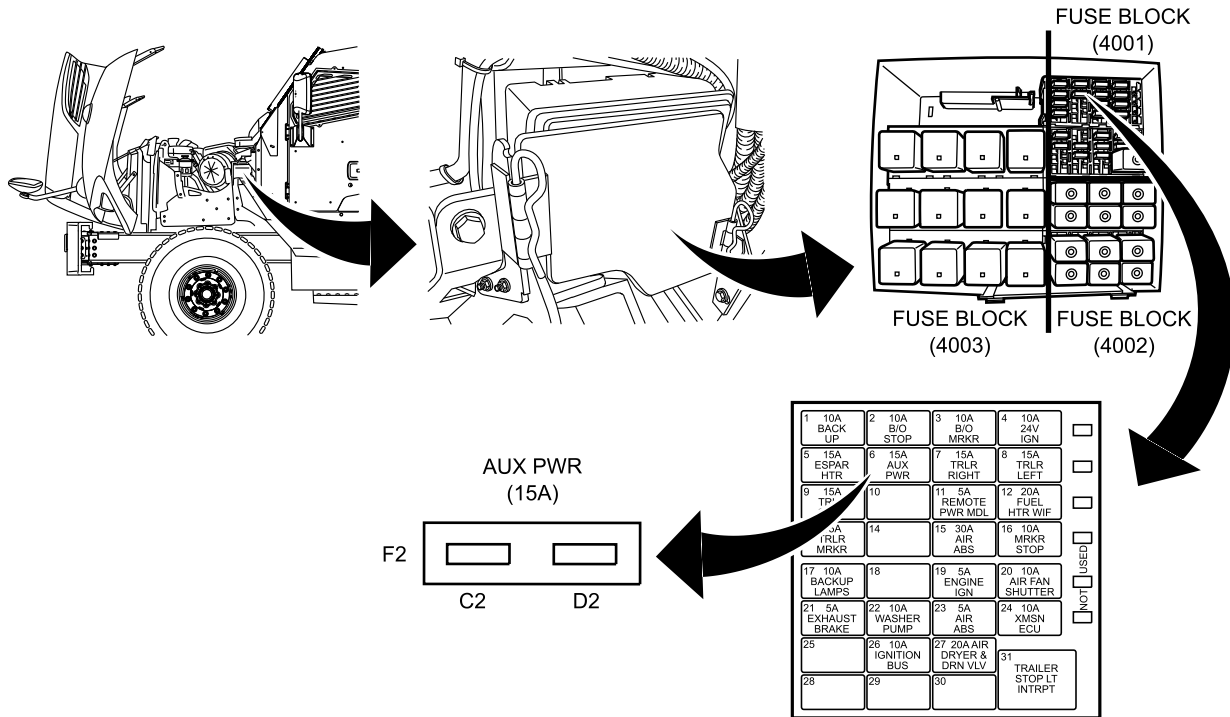
NO Go to Step 70.

STEP

58. Turn ignition switch OFF (TM 9-2355-106-10).
59. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
60. Remove jumper wire from TRAILER ABS CENTER PIN relay.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

61. Remove and inspect AUX PWR 15 amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 24



B230605380

Figure 24. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 66.
NO Go to next step.

STEP

- 62. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 63. Turn ignition switch ON (TM 9-2355-106-10).
- 64. Measure DC voltage between ground and each AUX PWR fuse socket terminals C2 and D2 with multimeter. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V for each test?

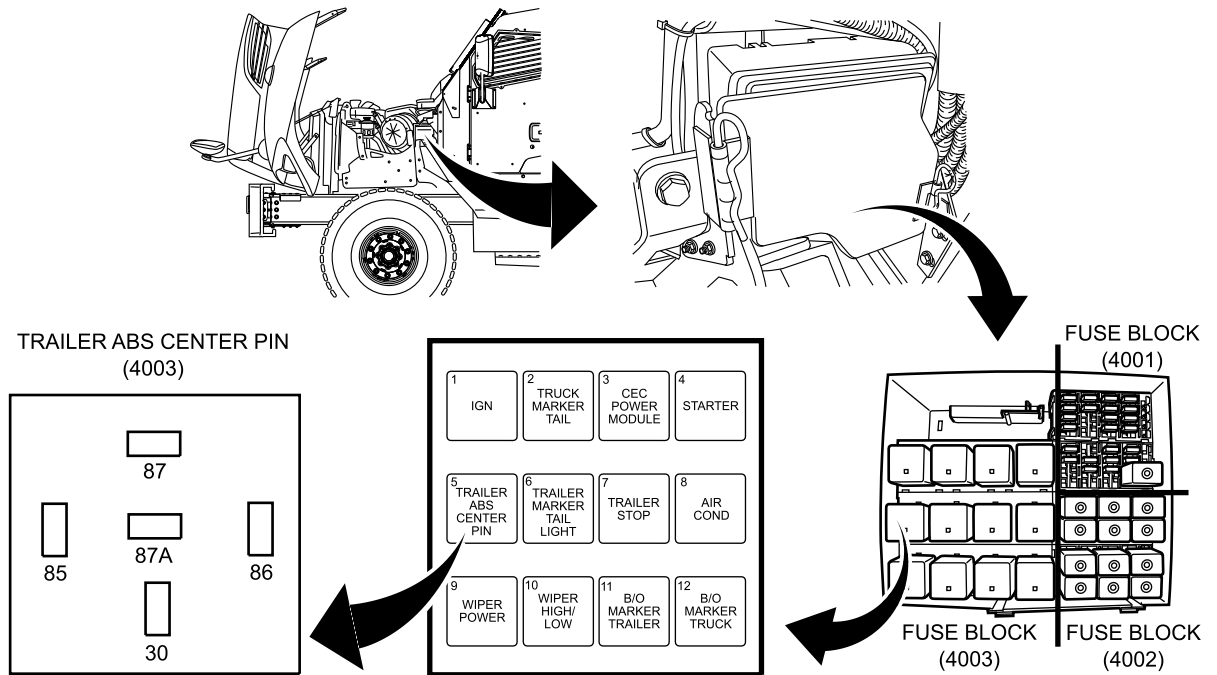
DECISION

YES Go to Step 69.
NO Go to Step 70.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

65. Measure resistance between TRAILER ABS CENTER PIN relay terminal 85 and ground with multimeter. Refer to Figure 25.



B230605352

Figure 25. Engine Compartment Power Distribution Center (PDC).

CONDITION/INDICATION

Does multimeter read OL?

DECISION

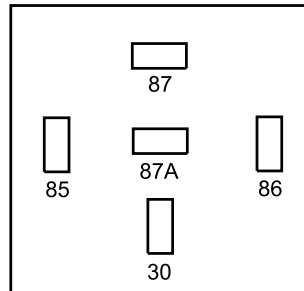
YES Go to Step 69.

NO Go to Step 73.

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

66. Measure resistance between TRAILER ABS CENTER PIN relay terminal 87 and ground with multimeter. Refer to Figure 26.

TRAILER ABS CENTER PIN
(4003)



B230605449

Figure 26. TRAILER ABS CENTER PIN Relay.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 69.
NO Go to Step 73.

MALFUNCTION

- 67. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 68. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 69. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 70. Power Distribution Center (PDC) is faulty.

ACTION

Refer to Power Distribution Center (PDC) Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 71. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 72. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST

TRAILER CONNECTOR AUXILIARY POWER CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 73. Relay is faulty.

ACTION

Replace relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 74. No fault is currently present.

ACTION

Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0426
WP 0427
WP 0517
WP 0600
WP 0598
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0092
WP 0257
WP 0303
WP 0319
WP 0333
WP 0335
WP 0336
WP 0353
WP 0429
WP 0431

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 64
WP 0789, Figure 65
WP 0789, Figure 59
WP 0789, Figure 55
WP 0789, Figure 60

TROUBLESHOOTING PROCEDURE

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.

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.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

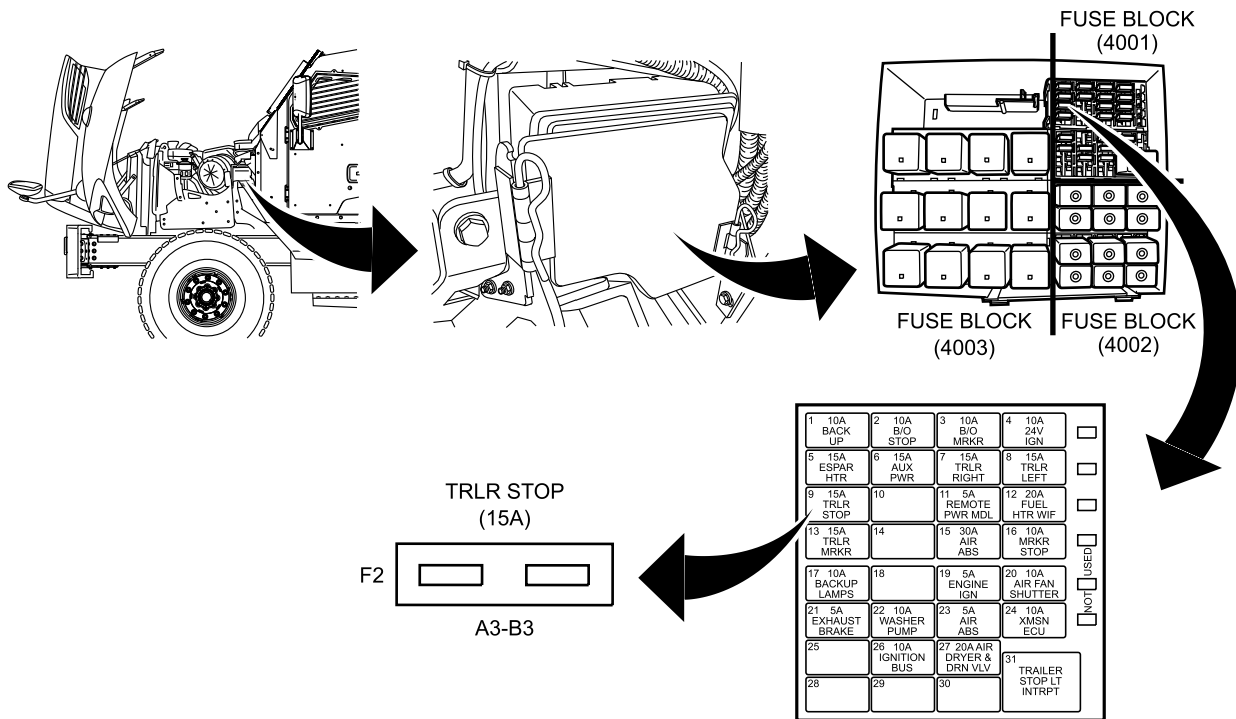
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Remove and visually inspect TRLR STOP fuse. Refer to Figure 1. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).



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Figure 1. Engine Compartment Power Distribution Center (PDC).

CONDITION/INDICATION

Is fuse open?

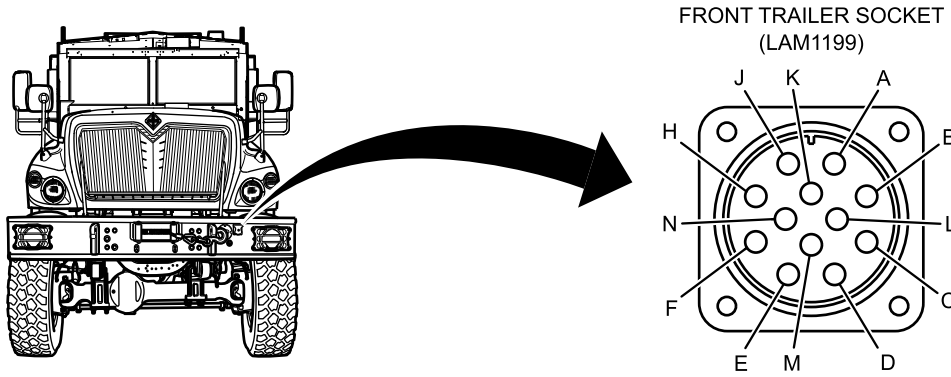
DECISION

YES Go to Step 90.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

2. Measure resistance between connector LAM1199 terminals M and L with multimeter. Refer to Figure 2.



B230605228

Figure 2. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 6.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

3. Install TRLR STOP fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333).
4. Connect jumper wire between connector LAM1200 terminals M and L. Refer to Figure 3.

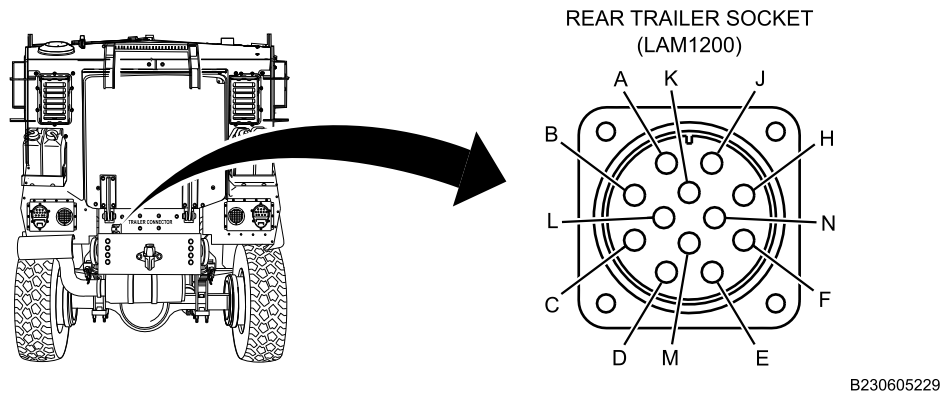


Figure 3. Lower Rear Body Panel.

5. Measure resistance between connector LAM1199 terminals M and L with multimeter. Refer to Figure 4.

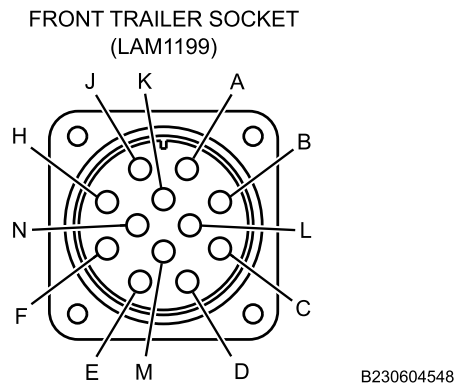


Figure 4. Connector LAM1199.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 27.
NO Go to Step 13.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

6. Remove left side engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
7. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
8. Disconnect connector 9724. Refer to Figure 5.

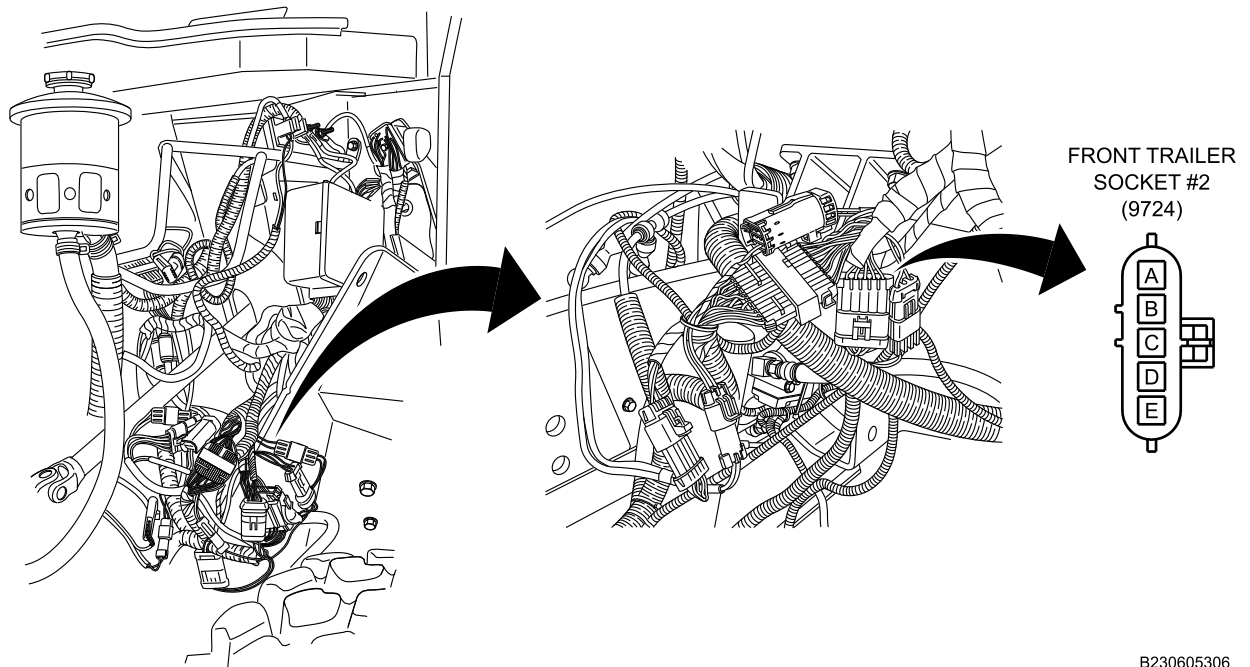


Figure 5. Engine Compartment Under Air Cleaner Housing.

9. Measure resistance between connector 9724 terminal D and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL?

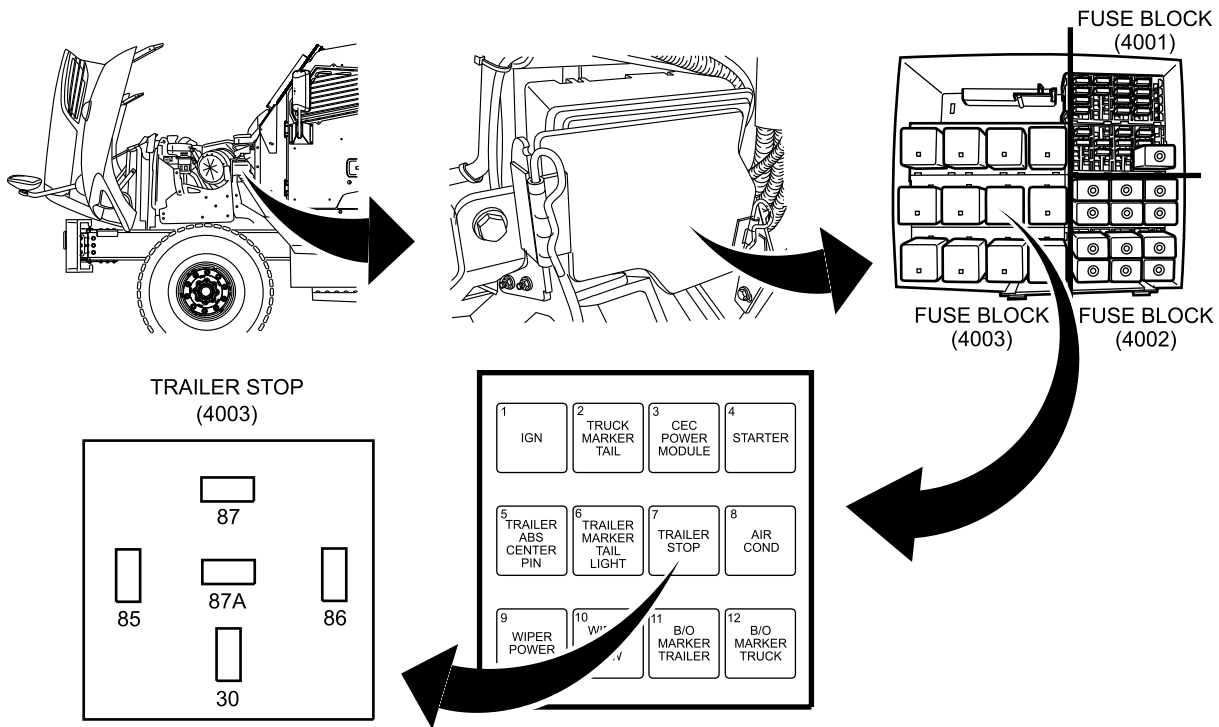
DECISION

YES Go to next step.
NO Go to Step 104.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

10. Remove TRAILER STOP relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 6.



B230605354

Figure 6. Engine Compartment Power Distribution Center (PDC).

11. Measure resistance between TRAILER STOP relay socket terminal 87A and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 101.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Measure resistance between TRAILER STOP relay socket terminal 30 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

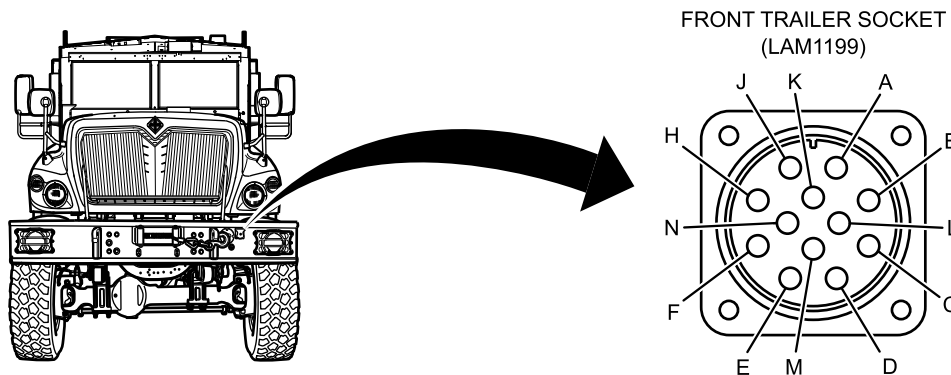
Does multimeter read OL?

DECISION

NO Go to Step 101.
YES Go to Step 106.

STEP

13. Remove TRAILER STOP relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 6.
14. Connect a jumper wire between TRAILER STOP relay socket terminals 87A and 30. Refer to Figure 6.
15. Measure resistance between front trailer socket connector LAM1199 terminals M and L with multimeter. Refer to Figure 7.



B230605228

Figure 7. Left Side Front Bumper.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 106.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

16. Remove left side engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
17. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
18. Disconnect connector 9724 (three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 8.

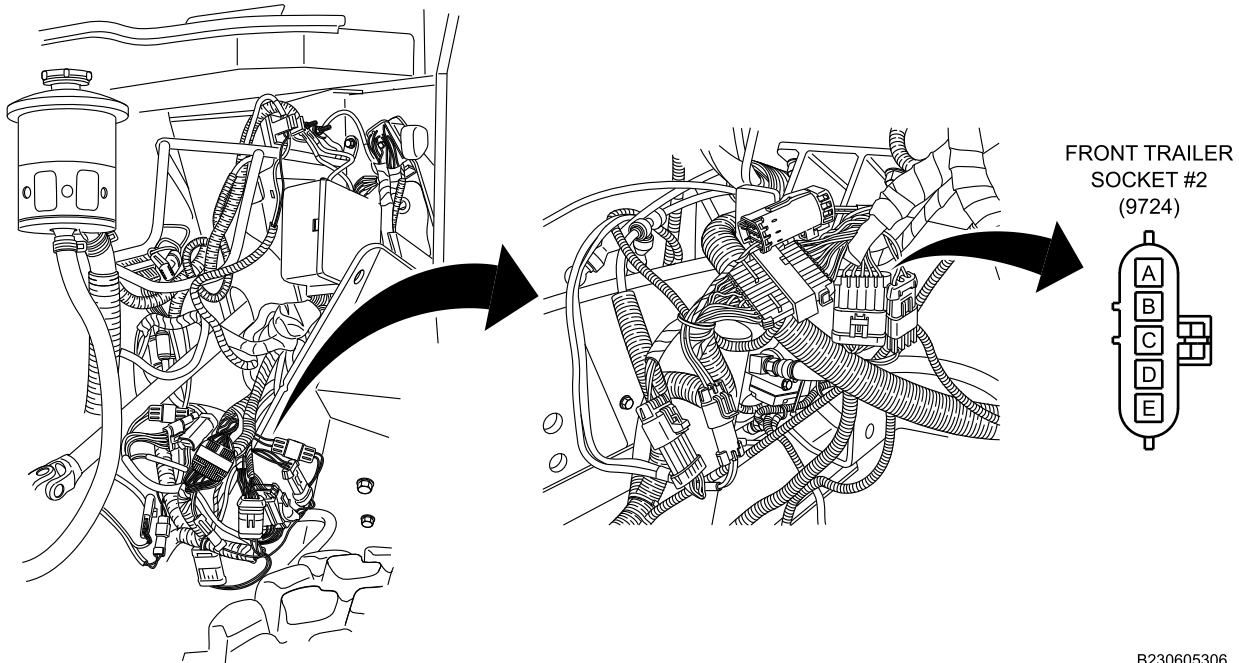


Figure 8. Engine Compartment Under Air Cleaner Housing.

19. Measure resistance between connector 9724 terminal D and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

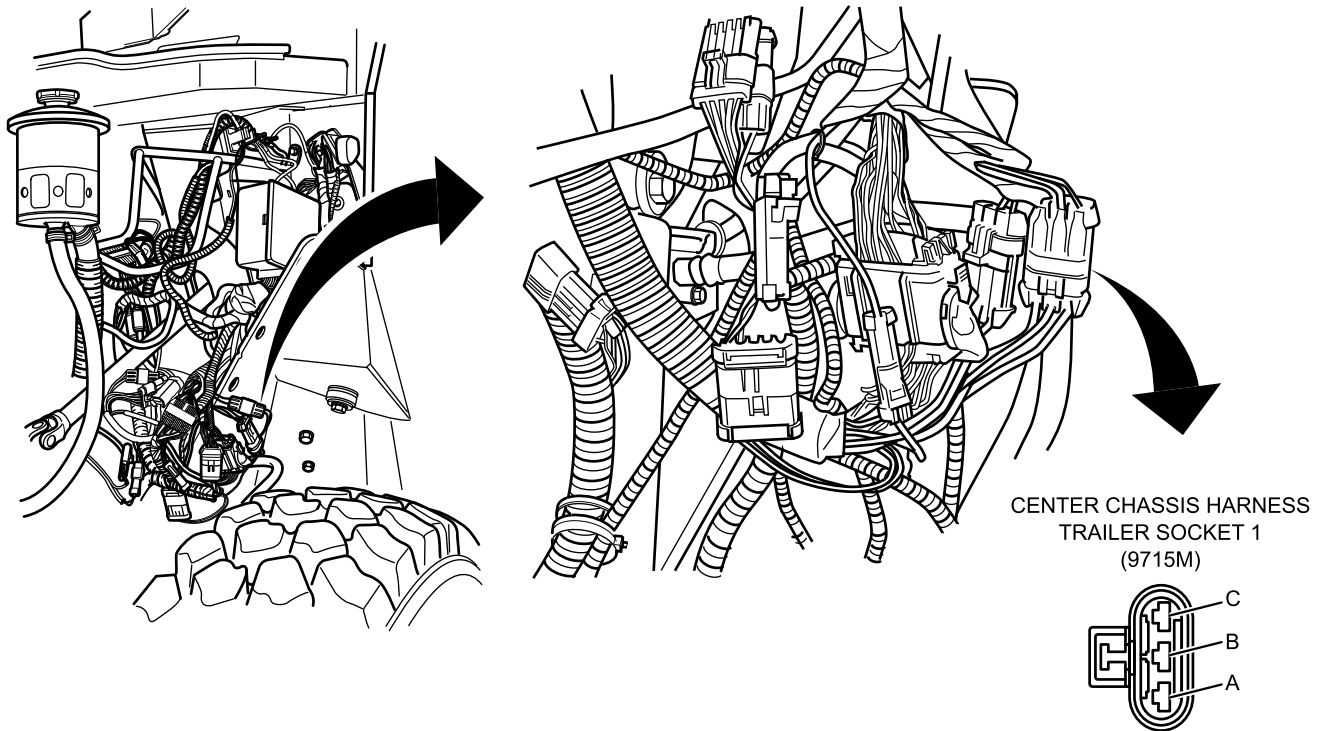
Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 104.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

20. Disconnect connector 9715M (three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 9.



B230605339

Figure 9. Left Frame Rail.

21. Measure resistance between connector 9715M terminal A and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 101.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

22. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
23. Disconnect connector 9715 (three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 10

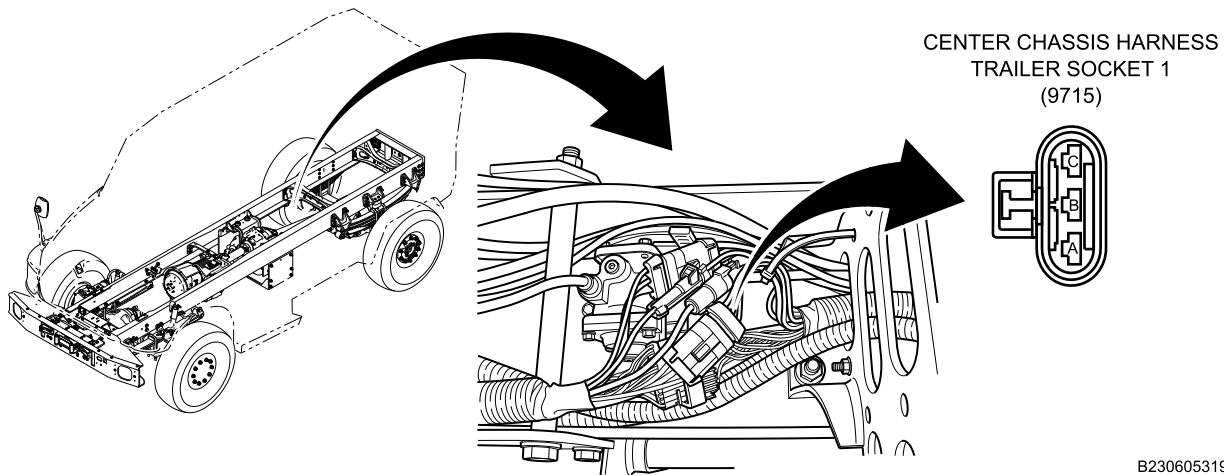


Figure 10. Left Frame Rail.

24. Measure resistance between connector 9715 terminal A and ground with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 98.
 NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)
STEP

25. Disconnect connector 9780M. Refer to Figure 11.

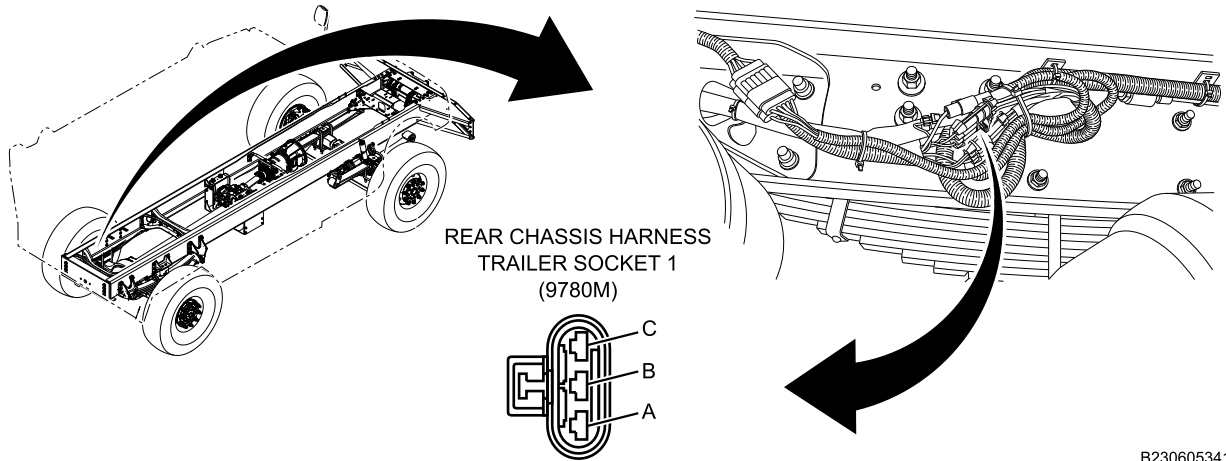


Figure 11. Left Rear Frame Rail.

26. Measure resistance between connector 9780M terminal A and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

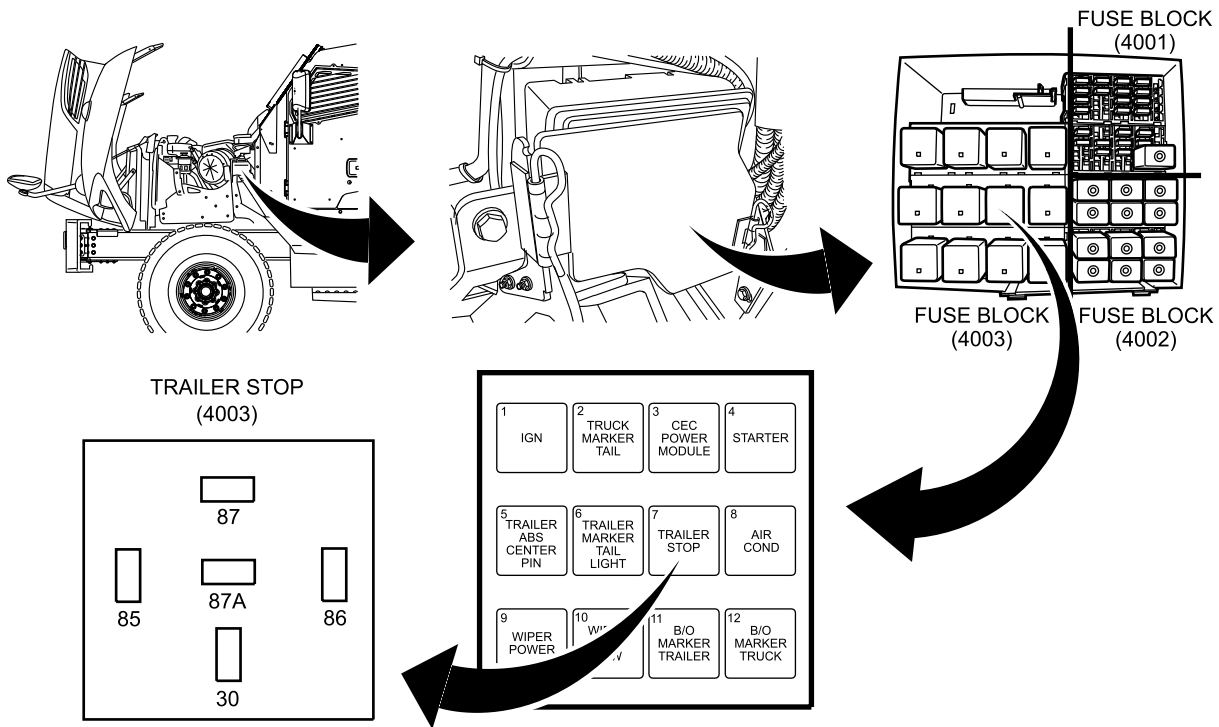
DECISION

YES Go to Step 99.
NO Go to Step 105.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

27. Remove TRAILER STOP relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 12.



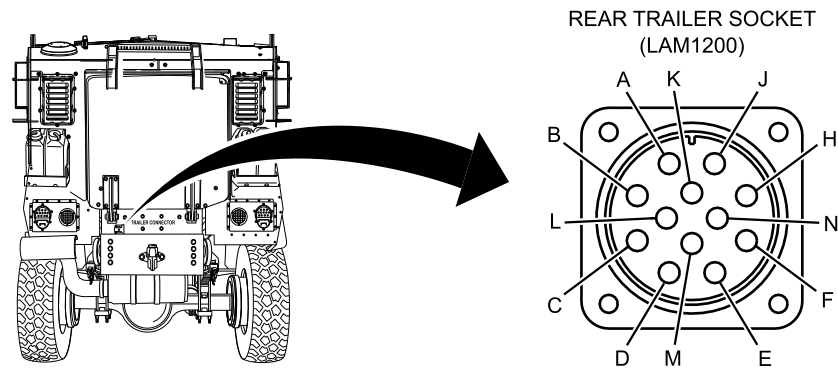
B230605354

Figure 12. Engine Compartment Power Distribution Center (PDC).

- 28. Connect jumper wire between TRAILER STOP relay socket terminals 87 and 30. Refer to Figure 12.
- 29. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 30. Turn ignition switch ON (TM 9-2355-106-10).
- 31. Enable SERVICE DRIVE lights, using Master Vehicle Light Switch (MVLS) (TM 9-2355-106-10).

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

32. Measure DC voltage between connector LAM1200 terminal M and L with multimeter. Refer to Figure 13.



B230605229

Figure 13. Lower Rear Body Panel.

CONDITION/INDICATION

Does multimeter read between 21.0V and 27.0V?

DECISION

NO Go to Step 64.
YES Go to next step.

STEP

33. Turn ignition switch OFF (TM 9-2355-106-10).
34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
35. Remove jumper wire from TRAILER STOP relay socket terminals 87 and 30.
36. Turn MAIN POWER switch ON (TM 9-2355-106-10).
37. Turn ignition switch ON (TM 9-2355-106-10).
38. Measure DC voltage between relay socket terminal 85 and 86 with multimeter. Refer to Figure 12.
39. With assistant pressing brake pedal, observe multimeter.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

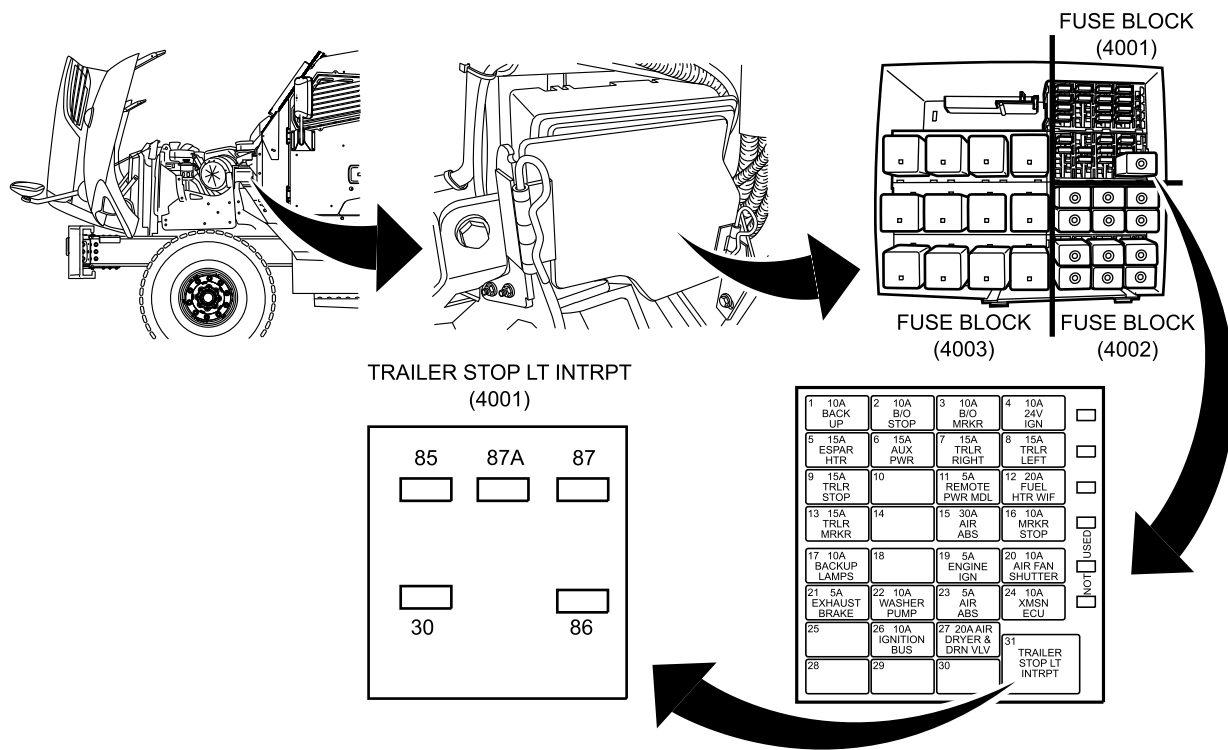
DECISION

YES Go to Step 106.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

40. Turn ignition switch OFF (TM 9-2355-106-10).
41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
42. Remove TRAILER STOP LT INTRPT relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 14.



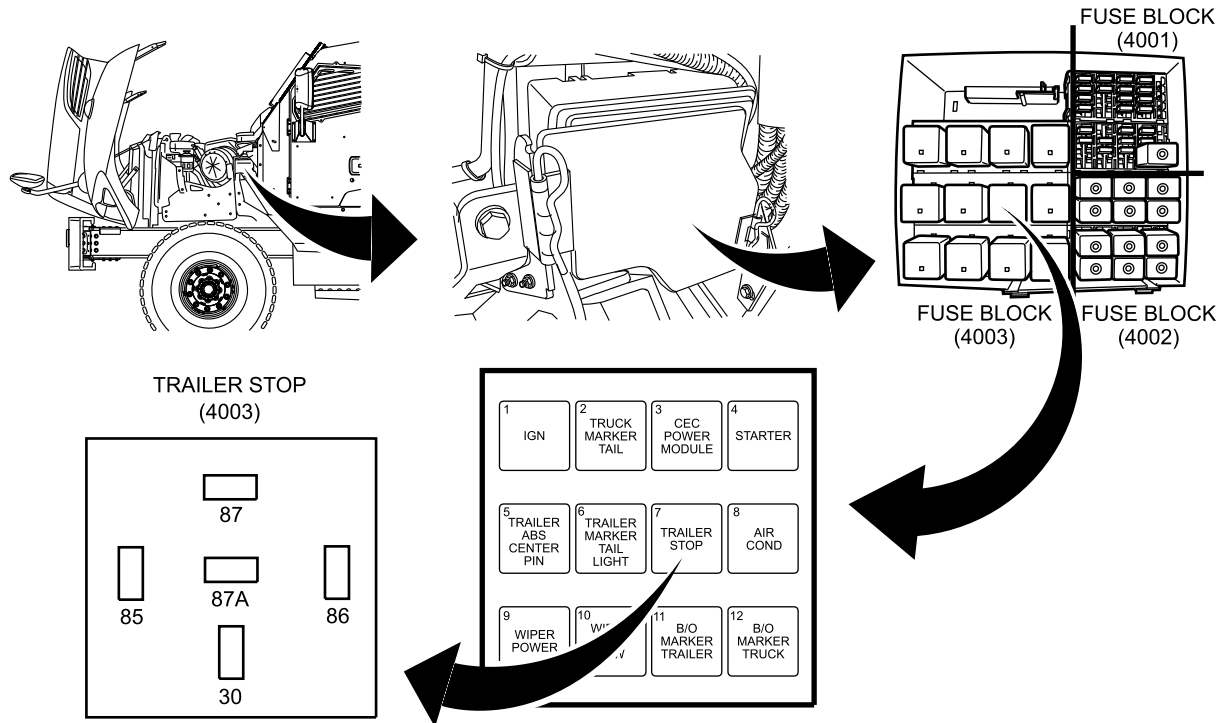
B230605312

Figure 14. Engine Compartment PDC.

43. Connect jumper wire between TRAILER STOP LT INTRPT relay socket terminal 87 and 30. Refer to Figure 14.
44. Turn MAIN POWER switch ON (TM 9-2355-106-10).
45. Turn ignition switch ON (TM 9-2355-106-10).
46. With assistant pressing brake pedal, observe multimeter.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

47. Measure DC voltage between TRAILER STOP relay socket terminal 85 and 86 with multimeter. Refer to Figure 15.



B230605354

Figure 15. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

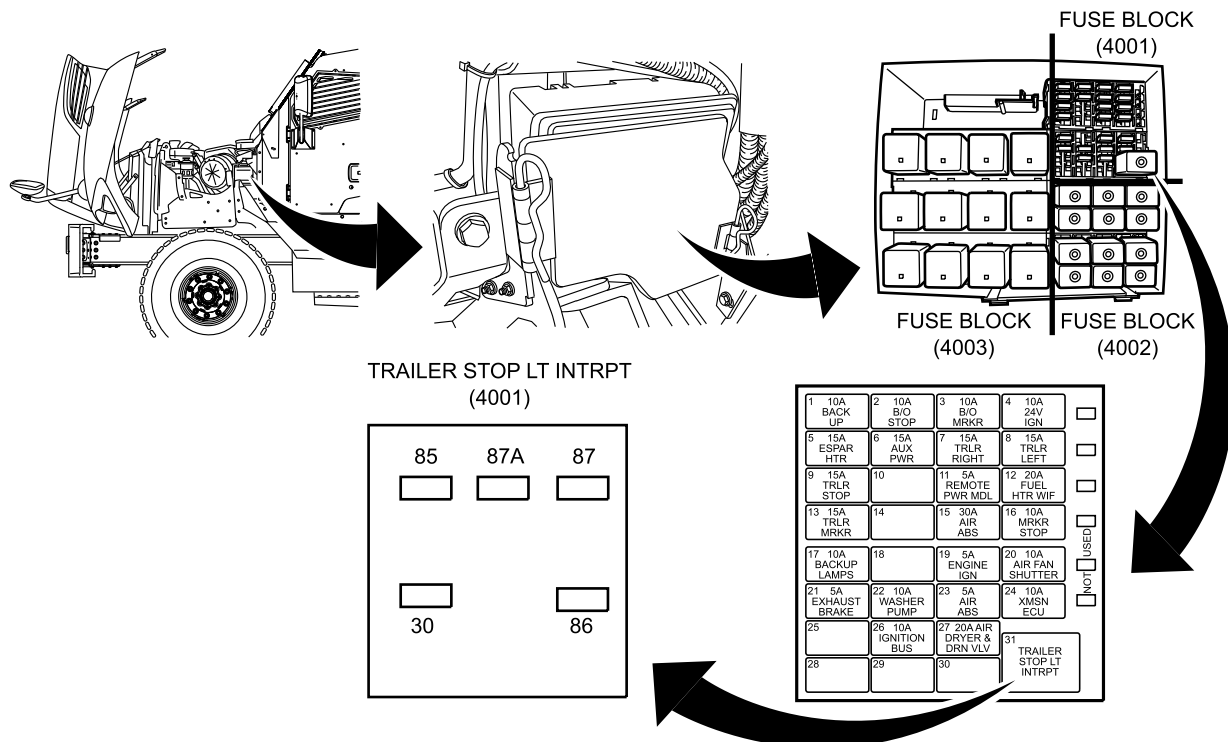
DECISION

NO Go to Step 70.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 48. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 49. Turn ignition switch OFF (TM 9-2355-106-10).
- 50. Remove jumper wire from TRAILER STOP LT INTRPT relay socket terminals 87 and 30. Refer to Figure 16.



B230605312

Figure 16. Engine Compartment PDC.

- 51. Measure resistance between TRAILER STOP LT INTRPT relay socket terminal 85 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 101.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

52. Turn MAIN POWER switch ON (TM 9-2355-106-10).
53. Turn ignition switch ON (TM 9-2355-106-10).
54. Measure DC voltage between TRAILER STOP LT INTRPT relay socket terminal 86 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 106.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 55. Turn ignition switch OFF (TM 9-2355-106-10).
- 56. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 57. Disconnect IP/pass-through connector 1701. Refer to Figure 17.

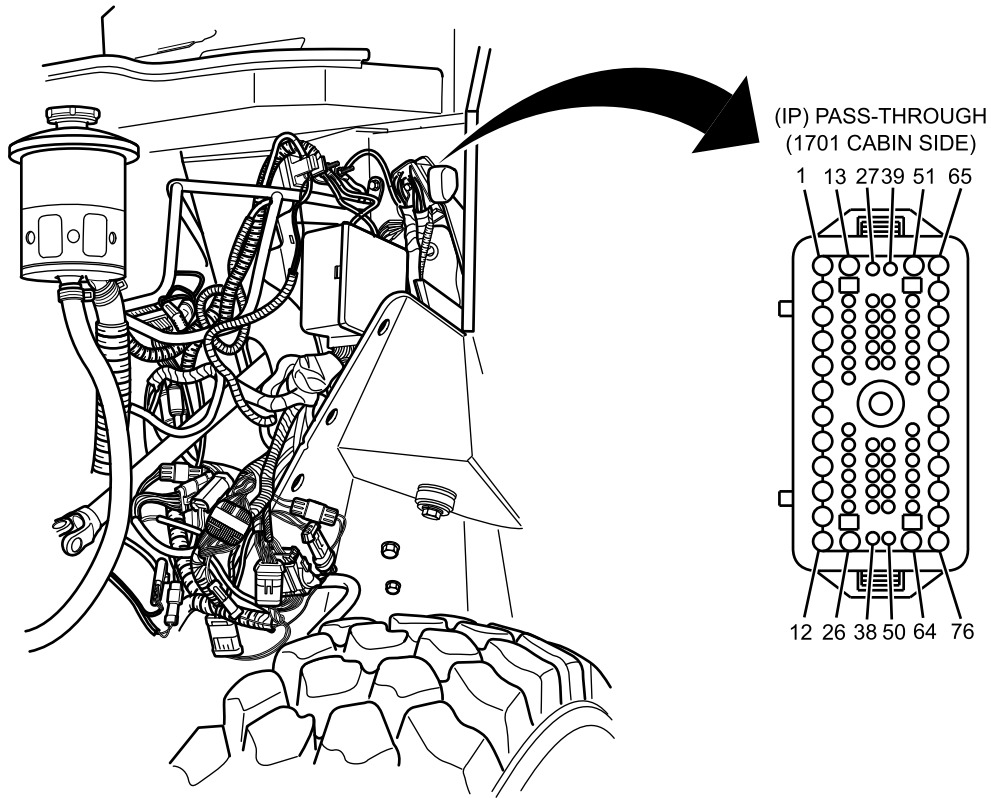
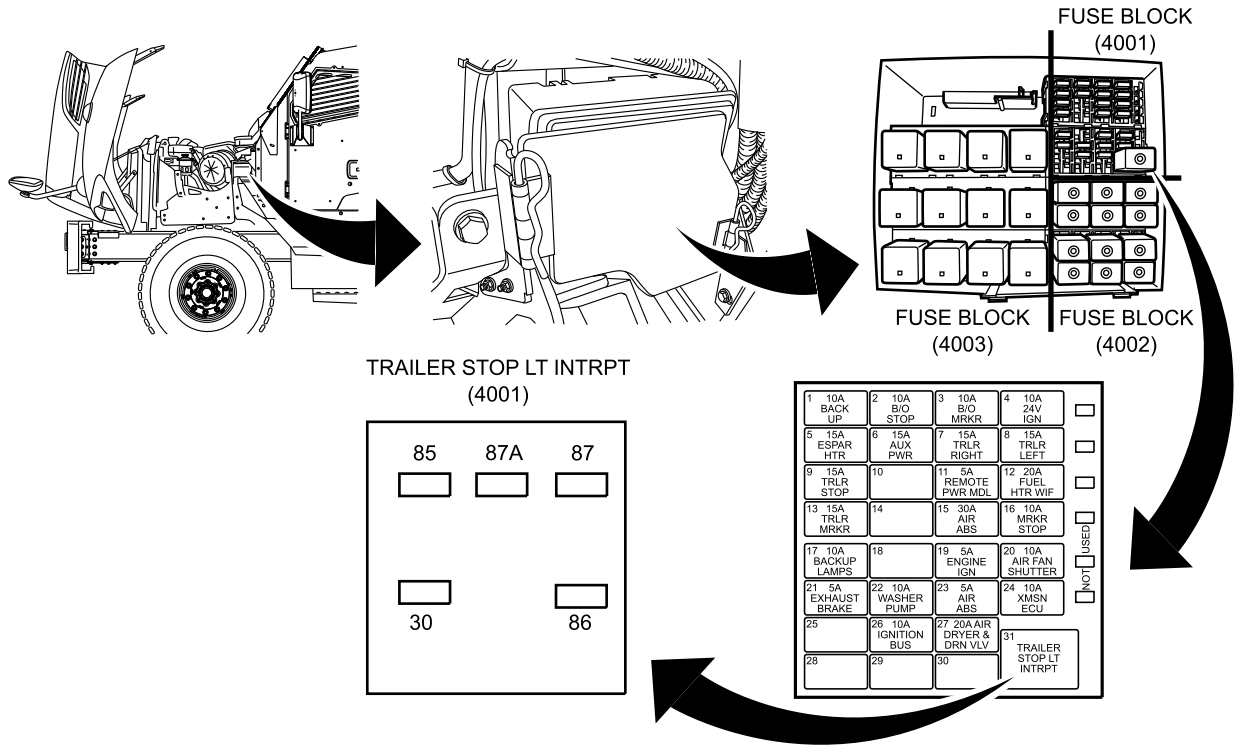


Figure 17. Left Side Engine Compartment Bulkhead.

B230604024

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

58. Measure resistance between TRAILER STOP LT INTRPT relay socket terminal 86 and ground with multimeter. Refer to Figure 18.



B230605312

Figure 18. Engine Compartment PDC.

CONDITION/INDICATION

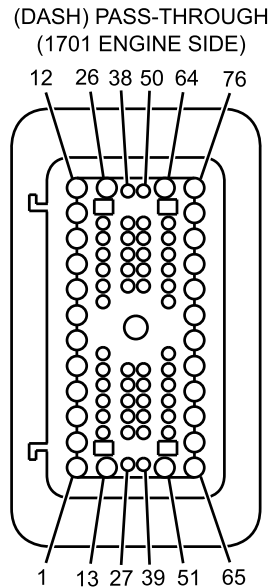
Does multimeter read OL?

DECISION

NO Go to Step 101.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

59. Measure resistance between TRAILER STOP LT INTRPT relay socket terminal 86 and connector 1701 (engine side) terminal 27 with multimeter. Refer to Figure 18 and Figure 19.



B230603182

Figure 19. Left Side Engine Compartment Bulkhead.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 101.
YES Go to next step.

STEP

60. Measure resistance between connector 1701 terminal 27 and all other connector 1701 terminals with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read OL for each test?

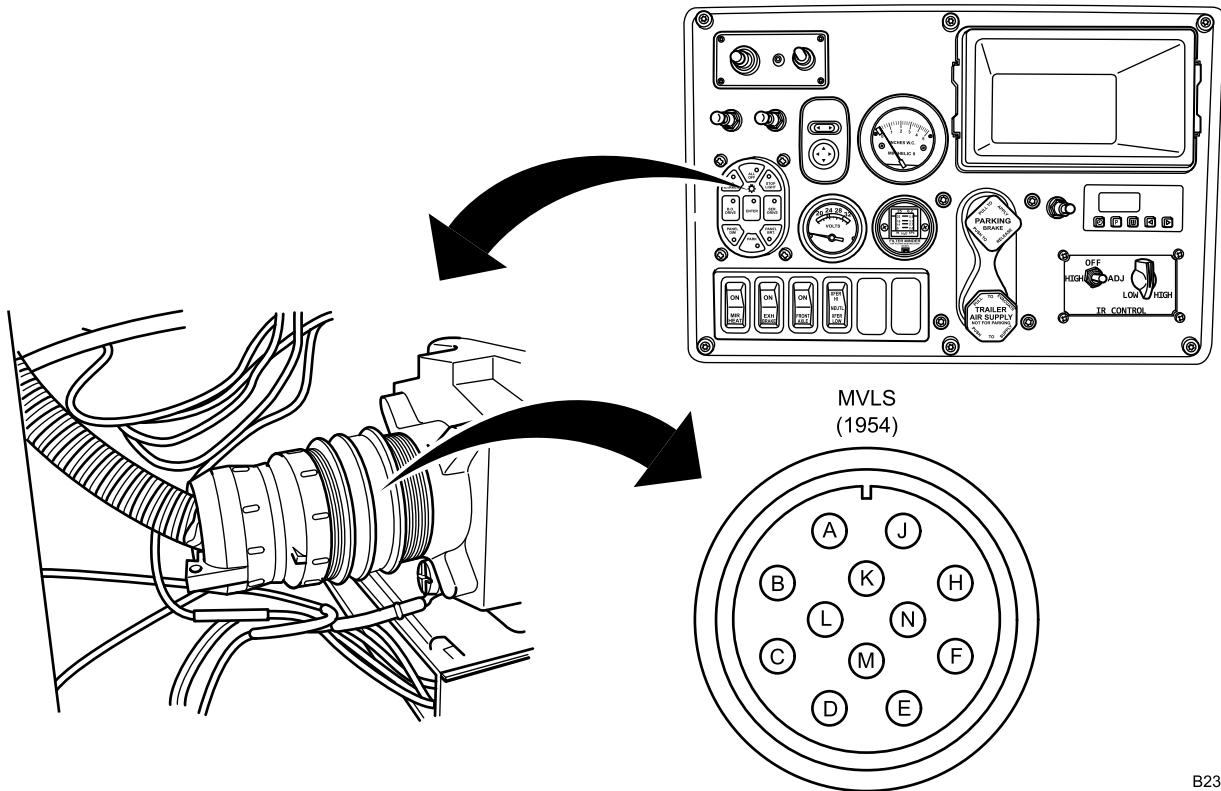
DECISION

NO Go to Step 101.
YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

61. Disconnect MVLS connector 1954. Refer to Master Vehicle Light Switch (MVLS) Removal and Installation (WP 0303). Refer to Figure 20.



B230604571

Figure 20. Behind MVLS Switch.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

62. Measure resistance between connector 1701 (cabin side) terminal 27 and ground with multimeter. Refer to Figure 21.

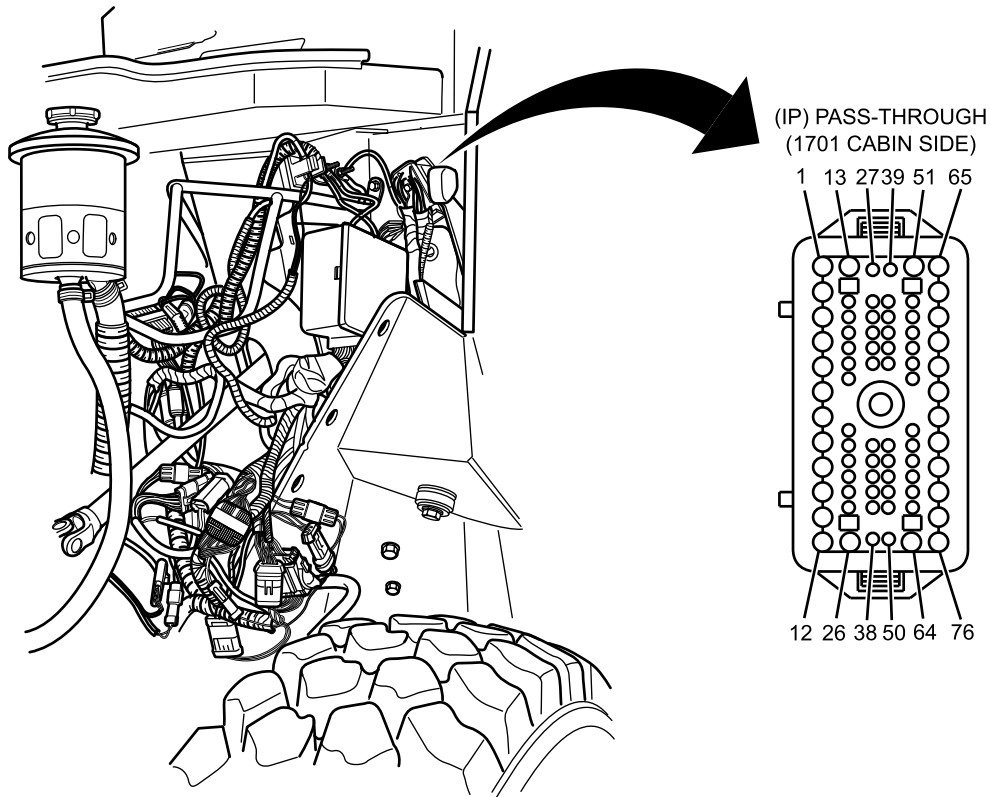


Figure 21. Left Side Engine Compartment Bulkhead.

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CONDITION/INDICATION

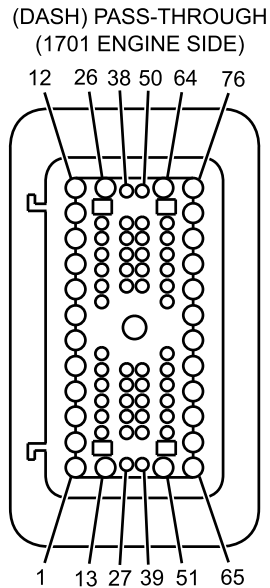
Does multimeter read OL?

DECISION

NO Go to Step 100.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

63. Measure resistance between connector 1701 (cabin side) terminal 27 and all other terminals in connector 1701 with multimeter. Refer to Figure 22.



B230603182

Figure 22. Connector 1701.

CONDITION/INDICATION

Does multimeter read OL for each test?

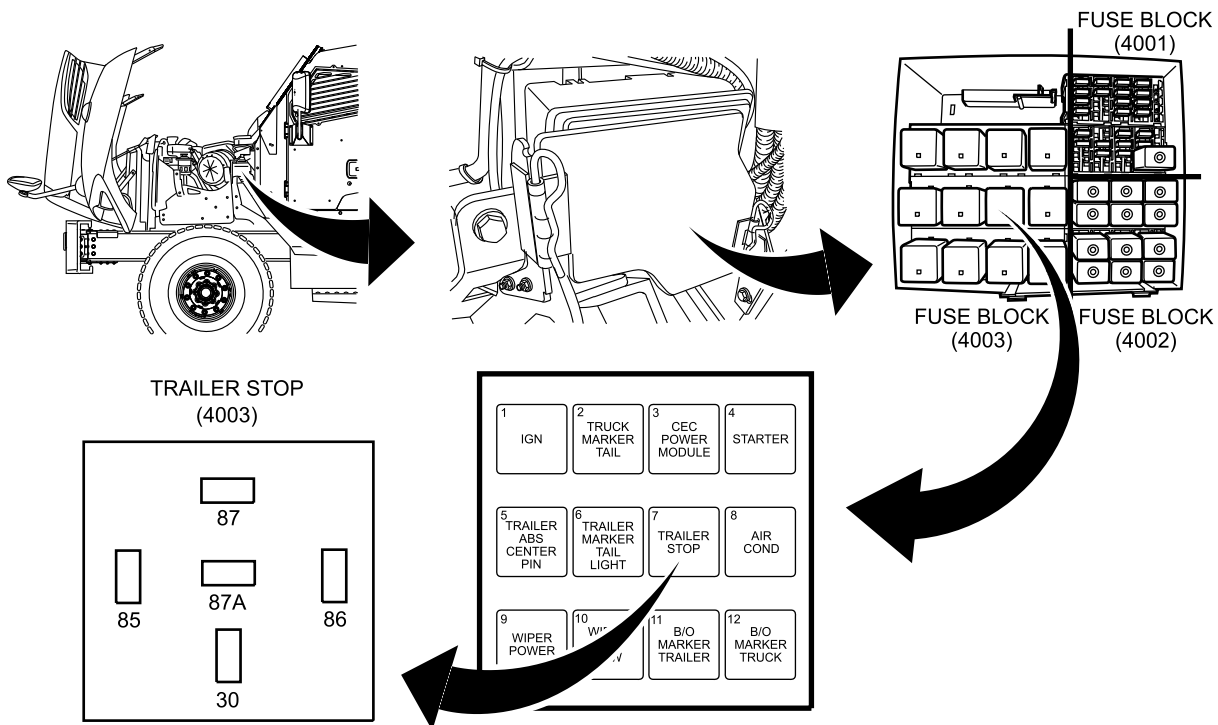
DECISION

NO Go to Step 100.
YES Go to Step 102.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 64. Turn ignition switch OFF (TM 9-2355-106-10).
- 65. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 66. Remove jumper wire from TRAILER STOP relay socket terminals 87 and 30. Refer to Figure 23.



B230605354

Figure 23. Engine Compartment PDC.

- 67. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 68. Turn ignition switch ON (TM 9-2355-106-10).
- 69. Measure DC voltage between TRAILER STOP relay socket terminal 87 and ground with multimeter. Refer to Figure 23.

CONDITION/INDICATION

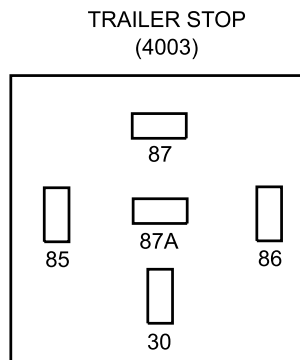
Does multimeter read between 21.0V and 27.0V?

DECISION

- NO Go to Step 103.
- YES Go to Step 106.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

70. Measure DC voltage between TRAILER STOP relay socket terminal 86 and ground with multimeter. Refer to Figure 24.



B230605451

Figure 24. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

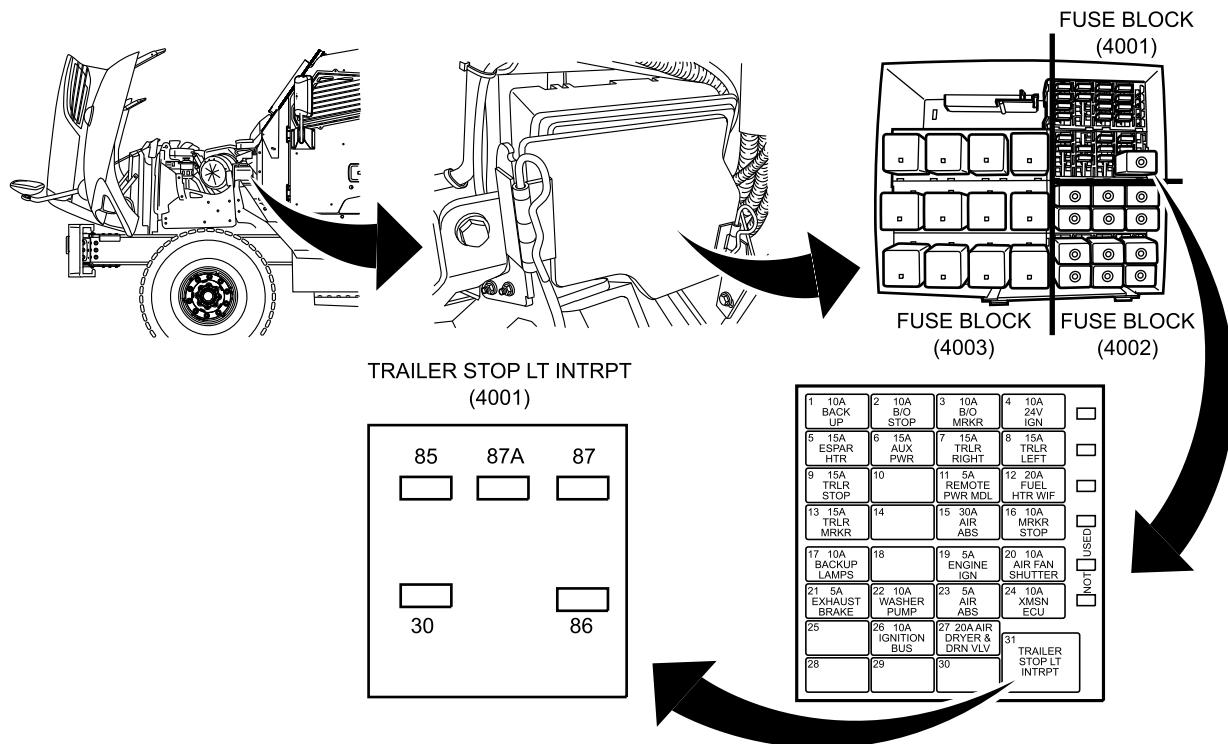
DECISION

NO Go to Step 78.
YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

71. Turn ignition switch OFF (TM 9-2355-106-10).
72. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
73. Remove jumper wire from TRAILER STOP LT INTRPT relay socket. Refer to Figure 25.



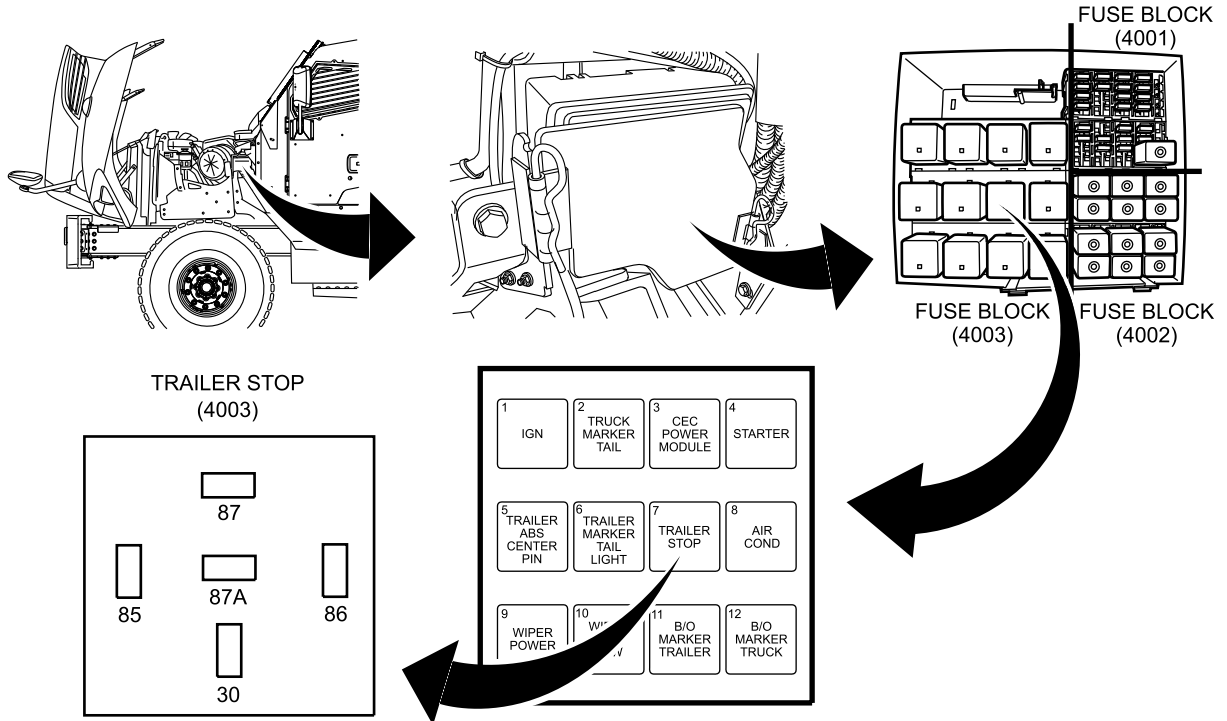
B230605312

Figure 25. Engine Compartment PDC.

74. Turn MAIN POWER switch ON (TM 9-2355-106-10).
75. Turn ignition switch ON (TM 9-2355-106-10).

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

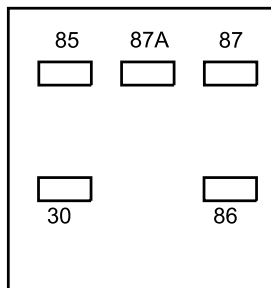
76. Measure DC voltage between TRAILER STOP relay socket terminal 86 and TRAILER STOP LT INTRPT relay socket 30 with multimeter. Refer to Figure 26. Refer to Figure 27.



B230605354

Figure 26. Engine Compartment PDC.

TRAILER STOP LT INTRPT
(4001)



B230605433

Figure 27. TRAILER STOP Relay Socket.

77. With assistant pressing brake pedal, observe multimeter.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

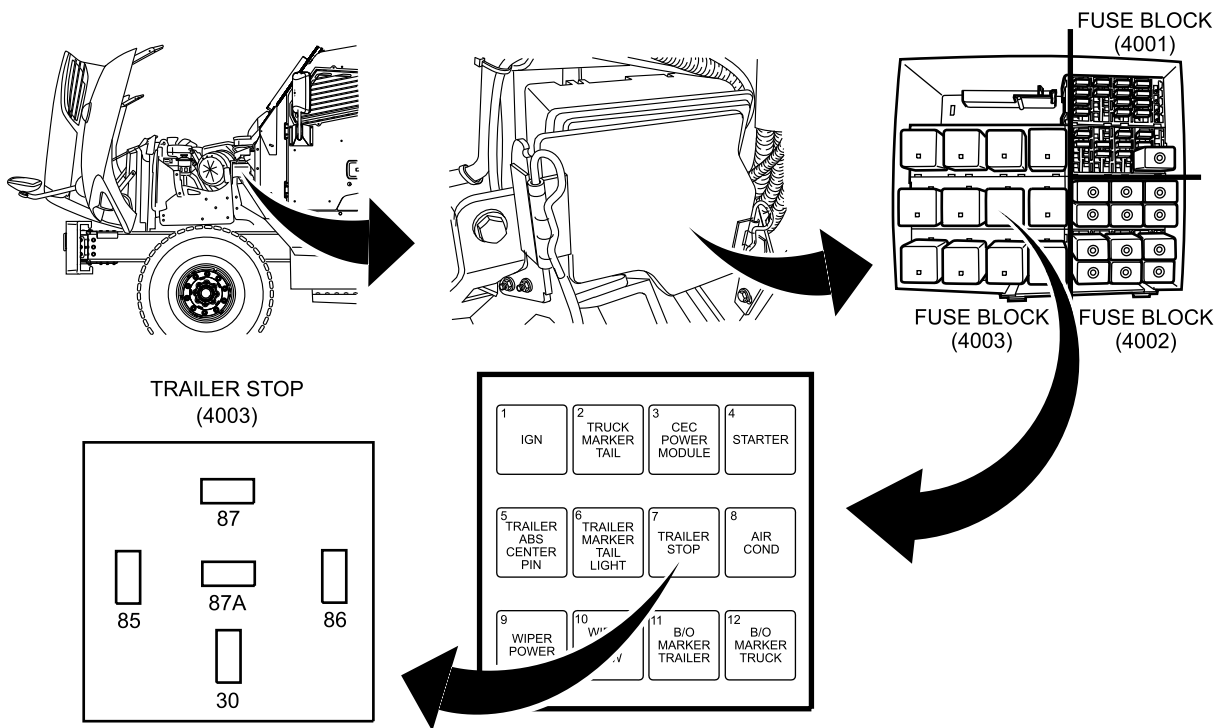
Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 84.
 YES Go to Step 101.

STEP

- 78. Turn ignition switch OFF (TM 9-2355-106-10).
- 79. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 80. Remove and inspect MRKR STOP 10-amp fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 28.



B230605354

Figure 28. Engine Compartment PDC.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 89.
 NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

81. Turn MAIN POWER switch ON (TM 9-2355-106-10).
82. Turn ignition switch ON (TM 9-2355-106-10).
83. Measure DC voltage between ground and fuse socket terminal G4 with multimeter. Refer to Figure 28.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 103.
YES Go to Step 101.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 84. Turn ignition switch OFF (TM 9-2355-106-10).
- 85. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 86. Disconnect Electronic System Controller (ESC) 4004. Refer to Figure 29.

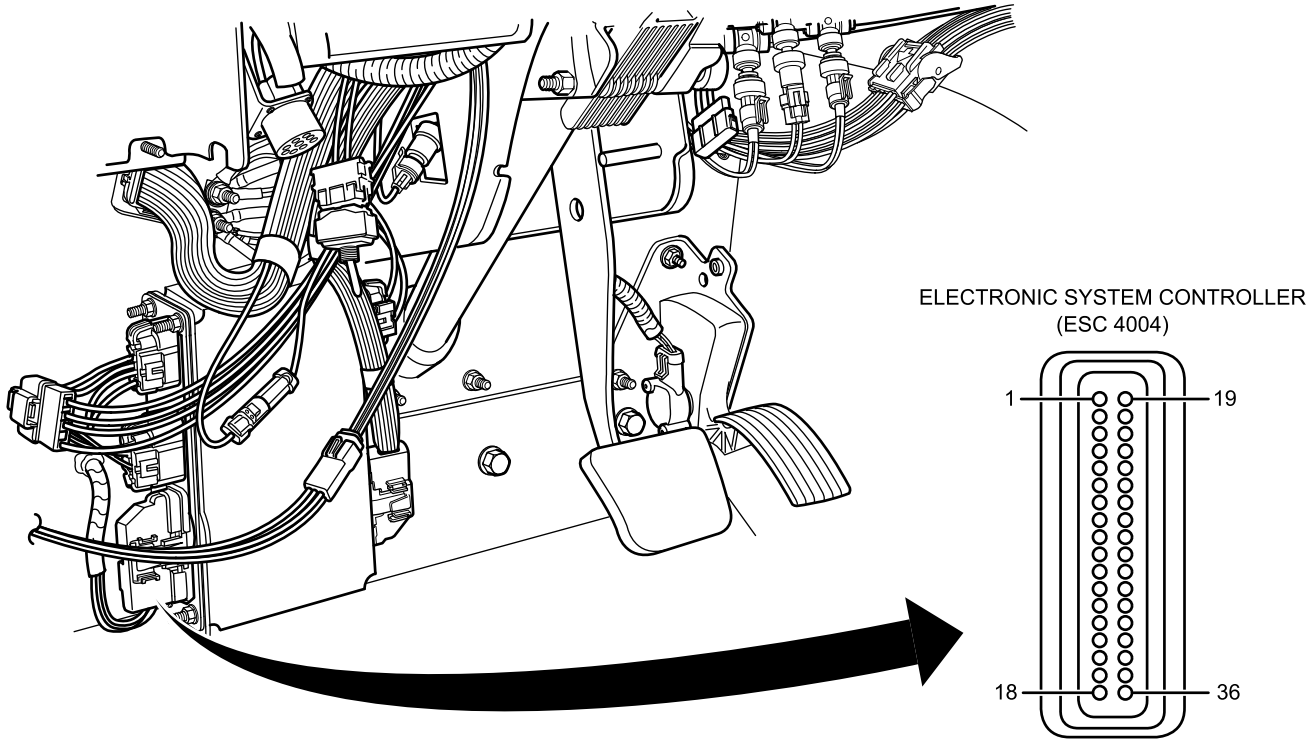
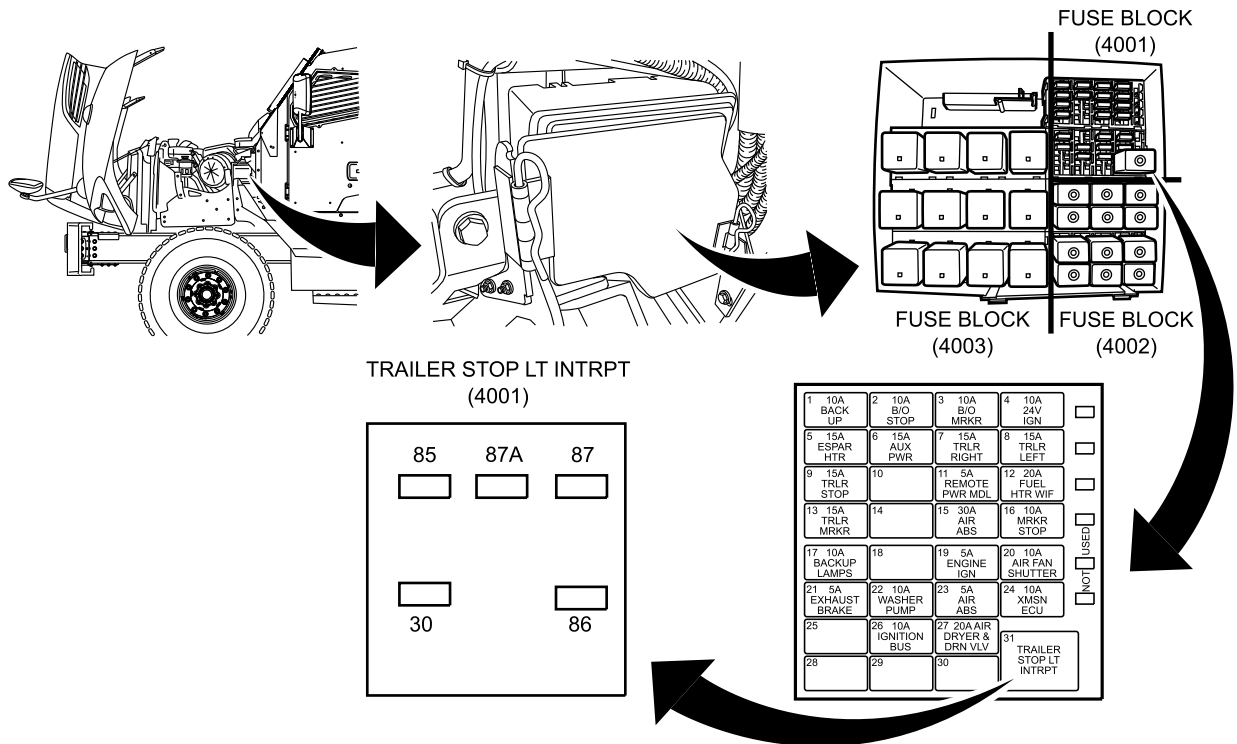


Figure 29. Under Left Side of Dash.

- 87. Measure resistance between TRAILER STOP LT INTRPT relay socket terminal 30 and connector 4004 terminal 21 with multimeter. Refer to Figure 29 and Figure 30.

B230604421

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605312

Figure 30. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

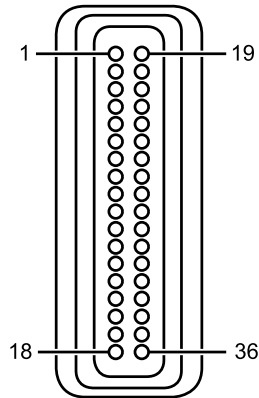
DECISION

NO Go to Step 101.
 YES Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

88. Measure resistance between connector 4004 terminal 21 and all other connector terminals on connector 4004 with multimeter. Refer to Figure 31.

ELECTRONIC SYSTEM CONTROLLER
(ESC 4004)



B230603830

Figure 31. Under Left Side of Dash.

CONDITION/INDICATION

Does multimeter read OL for each test?

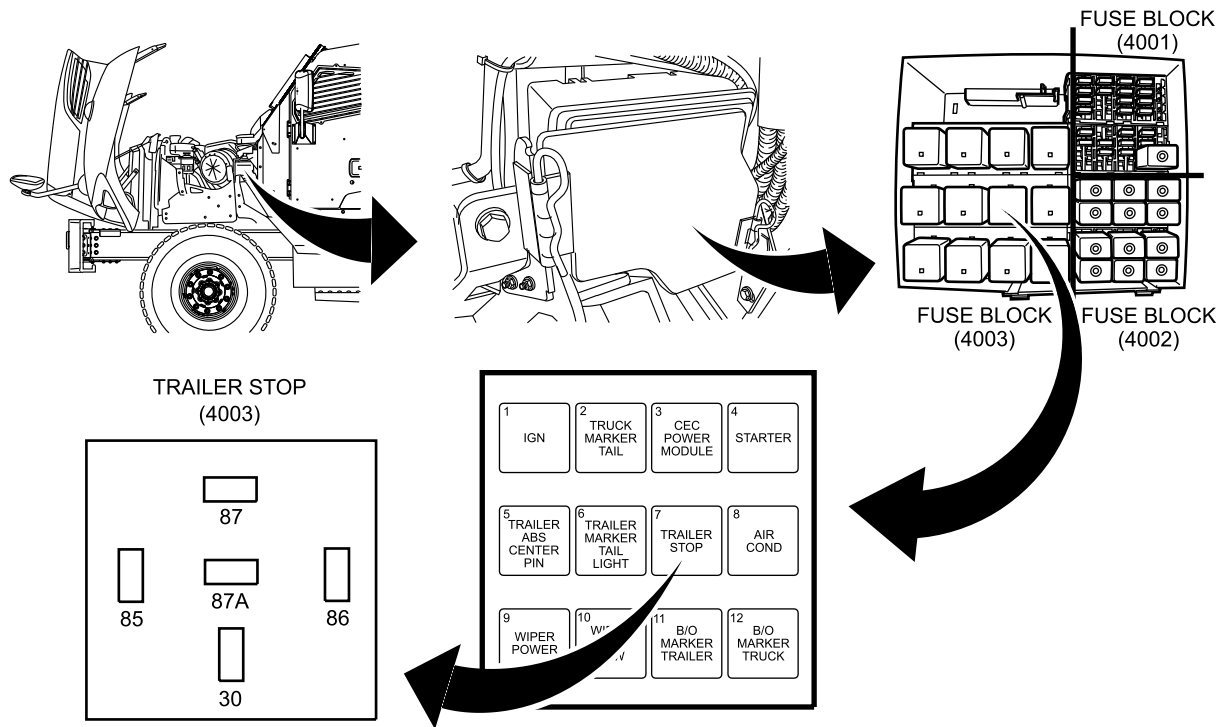
DECISION

NO Go to Step 101.
YES Go to Step 107.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

89. Measure resistance between TRAILER STOP relay socket terminal 86 and ground with multimeter. Refer to Figure 32.



B230605354

Figure 32. Engine Compartment PDC.

CONDITION/INDICATION

Does multimeter read OL?

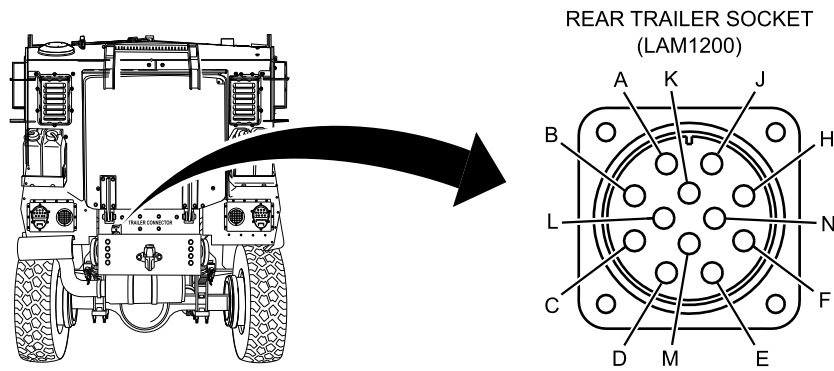
DECISION

NO Go to Step 101.
 YES Go to Step 106.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

90. Measure resistance between connector 1200 terminals M and L with multimeter. Refer to Figure 33.



B230605229

Figure 33. Lower Rear Body Panel.

CONDITION/INDICATION

Does multimeter read OL?

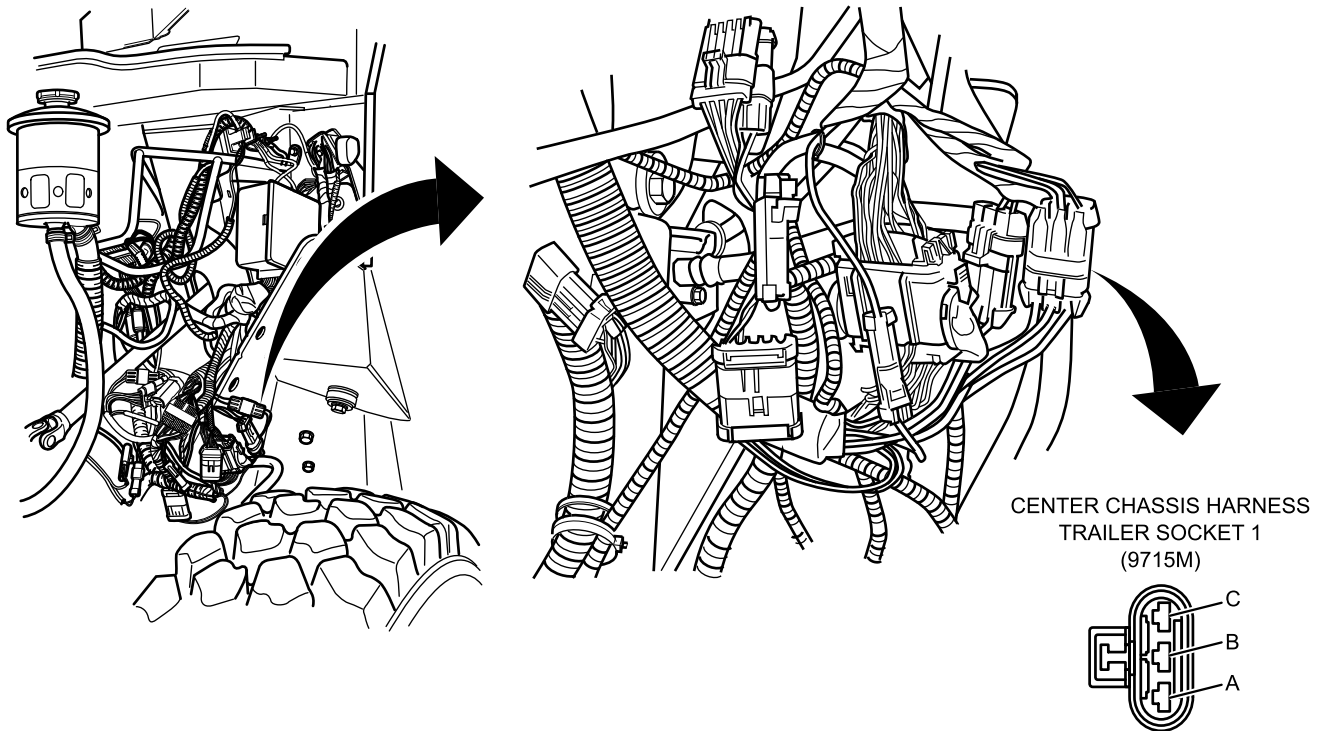
DECISION

YES Go to Step 97.

NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

91. Remove left side engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
92. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
93. Disconnect connector 9715M (three-wire connector containing RED, BROWN, and GRAY wires) from 9715P. Refer to Figure 34.



B230605339

Figure 34. Left Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

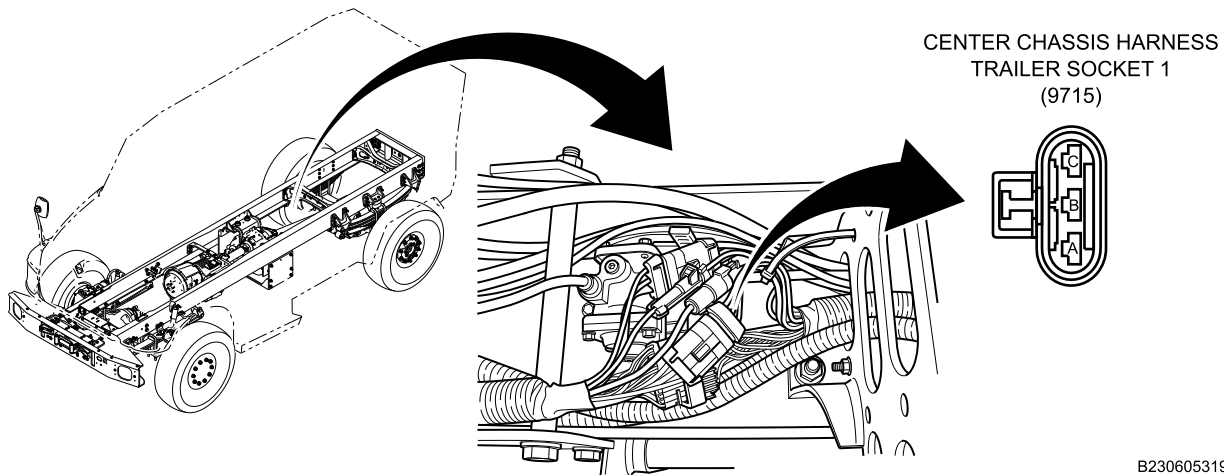
DECISION

YES Go to Step 101.

NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

94. Remove air dryer. Refer to Air Dryer Removal and Installation (WP 0517).
95. Disconnect connector 9715 (three-wire connector containing RED, BROWN, and GRAY wires). Refer to Figure 35.



B230605319

Figure 35. Left Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 98.
NO Go to next step.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)
STEP

96. Disconnect connector 9780M (three-wire connector containing RED, BROWN, and DARK BLUE wires). Refer to Figure 36.

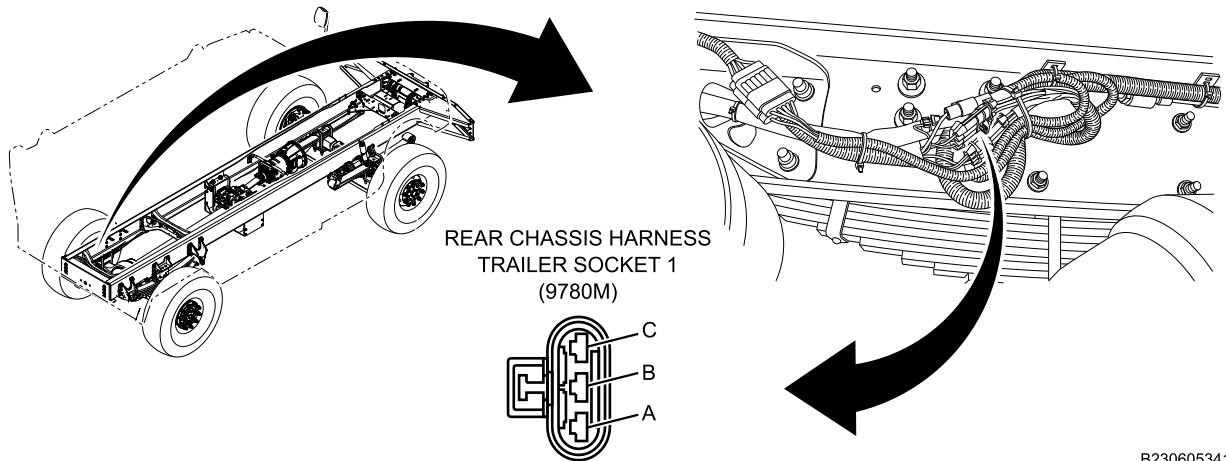


Figure 36. Left Rear Frame Rail.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 99.
NO Go to Step 105.

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 97. Fuse was blown because a short to ground existed in the auxiliary trailer circuit. The short to ground is not present at this time. The short to ground may be intermittent or, if this vehicle was towing another vehicle, the short to ground may exist in the vehicle that was being towed.

ACTION

Replace TRAILER STOP fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 98. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 99. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 100. Instrument panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 101. PDC harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 102. Master MVLS is faulty.

ACTION

Refer to Master Vehicle Light Switch (MVLS) Troubleshooting Procedure (WP 0092). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 103. Power distribution is faulty.

ACTION

Refer to Power Distribution Troubleshooting Procedure (WP 0059). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 104. Front trailer hookup is faulty.

ACTION

Replace front trailer hookup. Refer to Front Trailer Hookup Removal and Installation (WP 0429). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 105. Rear trailer hookup is faulty.

ACTION

Replace rear trailer hookup. Refer to Rear Trailer Hookup Removal and Installation (WP 0431). Return vehicle to service.

END OF TEST

TRAILER CONNECTOR BRAKE CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 106. Relay is faulty.

ACTION

Replace relay. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 107. Electronic system controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

FRONT CREW LIGHT OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

References

WP 0134
WP 0356
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Rotate black brightness knob on front crew light clockwise to maximum position. (TM 9-2355-106-10).
3. Pull and slide toggle switch on front crew light to WHITE position to illuminate LEDs WHITE (TM 9-2355-106-10).

CONDITION/INDICATION

Front crew light LEDs do not illuminate WHITE.

CORRECTIVE ACTION

Refer to Front Crew Light Troubleshooting Procedure (WP 0134).

1. Rotate BLACK brightness knob to dim and brighten LEDs (TM 9-2355-106-10).

FRONT CREW LIGHT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Front crew light LEDs do not dim and brighten.

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

1. Pull and slide toggle switch on front crew light to illuminate LEDs RED (TM 9-2355-106-10).

Front crew light LEDs do not illuminate RED.

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

1. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
2. Press and release EMER button on front crew light to illuminate RED LEDs for 30 seconds (TM 9-2355-106-10).

RED LEDs do not illuminate for 30 seconds.

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

1. Press and release EMER button twice to illuminate RED LEDs indefinitely (TM 9-2355-106-10).

RED LEDs do not illuminate indefinitely.

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

1. Turn front crew light OFF (TM 9-2355-106-10).

Front crew light does not turn off.

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0359
WP 0360
WP 0580
WP 0581
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0133
WP 0317
WP 0319
WP 0311
WP 0356
WP 0357
WP 0358

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 61,

Before Beginning This Troubleshooting Procedure

Successful diagnosis of front crew light depends on performing various procedures in correct sequence. Failure to comply will lead to misdiagnosis. Perform Front Crew Light Operational Checkout Procedure (WP 0133) before performing tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

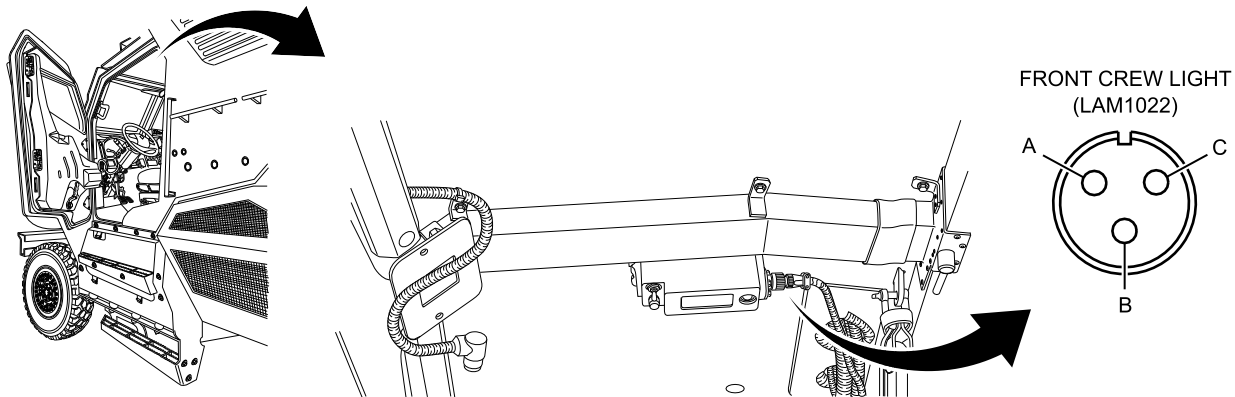
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect front crew light connector LAM1022. Refer to Figure 1.



005350

Figure 1. Front Cabin Ceiling Area.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Measure DC voltage between connector LAM1022 terminal A and B with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 69.
NO Go to next step.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

4. Measure DC voltage between connector LAM1022 terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

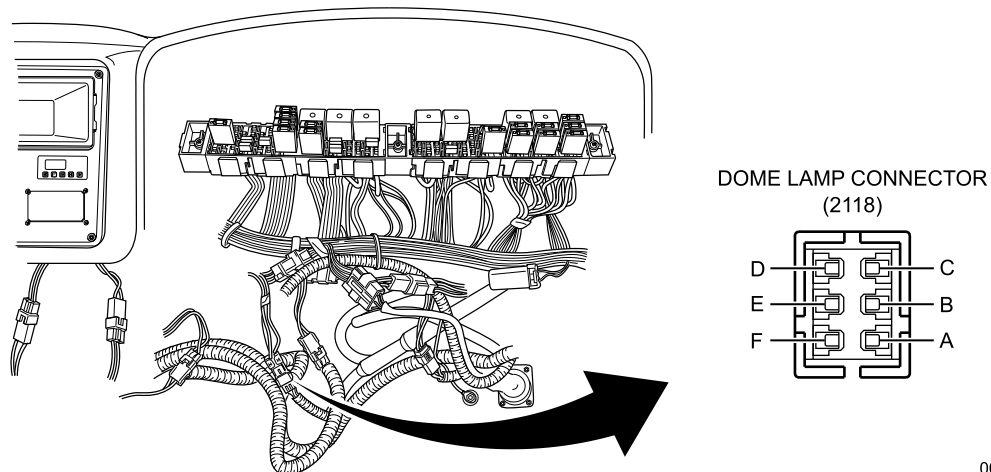
Does multimeter read more than 22.5V?

DECISION

YES Go to next step.
NO Go to Step 9.

STEP

5. Remove right side instrument panel closeout. Refer to Instrument Panel Right Side Closeout Removal and Installation (WP 0580).
6. Disconnect connector 2118 (BLUE wires). Refer to Figure 2.



005353

Figure 2. Right Side Instrument Panel Area.

7. Turn MAIN POWER switch ON (TM 9-2355-106-10).
8. Measure DC voltage between connector 2118 terminals A and B with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 76
NO Go to Step 70

STEP

9. Remove right side instrument panel closeout. Refer to Instrument Panel Right Side Closeout Removal and Installation (WP 0580).
10. Inspect circuit breaker F43 reset button (Figure 3, Item 1). Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

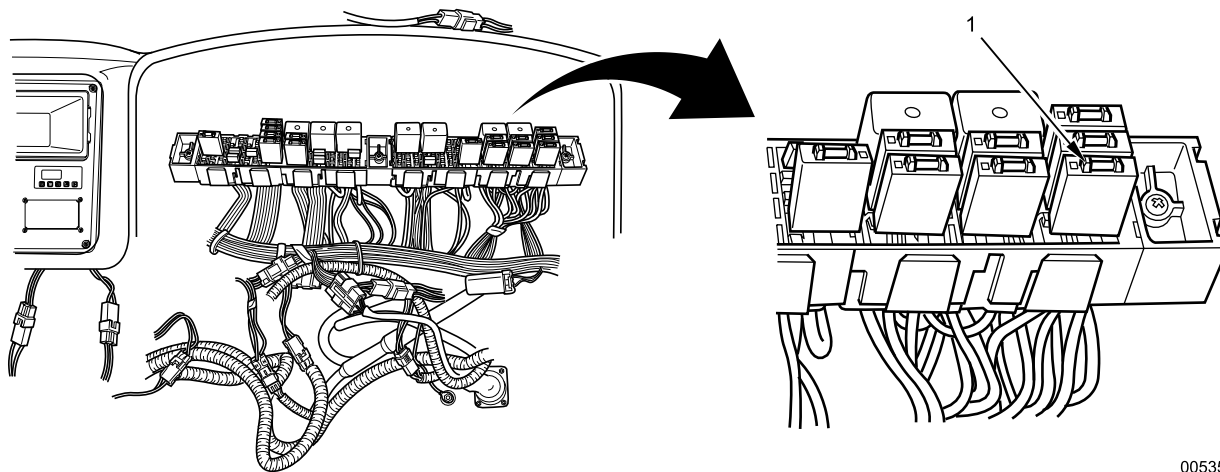


Figure 3. Circuit Breaker F43 Reset Button.

005357

CONDITION/INDICATION

Is circuit breaker F43 reset button popped up?

DECISION

YES Go to next step.
 NO Go to Step 61.

STEP

11. Remove IP center trim panel. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
12. Disconnect connector 1111. Refer to Figure 4.

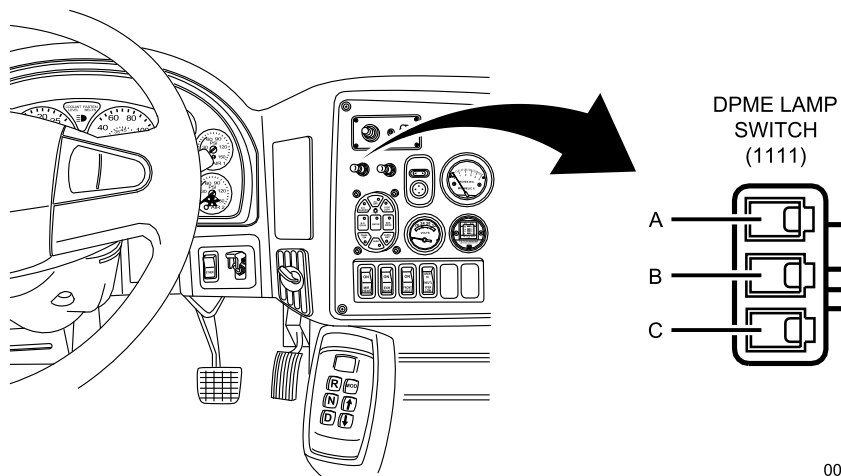


Figure 4. Center of Instrument Panel Area.

005364

13. Disconnect connector 2118 (BLUE wires). Refer to Figure 5.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

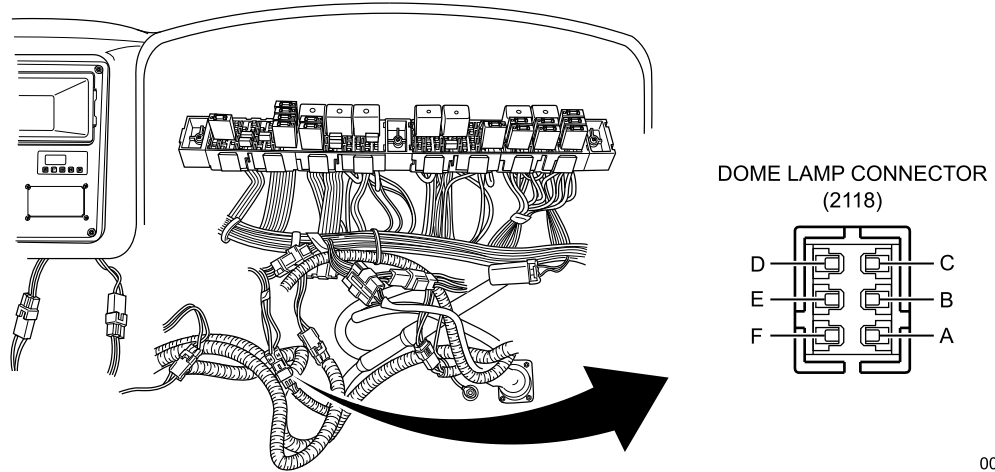


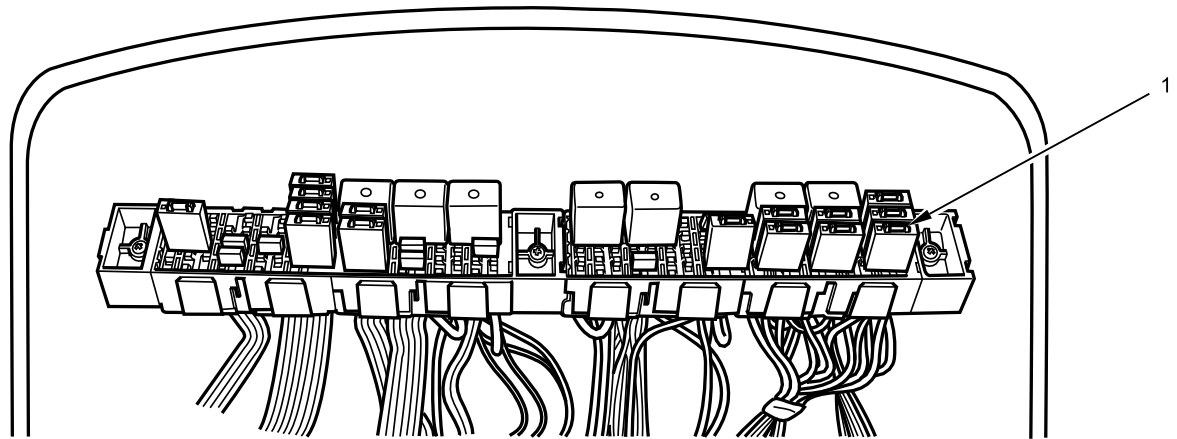
Figure 5. Right Side Instrument Panel Area.

14. Turn MAIN POWER switch ON (TM 9-2355-106-10).

005353

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

15. Push reset button (Figure 6, Item 1) on circuit breaker F43.



005366

Figure 6. Circuit Breaker F43 Reset Button.

CONDITION/INDICATION

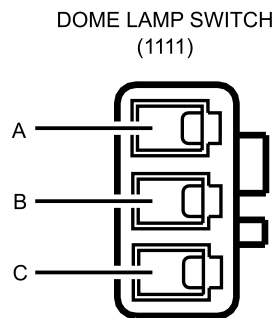
Did circuit breaker F43 reset button pop back up?

DECISION

YES Go to Step 70.
 NO Go to next step.

STEP

- 16. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 17. Connect a jumper wire between connector 1111 terminals A and B. Refer to Figure 7.



005380

Figure 7. Connector 1111.

18. Turn MAIN POWER switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 70.
NO Go to next step.

STEP

19. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
20. Remove jumper wire from connector 1111.
21. Connect a jumper wire between connector 1111 terminals A and C. Refer to Figure 7.
22. Turn MAIN POWER switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

DECISION

YES Go to Step 70.
NO Go to next step.

STEP

23. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
24. Remove jumper wire from connector 1111.
25. Connect connector 1111 to dome light switch.
26. Turn MAIN POWER switch ON (TM 9-2355-106-10).
27. Place Instrument Panel (IP) crew light switch in down position, center position, then in up position (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

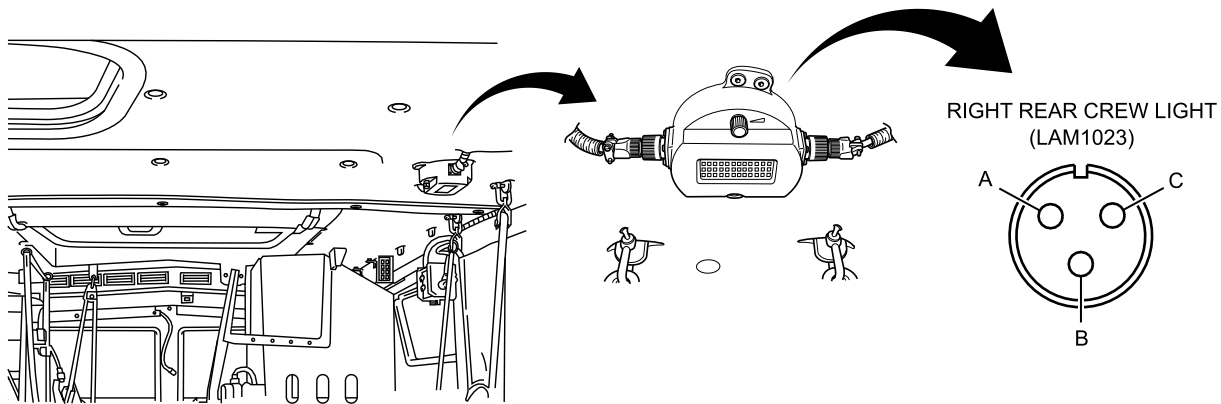
DECISION

YES Go to Step 71.
NO Go to next step.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

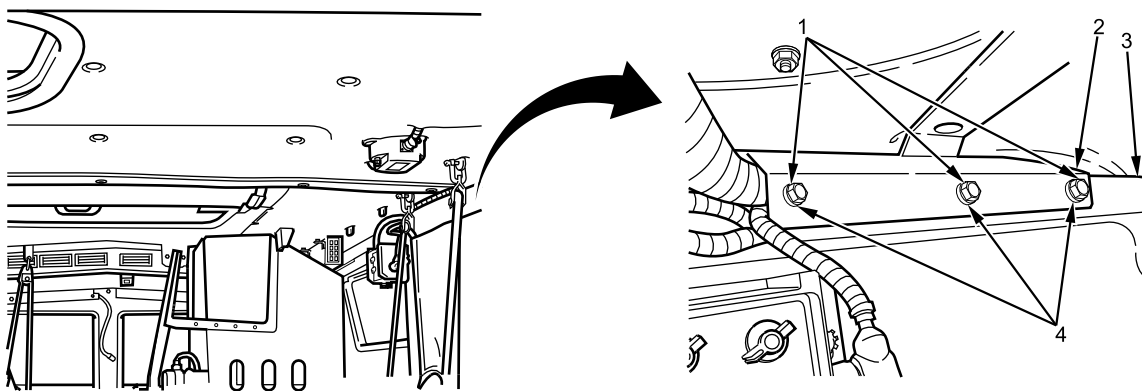
- 28. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 29. Disconnect connector LAM1023. Refer to Figure 8.



005367

Figure 8. Right Side Ceiling Area.

- 30. Remove three bolts (Figure 9, Item 1) and three flat washers (Figure 9, Item 4) securing right rear wire harness channel cover (Figure 9, Item 2) to right rear wire harness channel (Figure 9, Item 3).

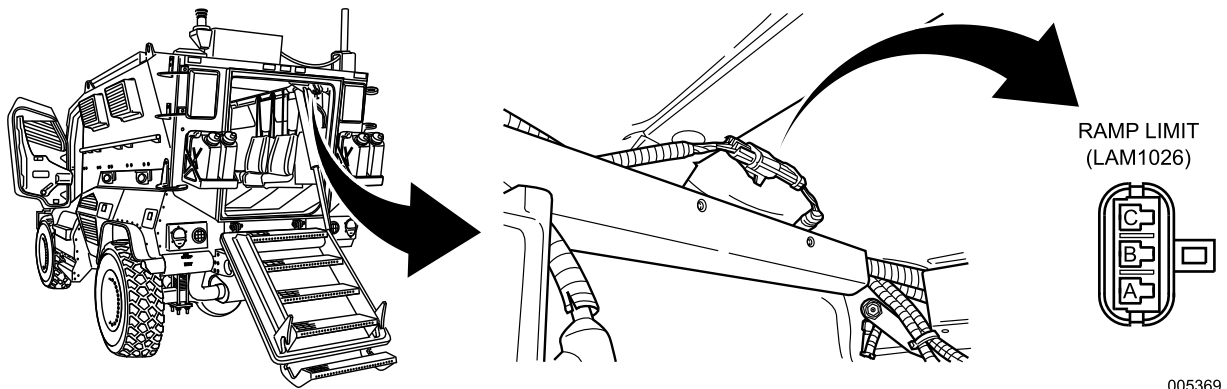


005368

Figure 9. Right Rear Wire Harness Channel Cover.

- 31. Disconnect connector LAM1026. Refer to Figure 10.

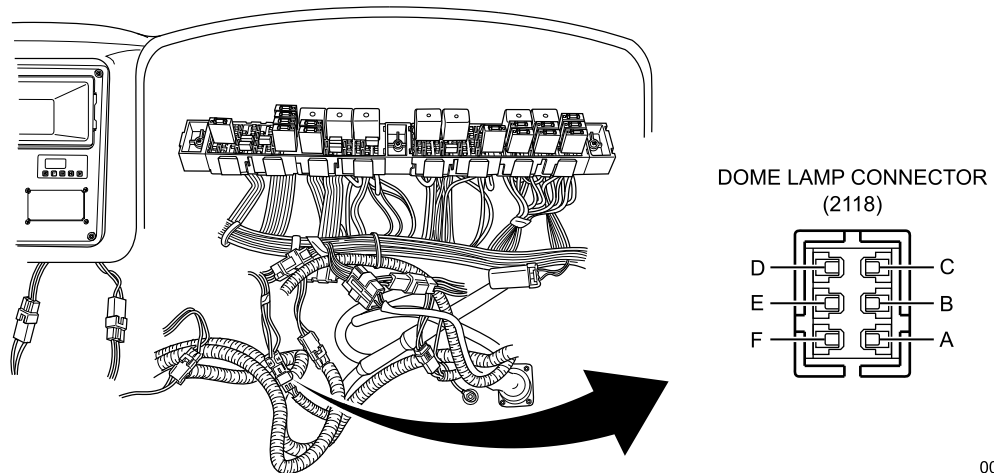
FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)



005369

Figure 10. Right Side Rear Door/Ramp Area.

32. Connect connector 2118. Refer to Figure 11.



005353

Figure 11. Right Side Instrument Panel Area.

33. Turn MAIN POWER switch ON (TM 9-2355-106-10).

34. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

DECISION

YES Go to Step 76.

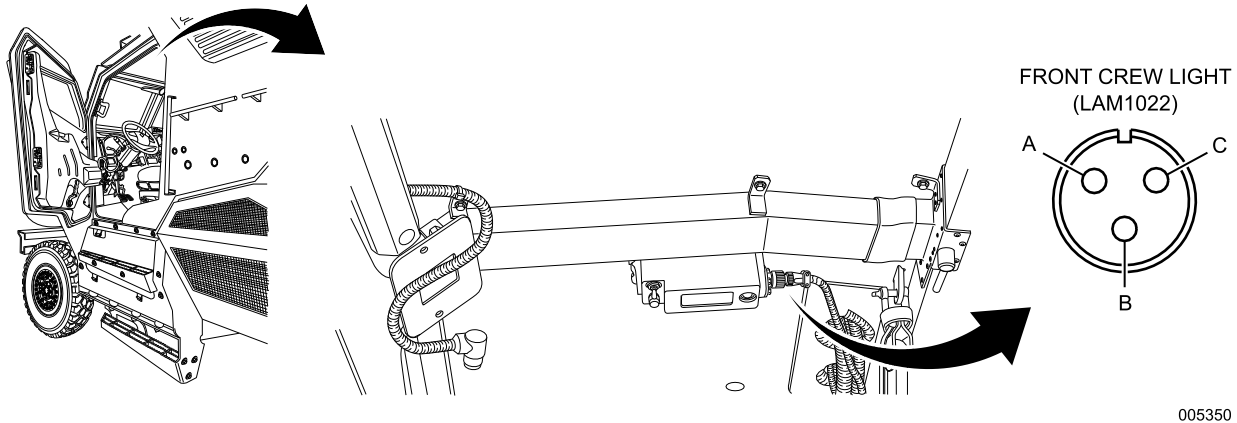
NO Go to next step.

STEP

35. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

36. Connect connector LAM1022. Refer to Figure 12.



005350

Figure 12. Front Cabin Ceiling Area.

37. Turn MAIN POWER switch ON (TM 9-2355-106-10).

38. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

DECISION

YES Go to Step 69.

NO Go to next step.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

39. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
40. Connect connector LAM1026. Refer to Figure 13.

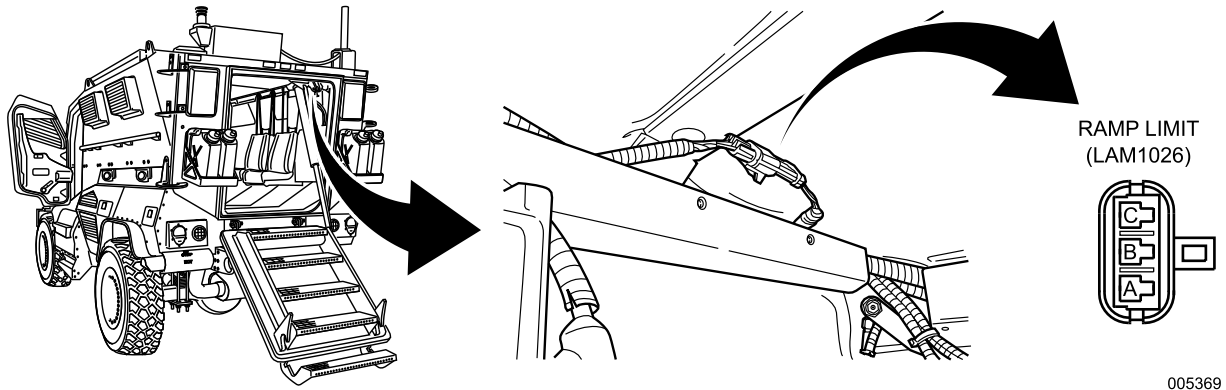


Figure 13. Right Side Rear Door/Ramp Area.

41. Turn MAIN POWER switch ON (TM 9-2355-106-10).
42. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).
43. Open and close rear door/ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

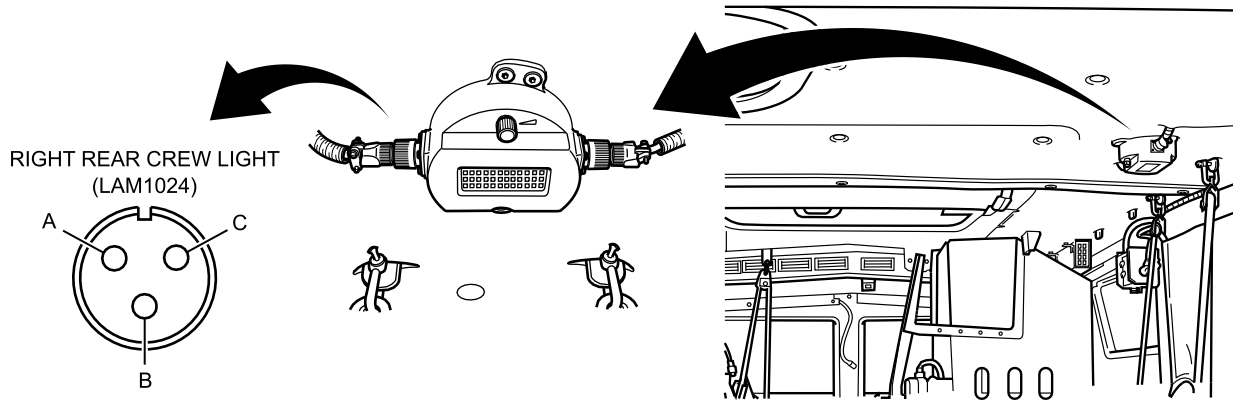
DECISION

YES Go to Step 74.
 NO Go to next step.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

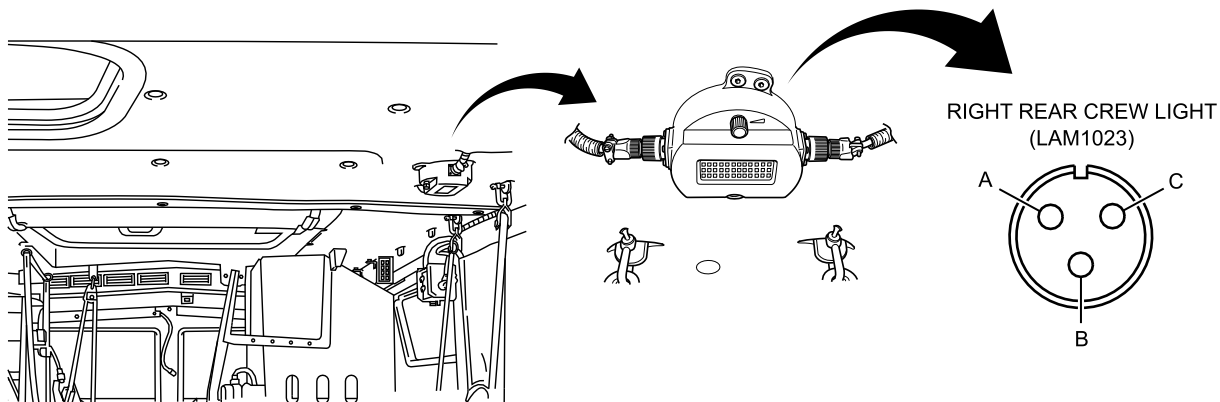
- 44. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 45. Disconnect connector LAM1024. Refer to Figure 14.



005373

Figure 14. Right Side Ceiling Area.

- 46. Connect connector LAM 1023. Refer to Figure 15.



005367

Figure 15. Right Side Ceiling Area.

- 47. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 48. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).
- 49. Open and close rear door/ramp (TM 9-2355-106-10).

CONDITION/INDICATION

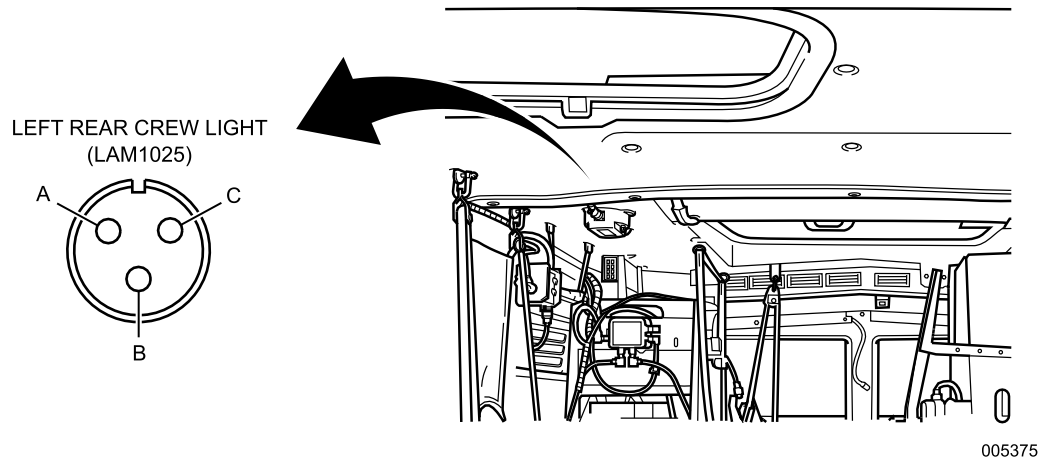
Did circuit breaker F43 reset button pop back up?

DECISION

- YES Go to Step 75.
- NO Go to next step.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

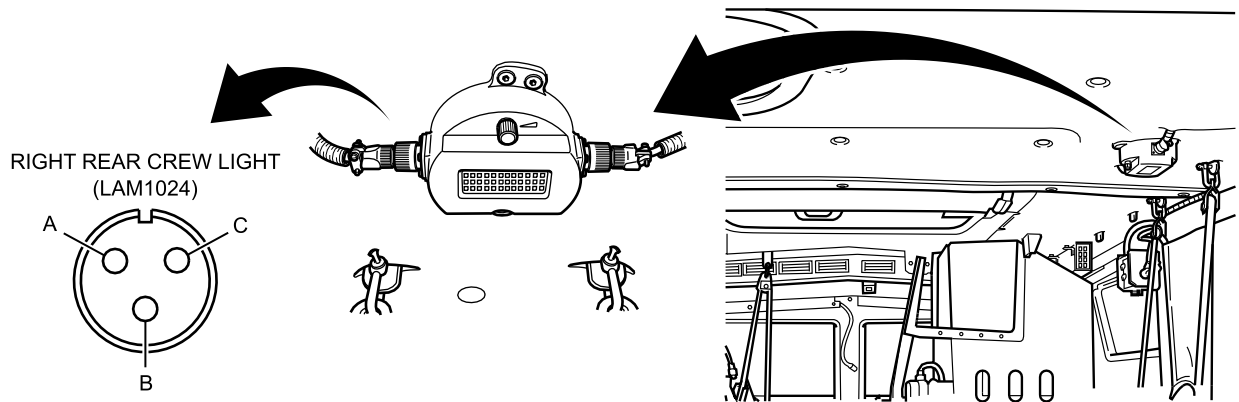
50. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
51. Disconnect connector LAM1025. Refer to Figure 16.



005375

Figure 16. Left Rear Ceiling Area.

52. Connect connector LAM1024. Refer to Figure 17.



005373

Figure 17. Right Side Ceiling Area.

53. Turn MAIN POWER switch ON (TM 9-2355-106-10).
54. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).
55. Open and close rear door/ramp (TM 9-2355-106-10).

CONDITION/INDICATION

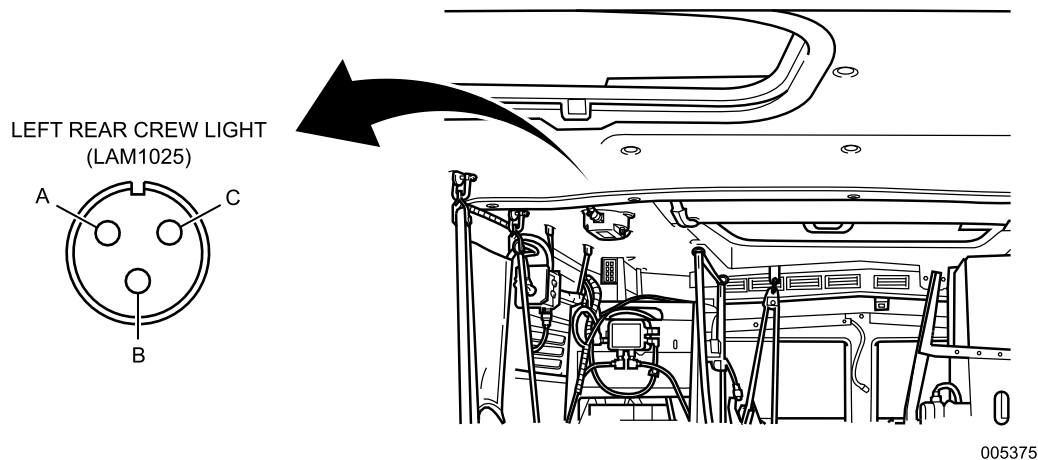
Did circuit breaker F43 reset button pop back up?

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

- YES Go to Step 73.
 NO Go to next step.

STEP

56. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 57. Connect connector LAM1025. Refer to Figure 18.



005375

Figure 18. Left Rear Ceiling Area.

58. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 59. Place IP crew light switch in down position, center position, then in up position (TM 9-2355-106-10).
 60. Open and close rear door/ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker F43 reset button pop back up?

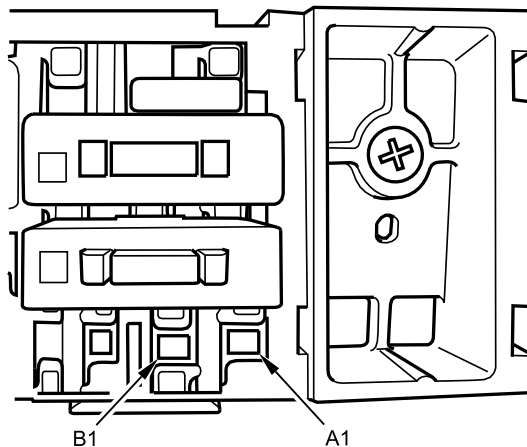
DECISION

- YES Go to Step 72.
 NO Fault is intermittent. Return vehicle to service.

STEP

61. Remove circuit breaker F43. Refer to Refer to Instrument Panel Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0317).
 62. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 63. Measure DC voltage between terminal A1 at circuit breaker socket F43 and ground with multimeter. Refer to Figure 19.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)



005378

Figure 19. Circuit Breaker Socket F43.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

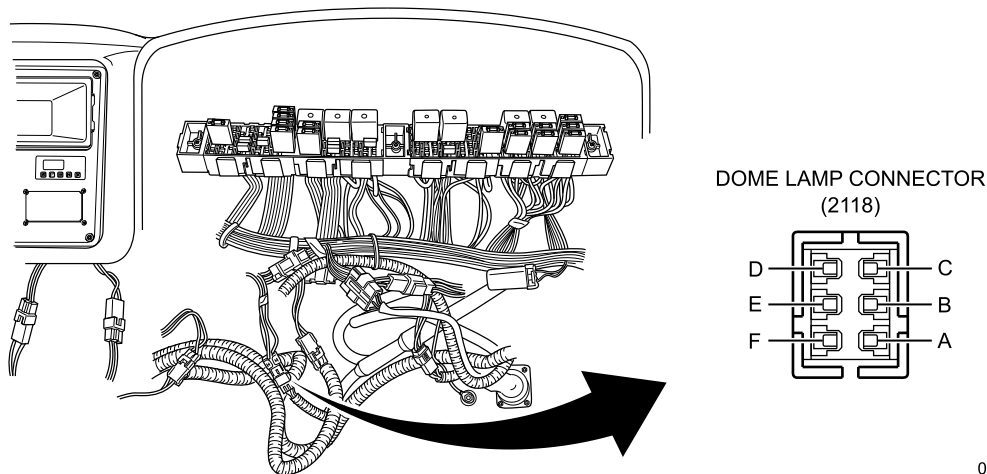
DECISION

YES Go to next step.

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).

STEP

- 64. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 65. Install circuit breaker F43.
- 66. Disconnect connector 2118. Refer to Figure 20.



005353

Figure 20. Right Side Instrument Panel Area.

- 67. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 68. Measure DC voltage between connector 2118 terminal A and ground with multimeter. Refer to Figure 20.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 76.

NO Go to Step 70.

MALFUNCTION

- 69. Front crew light is faulty.

ACTION

Replace front crew light. Refer to Front Crew Light Removal and Installation (WP 0356). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 70. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 71. IP crew light switch is faulty.

ACTION

Replace IP crew light switch. Refer to Crew Light Switch Removal and Installation (WP 0311). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 72. Left rear crew light is faulty.

ACTION

Replace left rear crew light. Refer to Rear Crew Light Removal and Installation (WP 0357). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 73. Harness is faulty.

ACTION

Replace harness. Refer to Interior Lights Left Rear Crew Light Harness Removal and Installation (WP 0359). Return vehicle to service.

FRONT CREW LIGHT TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 74. Rear door/ramp switch is faulty.

ACTION

Replace switch. Refer to Interior Lights Ramp Limit Switch Jumper Harness Removal and Installation (WP 0358). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 75. Right side rear crew light is faulty.

ACTION

Replace right rear crew light. Refer to Rear Crew Light Removal and Installation (WP 0357). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 76. Harness is faulty.

ACTION

Replace harness. Refer to Interior Lights Right Rear and Front Crew Lights Harness Removal and Installation (WP 0360). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

REAR CREW LIGHT OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0136
WP 0356
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Rear ramp door open (TM 9-2355-106-10)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).

NOTE

Do not press EMER button on crew lights.

2. Rotate black knob clockwise on each crew light to full brightness (TM 9-2355-106-10).
3. Ensure Instrument Panel (IP) crew light switch is in the OFF position (TM 9-2355-106-10).
4. Observe rear crew lights. Rear crew lights should be off.

REAR CREW LIGHT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Rear crew lights are on.

CORRECTIVE ACTION

Refer to Rear Crew Light Troubleshooting Procedure (WP 0136).

1. Close rear ramp/door (TM 9-2355-106-10).
2. Place Instrument Panel (IP) crew light switch in down position to illuminate both rear crew lights RED (TM 9-2355-106-10).

One or more rear crew lights do not illuminate RED.

Refer to Rear Crew Light Troubleshooting Procedure (WP 0136).

1. Place Instrument Panel (IP) crew light switch in up position to illuminate both rear crew lights WHITE (TM 9-2355-106-10).

One or more rear crew lights do not illuminate WHITE.

Refer to Rear Crew Light Troubleshooting Procedure (WP 0136).

1. Open rear ramp/door. Rear crew lights should illuminate RED (TM 9-2355-106-10).

One or more rear crew lights do not illuminate RED.

Refer to Rear Crew Light Troubleshooting Procedure (WP 0136).

1. Place Instrument Panel (IP) rear crew light switch in center position to turn both rear crew lights off (TM 9-2355-106-10).

One or more rear crew lights do not turn off.

Refer to Rear Crew Light Troubleshooting Procedure (WP 0136).

1. Press EMER button on each rear crew light. Each crew light should illuminate RED for 30 seconds (TM 9-2355-106-10).

Rear crew light does not illuminate RED.

Replace rear crew light that does not illuminate RED. Refer to Rear Crew Light Removal and Installation (WP 0356). Return vehicle to service.

1. Press EMER button on each rear crew light to turn them off (TM 9-2355-106-10).

Rear crew light does not turn off.

Replace rear crew light that does not turn off. Refer to Rear Crew Light Removal and Installation (WP 0356). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0359
WP 0360
WP 0581
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0135
WP 0319
WP 0311
WP 0357
WP 0358

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Rear Ramp Door Open (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 61

Before Beginning This Troubleshooting Procedure

Successful diagnosis of rear crew lights depends on performing various procedures in correct sequence. Failure to comply will lead to misdiagnosis. Perform Rear Crew Lights Operational Checkout Procedure (WP 0135) before performing tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).

NOTE

Do not press EMER button on crew lights.

2. Rotate BLACK knob on each rear crew light to full brightness (TM 9-2355-106-10).
3. Ensure Instrument Panel (IP) crew light switch is in the OFF position (TM 9-2355-106-10).
4. Observe rear crew lights.

CONDITION/INDICATION

Are rear crew lights on?

DECISION

YES Go to Step 30.
NO Go to next step.

STEP

5. Close rear ramp/door (TM 9-2355-106-10).
6. Place Instrument Panel (IP) crew light switch in down position to illuminate both rear crew lights RED (TM 9-2355-106-10).
7. Observe rear crew lights.
8. Place Instrument Panel (IP) crew light switch in up position to illuminate both rear crew lights WHITE (TM 9-2355-106-10).
9. Observe rear crew lights.

CONDITION/INDICATION

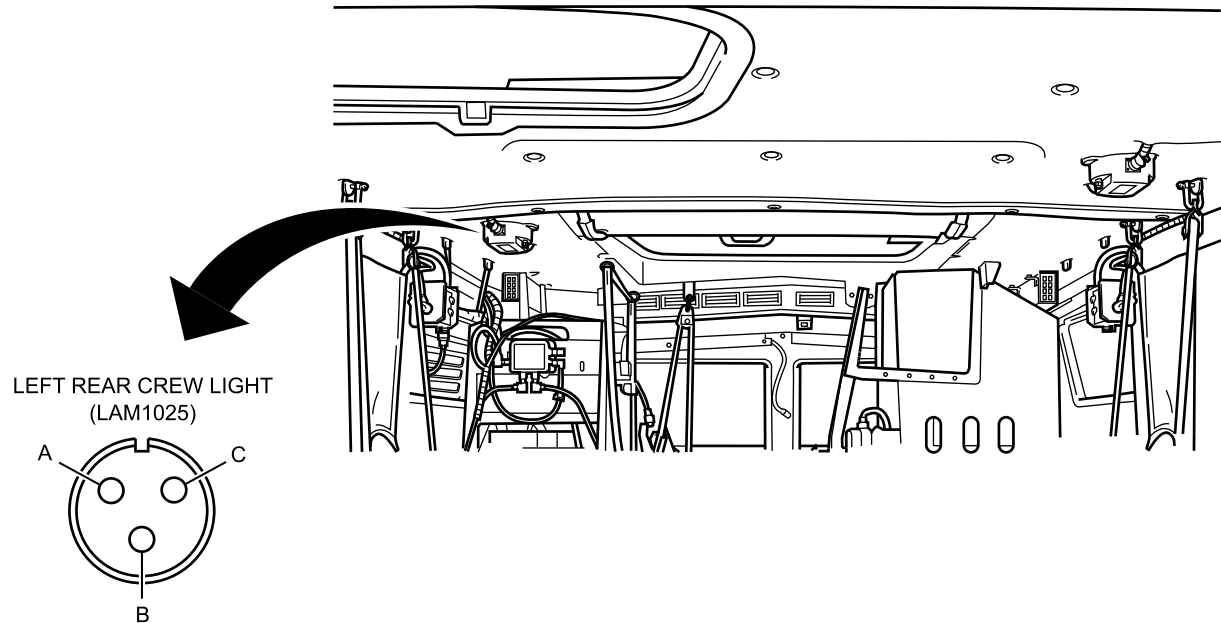
Did right rear crew light illuminate RED and WHITE?

DECISION

YES Go to next step.
NO Go to Step 23.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
11. Disconnect connector LAM1025. Refer to Figure 1.



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Figure 1. Left Rear Roof Area.

12. Turn MAIN POWER switch ON (TM 9-2355-106-10).
13. Measure DC voltage between connector LAM1025 terminals B and C with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

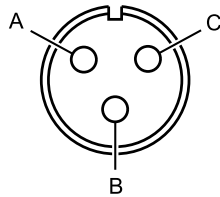
DECISION

YES Go to next step.
 NO Go to Step 16.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

14. Place Instrument Panel (IP) crew light switch in down position to illuminate both rear crew lights RED (TM 9-2355-106-10).
15. Measure DC voltage between connector LAM1025 terminals A and B with multimeter. Refer to Figure 2.

LEFT REAR CREW LIGHT
(LAM1025)



B230604115

Figure 2. Connector LAM1025.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 42.
NO Go to Step 20.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

16. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
17. Disconnect connector LAM1024. Refer to Figure 3.

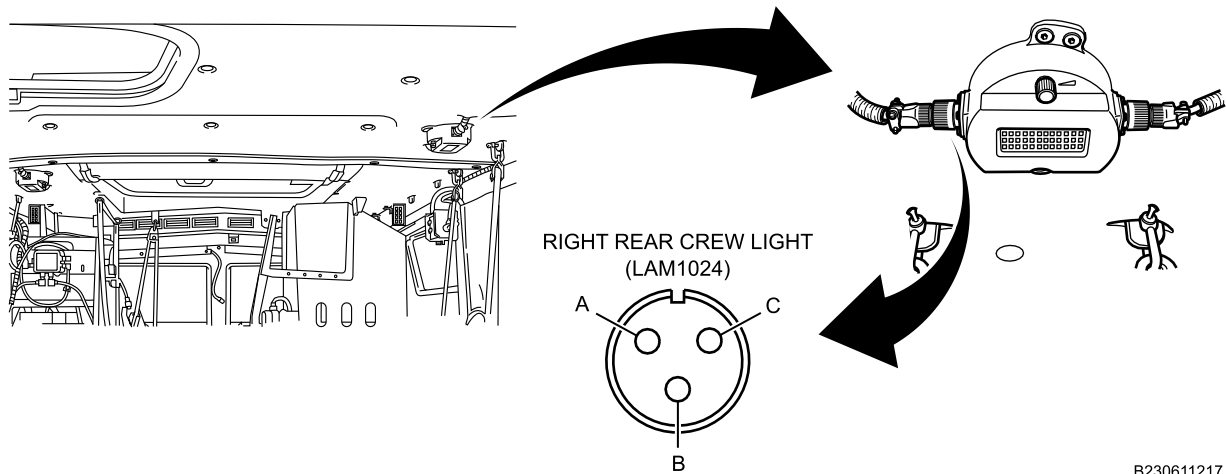
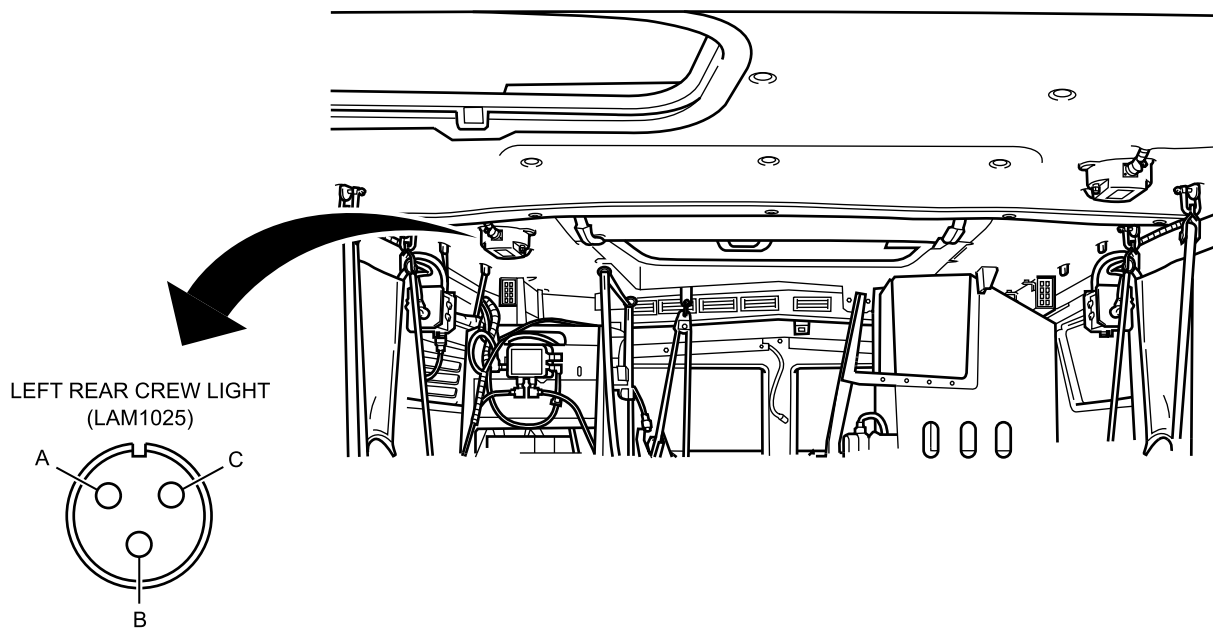


Figure 3. Right Rear Roof Area.

18. Connect a jumper wire between connector LAM1024 terminals B and C. Refer to Figure 3.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)

19. Measure resistance between connector LAM1025 terminals B and C with multimeter. Refer to Figure 4.



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Figure 4. Left Rear Roof Area.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 42.

NO Go to Step 43.

STEP

20. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

21. Disconnect connector LAM1024. Refer to Figure 5.

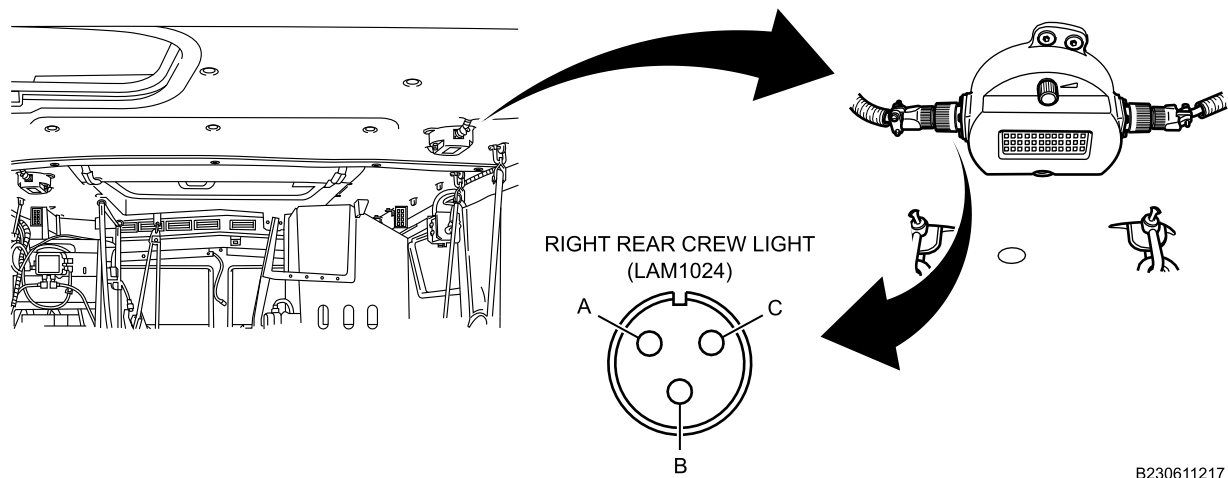
REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)


Figure 5. Right Rear Roof Area.

22. With assistant, measure resistance between connector LAM1024 terminal A and connector LAM1025 terminal A with multimeter. Refer to Figure 5 and Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 42.
 NO Go to Step 43.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

23. Refer to observations from last step.

CONDITION/INDICATION

Did left rear crew light illuminate RED and WHITE?

DECISION

YES Go to Step 45.

NO Go to next step.

STEP

24. Place Instrument Panel (IP) crew light switch in up position (TM 9-2355-106-10).

25. Open rear door/ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Do both rear crew lights stay illuminated WHITE?

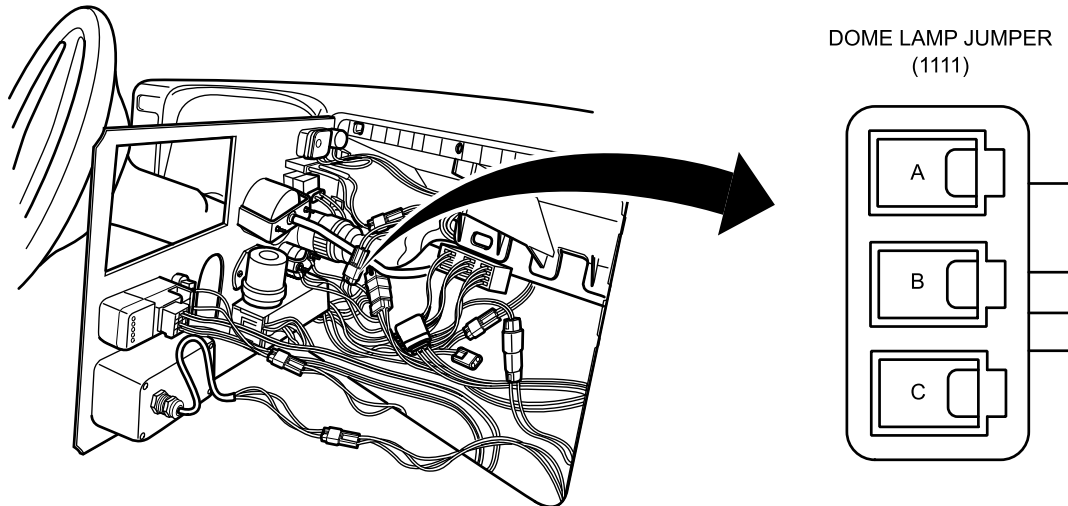
DECISION

YES Go to Step 44.

NO Go to next step.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

26. Remove IP center trim panel. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
27. Disconnect connector 1111. Refer to Figure 6.



B230605653

Figure 6. Center of Instrument Panel Area.

28. Turn MAIN POWER switch ON (TM 9-2355-106-10).
29. Measure DC voltage between connector 1111 terminal A and ground with multimeter. Refer to Figure 6

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

- YES Go to Step 41.
- NO Go to Step 40.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

30. Remove instrument panel right side closeout. Refer to Instrument Panel (IP) Right Side Closeout (WP 0580).
31. Disconnect connector 2118 from LAM1021. Refer to Figure 7.

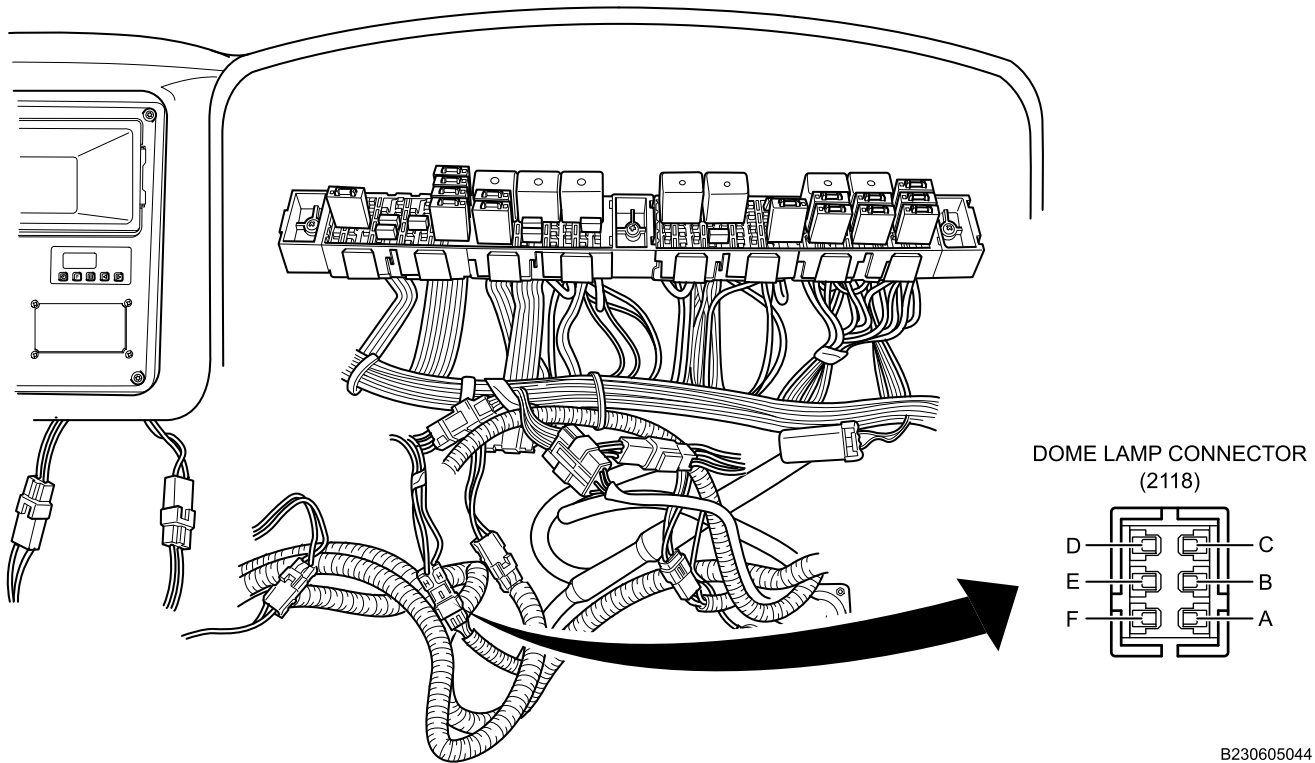


Figure 7. Right Side Instrument Panel Area.

32. Turn MAIN POWER switch ON (TM 9-2355-106-10).
33. Measure DC voltage between connector 2118 terminal C and ground with multimeter. Refer to Figure 7.
34. Measure DC voltage between connector 2118 terminal D and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

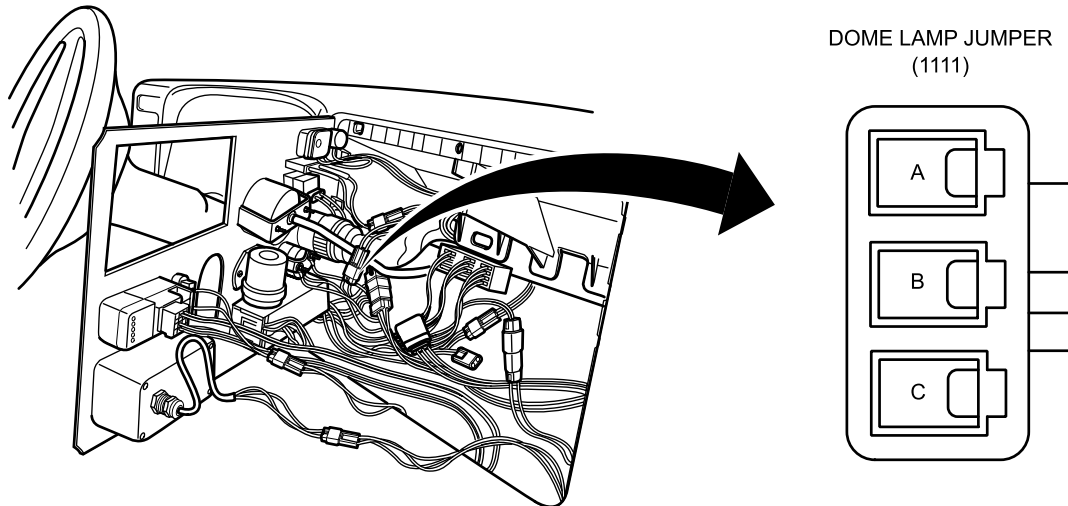
Did multimeter read more than 0V for either measurement?

DECISION

YES Go to next step.
 NO Go to Step 46.

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

35. Remove IP center trim panel. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
36. Disconnect connector 1111. Refer to Figure 8.



B230605653

Figure 8. Center of Instrument Panel Area.

37. Turn MAIN POWER switch ON (TM 9-2355-106-10).
38. Measure DC voltage between connector 1111 terminal B and ground. Refer to Figure 8.
39. Measure DC voltage between connector 1111 terminal C and ground. Refer to Figure 8.

CONDITION/INDICATION

Did multimeter read more than 0V for either measurement?

DECISION

YES Go to Step 40.
 NO Go to Step 41.

MALFUNCTION

- 40. Harness is faulty.

ACTION

Replace harness. Refer to Instrument Panel Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 41. Switch is faulty.

ACTION

Replace switch. Refer to Crew Light Switch Removal and Installation (WP 0311). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 42. Left rear crew light is faulty.

ACTION

Replace left rear crew light. Refer to Rear Crew Light Removal and Installation (WP 0357). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 43. Harness is faulty.

ACTION

Replace harness. Refer to Left Rear Crew Light Harness Removal and Installation (WP 0359). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 44. Harness is faulty.

ACTION

Replace harness. Refer to Ramp Limit Switch Jumper Harness Removal and Installation (WP 0358). Return vehicle to service.

END OF TEST

REAR CREW LIGHTS TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 45. Right rear crew light is faulty.

ACTION

Replace right rear crew light. Refer to Rear Crew Light Removal and Installation (WP 0357). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 46. Harness is faulty.

ACTION

Replace harness. Refer to Right Rear and Front Crew Lights Wiring Harness Removal and Installation (WP 0360). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0373
WP 0735
WP 0355
WP 0581
WP 0597
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0079
WP 0009
WP 0732
WP 0733
WP 0734
WP 0333
WP 0335

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Fuel tank armor door open (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 46

TROUBLESHOOTING PROCEDURE

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.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

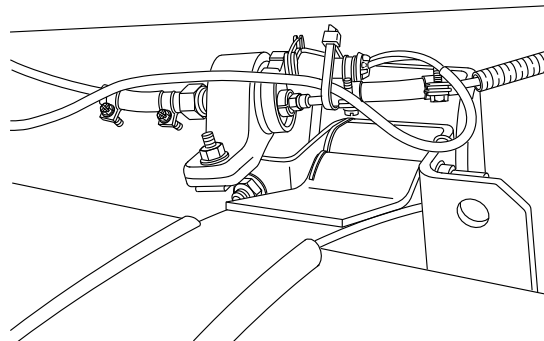
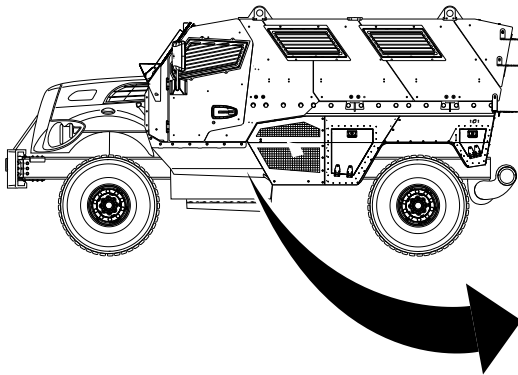
STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Place heater dash interrupt switch in the down position (TM 9-2355-106-10).

NOTE

Fuel-fired heater will not produce heat without sufficient fuel in vehicle fuel tank.

3. Activate fuel-fired heater in manual mode (TM 9-2355-106-10).
4. Verify fuel-fired heater fuel pump is running by listening to and feeling pump. Refer to Figure 1.



B230605126

Figure 1. Above Fuel Tank.

CONDITION/INDICATION

Is fuel-fired heater fuel pump running?

DECISION

NO Go to Step 17.
YES Go to next step.

STEP

5. Inspect fuel-fired heater fuel pump for leaking fuel. Refer to Figure 1.

CONDITION/INDICATION

Does inspection reveal fuel leaking from fuel-fired heater fuel pump?

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 114.

NO Go to next step.

STEP

6. Inspect fuel lines between fuel tank and fuel-fired heater for leaking fuel.

CONDITION/INDICATION

Does inspection reveal fuel leaking from fuel lines?

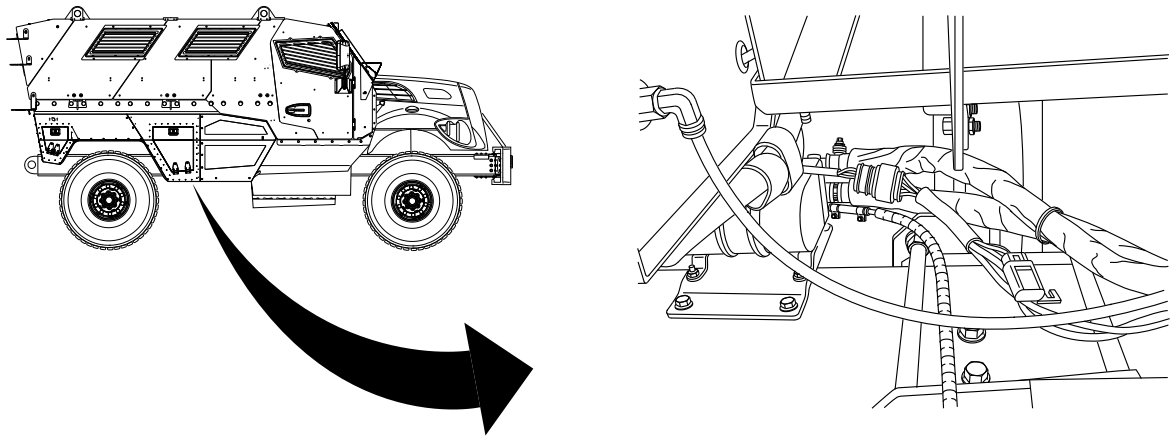
DECISION

YES Go to Step 115.

NO Go to next step.

STEP

7. Inspect fuel-fired heater for leaking fuel. Refer to Figure 2.



B230605127

Figure 2. Behind Right Forward Storage Compartment.

CONDITION/INDICATION

Does inspection reveal fuel leaking from fuel-fired heater?

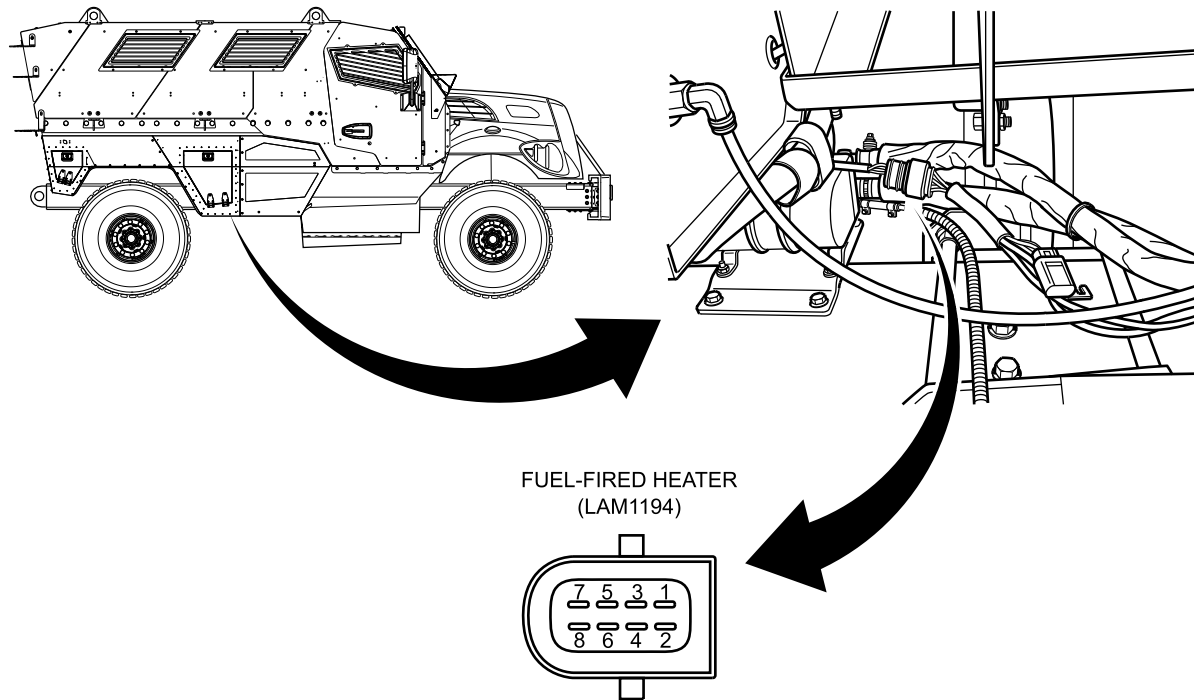
DECISION

YES Go to Step 116.

NO Go to next step.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector LAM1194. Refer to Figure 3.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

B230605473

Figure 3. Inboard of Right Rear Wheel.

11. Measure resistance between connector LAM1194 terminal 2 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 28.
YES Go to next step.

STEP

12. Turn MAIN POWER switch ON (TM 9-2355-106-10).
13. Turn ignition switch ON (TM 9-2355-106-10).
14. Measure DC voltage between connector LAM1194 terminals 1 and 2 with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Go to Step 31.
YES Go to next step.

STEP

15. Measure DC voltage between connector LAM1194 terminal 7 and ground with multimeter. Refer to Figure 3.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read between 21V and 27V?

DECISION

NO Go to Step 44.
YES Go to next step.

STEP

16. Measure DC voltage between connector LAM1194 terminal 5 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

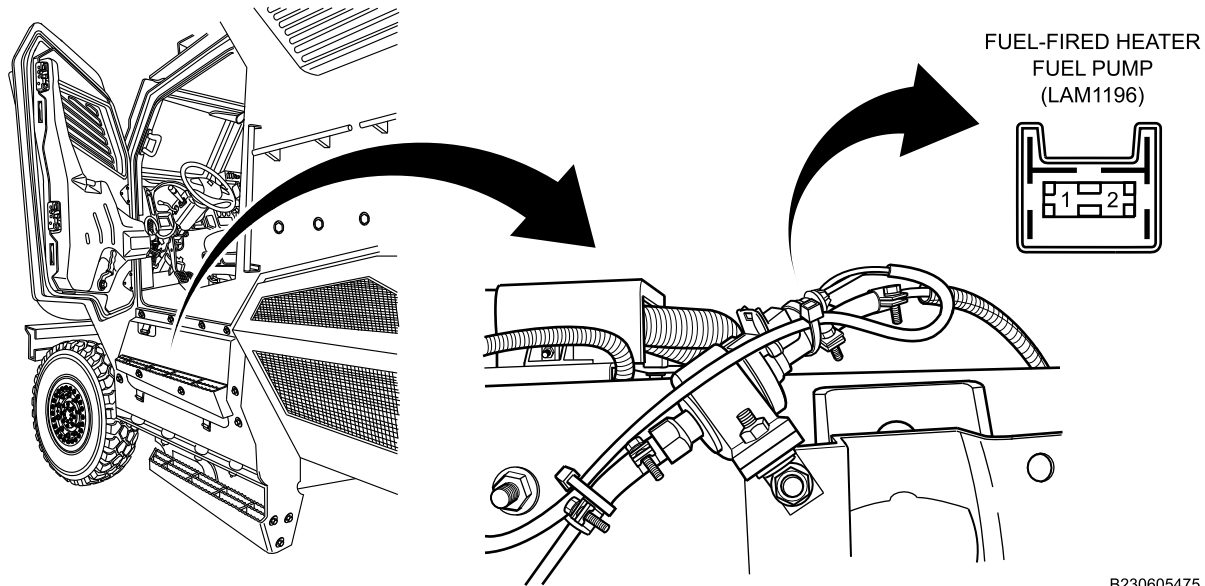
Does multimeter read between 21V and 27V?

DECISION

NO Go to Step 73.
YES Go to Step 116.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

17. Turn ignition switch OFF (TM 9-2355-106-10).
18. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
19. Disconnect connector LAM1196. Refer to Figure 4.



B230605475

Figure 4. Above Fuel Tank.

20. Turn MAIN POWER switch ON (TM 9-2355-106-10).
21. Turn ignition switch ON (TM 9-2355-106-10).
22. Measure DC voltage between connector LAM1196 terminals 1 and 2 with multimeter.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 114.
NO Go to next step.

STEP

23. Turn ignition switch OFF (TM 9-2355-106-10).
24. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
25. Measure resistance between connector LAM1196 terminal 1 and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

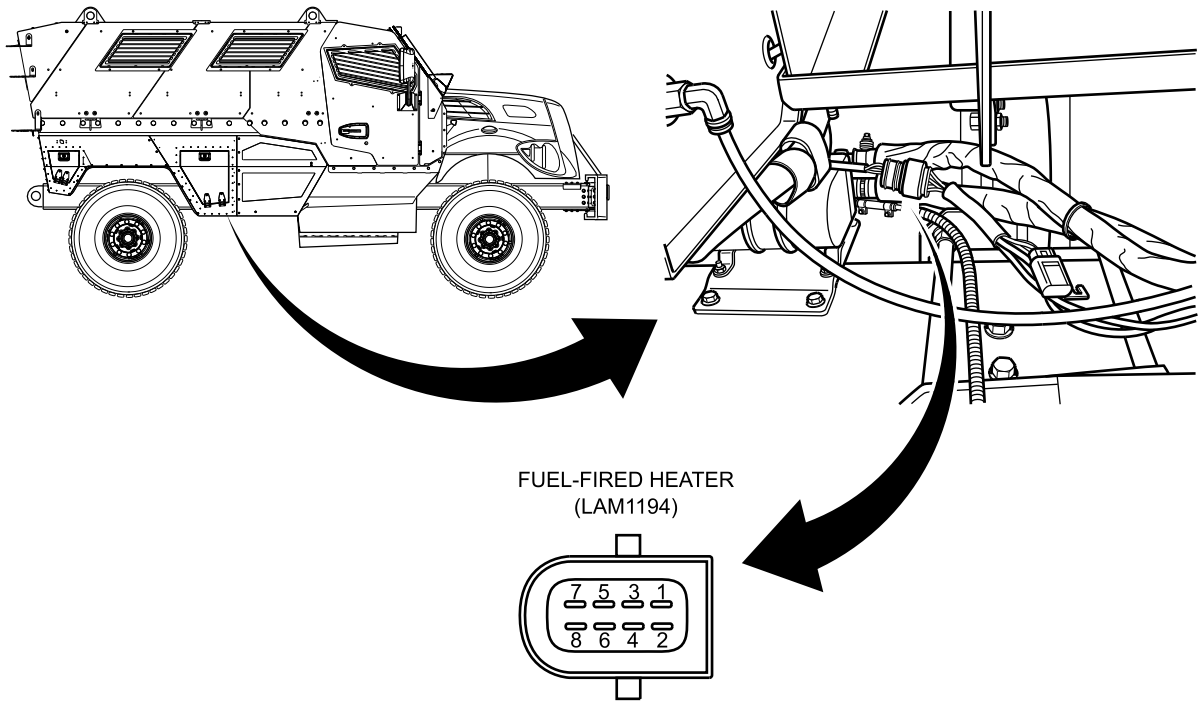
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 119.
YES Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

26. Disconnect connector LAM1194. Refer to Figure 5.



B230605473

Figure 5. Inboard of Right Rear Wheel.

27. With assistance, measure resistance between connector LAM1196 terminal 2 and connector LAM1194 terminal 4 with multimeter.

CONDITION/INDICATION

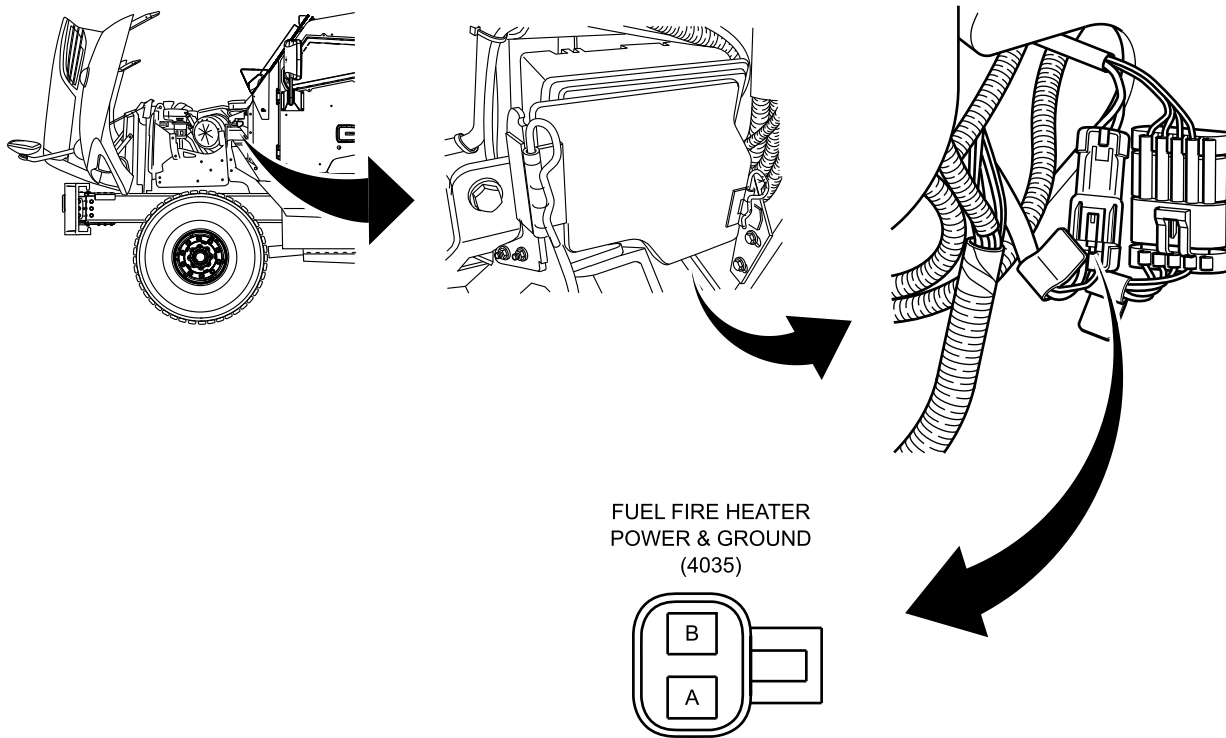
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 119.
 YES Go to Step 116.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

28. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
 29. Disconnect connector 4035. Refer to Figure 6.



B230605472

Figure 6. Above Frame, Inboard of Left Front Wheel.

30. Measure resistance between connector 4035 terminal B and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

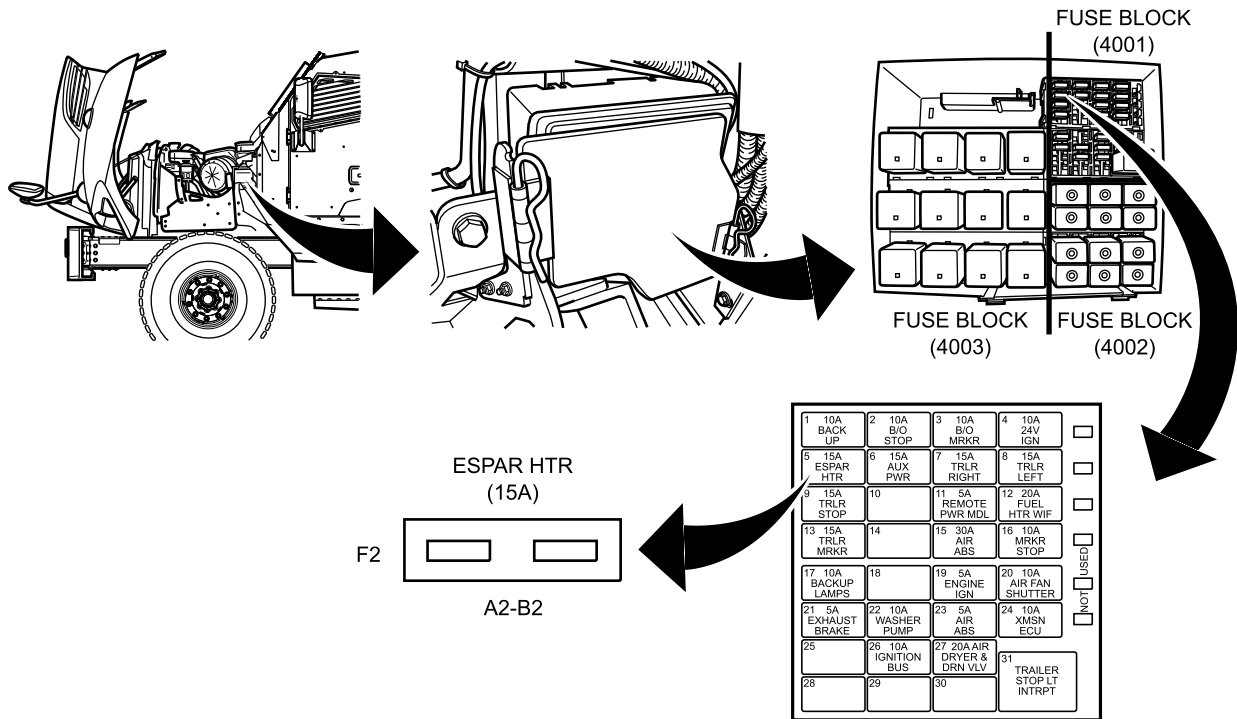
DECISION

NO Go to Step 121.
 YES Go to Step 119.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

31. Remove and inspect ESPAR HTR fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 7.



B230605379

Figure 7. Underhood Power Distribution Center.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 83.
NO Go to next step.

STEP

- 32. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 33. Turn ignition switch ON (TM 9-2355-106-10).
- 34. Measure DC voltage between ground and each 15-amp ESPAR HTR fuse socket terminals G1 and H1 with multimeter. Refer to Figure 7.

CONDITION/INDICATION

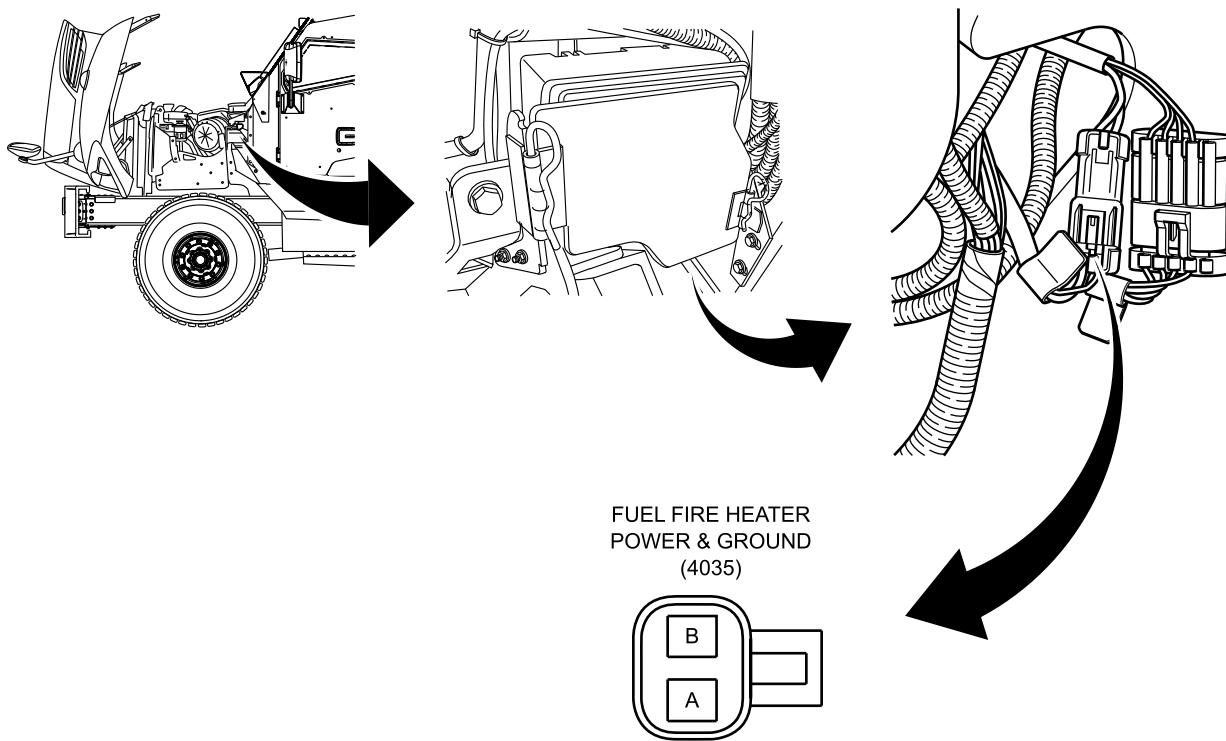
Does multimeter read between 21V and 27V for either test?

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 122.
YES Go to next step.

STEP

35. Turn ignition switch OFF (TM 9-2355-106-10).
36. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
37. Install 15-amp ESPAR HTR fuse.
38. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
39. Disconnect connector 4035. Refer to Figure 8.



B230605472

Figure 8. Above Frame, Inboard of Left Front Wheel.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

40. Turn MAIN POWER switch ON (TM 9-2355-106-10).
41. Turn ignition switch ON (TM 9-2355-106-10).
42. Measure DC voltage between connector 4035 terminal A and ground with multimeter.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

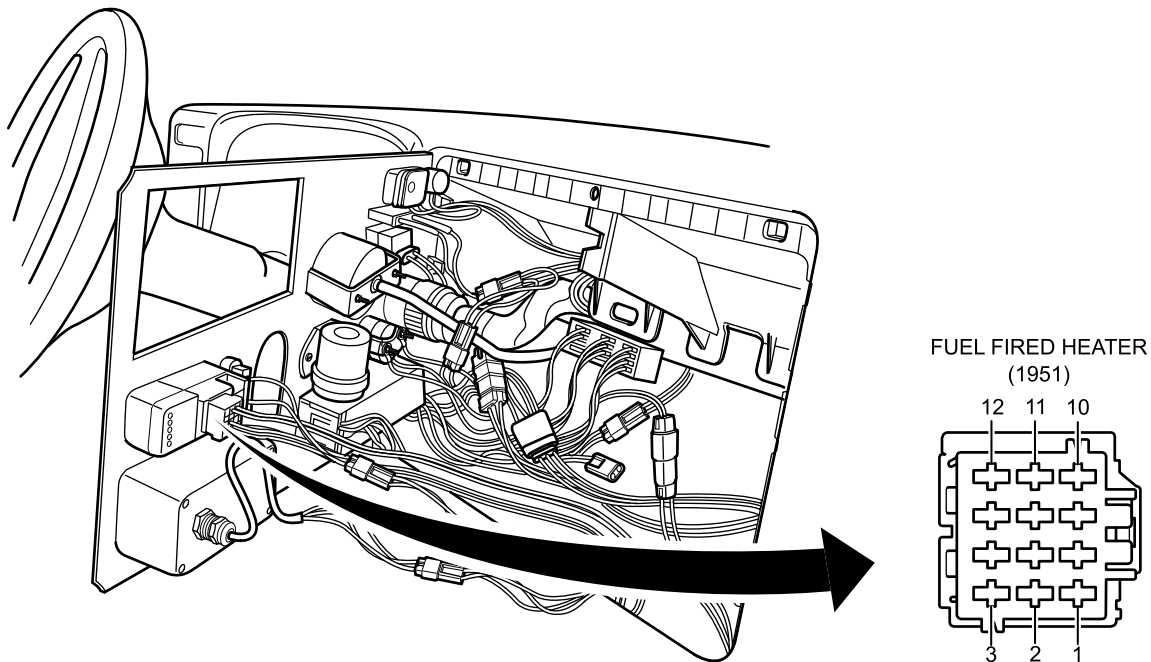
- YES Go to Step 119.
NO Go to Step 121.

STEP

43. Remove Instrument Panel (IP) center trim panel to gain access to connector 1951. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
44. Turn ignition switch OFF (TM 9-2355-106-10).
45. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

46. Disconnect connector 1951. Refer to Figure 9.



B230605225

Figure 9. Behind Center Instrument Panel (IP).

47. Measure resistance between ground and connector 1951 terminals 4 and then 12 with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

DECISION

NO Go to Step 61.
YES Go to next step.

STEP

48. Turn MAIN POWER switch ON (TM 9-2355-106-10).

49. Turn ignition switch ON (TM 9-2355-106-10).

50. Measure DC voltage between connector 1951 terminal 11 and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Go to Step 86.
YES Go to next step.

STEP

51. Turn ignition switch OFF (TM 9-2355-106-10).

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

52. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

53. Measure resistance between connector 1951 terminal 2 and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

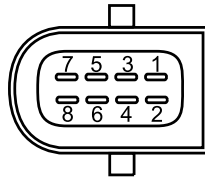
NO Go to Step 56.

YES Go to next step.

STEP

54. Install jumper wire between connector LAM1194 terminals 7 and 2. Refer to Figure 10.

FUEL-FIRED HEATER
(LAM1194)



B230604543

Figure 10. Connector LAM1194.

55. Measure resistance between connector 1951 terminal 2 and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

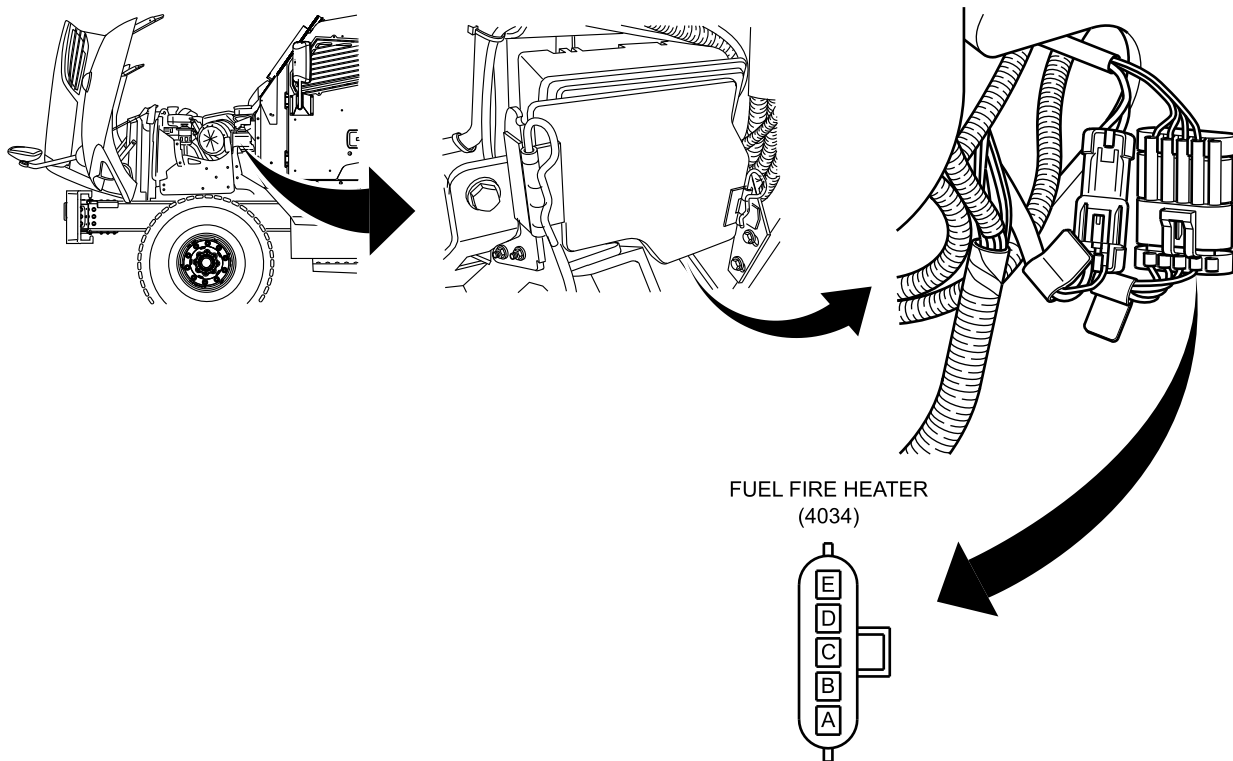
DECISION

NO Go to Step 67.

YES Go to Step 117.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

56. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
57. Disconnect connector 4034. Refer to Figure 11.



B230605471

Figure 11. Below Power Distribution Center (PDC).

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

58. Measure resistance between connector 1951 terminal 2 and ground with multimeter. Refer to Figure 12.

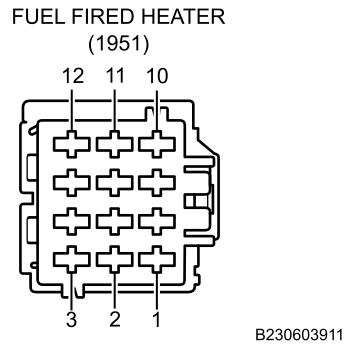


Figure 12. Connector 1951.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 119.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

59. Disconnect connector 1701. Refer to Figure 13.

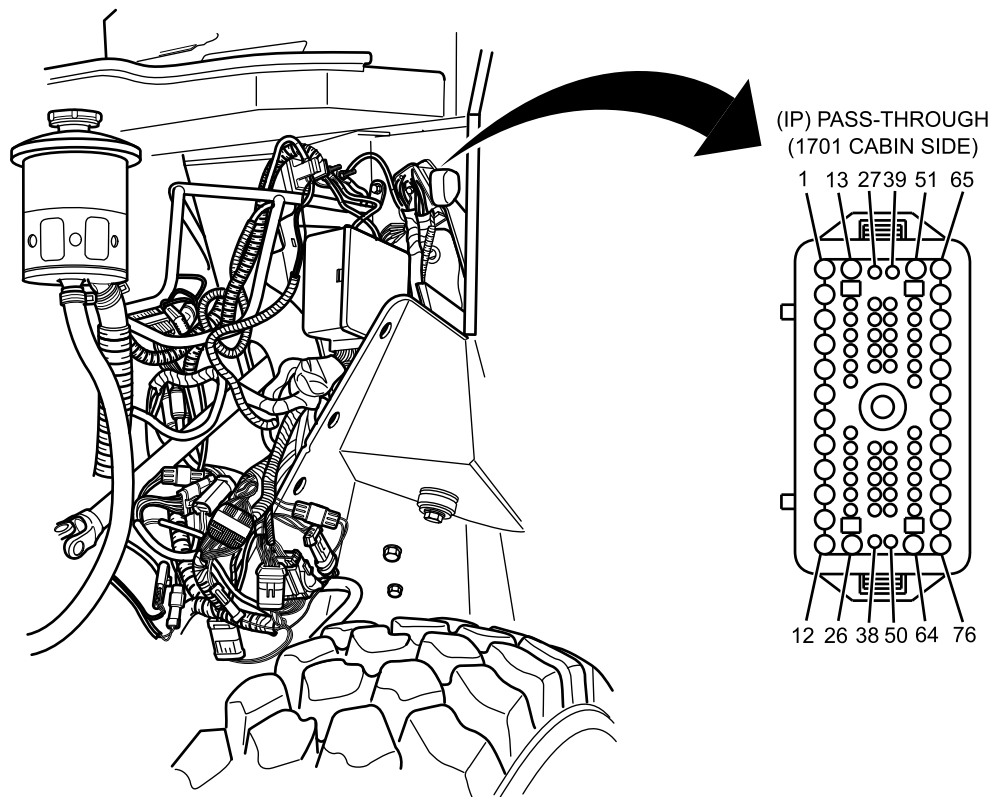


Figure 13. Left Side Firewall.

B230604024

60. Measure resistance between connector 1951 terminal 2 and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 121.
 NO Go to Step 120.

STEP

61. Refer to results of Step 47.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for either test?

DECISION

YES Go to Step 120.
 NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

62. Disconnect connector 1701. Refer to Figure 14.

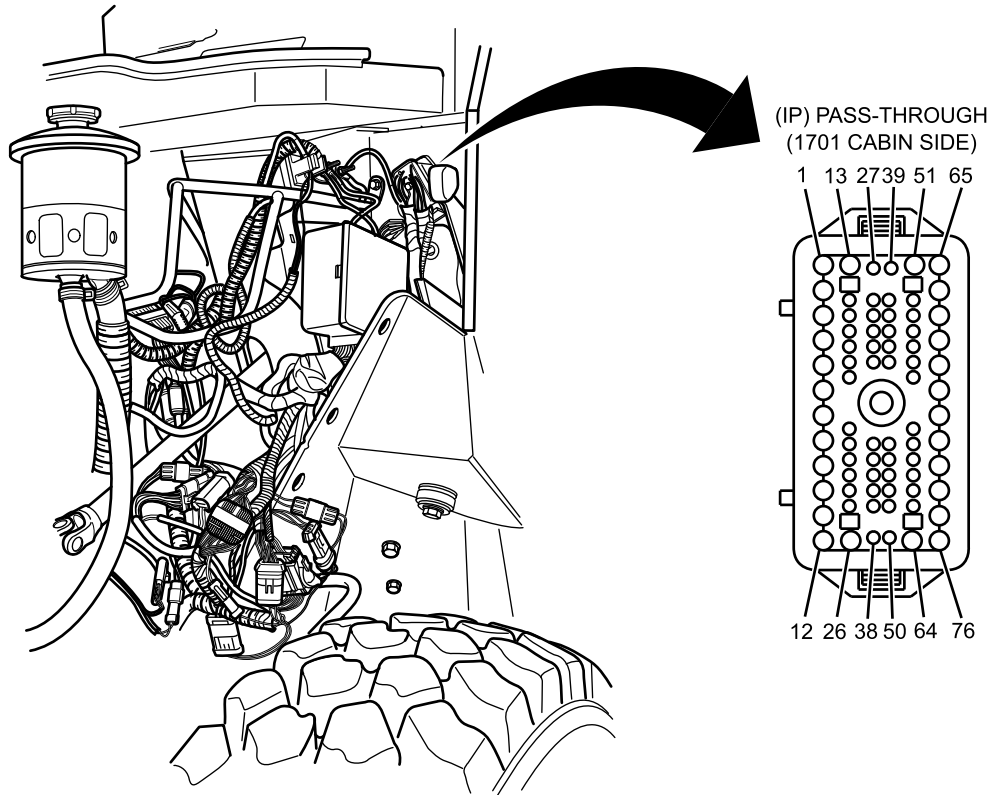


Figure 14. Left Side Firewall.

63. Measure resistance between connector 1701 (cabin side) terminal 45 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

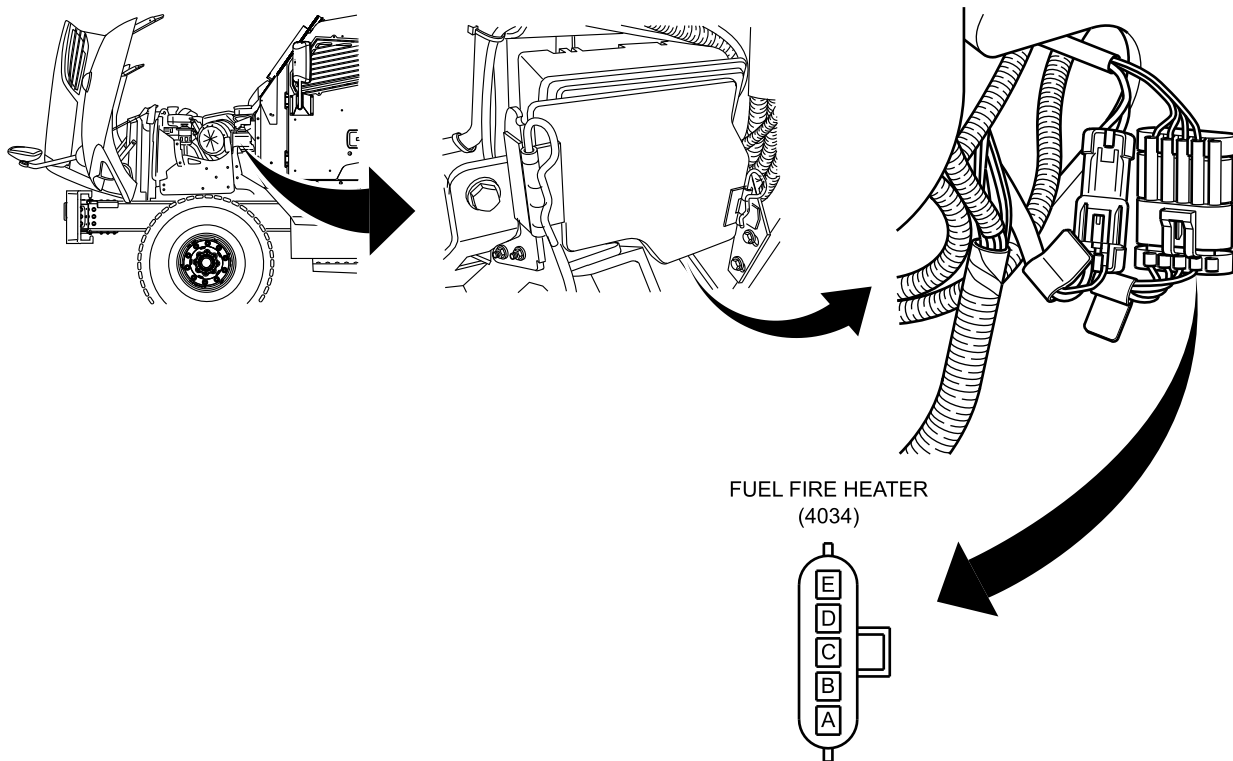
YES Go to Step 120.

NO Go to next step.

B230604024

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

64. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
 65. Disconnect connector 4034. Refer to Figure 15.



B230605471

Figure 15. Below Power Distribution Center (PDC).

66. Measure resistance between connector 4034 (heater side-male) terminal C and ground with multimeter.

CONDITION/INDICATION

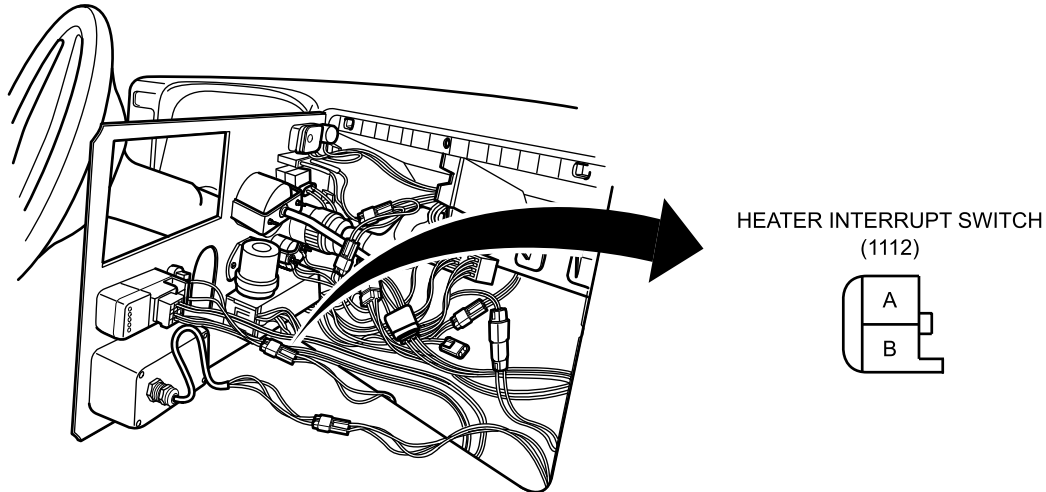
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 119.
 YES Go to Step 121.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

67. Disconnect connector 1112. Refer to Figure 16.



B230605468

Figure 16. Behind Center Instrument Panel (IP).

68. Measure resistance between terminals A and B on fuel-fired heater interrupt switch, not the harness connector, with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 118.
YES Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

69. Disconnect connector 1701. Refer to Figure 17.

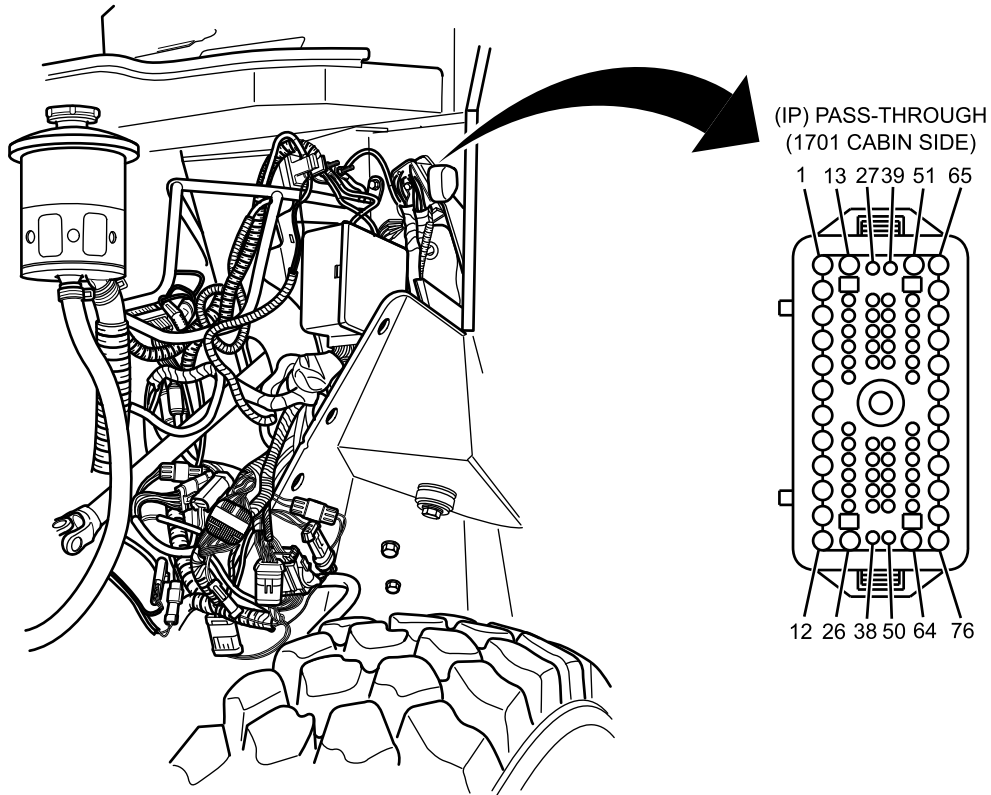


Figure 17. Left Side Firewall.

70. Measure resistance between connector 1701 (cabin side) terminal 48 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

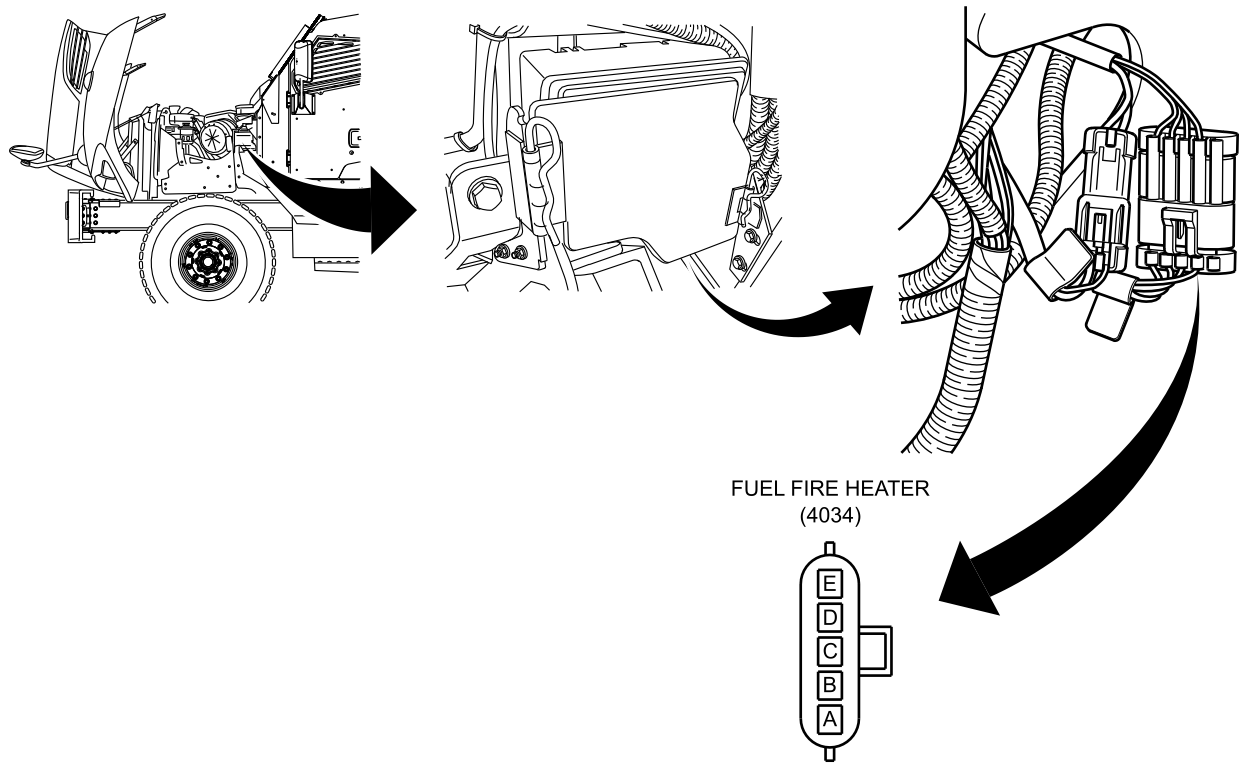
YES Go to Step 120.

NO Go to next step.

B230604024

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

71. Disconnect connector 4034. Refer to Figure 18.



B230605471

Figure 18. Below Power Distribution Center (PDC).

72. Measure resistance between connector 4034 (heater side-male) terminal B and ground with multimeter.

CONDITION/INDICATION

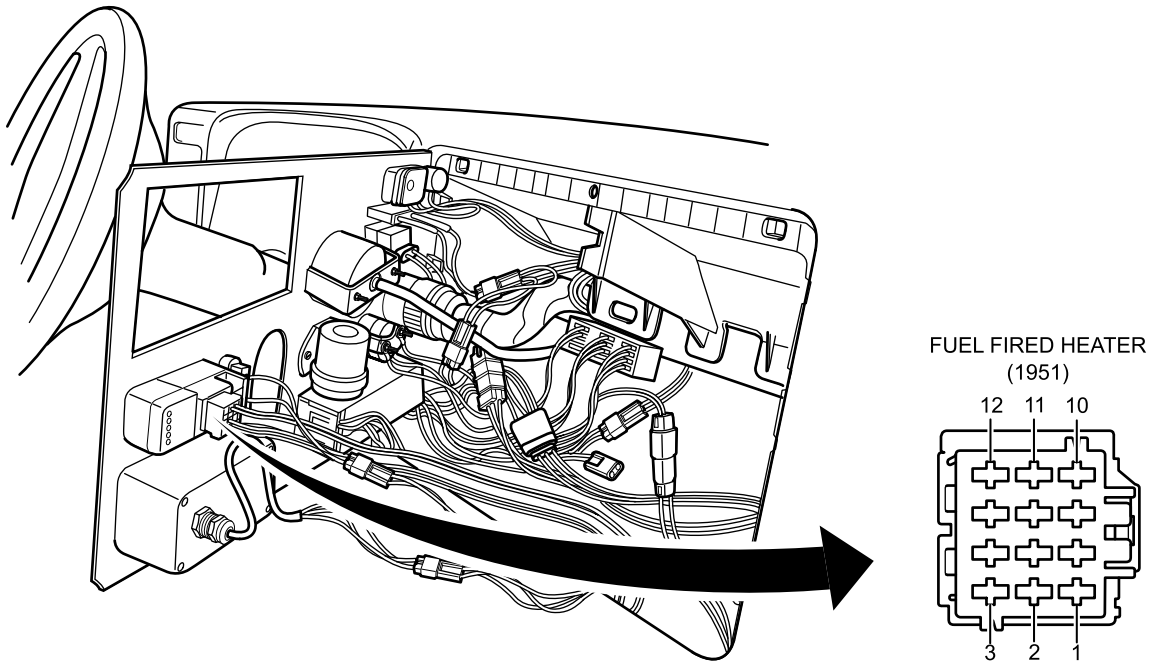
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 119.
 YES Go to Step 121.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

73. Remove Instrument Panel (IP) center trim panel to gain access to connector 1951. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).
74. Disconnect connector 1951. Refer to Figure 19.



B230605225

Figure 19. Behind Center Instrument Panel (IP).

75. Measure resistance between connector 1951 terminal 8 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read OL?

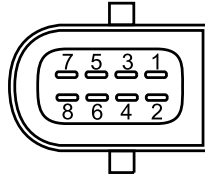
DECISION

NO Go to Step 101.
 YES Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

76. Install jumper wire between connector LAM1194 terminals 5 and 2. Refer to Figure 20.

FUEL-FIRED HEATER
(LAM1194)

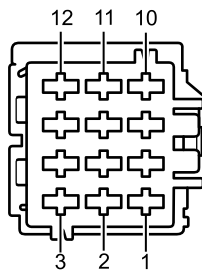


B230604543

Figure 20. Connector LAM1194.

77. Measure resistance between connector 1951 terminal 8 and ground with multimeter. Refer to Figure 21.

FUEL FIRED HEATER
(1951)



B230603911

Figure 21. Connector 1951.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 117.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

78. Disconnect connector 1701. Refer to Figure 22.

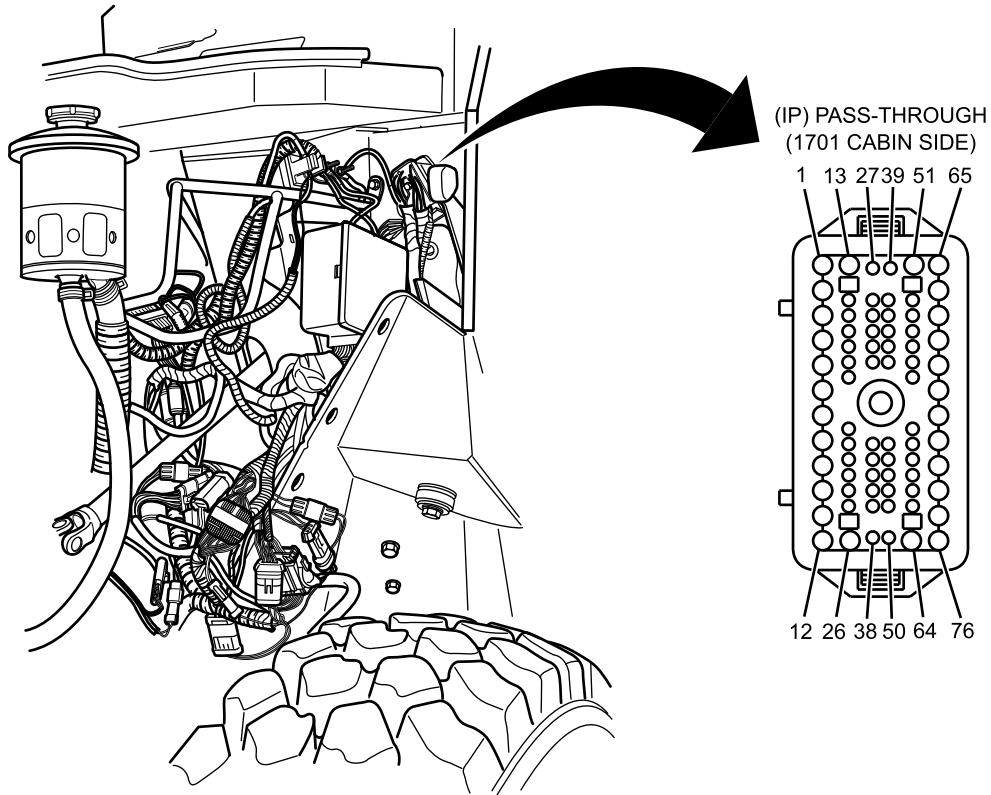


Figure 22. Left Side Firewall.

79. Measure resistance between connector 1701 (cabin side) terminal 47 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

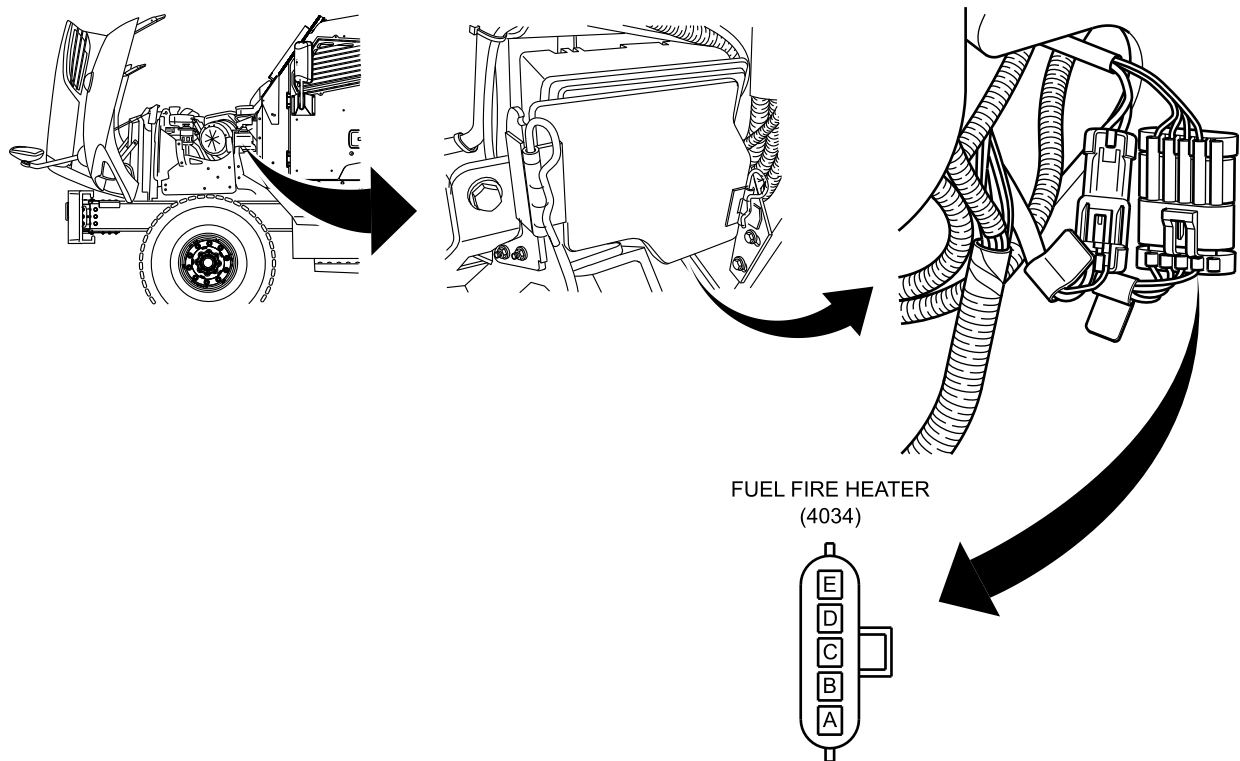
YES Go to Step 120.

NO Go to next step.

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FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

80. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
 81. Disconnect connector 4034. Refer to Figure 23.



B230605471

Figure 23. Below Power Distribution Center (PDC).

82. Measure resistance between connector 4034 (heater side-male) terminal D and ground with multimeter.

CONDITION/INDICATION

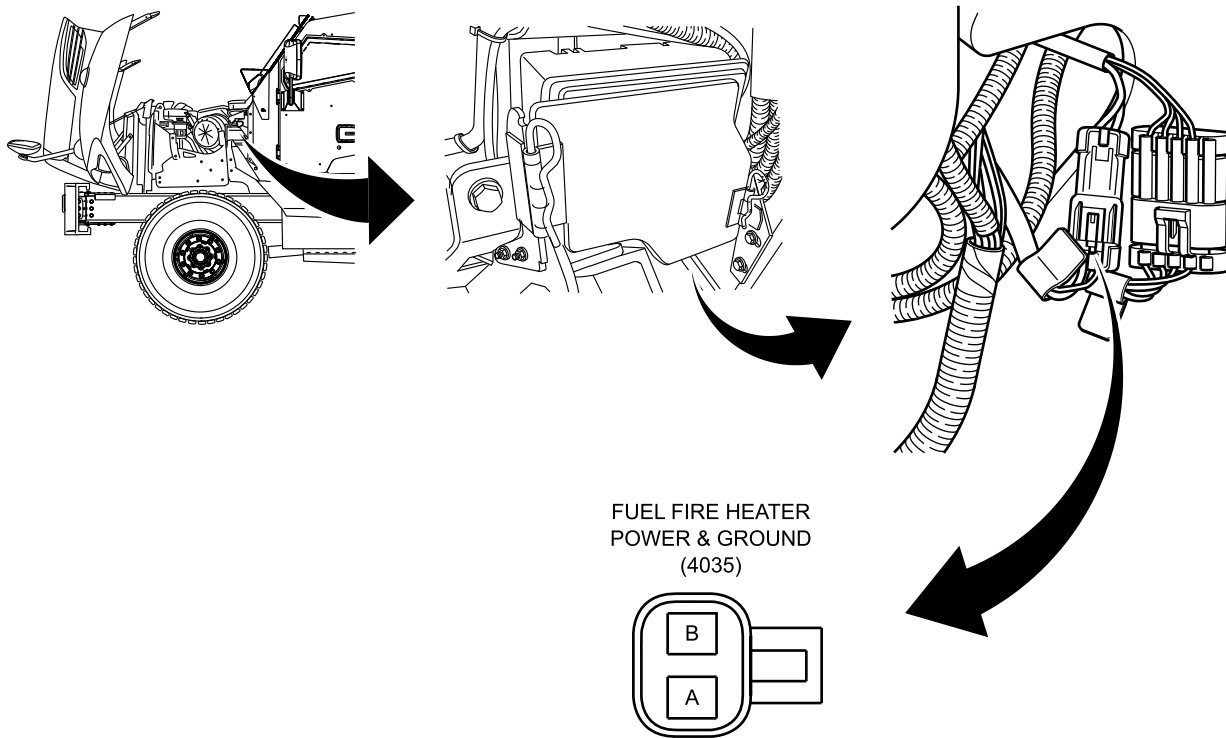
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 119.
 YES Go to Step 121.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

83. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
 84. Disconnect connector 4035. Refer to Figure 24.



B230605472

Figure 24. Above Frame, Inboard of Left Front Wheel.

85. Measure resistance between connector 4035 terminal A and ground with multimeter.

CONDITION/INDICATION

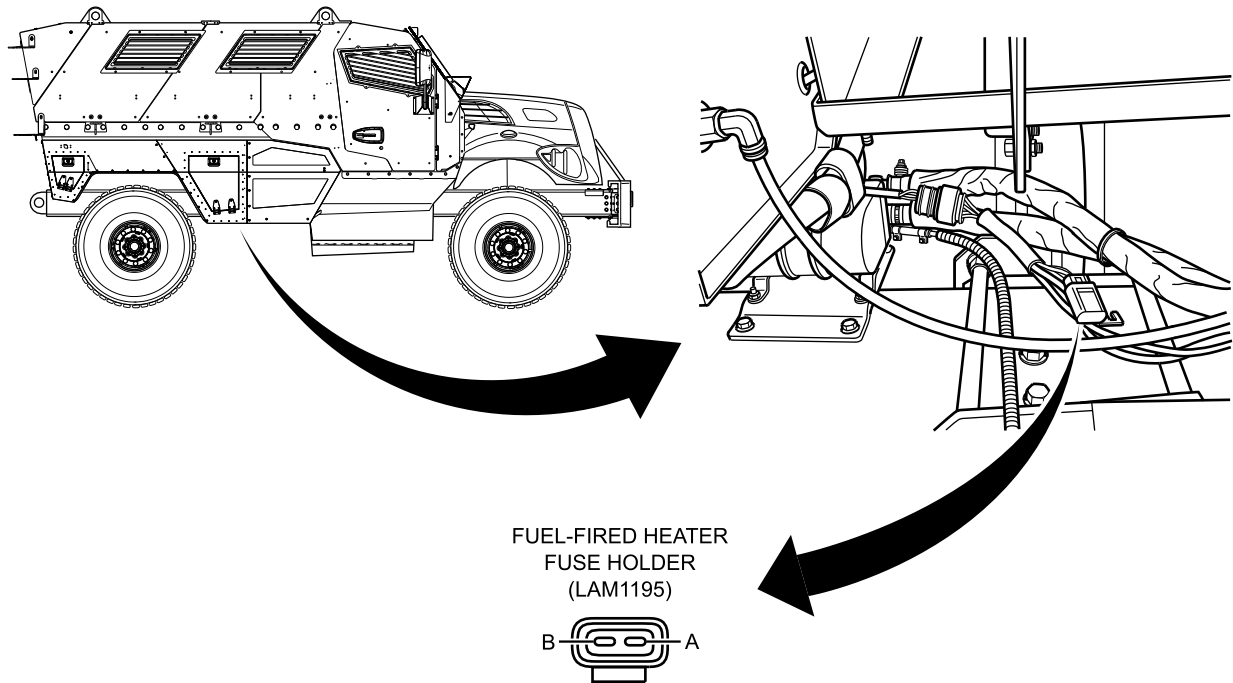
Does multimeter read OL?

DECISION

NO Go to Step 121.
 YES Go to Step 119.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

86. Remove and inspect fuse LAM1195. Refer to Figure 25. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0373).



B230605474

Figure 25. Behind Right Stowage Compartment.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

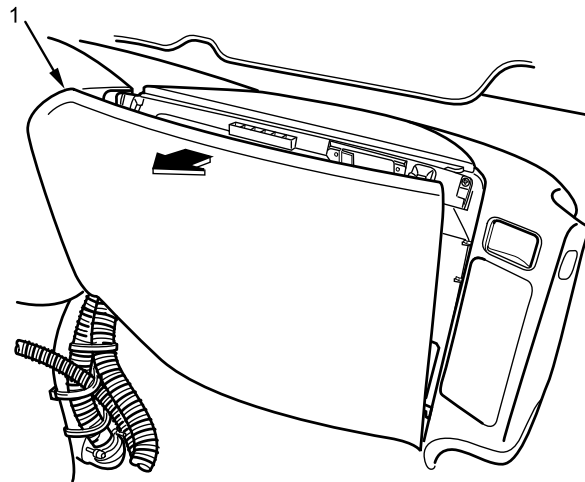
YES Go to Step 106.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

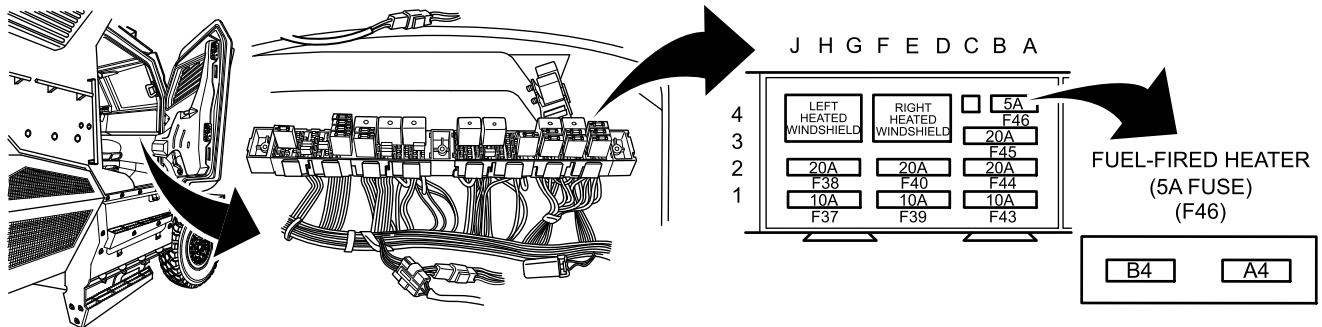
87. Remove instrument panel passenger side closeout panel (Figure 26, Item 1). Refer to Instrument Panel (IP) Right Side Closeout Removal and Installation (WP 0580).



B230601329

Figure 26. Instrument Panel Right Side Closeout Panel.

88. Remove and inspect fuse F46. Refer to Figure 27. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0373).



B230605529

Figure 27. Instrument Panel Fuse Blocks.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 113.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

89. Turn MAIN POWER switch ON (TM 9-2355-106-10).
90. Turn ignition switch ON (TM 9-2355-106-10).
91. Measure DC voltage between ground and each fuse LAM1195 socket terminal with multimeter. Refer to Figure 28.

FUEL-FIRED HEATER
FUSE HOLDER
(LAM1195)



B230604544

Figure 28. Connector LAM1195.

CONDITION/INDICATION

Does multimeter read between 21V and 27V for either test?

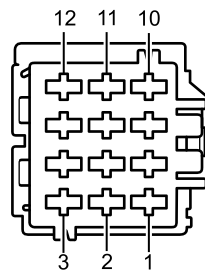
DECISION

NO Go to Step 119.
YES Go to next step.

STEP

92. Turn ignition switch OFF (TM 9-2355-106-10).
93. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
94. Install fuse F46. Refer to Figure 27. Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0373).
95. Install jumper wire between connector 1951 terminals 11 and 12. Refer to Figure 29.

FUEL FIRED HEATER
(1951)

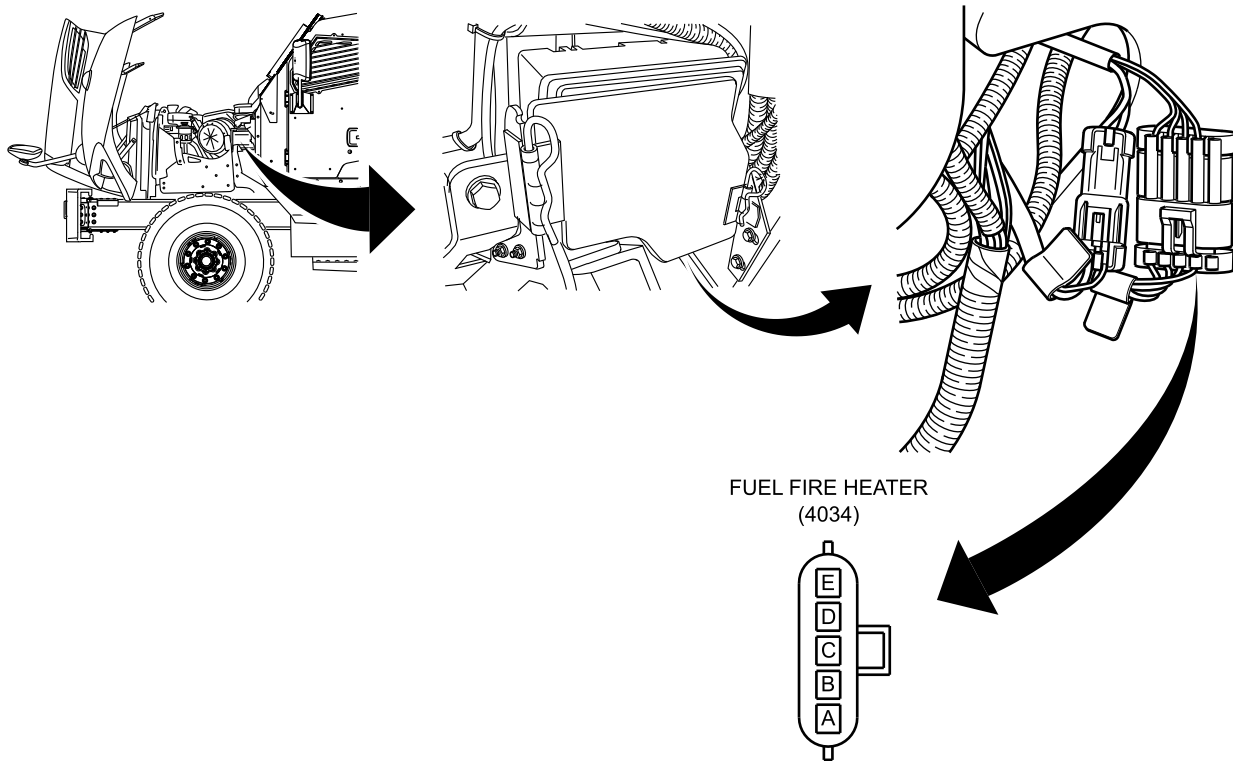


B230603911

Figure 29. Connector 1951.

96. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
97. Disconnect connector 4034. Refer to Figure 30.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605471

Figure 30. Below Power Distribution Center (PDC).

98. Measure resistance between connector 4034 terminal A and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 119.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

99. Disconnect connector 1701. Refer to Figure 31.

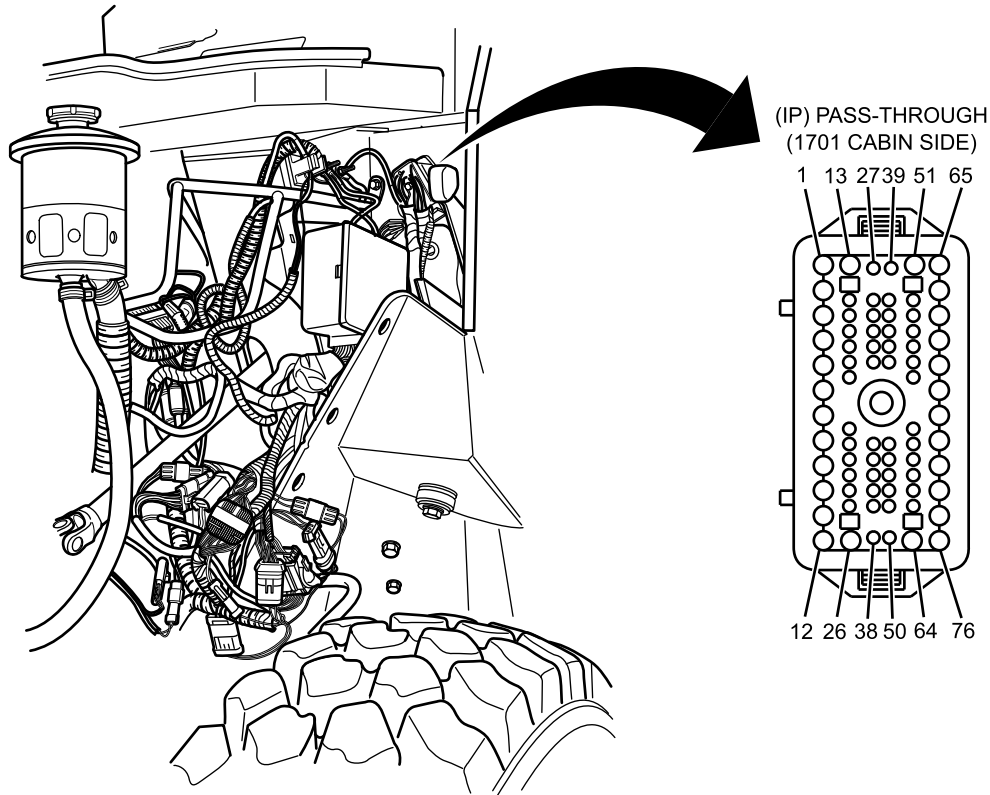


Figure 31. Left Side Firewall.

100. Measure resistance between connector 1701 terminal 46 and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 120.

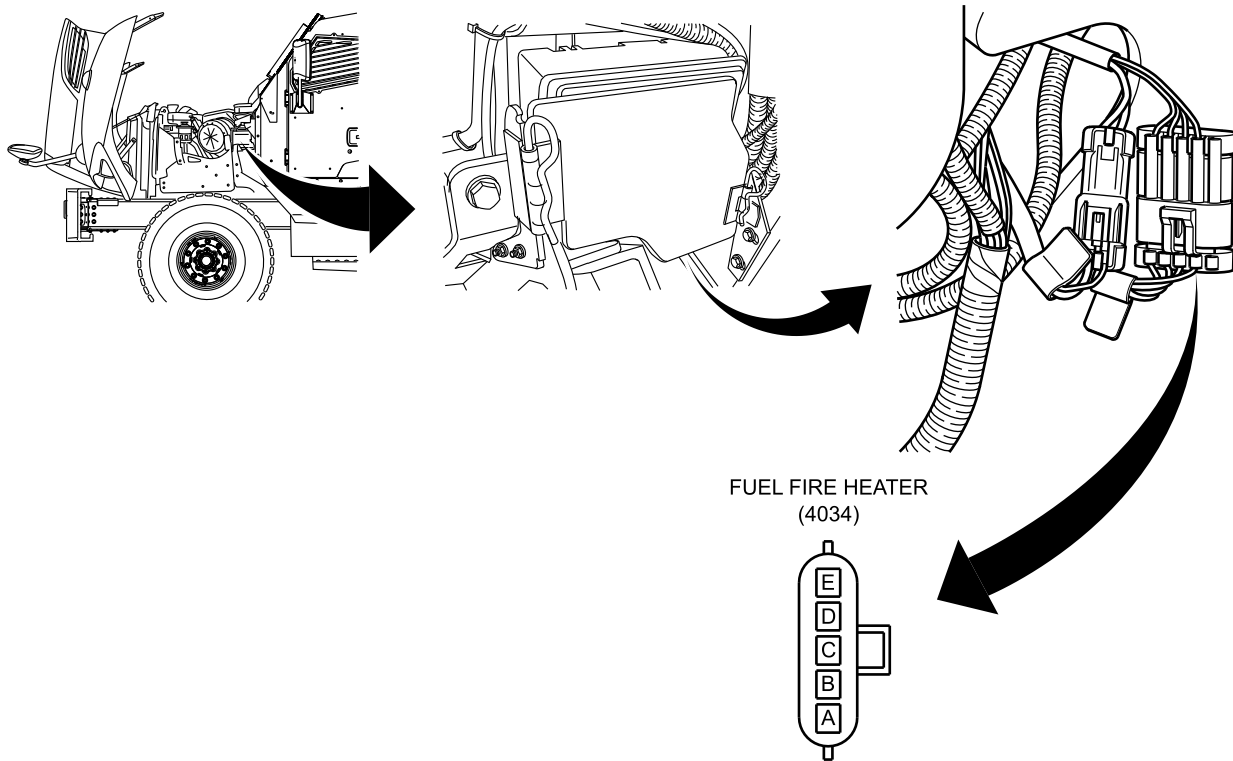
YES Go to Step 121.

B230604024

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 101.Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
- 102.Disconnect connector 4034. Refer to Figure 32.



B230605471

Figure 32. Below Power Distribution Center (PDC).

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

103. Measure resistance between connector 1951 terminal 8 and ground with multimeter. Refer to Figure 33.

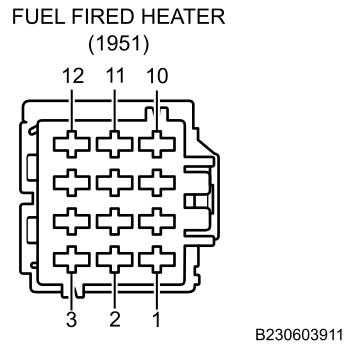


Figure 33. Connector 1951.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 119.

NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

104. Disconnect connector 1701. Refer to Figure 34.

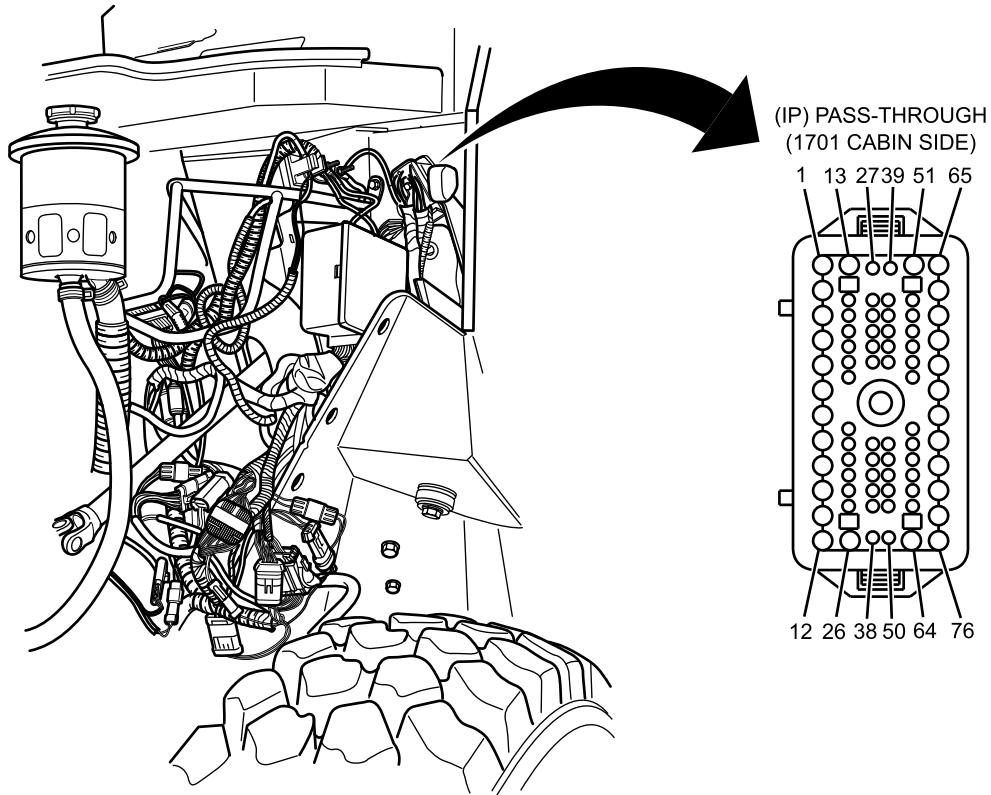


Figure 34. Left Side Firewall.

105. Measure resistance between connector 1951 terminal 8 and ground with multimeter. Refer to Figure 33.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 120.

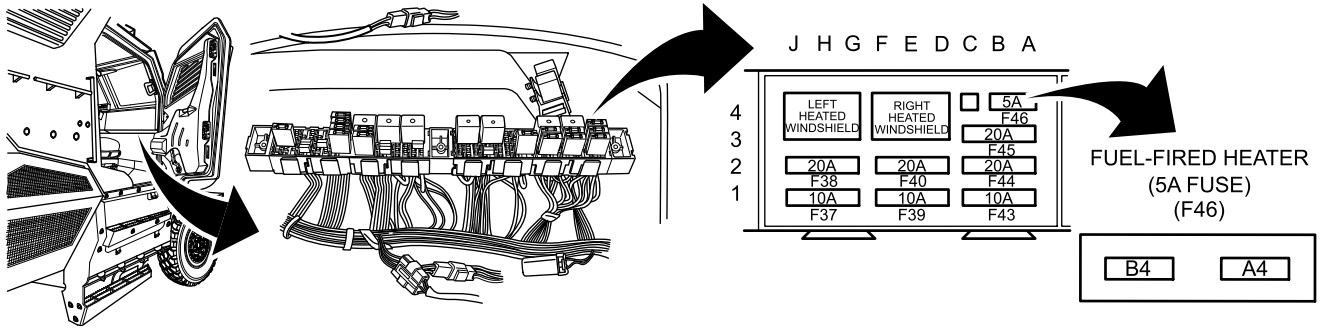
NO Go to Step 121.

B230604024

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

106. Remove and inspect fuse F46. Refer to Figure 35 Refer to Instrument Panel (IP) Circuit Breaker, Fuse, and Relay Removal and Installation (WP 0373).



B230605529

Figure 35. Instrument Panel Fuse Blocks.

107. Measure resistance between ground and each fuse F46 socket terminal with multimeter.

CONDITION/INDICATION

Does multimeter read OL for both tests?

DECISION

YES Go to Step 117.
 NO Go to next step.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

108. Disconnect connector 1701. Refer to Figure 36.

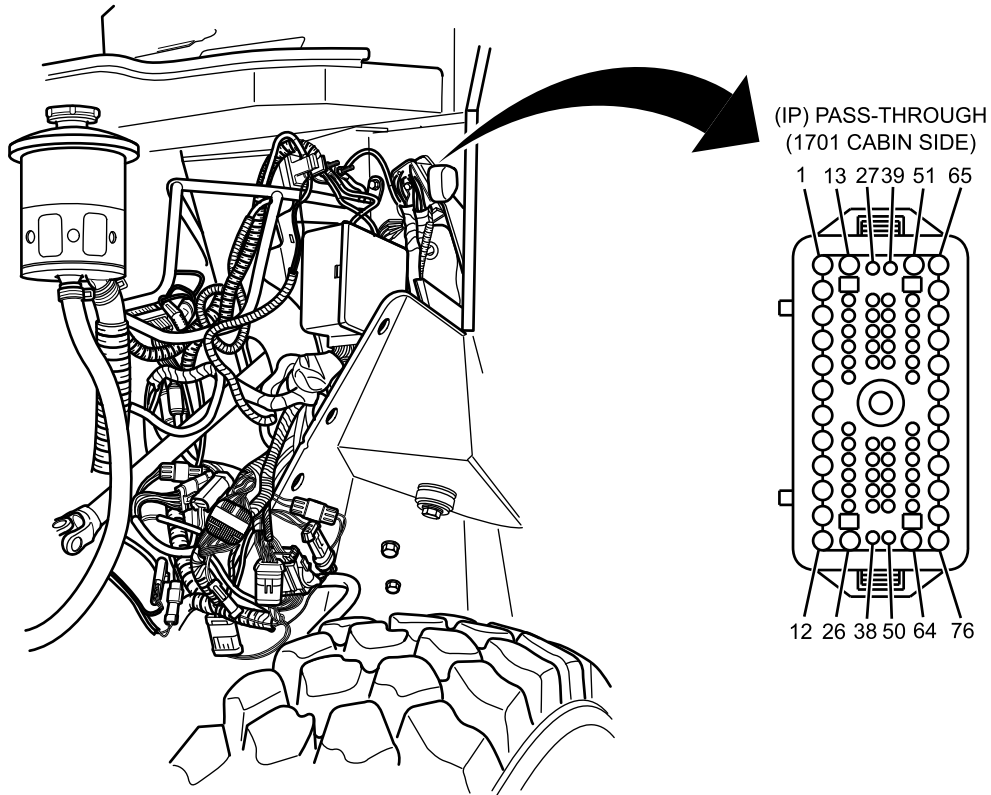


Figure 36. Left Side Firewall.

109. Measure resistance between ground and each fuse F46 socket terminal with multimeter. Refer to Figure 35.

CONDITION/INDICATION

Does multimeter read OL for both tests?

DECISION

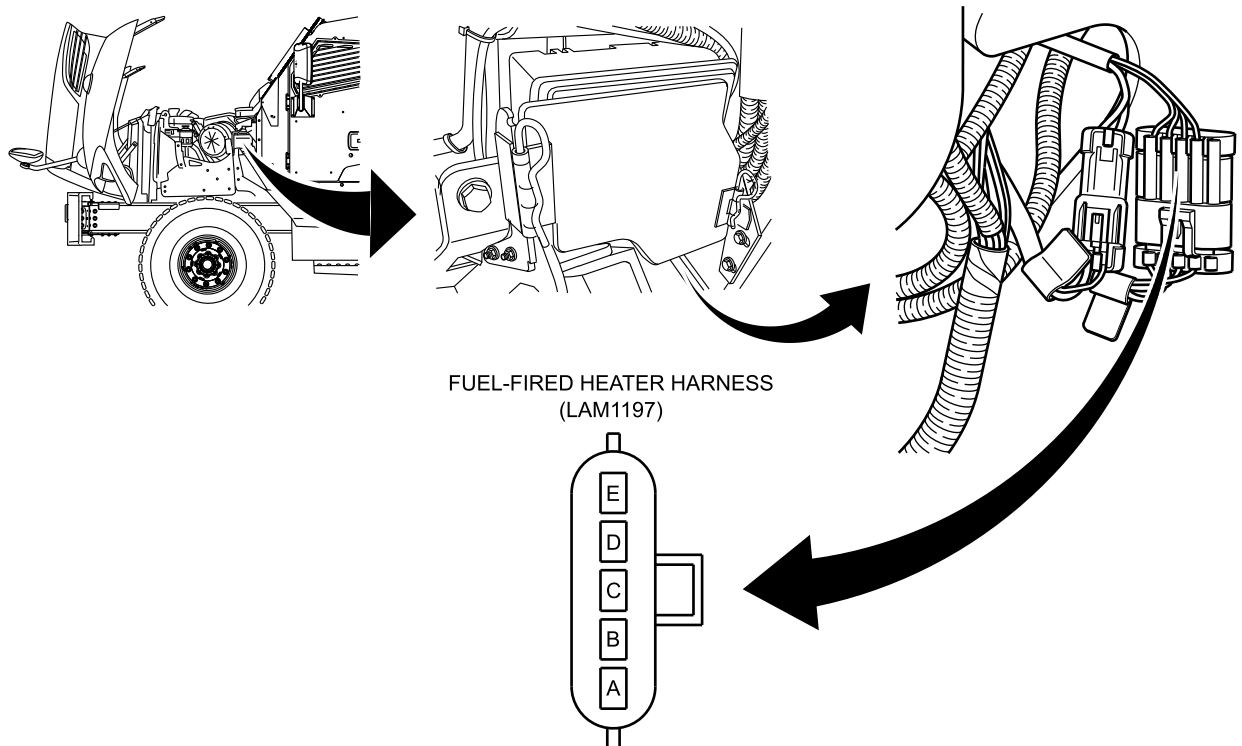
- YES Go to Step 120.
- NO Go to next step.

B230604024

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

110. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).

111. Disconnect connector LAM1197. Refer to Figure 37.



B230605476

Figure 37. Below Power Distribution Center (PDC).

112. Measure resistance between connector LAM1197 terminal A and ground with multimeter.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 121.

NO Go to Step 119.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

113. Measure resistance between ground and each fuse F46 socket terminal with multimeter.

CONDITION/INDICATION

Does multimeter read OL for both tests?

DECISION

YES Go to Step 117.

NO Go to Step 120.

MALFUNCTION

- 114. Fuel-fired heater fuel pump is faulty.

ACTION

Replace fuel-fired heater fuel pump. Refer to Fuel-Fired Heater Fuel Pump and Fuel Line Removal and Installation (WP 0733).

END OF TEST**MALFUNCTION**

- 115. Fuel-fired heater fuel line is leaking.

ACTION

Replace leaking fuel line. Refer to Fuel-Fired Heater Fuel Pump and Fuel Line Removal and Installation (WP 0733).

END OF TEST

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 116. Fuel-fired heater is faulty.

ACTION

Replace fuel-fired heater. Refer to Fuel-Fired Heater Removal and Installation (WP 0732).

END OF TEST**MALFUNCTION**

- 117. Fuel-fired heater timer control is faulty.

ACTION

Replace fuel-fired heater timer control. Refer to Fuel-Fired Heater Timer Control Removal and Installation (WP 0735).

END OF TEST**MALFUNCTION**

- 118. Fuel-fired heater interrupt switch is faulty.

ACTION

Replace fuel-fired heater interrupt switch. Refer to Fuel-Fired Heater Timer Control Removal and Installation (WP 0735).

END OF TEST**MALFUNCTION**

- 119. Fuel-fired heater and fuel-fired heater fuel pump harness is faulty.

ACTION

Replace fuel-fired heater and fuel-fired heater fuel pump harness. Refer to Fuel-Fired Heater and Fuel-Fired Heater Fuel Pump Harness Removal and Installation (WP 0734).

END OF TEST**MALFUNCTION**

- 120. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319).

END OF TEST**MALFUNCTION**

- 121. Power Distribution Center (PDC) harness is faulty.

FUEL-FIRED HEATER TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335).

END OF TEST**MALFUNCTION**

- 122. Vehicle power distribution is faulty.

ACTION

Go to Power Distribution Troubleshooting Procedure (WP 0059).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
**4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)	WP 0464
	WP 0426
	WP 0598
	WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0012
WP 0257
WP 0335
WP 0353

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Cabin doors open and secured (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 44

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- 2033 14 10 1
- 2033 14 10 2
- 2033 14 10 3
- 2033 14 10 4
- 2033 14 12 1
- 2033 14 12 2
- 2033 14 12 3
- 2033 14 12 4
- 2033 14 15 1
- 2033 14 15 2
- 2033 14 15 3
- 2033 14 15 4
- 2033 14 16 1
- 2033 14 16 2
- 2033 14 16 3
- 2033 14 16 4

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)**TROUBLESHOOTING PROCEDURE****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.

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.

Cabin door must be secured in the open position by using heavy duty straps to prevent accidental closure during vehicle maintenance. Pull check link retaining pin prior to securing door open. Failure to comply may result in serious injury or death to personnel.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve Electronic System Controller (ESC) Diagnostic Trouble Codes (DTCs). Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).
2. Note set DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

- 2033 14 16 1
- 2033 14 16 2
- 2033 14 16 3
- 2033 14 16 4

DECISION

YES Go to Step 6.
NO Go to next step.

STEP

3. Note set DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

- 2033 14 12 1
- 2033 14 12 2
- 2033 14 12 3
- 2033 14 12 4

DECISION

YES Go to Step 25.
NO Go to next step.

STEP

4. Note set DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

- 2033 14 10 1
- 2033 14 10 2
- 2033 14 10 3
- 2033 14 10 4

DECISION

YES Go to Step 44.
NO Go to next step.

STEP

5. Note set DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

- 2033 14 15 1
- 2033 14 15 2
- 2033 14 15 3
- 2033 14 15 4

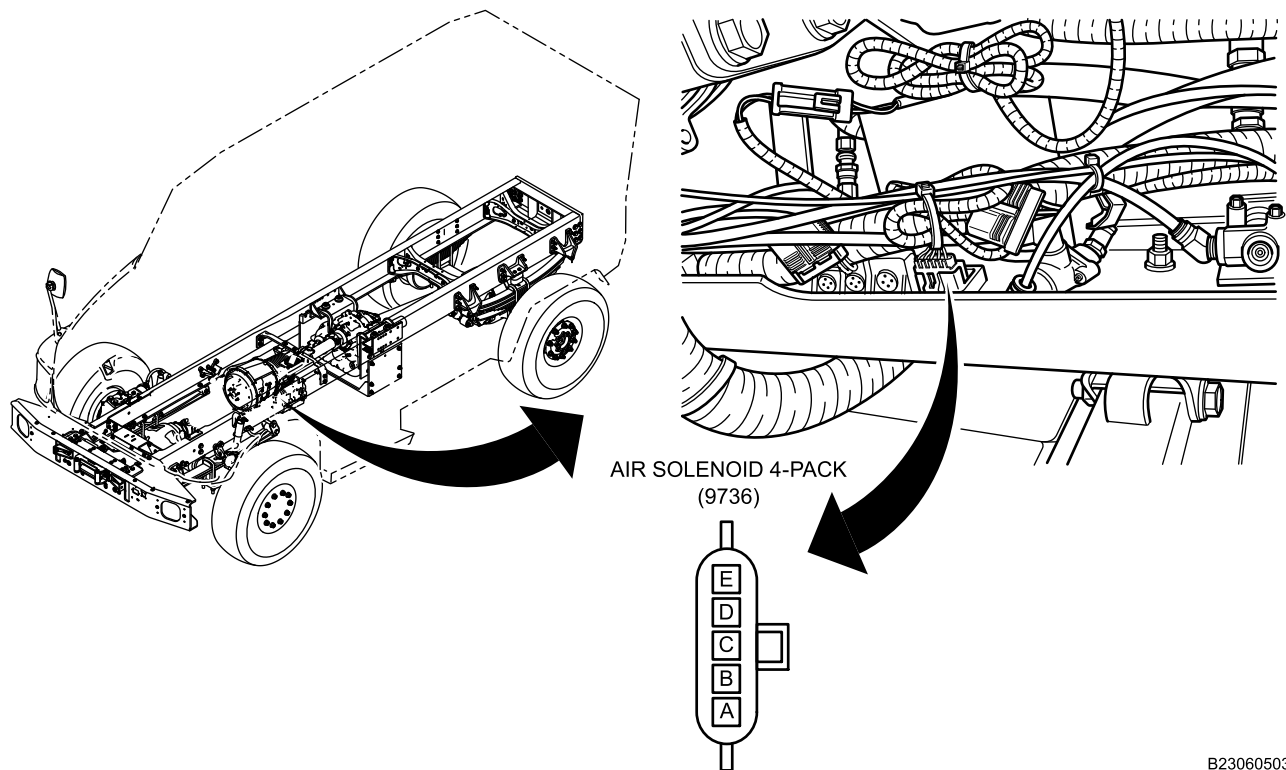
DECISION

YES Go to Step 63.
NO Go to Step 98.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Disconnect connector 9736 from air solenoid 4-pack. Refer to Figure 1.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605034

Figure 1. Left Side Frame Rail Center of Vehicle.

9. Turn MAIN POWER switch ON (TM 9-2355-106-10).
10. Turn ignition switch ON (TM 9-2355-106-10).
11. Measure DC voltage between connector 9736 terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to next step.
NO Go to Step 82.

STEP

12. Measure DC voltage between connector 9736 terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

YES Go to Step 94.
NO Go to next step.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

13. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
14. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
15. Disconnect connector 9714 from connector 9700. Refer to Figure 2.

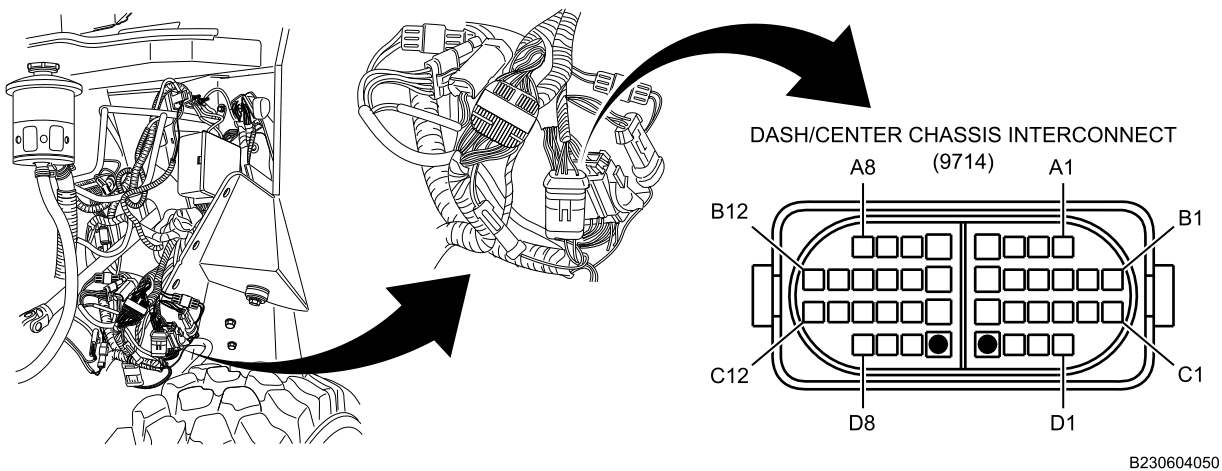


Figure 2. Engine Compartment Near Left Front Wheel.

16. Turn MAIN POWER switch ON (TM 9-2355-106-10).
17. Turn ignition switch ON (TM 9-2355-106-10).
18. Measure DC voltage between connector 9714 terminal B10 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

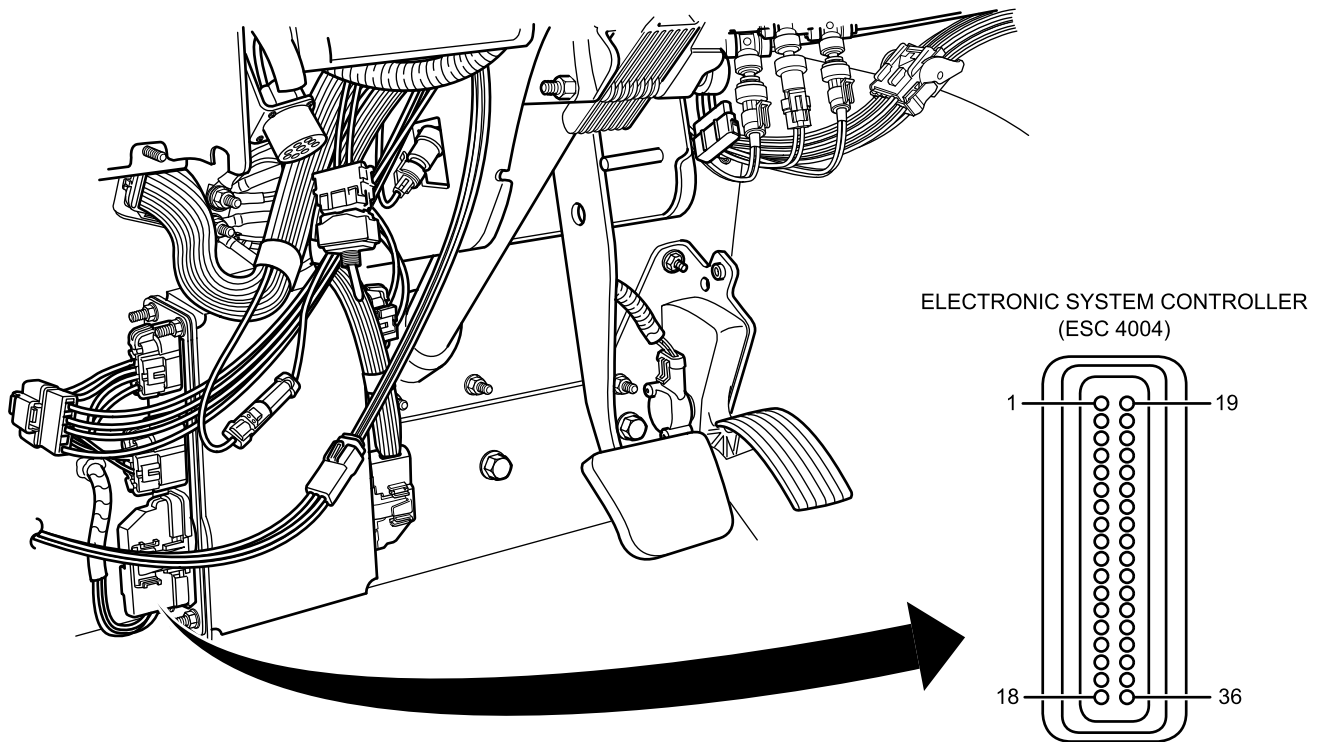
DECISION

YES Go to Step 95.
NO Go to next step.

STEP

19. Turn ignition switch OFF.
20. Turn MAIN POWER switch OFF.
21. Disconnect connector 4004 from ESC. Refer to Figure 3.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604421

Figure 3. Under Steering Column.

22. With assistance, measure resistance between connector 4004 terminal 31 and connector 9714 terminal B10 with multimeter. Refer to Figure 3 and Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

23. Measure resistance between connector 9714 terminal B10 and all other terminals in connector 9714 with multimeter. Refer to Figure 4.

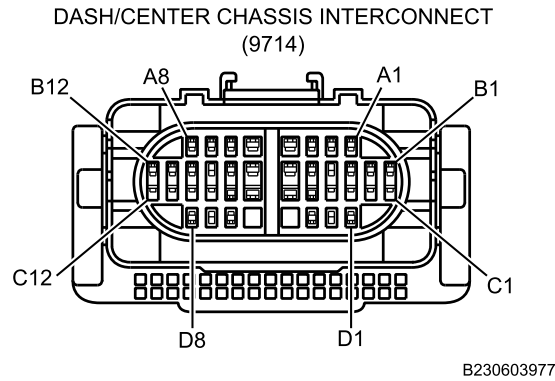


Figure 4. Connector 9714.

CONDITION/INDICATION

Does multimeter read OL for each test?

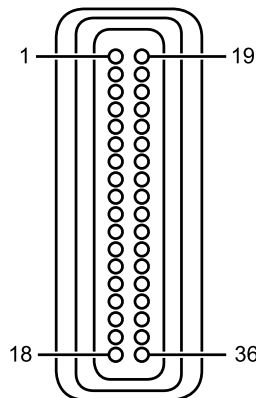
DECISION

YES Go to next step.
 NO Go to Step 96.

STEP

24. Measure resistance between connector 4004 terminal 31 and all other terminals in connector 4004 with multimeter. Refer to Figure 5.

ELECTRONIC SYSTEM CONTROLLER (ESC 4004)



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Figure 5. Connector 4004.

CONDITION/INDICATION

Does multimeter read OL for each test?

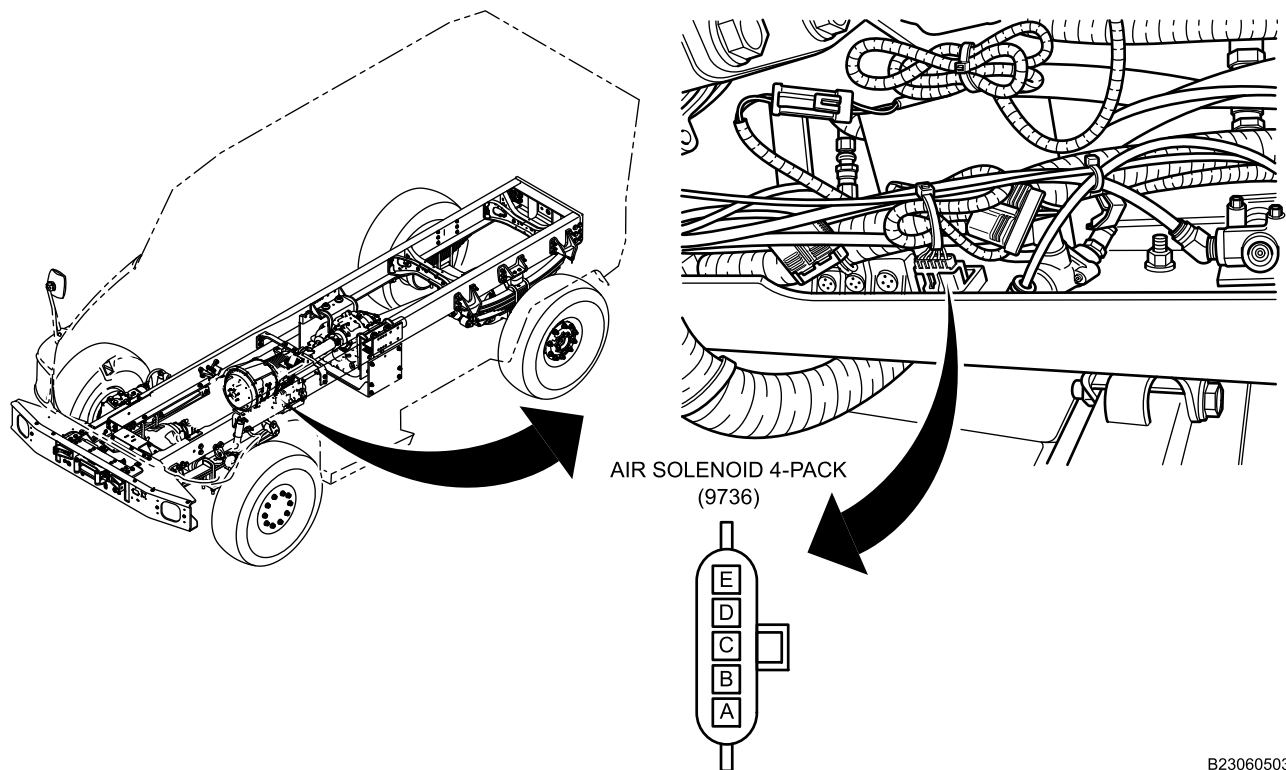
4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to Step 97.
NO Go to Step 96.

STEP

25. Turn ignition switch OFF (TM 9-2355-106-10).
26. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
27. Disconnect connector 9736 from air solenoid 4-pack. Refer to Figure 6.



B230605034

Figure 6. Left Side Frame Rail Center of Vehicle.

28. Turn MAIN POWER switch ON (TM 9-2355-106-10).
29. Turn ignition switch ON (TM 9-2355-106-10).
30. Measure DC voltage between connector 9736 terminal A and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

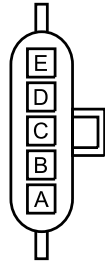
DECISION

- YES Go to next step.
NO Go to Step 82.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

31. Measure DC voltage between connector 9736 terminal C and ground with multimeter. Refer to Figure 7.

AIR SOLENOID 4-PACK
(9736)



B230605035

Figure 7. Connector 9736.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

YES Go to Step 94.
NO Go to next step.

STEP

32. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
33. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

34. Disconnect connector 9714 from connector 9700. Refer to Figure 8.

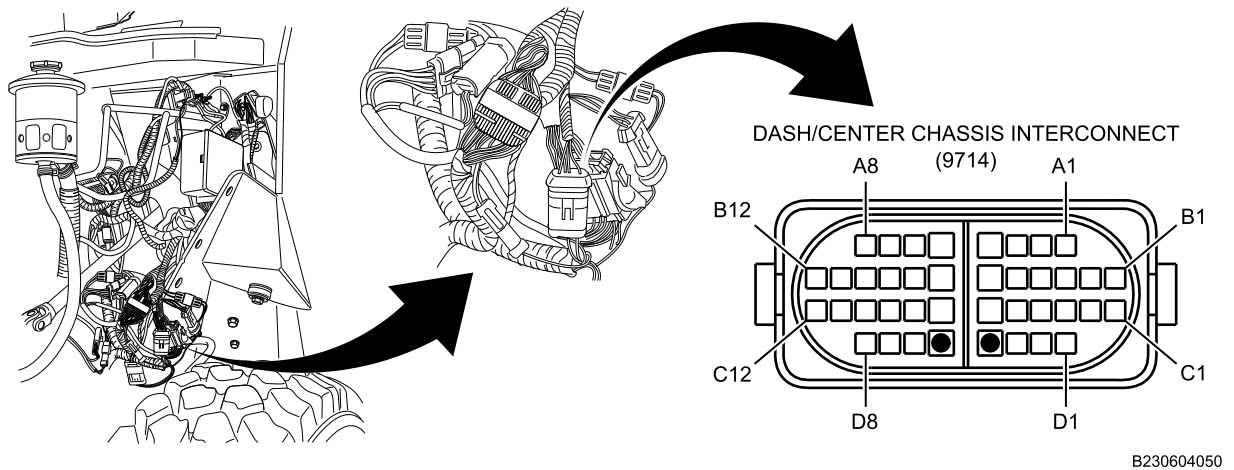


Figure 8. Engine Compartment Near Left Front Wheel.

35. Turn MAIN POWER switch ON (TM 9-2355-106-10).

36. Turn ignition switch ON (TM 9-2355-106-10).

37. Measure DC voltage between connector 9714 terminals C1 and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

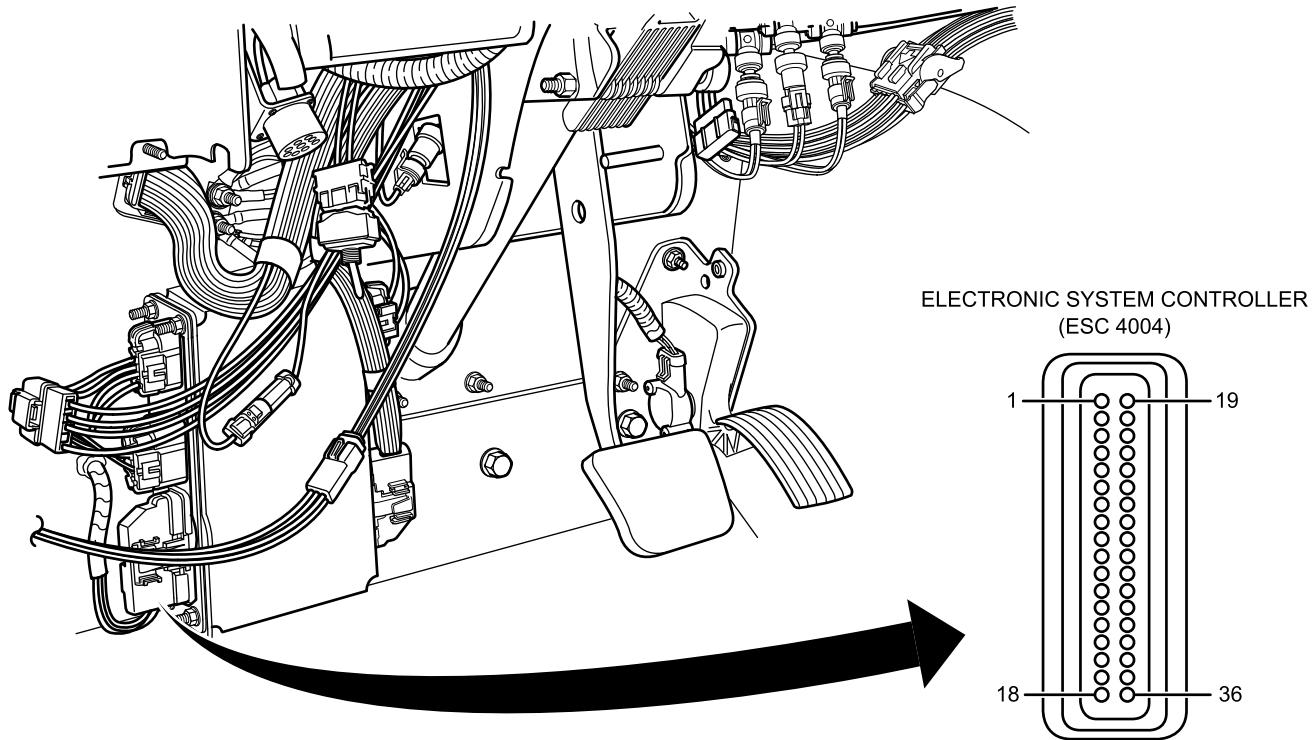
YES Go to Step 95.

NO Go to next step.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

38. Turn ignition switch OFF (TM 9-2355-106-10).
39. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
40. Disconnect connector 4004 from ESC. Refer to Figure 9.



B230604421

Figure 9. Under Steering Column.

41. With assistance, measure resistance between connector 4004 terminal 24 and connector 9714 terminal C1 with multimeter. Refer to Figure 9 and Figure 10.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
 NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

42. Measure resistance between connector 9714 terminal C1 and all other terminals in connector 9714 with multimeter. Refer to Figure 10.

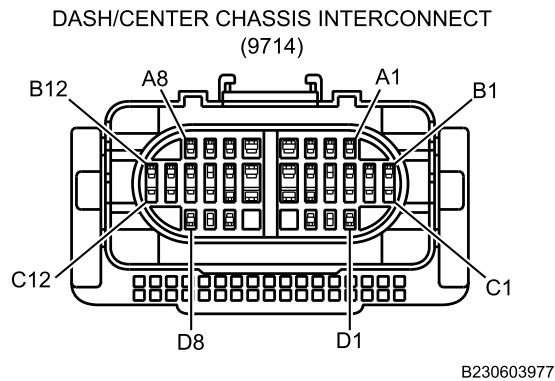


Figure 10. Connector 9714.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.
NO Go to Step 96.

STEP

43. Measure resistance between connector 4004 terminal 24 and all other terminals in connector 4004 with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 97.
NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

44. Turn ignition switch OFF (TM 9-2355-106-10).
45. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
46. Disconnect connector 9736 from air solenoid 4-pack. Refer to Figure 11.

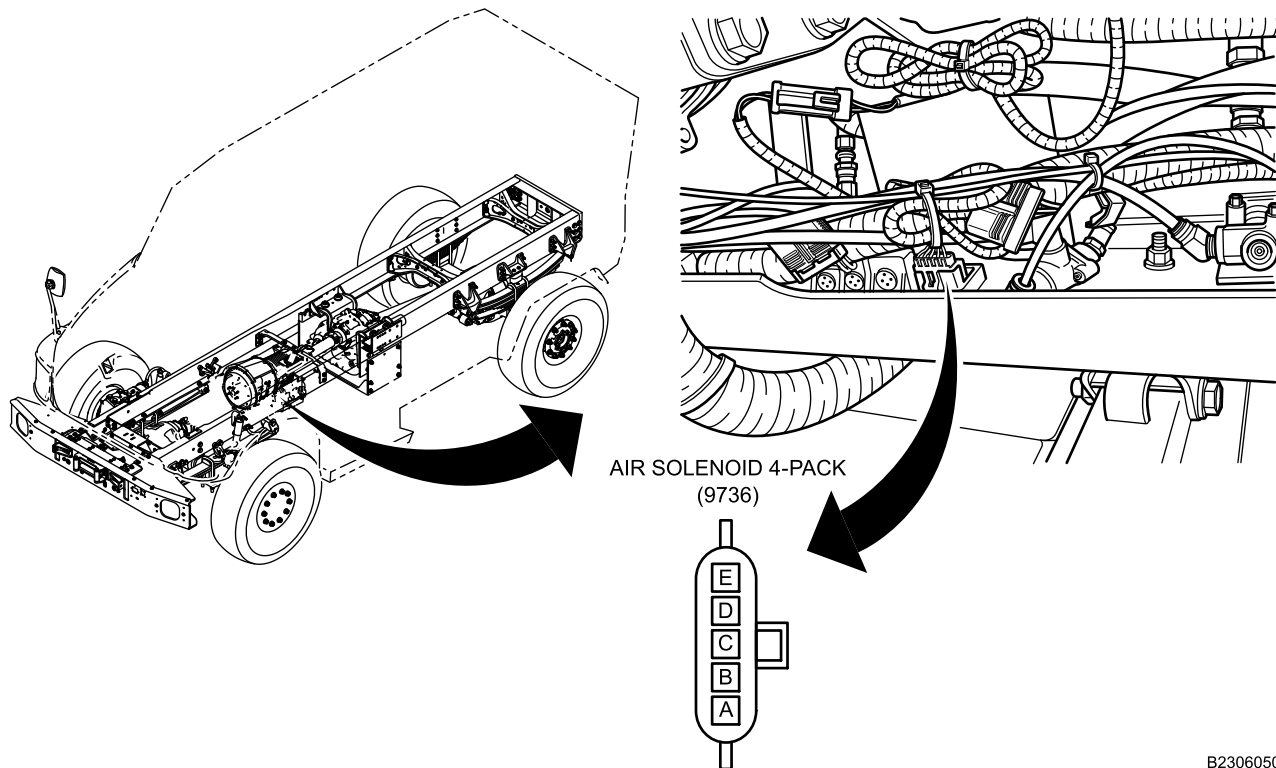


Figure 11. Left Side Frame Rail Center of Vehicle.

47. Turn MAIN POWER switch ON (TM 9-2355-106-10).
48. Turn ignition switch ON (TM 9-2355-106-10).
49. Measure DC voltage between connector 9736 terminal A and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to next step.
NO Go to Step 82.

STEP

50. Measure DC voltage between connector 9736 terminals D and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

YES Go to Step 94.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

51. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
52. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
53. Disconnect connector 9714 from connector 9700. Refer to Figure 12.

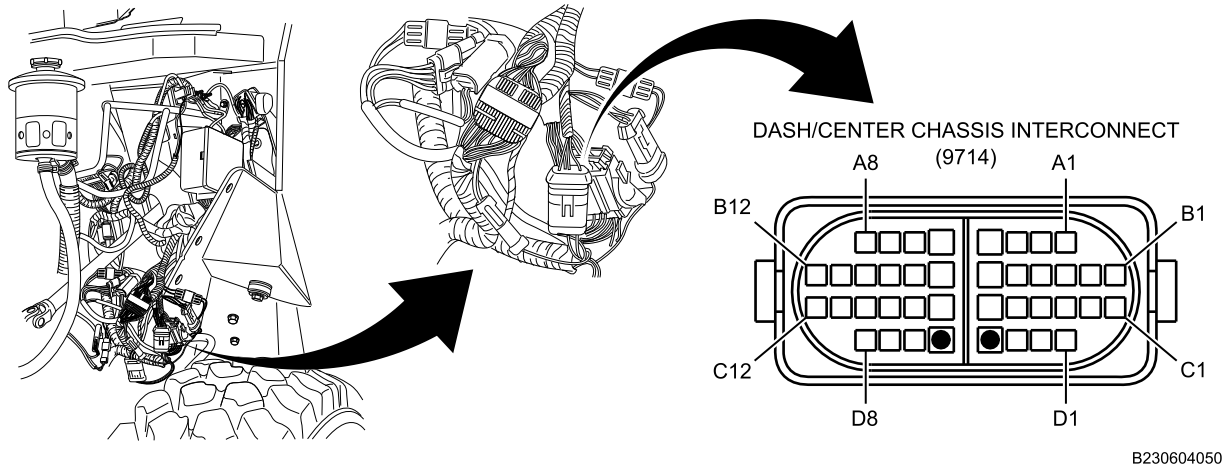


Figure 12. Engine Compartment Near Left Front Wheel.

54. Turn MAIN POWER switch ON (TM 9-2355-106-10).
55. Turn ignition switch ON (TM 9-2355-106-10).
56. Measure DC voltage between connector 9714 terminal C2 and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

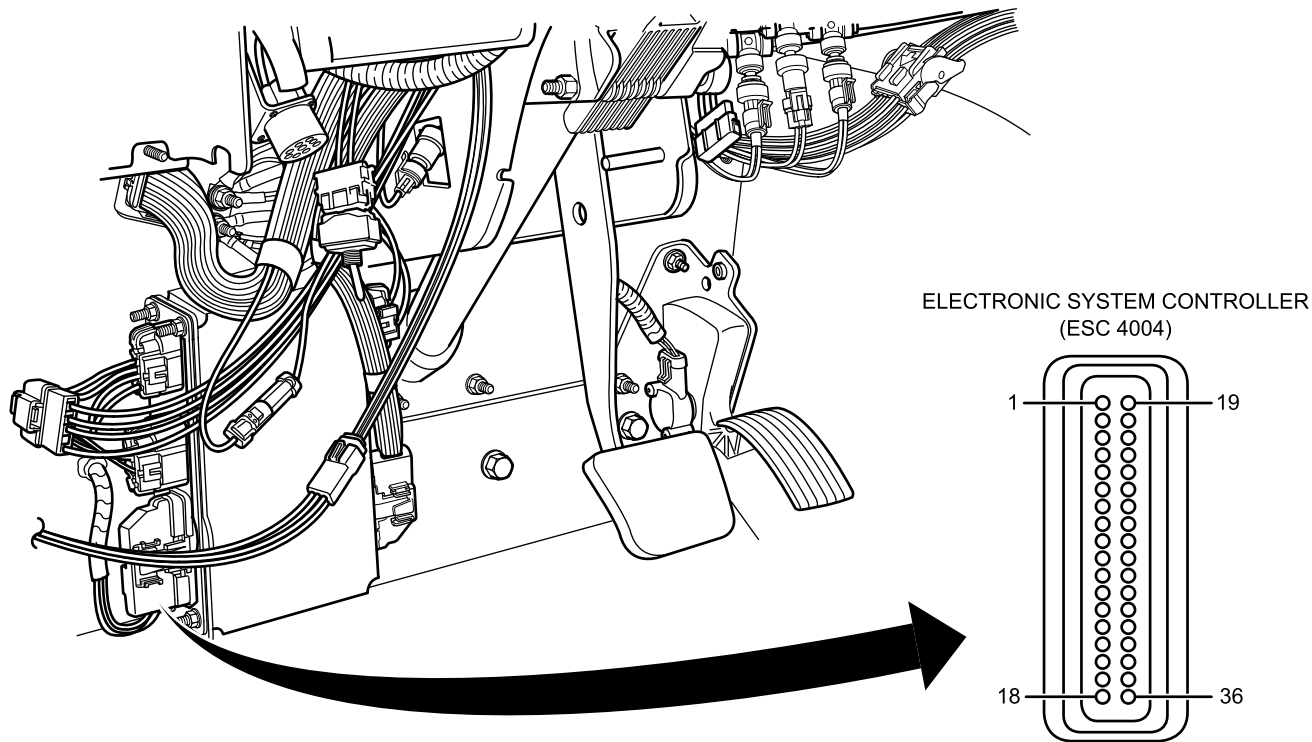
DECISION

YES Go to Step 95.
NO Go to next step.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

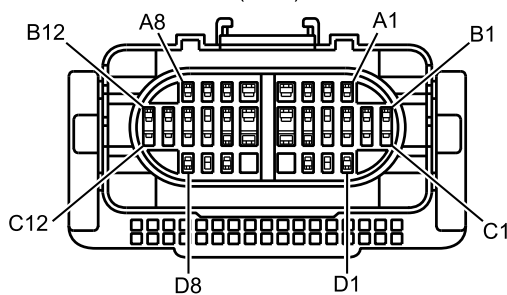
- 57. Turn ignition switch OFF (TM 9-2355-106-10).
- 58. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 59. Disconnect connector 4004 from ESC. Refer to Figure 13.



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Figure 13. Under Steering Column.

DASH/CENTER CHASSIS INTERCONNECT (9714)



B230603977

Figure 14. Connector 9714.

- 60. With assistance, measure resistance between connector 4004 terminal 22 and connector 9714 terminal C2 with multimeter. Refer to Figure 13 and Figure 14.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to next step.
NO Go to Step 96.

STEP

61. Measure resistance between connector 9714 terminal C2 and all other terminals in connector 9714 with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read OL for each test?

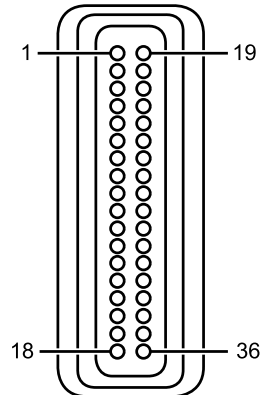
DECISION

YES Go to next step.
NO Go to Step 96.

STEP

62. Measure resistance between connector 4004 terminal 22 and all other terminals in connector 4004 with multimeter. Refer to Figure 15.

ELECTRONIC SYSTEM CONTROLLER
(ESC 4004)



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Figure 15. Connector 4004.

CONDITION/INDICATION

Does multimeter read OL for each test?

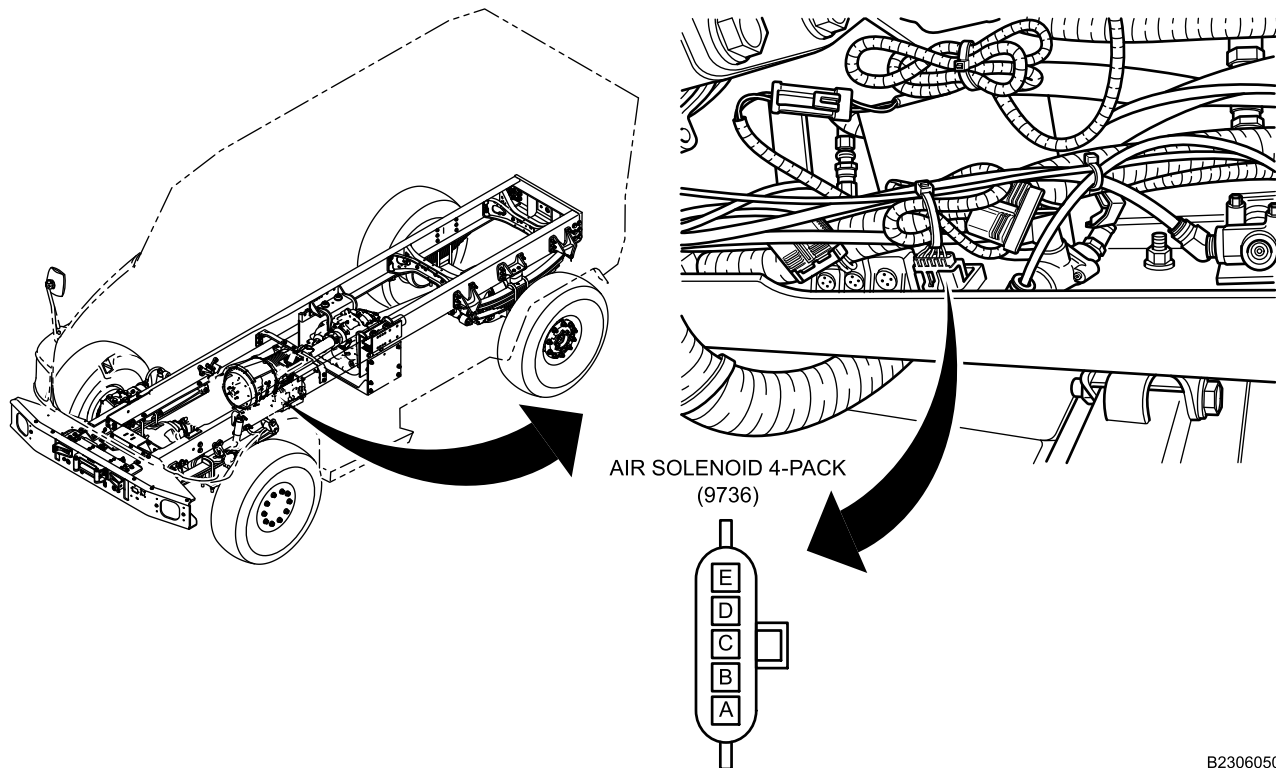
DECISION

YES Go to Step 97.
NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

63. Turn ignition switch OFF (TM 9-2355-106-10).
64. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
65. Disconnect connector 9736 from air solenoid 4-pack. Refer to Figure 16.



B230605034

Figure 16. Left Side Frame Rail Center of Vehicle.

66. Turn MAIN POWER switch ON (TM 9-2355-106-10).
67. Turn ignition switch ON (TM 9-2355-106-10).
68. Measure DC voltage between connector 9736 terminal A and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to next step.
NO Go to Step 82.

STEP

69. Measure DC voltage between connector 9736 terminal E and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

YES Go to Step 94.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

70. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
71. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
72. Disconnect connector 9714 from connector 9700. Refer to Figure 17.

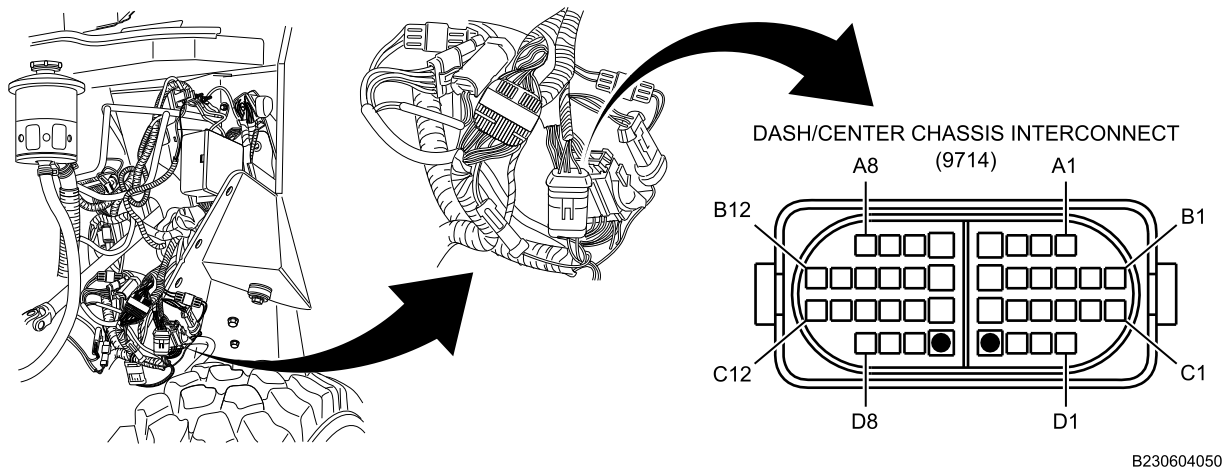


Figure 17. Engine Compartment Near Left Front Wheel.

73. Turn MAIN POWER switch ON (TM 9-2355-106-10).
74. Turn ignition switch ON (TM 9-2355-106-10).
75. Measure DC voltage between connector 9714 terminal C5 and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read between 2.0V and 3.0V?

DECISION

YES Go to Step 95.
NO Go to next step.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 76. Turn ignition switch OFF.
- 77. Turn MAIN POWER switch OFF.
- 78. Disconnect connector 4004 from ESC. Refer to Figure 18.

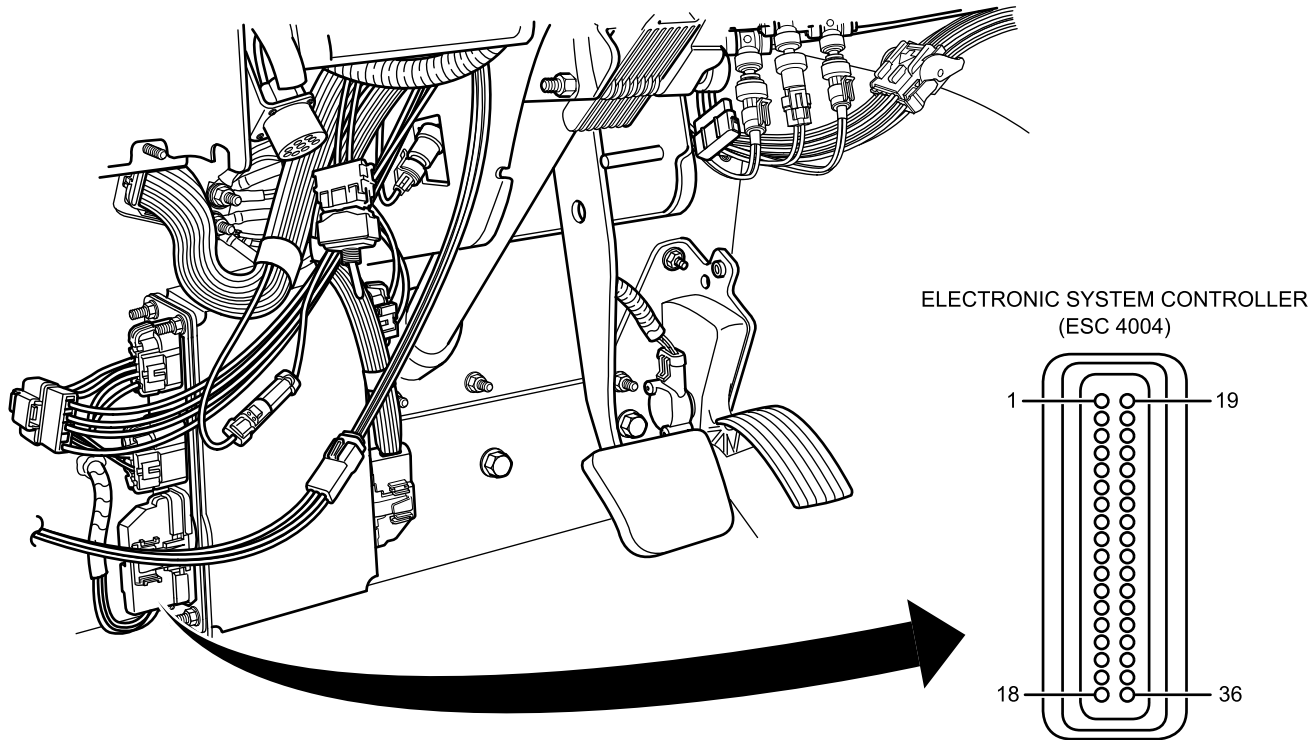


Figure 18. Under Steering Column.

- 79. With assistance, measure resistance between connector 4004 terminal 30 and connector 9714 terminal C5 with multimeter. Refer to Figure 18 and Figure 19.

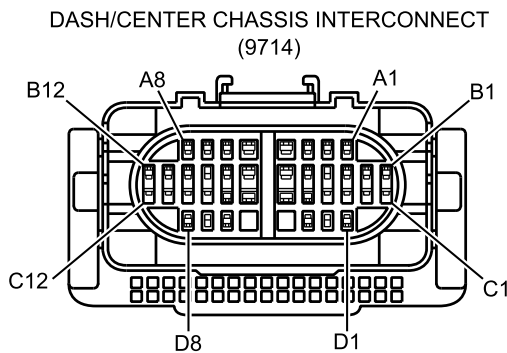


Figure 19. Connector 9714.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to next step.
NO Go to Step 96.

STEP

80. Measure resistance between connector 9714 terminal C5 and all other terminals in connector 9714 with multimeter. Multimeter should read OL for each test. Refer to Figure 20.

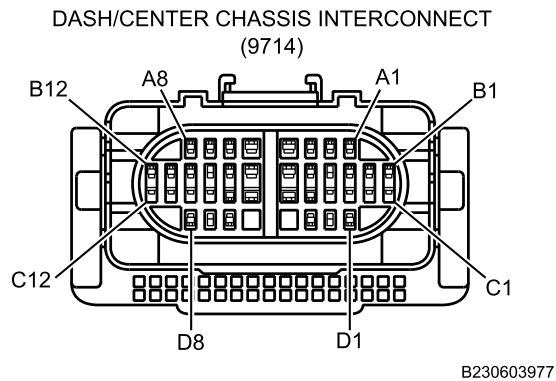


Figure 20. Connector 9714.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

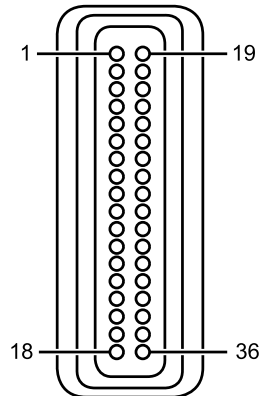
YES Go to next step.
NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

81. Measure resistance between connector 4004 terminal 30 and all other terminals in connector 4004 with multimeter. Refer to Figure 21.

ELECTRONIC SYSTEM CONTROLLER
(ESC 4004)



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Figure 21. Connector 4004.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 97.

NO Go to Step 96.

STEP

82. Remove air cleaner assembly. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
83. Remove left engine armor plate bracket. Refer to Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
84. Disconnect connector 9714 from connector 9700. Refer to Figure 22.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

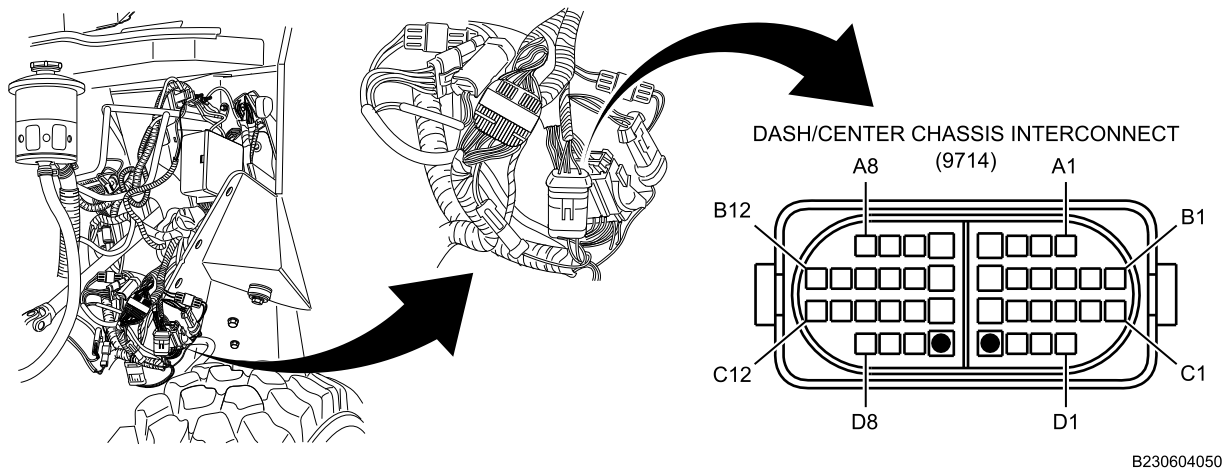


Figure 22. Engine Compartment Inboard Left Wheel.

85. Turn MAIN POWER switch ON (TM 9-2355-106-10).
86. Turn ignition switch ON (TM 9-2355-106-10).
87. Measure DC voltage between connector 9714 terminal C7 and ground. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 95.
NO Go to next step.

STEP

88. Turn ignition switch OFF (TM 9-2355-106-10).
89. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
90. Measure resistance between connector 9714 terminal C7 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

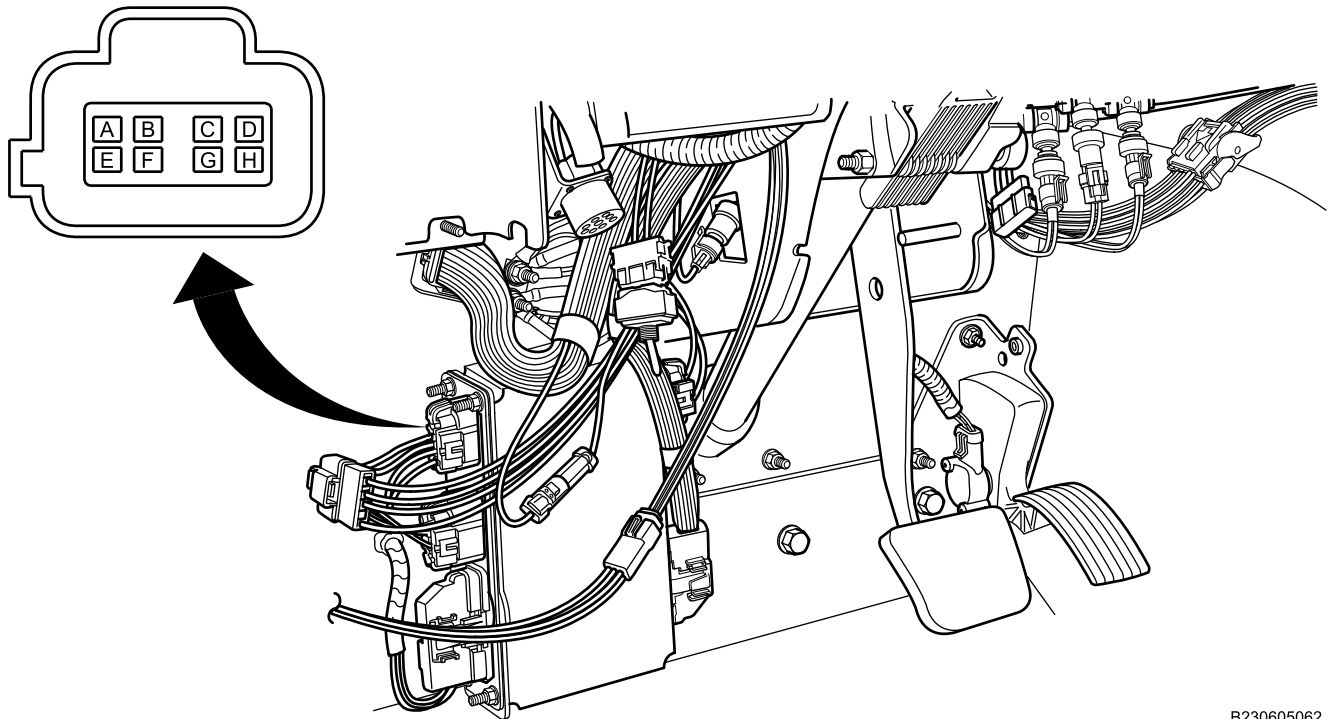
YES Go to next step.
NO Go to Step 96.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

91. Disconnect connector 4008 from ESC. Refer to Figure 23.

SYSTEM CONTROLLER (BLUE)
(4008)

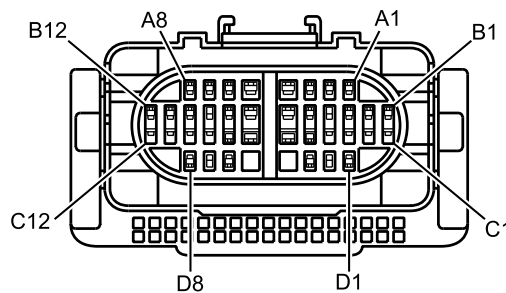


B230605062

Figure 23. Connector 4008.

92. With assistance, measure resistance between connector 4008 terminal A and connector 9714 terminal C7 with multimeter. Refer to Figure 23 and Figure 24.

DASH/CENTER CHASSIS INTERCONNECT
(9714)



B230603977

Figure 24. Connector 9714.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 96.
YES Go to next step.

4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

93. Measure resistance between connector 4008 terminal A and all other terminals in connector 4008 with multimeter. Refer to Figure 25.

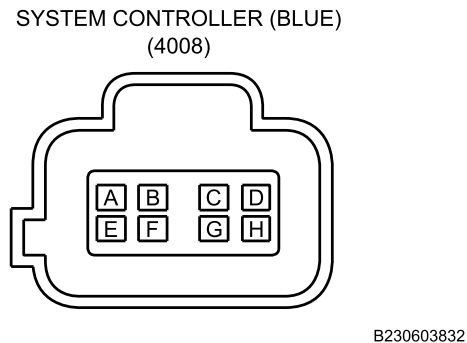


Figure 25. Connector 4008.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 96.
YES Go to Step 97.

MALFUNCTION

- 94. 4-pack air solenoid module is faulty.

ACTION

Replace 4-pack air solenoid module. Refer to 4-Pack Air Solenoid Module and Support Removal and Installation (WP 0464). Return vehicle to service.

END OF TEST

MALFUNCTION

- 95. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST

MALFUNCTION

- 96. Power distribution center (PDC) harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

**4-PACK AIR SOLENOID CIRCUITS FROM ELECTRONIC SYSTEM CONTROLLER (ESC) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 97. Electronic System Controller (ESC) is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 98. Condition that set DTC is not present.

ACTION

Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)	WP 0335
	WP 0355
	WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0011
WP 0059
WP 0067
WP 0319
WP 0333

Drawings Required

WP 0789, Figure 2
WP 0789, Figure 3

This procedure applies to Antilock Brake System (ABS) control module power, ground, and communication faults; and following DTCs:

- 11-1
- 11-2
- 11-3

TROUBLESHOOTING PROCEDURE**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.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Connect MSD. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. Confirm MSD communicates with at least one module.

CONDITION/INDICATION

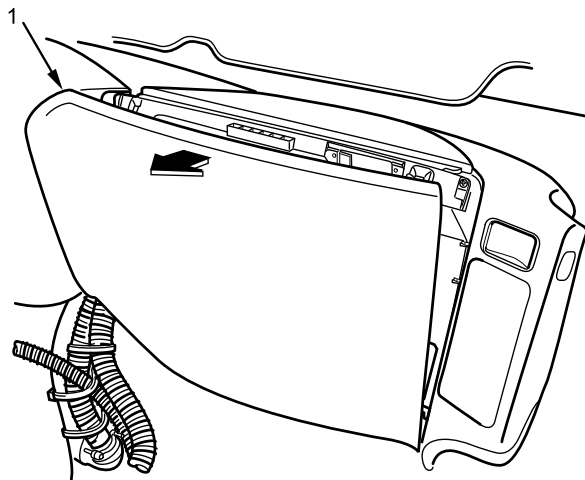
Does MSD communicate with at least one module?

DECISION

NO Go to Step 38.
YES Go to next step.

STEP

3. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
4. Turn ignition switch OFF (TM 9-2355-106-10).
5. Remove instrument panel right side closeout panel (Figure 1, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



B230601329

Figure 1. Instrument Panel Right Side Closeout Panel.

6. Disconnect connector 4953. Refer to Figure 2.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

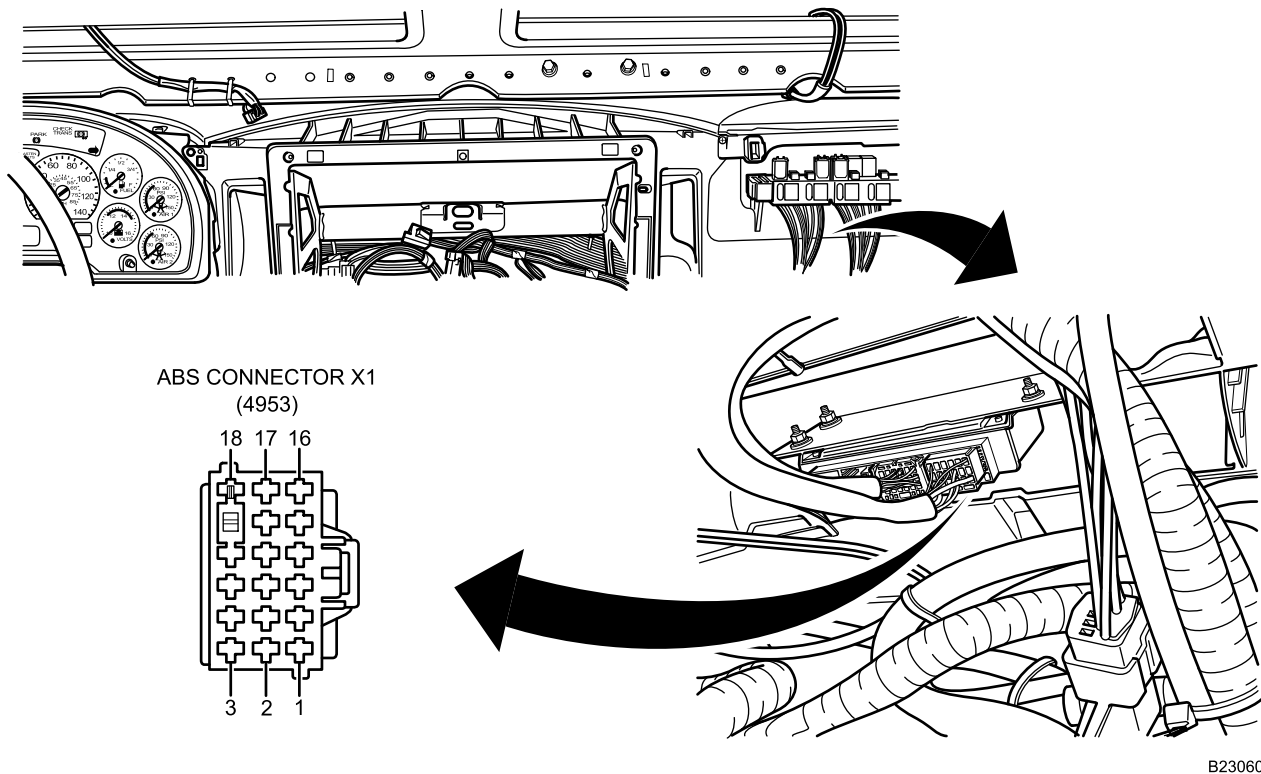


Figure 2. Behind Right Side of Instrument Panel (IP).

7. Measure resistance between connector 4953 terminal 1 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

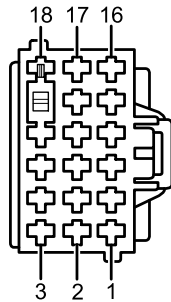
NO Go to Step 39.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

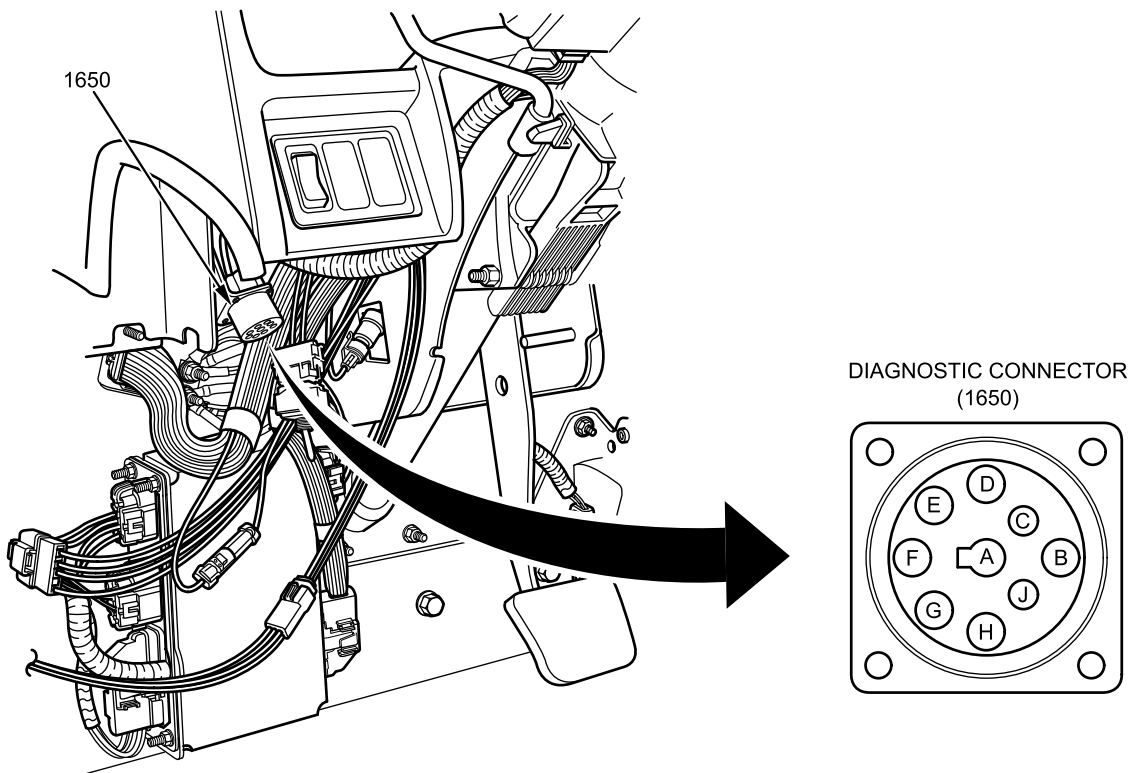
8. Measure resistance between connector 4953 terminal 7 and connector 1650 terminal D with multimeter. Refer to Figure 3 and Figure 4.

ABS CONNECTOR X1
(4953)



B230603804

Figure 3. Connector 4953.



B230604693

Figure 4. Left Side Lower Instrument Panel.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 39.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

9. Measure resistance between connector 4953 terminal 8 and connector 1650 terminal C with multimeter. Refer to Figure 3 and Figure 4.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

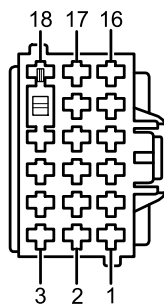
DECISION

NO Go to Step 39.
YES Go to next step.

STEP

10. Turn MAIN POWER switch ON (TM 9-2355-106-10).
11. Turn ignition switch ON (TM 9-2355-106-10).
12. Measure DC voltage between connector 4953 terminal 3 and ground with multimeter. Refer to Figure 5.

ABS CONNECTOR X1
(4953)



B230603804

Figure 5. Connector 4953.

CONDITION/INDICATION

Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

NO Go to Step 14.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

13. Measure DC voltage between connector 4953 terminal 16 and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

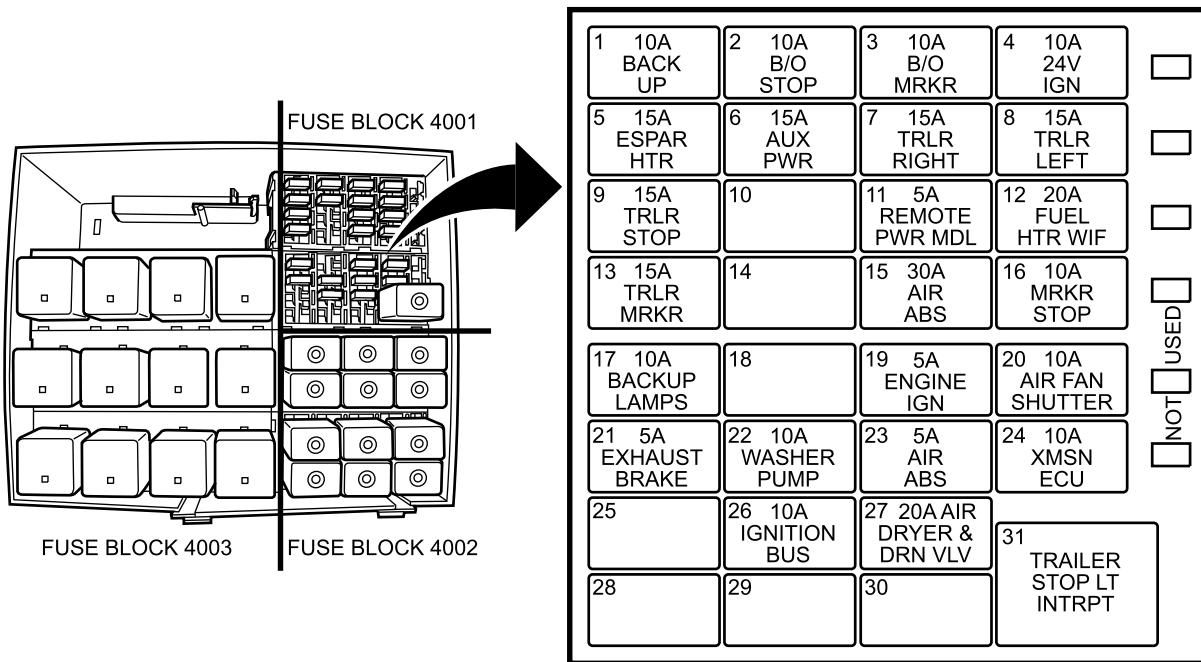
Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

NO Go to Step 25.
 YES Go to Step 41.

STEP

14. Turn ignition switch OFF (TM 9-2355-106-10).
 15. Turn MAIN POWER switch OFF (TM 9-2355-106-10).



B230601892

Figure 6. Underhood Power Distribution Center.

16. Remove 5A AIR ABS fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 6.

CONDITION/INDICATION

Is fuse open?

DECISION

YES Go to Step 32
 NO Go to next step.

STEP

17. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Turn ignition switch ON (TM 9-2355-106-10).
19. Measure DC voltage between ground and each AIR ABS fuse socket terminal with multimeter.

CONDITION/INDICATION

Does multimeter read between 10.5 volts and 13.5 volts for either test?

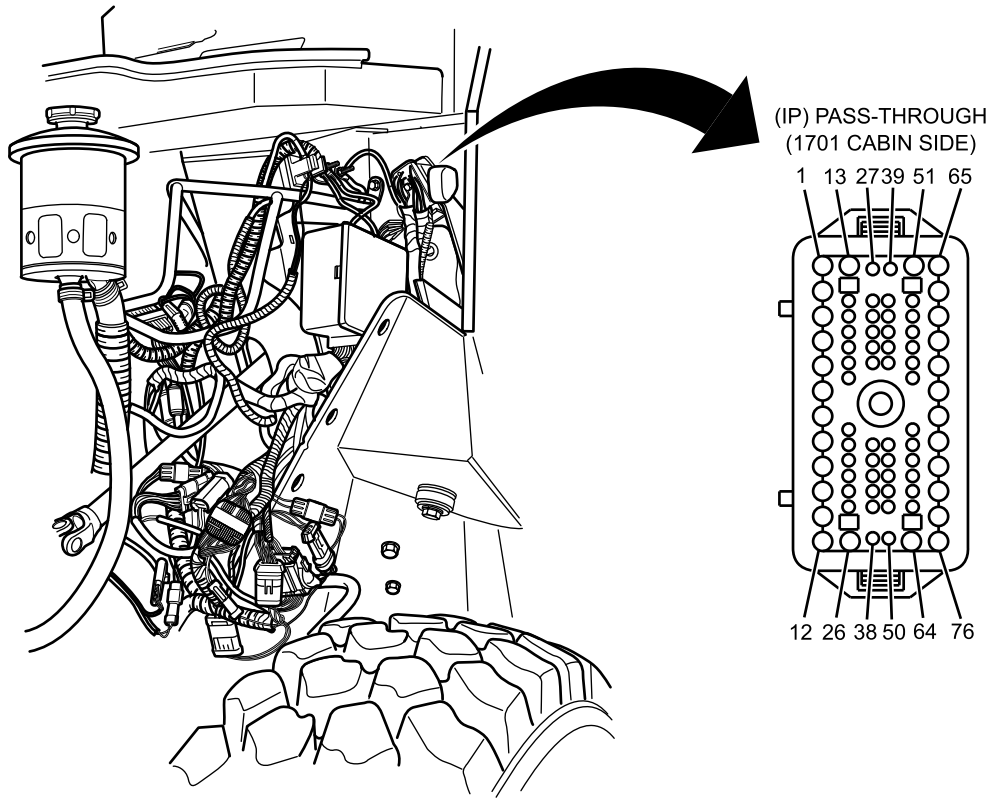
DECISION

NO Go to Power Distribution Troubleshooting Procedure (WP 0059).
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

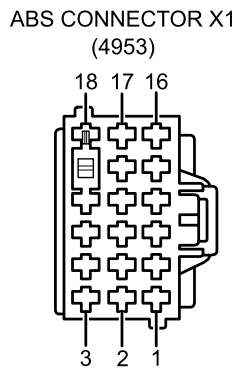
- 20. Turn ignition switch OFF (TM 9-2355-106-10).
- 21. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 22. Disconnect connector 1701. Refer to Figure 7.



B230604024

Figure 7. Left Side Firewall.

- 23. Measure resistance between connector 4953 terminal 3 and connector 1701 (cabin side) terminal 75 with multimeter. Refer to Figure 8 and Figure 7.



B230603804

Figure 8. Connector 4953.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 39.
YES Go to next step.

STEP

24. Measure resistance between connector 1701 (cabin side) terminal 75 and all other connector 1701 (cabin side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 7.

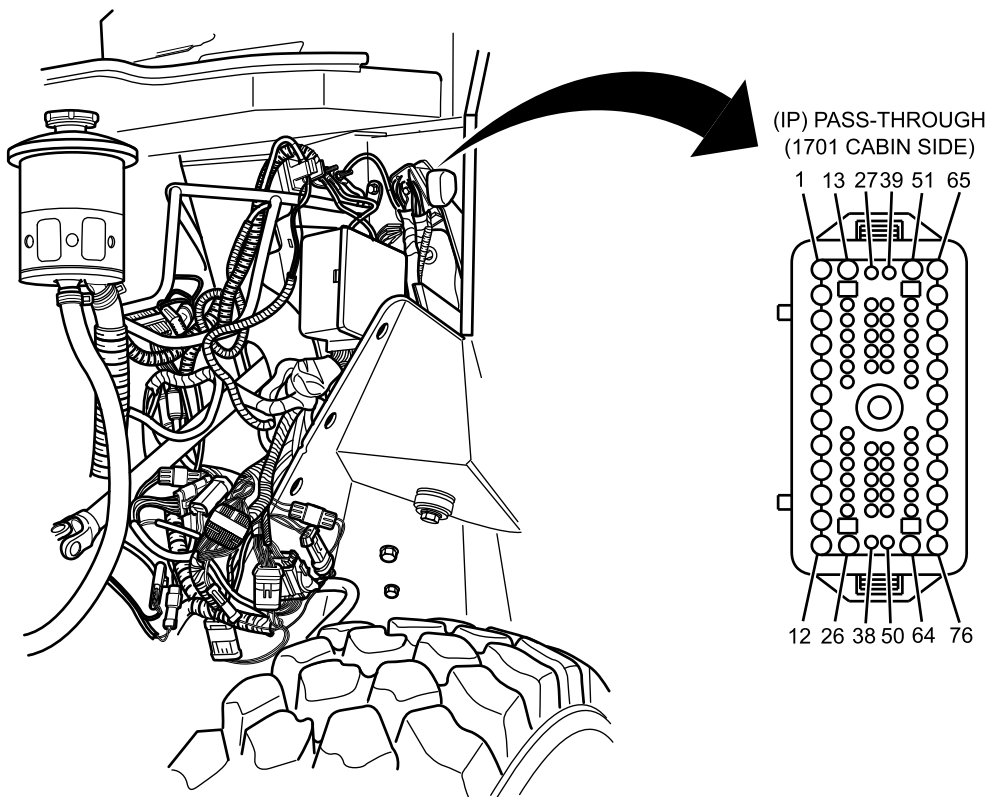


Figure 9. Left Side Firewall.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

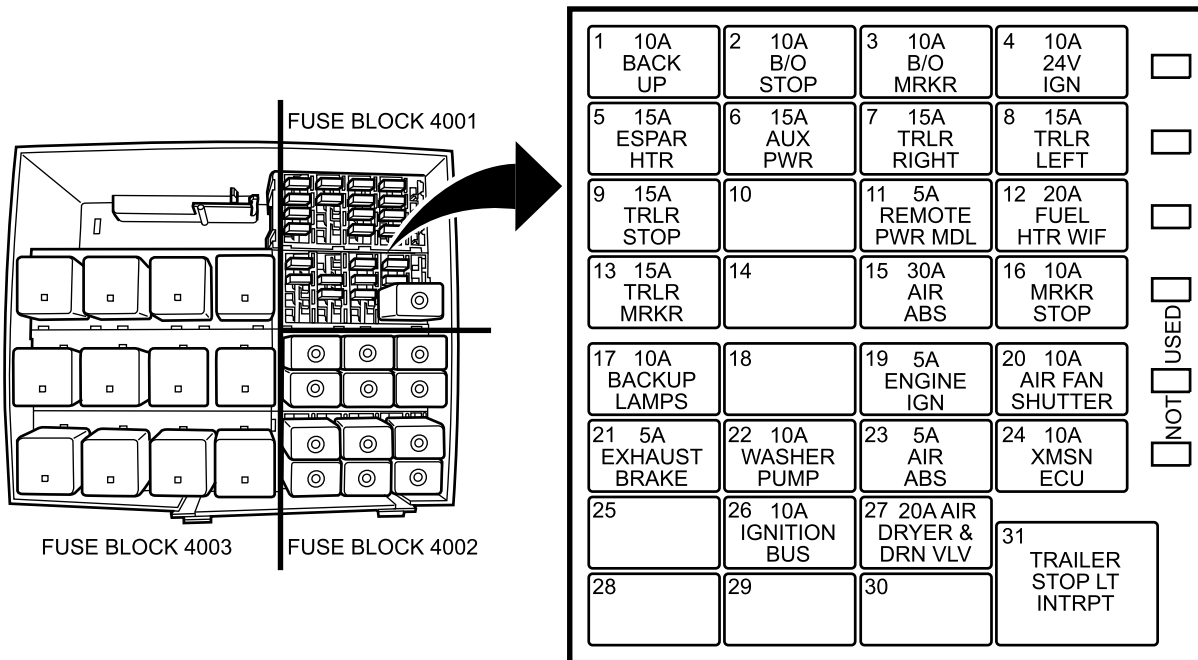
NO Go to Step 39.
YES Go to Step 40.

B230604024

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 25. Turn ignition switch OFF (TM 9-2355-106-10).
- 26. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 27. Remove 30A AIR ABS fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 10.



B230601892

Figure 10. Underhood Power Distribution Center.

CONDITION/INDICATION

Is fuse open?

DECISION

- YES Go to Step 35.
- NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Disconnect connector 1701. Refer to Figure 11.

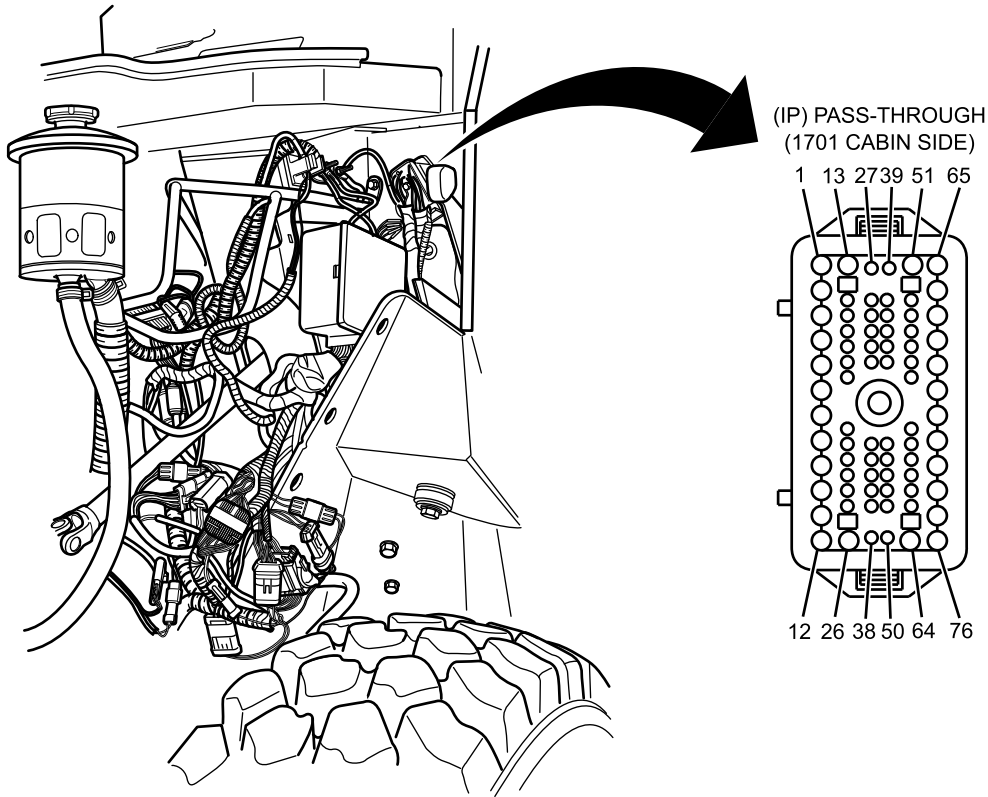
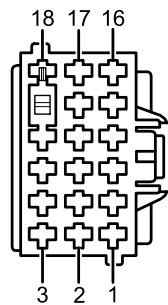


Figure 11. Left Side Firewall.

ABS CONNECTOR X1
(4953)



B230603804

Figure 12. Connector 4953.

29. Measure resistance between connector 4953 terminal 16 and ground with multimeter. Refer to Figure 12.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 39.
YES Go to next step.

STEP

30. Measure resistance between connector 4953 terminal 16 and connector 1701 (cabin side) terminal 74 with multimeter. Refer to Figure 12 and Figure 11.

CONDITION/INDICATION

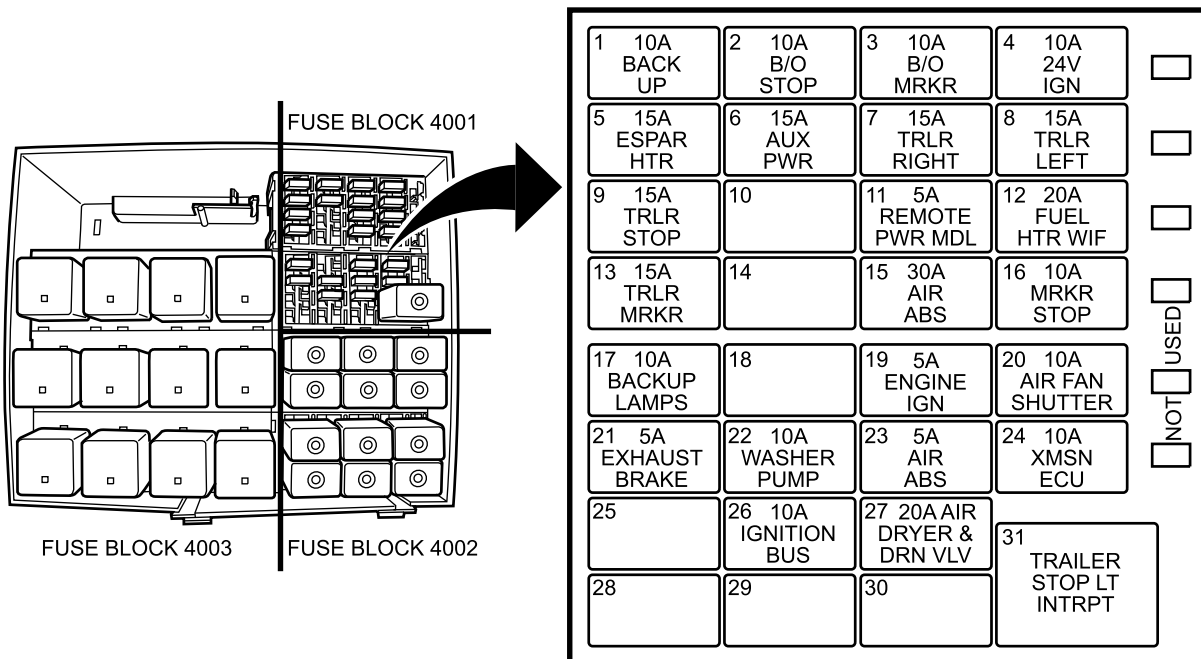
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 39.
YES Go to next step.

STEP

31. Measure resistance between connector 1701 (cabin side) terminal 74 and all other connector 1701 (cabin side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 11.



B230601892

Figure 13. Underhood Power Distribution Center.

CONDITION/INDICATION

Does multimeter read OL for each test?

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- NO Go to Step 39.
- YES Go to Step 40.

STEP

32. Measure resistance between connector 4953 terminal 3 and ground with multimeter. Refer to Figure 15.

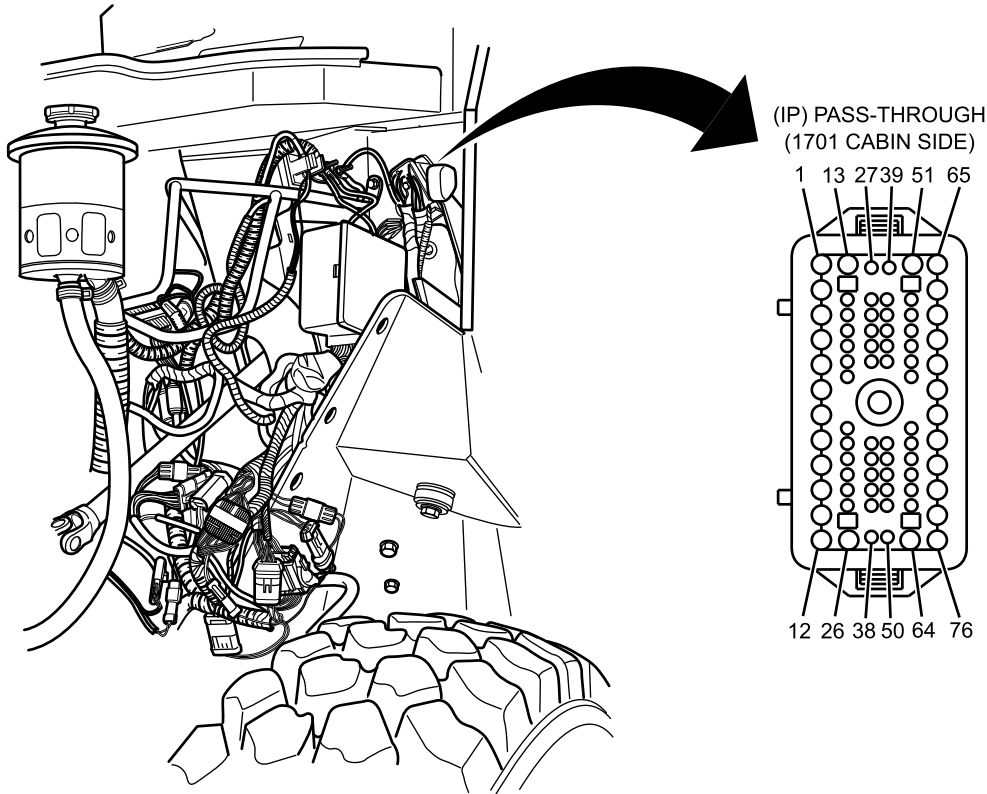
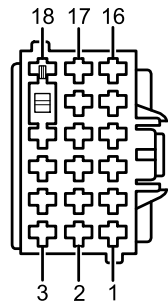


Figure 14. Left Side Firewall.

ABS CONNECTOR X1
(4953)



B230603804

Figure 15. Connector 4953.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL?

DECISION

YES Go to Step 41.
NO Go to next step.

STEP

33. Disconnect connector 1701. Refer to Figure 14.

34. Measure resistance between connector 4953 terminal 3 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 39.
YES Go to Step 40.

STEP

35. Measure resistance between connector 4953 terminal 16 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 41.
NO Go to next step.

STEP

36. Disconnect connector 1701. Refer to Figure 14.

37. Measure resistance between connector 4953 terminal 16 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 39.
YES Go to Step 40.

ANTILOCK BRAKE SYSTEM (ABS) J1939 SERIAL COMMUNICATIONS TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 38. Data link circuits are faulty.

ACTION

Go to Multiplexing Data Link Circuits Troubleshooting Procedure (WP 0067). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 39. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 40. Power Distribution Center (PDC) Harness is faulty.

ACTION

Replace PDC harness. Refer to Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 41. Antilock Brake System (ABS) control module is faulty.

ACTION

Replace ABS control module. Refer to Antilock Brake System (ABS) Control Module Removal and Installation (WP 0355). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT
TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0597
WP 0598
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0319
WP 0335
WP 0424
WP 0426
WP 0427
WP 0511
WP 0507
WP 0355

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 42,
WP 0789, Figure 43,

This procedure applies to the following Diagnostic Trouble Codes (DTCs):

- 12-7
- 12-8

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 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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

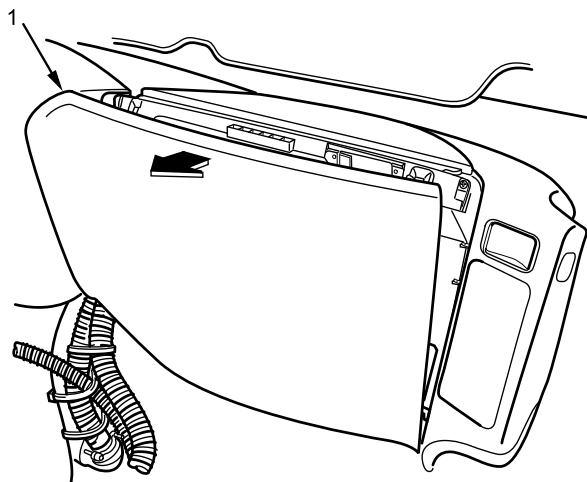
ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

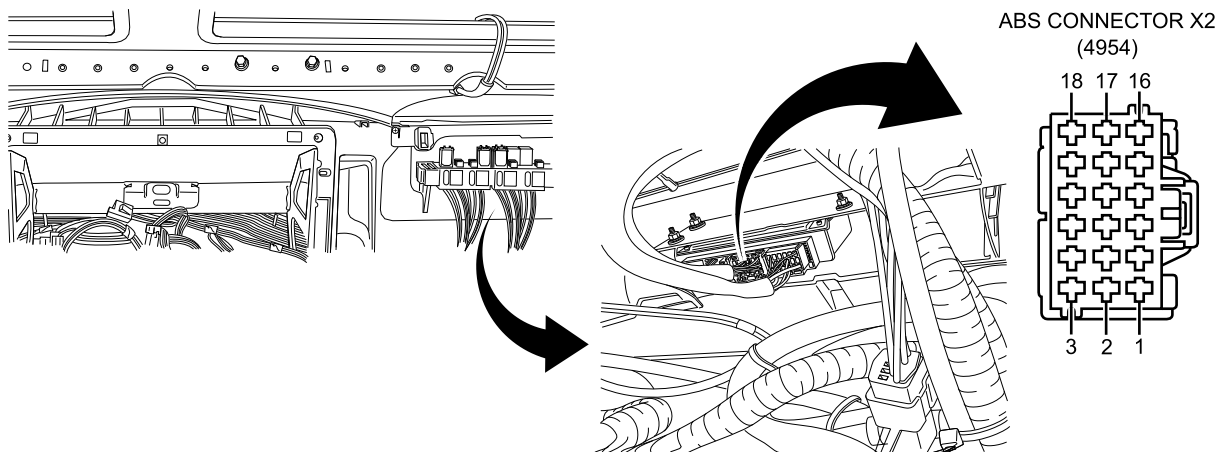
1. Remove instrument panel right side closeout panel (Figure 1, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



B230601329

Figure 1. Instrument Panel Right Side Closeout Panel.

2. Disconnect connector 4954. Refer to Figure 2



B231204914

Figure 2. Behind Right Instrument Panel.

3. Measure resistance between connector 4954 terminal 3 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read OL?

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 13.
YES Go to next step.

STEP

4. Measure resistance between connector 4954 terminal 6 and ground with multimeter. Refer to Figure 3.

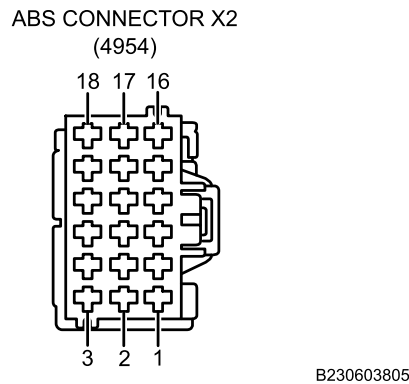


Figure 3. Connector 4954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 18.
YES Go to next step.

STEP

5. Measure resistance between connector 4954 terminal 9 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
YES Go to next step.

STEP

6. Measure resistance between connector 4954 terminal 12 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 29.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

YES Go to next step.

STEP

7. Turn MAIN POWER switch ON (TM 9-2355-106-10).
8. Turn ignition switch ON (TM 9-2355-106-10).
9. Measure DC voltage between connector 4954 terminal 3 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

NO Go to Step 35.
YES Go to next step.

STEP

10. Measure DC voltage between connector 4954 terminal 6 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read 0 volts?

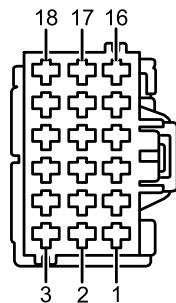
DECISION

NO Go to Step 51.
YES Go to next step.

STEP

11. Measure DC voltage between connector 4954 terminal 9 and ground with multimeter. Refer to Figure 4.

ABS CONNECTOR X2
(4954)



B230603805

Figure 4. Connector 4954.

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

NO Go to Step 67.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

12. Measure DC voltage between connector 4954 terminal 12 and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

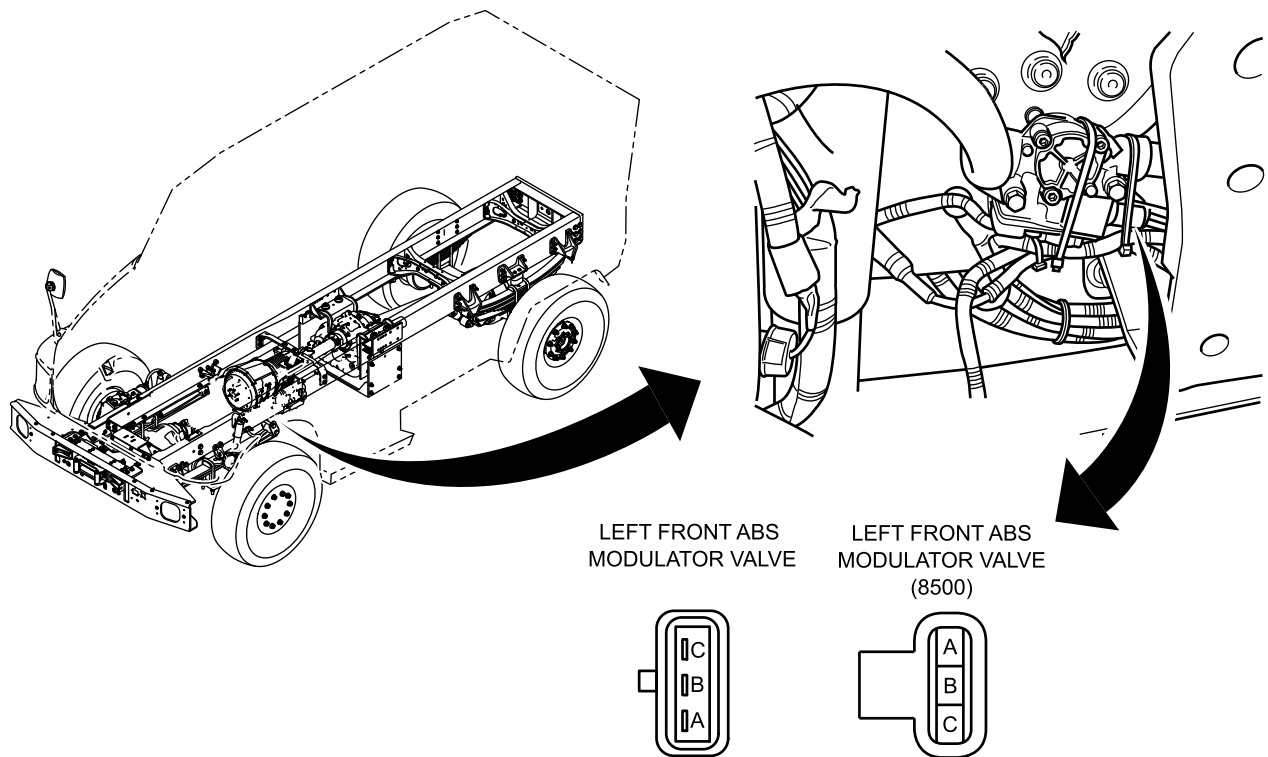
Does multimeter read 0 volts?

DECISION

NO Go to Step 88.
 YES Go to Step 118.

STEP

13. Disconnect connector 8500 from left front ABS modulator valve. Refer to Figure 5



B230605081

Figure 5. Outboard Left Front Frame Rail, Inboard of Left Front Wheel.

CONDITION/INDICATION

Does multimeter read OL?

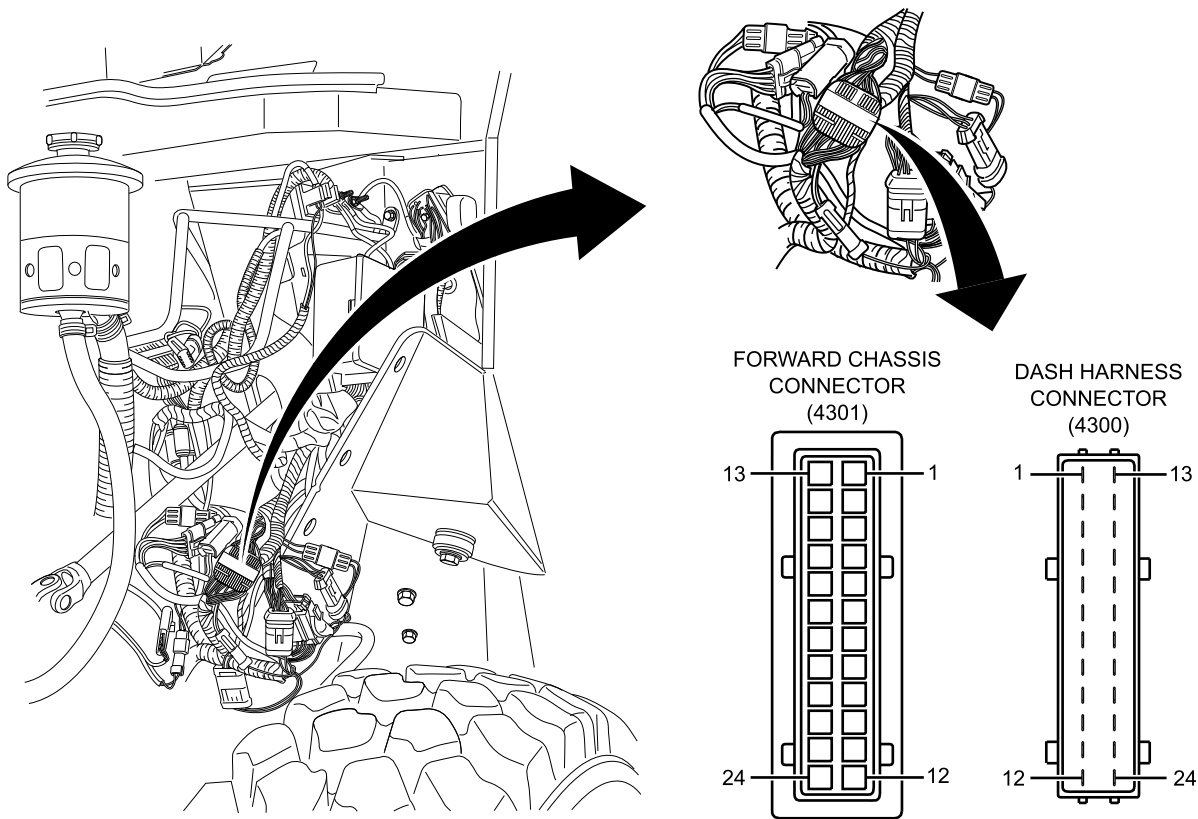
DECISION

YES Go to Step 115.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

14. Remove engine air filter assembly (TM 9-2355-106-10).
15. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
16. Disconnect connector 4301/4300. Refer to Figure 6



B230603738

Figure 6. Above Frame, Inboard of Left Front Wheel.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 117.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

17. Disconnect connector 1701. Refer to Figure 7

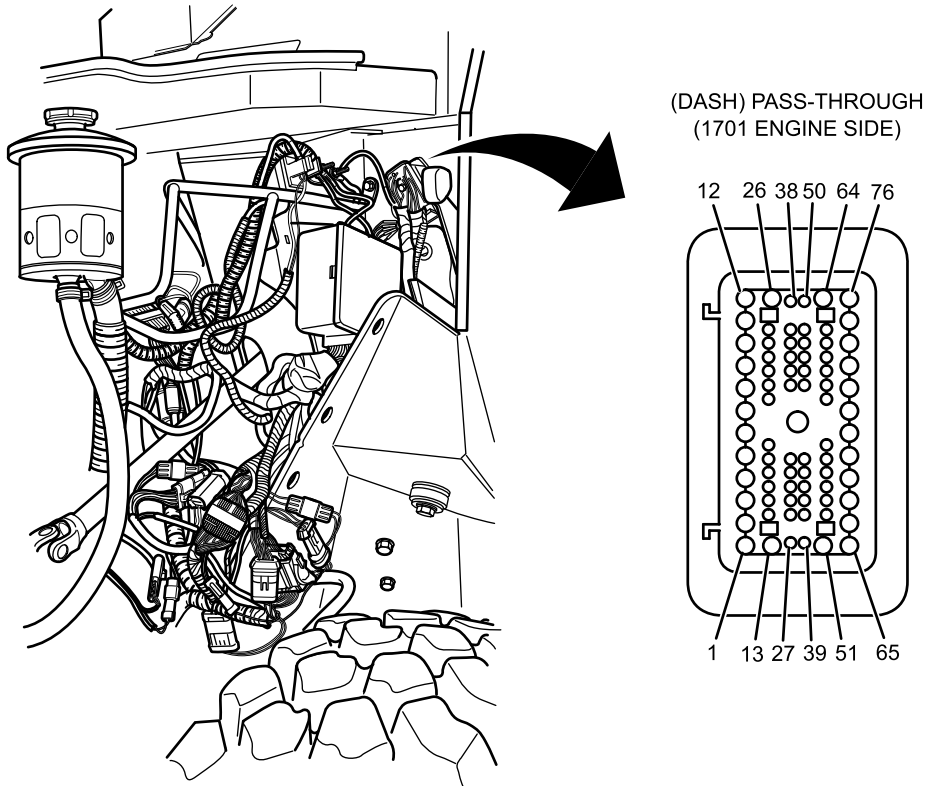


Figure 7. Left Side Firewall.

B230604025

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 113.
 YES Go to Step 112.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

18. Disconnect connector 8501 from right front ABS modulator valve. Refer to Figure 8.

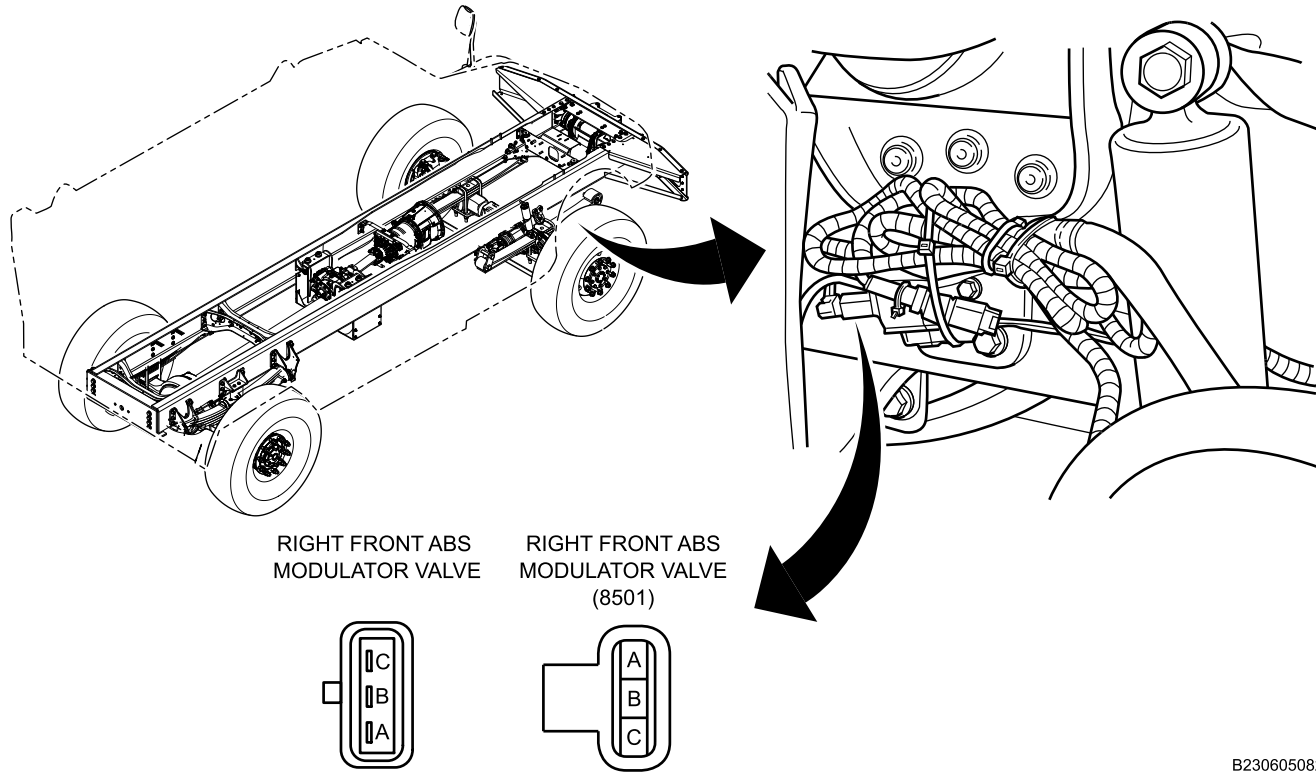


Figure 8. Outboard Left Front Frame Rail, Inboard of Left Front Wheel.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

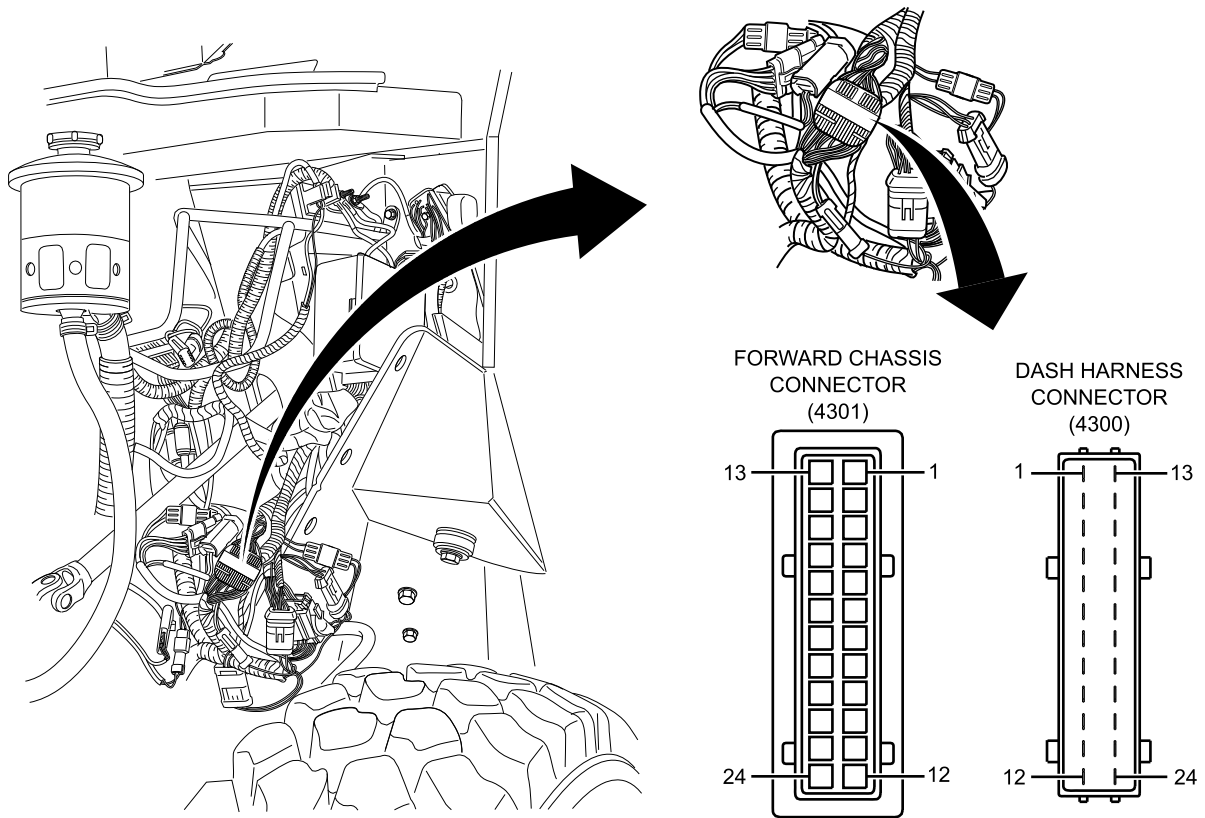
YES Go to Step 116.

NO Go to next step.

STEP

19. Remove engine air filter assembly (TM 9-2355-106-10).
20. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
21. Disconnect connector 4301/4300. Refer to Figure 9

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230603738

Figure 9. Above Frame, Inboard of Left Front Wheel.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 117.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

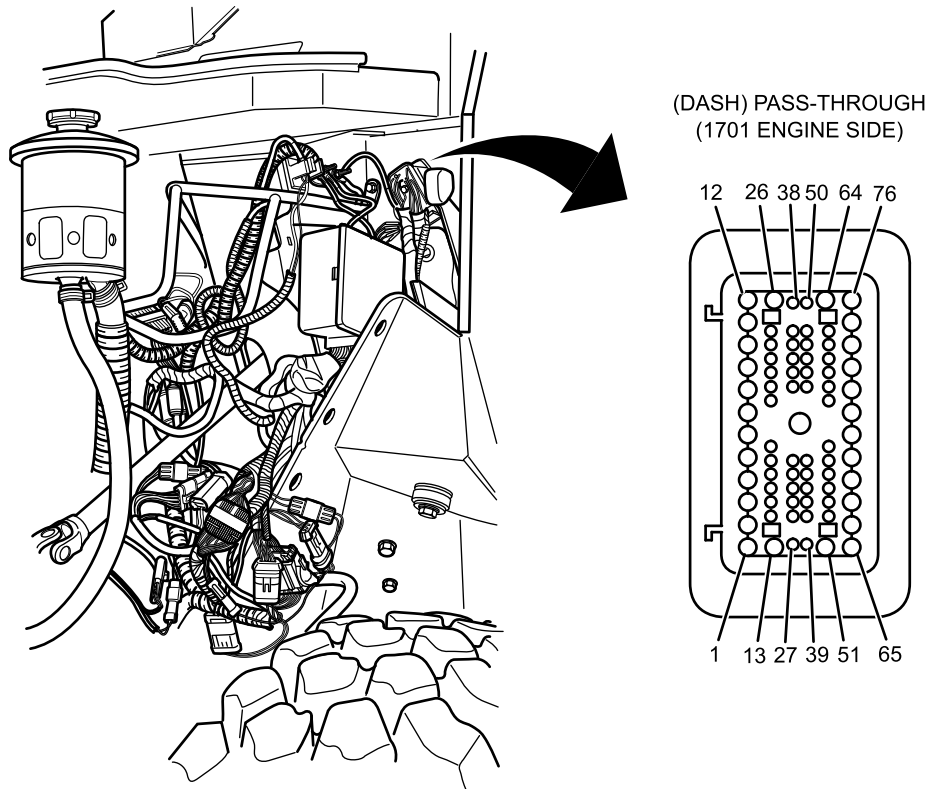


Figure 10. Left Side Firewall.

22. Disconnect connector 1701. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

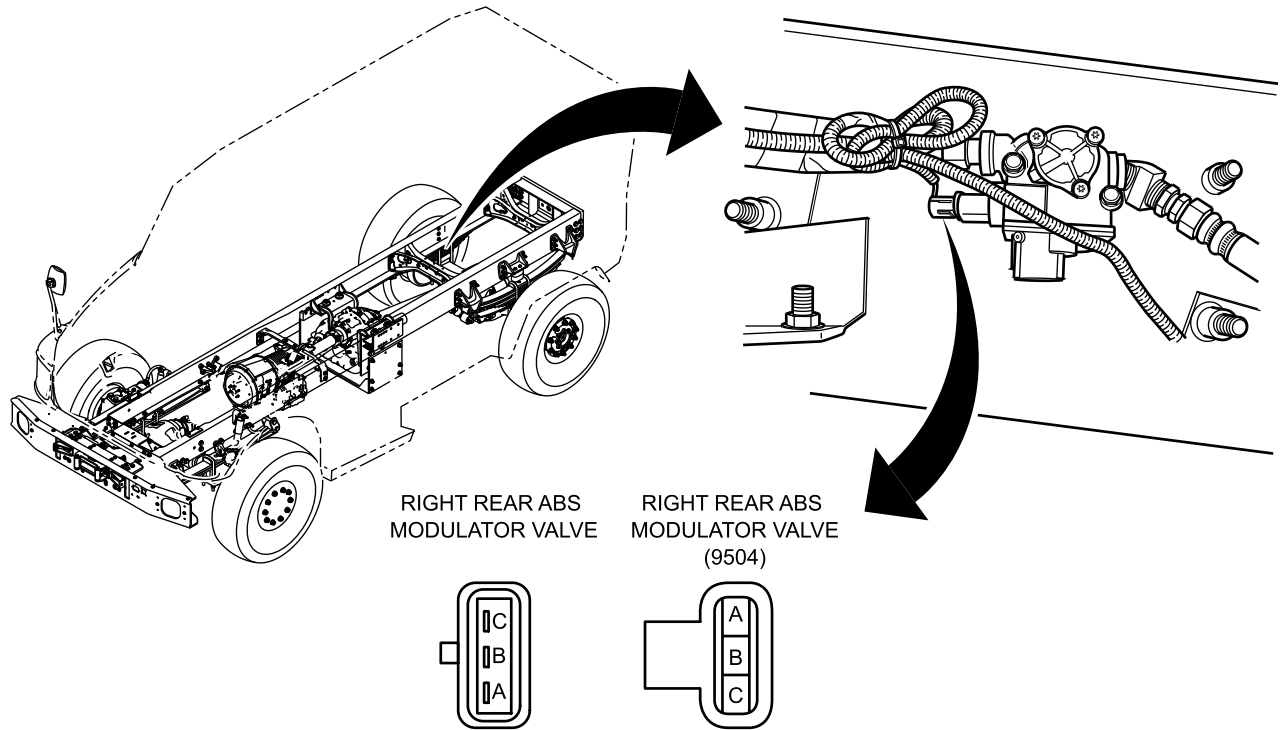
NO Go to Step 113.
 YES Go to Step 112.

B230604025

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

23. Disconnect connector 9504 from right rear ABS modulator valve. Refer to Figure 11.



B230605076

Figure 11. Inboard Right Frame Rail, Near Right Rear Wheel.

CONDITION/INDICATION

Does multimeter read OL?

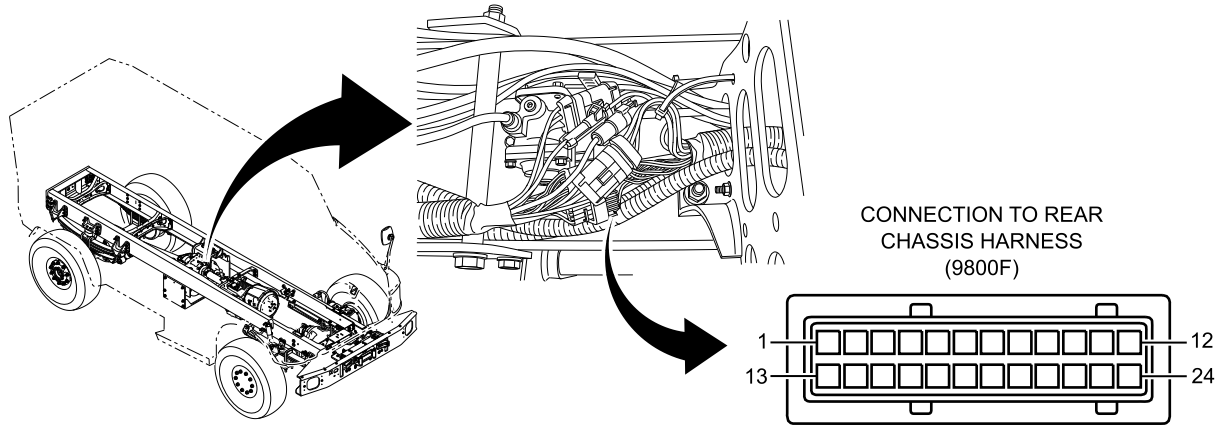
DECISION

YES Go to Step 110.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

24. Disconnect connector 9800F from connector 9800M. Refer to Figure 12.



B230605036

Figure 12. Inboard Left Frame Rail, Near Fuel Tank.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

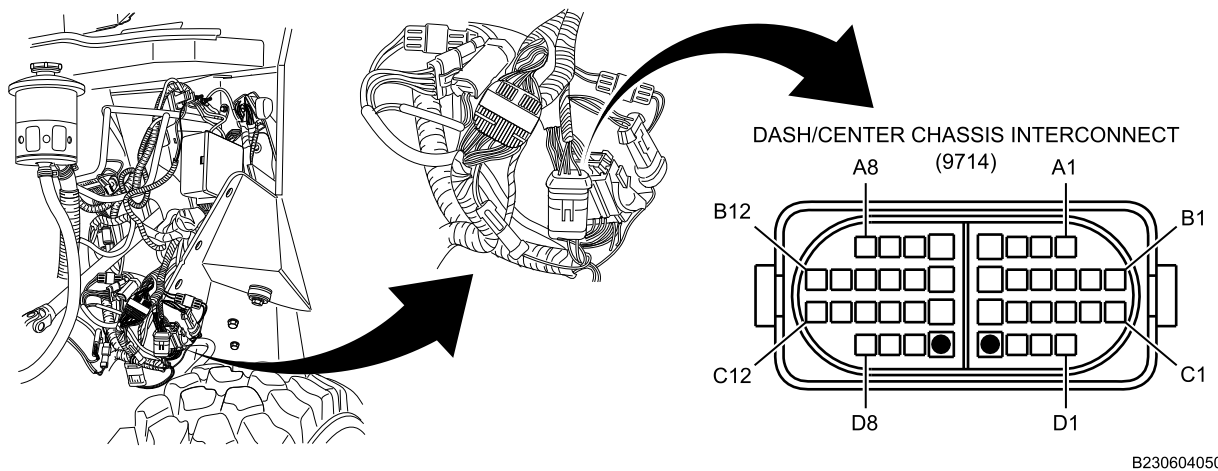
YES Go to Step 114.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

25. Remove engine air filter assembly (TM 9-2355-106-10).
26. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
27. Disconnect connector 9714/9700. Refer to Figure 13



B230604050

Figure 13. Above Frame, Inboard of Left Front Wheel.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 109.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Disconnect connector 1701. Refer to Figure 14.

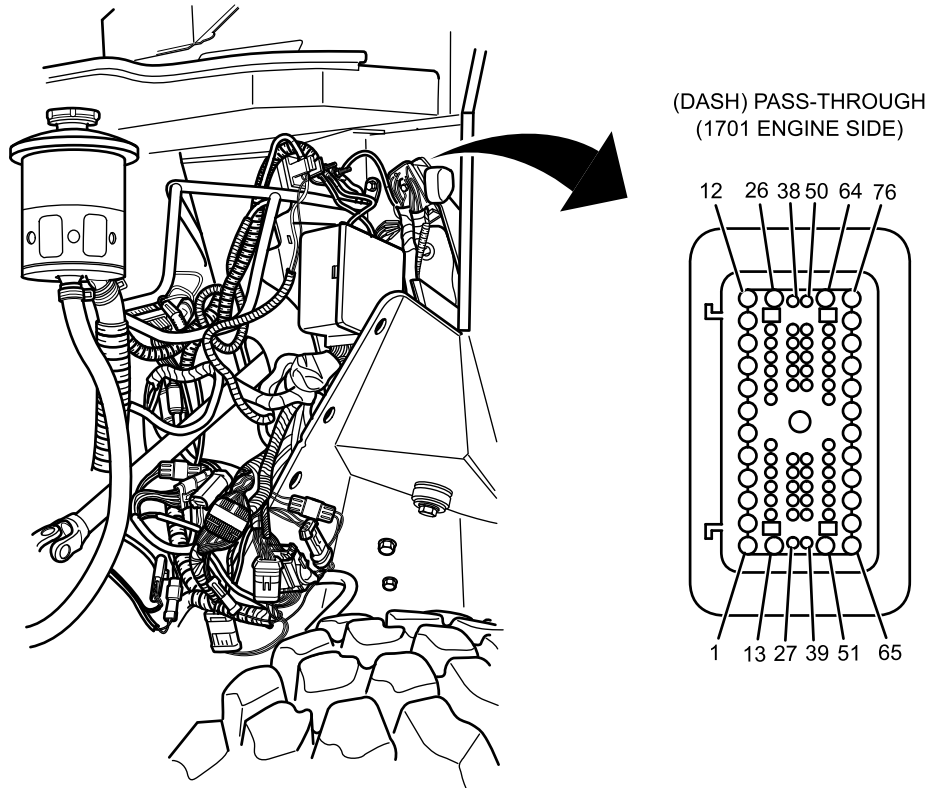


Figure 14. Left Side Firewall.

B230604025

CONDITION/INDICATION

Does multimeter read OL?

DECISION

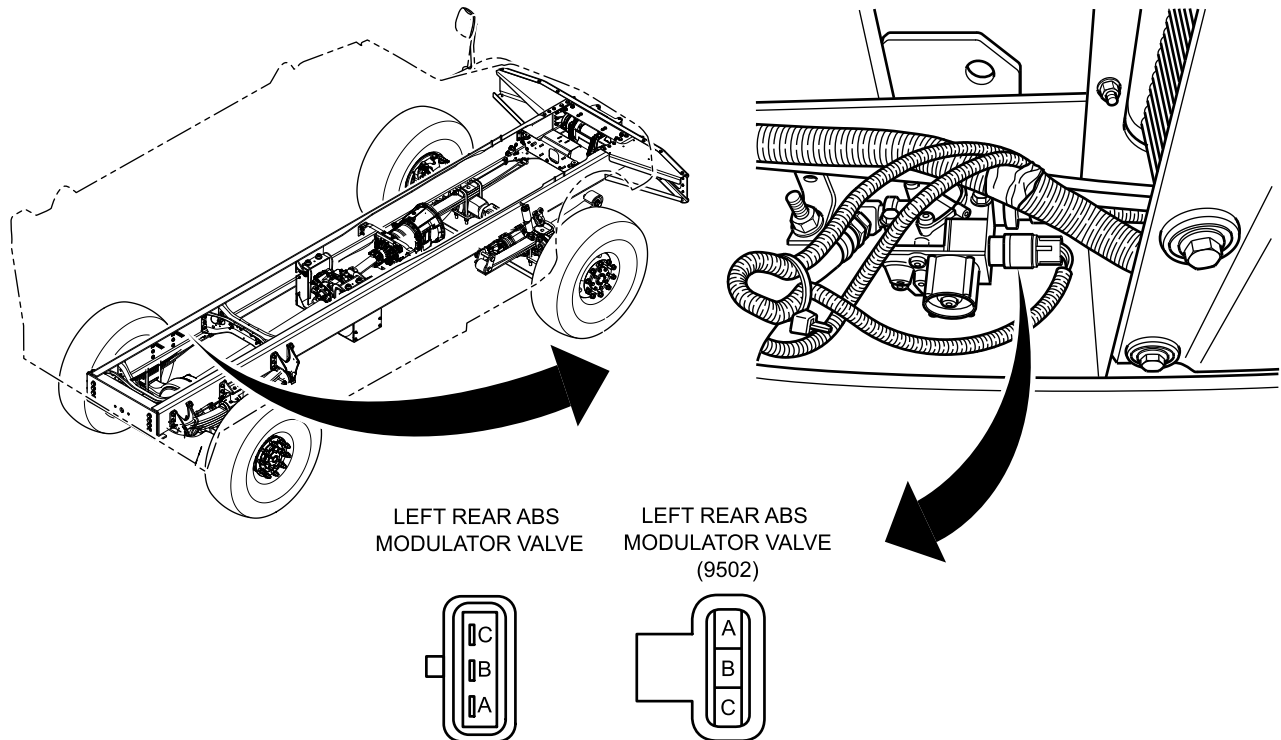
YES Go to Step 112.

NO Go to Step 113.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

29. Disconnect connector 9502 from left rear ABS modulator valve. Refer to Figure 15.



B230605077

Figure 15. Inboard Left Frame Rail, Near Left Rear Wheel.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

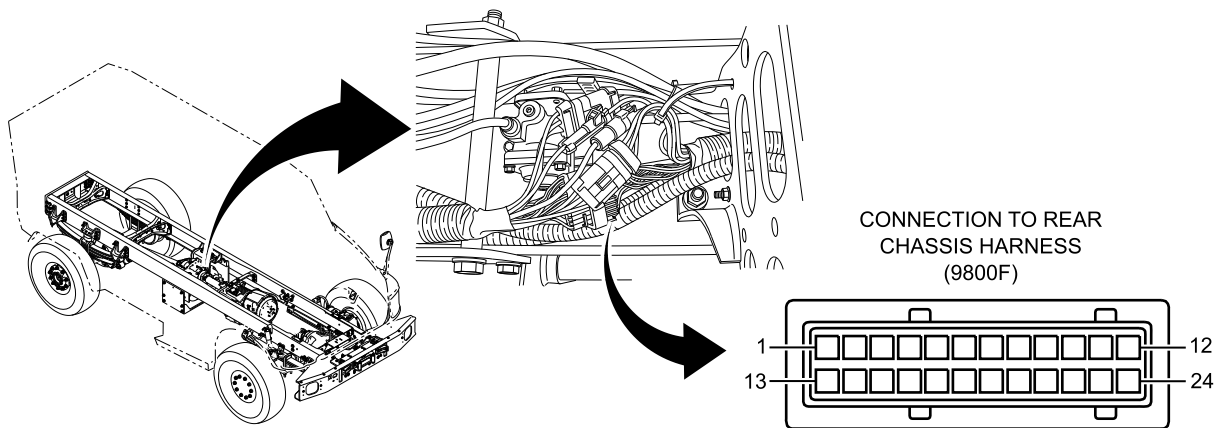
YES Go to Step 111.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

30. Disconnect connector 9800F from connector 9800M. Refer to Figure 16.



B230605036

Figure 16. Inboard Left Frame Rail, Near Fuel Tank.

CONDITION/INDICATION

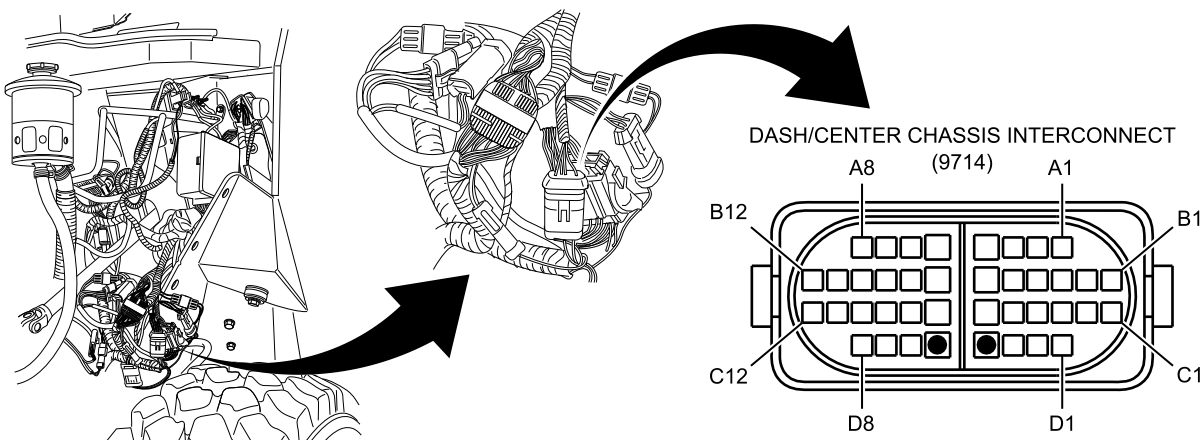
Does multimeter read OL?

DECISION

YES Go to Step 114.
NO Go to next step.

STEP

- 31. Remove engine air filter assembly (TM 9-2355-106-10).
- 32. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 33. Disconnect connector 9714/9700. Refer to Figure 17.



B230604050

Figure 17. Above Frame, Inboard of Left Front Wheel.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Does multimeter read OL?

DECISION

YES Go to Step 109.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

34. Disconnect connector 1701. Refer to Figure 18.

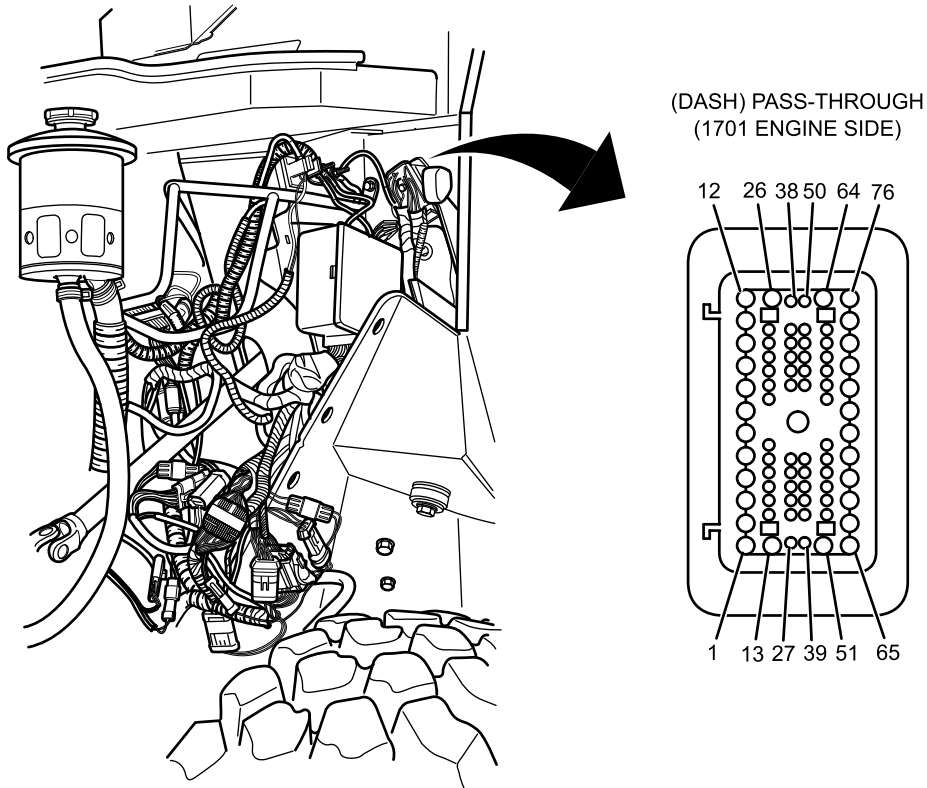


Figure 18. Left Side Firewall.

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CONDITION/INDICATION

Does multimeter read OL?

DECISION

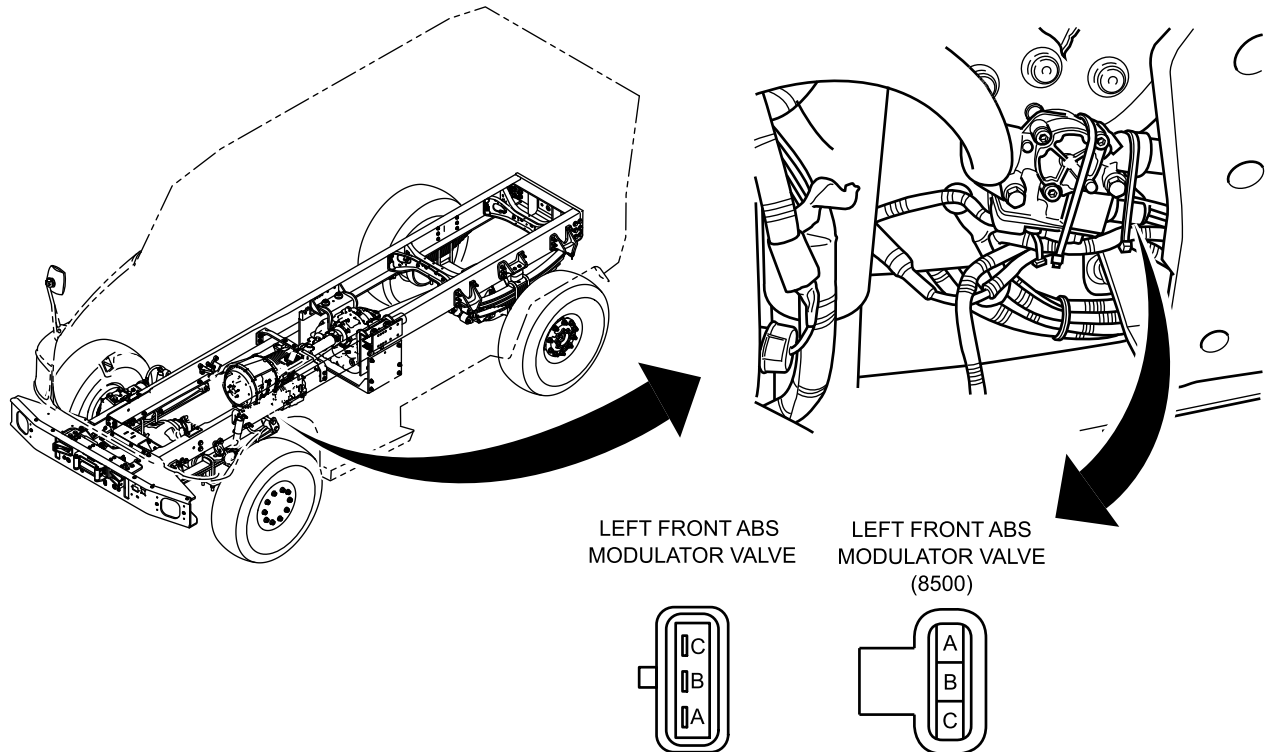
YES Go to Step 112.

NO Go to Step 113.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

35. Turn ignition switch OFF (TM 9-2355-106-10).
36. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
37. Disconnect connector 8500 from left front ABS modulator valve. Refer to Figure 19.



B230605081

Figure 19. Outboard Left Front Frame Rail, Inboard of Left Front Wheel.

38. Turn MAIN POWER switch ON (TM 9-2355-106-10).
39. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

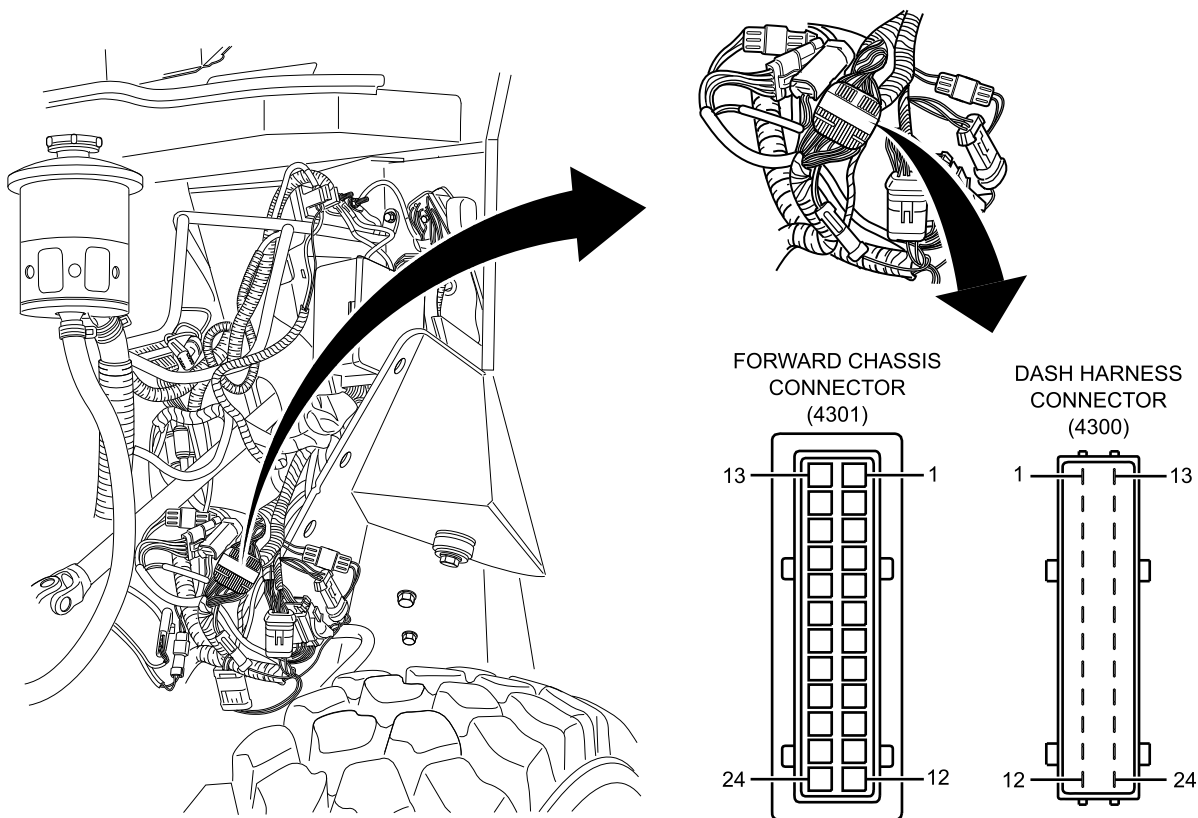
DECISION

YES Go to Step 115.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

40. Turn ignition switch OFF (TM 9-2355-106-10).
41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
42. Remove engine air filter assembly (TM 9-2355-106-10).
43. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
44. Disconnect connector 4301/4300. Refer to Figure 20.



B230603738

Figure 20. Above Frame, Inboard of Left Front Wheel.

45. Turn MAIN POWER switch ON (TM 9-2355-106-10).
46. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

YES Go to Step 117.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

47. Turn ignition switch OFF (TM 9-2355-106-10).
48. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
49. Disconnect connector 1701. Refer to Figure 21.

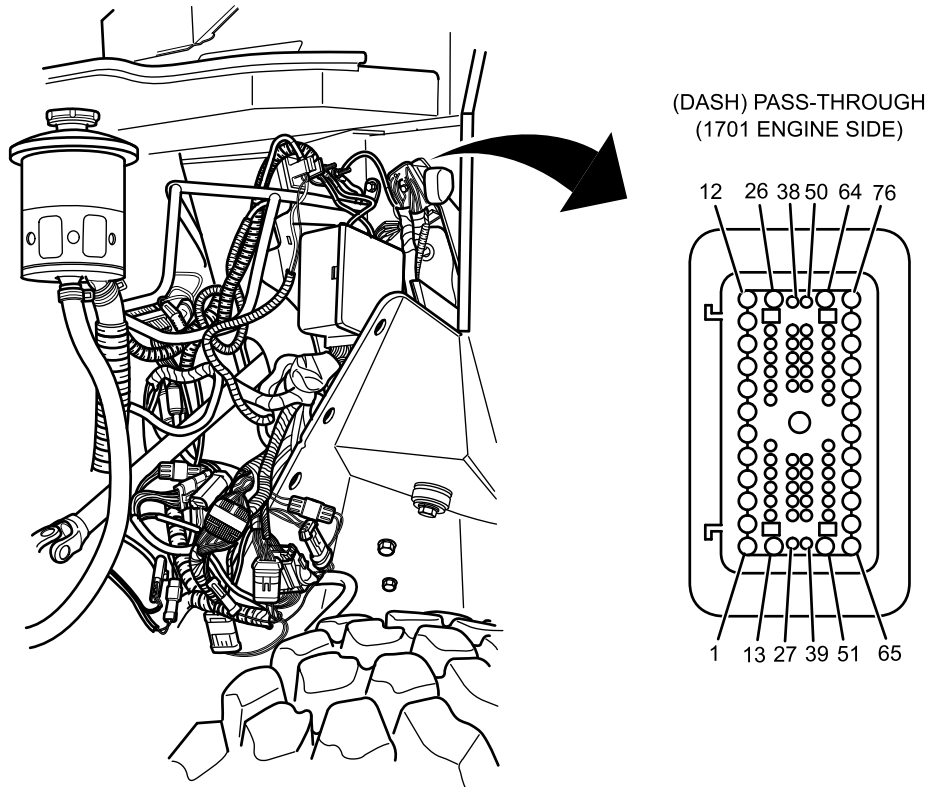


Figure 21. Left Side Firewall.

50. Measure resistance between connector 1701 (engine side) terminal 3 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 21.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

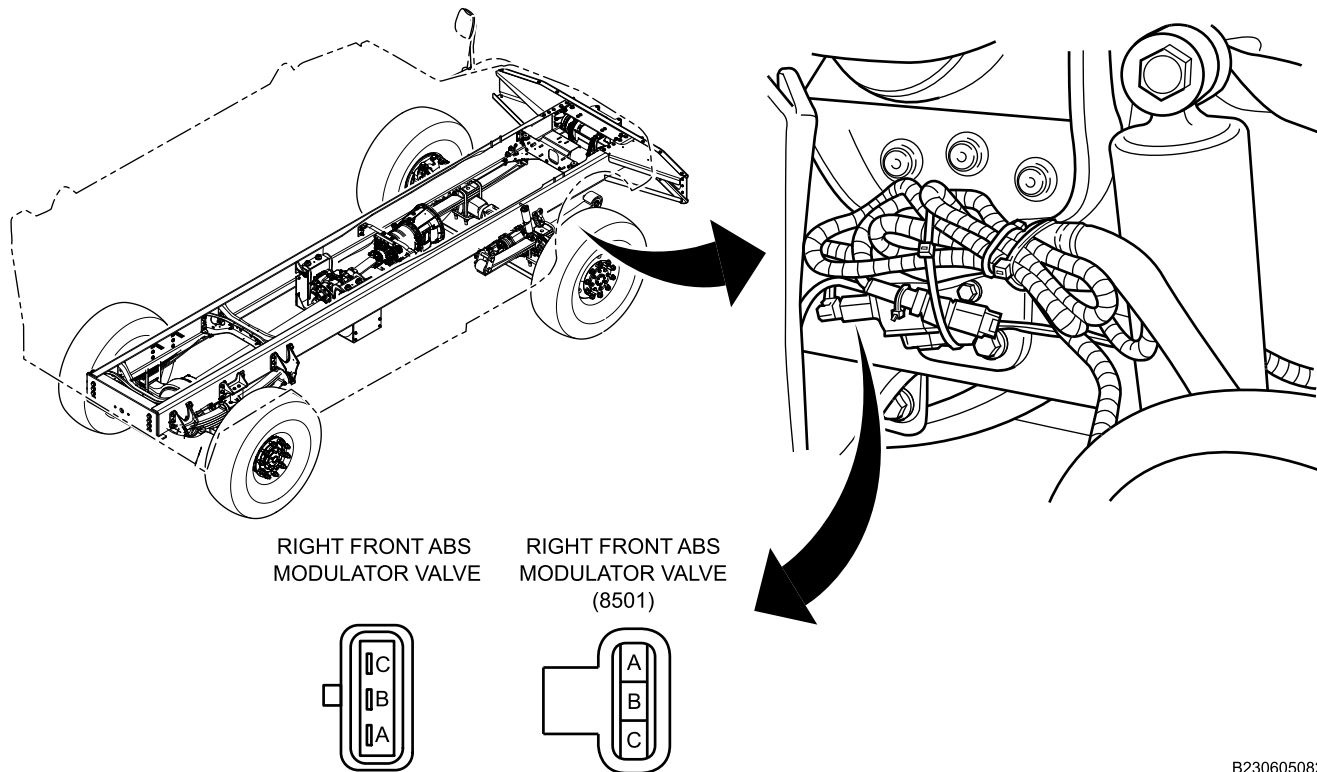
YES Go to Step 113.
NO Go to Step 112.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

51. Turn ignition switch OFF (TM 9-2355-106-10).
52. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
53. Disconnect connector 8501 from right front ABS modulator valve. Refer to Figure 22.



B230605082

Figure 22. Outboard Frame Rail, Inboard of Right Front Wheel.

54. Turn MAIN POWER switch ON (TM 9-2355-106-10).
55. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

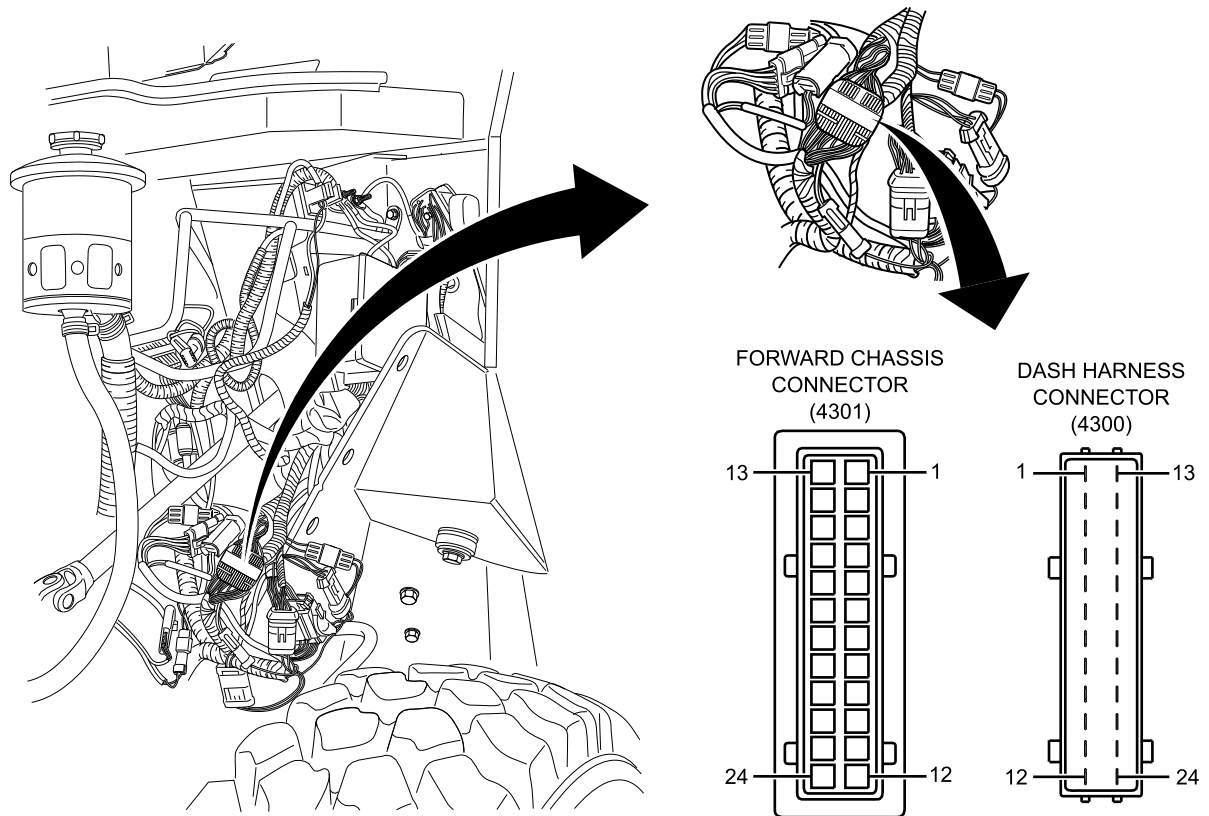
DECISION

YES Go to Step 116.
 NO Go to next step.

STEP

56. Turn ignition switch OFF (TM 9-2355-106-10).
57. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
58. Remove engine air filter assembly (TM 9-2355-106-10).
59. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
60. Disconnect connector 4301/4300. Refer to Figure 23.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230603738

Figure 23. Above Frame, Inboard of Left Front Wheel.

61. Turn MAIN POWER switch ON (TM 9-2355-106-10).
62. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

- YES Go to Step 117.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

63. Turn ignition switch OFF (TM 9-2355-106-10).
64. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
65. Disconnect connector 1701. Refer to Figure 24.

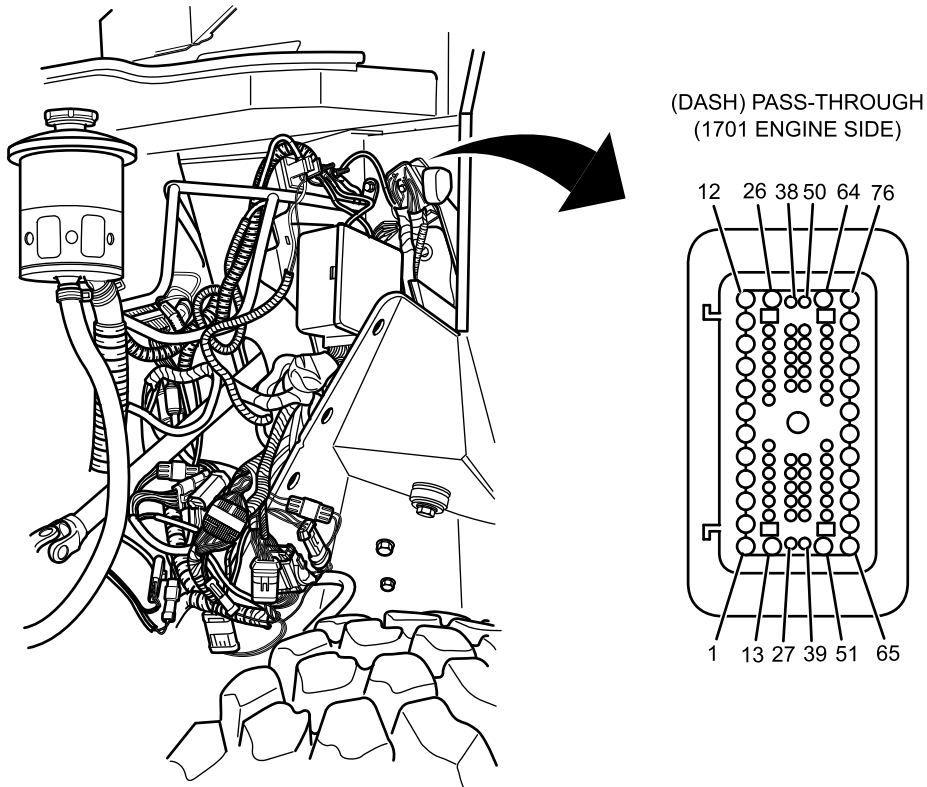


Figure 24. Left Side Firewall.

66. Measure resistance between connector 1701 (engine side) terminal 6 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

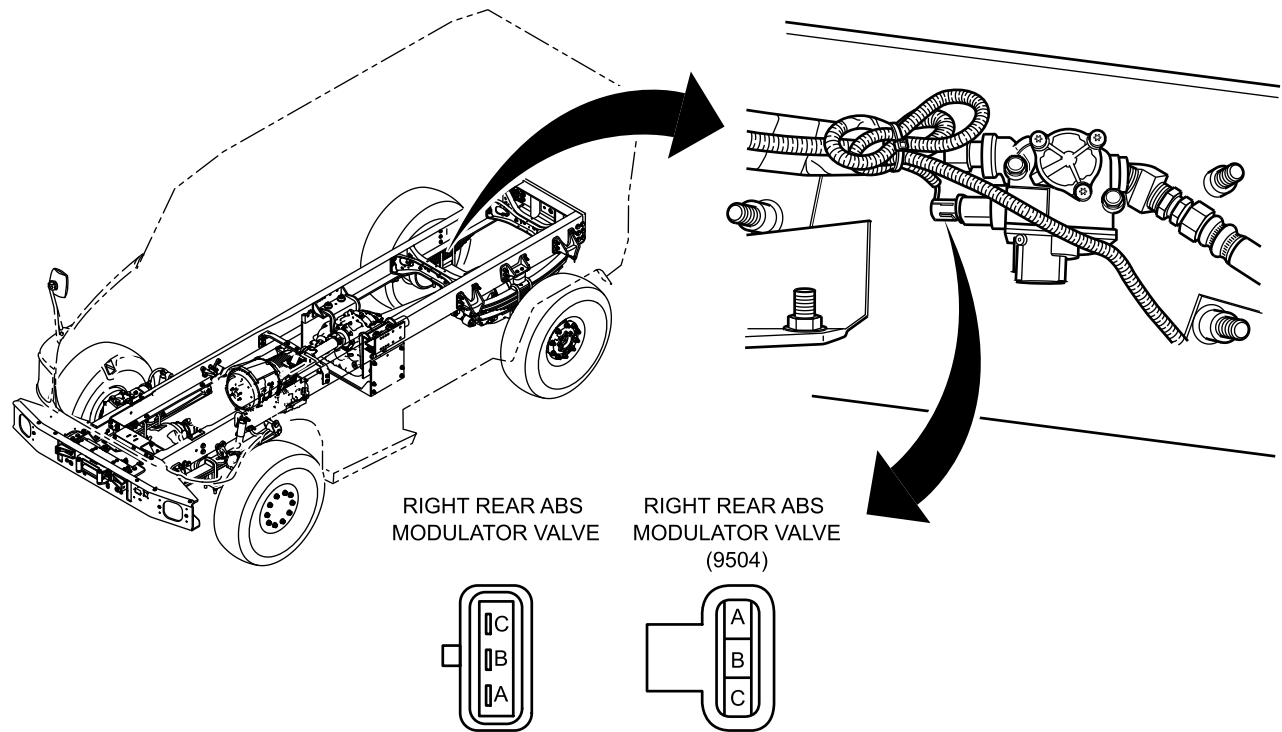
YES Go to Step 113.
 NO Go to Step 112.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

67. Turn ignition switch OFF (TM 9-2355-106-10).
68. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
69. Disconnect connector 9504 from right rear ABS modulator valve. Refer to Figure 25.



B230605076

Figure 25. Inboard Right Frame Rail, Near Right Rear Wheel.

70. Turn MAIN POWER switch ON (TM 9-2355-106-10).
71. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

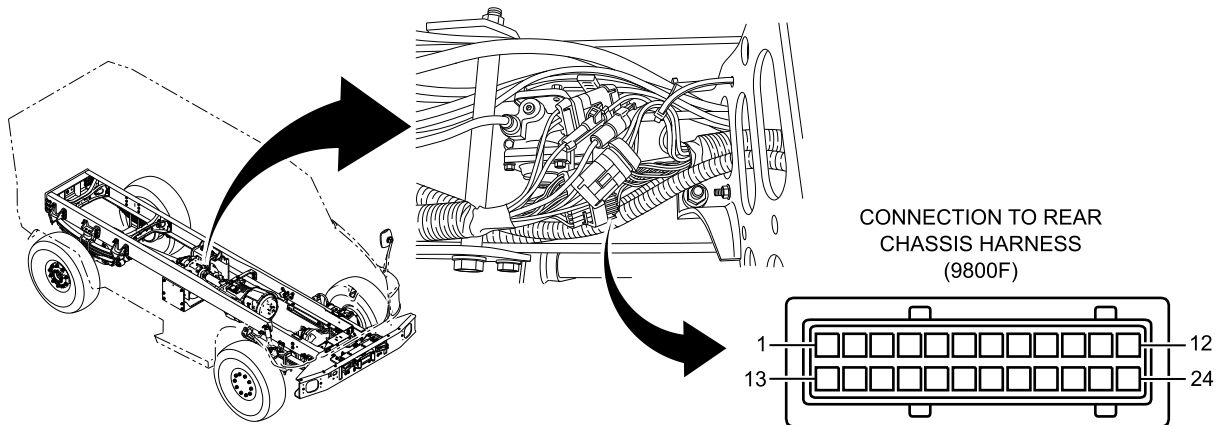
DECISION

YES Go to Step 110.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

72. Turn ignition switch OFF (TM 9-2355-106-10).
73. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
74. Disconnect connector 9800F from connector 9800M. Refer to Figure 26.



B230605036

Figure 26. Inboard Left Frame Rail, Near Fuel Tank.

75. Turn MAIN POWER switch ON (TM 9-2355-106-10).
76. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

YES Go to Step 114.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

77. Turn ignition switch OFF (TM 9-2355-106-10).
78. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
79. Remove engine air filter assembly (TM 9-2355-106-10).
80. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
81. Disconnect connector 9714/9700. Refer to Figure 27.

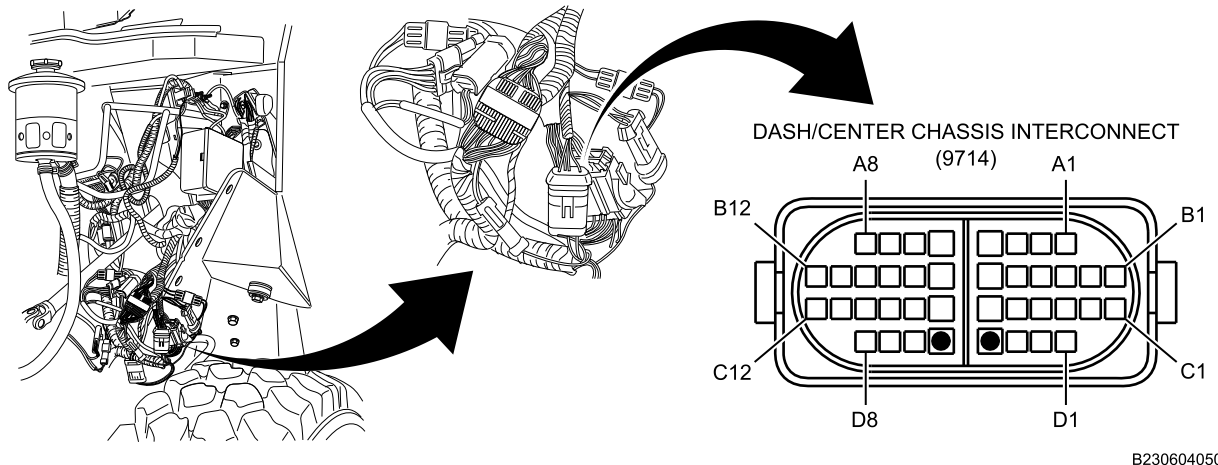


Figure 27. Above Frame, Inboard of Left Front Wheel.

82. Turn MAIN POWER switch ON (TM 9-2355-106-10).
83. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

YES Go to Step 109.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 84. Turn ignition switch OFF (TM 9-2355-106-10).
- 85. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 86. Disconnect connector 1701. Refer to Figure 28.

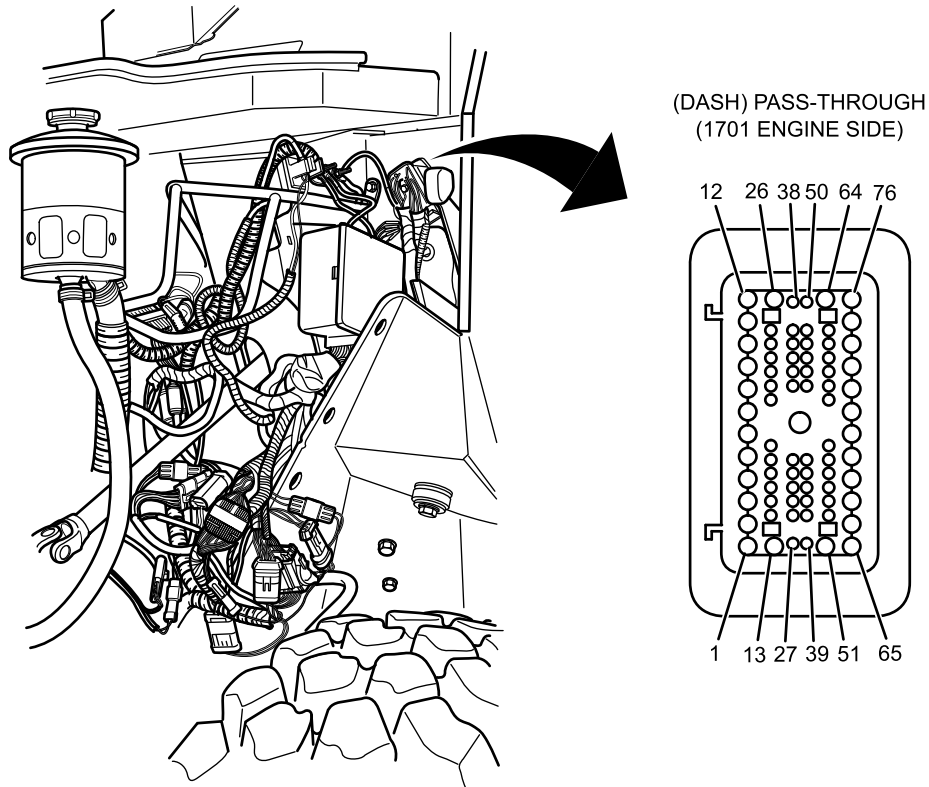


Figure 28. Left Side Firewall.

- 87. Measure resistance between connector 1701 (engine side) terminal 9 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 28.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

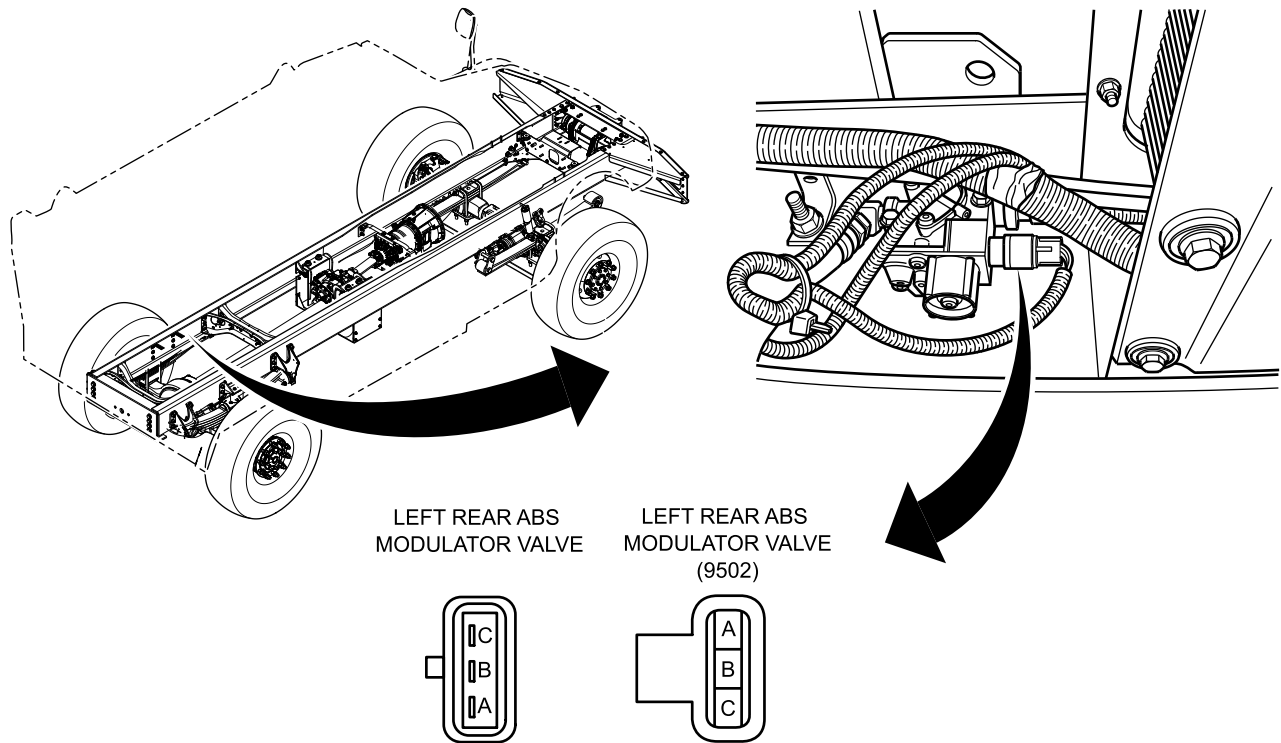
NO Go to Step 112.
 YES Go to Step 113.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

88. Turn ignition switch OFF (TM 9-2355-106-10).
89. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
90. Disconnect connector 9502 from left rear ABS modulator valve. Refer to Figure 29.



B230605077

Figure 29. Inboard Left Frame Rail, Near Left Rear Wheel.

91. Turn MAIN POWER switch ON (TM 9-2355-106-10).
92. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

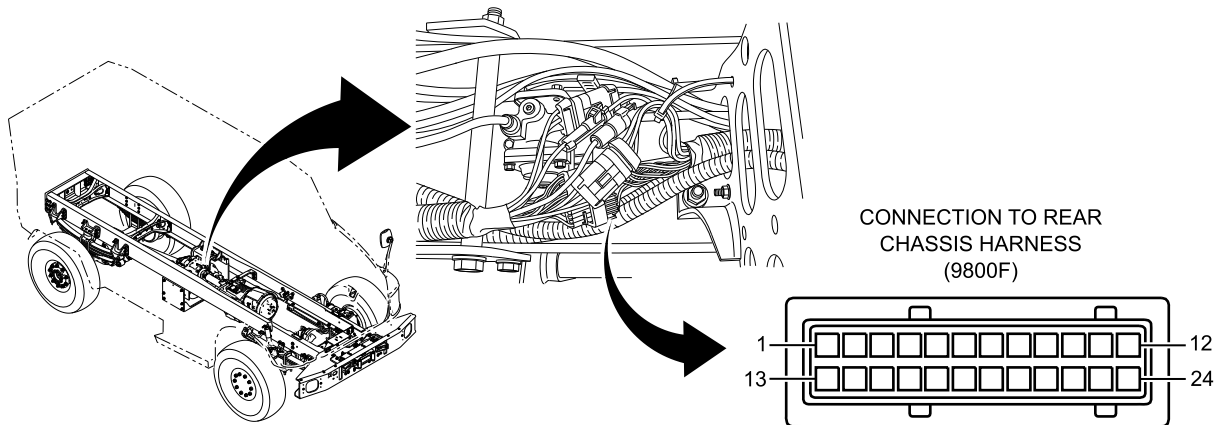
DECISION

YES Go to Step 111.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

93. Turn ignition switch OFF (TM 9-2355-106-10).
94. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
95. Disconnect connector 9800F from connector 9800M. Refer to Figure 30.



B230605036

Figure 30. Inboard Left Frame Rail, Near Fuel Tank.

96. Turn MAIN POWER switch ON (TM 9-2355-106-10).
97. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

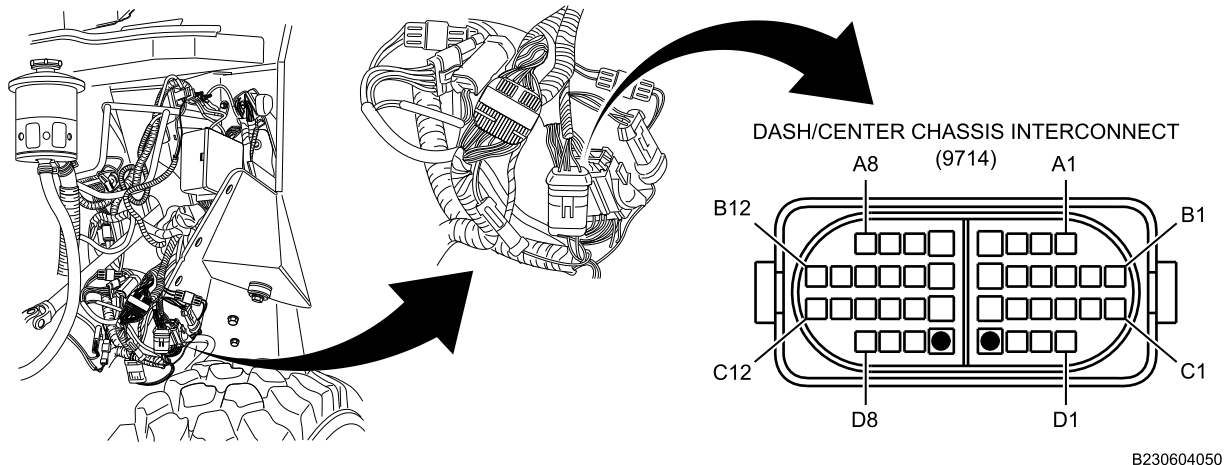
DECISION

YES Go to Step 114.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

98. Turn ignition switch OFF (TM 9-2355-106-10).
99. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
100. Remove engine air filter assembly (TM 9-2355-106-10).
101. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
102. Disconnect connector 9714/9700. Refer to Figure 31.



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Figure 31. Above Frame, Inboard of Left Front Wheel.

103. Turn MAIN POWER switch ON (TM 9-2355-106-10).
104. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

YES Go to Step 109.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

105. Turn ignition switch OFF (TM 9-2355-106-10).
106. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
107. Disconnect connector 1701. Refer to Figure 32.

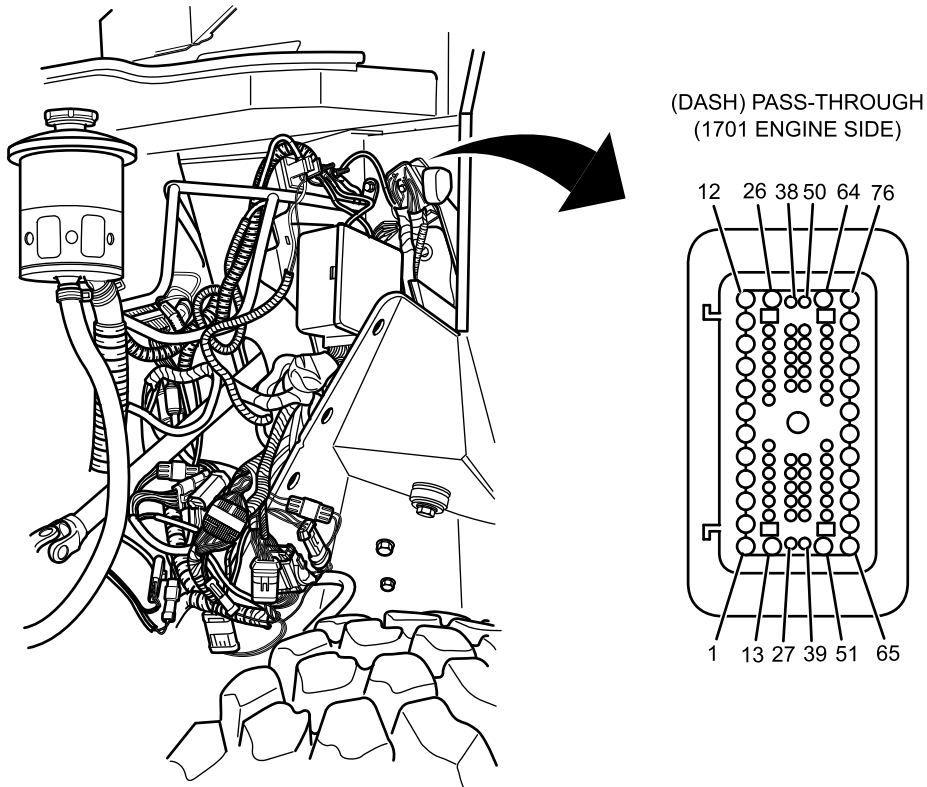


Figure 32. Left Side Firewall.

108. Measure resistance between connector 1701 (engine side) terminal 12 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 32.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 112.
 YES Go to Step 113.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 109. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 110. Right rear modulator valve is faulty.

ACTION

Replace right rear modulator valve. Refer to Rear Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0511). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 111. Left rear modulator valve is faulty.

ACTION

Replace left rear modulator valve. Refer to Rear Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0511). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 112. Power Distribution Center (PDC) harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 113. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Replacement (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 114. Rear chassis harness is faulty.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) COMMON CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****ACTION**

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 115. Left front modulator valve is faulty.

ACTION

Replace left front modulator valve. Refer to Front Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0507). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 116. Right front modulator valve is faulty.

ACTION

Replace right front modulator valve. Refer to Front Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0507). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 117. Forward chassis harness is faulty.

ACTION

Replace forward chassis harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 118. Antilock Brake System (ABS) control module is faulty.

ACTION

Replace ABS control module. Refer to Antilock Brake System (ABS) Control Module Removal and Installation (WP 0355). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal test kit (WP 0795, Item 122)

WP 0405

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0257
WP 0333
WP 0335
WP 0336
WP 0337
WP 0405
WP 0406
WP 0453
WP 0454

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 17
WP 0789, Figure 68
WP 0789, Figure 72
WP 0789, Figure 73

This procedure covers the following symptom and Diagnostic Trouble Codes (DTCs):

- No Communication with Transmission Control Module (TCM)
- 639 14 2 240
- 639 14 5 240
- P0880
- P0881
- P0882
- P0883

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**TROUBLESHOOTING PROCEDURE****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.

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

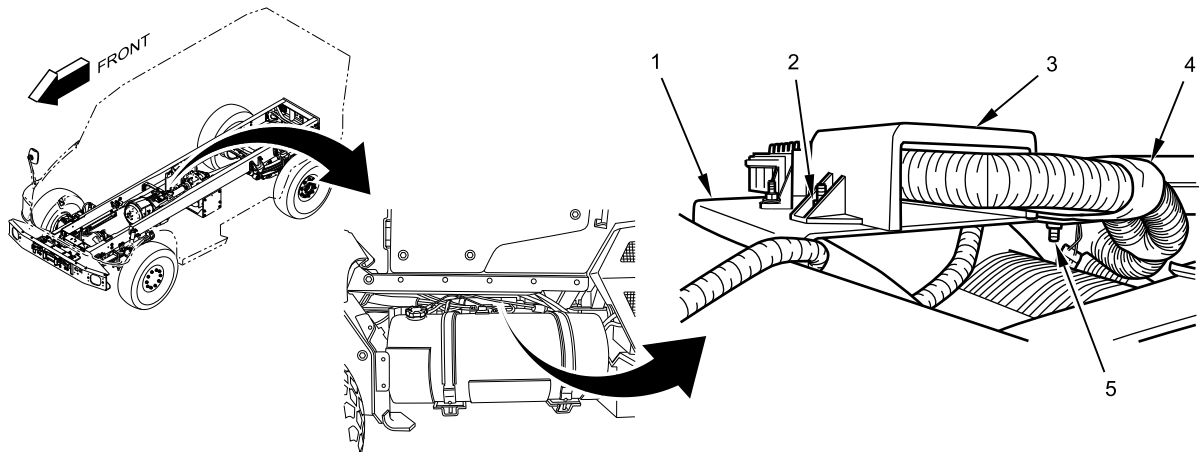
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

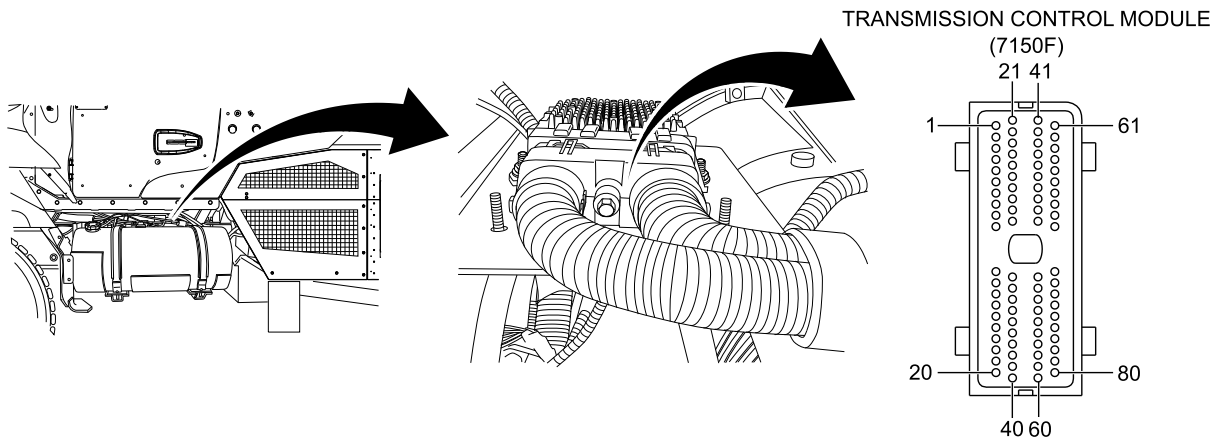
1. Remove two nuts (Figure 1, Item 2) and transmission control unit cover (Figure 1, Item 3) from transmission control unit brace (Figure 1, Item 1).



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Figure 1. Transmission Control Unit Cover.

2. Remove nut and bolt (Figure 1, Item 5) from harness support retainer (Figure 1, Item 4) on transmission control unit brace (Figure 1, Item 1).
3. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



B230704263

Figure 2. Left Side Frame Rail.

4. Turn ignition switch ON (TM 9-2355-106-10).
5. Turn MAIN POWER switch ON (TM 9-2355-106-10).
6. Measure DC voltage between connector 7150F terminal 63 and ground with multimeter. Refer to Figure 2.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 35.
YES Go to next step.

STEP

7. Measure DC voltage between ground and connector 7150F terminals 70 and 10 with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V for both tests?

DECISION

YES Go to Step 10.
NO Go to next step.

STEP

8. Refer to results from Step 7.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V for either test?

DECISION

YES Go to Step 52.
NO Go to next step.

STEP

9. Check Trans ECU Feed 10A fuse. Refer to Figure 3. Refer to Engine Control Module (ECM) and Transmission Control Module (TCM) Clean Power Fuse Removal and Installation (WP 0412).

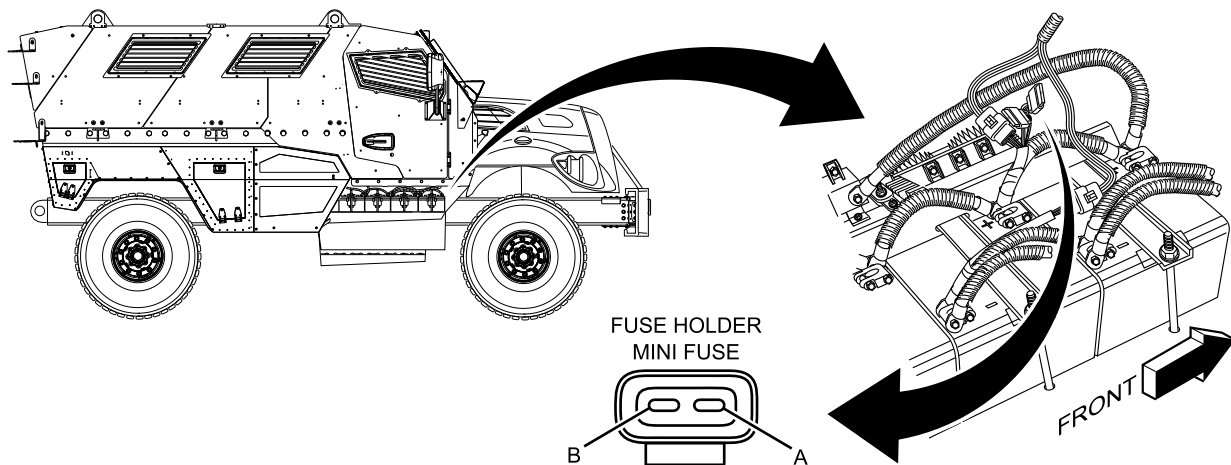


Figure 3. Battery Compartment.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Is fuse good?

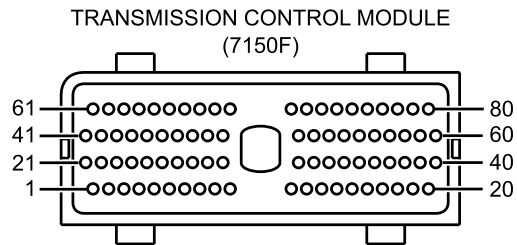
DECISION

YES Go to Step 14.

NO Go to Step 19.

STEP

10. Turn ignition switch OFF (TM 9-2355-106-10).
11. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
12. Measure resistance between ground and connector 7150F terminals 69 and 9 with multimeter. Refer to Figure 4.



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Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for both tests?

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 31.
 NO Go to next step.

STEP

13. Refer to results from Step 12.

CONDITION/INDICATION

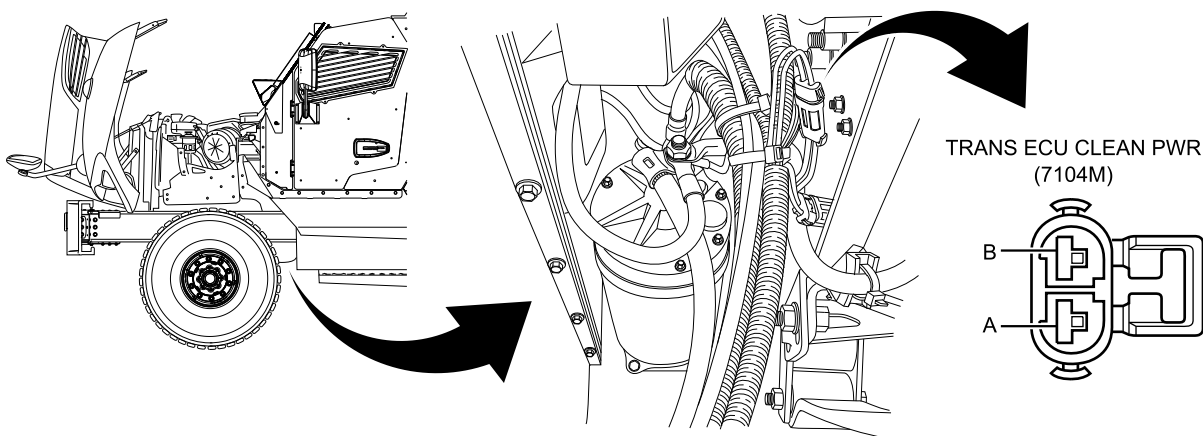
Does multimeter read less than 5 ohms for either test?

DECISION

NO Go to Step 27.
 YES Go to Step 52.

STEP

14. Disconnect connector 7104M. Refer to Figure 5.



B230604978

Figure 5. Starter Motor Area.

15. Install Trans ECU Feed 10A fuse. Refer to Engine Control Module (ECM) and Transmission Control Module (TCM) Clean Power Fuse Removal and Installation (WP 0412).
16. Turn MAIN POWER switch ON (TM 9-2355-106-10).
17. Turn ignition switch ON (TM 9-2355-106-10).
18. Measure DC voltage between connector 7104M terminal A and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

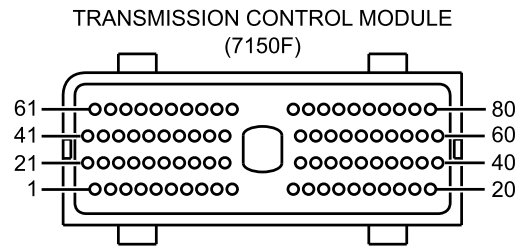
Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 52.
 NO Go to Step 26.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

19. Turn ignition switch OFF (TM 9-2355-106-10).
20. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
21. Disconnect connector 7104M. Refer to Figure 5.
22. Measure resistance between connector 7150F terminal 70 and ground with multimeter. Refer to Figure 6.



B230603836

Figure 6. Connector 7150F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 52.
 YES Go to next step.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

23. Disconnect connector 9261M from 9261F. Refer to Figure 7.

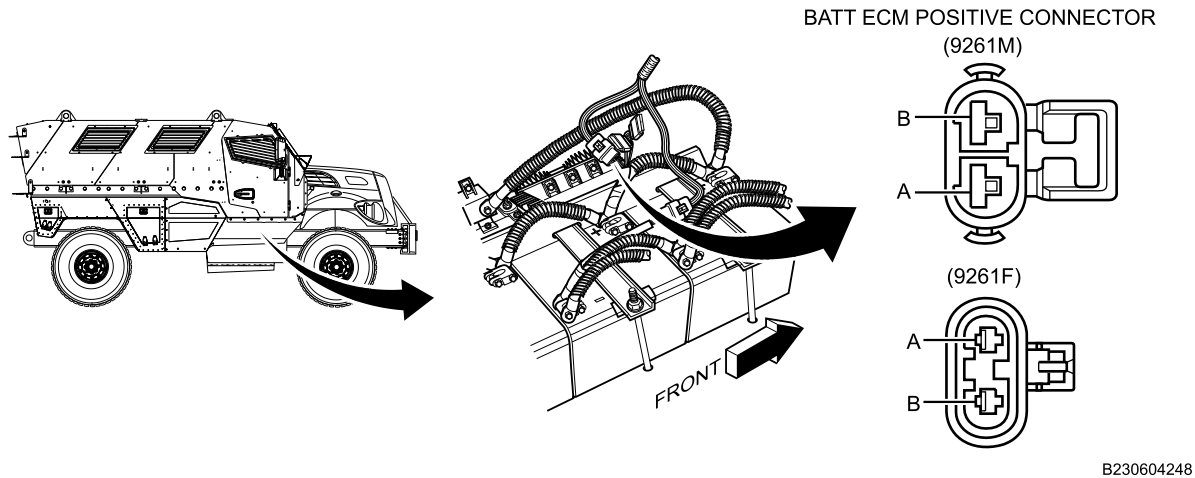


Figure 7. Battery Box Compartment.

24. Measure resistance between connector 9261M terminal B and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 50.
YES Go to next step.

STEP

25. Measure resistance between connector 9261F terminal B and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 49.
YES Go to Step 51.

STEP

26. Measure DC voltage between connector 9261F terminal B and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 50.
NO Go to Step 49.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

27. Disconnect connector 7104M/7104F. Refer to Figure 8.

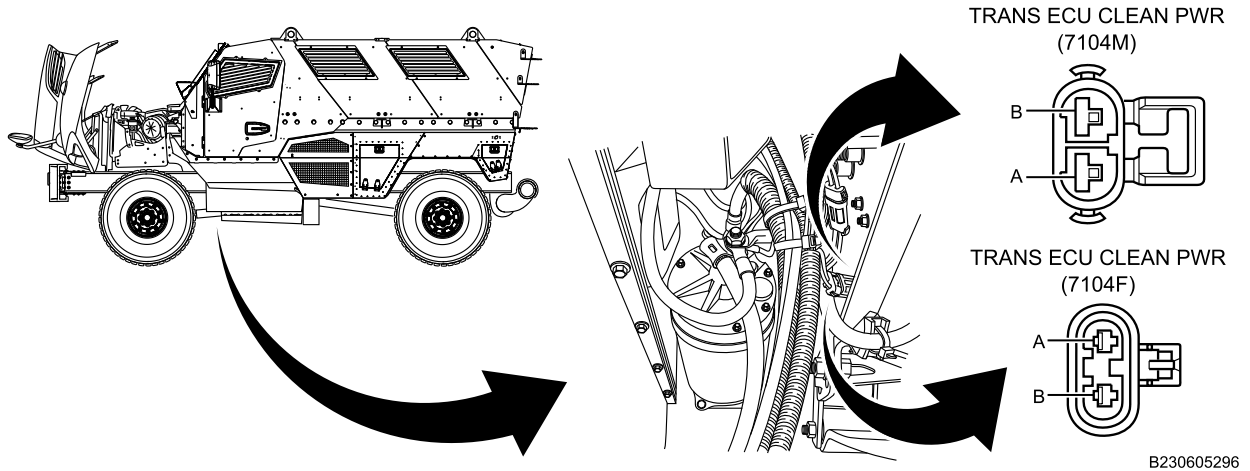


Figure 8. Left Side of Engine Starter Area.

28. Measure resistance between connector 7104M terminal B and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

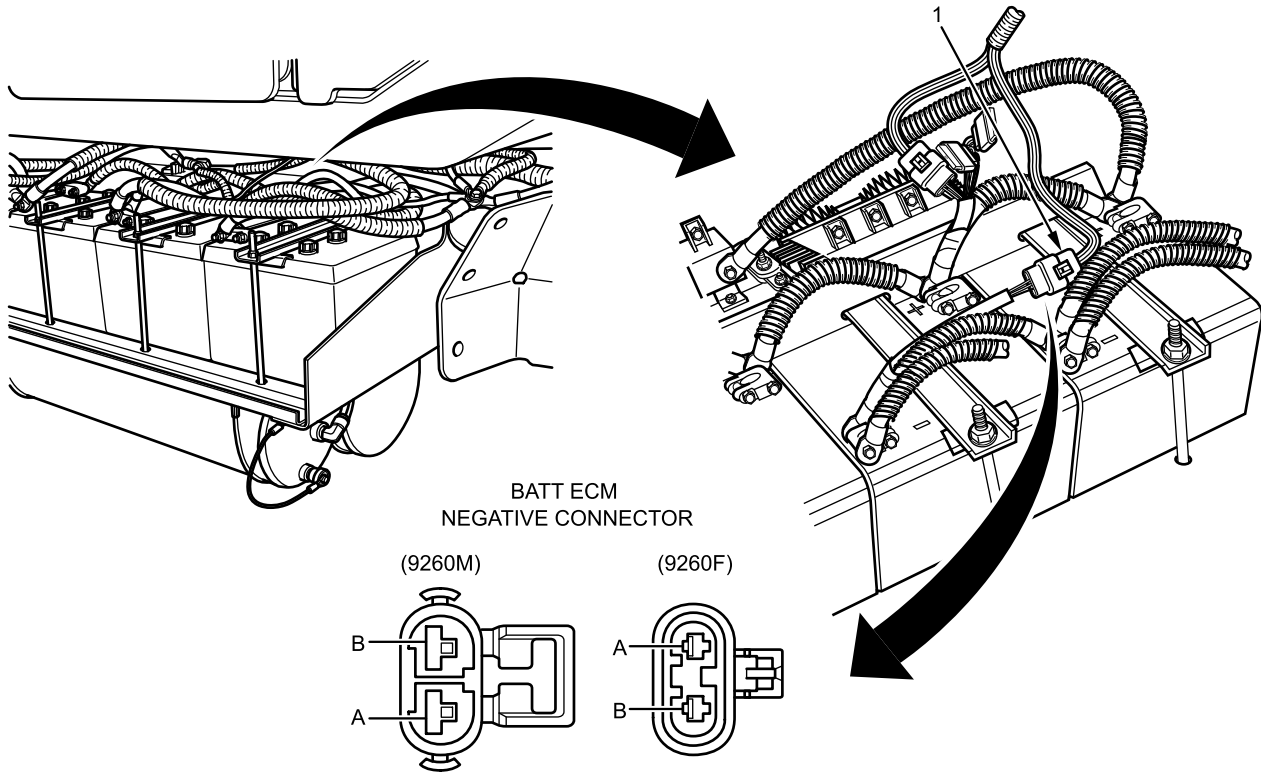
YES Go to Step 52.

NO Go to next step.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

29. Disconnect connector 9260M/9260F. Refer to Figure 9.



B230604249

Figure 9. Battery Compartment.

30. Measure resistance between connector 9260M terminal B and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

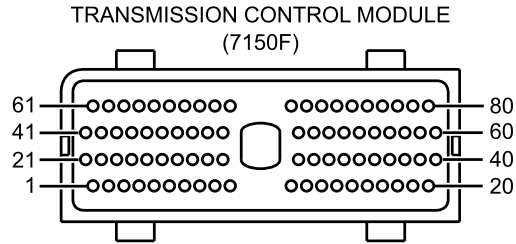
DECISION

NO Go to Step 48.
 YES Go to Step 50.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

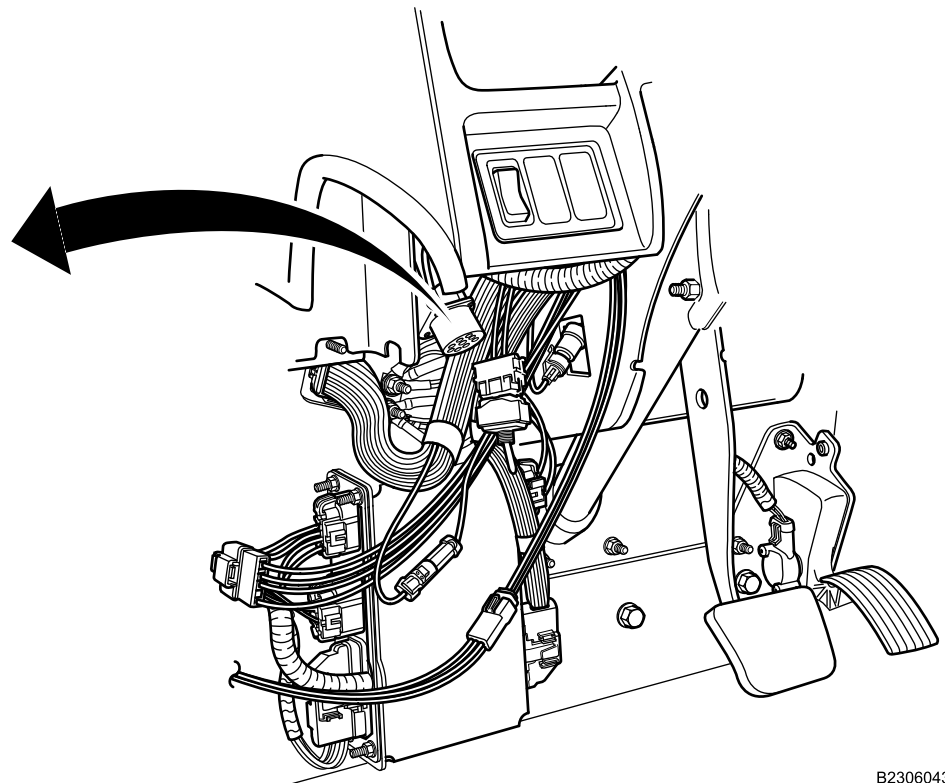
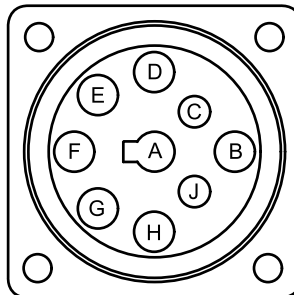
31. Turn ignition switch OFF (TM 9-2355-106-10).
32. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
33. Measure resistance between connector 7150F terminal 8 and connector 1650 terminal C with multimeter. Refer to Figure 10 and Figure 11.



B230603836

Figure 10. Connector 7150F.

DIAGNOSTIC CONNECTOR
(1650)



B230604302

Figure 11. Under Left Side of Dash.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 52.
YES Go to next step.

STEP

34. Measure resistance between connector 7150F terminal 28 and connector 1650 terminal D with multimeter.
Refer to Figure 10 and Figure 11.

CONDITION/INDICATION

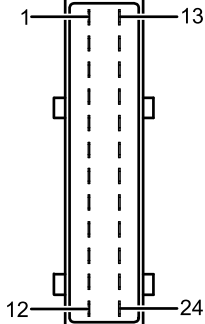
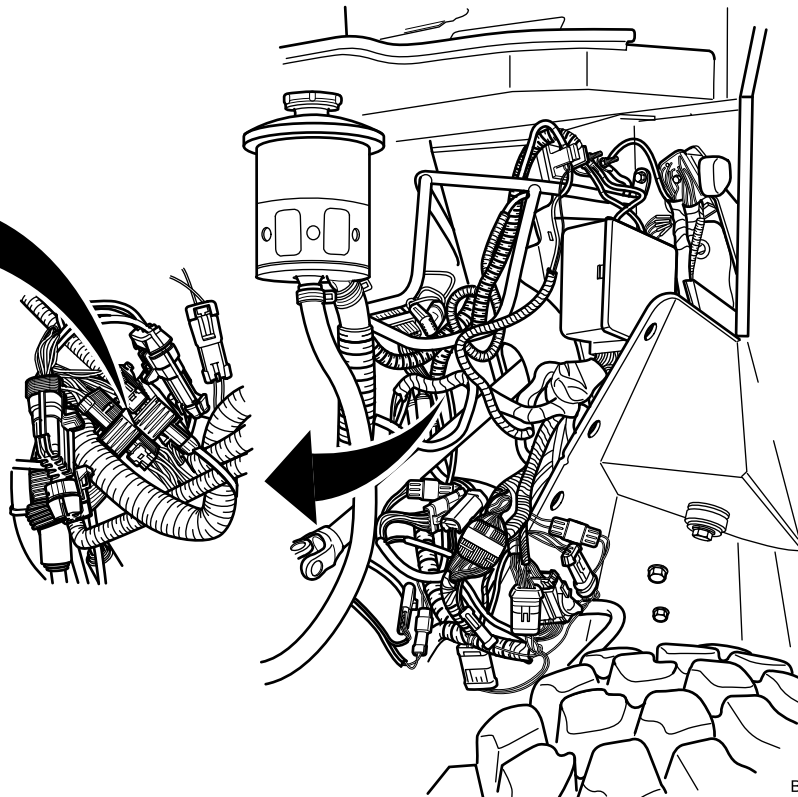
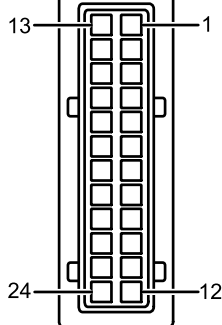
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 52.
YES Go to Step 51.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

35. Remove air filter housing. Refer to Air Cleaner Assembly Removal and Installation (WP 0257).
 36. Disconnect 3-wire connector 4705F1/4705F2. Refer to Figure 12.

DASH/XMSN CONNECTOR
(4705F1)DASH/XMSN CONNECTOR
(4705F2)

B230604445

Figure 12. Dash Harness.

37. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 38. Turn ignition switch ON (TM 9-2355-106-10).
 39. Measure DC voltage between connector 4705F1 terminal 12 and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

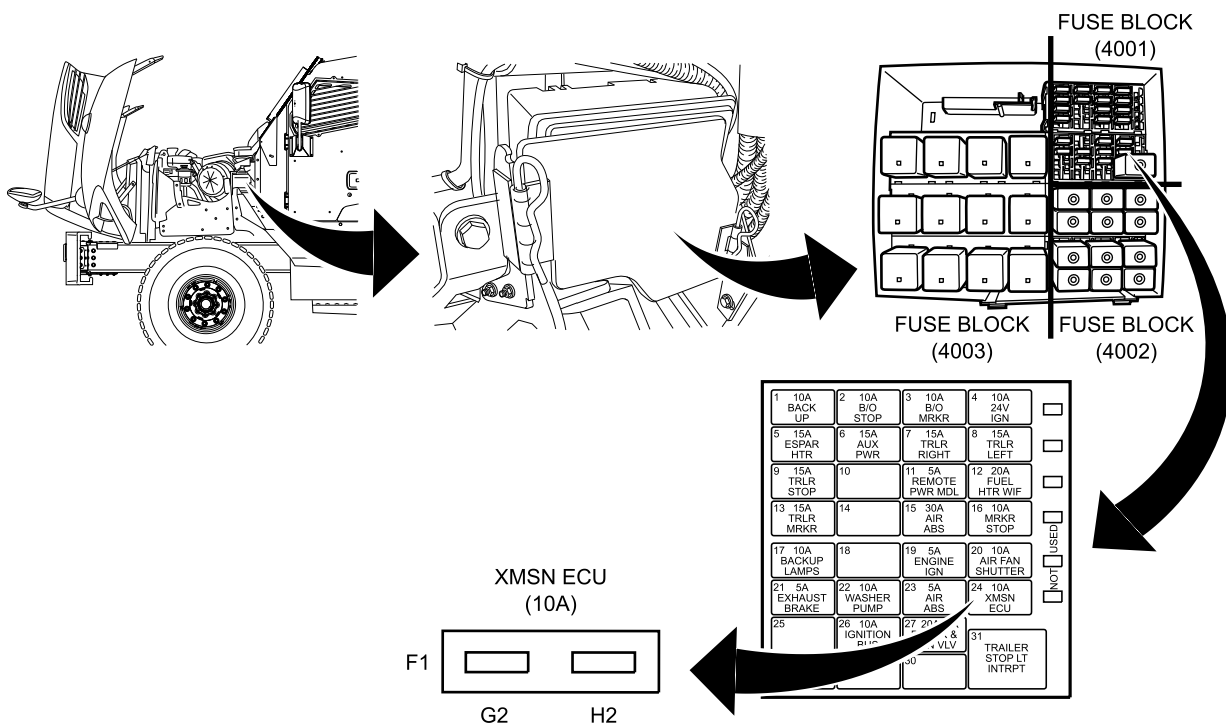
DECISION

YES Go to Step 52.
 NO Go to next step.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 40. Turn ignition switch OFF (TM 9-2355-106-10).
- 41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 42. Remove 10A XMSN ECU fuse. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 13.



B230605394

Figure 13. Fuse Block Under Hood.

CONDITION/INDICATION

Is fuse good?

DECISION

- NO Go to Step 46.
- YES Go to next step.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 43. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 44. Turn ignition switch ON (TM 9-2355-106-10).
- 45. With 10A XMSN ECU fuse removed, measure DC voltage between terminal socket G2 and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

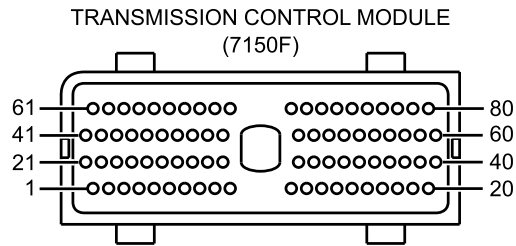
Does multimeter read between 10.5V and 13.5V?

DECISION

- NO Go to Step 54.
- YES Go to Step 53.

STEP

- 46. Measure resistance between connector 7150F terminal 63 and ground with multimeter. Refer to Figure 14.



B230603836

Figure 14. Connector 7150F.

CONDITION/INDICATION

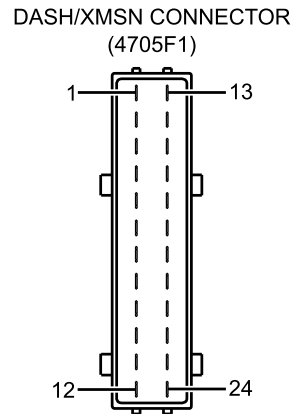
Does multimeter read OL?

DECISION

- NO Go to Step 52.
- YES Go to next step.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

47. Measure resistance between connector 4705F1 terminal 12 and ground with multimeter. Refer to Figure 15.



B230603916

Figure 15. Connector 4705F1.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 53.
YES Go to Step 51.

MALFUNCTION

- 48. Battery cable and clean ground harness is faulty.

ACTION

Replace battery cable and clean ground harness. Refer to MAIN POWER Procedure (WP 0404). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 49. Battery cable and clean power harness is faulty.

ACTION

Replace battery cable and clean power harness. Refer to Battery Cable and Clean Power Harness Removal and Installation (WP 0405). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. ECM and TCM clean power and ground harness is faulty.

TRANSMISSION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace ECM and TCM clean power and ground harness. Refer to Engine Control Module (ECM) and Transmission Control Module (TCM) Clean Power and Ground Harness Removal and Installation (WP 0406). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 51. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 52. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 53. Power Distribution Center (PDC) harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 54. Power distribution is faulty.

ACTION

Diagnose power distribution fault. Refer to Power Distribution Center (PDC) Mini Fuse Block 4001 Troubleshooting Procedure (WP 0065).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)	WP 0008
	WP 0454
	WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0011

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Check for proper fluid level in transmission. Refer to (TM 9-2355-106-10).
2. Connect MSD to vehicle. Refer to Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
3. Verify communication between MSD and Transmission Control Module (TCM).

CONDITION/INDICATION

MSD does not communicate with TCM.

CORRECTIVE ACTION

Go to Transmission Circuit Troubleshooting Procedure (WP 0141).

1. Read DTCs.
2. Verify that no active transmission DTCs are set.

Transmission DTCs P0880, P0881, P0882, and P0883 are set.

Go to Transmission Circuit Troubleshooting Procedure (WP 0141).

1. Verify that no other active transmission DTCs are set.

Other transmission DTCs are set.

Go to Transmission Diagnostic Trouble Code (DTC) Index (WP 0008).

1. Operate vehicle and verify transmission shifts through all gears.

Transmission does not shift through all gears.

Replace transmission. Go to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers Diagnostic Trouble Code (DTC) P0218.

TROUBLESHOOTING PROCEDURE**STEP****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.

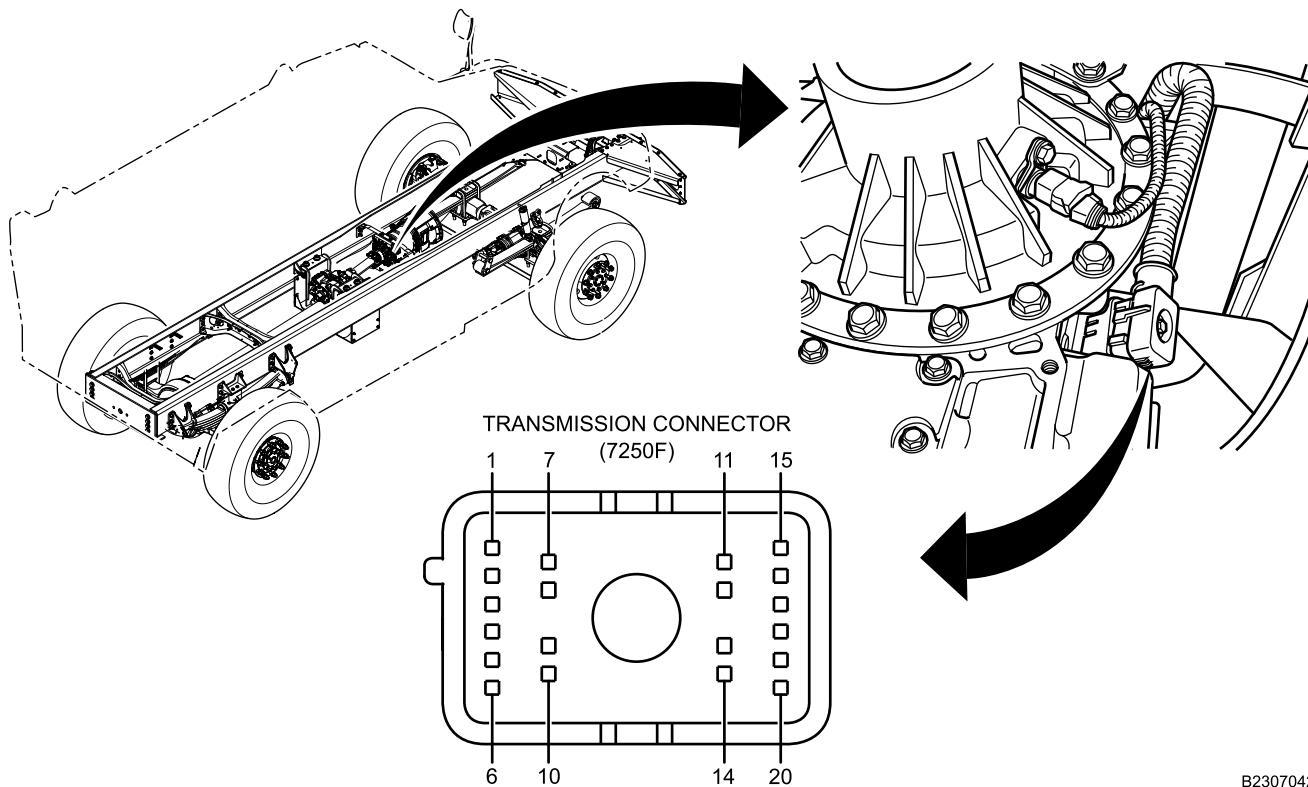
TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7250F terminal 19 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 6.
NO Go to next step.

TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 7250F terminal 18 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 4.5V and 5.5V?

DECISION

YES Go to Step 14.

NO Go to Step 8.

STEP

6. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

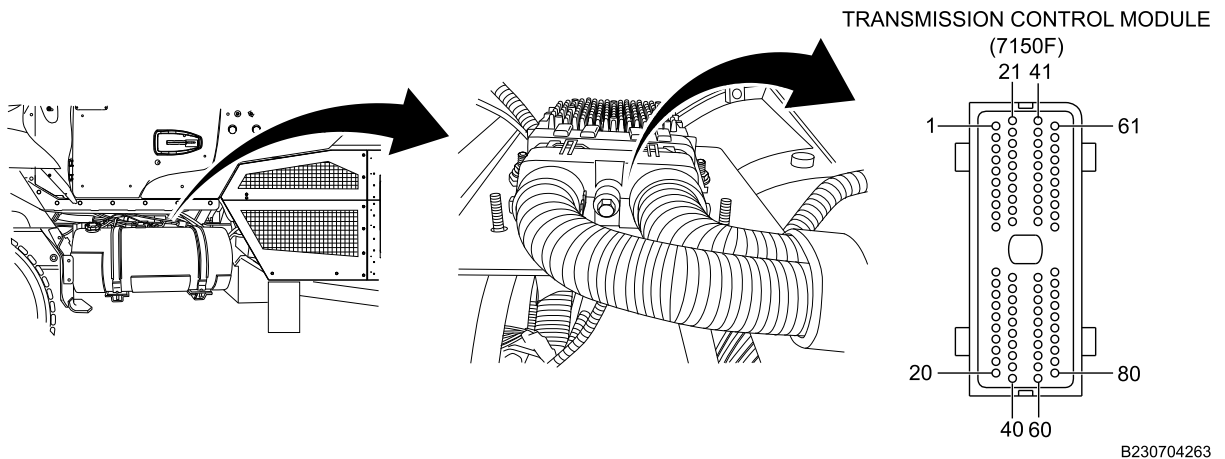


Figure 2. Left Side Frame Rail.

TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE - (CONTINUED)

7. Measure resistance between connector 7150F terminal 58 and connector 7250F terminal 19 with multimeter. Refer to Figure 4. Refer to Figure 3.

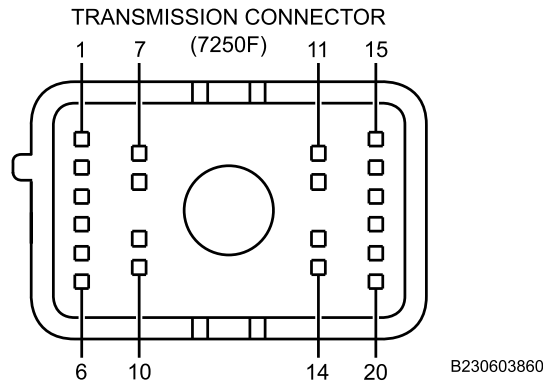


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 16.
NO Go to Step 15.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

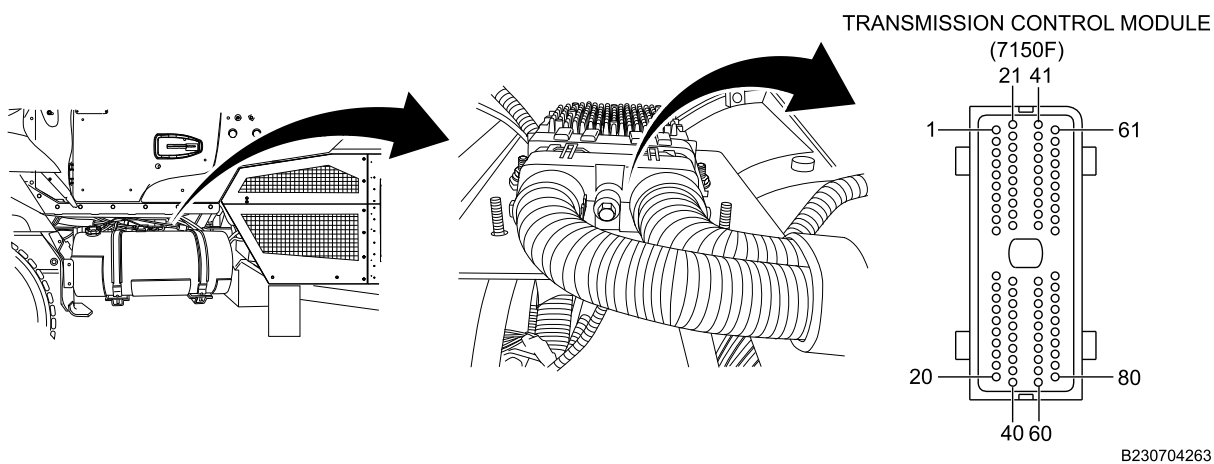


Figure 4. Left Side Frame Rail.

11. Measure resistance between connector 7250F terminal 18 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL?

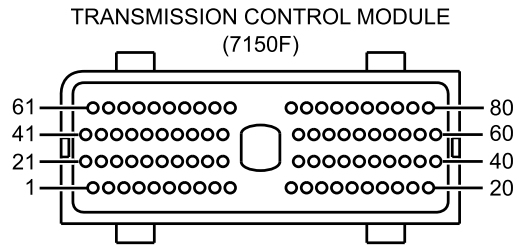
TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- NO Go to Step 16.
- YES Go to next step.

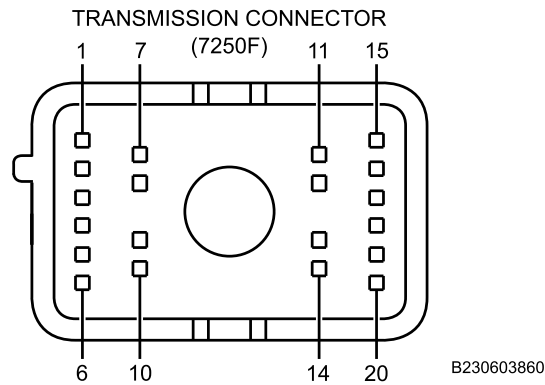
STEP

12. Measure resistance between connector 7150F terminal 54 and connector 7250F terminal 18 with multimeter. Refer to Figure 5. Refer to Figure 6.



B230603836

Figure 5. Connector 7150F.



B230603860

Figure 6. Connector 7250F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

- NO Go to Step 16.
- YES Go to next step.

STEP

13. Measure resistance between connector 7250F terminal 18 and all other terminals in connector 7250F with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read OL for each test?

TRANSMISSION FLUID OVER TEMPERATURE TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to Step 15.

NO Go to Step 16.

MALFUNCTION

- 14. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 15. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 16. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION CONTROL MODULE (TCM) OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0012

WP 0142

WP 0453

Before Beginning This Operational Checkout Procedure

Successful diagnosis of TCM depends on performing various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Transmission Operational Checkout Procedure (WP 0142) before performing tests in this operational checkout procedure.

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0602
- P0610
- P0613
- P0614
- P0634
- P063E
- P063F

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve DTCs manually or with MSD. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

One or more of the following DTCs are set.

P0602

P0610

P0613

P0614

P0634

P063E

P063F

CORRECTIVE ACTION

Replace TCM. Refer to TCM Removal and Installation (WP 0453). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**TRANSMISSION HIGH SIDE DRIVER TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0658
- P0659

TROUBLESHOOTING PROCEDURE**STEP****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.

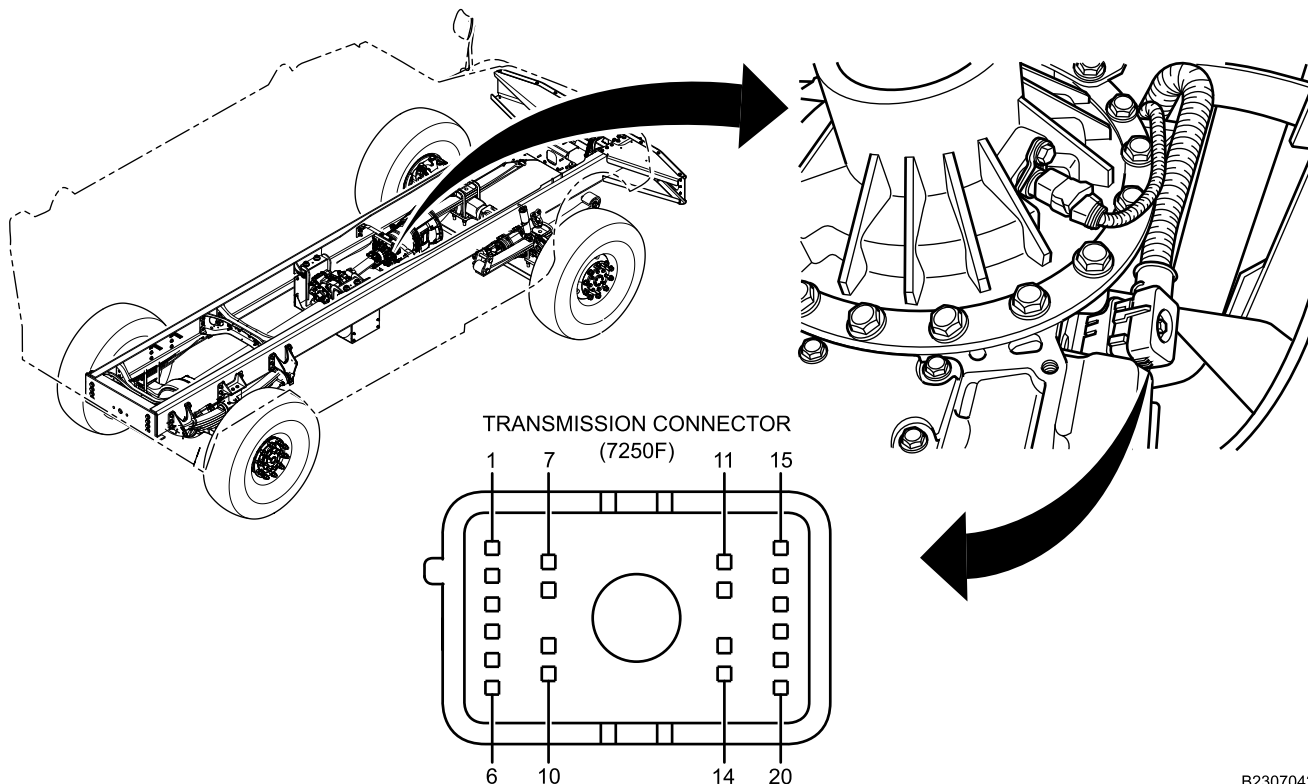
TRANSMISSION HIGH SIDE DRIVER TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 1.0V?

DECISION

NO Go to Step 6.
YES Go to next step.

TRANSMISSION HIGH SIDE DRIVER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Measure DC voltage between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

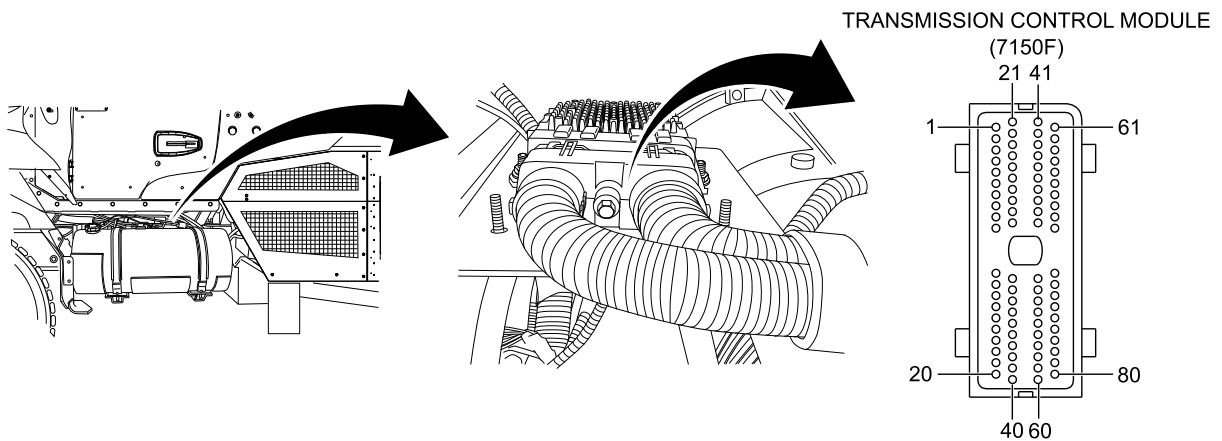
Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 12.
NO Go to next step.

STEP

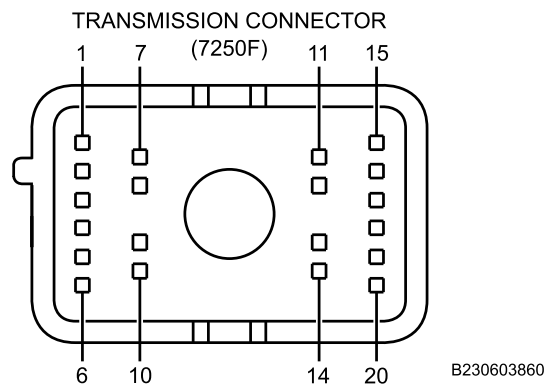
6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



B230704263

Figure 2. Left Side Frame Rail.

9. Measure resistance between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 3.



B230603860

Figure 3. Connector 7250F.

TRANSMISSION HIGH SIDE DRIVER TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

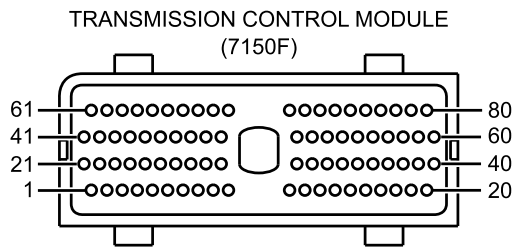
Does multimeter read OL?

DECISION

NO Go to Step 14.
 YES Go to next step.

STEP

10. Measure resistance between connector 7150F terminal 11 and connector 7250F terminal 1 with multimeter.
 Refer to Figure 4. Refer to Figure 3.



B230603836

Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 14.
 YES Go to next step.

TRANSMISSION HIGH SIDE DRIVER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

11. Measure resistance between connector 7250F terminal 1 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 13.

NO Go to Step 14.

MALFUNCTION

- 12. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 13. Transmission Control Module (TCM) is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 14. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION CONTROL SYSTEM ID TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers Diagnostic Trouble Code (DTC) P0702.

TROUBLESHOOTING PROCEDURE**STEP****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.

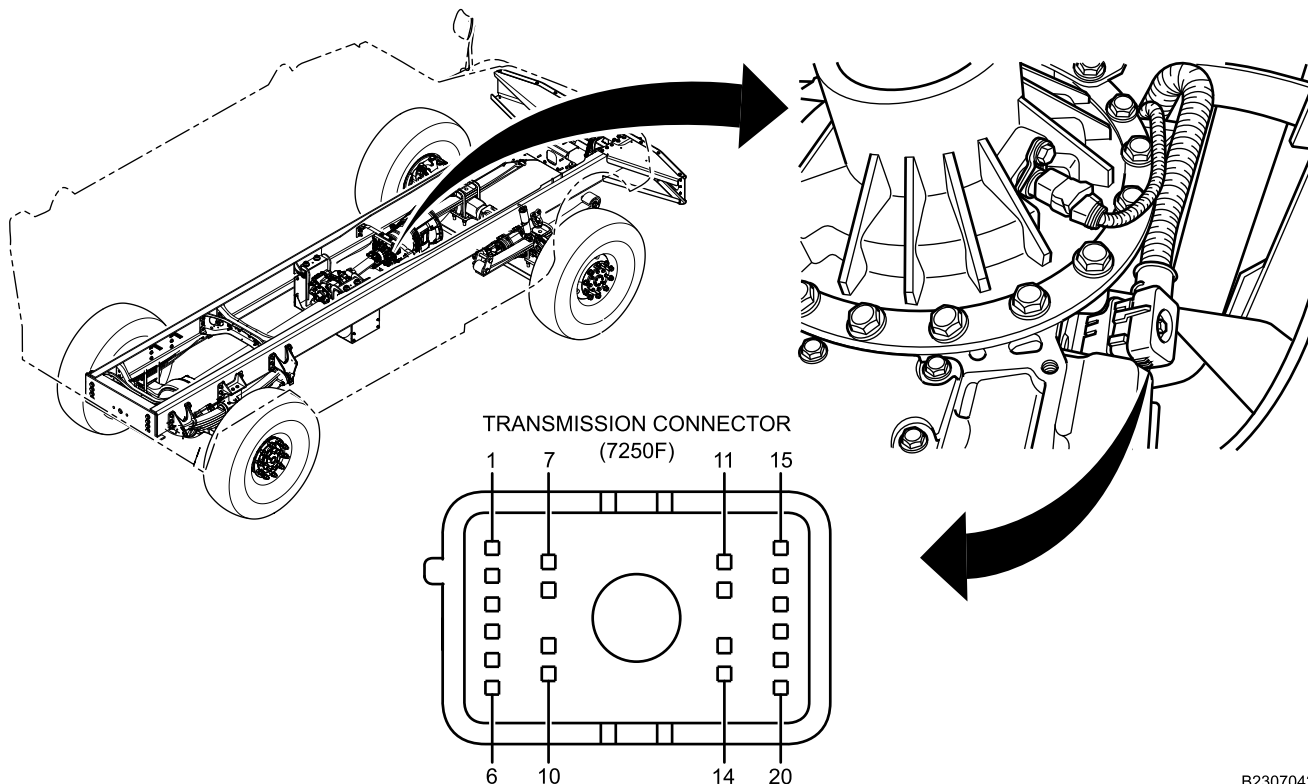
TRANSMISSION CONTROL SYSTEM ID TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7250F terminal 20 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter display either of the following readings:

OL

Less than 100 ohms

DECISION

NO Go to Step 7.

YES Go to next step.

TRANSMISSION CONTROL SYSTEM ID TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

3. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

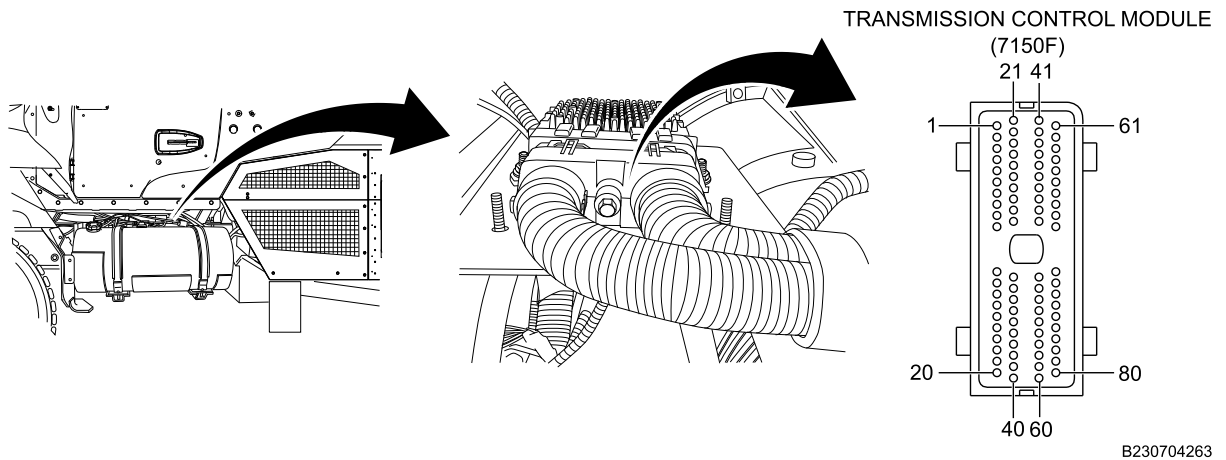


Figure 2. Left Side Frame Rail.

4. Measure resistance between connector 7250F terminal 20 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read OL?

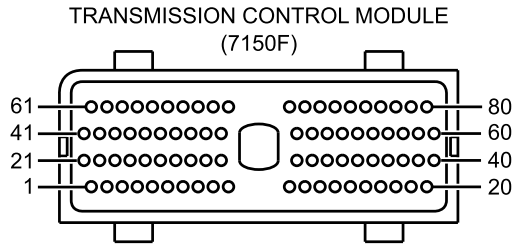
DECISION

NO Go to Step 9.
YES Go to next step.

TRANSMISSION CONTROL SYSTEM ID TROUBLESHOOTING PROCEDURE - (CONTINUED)

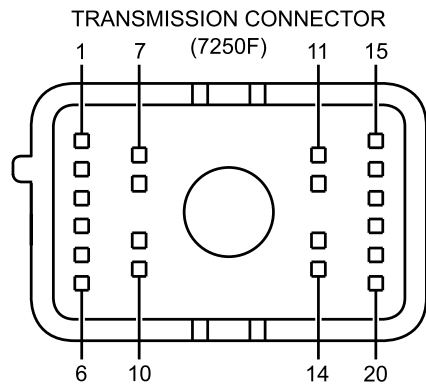
STEP

5. Measure resistance between connector 7150F terminal 76 and connector 7250F terminal 20 with multimeter. Refer to Figure 3. Refer to Figure 4.



B230603836

Figure 3. Connector 7150F.



B230603860

Figure 4. Connector 7250F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 9.
 YES Go to next step.

STEP

6. Measure resistance between connector 7250F terminal 20 and all other terminals in connector 7250F with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 8.
 NO Go to Step 9.

MALFUNCTION

- 7. Transmission is faulty.

TRANSMISSION CONTROL SYSTEM ID TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 8. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 9. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P070C
- P070D

TROUBLESHOOTING PROCEDURE**STEP****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.

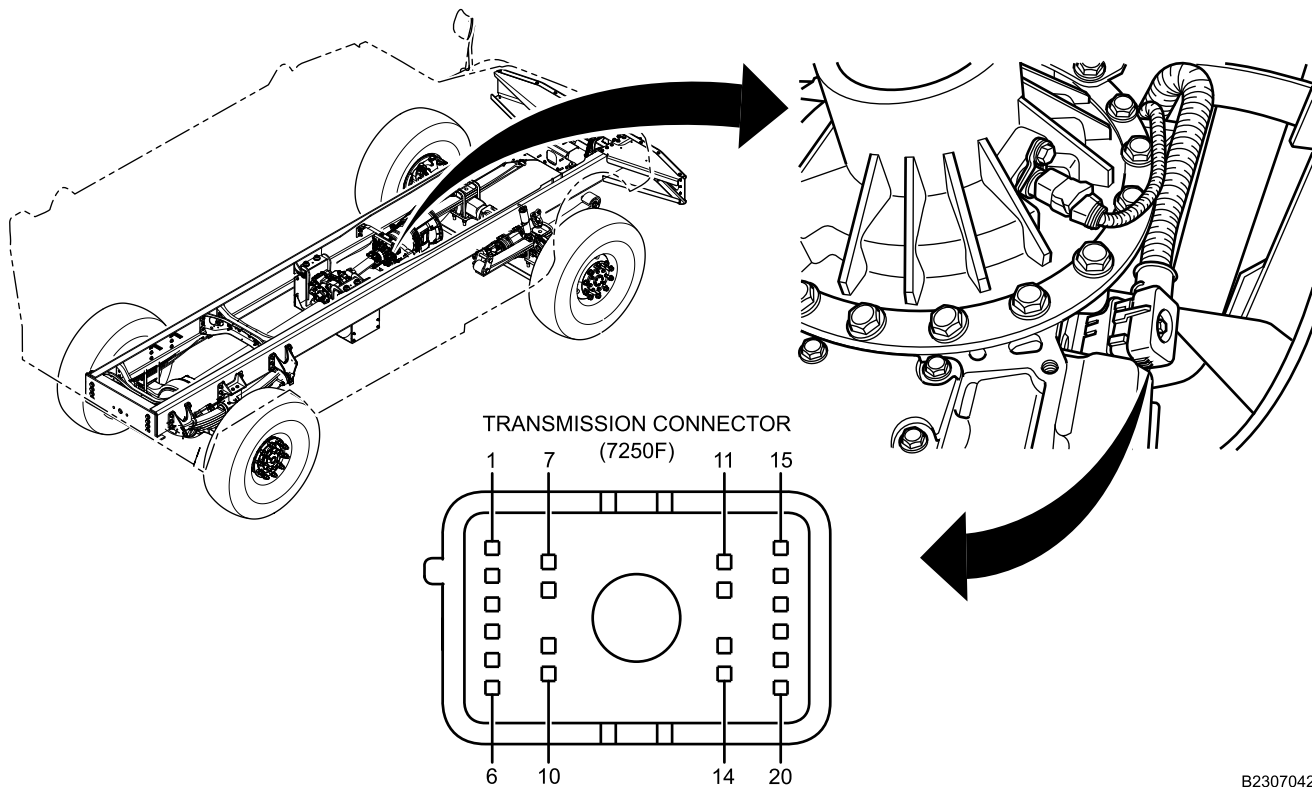
TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7250F terminal 19 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 19.
NO Go to next step.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 7250F terminal 16 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 4.5V and 5.5V?

DECISION

NO Go to Step 13.
YES Go to next step.

STEP

6. Measure DC voltage between connector 7250F terminal 15 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 0.1V and 0.8V?

DECISION

NO Go to next step.
YES Go to Step 21.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

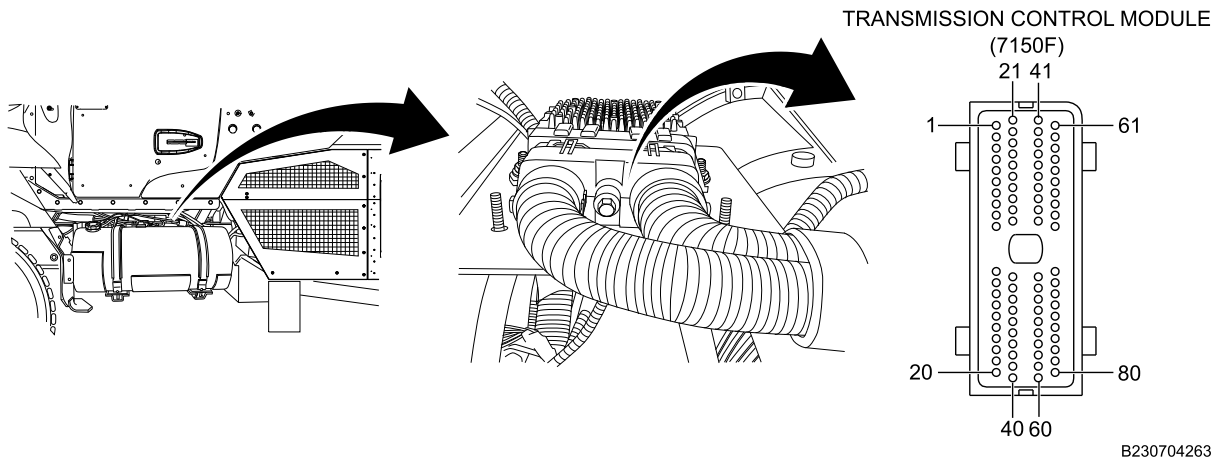


Figure 2. Left Side Frame Rail.

10. Measure resistance between connector 7250F terminal 15 and ground with multimeter. Refer to Figure 3.

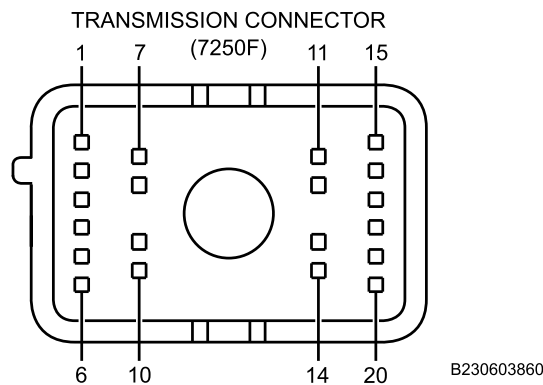


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

11. Measure resistance between connector 7150F terminal 16 and connector 7250F terminal 15 with multimeter. Refer to Figure 2. Refer to Figure 3.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 23.

NO Go to next step.

STEP

12. Measure resistance between connector 7250F terminal 15 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 22.

NO Go to Step 23.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
15. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

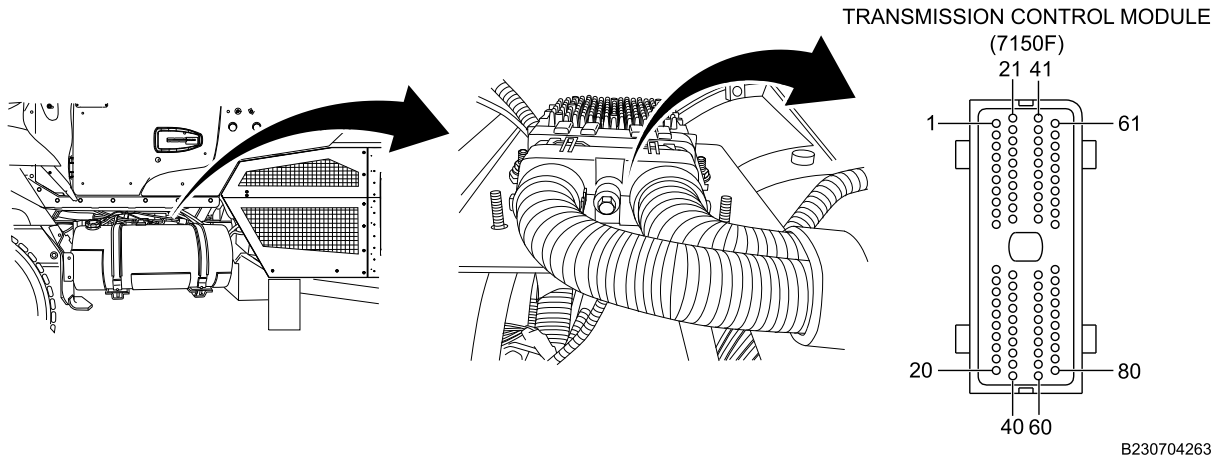


Figure 4. Left Side Frame Rail.

16. Measure resistance between connector 7250F terminal 16 and ground with multimeter. Refer to Figure 5.

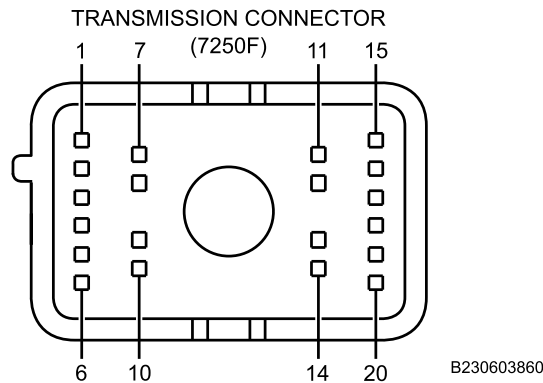


Figure 5. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

17. Measure resistance between connector 7150F terminal 12 and connector 7250F terminal 16 with multimeter. Refer to Figure 4. Refer to Figure 5.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 23.
YES Go to next step.

STEP

18. Measure resistance between connector 7250F terminal 16 and all other terminals in connector 7250F with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 22.
NO Go to Step 23.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

19. Disconnect connector 7150F. Refer to Figure 6. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

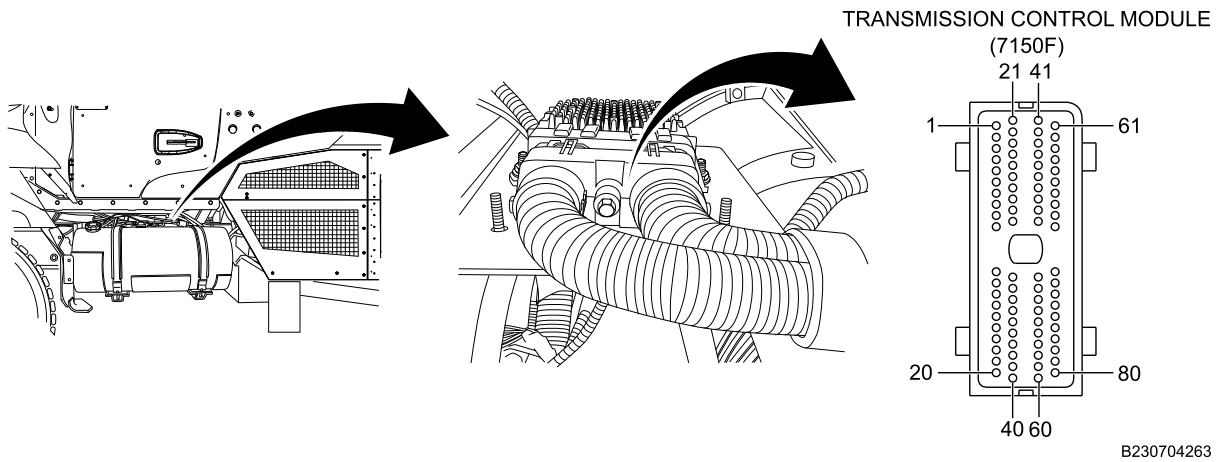


Figure 6. Left Side Frame Rail.

20. Measure resistance between connector 7150F terminal 58 and connector 7250F terminal 19 with multimeter. Refer to Figure 6. Refer to Figure 7.

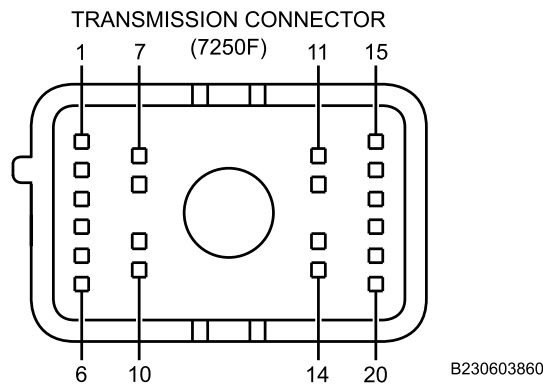


Figure 7. Connector 7250F.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

- YES Go to Step 23.
 NO Go to Step 22.

TRANSMISSION FLUID LEVEL SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 21. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 22. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 23. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0711
- P0712
- P0713

TROUBLESHOOTING PROCEDURE**STEP****WARNING**

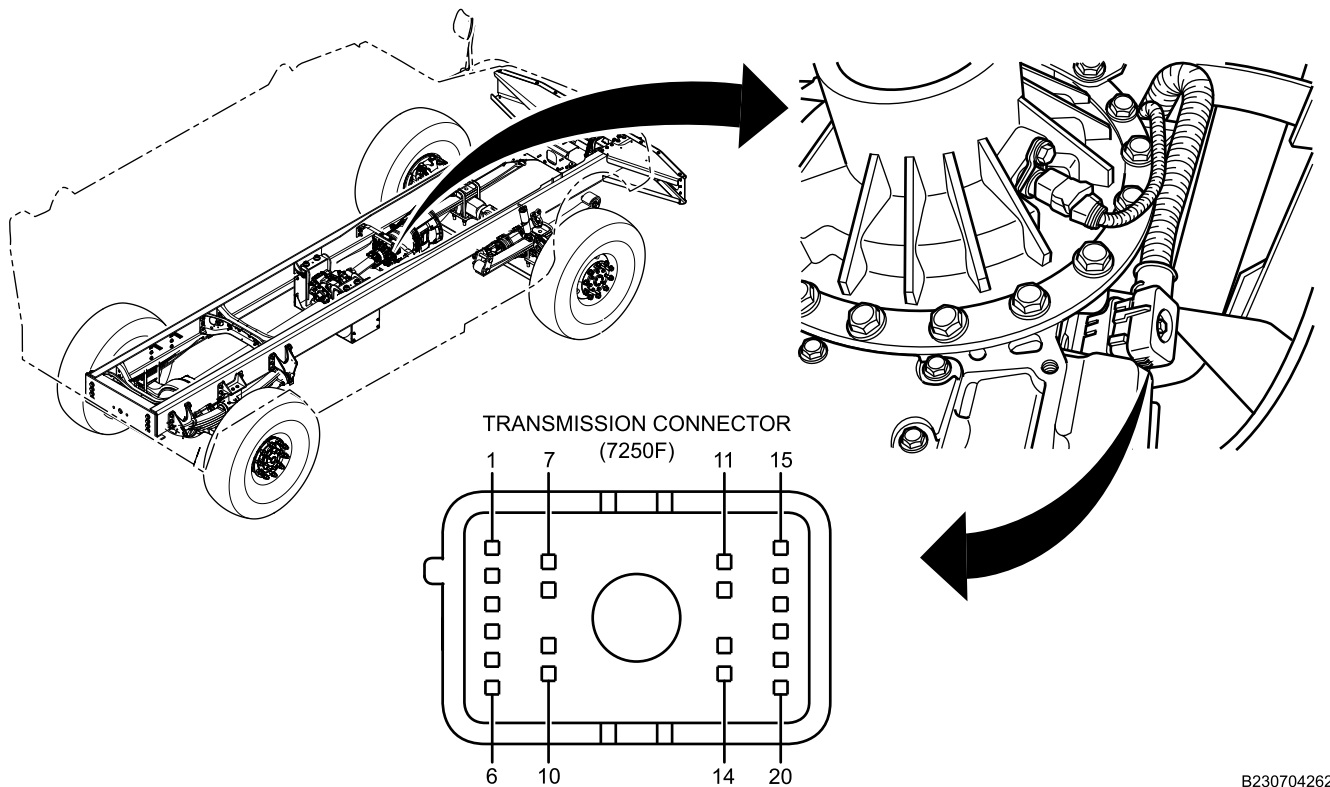
Use extreme caution when testing or working on or around electrical circuits. Always assume that electrical circuits are live. Electrical shock can occur upon contact with voltage high enough to cause current flow through muscles or nerves. On Direct Current (DC) systems, generally 1 milliamp of current 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.

TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.



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Figure 1. Right Side of Transmission.

1. Disconnect connector 7250F. Refer to Figure 1.
2. Measure resistance between connector 7250F terminal 19 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 6.
NO Go to next step.

STEP

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 7250F terminal 18 and ground with multimeter. Refer to Figure 2.

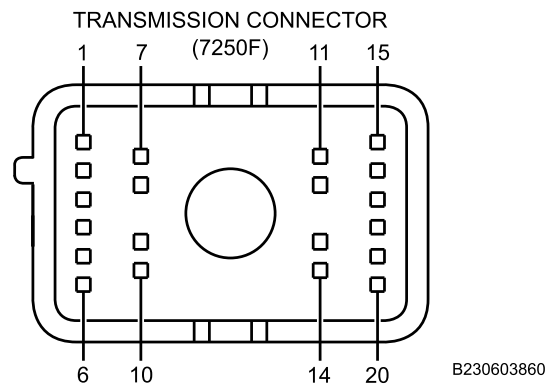
TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 2. Connector 7250F.

CONDITION/INDICATION

Does multimeter read between 4.5V and 5.5V?

DECISION

YES Go to Step 14.

NO Go to Step 8.

TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

6. Disconnect connector 7150F. Refer to Figure 3. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

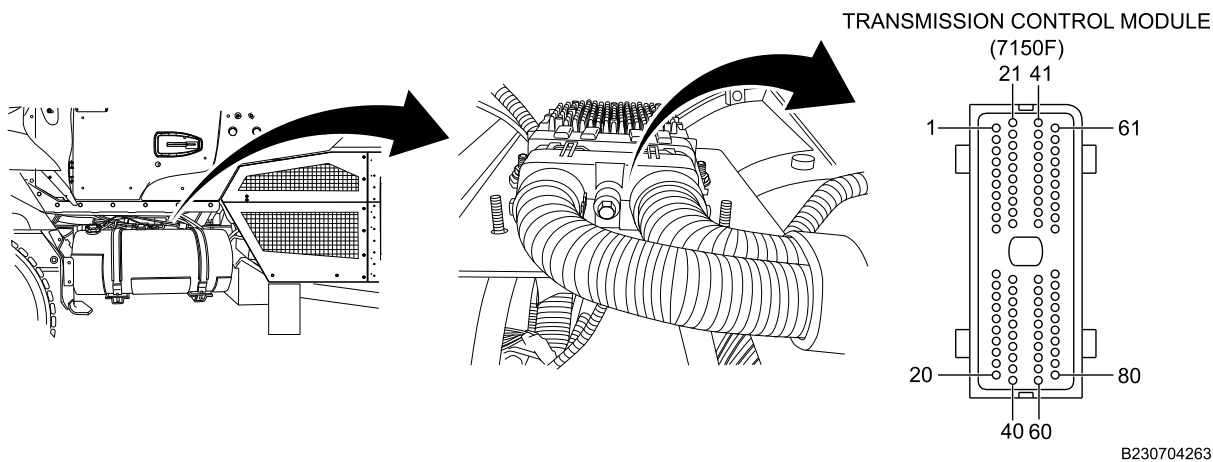


Figure 3. Left Side Frame Rail.

7. Measure resistance between connector 7150F terminal 58 and connector 7250F terminal 19 with multimeter. Refer to Figure 4. Refer to Figure 5.

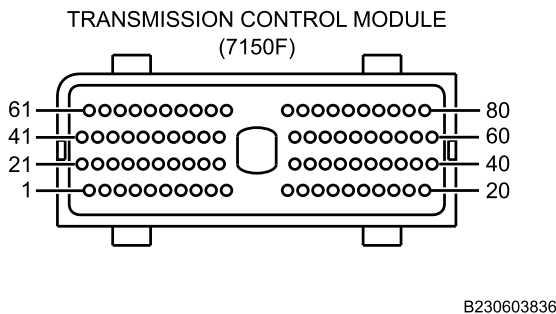


Figure 4. Connector 7150F.

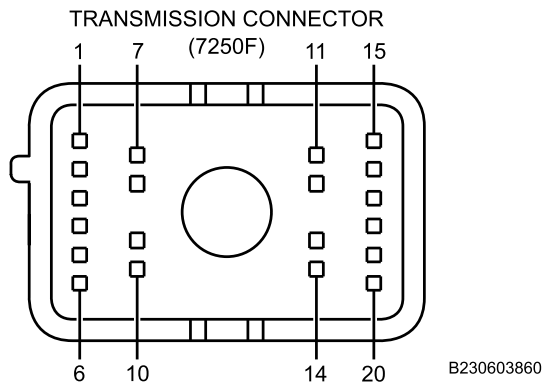


Figure 5. Connector 7250F.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

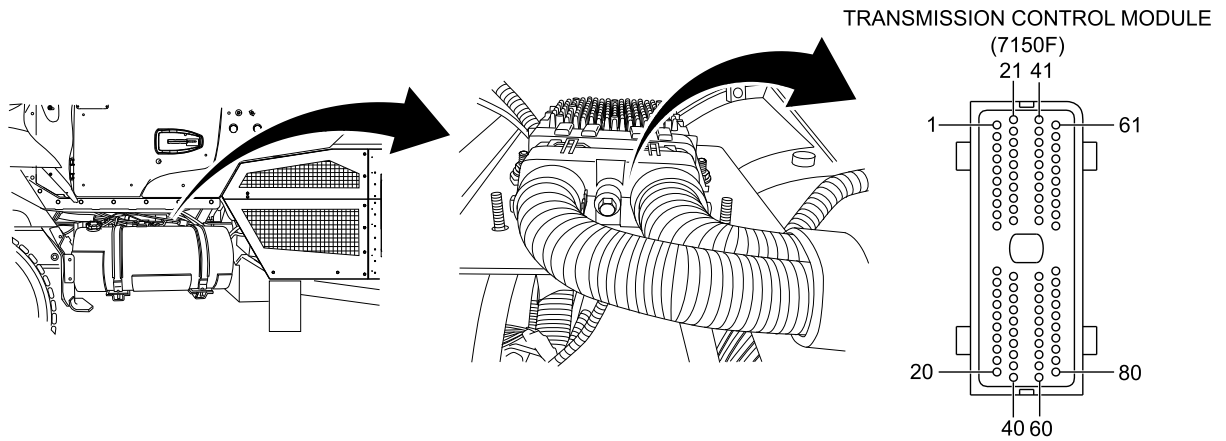
TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to Step 16.
- NO Go to Step 15.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector 7150F. Refer to Figure 6. Refer to TCM Removal and Installation (WP 0453).



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Figure 6. Left Side Frame Rail.

TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

11. Measure resistance between connector 7250F terminal 18 and ground with multimeter. Refer to Figure 7.

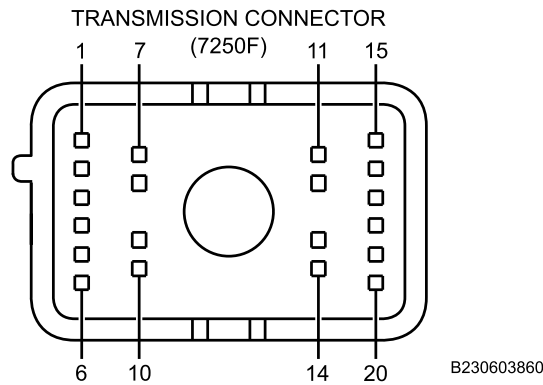


Figure 7. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 16.
 YES Go to next step.

STEP

12. Measure resistance between connector 7150F terminal 54 and connector 7250F terminal 18 with multimeter. Refer to Figure 8. Refer to Figure 9.

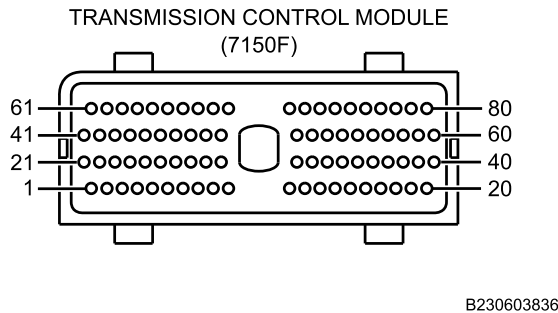


Figure 8. Connector 7150F.

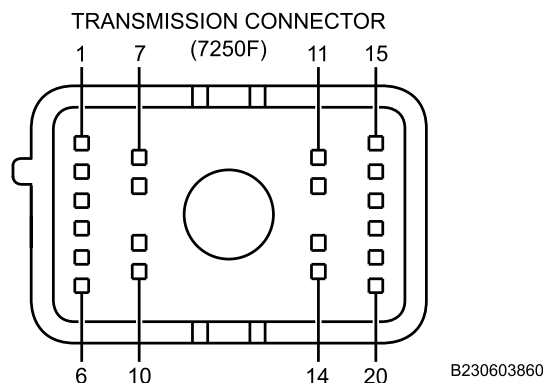


Figure 9. Connector 7250F.

TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 16.
YES Go to next step.

STEP

13. Measure resistance between connector 7250F terminal 18 and all other terminals in connector 7250F with multimeter. Refer to Figure 10.

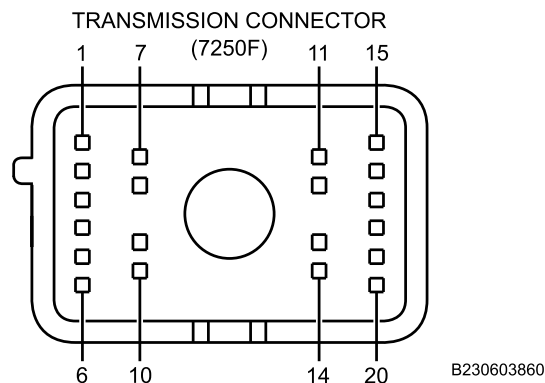


Figure 10. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 15.
NO Go to Step 16.

MALFUNCTION

- 14. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 15. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

TRANSMISSION FLUID TEMPERATURE SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 16. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0459
WP 0606
WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK) (WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0144
WP 0336
WP 0453
WP 0454

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0721
- P0722

TROUBLESHOOTING PROCEDURE**STEP****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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Retrieve DTCs manually or with MSD. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

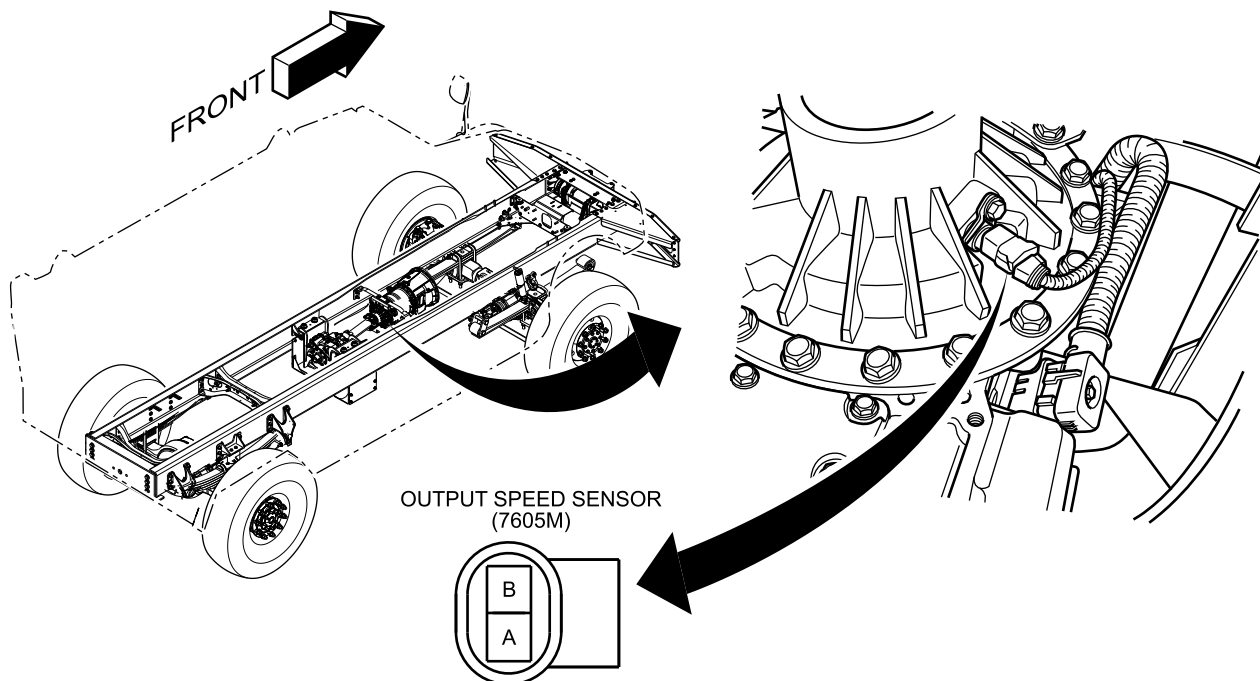
Are DTCs P0880, P0881, P0882 or P0883 set?

DECISION

YES Go to Transmission Control Module (TCM) Power Operational Checkout Procedure (WP 0144).
NO Go to next step.

STEP

2. Disconnect connector 7605M. Refer to Figure 1.



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Figure 1. Right Rear of Transmission.

3. Measure resistance between connector 7605M terminal B and ground with multimeter. Refer to Figure 1.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 100 ohms?

DECISION

YES Go to Step 16.

NO Go to next step.

STEP

4. Turn MAIN POWER switch ON (TM 9-2355-106-10).
5. Turn ignition switch ON (TM 9-2355-106-10).
6. Measure DC voltage between connector 7605M terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 0.5V and 1.5V?

DECISION

NO Go to Step 14.

YES Go to next step.

STEP

7. Measure DC voltage between connector 7605M terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 3.5V and 4.5V?

DECISION

NO Go to Step 20.

YES Go to next step.

STEP

8. Measure DC voltage between connector 7605M terminals A and B with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 2.5V and 3.5V?

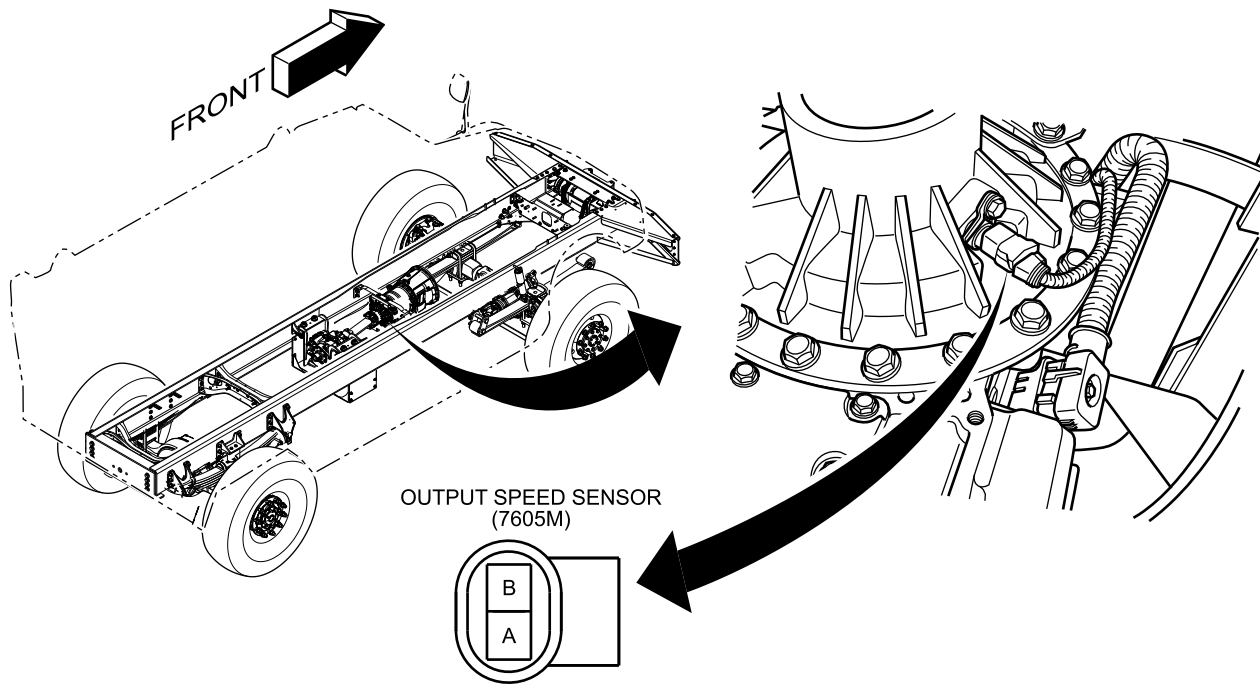
DECISION

NO Go to Step 20.

YES Go to next step.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

9. Turn ignition switch OFF (TM 9-2355-106-10).
10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
11. Install output speed sensor connector 7605M. Refer to Figure 2.



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Figure 2. Right Rear of Transmission.

12. Disconnect connector 7150F. Refer to Figure 3. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

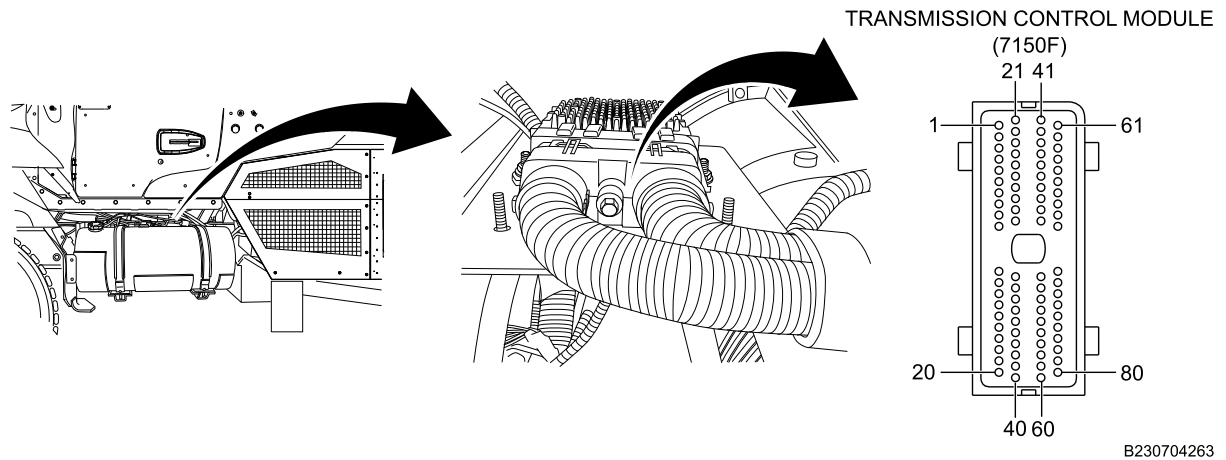


Figure 3. Left Side Frame Rail.

13. Measure resistance between connector 7150F terminal 60 and terminal 40 with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read between 150 and 500 ohms?

DECISION

YES Go to Step 29.
NO Go to Step 26.

STEP

14. Turn ignition switch OFF (TM 9-2355-106-10).
15. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
16. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

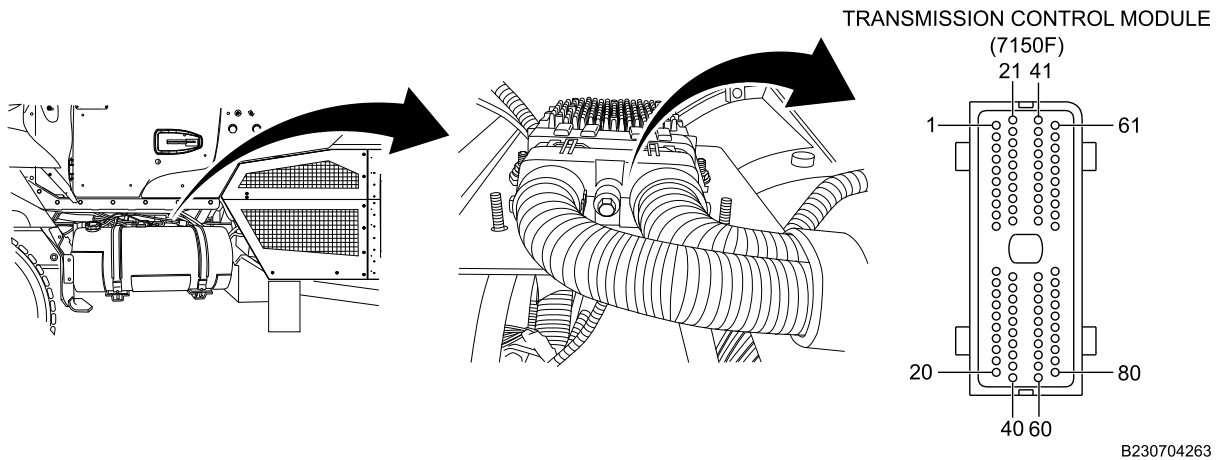
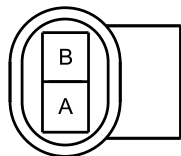


Figure 4. Left Side Frame Rail.

17. Measure resistance between connector 7605M terminal B and ground with multimeter. Refer to Figure 5.

OUTPUT SPEED SENSOR
(7605M)



B230603862

Figure 5. Connector 7605M.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 28.
YES Go to next step.

STEP

18. Measure resistance between connector 7150F terminal 40 and connector 7605M terminal B with multimeter. Refer to Figure 4. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 28.
YES Go to next step.

STEP

19. Measure resistance between connector 7605M terminals A and B with multimeter. Refer to Figure 5.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 27.

NO Go to Step 28.

STEP

20. Turn ignition switch OFF (TM 9-2355-106-10).
21. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
22. Disconnect connector 7150F. Refer to Figure 6. Refer to Transmission Control (TCM) Removal and Installation (WP 0453).

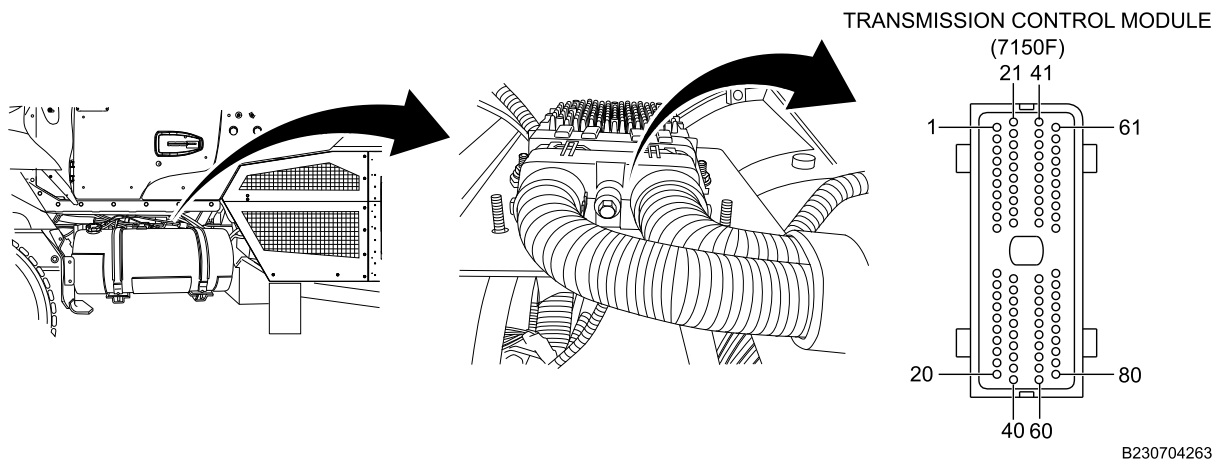
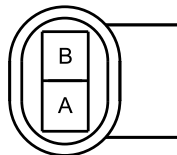


Figure 6. Left Side Frame Rail.

23. Measure resistance between connector 7605M terminal A and ground with multimeter. Refer to Figure 7.

OUTPUT SPEED SENSOR
(7605M)



B230603862

Figure 7. Connector 7605M.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 28.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

YES Go to next step.

STEP

24. Measure resistance between connector 7150F terminal 60 and connector 7605M terminal A with multimeter. Refer to Figure 6. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 28.
YES Go to next step.

STEP

25. Measure resistance between connector 7605M terminals A and B with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 27.
NO Go to Step 28.

MALFUNCTION

- 26. Output speed sensor is faulty.

ACTION

Replace output speed sensor. Refer to Output Speed Sensor Removal and Installation (WP 0459). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 27. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 28. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

TRANSMISSION OUTPUT SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 29. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0459

WP 0606

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0726
- P0727

TROUBLESHOOTING PROCEDURE

STEP

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 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.

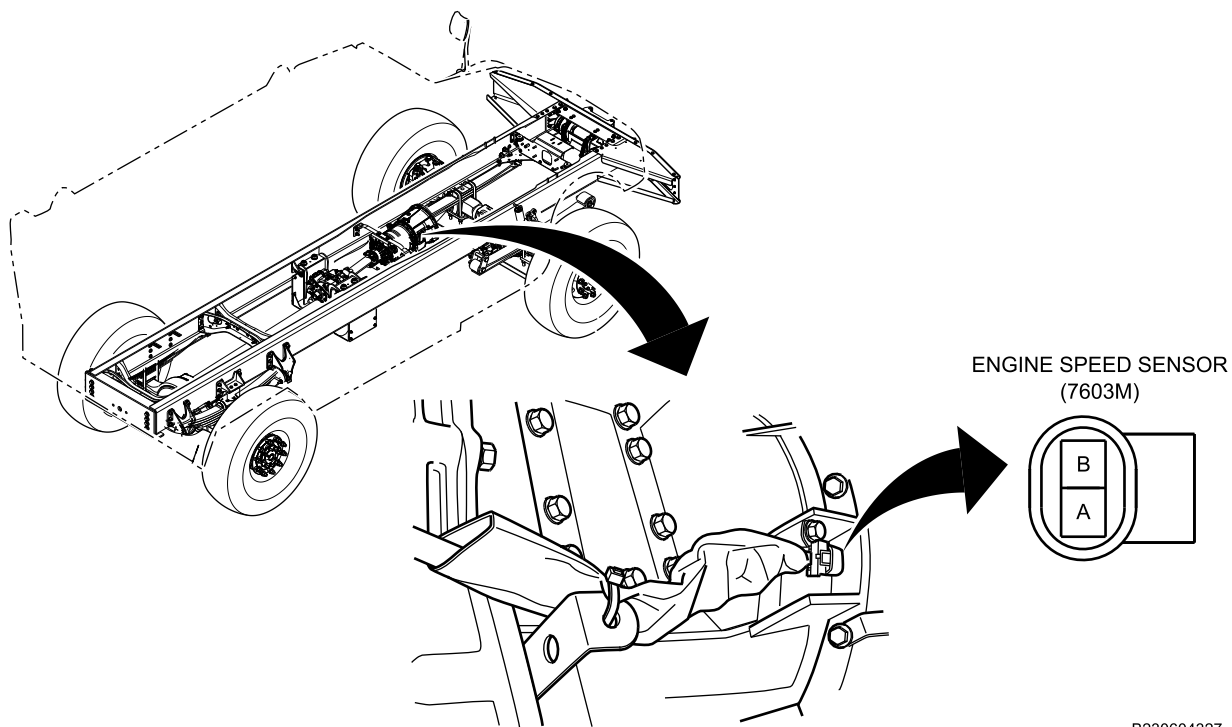
TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7603M. Refer to Figure 1.



B230604327

Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7603M terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 100 ohms?

DECISION

YES Go to Step 15.
NO Go to next step.

STEP

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 7603M terminal B and ground with multimeter. Refer to Figure 1.

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read between 0.05V and 0.50V?

DECISION

NO Go to Step 13.
YES Go to next step.

STEP

6. Measure DC voltage between connector 7603M terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 3.5V and 4.5V?

DECISION

NO Go to Step 19.
YES Go to next step.

STEP

7. Measure DC voltage between connector 7603M terminal A and terminal B with multimeter. Refer to Figure 1.

CONDITION/INDICATION

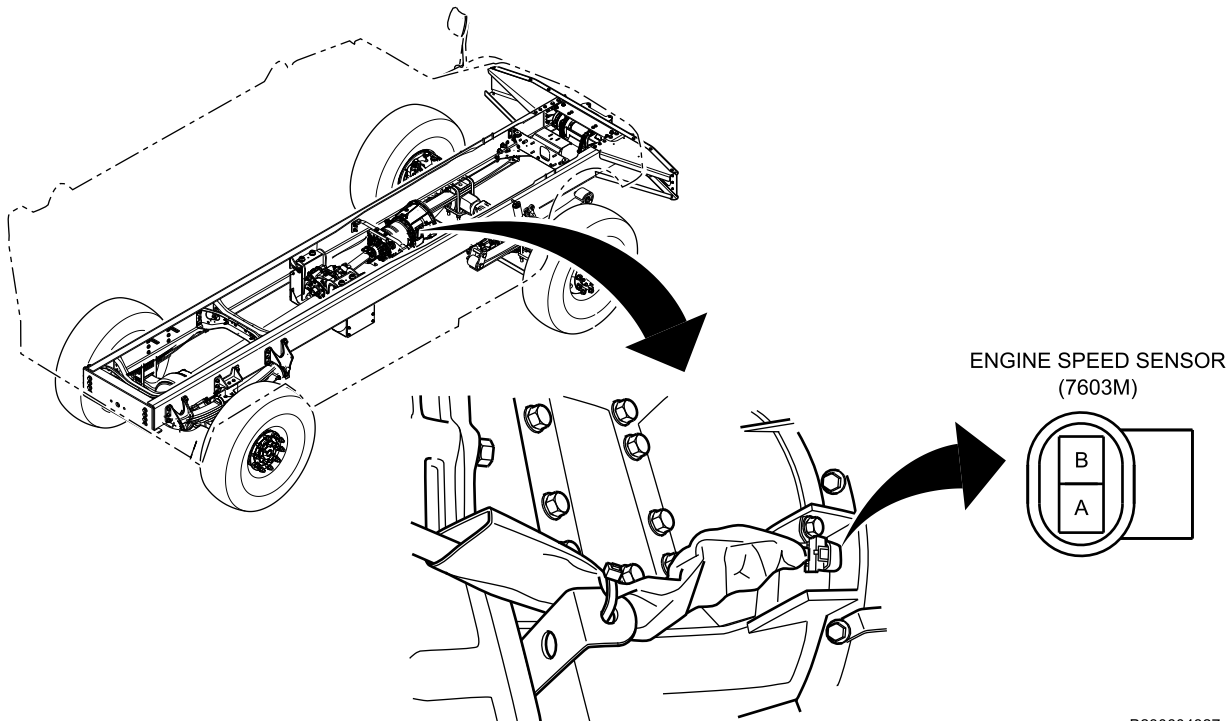
Does multimeter read between 2.5V and 3.5V?

DECISION

NO Go to Step 19.
YES Go to next step.

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Install connector 7603M. Refer to Figure 2.



B230604327

Figure 2. Right Side of Transmission.

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

11. Disconnect connector 7150F. Refer to Figure 3. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

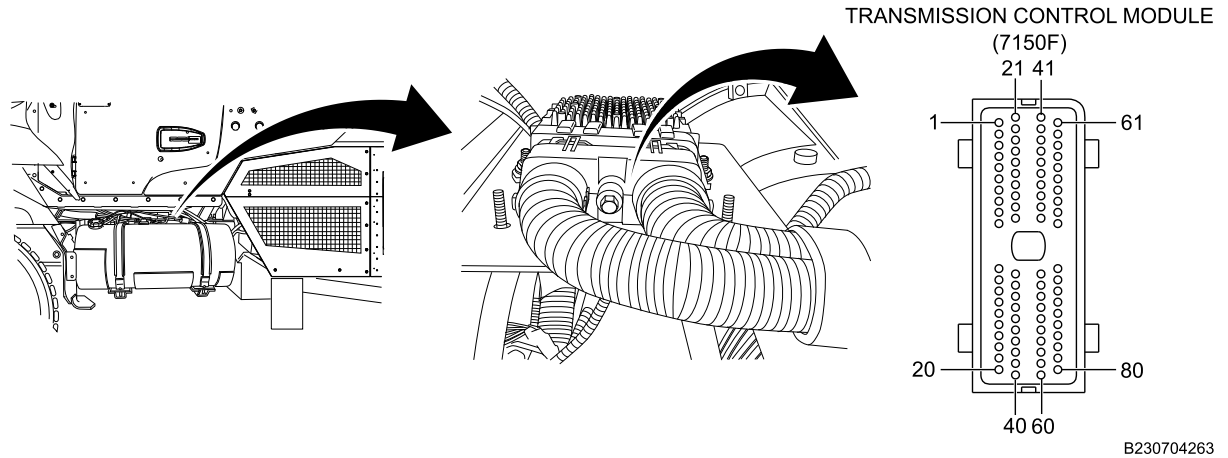


Figure 3. Left Side Frame Rail.

12. Measure resistance between connector 7150F terminal 59 and terminal 39 with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read between 150 and 500 ohms?

DECISION

YES Go to Step 28.

NO Go to Step 25.

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

15. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

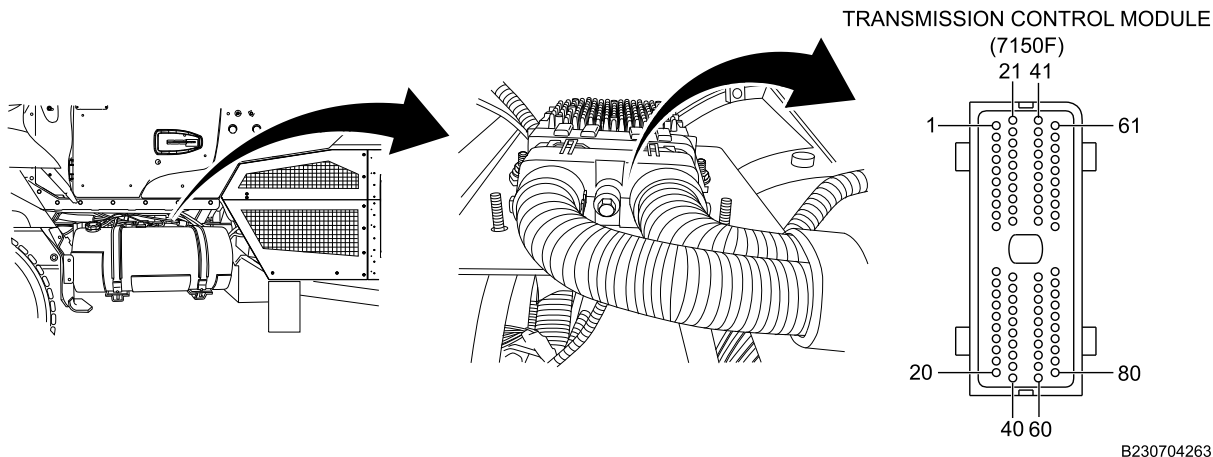
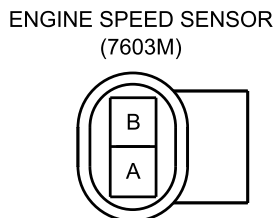


Figure 4. Left Side Frame Rail.

16. Measure resistance between connector 7603M terminal B and ground with multimeter. Refer to Figure 5.



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Figure 5. Connector 7603M.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 27.
 YES Go to next step.

STEP

17. With assistance, measure resistance between connector 7150F terminal 39 and connector 7603M terminal B with multimeter. Refer to Figure 4. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 27.
 YES Go to next step.

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

18. Measure resistance between connector 7603M terminal B and terminal A with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 26.

NO Go to Step 27.

STEP

- 19. Turn ignition switch OFF (TM 9-2355-106-10).
- 20. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 21. Disconnect connector 7150F. Refer to Figure 6. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

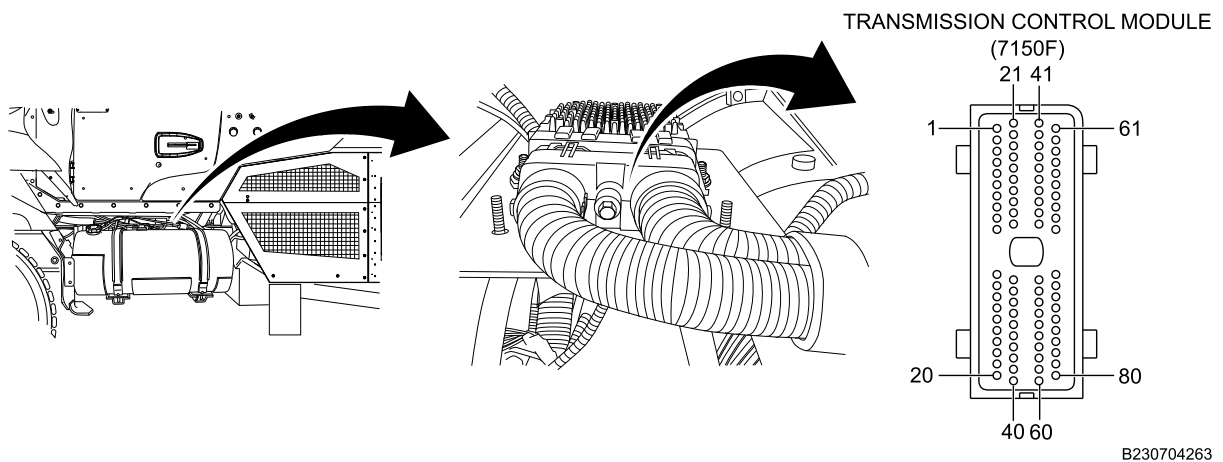
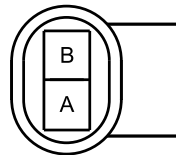


Figure 6. Left Side Frame Rail.

22. Measure resistance between connector 7603M terminal A and ground with multimeter. Refer to Figure 7.

ENGINE SPEED SENSOR (7603M)



B230603861

Figure 7. Connector 7603M.

CONDITION/INDICATION

Does multimeter read OL?

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 27.
YES Go to next step.

STEP

23. With assistance, measure resistance between connector 7150F terminal 59 and connector 7603M terminal A with multimeter. Refer to Figure 6. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 27.
YES Go to next step.

STEP

24. Measure resistance between connector 7603M terminal A and B with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 26.
NO Go to Step 27.

MALFUNCTION

- 25. Engine speed sensor is faulty.

ACTION

Replace engine speed sensor. Refer to Transmission Speed Sensors Removal and Installation (WP 0459).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 26. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 27. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

TRANSMISSION ENGINE SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 28. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
INTERNAL TRANSMISSION OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)	WP 0149
	WP 0150
	WP 0454

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0012

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0721
- P0722
- P0726
- P0727
- P0731
- P0732
- P0733
- P0734
- P0735
- P0736

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve DTCs. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).
2. Read Diagnostic Trouble Codes (DTCs).

CONDITION/INDICATION

One or more of the following DTCs are set.

P0721
P0722

CORRECTIVE ACTION

Refer to Transmission Output Speed Sensor Troubleshooting Procedure (WP 0149).

1. Read DTCs.

One or more of the following DTCs are set.

P0726
P0727

Refer to Transmission Engine Speed Sensor Troubleshooting Procedure (WP 0150).

INTERNAL TRANSMISSION OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Read DTCs.

One or more of the following DTCs are set.

- P0731
- P0732
- P0733
- P0734
- P0735
- P0736

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0454

WP 0606

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0336

WP 0453

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Code (DTCs):

- P0776
- P0777
- P0964
- P0966
- P0967

TROUBLESHOOTING PROCEDURE**STEP****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.

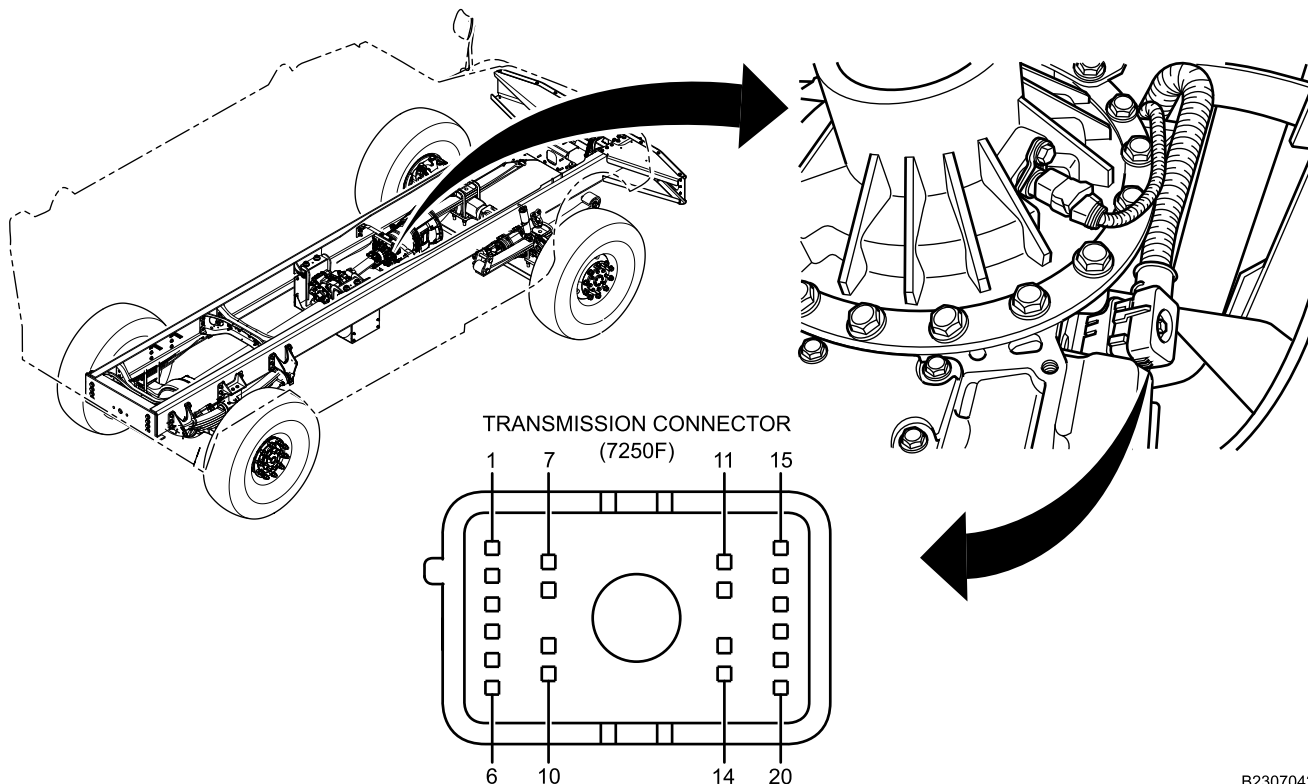
TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 7.
YES Go to next step.

STEP

5. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).

TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

6. Measure resistance between connector 7250F terminal 5 and ground with multimeter while activating pressure control solenoid 2 with MSD. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 20 ohms?

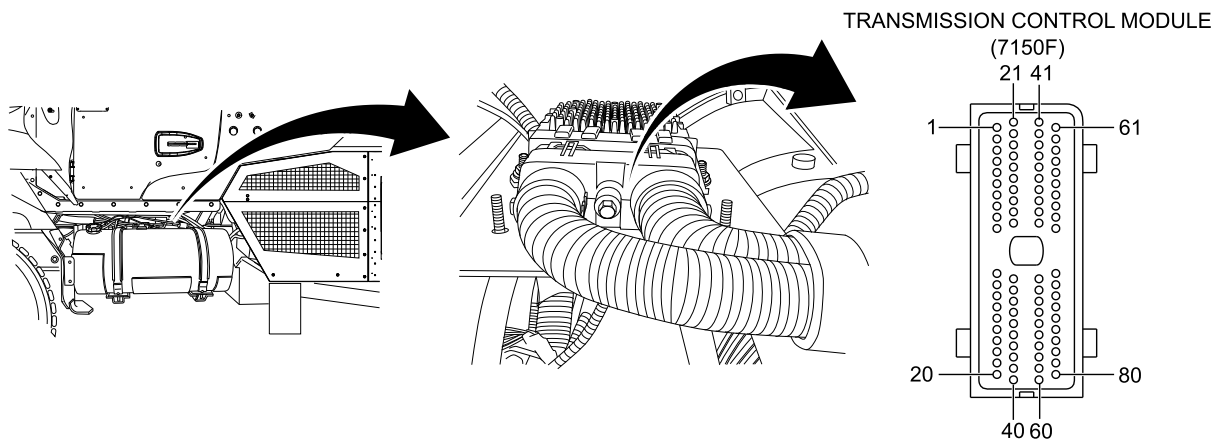
DECISION

YES Go to Step 19.

NO Go to Step 13.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
 8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 9. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



B230704263

Figure 2. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 3.

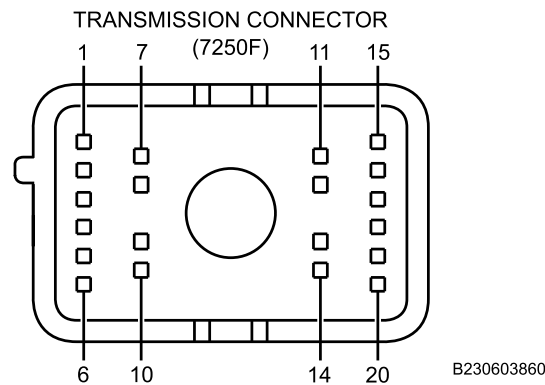


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

11. Measure resistance between connector 7150F terminal 71 and connector 7250F terminal 6 with multimeter. Refer to Figure 4 and Figure 3.

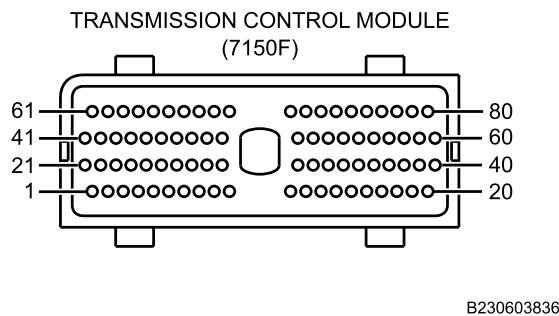


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

12. Measure resistance between connector 7250F terminal 6 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 20.

NO Go to Step 21.

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
15. Disconnect connector 7150F. Refer to Figure 5. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

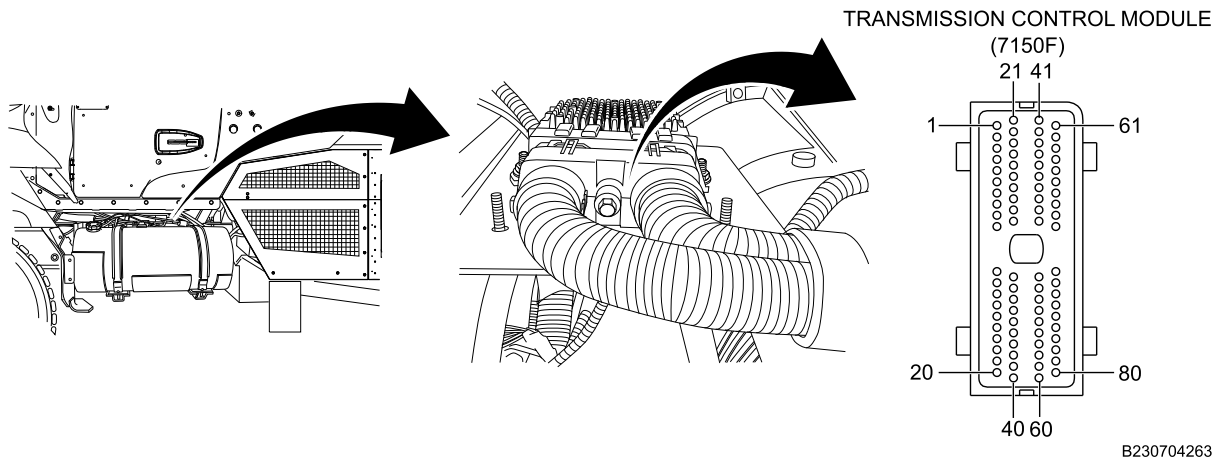


Figure 5. Left Side Frame Rail.

16. Measure resistance between connector 7250F terminal 5 and ground with multimeter. Refer to Figure 6.

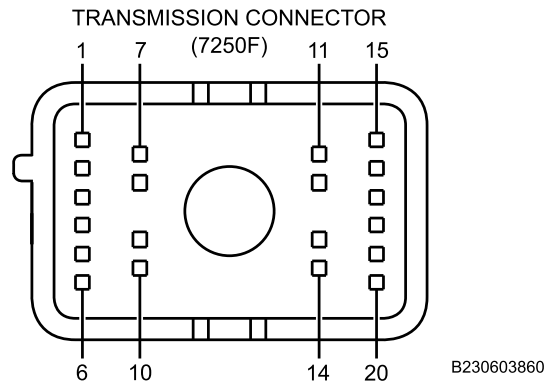


Figure 6. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

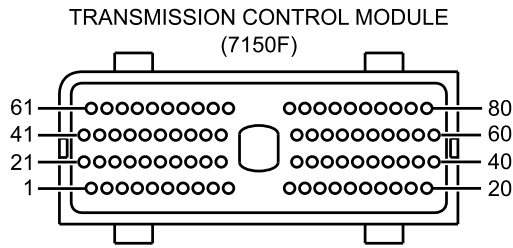
TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

17. Measure resistance between connector 7150F terminal 52 and connector 7250F terminal 5 with multimeter. Refer to Figure 7 and Figure 6.



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Figure 7. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

18. Measure resistance between connector 7250F terminal 5 and all other terminals in connector 7250F with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 20.
 NO Go to Step 21.

TRANSMISSION PRESSURE CONTROL SOLENOID 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 19. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 20. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0454

WP 0606

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0336

WP 0453

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Code (DTCs):

- P0796
- P0797
- P0968
- P0970
- P0971

TROUBLESHOOTING PROCEDURE**STEP****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.

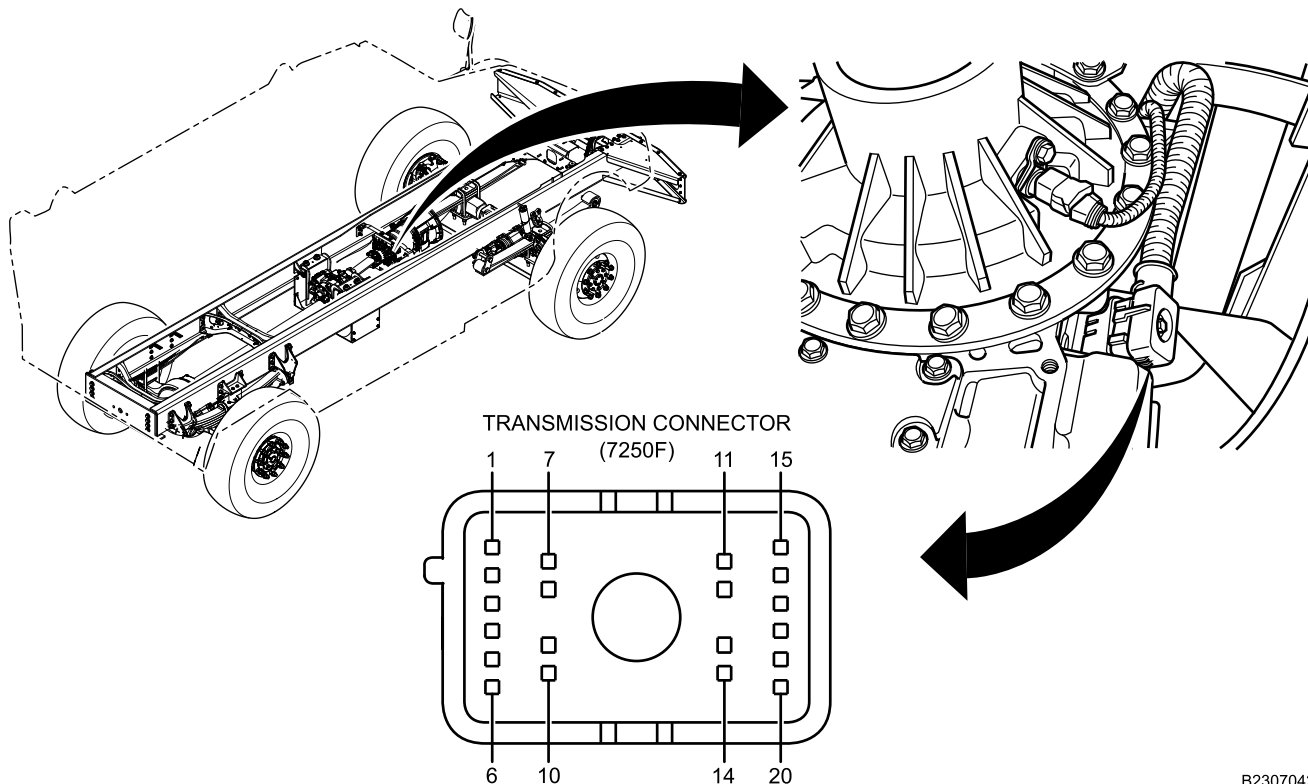
TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 9.
YES Go to next step.

STEP

5. Turn ignition switch OFF (TM 9-2355-106-10).
6. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)

7. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
8. Measure resistance between connector 7250F terminal 9 and ground with multimeter while activating pressure control solenoid 3 with MSD. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 20 ohms?

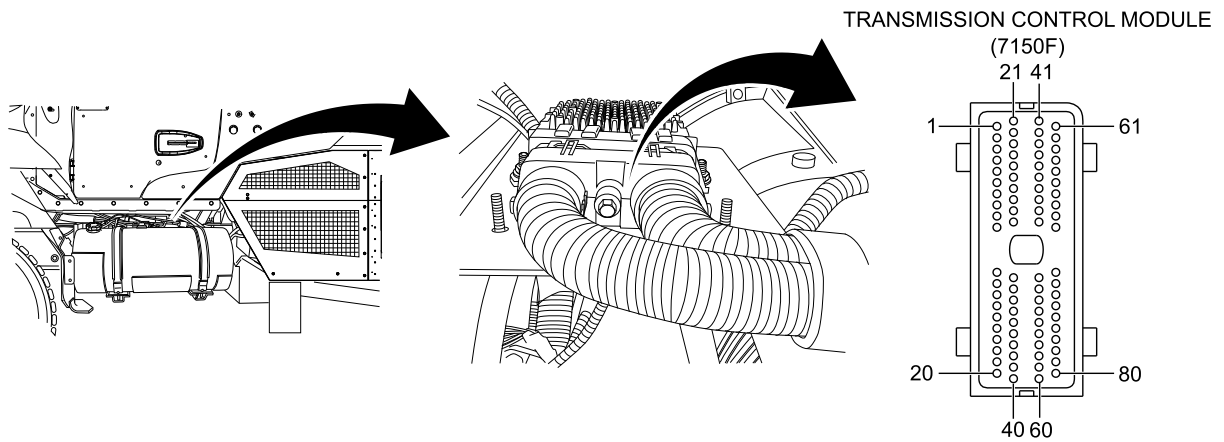
DECISION

YES Go to Step 21.

NO Go to Step 15.

STEP

9. Turn ignition switch OFF (TM 9-2355-106-10).
10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
11. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



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Figure 2. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)

12. Measure resistance between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 3.

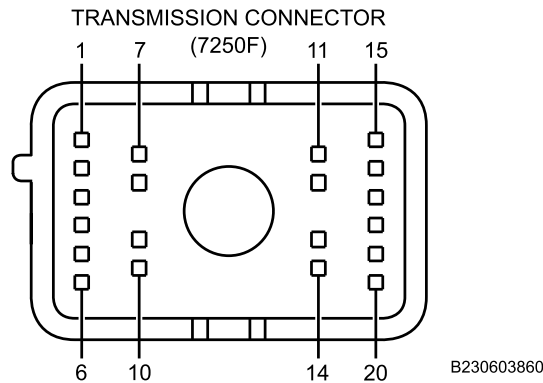


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

13. Measure resistance between connector 7150F terminal 71 and connector 7250F terminal 6 with multimeter. Refer to Figure 4 and Figure 3.

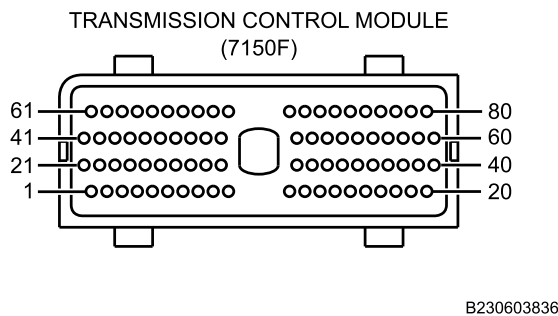


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

14. Measure resistance between connector 7250F terminal 6 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

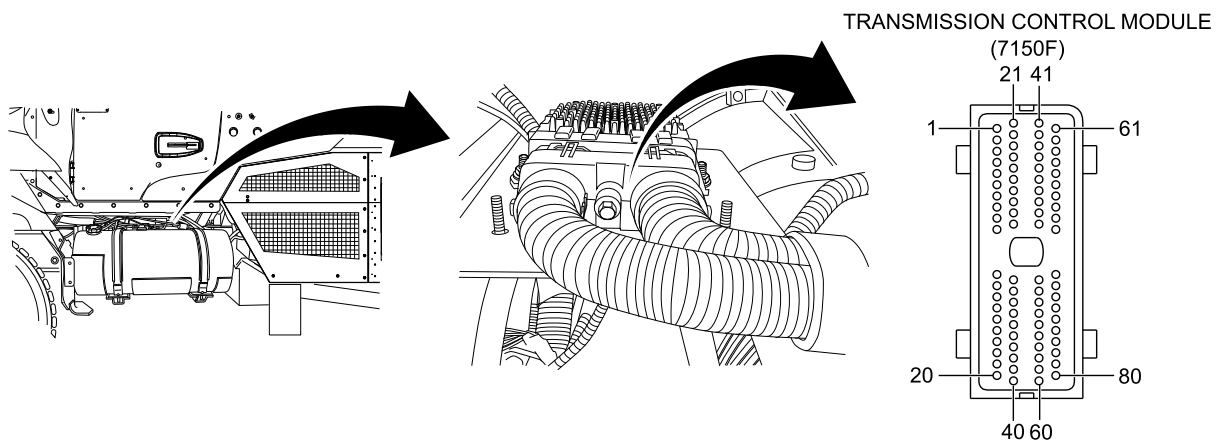
DECISION

YES Go to Step 22.

NO Go to Step 23.

STEP

15. Turn ignition switch OFF (TM 9-2355-106-10).
16. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
17. Disconnect connector 7150F. Refer to Figure 5. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



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Figure 5. Connector 7150F.

TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Measure resistance between connector 7250F terminal 9 and ground with multimeter. Refer to Figure 6.

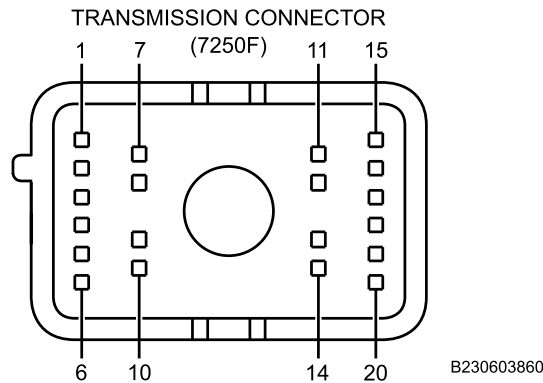


Figure 6. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

19. Measure resistance between connector 7150F terminal 33 and connector 7250F terminal 9 with multimeter. Refer to Figure 7 and Figure 6.

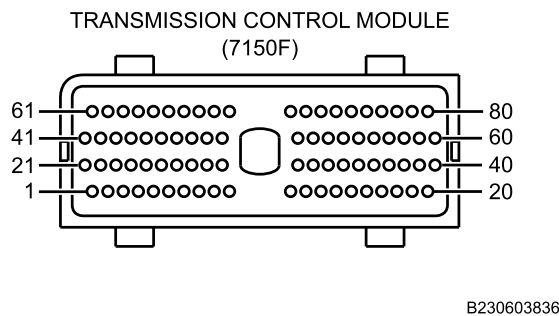


Figure 7. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 23.
 YES Go to next step.

STEP

20. Measure resistance between connector 7250F terminal 9 and all other terminals in connector 7250F with multimeter. Refer to Figure 6.

TRANSMISSION PRESSURE CONTROL SOLENOID 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

DECISION

YES Go to Step 22.

NO Go to Step 23.

MALFUNCTION

- 21. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 22. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 23. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0842
- P0843

TROUBLESHOOTING PROCEDURE**STEP****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.

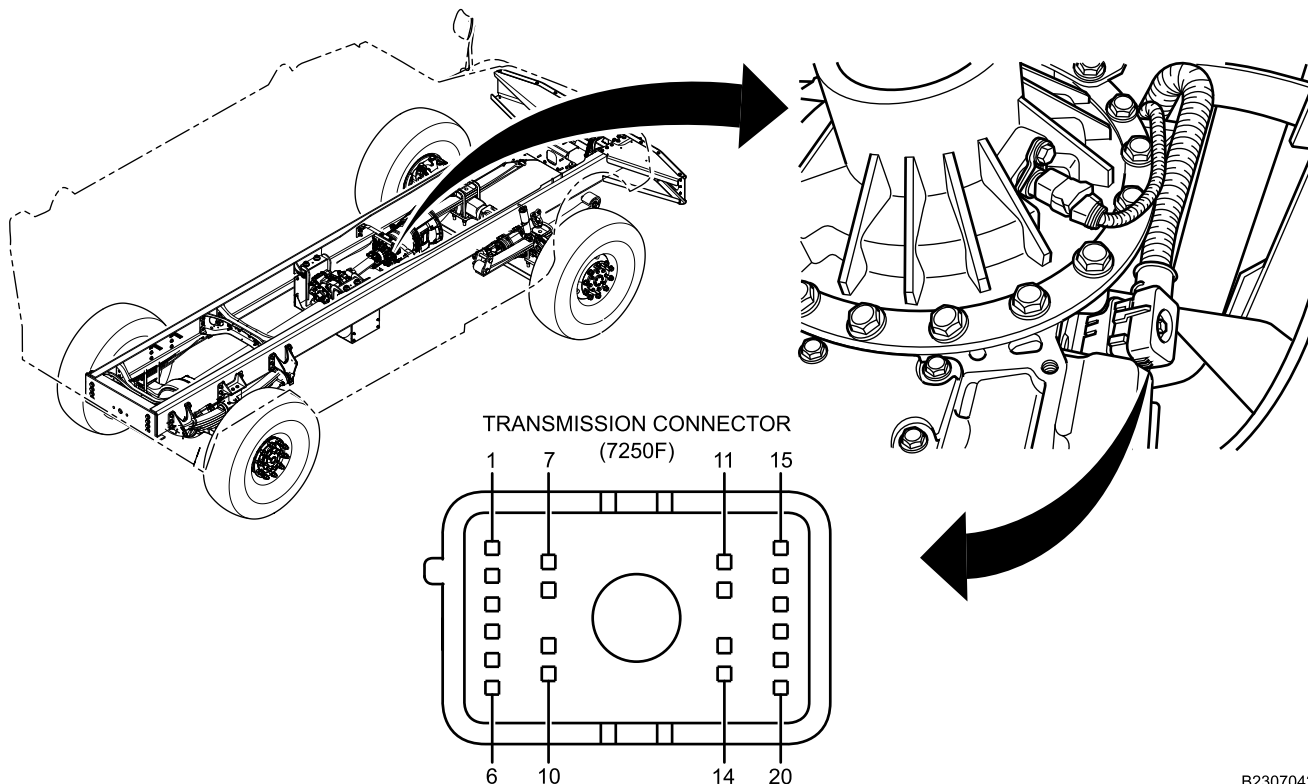
TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7250F terminal 19 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 6.
NO Go to next step.

TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 7250F terminal 3 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 4.5V and 5.5V?

DECISION

YES Go to Step 14.

NO Go to Step 8.

STEP

6. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

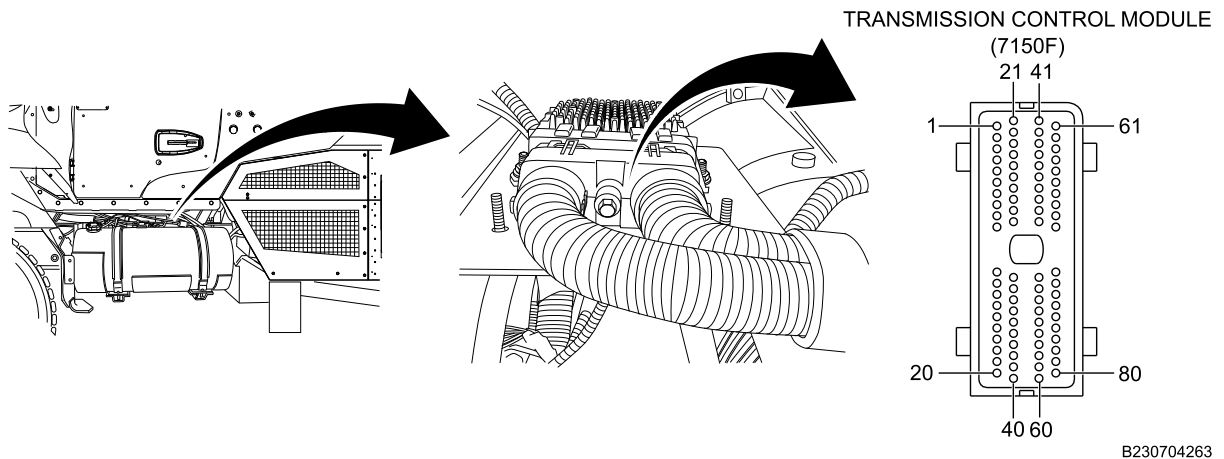


Figure 2. Left Side Frame Rail.

7. Measure resistance between connector 7150F terminal 58 and connector 7250F terminal 19 with multimeter. Refer to Figure 2 and Figure 1.

TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

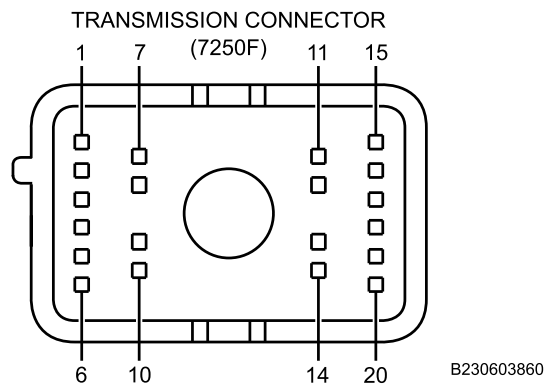


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read more than 5 ohms?

DECISION

YES Go to Step 16.
 NO Go to Step 15.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

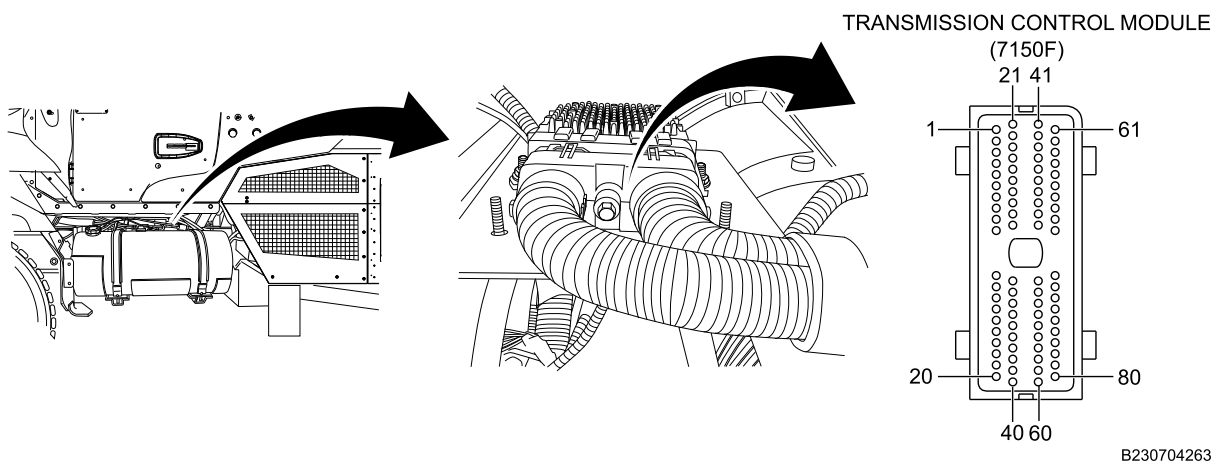


Figure 4. Right Side Frame Rail.

11. Measure resistance between connector 7250F terminal 3 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

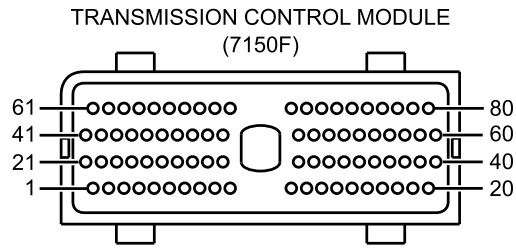
Does multimeter read OL?

TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

NO Go to Step 16.
 YES Go to next step.

STEP

12. Measure resistance between connector 7150F terminal 77 and connector 7250F terminal 3 with multimeter. Refer to Figure 5 and Figure 3.



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Figure 5. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 16.
 YES Go to next step.

STEP

13. Measure resistance between connector 7250F terminal 3 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 15.
 NO Go to Step 16.

TRANSMISSION PRESSURE SWITCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 14. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 15. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 16. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION SLIPPING OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0142

WP 0154

WP 0454

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0012

Before Beginning This Troubleshooting Procedure

Successful diagnosis of transmission depends on performing various procedures in correct sequence. Failure to comply will lead to misdiagnosis. Perform Transmission Operational Checkout Procedure (WP 0142) before performing tests in this troubleshooting procedure.

This procedure covers the following Diagnostic Trouble Code (DTC):

- P0894

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve DTCs manually or with MSD. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).
2. Read DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

P0842

P0843

CORRECTIVE ACTION

Refer to Transmission Pressure Switch Troubleshooting Procedure (WP 0154) first.

1. Read DTCs.

P0894 is set.

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
 (WP 0795, Item 37)
 Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
 TM 9-2355-106-23P
 WP 0336
 WP 0453
 WP 0454
 WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
 Transmission set in NEUTRAL (N) (TM
 9-2355-106-10)
 Engine off (TM 9-2355-106-10)
 MAIN POWER switch off (TM 9-2355-106-10)
 Wheels chocked (TM 9-2355-106-10)
 Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0960
- P0962
- P0963

TROUBLESHOOTING PROCEDURE**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.

TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE - (CONTINUED)

CAUTION

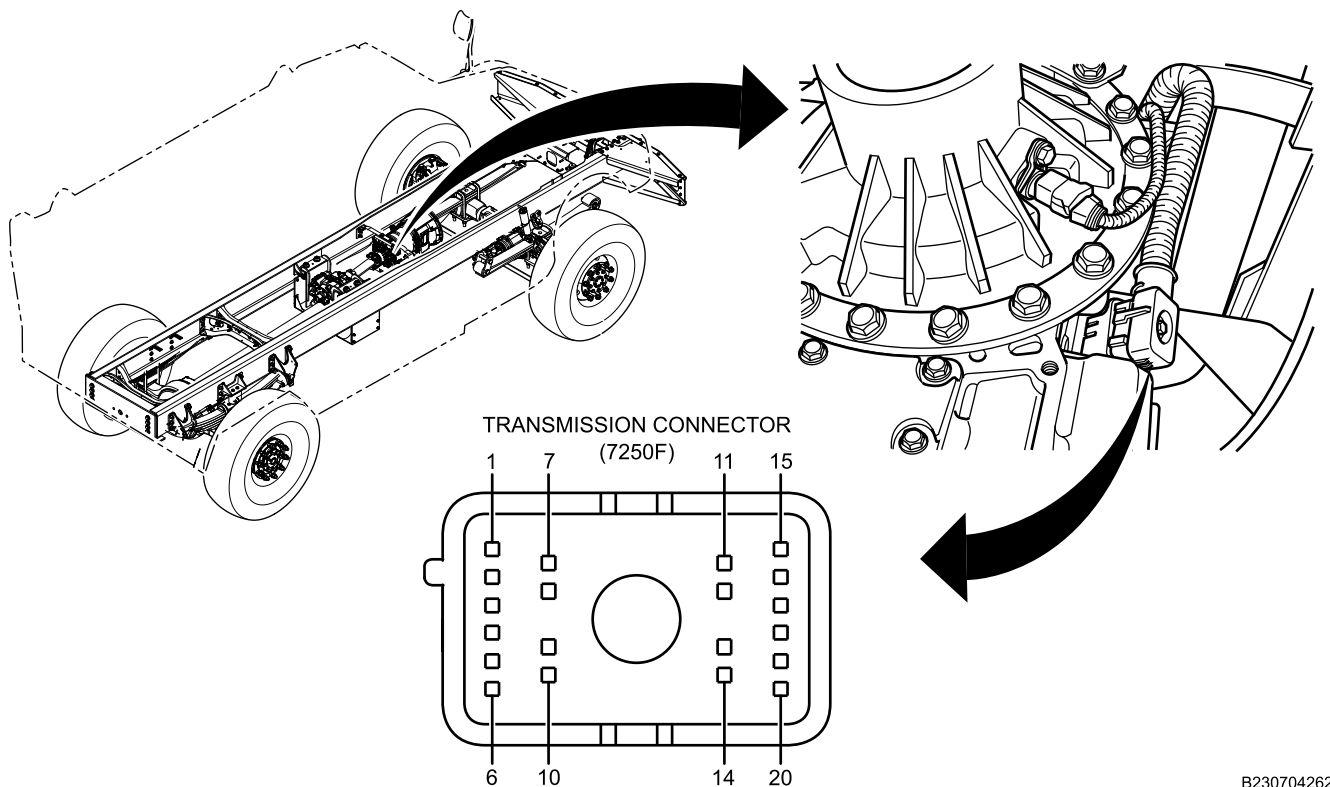
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Measure resistance between connector 7250F terminal 8 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 100 ohms?

DECISION

YES Go to Step 10.

NO Go to next step.

STEP

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).

**TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

5. Measure DC voltage between connector 7250F terminal 8 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 1.0V?

DECISION

NO Go to Step 8.
YES Go to next step.

STEP

6. Measure DC voltage between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 14.
YES Go to next step.

STEP

7. Measure DC voltage between connector 7250F terminal 1 and terminal 8 with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 14.
YES Go to Step 20.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

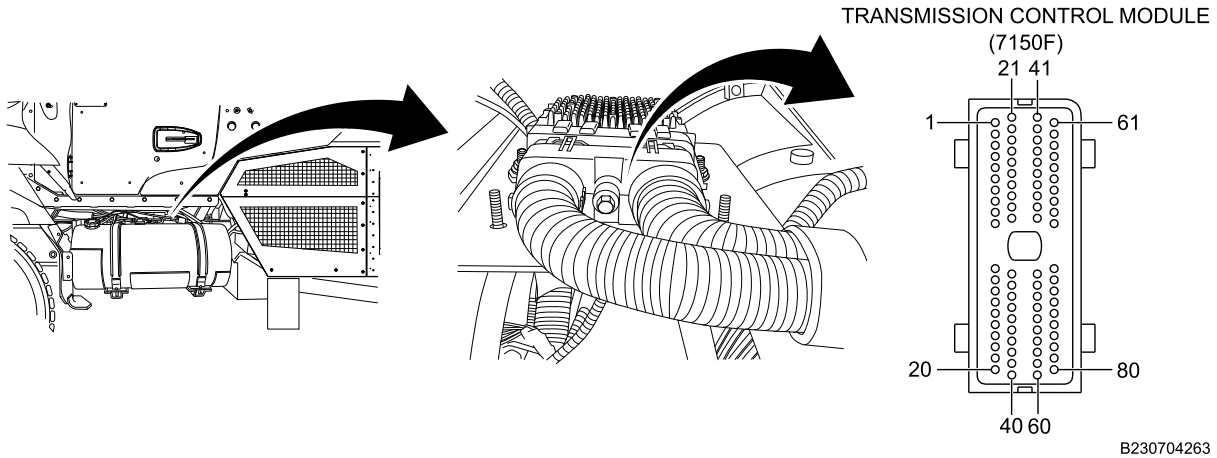


Figure 2. Left Side Frame Rail.

11. Measure resistance between connector 7250F terminal 8 and ground with multimeter. Refer to Figure 3.

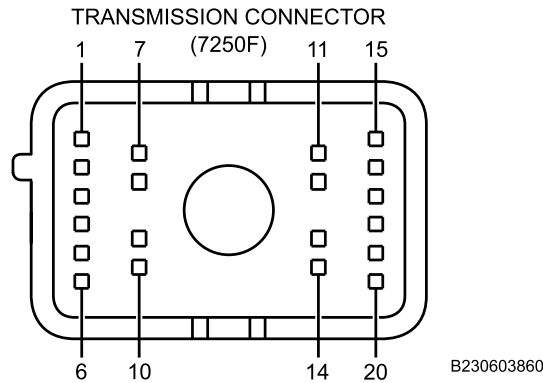


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 22.
 YES Go to next step.

**TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

12. Measure resistance between connector 7150F terminal 77 and connector 7250F terminal 8 with multimeter. Refer to Figure 2 and Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 22.
YES Go to next step.

STEP

13. Measure resistance between connector 7250F terminal 8 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 21.
NO Go to Step 22.

STEP

14. Turn ignition switch OFF (TM 9-2355-106-10).
15. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE - (CONTINUED)

16. Disconnect connector 7150F. Refer to Figure 4. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

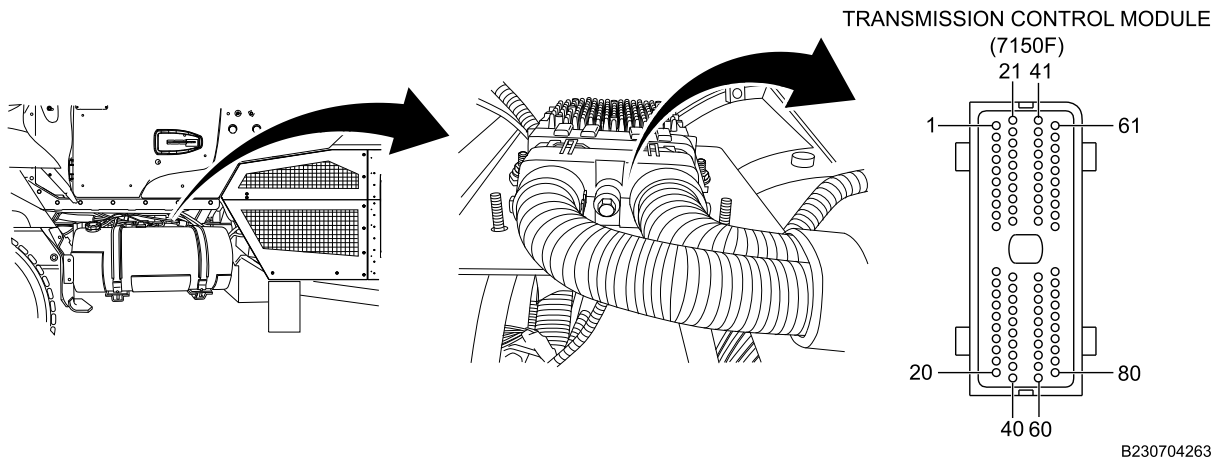


Figure 4. Left Side Frame Rail.

17. Measure resistance between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 5.

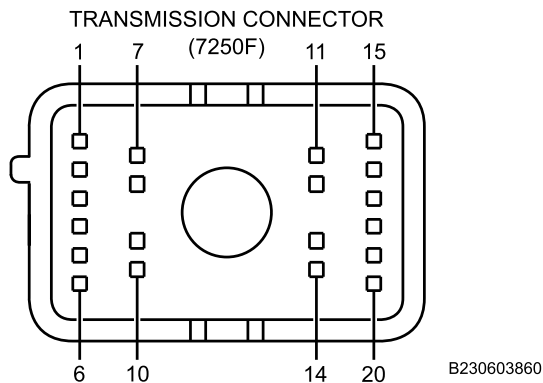


Figure 5. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 22.
 YES Go to next step.

STEP

18. Measure resistance between connector 7150F terminal 11 and connector 7250F terminal 1 with multimeter. Refer to Figure 4 and Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

**TRANSMISSION PRESSURE CONTROL MAIN MOD SOLENOID TROUBLESHOOTING PROCEDURE -
(CONTINUED)****DECISION**

NO Go to Step 22.
YES Go to next step.

STEP

19. Measure resistance between connector 7250F terminal 1 and all other terminals in connector 7250F with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 21.
NO Go to Step 22.

MALFUNCTION

- 20. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 22. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Test Equipment

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0454

WP 0606

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0336

WP 0453

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P0973
- P0974

TROUBLESHOOTING PROCEDURE

STEP

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.

CAUTION

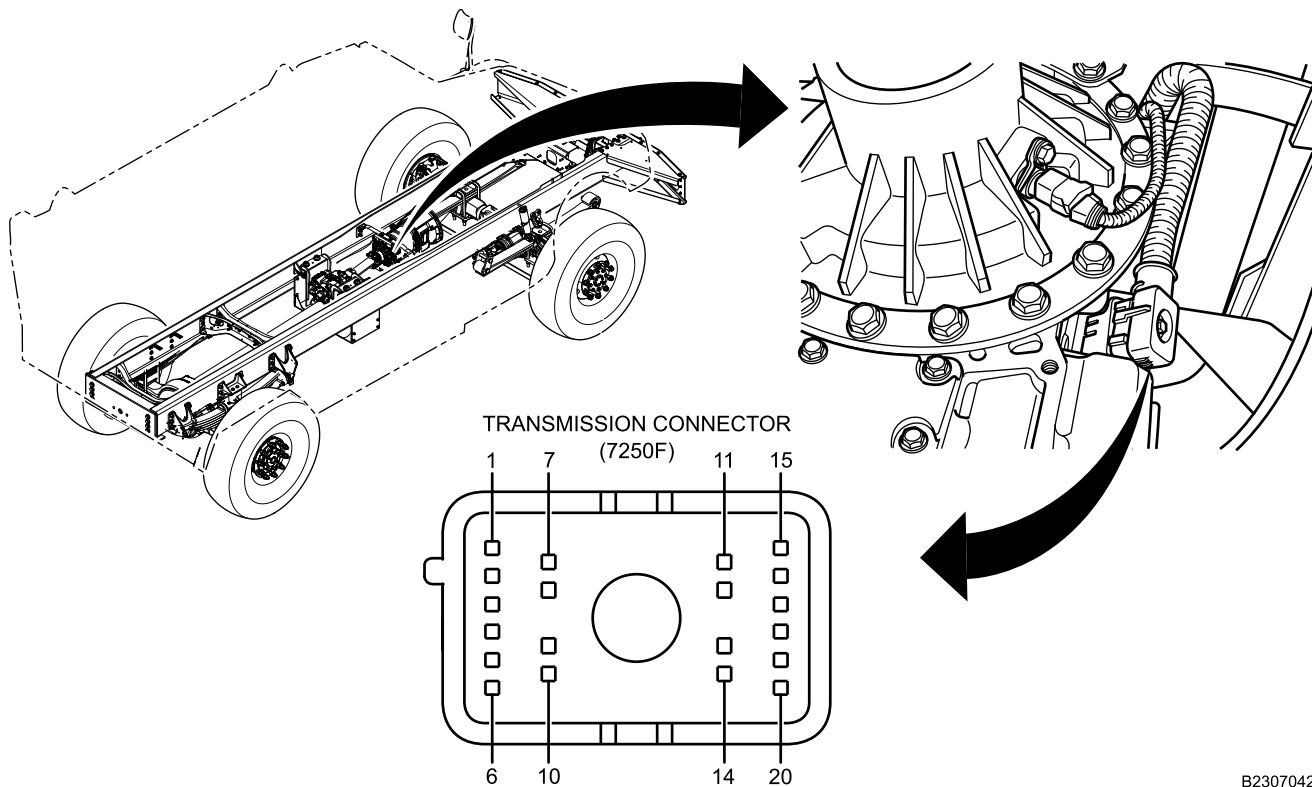
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 7.
 YES Go to next step.

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
6. Measure resistance between connector 7250F terminal 10 and ground with multimeter while activating shift solenoid 1 with MSD. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 1000 ohms?

DECISION

YES Go to Step 19.

NO Go to Step 13.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
9. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

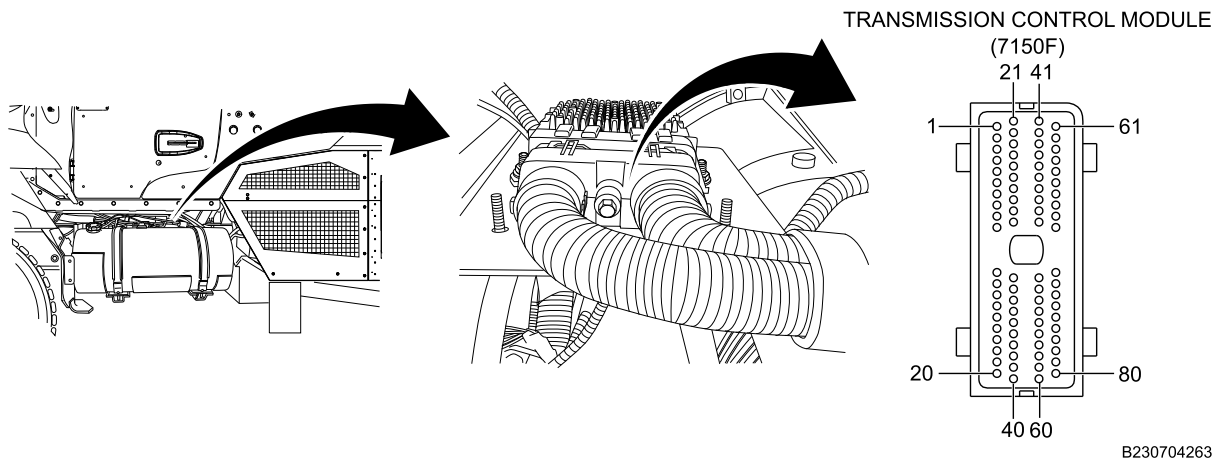


Figure 2. Left Side Frame Rail.

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TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 3.

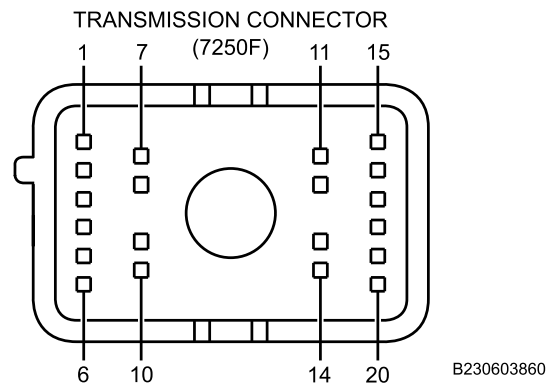


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

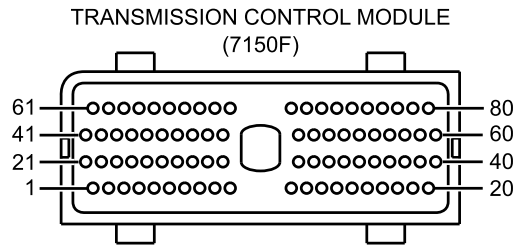
DECISION

NO Go to Step 21.
YES Go to next step.

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

11. Measure resistance between connector 7150F terminal 71 and connector 7250F terminal 6 with multimeter. Refer to Figure 4. Refer to Figure 3.



B230603836

Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
 YES Go to next step.

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

12. Measure resistance between connector 7250F terminal 6 and all other terminals in connector 7250F with multimeter. Refer to Figure 5.

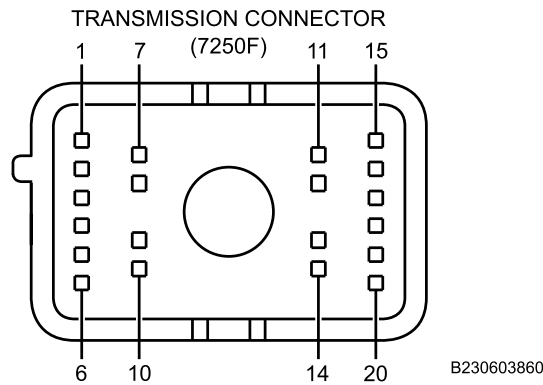


Figure 5. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

- YES Go to Step 20.
- NO Go to Step 21.

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
15. Disconnect connector 7150F. Refer to Figure 6. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

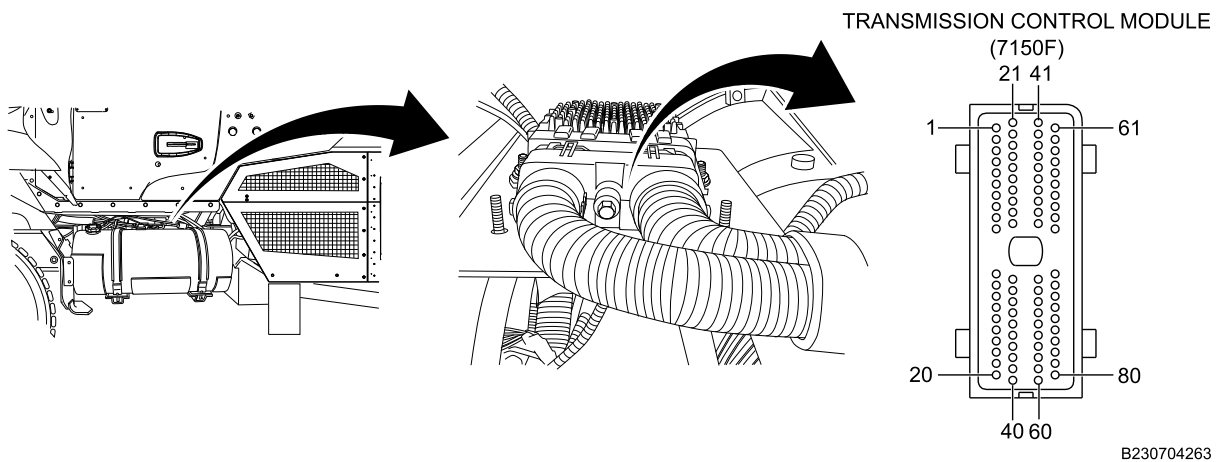


Figure 6. Left Side Frame Rail.

16. Measure resistance between connector 7250F terminal 10 and ground with multimeter. Refer to Figure 7.

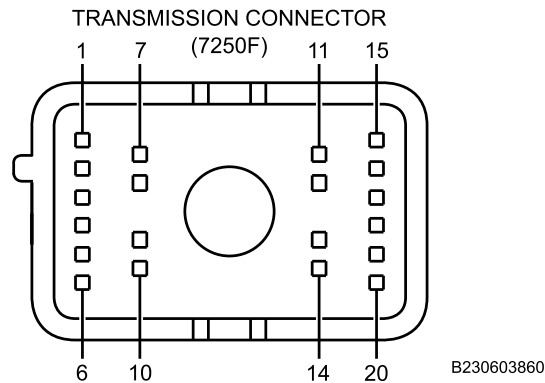
TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 7. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
YES Go to next step.

STEP

17. Measure resistance between connector 7150F terminal 51 and connector 7250F terminal 10 with multimeter. Refer to Figure 6. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
YES Go to next step.

STEP

18. Measure resistance between connector 7250F terminal 10 and all other terminals in connector 7250F with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 20.
NO Go to Step 21.

MALFUNCTION

- 19. Transmission is faulty.

TRANSMISSION SHIFT SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**ACTION**

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 20. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION LOW GEAR TROUBLESHOOTING PROCEDURE****INITIAL SETUP:****Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0149

WP 0150

WP 0454

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0012

WP 0142

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the transmission depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Transmission Operational Checkout Procedure (WP 0142) before performing the tests in this troubleshooting procedure.

This procedure covers the following Diagnostic Trouble Code (DTC):

DTC P1739

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve DTCs manually or with MSD. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

One or more of the following DTCs are set.

P0721

P0722

CORRECTIVE ACTION

Refer to Transmission Output Speed Sensor Troubleshooting Procedure (WP 0149).

1. Read DTCs.

One or more of the following DTCs are set.

P0726

P0727

Refer to Transmission Engine Speed Sensor Troubleshooting Procedure (WP 0150).

1. Read DTCs.

DTC P1739 is set.

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE

TRANSMISSION HIGH SIDE DRIVER 2 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P2670
- P2671

TROUBLESHOOTING PROCEDURE

STEP

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.

CAUTION

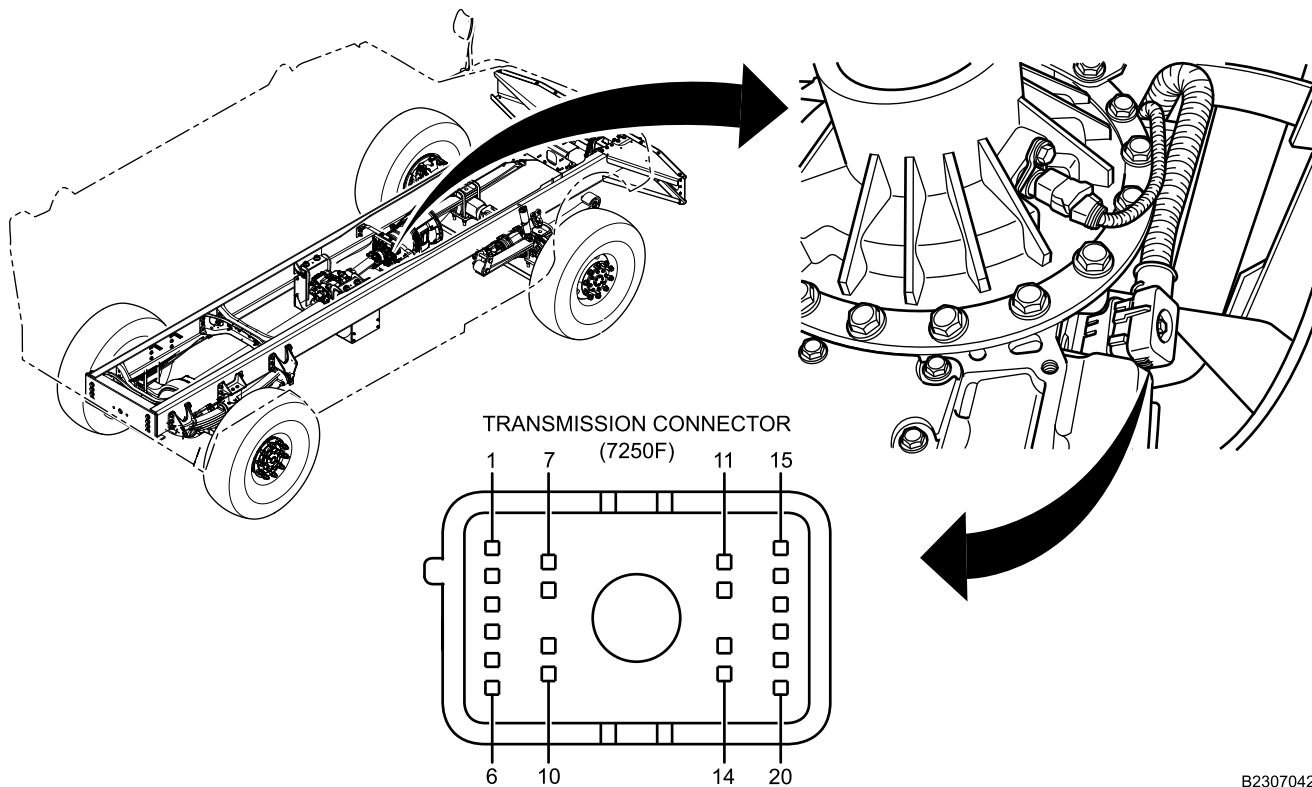
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

TRANSMISSION HIGH SIDE DRIVER 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 1.0V?

DECISION

NO Go to Step 6.
 YES Go to next step.

TRANSMISSION HIGH SIDE DRIVER 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

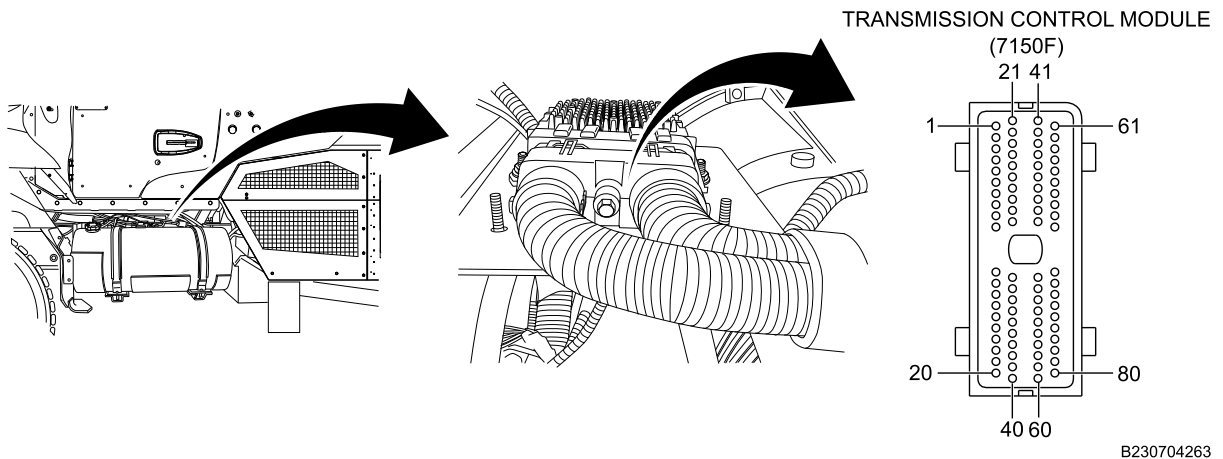
DECISION

YES Go to Step 12.

NO Go to next step.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
 7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 8. Disconnect connector 7150F. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Refer to Figure 2.



B230704263

Figure 2. Left Side Frame Rail.

TRANSMISSION HIGH SIDE DRIVER 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)

9. Measure resistance between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 3.

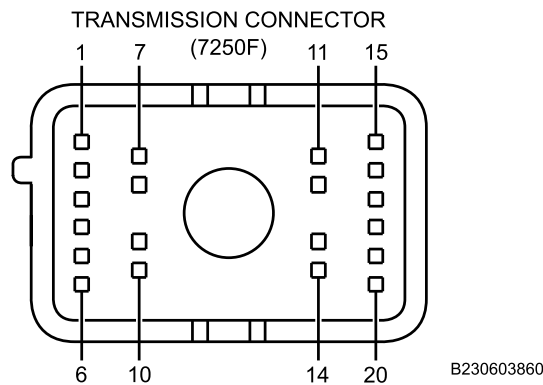


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 14.
 YES Go to next step.

STEP

10. Measure resistance between connector 7150F terminal 71 and connector 7250F terminal 6 with multimeter. Refer to Figure 4. Refer to Figure 3.

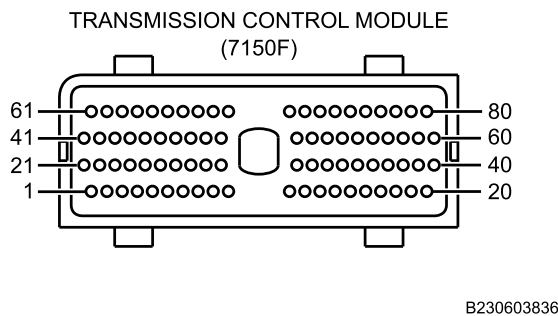


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 14.
 YES Go to next step.

STEP

11. Measure resistance between connector 7250F terminal 6 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

TRANSMISSION HIGH SIDE DRIVER 2 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

DECISION

YES Go to Step 13.

NO Go to Step 14.

MALFUNCTION

- 12. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 13. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 14. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION HIGH SIDE DRIVER 3 TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0336
WP 0453
WP 0454
WP 0606
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Belly armor removed (WP 0606)

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Code (DTCs):

- P2685
- P2686

TROUBLESHOOTING PROCEDURE**STEP****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.

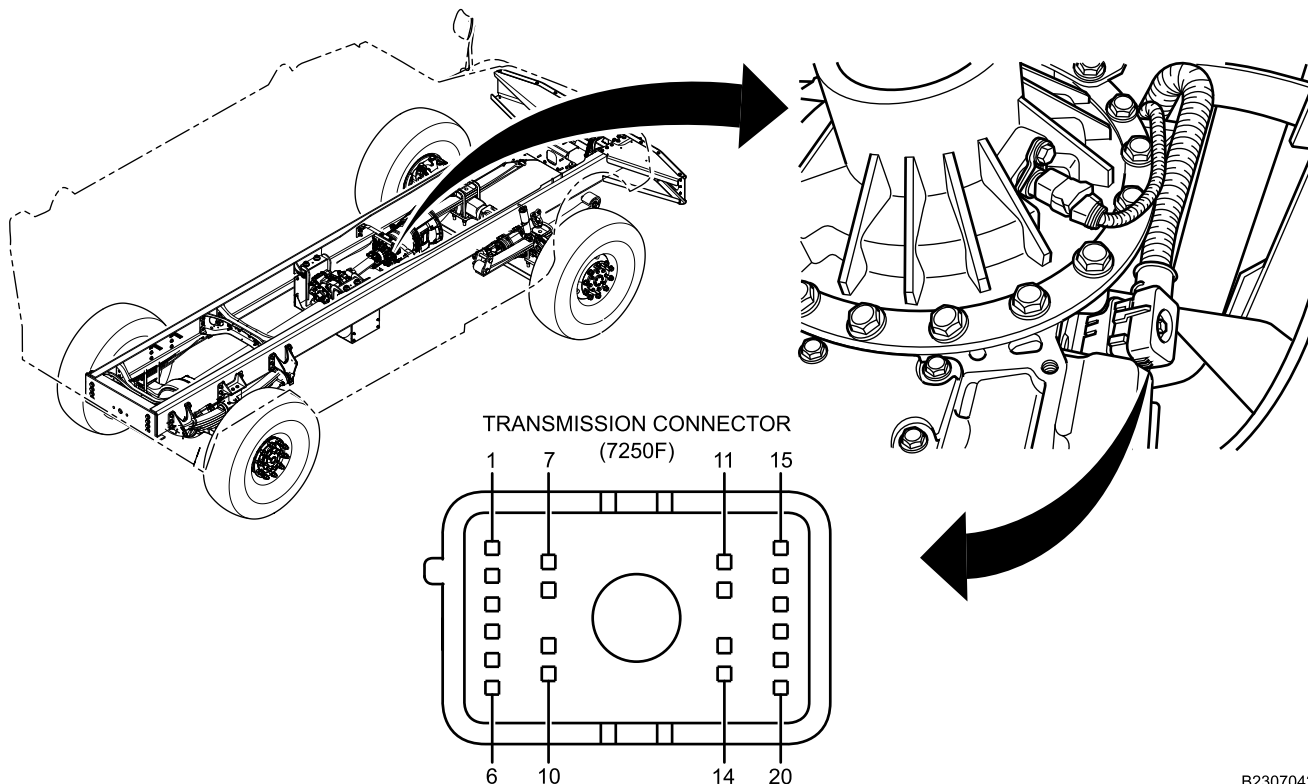
TRANSMISSION HIGH SIDE DRIVER 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



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Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 11 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 1.0V?

DECISION

NO Go to Step 6.
YES Go to next step.

TRANSMISSION HIGH SIDE DRIVER 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Measure DC voltage between connector 7250F terminal 11 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

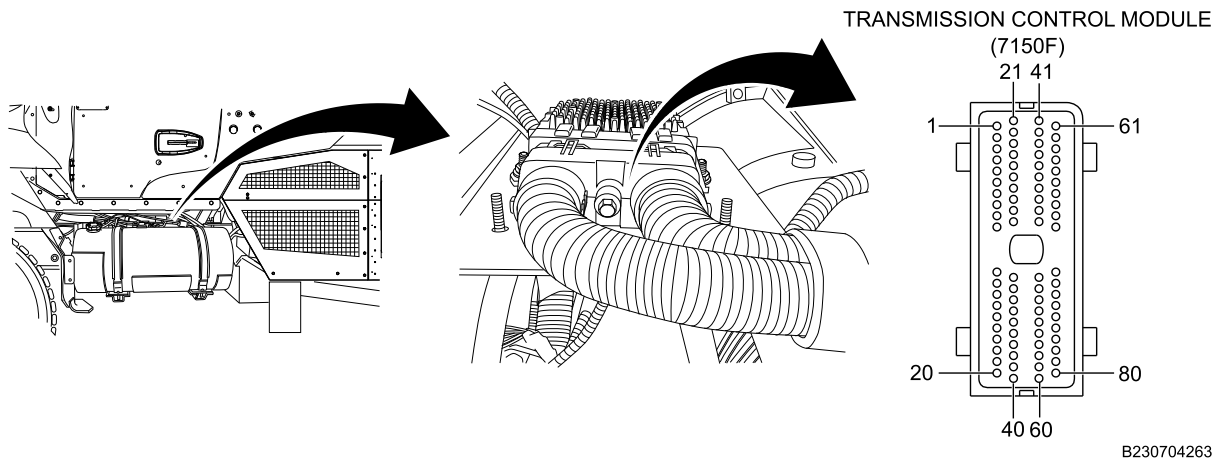
Does multimeter read between 10.5V and 13.5V?

DECISION

YES Go to Step 12.
NO Go to next step.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



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Figure 2. Left Side Frame Rail.

TRANSMISSION HIGH SIDE DRIVER 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)

9. Measure resistance between connector 7250F terminal 11 and ground with multimeter. Refer to Figure 3.

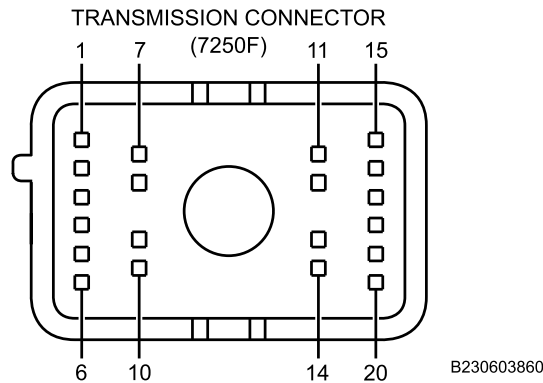


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 14.
 YES Go to next step.

STEP

10. Measure resistance between connector 7150F terminal 31 and connector 7250F terminal 11 with multimeter. Refer to Figure 4 and Figure 3.

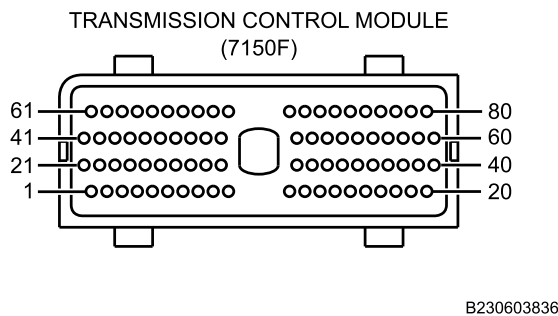


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 14.
 YES Go to next step.

STEP

11. Measure resistance between connector 7250F terminal 11 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

TRANSMISSION HIGH SIDE DRIVER 3 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

DECISION

YES Go to Step 13.

NO Go to Step 14.

MALFUNCTION

- 12. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 13. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 14. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Test Equipment

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0454

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0336

WP 0453

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P2714
- P2715
- P2718
- P2720
- P2721

TROUBLESHOOTING PROCEDURE

STEP

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.

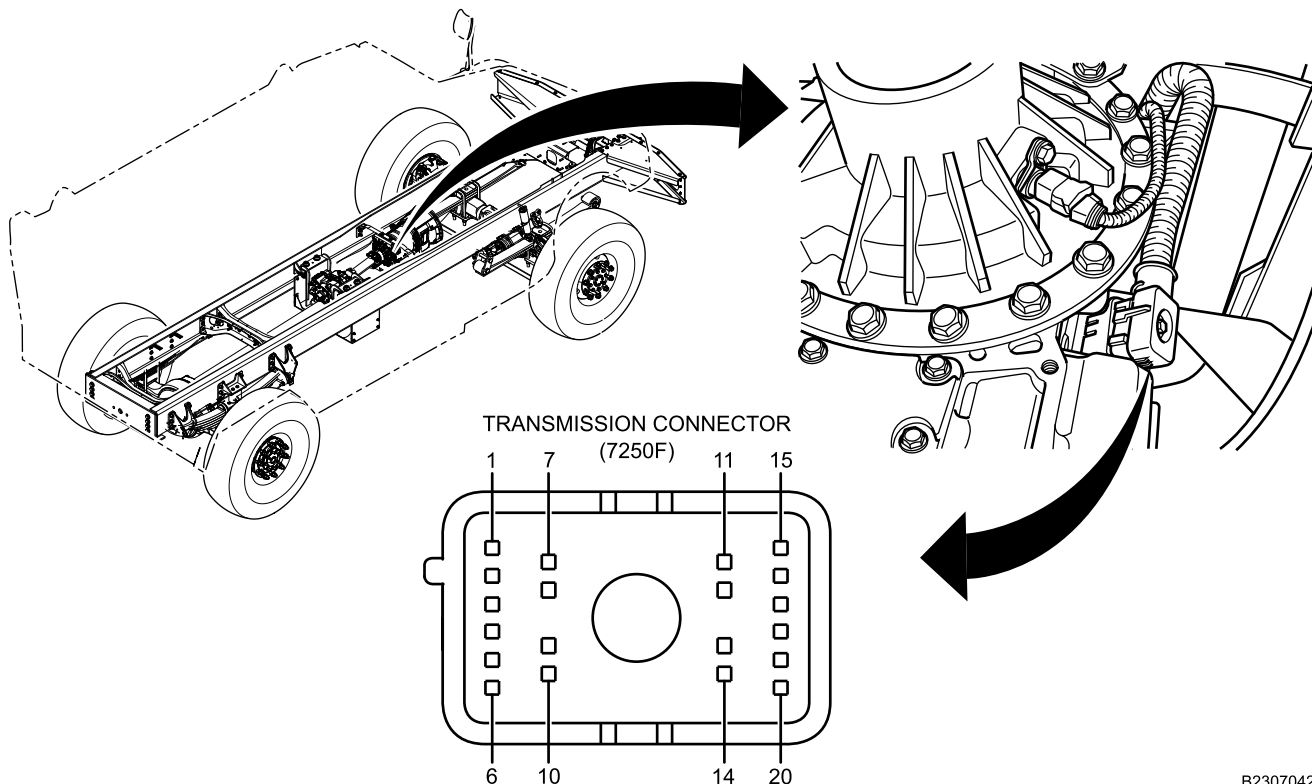
TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 7.
YES Go to next step.

STEP

5. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)

6. With assistant, measure resistance between connector 7250F terminal 2 and ground with multimeter while activating pressure control solenoid 4 with MSD. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 20 ohms?

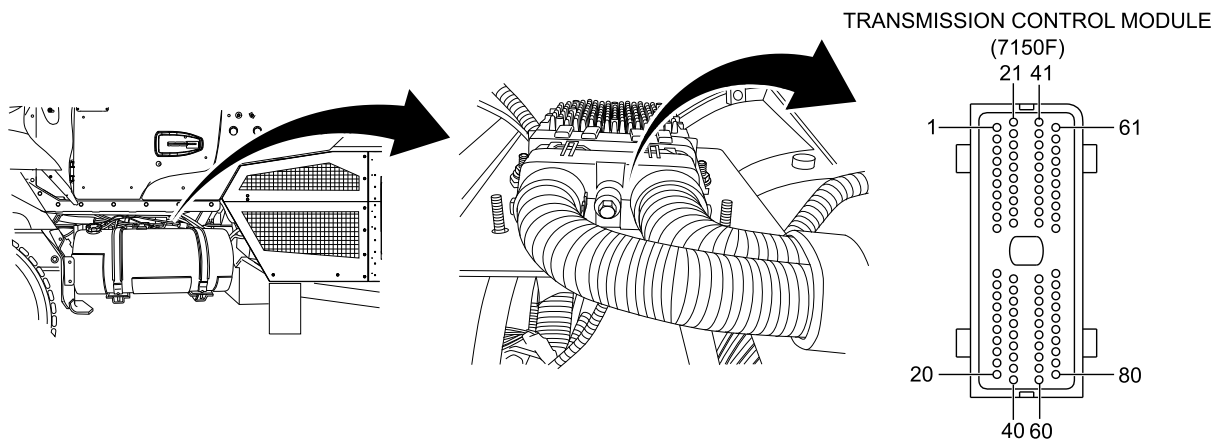
DECISION

YES Go to Step 19.

NO Go to Step 13

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
 8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 9. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



B230704263

Figure 2. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector 7250F terminal 1 and ground with multimeter. Refer to Figure 3.

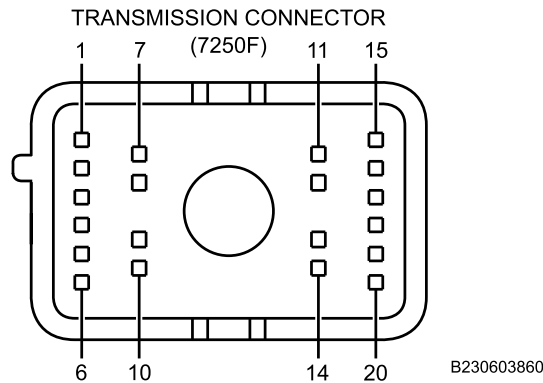


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

11. Measure resistance between connector 7150F terminal 11 and connector 7250F terminal 1 with multimeter. Refer to Figure 4 and Figure 3.

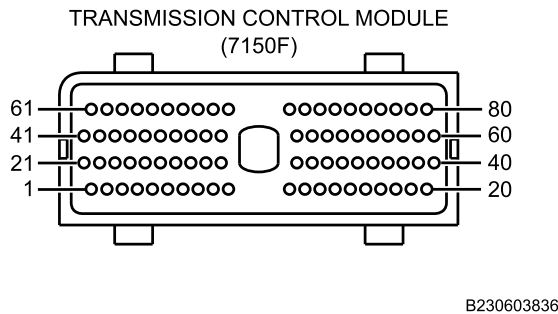


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21
 YES Go to next step.

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

12. Measure resistance between connector 7250F terminal 1 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

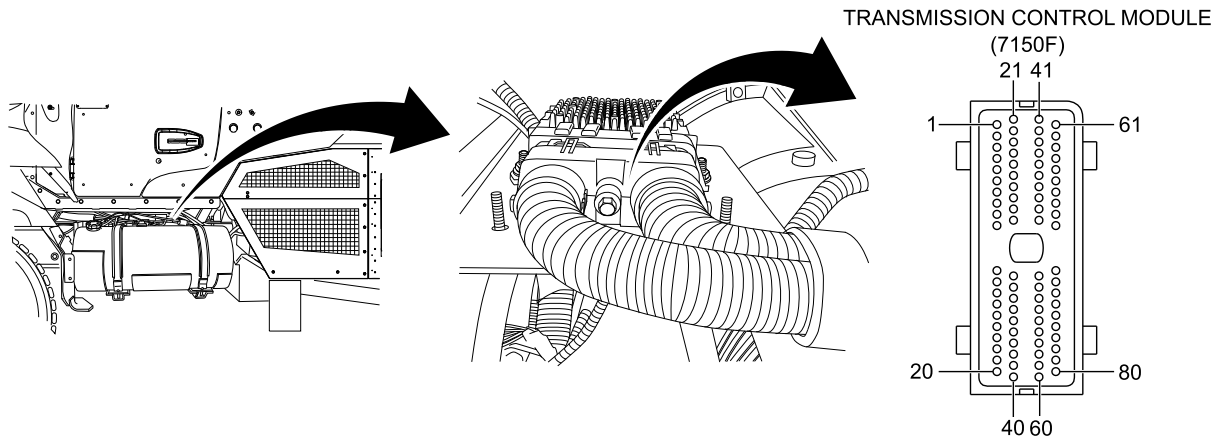
DECISION

YES Go to Step 20

NO Go to Step 21

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
15. Disconnect connector 7150F. Refer to Figure 5. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



B230704263

Figure 5. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)

16. Measure resistance between connector 7250F terminal 2 and ground with multimeter. Refer to Figure 6.

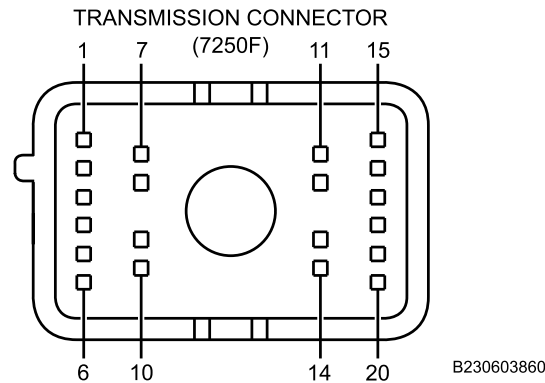


Figure 6. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

17. Measure resistance between connector 7150F terminal 55 and connector 7250F terminal 2 with multimeter. Refer to Figure 7 and Figure 6.

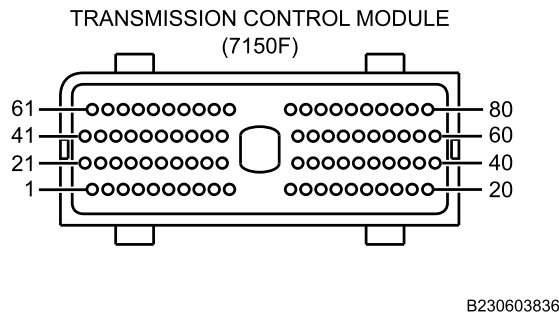


Figure 7. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21
 YES Go to next step.

STEP

18. Measure resistance between connector 7250F terminal 2 and all other terminals in connector 7250F with multimeter. Refer to Figure 6.

TRANSMISSION PRESSURE CONTROL SOLENOID 4 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

DECISION

YES Go to Step 20

NO Go to Step 21

MALFUNCTION

- 19. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 20. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0454

WP 0606

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0336

WP 0453

Drawings Required

WP 0789, Figure 74

This procedure covers the following Diagnostic Trouble Codes (DTCs):

- P2723
- P2724
- P2727
- P2729
- P2730

TROUBLESHOOTING PROCEDURE**STEP****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.

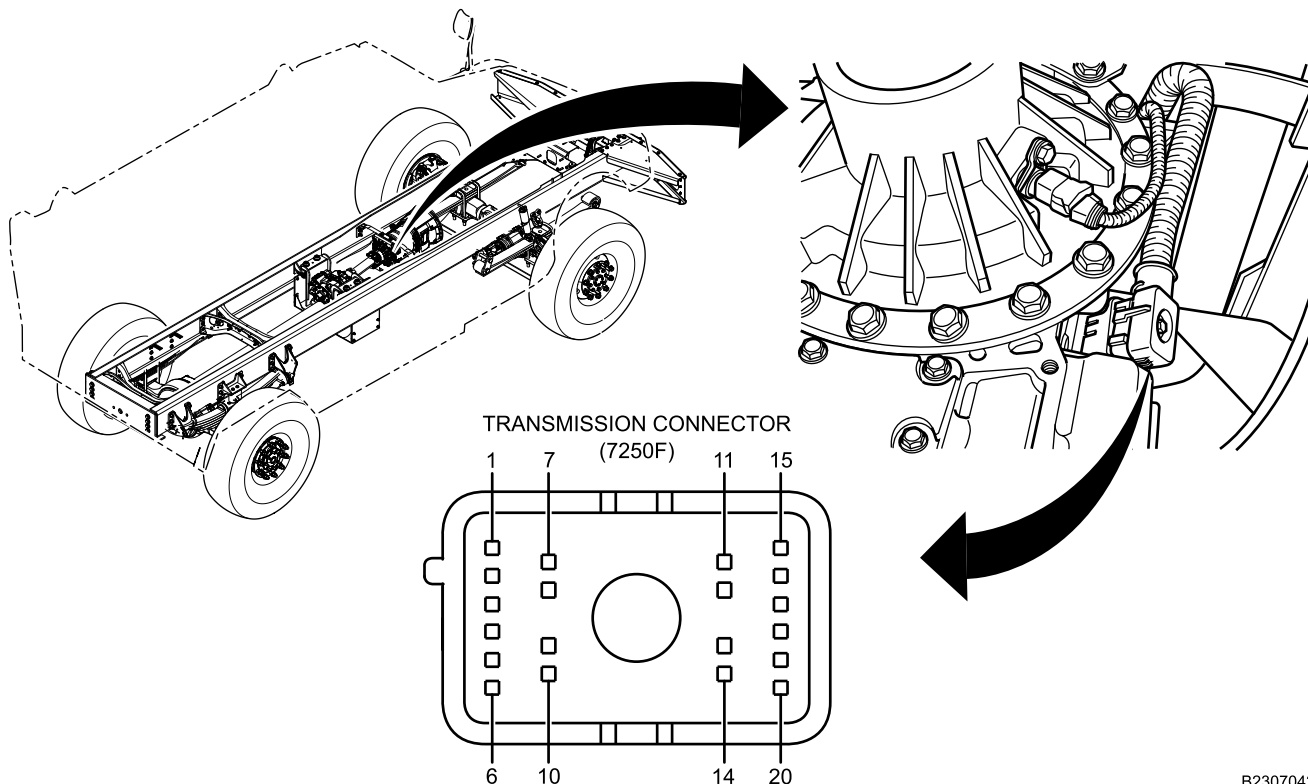
TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

1. Disconnect connector 7250F. Refer to Figure 1.



B230704262

Figure 1. Right Side of Transmission.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

DECISION

NO Go to Step 7.
YES Go to next step.

TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Connect MSD to vehicle. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
6. Measure resistance between connector 7250F terminal 4 and ground with multimeter while activating pressure control solenoid 1 with MSD. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 20 ohms?

DECISION

YES Go to Step 19.

NO Go to Step 13.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
9. Disconnect connector 7150F. Refer to Figure 2. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).

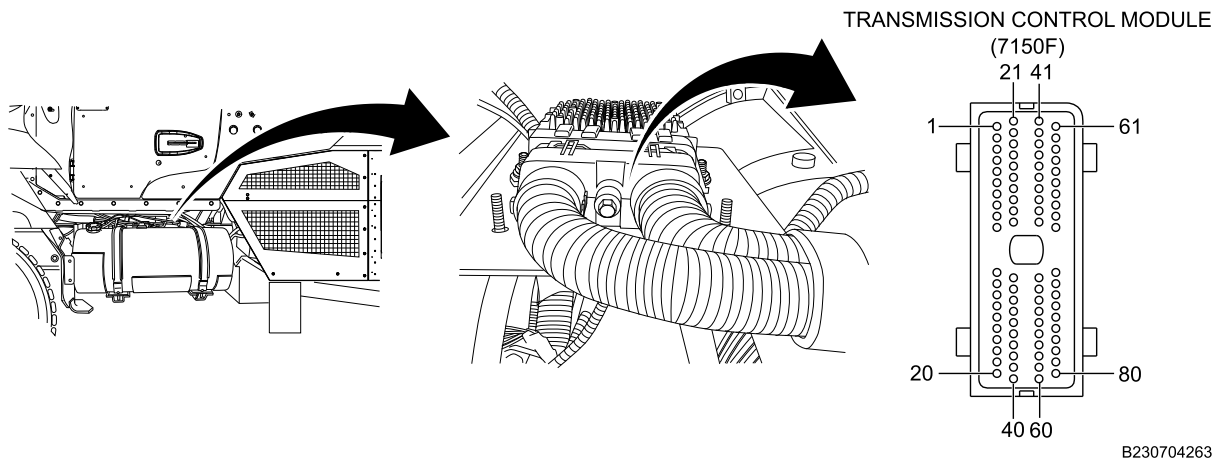


Figure 2. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector 7250F terminal 6 and ground with multimeter. Refer to Figure 3.

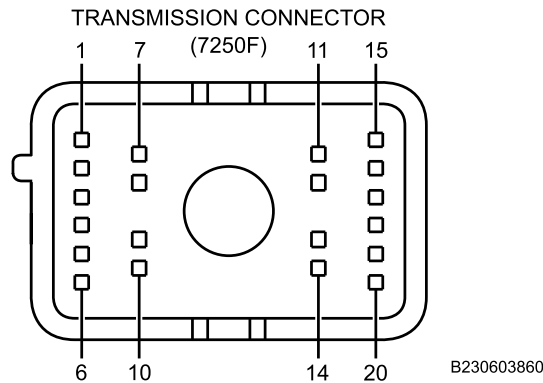


Figure 3. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

11. Measure resistance between connector 7150F terminal 71 and connector 7250F terminal 6 with multimeter. Refer to Figure 4 and Figure 3.

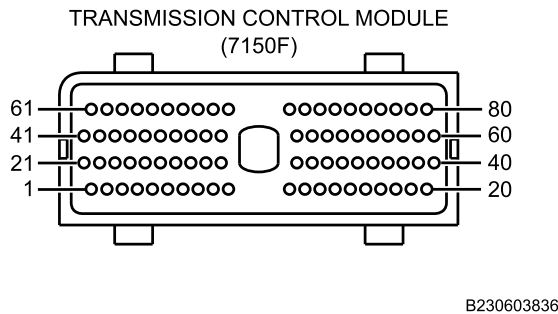


Figure 4. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
 YES Go to next step.

TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Measure resistance between connector 7250F terminal 6 and all other terminals in connector 7250F with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL for each test?

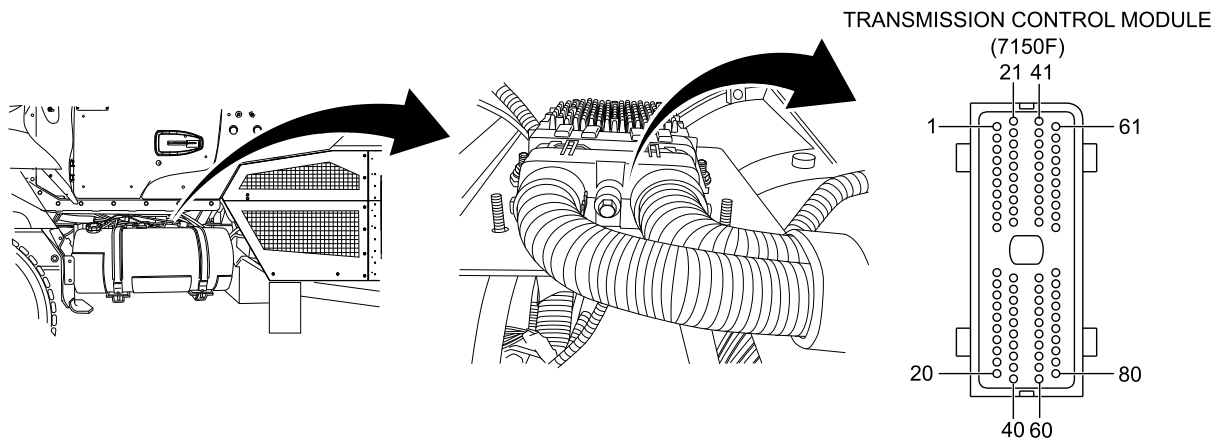
DECISION

YES Go to Step 20.

NO Go to Step 21.

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
 14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 15. Disconnect connector 7150F. Refer to Figure 5. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453).



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Figure 5. Left Side Frame Rail.

TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)

16. Measure resistance between connector 7250F terminal 4 and ground with multimeter. Refer to Figure 6.

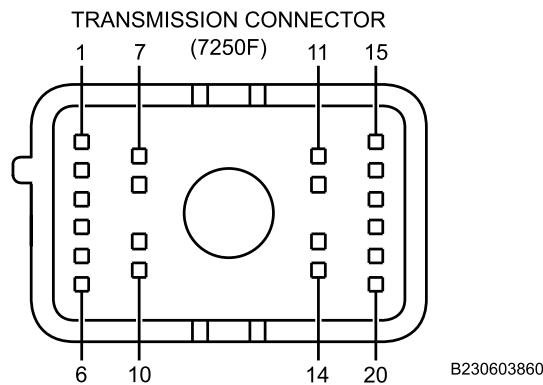


Figure 6. Connector 7250F.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

17. Measure resistance between connector 7150F terminal 36 and connector 7250F terminal 4 with multimeter. Refer to Figure 7 and Figure 6.

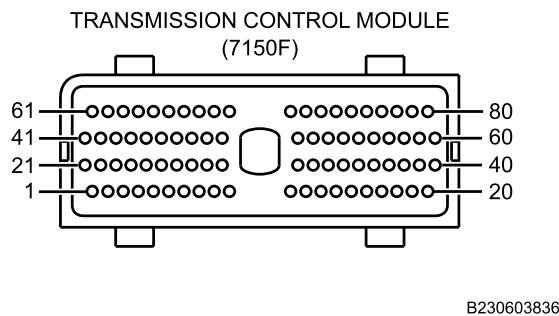


Figure 7. Connector 7150F.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 21.
 YES Go to next step.

STEP

18. Measure resistance between connector 7250F terminal 4 and all other terminals in connector 7250F with multimeter. Refer to Figure 6.

TRANSMISSION PRESSURE CONTROL SOLENOID 1 TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL for each test?

DECISION

YES Go to Step 20.

NO Go to Step 21.

MALFUNCTION

- 19. Transmission is faulty.

ACTION

Replace transmission. Refer to Transmission Assembly Removal and Installation (WP 0454). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 20. TCM is faulty.

ACTION

Replace TCM. Refer to Transmission Control Module (TCM) Removal and Installation (WP 0453). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 21. Engine wiring harness is faulty.

ACTION

Replace engine wiring harness. Refer to Engine Wiring Harness Removal and Installation (WP 0336). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**TRANSMISSION COMMUNICATION TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0012

WP 0067

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

This procedure covers the following Diagnostic Trouble Code DTCs:

- U0010
- U0100
- U0103
- U0115
- U0291
- U0304
- U0333
- U0404
- U0592

TRANSMISSION COMMUNICATION TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Retrieve DTCs manually or with MSD. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).
2. Read DTCs.

CONDITION/INDICATION

One or more of the following DTCs are set.

U0010

U0100

U0103

U0115

U0291

U0304

U0333

U0404

U0592

CORRECTIVE ACTION

Go to Multiplexing Data Link Circuit Troubleshooting Procedure (WP 0067).

END OF WORK PACKAGE

FIELD MAINTENANCE**TRANSFER CASE OPERATIONAL CHECKOUT PROCEDURE****INITIAL SETUP:****Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0233

WP 0464

WP 0460

WP 0461

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0468

WP 0519

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Transfer case armor removed (WP 0462)

Belly armor removed (WP 0606)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0011

WP 0138

WP 0165

WP 0175

TRANSFER CASE LEAK INSPECTION**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Check the transfer case fluid type and fluid level (TM 9-2355-106-10).

CONDITION/INDICATION

Incorrect fluid level and/or incorrect fluid type.

CORRECTIVE ACTION

Fill to correct level with proper fluid (TM 9-2355-106-10). Return vehicle to service.

1. Inspect for plugged transfer case vent hose. Refer to Transfer Case Assembly Removal and Installation (WP 0460).

Transfer case vent hose is plugged.

Clean the vent hose as necessary. Return vehicle to service.

1. Inspect the transfer case for cracks, damage, joint leaks, or seal leaks. Refer to Transfer Case Assembly Removal and Installation (WP 0460).

Transfer case is cracked, damaged, or leaking.

Replace transfer case. Refer to Transfer Case Assembly Removal and Installation (WP 0460). Return vehicle to service.

TRANSFER CASE OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**TRANSFER CASE EXCESSIVE NOISE AND VIBRATION CHECK****STEP**

1. Inspect for dirt or debris around transfer case and drive shafts. Refer to Propeller Shaft Operational Checkout Procedure (WP 0165).

CONDITION/INDICATION

Dirt and or debris found around transfer case or drive shafts.

CORRECTIVE ACTION

Clean dirt or debris from around the transfer case or drive shafts. Return vehicle to service.

1. Check for loose or broken transfer case-to-vehicle mounting brackets or fasteners. Refer to Transfer Case Mount and Support Removal and Installation (WP 0461).

Broken or loose mounting brackets or fasteners found.

Replace or tighten broken or loose mounting brackets or fasteners. Refer to Transfer Case Mount and Support Removal and Installation (WP 0461). Return vehicle to service.

1. Check transfer case fluid for metal particles and housing damage (TM 9-2355-106-10).

Excessive metal particles found in transfer case fluid, or housing damage.

Replace transfer case assembly. Refer to Transfer Case Assembly Removal and Installation (WP 0460).

1. Check for bent, loose, or worn propeller shaft or U-joints. Refer to Propeller Shaft Operational Checkout Procedure (WP 0165).

Bent, worn, or loose propeller shaft or U-joints found.

Replace propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

1. Check for excessive movement in the transfer case input or output shafts. Refer to Propeller Shaft Checkout Procedure (WP 0165).

Excessive movement in transfer case input or output shafts found.

Replace transfer case. Refer to Transfer Case Assembly Removal and Installation (WP 0460). Return vehicle to service.

TRANSFER CASE OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**TRANSFER CASE HIGH/LOW GEAR SHIFTING CHECK****STEP**

1. Connect MSD. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. Check vehicle for any 4-pack air solenoid DTCs. Refer to 4-Pack Air Solenoid Circuits from Electronic System Controller (ESC) Troubleshooting Procedure (WP 0138).

CONDITION/INDICATION

DTC is found.

CORRECTIVE ACTION

Refer to 4-Pack Air Solenoid Circuits from Electronic System Controller (ESC) Troubleshooting Procedure (WP 0138).

1. Check the air pressure gauges (TM 9-2355-106-10).

The air pressure is below 65 psi (448 kPa).

Refer to Air Compressor Operational Checkout and Troubleshooting Procedure (WP 0175).

1. Inspect air dryer for contamination. Refer to Air Dryer Desiccant Cartridge Removal and Installation (WP 0519).

The air dryer is contaminated.

Replace the air dryer desiccant. Refer to Air Dryer Desiccant Cartridge Removal and Installation (WP 0519).
Return vehicle to service.

FRONT AXLE DOES NOT ENGAGE/DISENGAGE CHECK**STEP**

1. Connect MSD. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. Check the vehicle for any 4-pack air solenoid DTCs. Refer to 4-Pack Air Solenoid Circuits from Electronic System Controller (ESC) Troubleshooting Procedure (WP 0138).

CONDITION/INDICATION

DTC is found.

CORRECTIVE ACTION

Refer to 4-Pack Air Solenoid Circuits from Electronic System Controller (ESC) Troubleshooting Procedure (WP 0138).

1. Check the air pressure gauges (TM 9-2355-106-10).

The air pressure is below 65 psi (448 kPa).

Refer to Air Compressor Operational Checkout and Troubleshooting Procedure (WP 0175). Return vehicle to service.

1. Inspect air dryer for contamination. Refer to Air Dryer Desiccant Cartridge Removal and Installation (WP 0519).

The air dryer is contaminated.

Replace the air dryer desiccant. Refer to Air Dryer Desiccant Cartridge Removal and Installation (WP 0519).
Return vehicle to service.

TRANSFER CASE OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**4-PACK AIR SOLENOID CHECK****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.

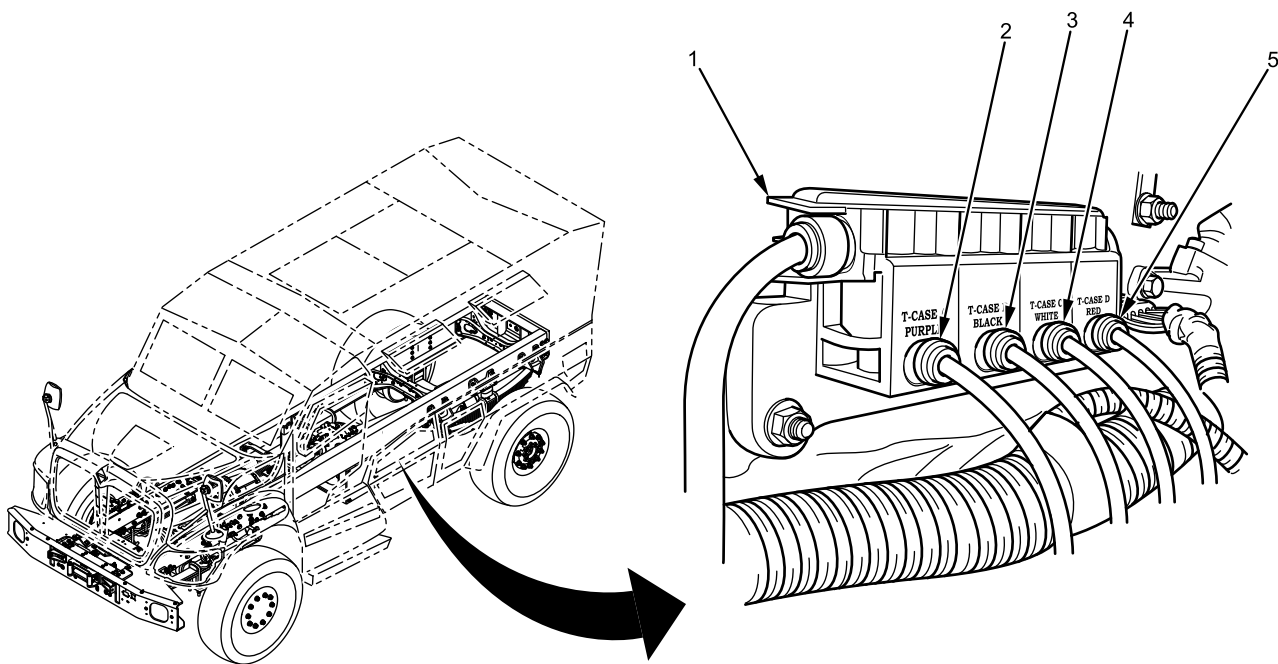
STEP

1. Drain air tanks (TM 9-2355-106-10).

NOTE

Label and tag each air line with location at 4-pack solenoid to ensure correct installation.

2. Disconnect four transfer case outlet air lines (Figure 1, Item 2 through 5) from 4-pack air solenoid (Figure 1, Item 1), located under left side of cab on frame rail.



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Figure 1. Transfer Case Air Line Shift Solenoids.

3. Ensure FRONT AXLE switch is disengaged. Start engine and slowly switch transfer case to NEUTRAL, TRANSFER HIGH, and TRANSFER LOW, while an assistant checks for air coming out of 4-pack air solenoid. Air should come out of one port at a time.

CONDITION/INDICATION

Air came out of more than one port at the same time, or no air came out of any port.

CORRECTIVE ACTION

Replace 4-pack air solenoid. Refer to 4-Pack Air Solenoid Module Removal and Installation (WP 0464).

TRANSFER CASE OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Switch transfer case to NEUTRAL and engage FRONT AXLE switch while an assistant checks for air coming out of 4-pack air solenoid. Air should come out of two ports.

Air came out of more than two ports at the same time, or no air came out of any port.

Replace four-pack air solenoid. Refer to 4-Pack Air Solenoid Module Removal and Installation (WP 0464).

END OF WORK PACKAGE

FIELD MAINTENANCE

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Dial indicator set (WP 0795, Item 27)
Grease gun (WP 0795, Item 41)

WP 0468
WP 0469
WP 0606
WP 0782

Materials/Parts

Rag (WP 0794, Item 39)
Grease (WP 0794, Item 21)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

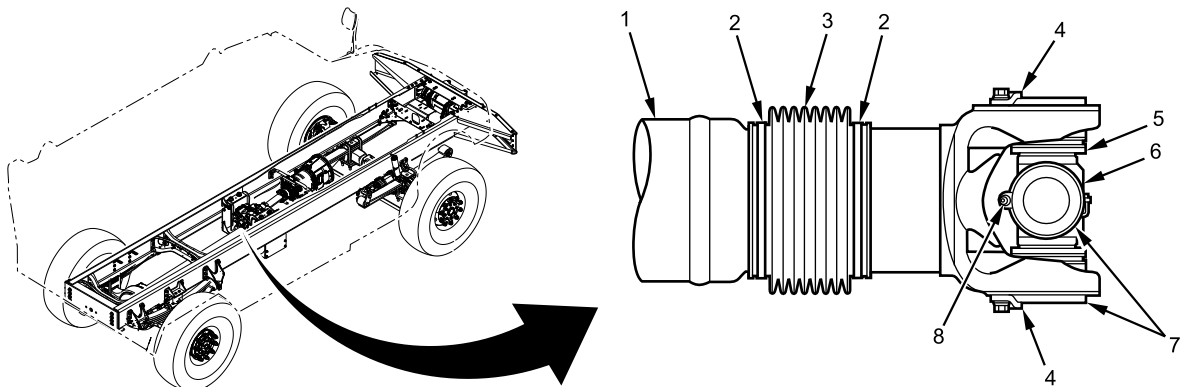
References

TM 9-2355-106-10
TM 9-2355-106-23P

REAR AXLE TO TRANSFER CASE PROPELLER SHAFT CHECKOUT PROCEDURE

STEP

1. Verify U-joint bearing caps (Figure 1, Item 7) or retainers (Figure 1, Item 4) are not missing or damaged.



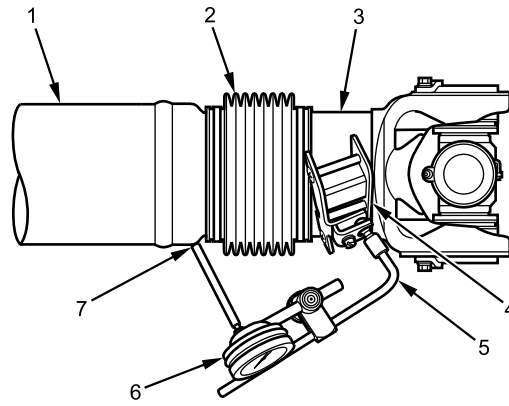
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Figure 1. Propeller Shaft.

2. Verify U-joint bearing caps (Figure 1, Item 7) are not damaged or discolored from excessive heat.
3. Verify U-joint seals (Figure 1, Item 5) and length compensation boot retainers (Figure 1, Item 2) are not worn or damaged. Worn or damaged seals may result in excessive grease loss.
4. Verify length compensation boot (Figure 1, Item 3) is not leaking or damaged.
5. Verify propeller shaft (Figure 1, Item 1) is not missing any balance weights.
6. Verify propeller shaft (Figure 1, Item 1) is not deformed, cracked or damaged.
7. Verify U-joint grease fittings (Figure 1, Item 8) are not missing, damaged, or leaking (TM 9-2355-106-10).
8. Apply grease to U-joint grease fittings (Figure 1, Item 8) until grease escapes from seals (Figure 1, Item 5). Verify seals allow grease to escape and no water or rust is found in grease.
9. Verify U-joints (Figure 1, Item 6) do not have excessive play or resistance. One U-joint shown. Other U-joints similar.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

10. Position dial indicator magnetic base (Figure 2, Item 4) on yoke shaft tube (Figure 2, Item 3).



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Figure 2. Length Compensation Eccentricity Check.

11. Extend dial indicator (Figure 2, Item 6) across dial indicator arm (Figure 2, Item 5) over length compensation boot (Figure 2, Item 2).
12. Position dial indicator plunger (Figure 2, Item 7) on propeller shaft (Figure 2, Item 1).
13. Apply up-and-down force to yoke shaft tube (Figure 2, Item 3) while observing dial indicator (Figure 2, Item 6). Verify propeller shaft length compensation slip member is not deflecting more than 0.012 inch (0.305 mm).

CONDITION/INDICATION

U-joint bearing caps or retainers are missing, damaged, or discolored from excessive heat.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

U-joint seals are worn or damaged.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Length compensation boot or seals worn, damaged, or leaking.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Propeller shaft missing balance weights.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Propeller shaft deformed, cracked, or damaged.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

U-joint grease fittings leaking, damaged, or missing.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

Water or rust found in grease.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

U joints have excessive play or resistance.

CORRECTIVE ACTION

Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

Propeller shaft length compensation slip member deflects more than 0.012 inch (0.305 mm).

CORRECTIVE ACTION

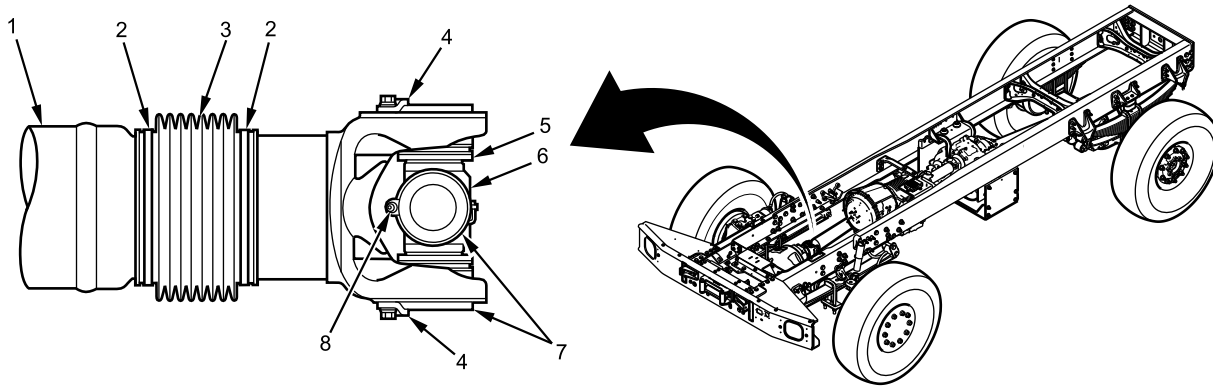
Replace rear axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

FRONT AXLE TO TRANSFER CASE PROPELLER SHAFT CHECKOUT PROCEDURE

STEP

1. Remove belly armor. Refer to Belly Armor Removal and Installation (WP 0606).
2. Verify U-joint bearing caps (Figure 3, Item 7) or retainers (Figure 3, Item 4) are not missing or damaged.



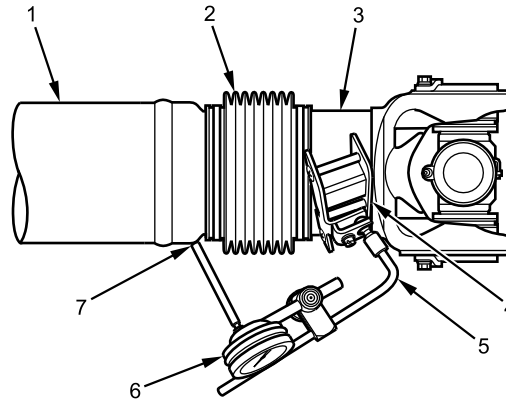
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Figure 3. Propeller Shaft.

3. Verify U-joint bearing caps (Figure 3, Item 7) are not damaged or discolored from excessive heat.
4. Verify U-joint seals (Figure 3, Item 5) and length compensation boot retainers (Figure 3, Item 2) are not worn, damaged, or leaking. Worn or damaged seals may result in excessive grease loss.
5. Verify length compensation boot (Figure 3, Item 3) is not damaged or leaking.
6. Verify propeller shaft (Figure 3, Item 1) is not missing any balance weights.
7. Verify propeller shaft (Figure 3, Item 1) is not deformed, cracked or damaged.
8. Verify U-joints (Figure 3, Item 6) do not have excessive play or resistance. One U-joint shown. Other U-joints similar.
9. Verify U-joint grease fittings (Figure 3, Item 8) are not missing, damaged or leaking.
10. Apply grease to U-joint grease fittings (Figure 3, Item 8) until grease escapes from seals (Figure 3, Item 5). Verify seals allow grease to escape and no water or rust is found in grease.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

11. Position dial indicator magnetic base (Figure 4, Item 4) on yoke shaft tube (Figure 4, Item 3).



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Figure 4. Length Compensation Eccentricity Check.

12. Extend dial indicator (Figure 4, Item 6) across dial indicator arm (Figure 4, Item 5) over length compensation boot (Figure 4, Item 2).
13. Position dial indicator plunger (Figure 4, Item 7) on propeller shaft (Figure 4, Item 1).
14. Apply up-and-down force to yoke shaft tube (Figure 4, Item 3) while observing dial indicator (Figure 4, Item 6). Verify propeller shaft length compensation slip member is not deflecting more than 0.012 inch (0.305 mm).
15. Apply up-and-down force to propeller shaft (Figure 4, Item 2) while observing dial indicator (Figure 4, Item 4). Verify propeller shaft length compensation slip member is not deflecting more than 0.012 inch (0.305 mm).

CONDITION/INDICATION

U-joint bearing caps or retainers are missing, damaged, or discolored from excessive heat.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

U-joint seals are worn or damaged.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Length compensation boot or seals worn, damaged, or leaking.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Propeller shaft missing balance weights.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CORRECTIVE ACTION**

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

Propeller shaft deformed, cracked, or damaged.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

U-joint grease fittings leaking, damaged, or missing.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

Water or rust found in grease.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

U joints have excessive play or resistance.

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

CONDITION/INDICATION

Propeller shaft length compensation slip member deflects more than 0.012 inch (0.305 mm).

CORRECTIVE ACTION

Replace front axle to transfer case propeller shaft. Refer to Propeller Shaft Removal and Installation (WP 0468).
Return vehicle to service.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**TRANSMISSION TO TRANSFER CASE PROPELLER SHAFT CHECKOUT PROCEDURE****STEP**

1. Remove transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468).
2. Verify length compensation seal housing (Figure 5, Item 2) is not damaged.

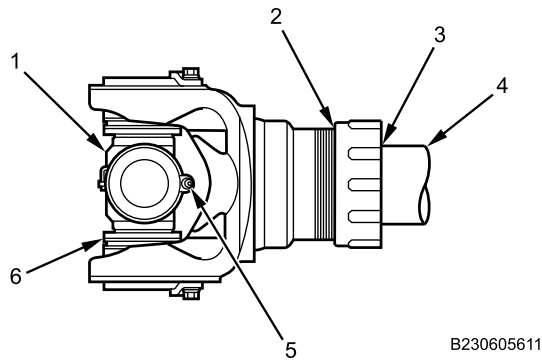


Figure 5. Propeller Shaft.

3. Verify length compensation seal (Figure 5, Item 3) and propeller shaft (Figure 5, Item 4) sealing surface are not leaking or damaged.
4. Verify U-joints (Figure 5, Item 1) do not have excessive play or resistance. One U-joint shown. Other U-joints similar.
5. Apply grease to U-joint grease fittings (Figure 5, Item 5) until grease escapes from seals (Figure 5, Item 6). Verify seals allow grease to escape and no water or rust is found in grease.

NOTE

When installing dial indicator, make sure the magnetic base is mounted flat to prevent movement during testing.

6. Position dial indicator magnetic base (Figure 6, Item 1) on drive shaft (Figure 6, Item 2).

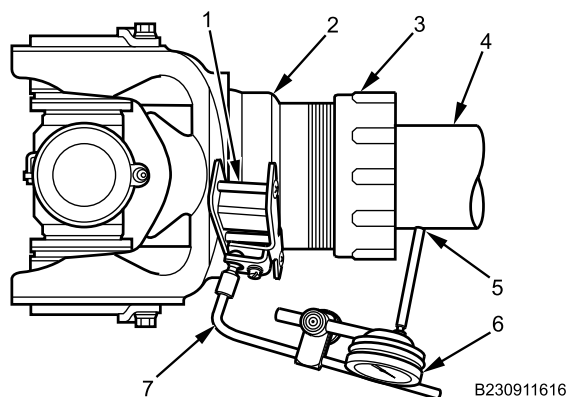


Figure 6. Length Compensation Eccentricity Check.

PROPELLER SHAFT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

7. Extend dial indicator (Figure 6, Item 6) across dial indicator arm (Figure 6, Item 7) over shaft seal (Figure 6, Item 3)
8. Position dial indicator plunger (Figure 6, Item 5) on propeller shaft (Figure 6, Item 2).
9. Apply up-and-down force to propeller shaft (Figure 6, Item 4) while observing dial indicator (Figure 6, Item 6). Verify propeller shaft length compensation slip member is not deflecting more than 0.012 inch (0.305 mm).

CONDITION/INDICATION

Length compensation seal housing damaged.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Length compensation seal and propeller shaft sealing surface are leaking or damaged.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

U-joints have excessive play or resistance.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Water or rust found in grease.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Propeller shaft deformed, cracked, or damaged.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

U-joint grease fittings leaking, damaged, or missing.

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

CONDITION/INDICATION

Propeller shaft length compensation slip member deflects more than 0.012 inch (0.305 mm).

CORRECTIVE ACTION

Replace transmission to transfer case propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
FRONT AXLE OPERATIONAL CHECKOUT PROCEDURES

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0474

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0164
WP 0165
WP 0171
WP 0468
WP 0470
WP 0473

Equipment Condition

Vehicle positioned on level surface (TM 9-2355-106-10)
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Check axle fluid for metal particles and housing damage (TM 9-2355-106-10).

CONDITION/INDICATION

Excessive metal particles found in axle fluid or housing damage.

CORRECTIVE ACTION

Replace axle assembly. Refer to Front Axle Assembly Removal and Installation (WP 0470).

1. Check axle fluid for foreign material or water contamination (TM 9-2355-106-10).

Fluid has foreign material or water contamination.

STEP 1. Check heavy duty hose for proper routing and condition. Refer to Front Axle Breather Removal and Installation (WP 0473).

STEP 2. Change axle fluid. Refer to Front Axle Differential Drain/Fill Procedure (WP 0474).

1. Check transfer case for proper engagement. Refer to Transfer Case Operational Checkout Procedure (WP 0164).
2. Check brake shoes and S-camshaft for proper operation. Refer to Brake System Troubleshooting Procedure (WP 0171).
3. Inspect propeller shaft joints for looseness. Refer to Propeller Shaft Operational Checkout Procedure (WP 0165).

Loose propeller shaft.

Replace propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468).

1. Check axle assembly for leaks (TM 9-2355-106-10).

Class III oil leak from axle assembly.

Replace unserviceable seal or axle assembly. Refer to Front Axle Assembly Removal and Installation (WP 0470). Inspect heavy duty hose for proper venting. Refer to Front Axle Breather Removal and Installation (WP 0473).

FRONT AXLE OPERATIONAL CHECKOUT PROCEDURES - (CONTINUED)

1. Inspect axle heavy duty hose. Refer to Front Axle Breather Removal and Installation (WP 0473).

Damaged or faulty axle heavy duty hose.

Replace axle heavy duty hose. Refer to Front Axle Breather Removal and Installation (WP 0473).

END OF WORK PACKAGE

FIELD MAINTENANCE
REAR AXLE OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0479

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0164
WP 0165
WP 0171
WP 0468
WP 0478

Equipment Condition

Vehicle positioned on level surface (TM 9-2355-106-10)
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Check axle fluid for metal particles and housing damage (TM 9-2355-106-10).

CONDITION/INDICATION

Excessive metal particles found in axle fluid, or housing damage.

CORRECTIVE ACTION

Replace axle assembly. Refer to Rear Axle Assembly Removal and Installation (WP 0478).

1. Check axle fluid for foreign material or water contamination (TM 9-2355-106-10).

Axle fluid has foreign material or water contamination.

STEP 1. Check heavy duty hose for proper routing and condition. Refer to Rear Axle Assembly Removal and Installation (WP 0478).

STEP 2. Change axle fluid. Refer to Rear Axle Differential Drain and Fill Procedure (WP 0479).

1. Check transfer case for proper engagement. Refer to Transfer Case Operational Checkout Procedure (WP 0164).
2. Check brake shoes and S-camshaft for proper operation. Refer to Brake System Troubleshooting Procedure (WP 0171).
3. Inspect propeller shaft joints for looseness. Refer to Propeller Shaft Operational Checkout Procedure (WP 0165).

Loose propeller shaft.

Replace propeller shaft. Refer to Prop Shaft Removal and Installation (WP 0468).

REAR AXLE OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Check axle assembly for leaks (TM 9-2355-106-10).

Class III oil leak from axle assembly.

Replace unserviceable seal or axle assembly. Refer to Rear Axle Assembly Removal and Installation (WP 0478).
Inspect heavy duty hose for proper venting (WP 0478).

1. Inspect axle heavy duty hose. Refer to Front Axle Breather Removal and Installation (WP 0473).

Damaged or faulty axle heavy duty hose.

Replace axle heavy duty hose. Refer to Front Axle Breather Removal and Installation (WP 0473).

END OF WORK PACKAGE

FIELD MAINTENANCE

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0324
WP 0319
WP 0353
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0392
WP 0238
WP 0393
WP 0329
WP 0317
WP 0326
WP 0597

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine shut off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 69

This procedure covers the following Electronic System Controller (ESC) Diagnostic Trouble Codes (DTCs):

- 597 14 1 0
- 612 14 1 1
- 612 14 1 2

TROUBLESHOOTING PROCEDURE

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.

CAUTION

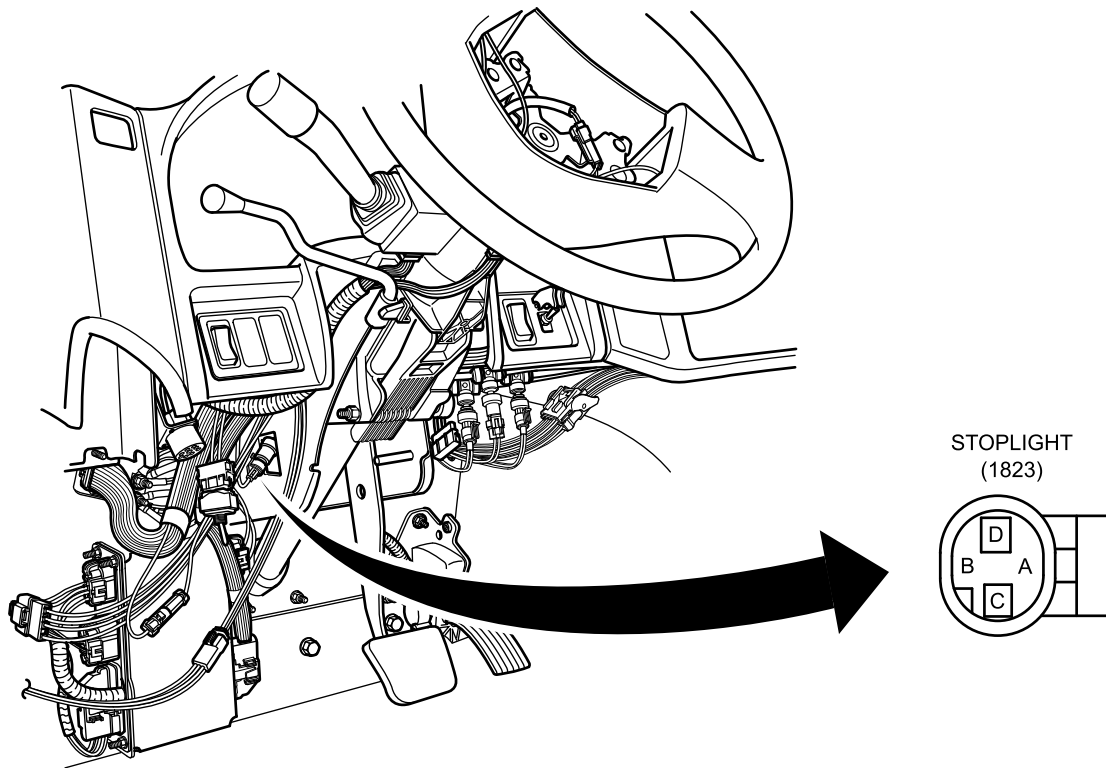
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect harness connector 1823. Refer to Figure 1.



B230604459

Figure 1. Below Dash, Left of Steering Column.

2. Measure resistance between connector 1823 terminal D and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 18.
YES Go to next step.

STEP

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Turn ignition switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector 1823 terminal C and ground with multimeter. Refer to Figure 1.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read between 10.5V and 13.5V?

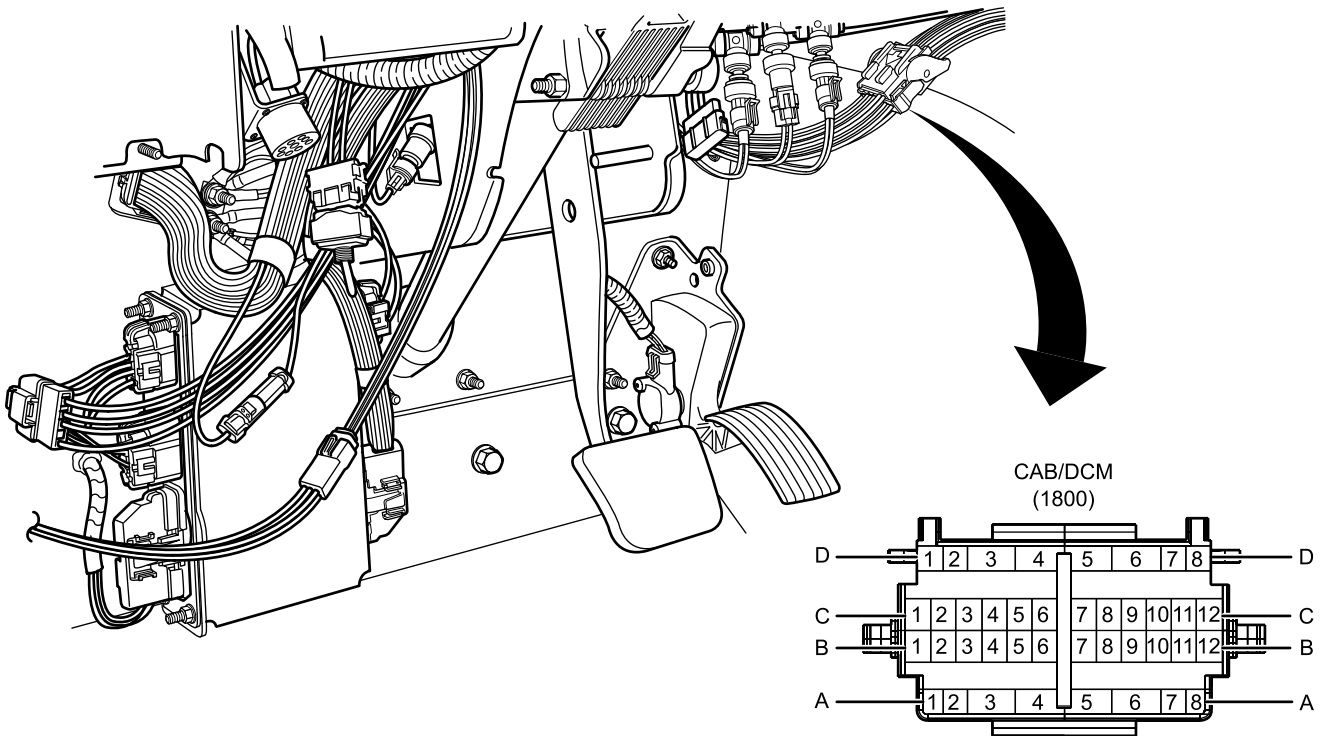
DECISION

YES Go to Step 24.

NO Go to next step.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Disconnect harness connector 1800/1805. Refer to Figure 2.



B230603796

Figure 2. Below Dash.

9. Turn MAIN POWER switch ON (TM 9-2355-106-10).
10. Turn ignition switch ON (TM 9-2355-106-10).
11. Measure DC voltage between connector 1800 terminal B9 and ground with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read between 10.5V and 13.5V?

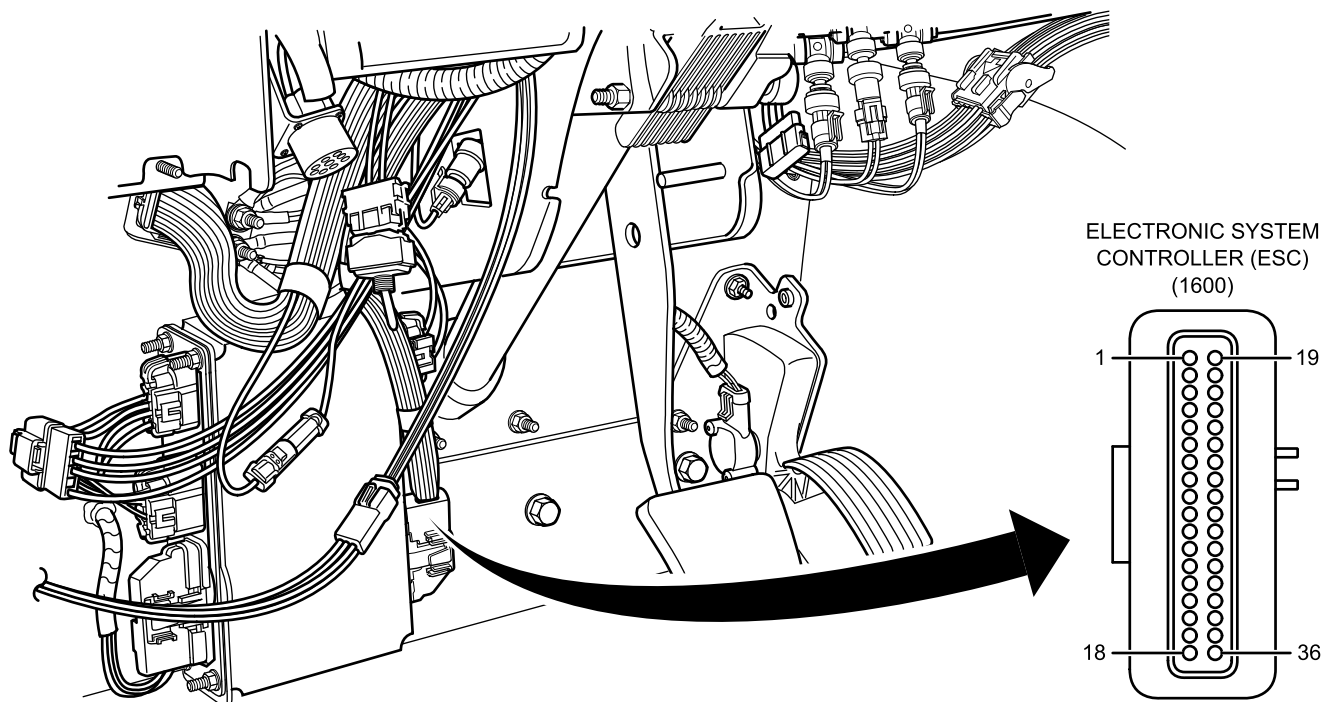
STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

- YES Go to Step 22.
- NO Go to next step.

STEP

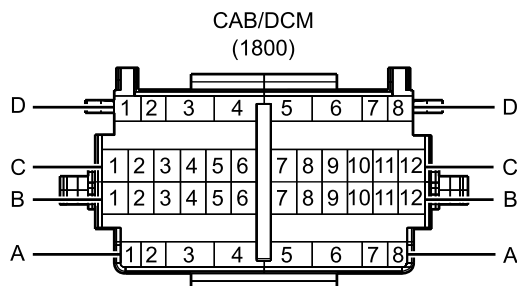
12. Turn ignition switch OFF (TM 9-2355-106-10).
13. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
14. Disconnect ESC connector 1600. Refer to Figure 3.



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Figure 3. Electronic System Controller (ESC).

15. Measure resistance between connector 1800 terminals B9 and A4 with multimeter. Refer to Figure 4.



B230603802

Figure 4. Connector 1800.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read OL?

DECISION

NO Go to Step 23.
YES Go to next step.

STEP

16. Measure resistance between connector 1800 terminal B9 and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 23.
YES Go to next step.

STEP

17. Measure resistance between connector 1800 terminal B9 and connector 1600 terminal 33 with multimeter. Refer to Figure 4 and Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

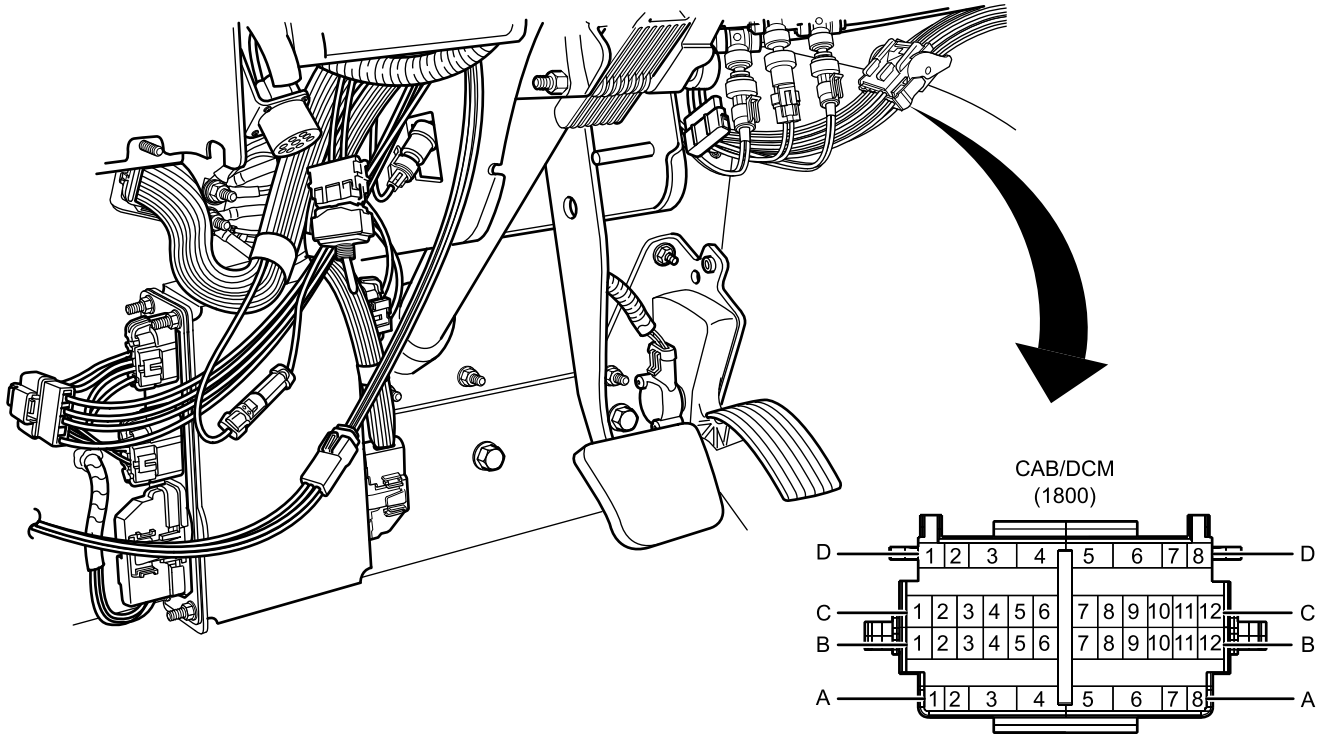
DECISION

NO Go to Step 23.
YES Go to Step 25.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

18. Disconnect connector 1800/1805. Refer to Figure 5.



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Figure 5. Below Dash.

19. Measure resistance between connector 1800 terminal A4 and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

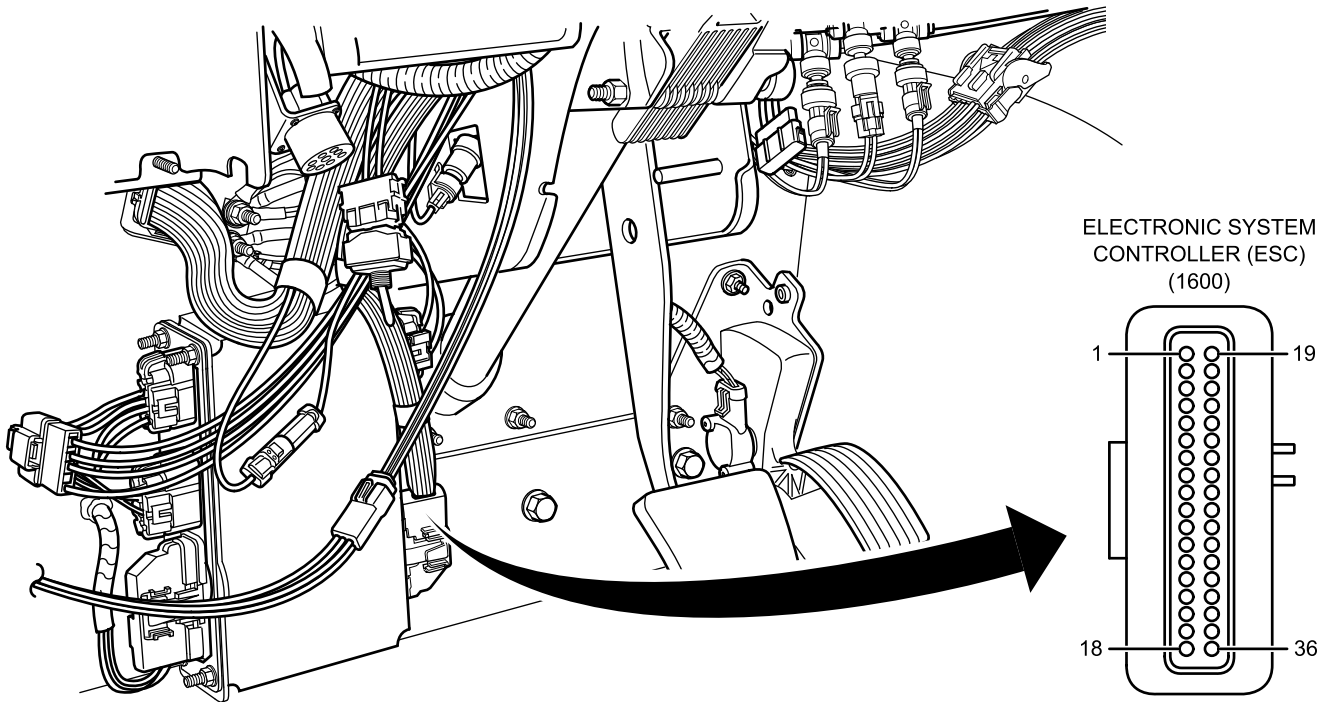
DECISION

YES Go to Step 22.
 NO Go to next step.

STEP

20. Disconnect ESC connector 1600. Refer to Figure 6.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230603692

Figure 6. Electronic System Controller (ESC).

21. Measure resistance between connector 1600 terminal 3 and connector 1800 terminal A4 with multimeter. Refer to Figure 6 and Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 25.
NO Go to Step 23.

MALFUNCTION

- 22. Steering column wiring harness is faulty.

ACTION

Replace steering column wiring harness. Refer to Steering Column Wiring Harness Removal and Installation (WP 0324). Return vehicle to service.

STOPLIGHT SWITCH CIRCUITS TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 23. Instrument panel wiring harness is faulty.

ACTION

Replace instrument panel wiring harness. Refer to Instrument Panel Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 24. Stoplight switch is faulty.

ACTION

Replace stoplight switch. Refer to Brake Stoplight Switch Removal and Installation (WP 0326). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 25. ESC is faulty.

ACTION

Replace ESC. Refer to Electronic System Controller (ESC) Removal and Installation (WP 0353). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0009
 WP 0257
 WP 0493
 WP 0486

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
 (WP 0795, Item 37)

WP 0494
 WP 0487
 WP 0519
 WP 0495

Personnel Required

Maintainer - (2)

WP 0488
 WP 0496
 WP 0489

References

TM 9-2355-106-10
 TM 9-2355-106-23P
 WP 0070
 WP 0074
 WP 0086
 WP 0087
 WP 0088
 WP 0170
 WP 0172
 WP 0173
 WP 0175
 WP 0176

WP 0523
 WP 0524
 WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
 Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
 Engine off (TM 9-2355-106-10)
 MAIN POWER switch off (TM 9-2355-106-10)
 Wheels chocked (TM 9-2355-106-10)
 Engine hood open and secured (TM 9-2355-106-10)
 Battery door opened (TM 9-2355-106-10)

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**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.

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 jackstands 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.

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Drain air tanks completely (TM 9-2355-106-10).

CONDITION/INDICATION**NOTE**

A small amount of water and oil discharge from drain valve is normal. Varying environmental and operating conditions will affect the amount of water and oil discharge. Only regular draining can indicate what is normal for a specific vehicle in specific conditions.

Excessive amounts of water and oil are discharged.

CORRECTIVE ACTION

- Replace air dryer desiccant cartridge. Refer to Air Dryer Desiccant Cartridge Removal and Installation (WP 0519).
- Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for air dryer checkout.

CONDITION/INDICATION

Excessive amounts of oil are discharged.

CORRECTIVE ACTION

- Inspect engine air filter and replace if necessary. Refer to Engine Air Filter Assembly Removal and Installation (TM 9-2355-106-10).

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

- Verify air compressor intake hose is connected to engine air filter. If hose is disconnected, compressor may be damaged. Refer to Air Compressor Operational Checkout Procedure (WP 0175).
 - Inspect air compressor intake hose for kinks and restrictions. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523).
 - Inspect air compressor delivery air line for kinks and restrictions. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524).
 - Inspect air compressor coolant lines for kinks and restrictions. Refer to Air Compressor Operational Checkout Procedure (WP 0175).
 - Air compressor may be damaged. Refer to Air Compressor Operational Checkout Procedure (WP 0175).
1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 2. Start and idle engine (TM 9-2355-106-10).
 3. Select PARK on Master Vehicle Light Switch (MVLs).
 4. Observe instrument cluster. Pressure shown on air pressure gauges should be near 0 psi and rising. RED warning lamps on air pressure gauges should be on. Audible alarm should sound.

Air pressure is not building (TM 9-2355-106-10).

- Inspect for faulty air dryer heater. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for air dryer checkout.
- Listen and check for large air leaks. Refer to Chapter 5 Index for a listing of replacement procedures.
- Inspect compressor delivery line for kinks and restrictions. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524).
- Inspect for faulty governor. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).
- Inspect for faulty air compressor. Refer to Air Compressor Operational Checkout Procedure (WP 0175).

RED warning lamps do not illuminate.

Inspect for faulty gauges. Refer to Instrument Panel Cluster (IPC) Operational Checkout Procedure (WP 0070).

Audible alarm does not sound.

Inspect for faulty audible alarm. Refer to Audible Alarm Troubleshooting Procedure (WP 0088).

1. Observe air pressure gauges. As pressure exceeds 70 psi (483 kPa), audible alarm should stop sounding and RED warning lamps should stop illuminating.

Audible alarm continues to sound.

- Inspect for unrelated malfunction causing alarm to sound. Refer to Vehicle Troubleshooting Symptom Index (WP 0005).
- Inspect for faulty audible alarm. Refer to Audible Alarm Troubleshooting Procedure (WP 0088).

RED warning lamps continue to illuminate.

Inspect for faulty air pressure gauges. Refer to AIR 1/Primary Air Pressure Gauge Troubleshooting Procedure (WP 0086). Refer to Secondary Air Pressure Gauge Troubleshooting Procedure (WP 0087).

1. Observe air pressure gauges as pressure increased from 85 to 100 psi (586 to 689 kPa). Elapsed time between two readings should not exceed 40 seconds.

Elapsed time exceeds 40 seconds.

- Inspect for kinked or restricted compressor delivery air line. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524).
- Inspect for compressor supply air line disconnected from air filter, causing faulty compressor. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523).

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

- Inspect for kinked or restricted compressor supply air line. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523).
 - Inspect for faulty compressor. Refer to Air Compressor Operational Checkout Procedure (WP 0175).
1. Observe gauges as pressure reaches 120 psi (827 kPa). Compressor should stop building air pressure and air dryer should purge.

Compressor continues to build air pressure.

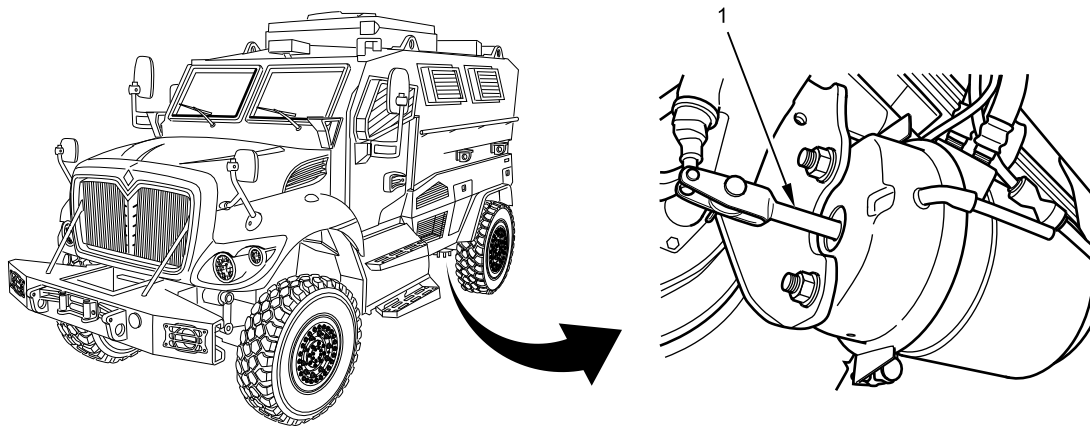
- Inspect for kinked or damaged governor reservoir line. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).
- Inspect for faulty governor. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).
- Inspect for faulty compressor. Refer to Air Compressor Operational Checkout Procedure (WP 0175).

Air dryer does not purge.

- Inspect for damaged or restricted air line between governor and air dryer. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for air dryer checkout.
 - Inspect for faulty air dryer. Refer to Air Brake Component Operational Checkout Procedure for air dryer checkout (WP 0173).
 - Inspect for faulty governor. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).
1. Press and release brake pedal until air pressure drops to 100 psi. Air compressor should begin building air pressure.

Air compressor did not begin building air pressure.

- Inspect for faulty governor. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).
 - Inspect for faulty compressor. Refer to Air Compressor Operational Checkout Procedure (WP 0175).
1. Allow air pressure to increase to 120 psi (827 kPa) and air dryer to purge.



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Figure 1. Left Rear Brake Chamber.

2. Turn engine off (TM 9-2355-106-10).
3. Turn ignition on (TM 9-2355-106-10).
4. Release parking brake (TM 9-2355-106-10). With assistance, observe rear brake chambers. Pushrods (Figure 1, Item 1) should retract into chambers. Left shown; right similar.
5. Observe air pressure gauges for 2 minutes. Air pressure should not drop more than 4 psi (28 kPa).

One or both brake chamber pushrods do not retract and/or the air pressure drops more than 4 psi (28 kPa).

- Inspect for large air leak. Refer to Air Brake System Operational Checkout Procedure (WP 0172).

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

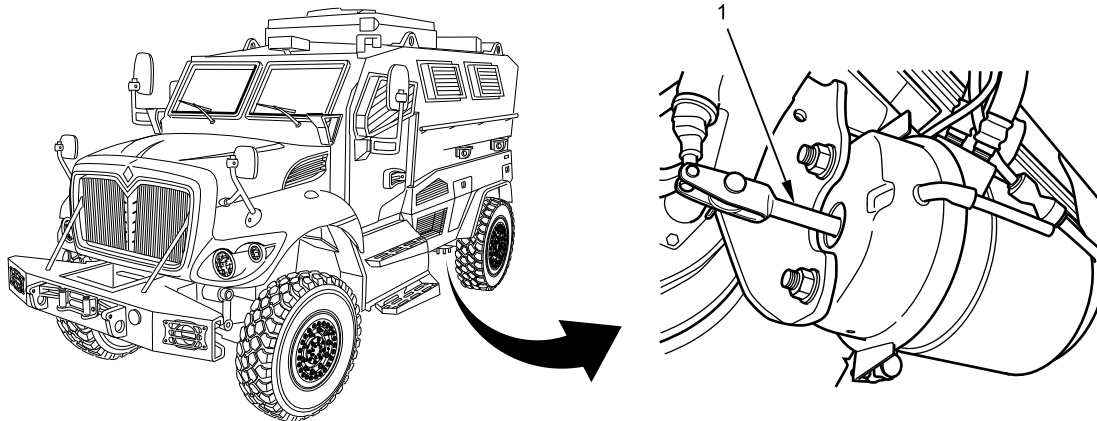
- Inspect for faulty quick release valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for quick release valve checkout.
 - Inspect for faulty rear brake chamber. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for rear brake chamber checkout.
 - Inspect for faulty park brake control valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for park brake control valve checkout.
1. Fully apply and hold service brakes for 2 minutes. With assistance, observe all brake chambers. Pushrods should extend from brake chambers. Observe gauges. After pressure stabilizes from application, air pressure should drop less than 6 psi (41 kPa).

One or more pushrods do not extend from brake chambers and/or air pressure dropped more than 6 psi (41 kPa).

- Inspect for large air leak. Refer to Air Brake System Operational Checkout Procedure (WP 0172).
 - Inspect for faulty foot valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for foot valve checkout.
 - Inspect for faulty rear relay valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for relay valve checkout.
 - Inspect for faulty brake chamber. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for front and rear brake chamber checkout.
1. Release service brake. Air should exhaust quickly through the relay valve for the rear brakes and through the foot valve for the front brakes.

Air exhausts slowly.

- Inspect for restricted brake hose. Refer to Air Brake Component Operational Checkout Procedure (WP 0173).
 - Inspect for faulty relay valve. Refer to Air Brake Component Operational Checkout Procedure for relay valve checkout (WP 0173).
 - Inspect for faulty foot valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for foot valve checkout.
1. Mark each brake chamber pushrod (Figure 2, Item 1) where it exits face of chamber.



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Figure 2. Left Rear Brake Chamber.

2. Using a pry bar, manually actuate each brake until contact of brake shoes to drum is felt.

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

3. Measure free stroke travel of each brake chamber pushrod from mark previously made to face of brake chamber. The free stroke measurement should be 0.5-0.75 in. (12.7-19.0 mm).
4. Observe gauges. Ensure air pressure is 90-100 psi (620-689 kPa). Fully apply and hold service brakes. With assistance, measure applied stroke travel of each brake chamber pushrod from mark previously made to face of chamber. Applied stroke measurement should be less than 2.5 in. (63.5 mm).

Free stroke measurement is within specification, but applied stroke measurement is not within specification.

- Inspect for cracked brake shoe lining. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for cracked or out-of-round brake drum. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for worn and/or incorrectly lubricated anchor pins. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).
- Inspect for worn brake spider anchor pin bushings. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for broken and stretched return springs and shoe pins. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for flat spots worn on S-camshaft rollers and S-camshaft shafts. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for S-camshaft shaft worn and unlubricated at rollers or loose at bushings, and for broken spline teeth at slack adjuster. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

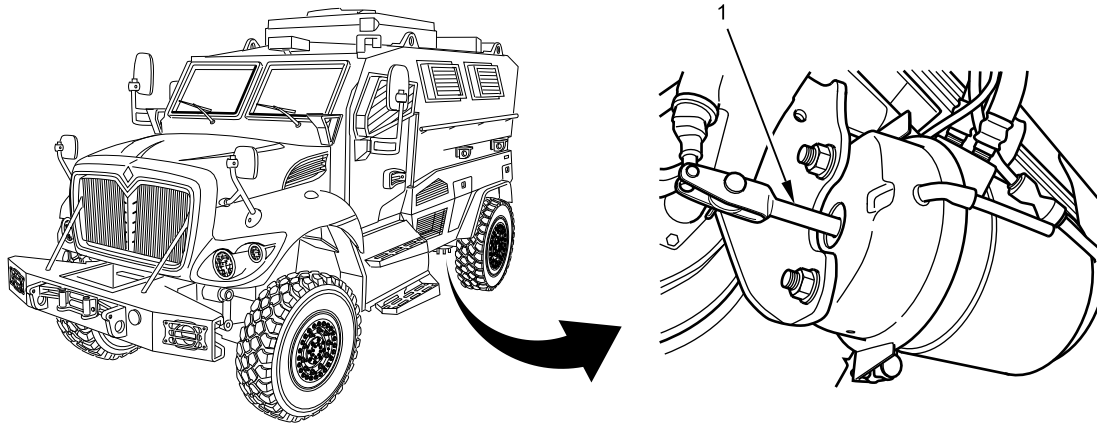
Free stroke measurement above specified range and applied stroke measurement not within specifications.

- Inspect for worn and poorly lubricated S-camshaft rollers. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).
- Inspect for S-camshaft shaft worn at rollers or loose at bushings, and for broken spline teeth at slack adjuster. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for broken and stretched return springs and shoe pins. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for faulty slack adjuster. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

Free stroke measurement below specified range.

- Inspect for binding S-camshaft. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for faulty slack adjuster. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

1. Ensure service brakes are released.
2. Apply parking brake (TM 9-2355-106-10).
3. With assistance, observe rear brake chambers. Pushrods (Figure 3, Item 1) should extend from chambers and air should exhaust quickly through quick release valve.

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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Figure 3. Left Rear Brake Chamber.

Pushrods do not extend.

- Inspect for broken spring in rear brake chamber. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for brake chamber checkout.
- Inspect for faulty quick release valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for quick release valve checkout.

Air does not exhaust quickly.

Inspect for faulty quick release valve. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for quick release valve checkout.

1. Close and secure engine hood (TM 9-2355-106-10).
2. Remove wheel chocks (TM 9-2355-106-10).
3. Start engine (TM 9-2355-106-10).
4. Release parking brake (TM 9-2355-106-10).
5. Test drive vehicle, starting with slower speeds first, varying speeds 10-50 mph (16-80 kph) (TM 9-2355-106-10).
6. Apply brakes several times. Vehicle should stop firmly and straight without pulling to either side.

Vehicle pulls left or right while braking.

- Inspect for worn brake lining. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect brake components for lack of lubrication. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).
- Inspect for failed hub seal contaminating linings with oil. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493). Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for binding S-camshaft. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

Vehicle has insufficient braking.

- Inspect for worn brake linings. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
- Inspect for poorly lubricated brake components. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

- Inspect for overheated and glazed linings. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).
1. Test-drive vehicle, stop, apply parking brake, and observe instrument panel cluster (TM 9-2355-106-10).
 2. No warning lamps should be illuminated (TM 9-2355-106-10).

ABS lamp is illuminated (TM 9-2355-106-10).

Retrieve DTCs and proceed with DTC diagnosis. Refer to Antilock Brake System (ABS) Diagnostic Trouble Code (DTC) Index (WP 0009).

END OF WORK PACKAGE

FIELD MAINTENANCE

BRAKE SYSTEM MECHANICAL COMPONENTS OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Wrench, torque, dial, 300 lb-in., 3/8-inch drive
(WP 0795, Item 147)

WP 0489
WP 0497
WP 0490
WP 0498
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0493
WP 0486
WP 0494
WP 0487
WP 0514
WP 0516
WP 0495
WP 0488
WP 0496

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Front and rear wheel and tire removed (WP 0530)
Front brake drum removed (WP 0487)
Front wheel hub and bearing removed (WP 0471)
Rear brake drum and hub assembly removed
(WP 0494)

WARNING

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. Jackstands and hydraulic jack must be used on a stable surface capable of supporting the combined weight of the vehicle being lifted and the lifting equipment. Do not use jack alone to support vehicle. Never work under or near a vehicle supported only by jack or lifting device. Use rated jackstands under frame rails to properly support vehicle. Do not support vehicle under front and rear axles. Use additional jackstands 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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Inspect brake drums for following conditions:
 - Cracks
 - Severe heat checking
 - Heat spotting
 - Scoring
 - Pitting

CONDITION/INDICATION

Brake drum inspection reveals one or more listed conditions.

BRAKE SYSTEM MECHANICAL COMPONENTS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CORRECTIVE ACTION**

Replace unserviceable brake drum. Refer to Front Brake Drum Removal and Installation (WP 0487). Refer to Rear Brake Drum and Hub Assembly Removal and Installation (WP 0494).

1. Measure brake drum inside diameter.

Brake drum diameter measures more than 16-5/8 in (42.21 cm).

Replace unserviceable brake drum. Refer to Front Brake Drum Removal and Installation (WP 0487). Refer to Rear Brake Drum and Hub Assembly Removal and Installation (WP 0494).

1. Inspect brake shoe anchor pins and bushings. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).

Inspection reveals worn or corroded pins or bushings.

Replace unserviceable anchor pins and bushings. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).

1. Inspect brake spider. Refer to Front Brake Spider and Spindle Assembly Removal and Installation (WP 0489). Refer to Rear Brake Spider Assembly Removal and Installation (WP 0496).

Inspection reveals cracked or expanded anchor pin bushing holes.

Replace unserviceable brake spider. Refer to Front Brake Spider and Spindle Assembly Removal and Installation (WP 0489). Refer to Rear Brake Spider Assembly Removal and Installation (WP 0496).

1. Inspect S-camshaft bracket. Refer to Brake S-camshaft Tube Support Bracket Removal and Installation (WP 0498).

Inspection reveals broken welds, cracks or improper alignment.

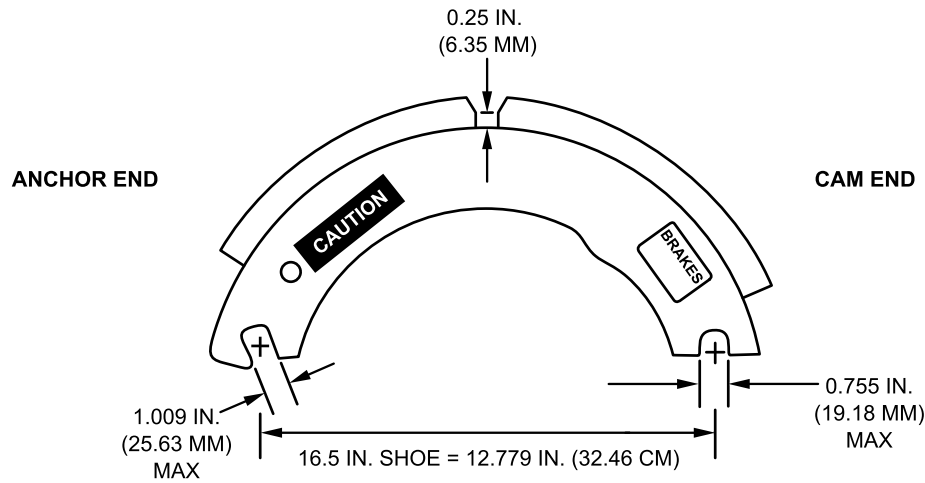
Replace unserviceable S-camshaft bracket. Refer to Brake S-Camshaft Tube Support Bracket Removal and Installation (WP 0498).

1. Inspect brake shoe rollers. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).

Inspection reveals wear or corrosion.

Replace unserviceable roller. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493).

1. Inspect brake shoes for the following conditions. Refer to Figure 1.
 - Worn brake linings, replace brake shoes if any part of brake lining is 1/4 inch (6.35 mm) thick or less
 - Expanded rivet holes
 - Broken welds
 - Cracks
 - Improper alignment
 - Distance from center of anchor pin hole to center of roller hole more than 12.779 in. (32.46 cm)
 - Anchor pin holes more than 1.009 in (25.6 mm)
 - Brake shoe roller hole more than 0.755 in. (19.18 mm)
 - Oil contamination on brake shoe lining.

BRAKE SYSTEM MECHANICAL COMPONENTS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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Figure 1. Brake Shoe.

Inspection reveals one or more listed conditions.

Replace brake shoes. Refer to Front Brake Shoes Removal and Installation (WP 0486). Refer to Rear Brake Shoes Removal and Installation (WP 0493). Replace front hub assembly seal. Refer to Front Wheel Hub and Bearing Removal and Installation (WP 0471). Replace rear hub assembly seal. Refer to Rear Hub Assembly Seal and Bearing Cup Removal and Installation (WP 0480).

1. Inspect large and small slack adjuster pins and extension clips. Refer to Front Brake Air Chamber Removal and Installation (WP 0514). Refer to Rear Brake Air Chamber Removal and Installation (WP 0516).

Inspection reveals damaged or worn slack adjuster pins or extension clips.

WARNING

Replace extension clips if removed. Extension clips can bend and lose retention during removal. Failure to comply may result in damage to equipment and serious injury or death to personnel.

Replace unserviceable slack adjuster pins and extension clips. Refer to Front Brake Air Chamber Removal and Installation (WP 0514). Refer to Rear Brake Air Chamber Removal and Installation (WP 0516).

NOTE

Replace camshaft bushings and seals whenever a new camshaft is installed. Refer to Front Brake S-Camshaft Removal and Installation (WP 0488). Refer to Rear Brake S-Camshaft Removal and Installation (WP 0495).

1. Inspect S-camshaft for following conditions:

- Wear
- Cracks
- Corrosion
- Broken spline teeth
- Binding

Inspection reveals one or more listed condition.

BRAKE SYSTEM MECHANICAL COMPONENTS OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Replace S-camshaft. Refer to Front Brake S-Camshaft Removal and Installation (WP 0488). Refer to Rear Brake S-Camshaft Removal and Installation (WP 0495).

WARNING

Turn adjusting nut counterclockwise when checking gear torque on automatic slack adjuster, or pawl teeth will be damaged. Damaged pawl teeth will prevent slack adjuster from automatically adjusting clearance between brake shoes and drum. Failure to comply may result in damage to equipment and serious injury or death to personnel.

1. Test automatic slack adjuster for wear or binding by performing the following:
 - Remove slack adjuster. Refer to Front Slack Adjuster Assembly Removal and Installation (WP 0490). Refer to Rear Slack Adjuster Assembly Removal and Installation (WP 0497).
 - Turn adjusting nut counterclockwise 22 complete turns with torque wrench while observing torque wrench dial. Torque should not exceed 25 lb-in. (2.8 N•m). Refer to Figure 2.

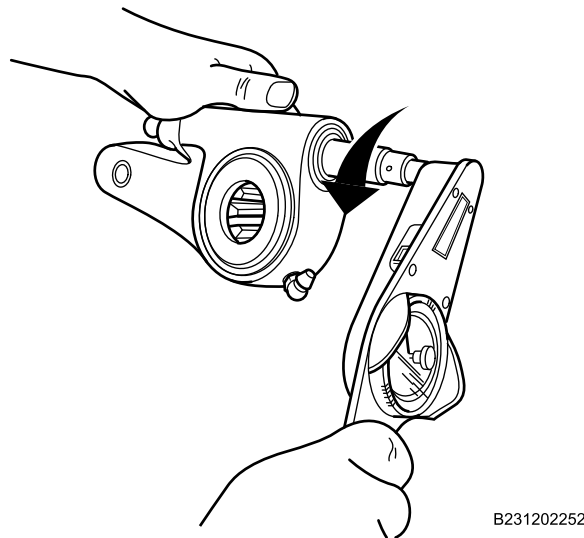


Figure 2. Automatic Slack Adjuster Test.

Torque exceeds 25 lb-in. (2.8 N•m).

Replace automatic slack adjuster. Refer to Front Slack Adjuster Removal and Installation (WP 0490). Refer to Rear Slack Adjuster Removal and Installation (WP 0497).

END OF WORK PACKAGE

FIELD MAINTENANCE
BRAKE SYSTEM TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Personnel Required**

Maintainer - (2)

WP 0484

WP 0514

WP 0782

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0170

WP 0173

WP 0175

WP 0176

WP 0458

WP 0480

Equipment Condition

Parking brake set (TM 9-2355-106-10)

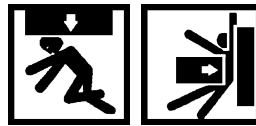
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Engine hood open and secured (TM 9-2355-106-10)

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

SYMPTOM

Insufficient braking.

MALFUNCTION

Insufficient air supply to brakes.

CORRECTIVE ACTION

STEP 1. Start and idle engine (TM 9-2355-106-10).

STEP 2. Observe instrument panel cluster air gauges and allow air pressure to build to 100 psi (690 kPa) (TM 9-2355-106-10).

STEP 3. Turn engine OFF (TM 9-2355-106-10).

STEP 4. Apply and hold service brakes (TM 9-2355-106-10).

STEP 5. Have assistant listen and inspect for large air leaks. If leaking components are found, refer to Chapter 5 Index for relevant replacement procedures.

STEP 6. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0176).

STEP 7. Refer to Air Compressor Operational Checkout Procedure (WP 0175).

STEP 8. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for foot valve checkout.

MALFUNCTION

BRAKE SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)

Worn brake lining.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Binding brake components.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Brakes out of adjustment.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

SYMPTOM

Vehicle pulls left or right while braking.

MALFUNCTION

Worn brake lining.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Brakes out of adjustment.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

S-camshaft binding.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Hub seal failed, allowing contamination of brake linings.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170). Refer to Front Wheel Hub and Bearing Removal and Installation (WP 0458). Refer to Rear Hub Assembly Seal and Bearing Cup Removal and Installation (WP 0480).

MALFUNCTION

Brake chamber diaphragm failed.

CORRECTIVE ACTION

STEP 1. Refer to Front Brake Air Chamber Removal and Installation (WP 0514) and Rear Brake Air Chamber Removal and Installation (WP 0480).

MALFUNCTION

BRAKE SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)

Slack adjuster binding.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

SYMPTOM

Brakes drag or release too slowly.

MALFUNCTION

Brake components binding.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Brakes out of adjustment.

CORRECTIVE ACTION

STEP 1. Refer to Brake System Mechanical Components Operational Checkout Procedure (WP 0170).

MALFUNCTION

Faulty foot valve.

CORRECTIVE ACTION

STEP 1. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for foot valve checkout.

MALFUNCTION

Faulty relay valve.

CORRECTIVE ACTION

STEP 1. Refer to Air Brake Component Operational Checkout Procedure (WP 0173) for relay valve checkout.

MALFUNCTION

Restricted or damaged air hose.

CORRECTIVE ACTION

STEP 1. Visually inspect hoses for indications of damage. Remove and inspect hoses for restriction. Refer to Chapter 5 Index for relevant removal and replacement procedures.

END OF WORK PACKAGE

FIELD MAINTENANCE
AIR BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0173

WP 0009

WP 0499

WP 0529

WP 0782

Materials/Parts

Goggles, industrial (WP 0794, Item 20)

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0171

WP 0175

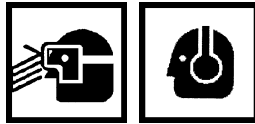
WORK PACKAGE OVERVIEW

This work package describes the air brake system operation and provides an operational checkout or troubleshooting procedure for each component in the air brake system. This work package does not include Antilock Brake System (ABS) or foundation brake system information.

For ABS information, refer to Antilock Brake System (ABS) Troubleshooting (WP 0009).

For foundation brake system information, refer to Brake System Troubleshooting (WP 0171).

Although some air compressor and governor information is included in this work package, refer to Air Compressor Operational Checkout and Troubleshooting (WP 0175) for a more comprehensive checkout procedure.

AIR BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**WARNING**

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.

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 ear and eye protection when releasing compressed air. Air under high pressure can cause small particles to become projectiles. Sudden release of air under high pressure can cause hearing damage. Failure to comply may result in damage to equipment and serious injury 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.

Before working on air brake system or any auxiliary pressurized system, make sure air pressure has been drained from all reservoirs. Failure to comply may result in serious injury or death to personnel.

NOTE

Use assistant when a procedure requires multiple actions that can not be performed with a single person.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Start engine and let idle (TM 9-2355-106-10).
2. Allow air pressure to build to 100-125 psi (689-861 kPa) in both primary and secondary air tanks (TM 9-2355-106-10).
3. Turn engine OFF. Turn ignition ON (TM 9-2355-106-10).
4. Open drain valve at supply tank and drain air pressure completely. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
 - a. Air pressure gauges should indicate that both primary and secondary air tanks retain air pressure (TM 9-2355-106-10).

CONDITION/INDICATION

Loss of air is evidenced in either system by observing air gauges.

CORRECTIVE ACTION

STEP 1. Apply soapy water to all air brake lines and components. Growing bubbles indicate leaks.

AIR BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

STEP 2. Replace leaking lines or components. Refer to Chapter 5 Index in this manual for a listing of replacement procedures.

1. YELLOW parking brake control knob pushed in (released position). RED trailer brake air supply control knob pushed in (supply position). Open drain valves on primary and secondary air tanks (TM 9-2355-106-10).
 - a. RED knob should pop out (released position) when air tank with highest pressure reaches 40 psi (± 5 psi) (276 kPa [± 34.5 kPa]). RED knob should pop immediately if air is depleted too quickly (TM 9-2355-106-10).
 - b. When air pressure in air tank with higher air pressure reaches 30 psi (± 5 psi) (207 kPa [± 34.5 kPa]), YELLOW knob may pop out.
 - c. When air pressure is decreased to 25 psi (± 5 psi) (172 kPa [± 34.5 kPa]), YELLOW knob must pop out.

Parking brake control and trailer air supply control do not work as described.

STEP 1. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

STEP 2. Replace parking brake and trailer air supply control (WP 0529).

1. Air tank drain valves closed. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
2. Allow air pressure to build to 100-125 psi (689-861 kPa) in both primary and secondary air tanks (TM 9-2355-106-10).
3. RED knob pushed in, carefully open trailer emergency supply line gladhand, located left of rear pintle hook and labeled EMERGENCY (TM 9-2355-106-10).
 - a. RED knob should pop out when system air pressure reaches approximately 60 psi (414 kPa).

Parking brake control and trailer air supply control do not work as described.

STEP 1. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

STEP 2. Replace parking brake and trailer air supply control (WP 0529).

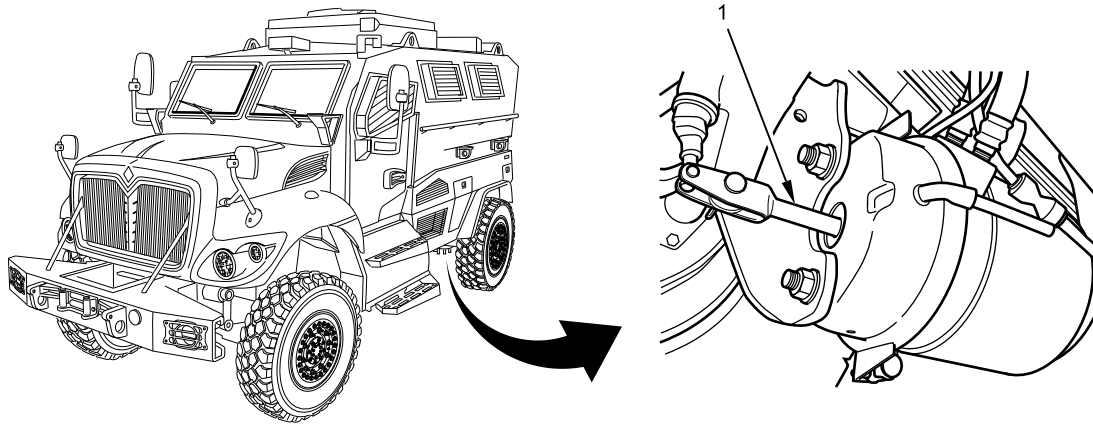
1. Trailer emergency supply line gladhand closed, build air pressure to 100-125 psi (689-861 kPa) in both primary and secondary air tanks. Push YELLOW knob in (TM 9-2355-106-10).
2. Observe air pressure gauges on instrument panel (TM 9-2355-106-10).

Air pressure leakdown rate exceeds 2 psi (13.8 kPa) per minute.

Go to Air Brake Component Operational Checks (WP 0173) and Air Compressor Checkout and Troubleshooting (WP 0175) to identify system fault.

1. Secondary air tank drain valve completely open. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
2. Apply and release service brakes (TM 9-2355-106-10) and observe service brake chamber pushrods (Figure 1, Item 1) on rear axle. Left shown; right similar.
 - a. Brake chamber pushrods should move until air pressure decreases to 25 psi (± 5 psi) (172 kPa [± 34.5 kPa]).
 - b. Parking brakes will apply when air pressure decreases to 25 psi (± 5 psi) (172 kPa [± 34.5 kPa]).

AIR BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



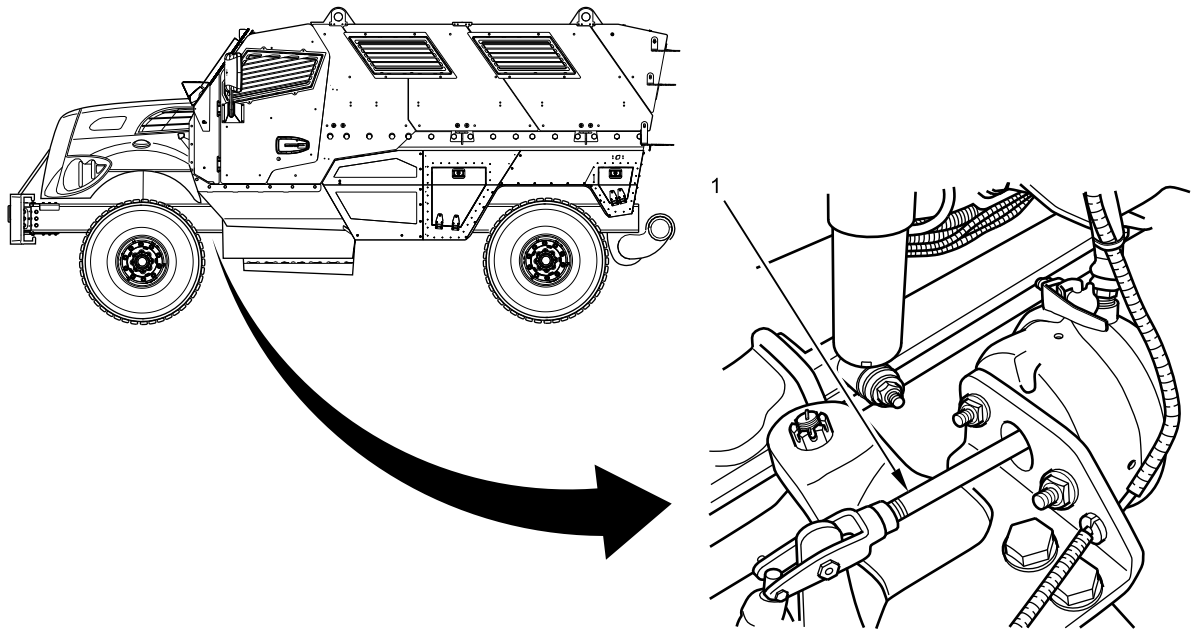
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Figure 1. Left Rear Brake Chamber.

Brake chamber pushrods or parking brakes do not perform as described.

Go to Air Brake Component Operational Checks (WP 0173) and Air Compressor Checkout and Troubleshooting (WP 0175) to identify system fault.

1. Close drain valve on secondary air tank. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
2. Build air pressure to 100-125 psi (689-861 kPa) in both primary and secondary air tanks (TM 9-2355-106-10).
3. Primary air tank drain valve completely open. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
4. Push YELLOW knob in (TM 9-2355-106-10).
5. Apply and release service brakes (TM 9-2355-106-10) while observing brake chamber pushrods (Figure 2, Item 1) on front axle. Left shown; right similar.
 - a. Brake chamber pushrods should move back and forth until air pressure decreases to 25 psi (± 5 psi) (172 kPa [± 34.5 kPa]).

AIR BRAKE SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

B231203647

Figure 2. Left Front Brake Chamber.

Brake chamber pushrod travel is not as described.

Go to Air Brake Component Operational Checks (WP 0173) and Air Compressor Checkout and Troubleshooting (WP 0175) to identify system fault.

END OF WORK PACKAGE

FIELD MAINTENANCE
AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK) (WP 0795, Item 37)	WP 0503 WP 0517 WP 0499
Screwdriver, round shank, cross-tip, #4 tip, 13.5" (WP 0795, Item 88)	WP 0520 WP 0514
Tire inflator (WP 0795, Item 125)	WP 0516
Grease Gun Adapter Kit (WP 0795, Item 40)	WP 0521
Grease gun, pneumatic, hose (WP 0795, Item 41)	WP 0510
Gun, air (WP 0795, Item 43)	WP 0522 WP 0509

Materials/Parts

Goggles, industrial (WP 0794, Item 20)	WP 0506 WP 0529
Clamp, screw (WP 0796, Item 140)	WP 0565

Personnel Required

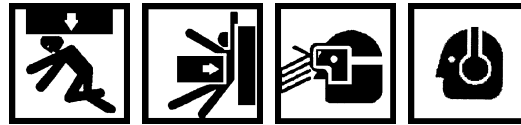
Maintainer - (2)	WP 0646 WP 0782
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References

TM 9-2355-106-10
 TM 9-2355-106-23P
 WP 0484
 WP 0511
 WP 0507
 WP 0502

Equipment Condition

Parking brake set (TM 9-2355-106-10)
 Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
 Engine off (TM 9-2355-106-10)
 MAIN POWER switch off (TM 9-2355-106-10)
 Wheels chocked (TM 9-2355-106-10)
 Engine hood open and secured (TM 9-2355-106-10)

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**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.

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.

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 ear and eye protection when releasing compressed air. Air under high pressure can cause small particles to become projectiles. Sudden release of air under high pressure can cause hearing damage. Failure to comply may result in damage to equipment and serious injury 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.

Before working on air brake system or any auxiliary pressurized system, make sure air pressure has been drained from all reservoirs. Failure to comply may result in serious injury or death to personnel.

NOTE

Use assistant when a procedure requires multiple actions that can not be performed with a single person.

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

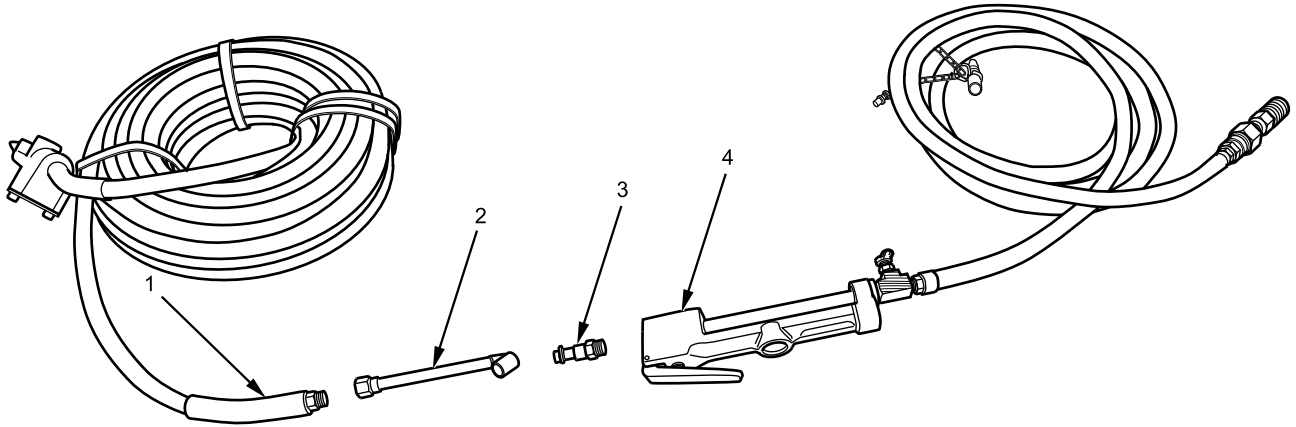
**PARKING BRAKE AND TRAILER AIR SUPPLY CONTROL OPERATIONAL CHECKOUT PROCEDURE
STEP****NOTE**

Some of the following tests require measurement of air pressure at air brake rear supply or service line gladhands. Modification of existing tools is required.

1. Modify tools per steps 2 through 5.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

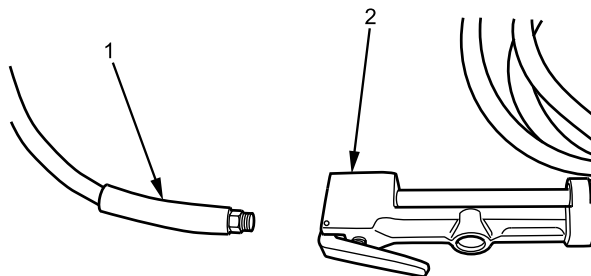
2. Remove valve stem chuck (Figure 1, Item 2) from grease gun hose (Figure 1, Item 1).



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Figure 1. Grease Gun Hose and Inflator Hose.

3. Remove NPT fitting (Figure 1, Item 3) from inflator hose (Figure 1, Item 4).
4. Connect grease gun hose (Figure 2, Item 1) to inflator hose (Figure 2, Item 2) securely.

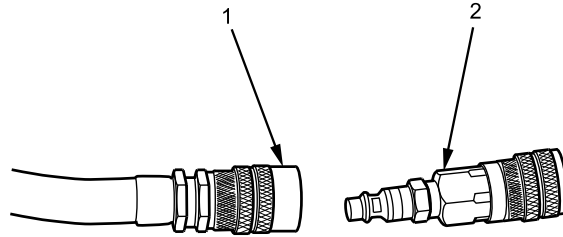


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Figure 2. Grease Gun Hose and Inflator Hose Connection.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

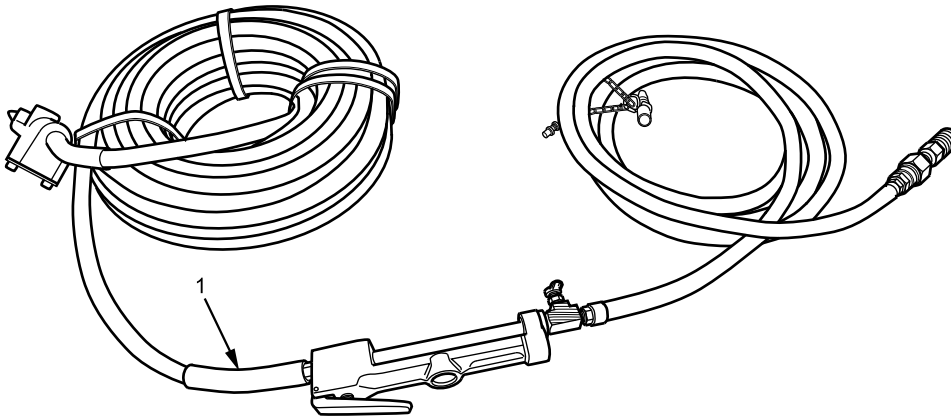
5. Connect inflator hose (Figure 3, Item 1) to grease gun adapter (Figure 3, Item 2).



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Figure 3. Grease Gun Hose and Grease Gun Adapter.

6. Verify that assembled inflator hose (Figure 4, Item 1) is correct as shown.

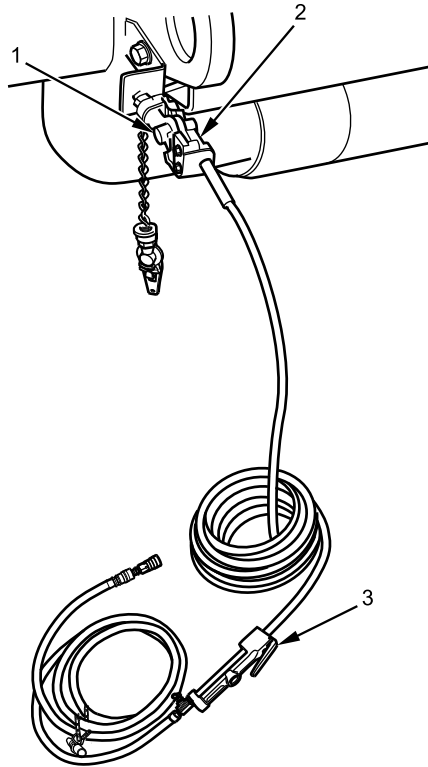


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Figure 4. Assembled Inflator Hose.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

7. Connect assembled gladhand connector (Figure 5, Item 2) and inflator gauge (Figure 5, Item 3) to rear emergency supply line (Figure 5, Item 1) (TM 9-2355-106-10).



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Figure 5. Assembled Inflator Hose Attached to Rear Supply Line.

8. System air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks, TRAILER AIR SUPPLY (RED) and PARKING BRAKE (YELLOW) knobs pushed in (TM 9-2355-106-10).
 - a. TRAILER AIR SUPPLY (RED) knob should not pop back out at this time.
9. With assistant, slowly reduce air pressure in primary and secondary air tanks by opening drain valves. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
 - a. Observe primary and secondary air pressure gauges (TM 9-2355-106-10). TRAILER AIR SUPPLY (RED) knob should pop out when system air pressure decreases to 20-45 psi (138-310 kPa).
 - b. PARKING BRAKE (YELLOW) knob should not pop out before TRAILER AIR SUPPLY (RED) knob pops out (TM 9-2355-106-10).

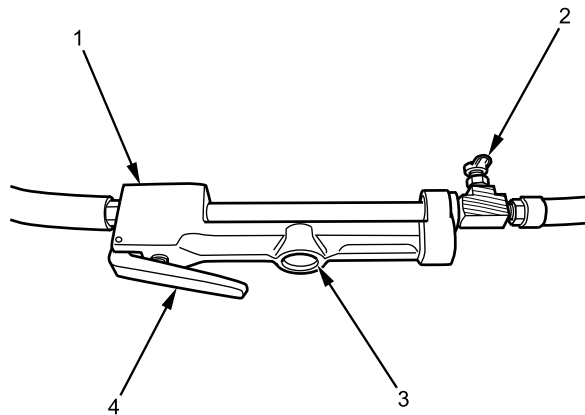
CONDITION/INDICATION

Parking brake and trailer air supply control does not operate as described above.

CORRECTIVE ACTION

- STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).
- STEP 2. Replace parking brake and trailer air supply control (WP 0529). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



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Figure 6. Inflater Gauge.

1. Hold TRAILER AIR SUPPLY (RED) knob in (TM 9-2355-106-10). Direct assistant to observe assembled inflater gauge (Figure 6, Item 1) connected to rear supply line while continuing to slowly release air pressure from system. Read pressure by squeezing and releasing handle (Figure 6, Item 4), then read pressure at indicator window (Figure 6, Item 3). Repeat frequently to update reading. Ensure air bleed valve (Figure 6, Item 2) is closed.
 - a. Air should audibly start to escape from exhaust port on parking brake and trailer air supply control (TM 9-2355-106-10) when trailer supply line pressure reaches 20 psi (138 kPa) minimum.

Air does not audibly start to escape from exhaust port on parking brake and trailer air supply control when trailer supply line pressure reaches 20 psi (138 kPa) minimum.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace parking brake and trailer air supply control (WP 0529). Return vehicle to service.

1. Release TRAILER AIR SUPPLY (RED) knob, close drain valves, system air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks, PARKING BRAKE (YELLOW) knob pushed in (TM 9-2355-106-10).
 - a. PARKING BRAKE (YELLOW) knob should stay in.
2. TRAILER AIR SUPPLY (RED) knob pushed in, PARKING BRAKE (YELLOW) knob pushed in (TM 9-2355-106-10).
3. Pull TRAILER AIR SUPPLY (RED) knob out (TM 9-2355-106-10).
 - a. PARKING BRAKE (YELLOW) knob should stay in.
4. TRAILER AIR SUPPLY (RED) knob pushed in. PARKING BRAKE (YELLOW) knob pulled out (TM 9-2355-106-10).
 - a. TRAILER AIR SUPPLY (RED) knob should pop out almost immediately.

Parking brake and trailer air supply control does not operate as described above.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace parking brake and trailer air supply control (WP 0529). Return vehicle to service.

1. System air pressure 110-125 psi (758-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10). Open drain valve on secondary air tank to slowly decrease pressure. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

Primary air tank pressure drops below 100 psi (789 kPa).

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace parking brake and trailer air supply control (WP 0529). Return vehicle to service.

1. System air pressure 110-125 psi (758-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10). Open drain valve on primary air tank to slowly decrease pressure. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

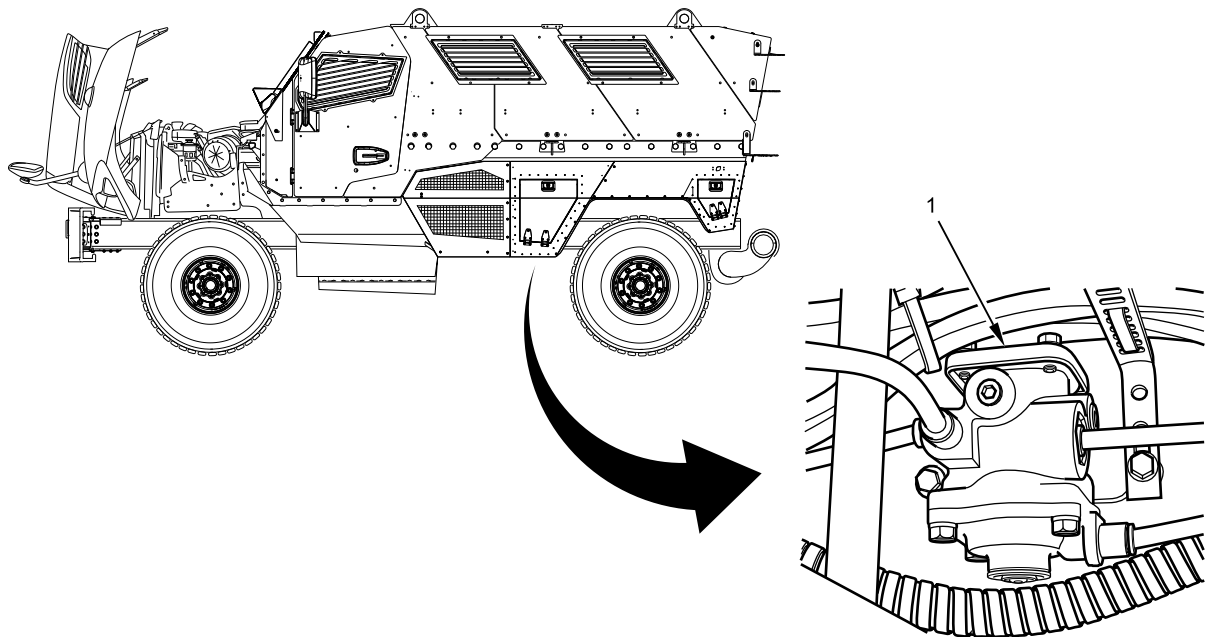
Secondary air tank pressure drops below 100 psi (789 kPa) (TM 9-2355-106-10).

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace parking brake and trailer air supply control (WP 0529). Return vehicle to service.

SPRING BRAKE MODULATING VALVE OPERATIONAL CHECKOUT PROCEDURE**STEP**

1. Air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10).
2. PARKING BRAKE (YELLOW) knob pushed in. Apply soap-and-water solution to spring brake modulating valve (Figure 7, Item 1) and air line connections.



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Figure 7. Spring Brake Modulating Valve.

- a. Permissible leakage is 1-inch bubble in 5 seconds.

CONDITION/INDICATION

Leakage exceeds 1-inch bubble in 5 seconds.

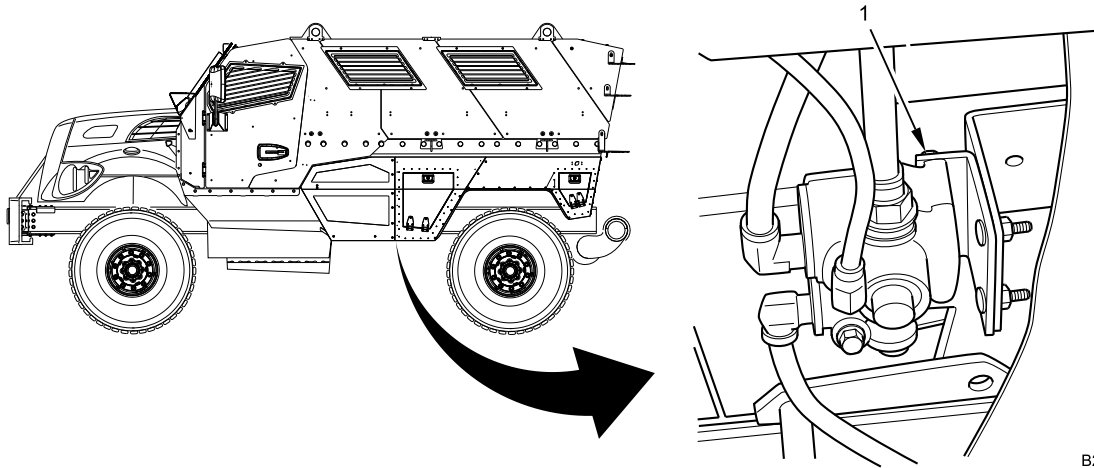
CORRECTIVE ACTION

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace spring brake modulating valve (WP 0509). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**RELAY VALVE OPERATIONAL CHECKOUT PROCEDURE****STEP**

1. Foot valve released (TM 9-2355-106-10). Apply soap-and-water solution to relay valve (Figure 8, Item 1) and associated air line connections.



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Figure 8. Relay Valve.

- a. Permissible leakage is 1-inch bubble in 3 seconds.
- b. No leak is permitted at cover assembly.

CONDITION/INDICATION

Leakage is excessive.

CORRECTIVE ACTION

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace relay valve (WP 0510). Return vehicle to service.

1. Foot valve applied (TM 9-2355-106-10). Apply soap-and-water solution to relay valve (Figure 8, Item 1) and associated air line connections.
 - a. Permissible leakage is 1-inch bubble in 3 seconds.
 - b. No leak is permitted at cover assembly.

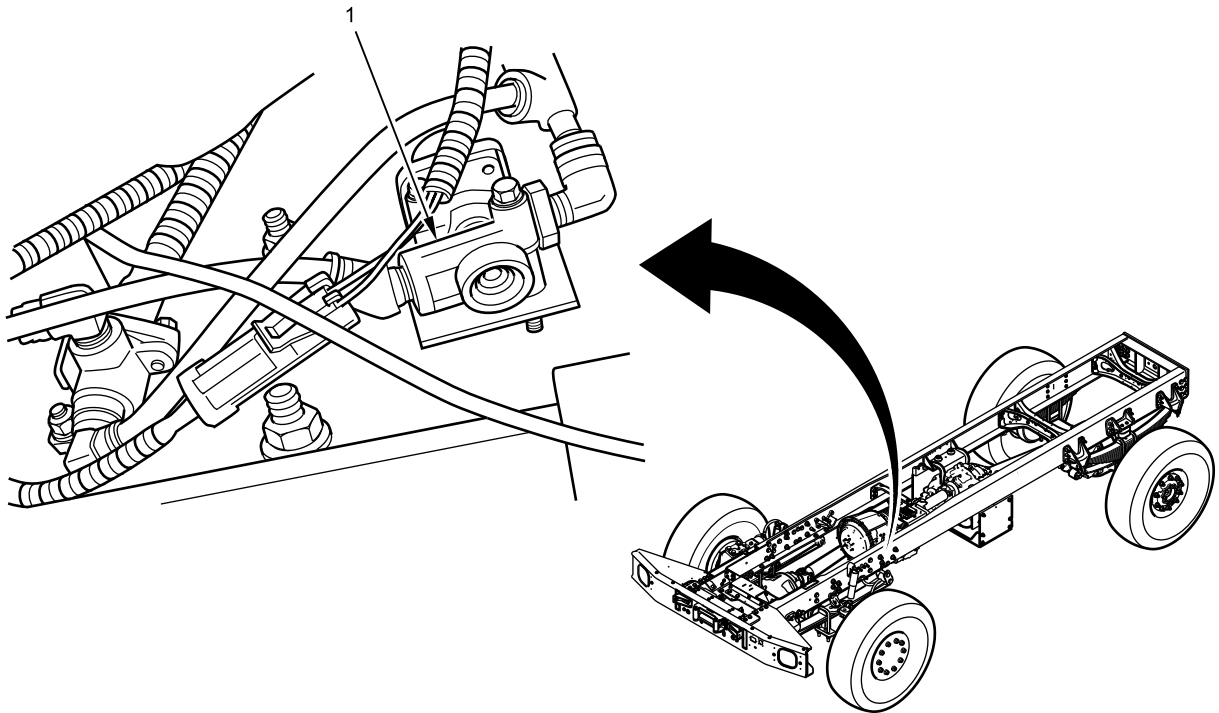
Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace relay valve (WP 0510). Return vehicle to service.

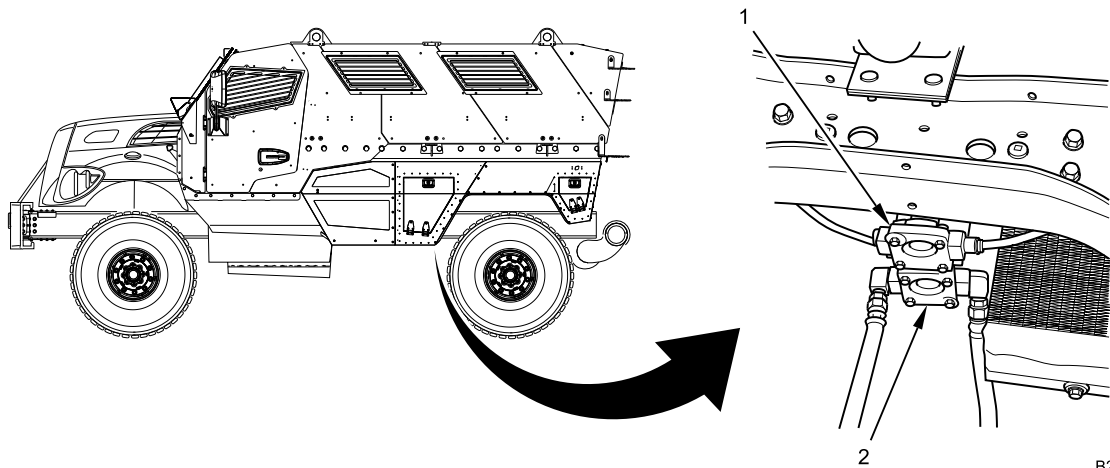
AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**QUICK-RELEASE VALVE OPERATIONAL CHECKOUT PROCEDURE****STEP**

1. Remove any accumulated contaminants from quick-release valves (Figure 9, Item 1) and (Figure 10, Item 1 and 2).



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Figure 9. Left Front Supply Line Quick-Release Valve.



B231203670

Figure 10. Right Front Service Line and Rear Brake Chamber Quick-Release Valves.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

2. Visually inspect quick-release valves for cracks, gouges, or other physical damage.

CONDITION/INDICATION

Physical damage is present.

CORRECTIVE ACTION

Replace quick-release valve (WP 0521). Return vehicle to service.

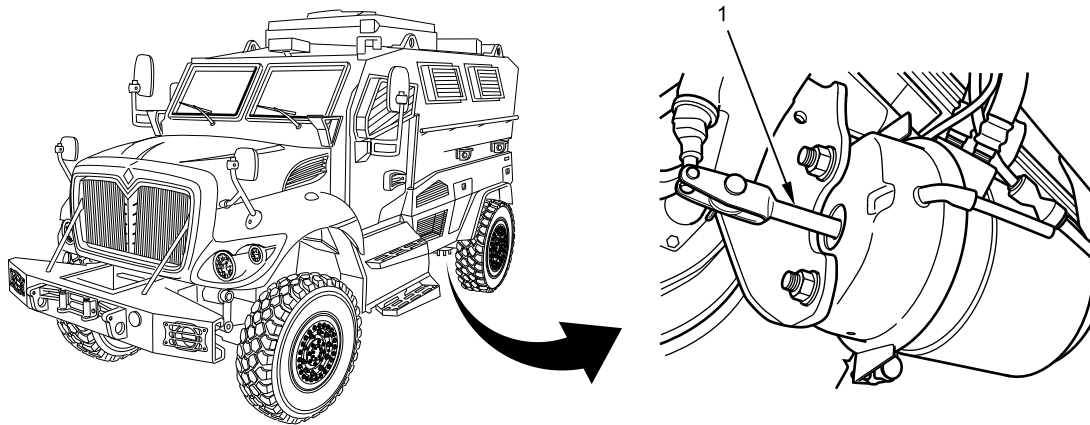
1. Inspect air lines connected to quick-release valves (Figure 9, Item 1) and (Figure 10, Item 1 and 2) for signs of wear or physical damage that could cause leakage.

Signs of wear or physical damage are present.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace leaking air lines. Refer to Chapter 5 Index in this manual. Return vehicle to service.

1. Engine running. Air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10).
2. Apply and release parking brake several times (TM 9-2355-106-10) and check for prompt application and release of brake chamber pushrods at each rear brake chamber (Figure 11, Item 1).



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Figure 11. Left Rear Brake Chamber.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

3. System pressure 100-125 psi (689-861 kPa), parking brake released (TM 9-2355-106-10), apply soap-and-water solution to bottom of quick-release valves (Figure 12, Item 1 and 2).
 - a. Permissible leakage is 1-inch bubble in 5 seconds.

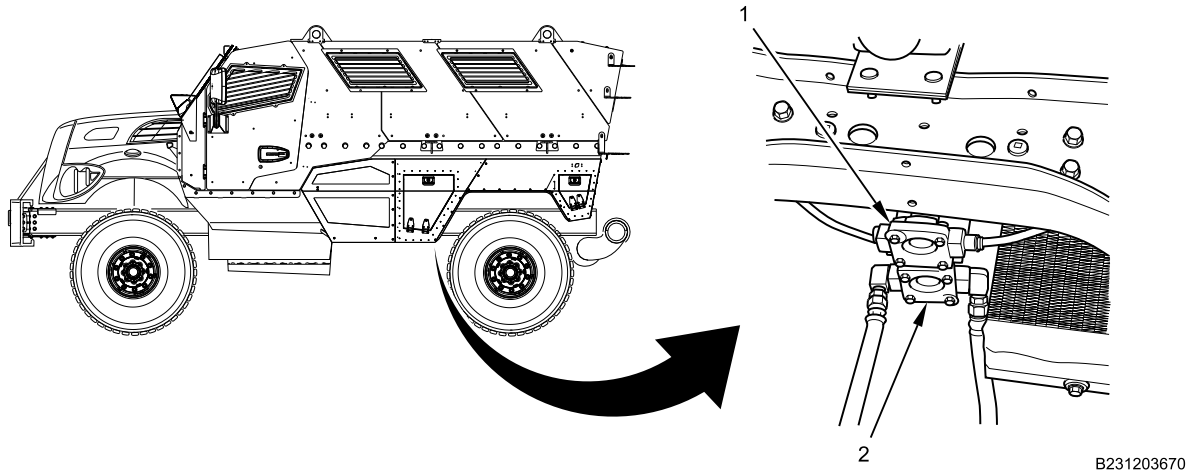


Figure 12. Right Front Service Line and Rear Brake Chamber Quick-Release Valves.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace quick-release valve (WP 0521). Return vehicle to service.

1. Park brake released (TM 9-2355-106-10). Apply soap-and-water solution around valve where exhaust cover meets body (Figure 13, Item 1).
 - a. No leakage is permitted.

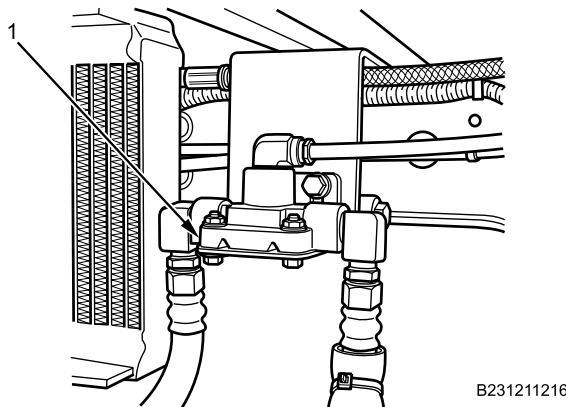


Figure 13. Rear Brake Chamber Quick-Release Valve.

Leakage is present.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace quick-release valve (WP 0521). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

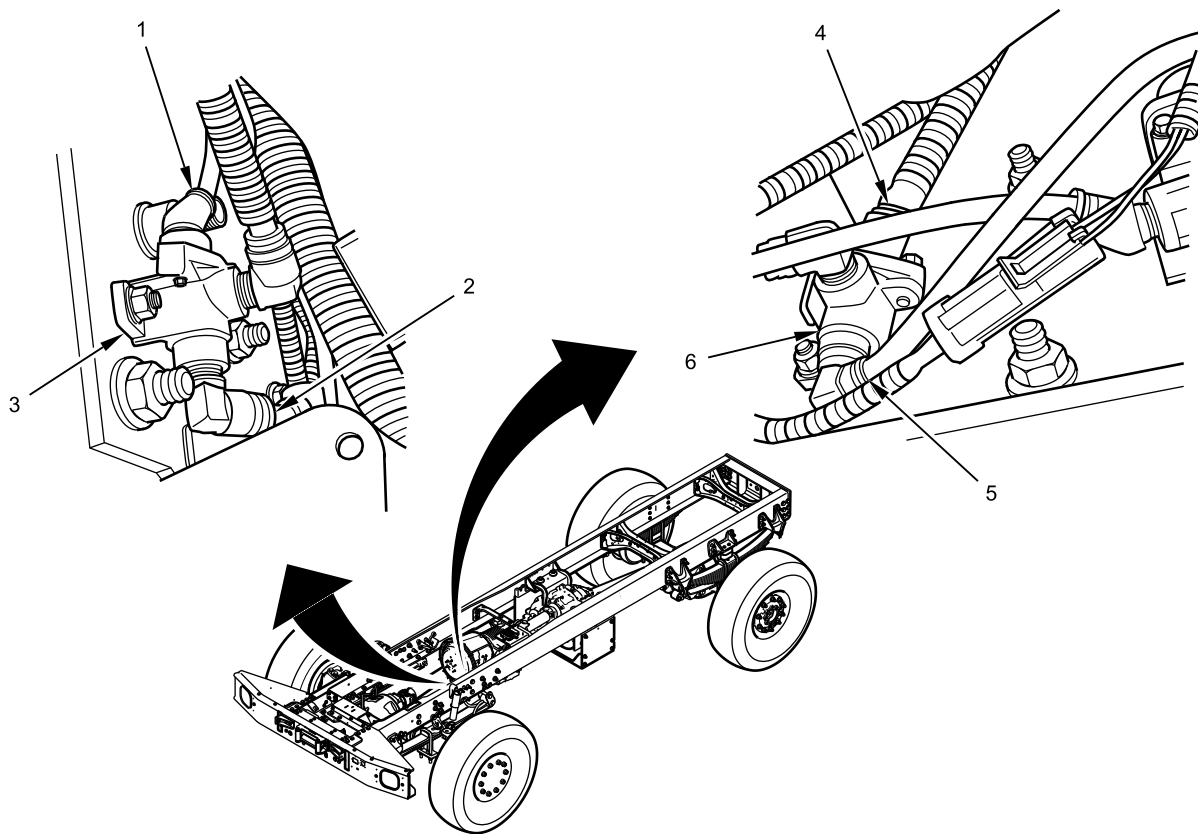
DOUBLE CHECK VALVE OPERATIONAL CHECKOUT PROCEDURE

NOTE

This procedure applies to either of the two double check valves.

STEP

1. Drain all air pressure from air tanks (TM 9-2355-106-10).
2. Disconnect air lines from both inlet ports (Figure 14, Item 1, 2, 4, 5) from double check valve (Figure 14, Item 3, 6).



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Figure 14. Double Check Valves.

3. Coat one inlet port with soap-and-water solution. Apply air to opposite inlet port with blow gun.
 - a. Permissible leakage is 1-inch bubble in 5 seconds.

CONDITION/INDICATION

Leakage is excessive.

CORRECTIVE ACTION

Replace double check valve (WP 0522). Return vehicle to service.

1. Coat other inlet port with soap-and-water solution. Apply air to opposite inlet port with blowgun.
 - a. Permissible leakage is 1-inch bubble in 5 seconds.

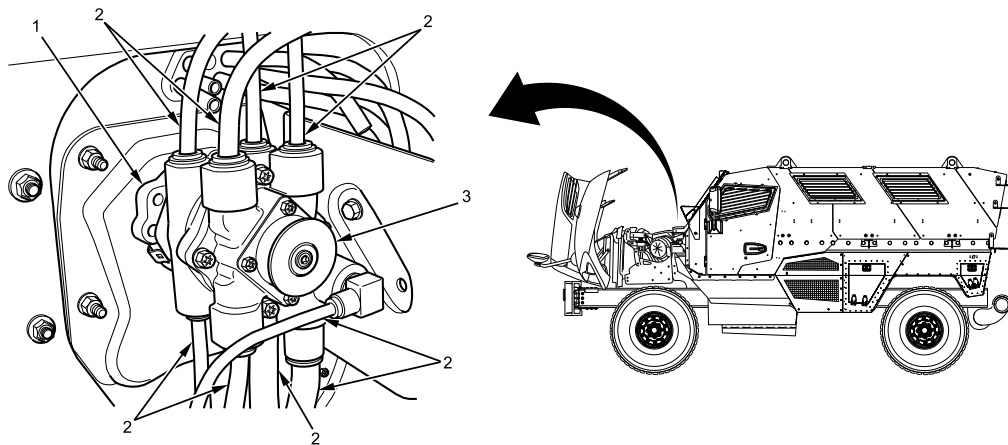
Leakage is excessive.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Replace double check valve (WP 0522). Return vehicle to service.

FOOT VALVE OPERATIONAL CHECKOUT PROCEDURE**STEP**

1. Remove driver control mounting bracket assembly exterior armor. Refer to Driver Control Mounting Bracket Assembly Exterior Armor Removal and Installation (WP 0646).
2. Air pressure 100-125 psi (689-861 kPa) in both primary and secondary air tanks, foot pedal applied (TM 9-2355-106-10).
3. Apply soap-and-water solution to entire foot valve (Figure 15, Item 1), including air line (Figure 15, Item 2) connections and exhaust port (Figure 15, Item 3).



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Figure 15. Foot Valve.

- a. Permissible leakage is 1-inch bubble in 3 seconds.

CONDITION/INDICATION

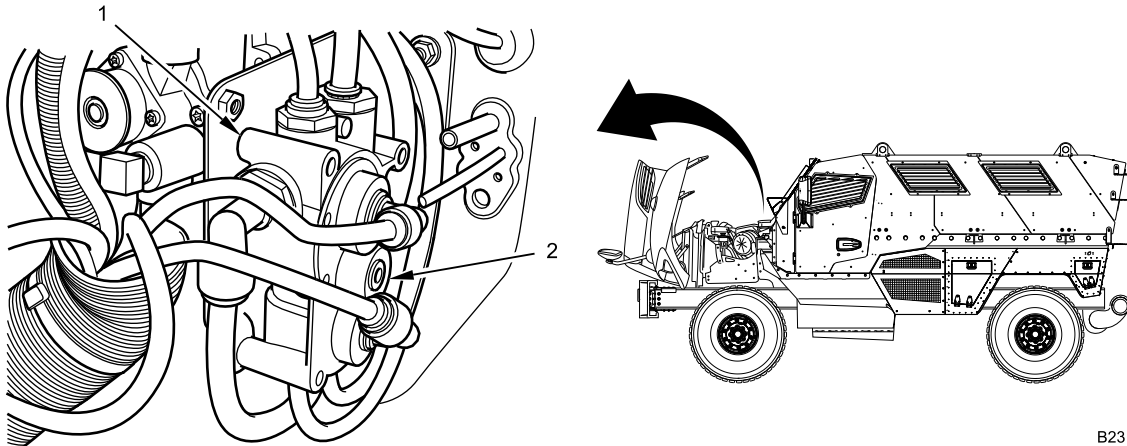
Leakage is excessive.

CORRECTIVE ACTION

- STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).
- STEP 2. Replace foot valve (WP 0502). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**TRACTOR PROTECTION VALVE OPERATIONAL CHECKOUT PROCEDURE****STEP**

1. Engine running, air pressure 100-125 psi (689-861 kPa) in both primary and secondary air tanks. TRAILER AIR SUPPLY (RED) knob pushed in (TM 9-2355-106-10).
2. Open rear service line gladhand, located right of rear pintle hook and labeled SERVICE (TM 9-2355-106-10). Apply trailer brake hand control (TM 9-2355-106-10). Apply soap-and-water solution to rear service line gladhand and exhaust port (Figure 16, Item 2) of tractor protection valve (Figure 16, Item 1).



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Figure 16. Tractor Protection Valve.

- a. Permissible leakage is 1-inch bubble in 3 seconds.

CONDITION/INDICATION

Leakage is excessive.

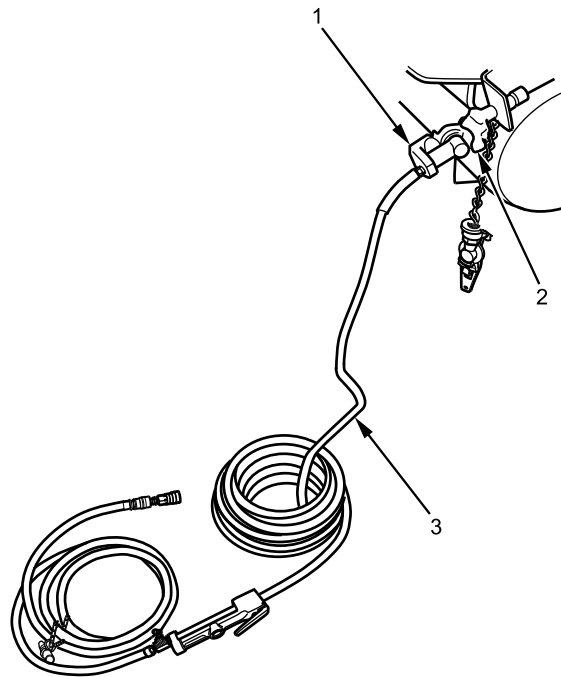
CORRECTIVE ACTION

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

1. Trailer brake hand control released, trailer air supply control TRAILER AIR SUPPLY (RED) knob pulled out. Connect assembled gladhand connector (Figure 17, Item 2) and inflator gauge (Figure 17, Item 3) to rear service line (Figure 17, Item 1). Refer to (TM 9-2355-106-10).

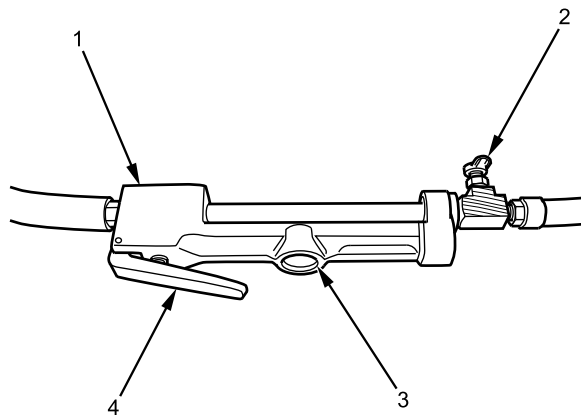
AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



B231203684

Figure 17. Assembled Inflator Hose Attached to Rear Service Line.

2. TRAILER AIR SUPPLY (RED) knob pushed in, trailer brake hand control applied (TM 9-2355-106-10). Direct assistant to observe assembled inflator gauge (Figure 18, Item 1) connected to rear service line while continuing to slowly release air pressure from system. Read pressure by squeezing and releasing handle (Figure 18, Item 4), then read pressure at indicator window (Figure 18, Item 3). Repeat frequently to update reading. Ensure air bleed valve (Figure 18, Item 2) is closed.
 - a. Air pressure should be present at rear service line gladhand pressure gauge. Pressure will vary depending on position of trailer brake hand control.



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Figure 18. Inflator Gauge.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Air pressure is not present at rear service line gladhand pressure gauge.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

1. Apply soap-and-water solution to tractor protection valve and air line fittings (Figure 16, Item 1).
 - a. Permissible leakage is 1-inch bubble in 3 seconds.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

1. Release trailer brake hand control (TM 9-2355-106-10), and check for leaks at tractor protection valve with soapy water.
 - a. Permissible leakage is 1-inch bubble in 3 seconds.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

1. Remove steering column covers. Refer to Steering Column Covers Removal and Installation (WP 0565).
2. Apply foot valve while checking exhaust port (Figure 19, Item 2) on trailer brake hand control (Figure 19, Item 1) for leaks with soapy water.
 - a. Permissible leakage is 1-inch bubble in 3 seconds.

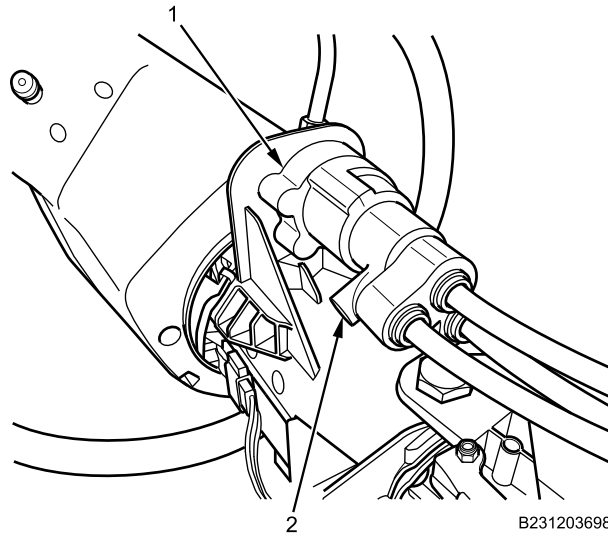


Figure 19. Trailer Brake Hand Control Valve.

Trailer brake hand control valve exhaust port leaks excessively.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace trailer brake hand control valve (WP 0529). Return vehicle to service.

1. Release foot valve.
2. Disconnect primary air line (GREEN) between foot valve and tractor protection valve, from top of tractor protection valve. Refer to Tractor Protection Valve Removal and Installation (WP 0503), REMOVAL, step 6.
3. Block off disconnected air line. Insert #4 cross-tip screwdriver into open end of disconnected air line and secure with screw clamp.
4. Apply foot valve (TM 9-2355-106-10).
5. Check for leak at disconnected port on tractor protection valve with soapy water.

Leak is present.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

1. Release foot valve (TM 9-2355-106-10).
2. Blow soapy water out of disconnected port on tractor protection valve with compressed air.
3. Unblock and connect primary air line to disconnected port on tractor protection valve.
4. Disconnect secondary air line (GREEN) from bottom of tractor protection valve. Refer to Tractor Protection Valve Removal and Installation (WP 0503), REMOVAL, step 13.
5. Block off disconnected air line. Insert #4 cross-tip screwdriver into open end of disconnected air line and secure with screw clamp.
6. Apply foot valve (TM 9-2355-106-10).
7. Inspect for leak at disconnected port on tractor protection valve with soapy water.

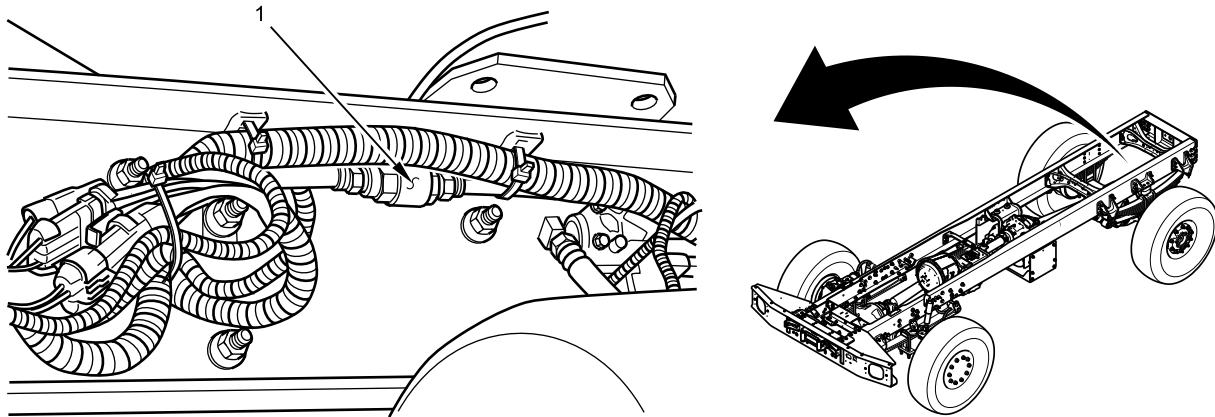
Leak is present.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace tractor protection valve (WP 0503). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**IN-LINE QUICK-RELEASE VALVE OPERATIONAL CHECKS.****STEP**

1. Remove any accumulated contaminants. Visually inspect valve exterior (Figure 20, Item 1) for physical damage.



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Figure 20. In-Line Quick-Release Valve.

CONDITION/INDICATION

Physical damage is present.

CORRECTIVE ACTION

Replace quick-release valve (WP 0521). Return vehicle to service.

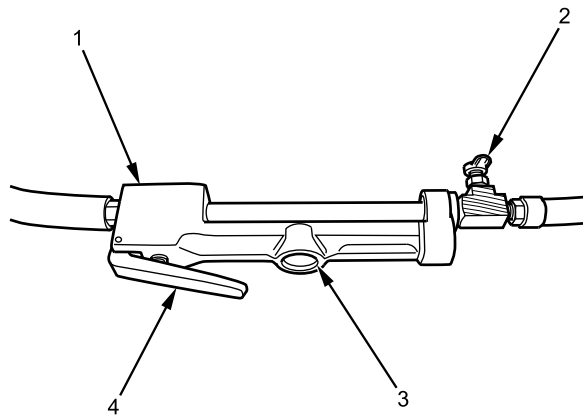
1. Inspect all air lines connected to the in-line quick-release valve for signs of wear or physical damage.

Physical damage is present.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace air lines as necessary. Refer to Chapter 5 Index in this manual. Return vehicle to service.

1. TRAILER AIR SUPPLY (RED) knob pulled out (TM 9-2355-106-10), assembled inflator hose connected to rear service line gladhand.
2. Air pressure at 100-125 psi (689-861 kPa) in primary and secondary air tanks. TRAILER AIR SUPPLY (RED) knob pushed in (TM 9-2355-106-10). Ensure air bleed valve (Figure 21, Item 2) is closed. Apply and release foot valve several times while observing inflator gauge (Figure 21, Item 1). Read pressure by squeezing and releasing handle (Figure 21, Item 4), then read pressure at indicator window (Figure 21, Item 3). Repeat frequently to update reading.
 - a. Gauge should show application and release pressure with no delay in response.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)


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Figure 21. Inflater Gauge.

In-line quick-release valve does not perform as described.

STEP 1. Pull TRAILER AIR SUPPLY (RED) knob out.

STEP 2. Replace in-line quick-release valve (WP 0521). Return vehicle to service.

1. Apply soap-and-water solution to in-line quick-release valve and fittings. Apply foot valve (TM 9-2355-106-10).
 - a. Permissible leakage at valve exhaust port is 1-inch bubble in 5 seconds.
 - b. No leakage is permitted at in-line quick-release valve body or connections.

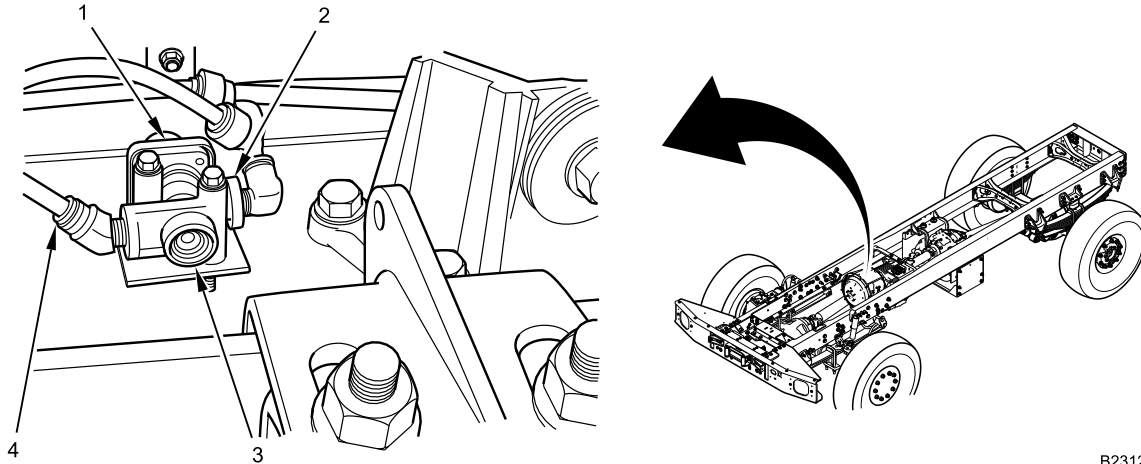
Leakage is present.

STEP 1. Pull TRAILER AIR SUPPLY (RED) knob out (TM 9-2355-106-10).

STEP 2. Replace in-line quick-release valve (WP 0521). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**PRESSURE PROTECTION VALVE OPERATIONAL CHECKS.****STEP**

1. System air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10). Apply soap-and-water solution to pressure protection valve body (Figure 22, Item 2).



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Figure 22. Pressure Protection Valve.

- a. Permissible leakage at cap (Figure 22, Item 1) is 1-inch bubble in 3 seconds. No leakage is permissible at bottom of valve (Figure 22, Item 3).

CONDITION/INDICATION

Leakage is excessive.

CORRECTIVE ACTION

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace pressure protection valve (WP 0520). Return vehicle to service.

1. Slowly and carefully, remove air line from delivery port quick connect (Figure 22, Item 4). Apply soap-and-water solution to delivery port.

- a. Permissible leakage is 1-inch bubble in 5 seconds.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace pressure protection valve (WP 0520). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**ANTILOCK BRAKE SYSTEM (ABS) ANTILOCK MODULATOR VALVE OPERATIONAL CHECKS.****STEP****NOTE**

The front ABS modulator valve is located rear of front tire on the outside of frame rail.

Left side shown; right side similar.

1. Apply soap-and-water solution to the exhaust port (Figure 23, Item 3) of the antilock modulator valve (Figure 23, Item 2) and any other components in the respective circuit. Permissible leakage at the exhaust port (Figure 23, Item 3) of antilock modulator valve is 1-inch bubble in 3 seconds. No leakage is permitted at supply or delivery line connections (Figure 23, Item 1).

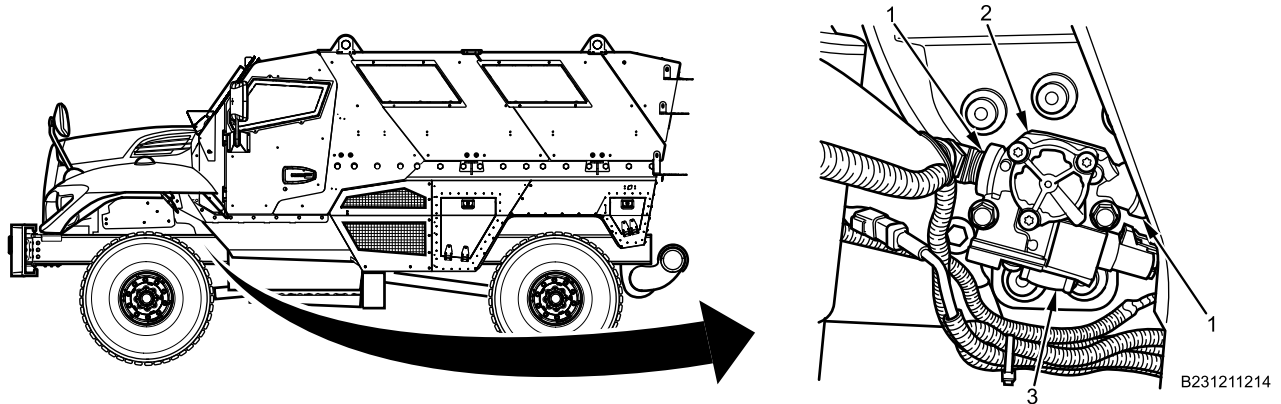


Figure 23. Front ABS Modulator Valve.

CONDITION/INDICATION

Leakage is excessive.

CORRECTIVE ACTION

- STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).
- STEP 2. Secure line connections or replace antilock modulator valve (WP 0511). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

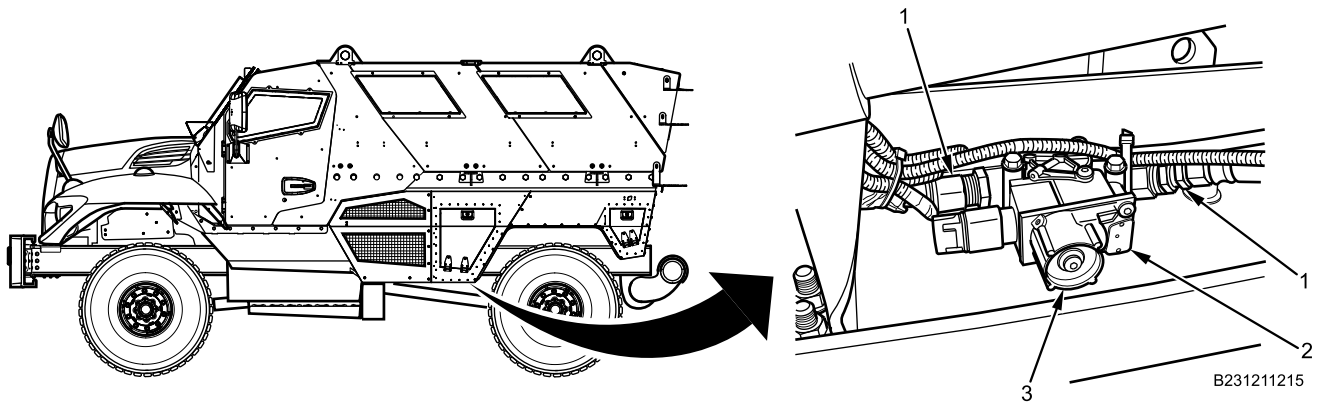


Figure 24. Rear ABS Modulator Valve.

NOTE

The rear ABS modulator valve is located in front of rear tire on the inside of frame rail.

Right side shown; left side similar.

1. Apply soap-and-water solution to the exhaust port (Figure 24, Item 3) of the antilock modulator valve (Figure 24, Item 2) and any other components in the respective circuit. Permissible leakage at the exhaust port (Figure 24, Item 3) of antilock modulator valve is 1-inch bubble in 3 seconds. No leakage is permitted at supply or delivery line connections (Figure 24, Item 1).

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace antilock modulator valve (WP 0507). Return vehicle to service.

1. Parking brakes released, system air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks (TM 9-2355-106-10).
2. Ignition off, foot valve applied. Turn ignition on (TM 9-2355-106-10).
 - a. One or two short bursts of air should audibly escape exhaust port of each antilock modulator.

No burst of exhaust is observed, or the exhaust of air is prolonged and not short, sharp, and well defined.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace antilock modulator valve (WP 0511) or (WP 0507). Return vehicle to service.

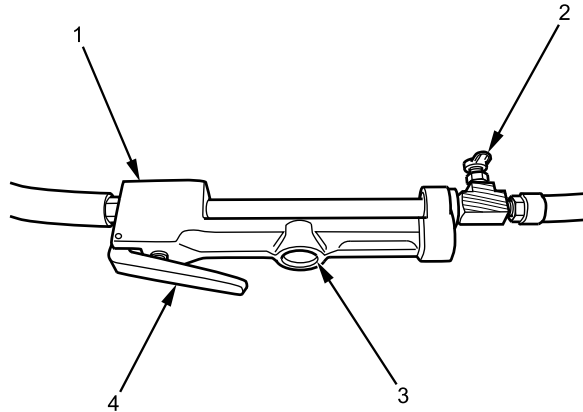
TRAILER BRAKE HAND CONTROL OPERATIONAL CHECKS.

STEP

1. Drain all air pressure from air tanks (TM 9-2355-106-10).

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

2. Assembled inflator hose connected to rear service line gladhand, system air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks. TRAILER AIR SUPPLY (RED) knob pushed in. Trailer brake hand control fully applied.
 - a. Pressure indicated on assembled inflator hose gauge and dash pressure gauge should be equal. Read pressure by squeezing and releasing handle (Figure 25, Item 4), then read pressure at indicator window (Figure 25, Item 3). Repeat frequently to update reading. Ensure air bleed valve (Figure 25, Item 2) is closed.



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Figure 25. Inflator Gauge.

CONDITION/INDICATION

Pressure indicated on assembled inflator gauge and dash pressure gauge is not equal.

CORRECTIVE ACTION

- STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).
- STEP 2. Replace trailer brake hand control (WP 0506). Return vehicle to service.

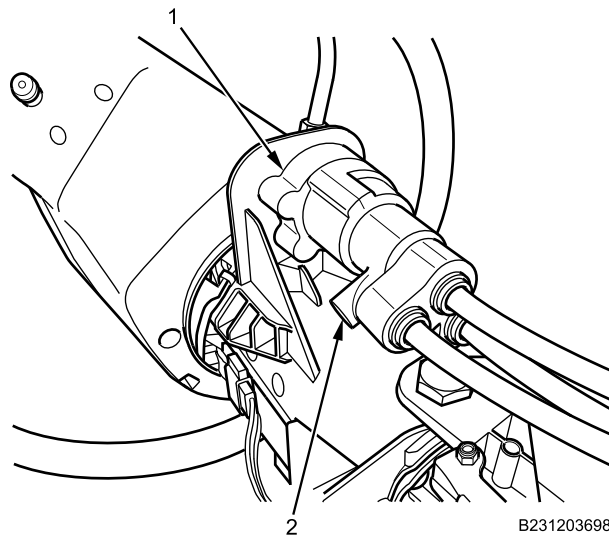
AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Figure 26. Trailer Brake Hand Control Valve.

1. Apply soap-and-water solution to exhaust port (Figure 26, Item 2) on trailer brake hand control (Figure 26, Item 1). System air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks, trailer brake hand control in released position (TM 9-2355-106-10).
 - a. Permissible leakage is 1-inch bubble in 5 seconds.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace trailer brake hand control (WP 0506). Return vehicle to service.

1. Trailer brake hand control in fully applied position (TM 9-2355-106-10).
 - a. Permissible leakage is 1-inch bubble in 3 seconds.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace trailer brake hand control (WP 0506). Return vehicle to service.

FRONT AXLE BRAKE CHAMBERS OPERATIONAL CHECKS.**STEP**

1. System air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks. Apply foot valve (TM 9-2355-106-10) while observing pushrods.
 - a. Actuating rods should move out promptly and smoothly.
2. Release foot valve (TM 9-2355-106-10) while observing pushrods.
 - a. Actuating rods should move in promptly and smoothly.

CONDITION/INDICATION

Brake chamber does not function as described.

CORRECTIVE ACTION

Replace front brake chamber (WP 0514). Return vehicle to service.

1. Apply and release foot valve (TM 9-2355-106-10) while observing pushrod travel.
 - a. Actuating rod travel should be as short as possible without brakes dragging. Full movement of pushrods on vehicle with properly adjusted brakes is 2.5 inches (63.5 mm) maximum.

Pushrod travel is too long.

Adjust travel of pushrod at slack adjuster (WP 0484). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CAUTION**

Do not overtighten clamping ring. If leakage is detected, tighten clamping ring only enough to stop leak. Failure to comply can cause distortion of sealing surface or clamping ring, requiring replacement of brake chamber.

NOTE

Front brake chambers are located inboard of front wheels and rearward of axle. Right front brake chamber shown; left similar.

1. Fully apply foot valve (TM 9-2355-106-10). Apply soap-and-water solution to brake chamber (Figure 27, Item 1) clamping ring (Figure 27, Item 3).

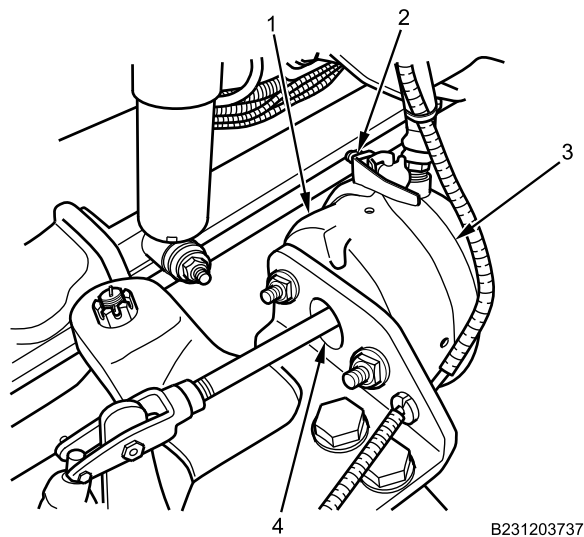


Figure 27. Right Front Brake Chamber.

Leakage is detected.

Tighten clamping ring nut (Figure 27, Item 2) only enough to stop leak.

1. Apply soap-and-water solution to pushrod hole (Figure 27, Item 4) and apply foot valve (TM 9-2355-106-10).
 - a. No leakage is permitted.

Leakage is present.

Replace front brake chamber (WP 0514). Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**REAR BRAKE CHAMBER OPERATIONAL CHECKS.****STEP**

1. System air pressure 100-125 psi (689-861 kPa) in primary and secondary air tanks. Apply foot valve while observing pushrods.
 - a. Pushrods should move out promptly and smoothly.
2. Release foot valve (TM 9-2355-106-10) while observing pushrods.
 - a. Pushrods should move in promptly and smoothly.

CONDITION/INDICATION

Pushrods do not perform as described.

CORRECTIVE ACTION

Replace rear brake chamber (WP 0516). Return vehicle to service.

1. Apply and release foot valve (TM 9-2355-106-10) while observing pushrod travel.
 - a. Pushrod travel should be as short as possible without brakes dragging. Full movement of pushrods on vehicle with properly adjusted brakes is 2.5 inches (63.5 mm) maximum.

Pushrod travel is too long.

Adjust travel of pushrod at slack adjuster (WP 0484). Return vehicle to service.

CAUTION

Do not overtighten clamping ring. If leakage is detected, tighten clamping ring only enough to stop leak. Failure to comply can cause distortion of sealing surface or clamping ring, requiring replacement of brake chamber.

NOTE

Rear brake chambers are located inboard of rear wheels and forward of axle. Left rear brake chamber shown; right similar.

1. Apply soap-and-water solution to clamping ring area (Figure 28, Item 3).

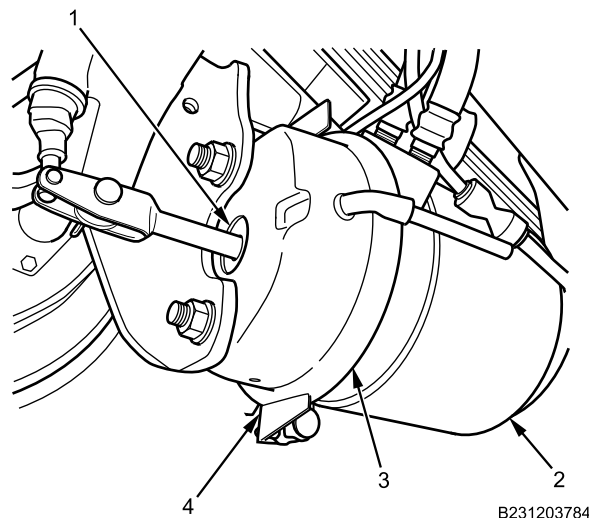


Figure 28. Left Rear Brake Chamber.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

2. Apply and release foot valve (TM 9-2355-106-10) while observing brake chamber (Figure 28, Item 2) clamping ring area (Figure 28, Item 3) for leaks.

Leakage is detected.

Tighten clamping ring nut (Figure 28, Item 4) only enough to stop leak.

1. Apply soap-and-water solution to pushrod hole (Figure 28, Item 1). Apply and release foot valve.
 - a. No leakage is permitted.

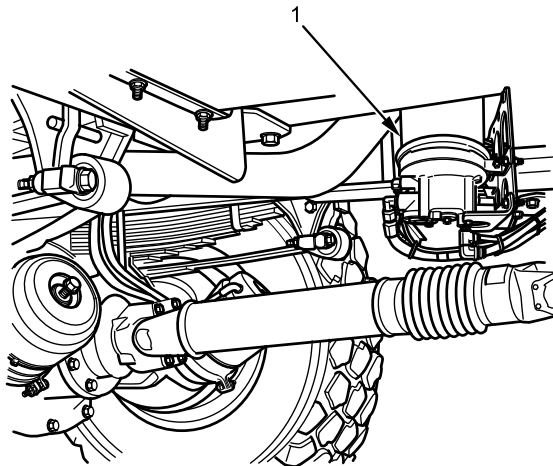
Leakage is detected.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace rear brake chamber (WP 0516). Return vehicle to service.

AIR DRYER OPERATIONAL CHECKS.**STEP**

1. Engine running (TM 9-2355-106-10). Air pressure 100-125 psi (689-861 kPa) in both primary and secondary air tanks. Check all connections and air lines from air dryer (Figure 29, Item 1) for air leaks with soapy water. No leaks should be present.



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Figure 29. Air Dryer.

CONDITION/INDICATION

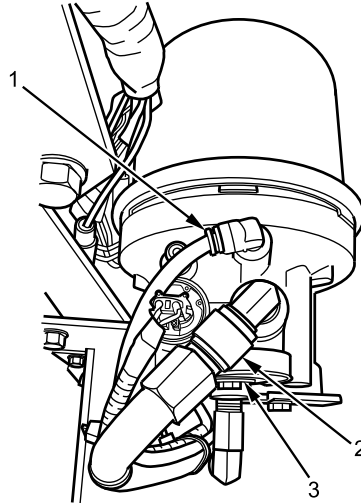
Leaks are present.

CORRECTIVE ACTION

Secure fittings or replace components as necessary. Refer to Chapter 5 Index in this manual. Return vehicle to service.

AIR BRAKE COMPONENT OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Air pressure at just below 95 psi (655 kPa), Engine off. Slowly and carefully disconnect compressor discharge line from air dryer supply port (Figure 30, Item 2). Apply soap-and-water solution to air dryer supply port.
 - a. Permissible leakage is 1-inch bubble in 1 second.



B231203744

Figure 30. Air Dryer Fittings.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace air dryer (WP 0517). Return vehicle to service.

1. 50 psi (345 kPa) or more system pressure (TM 9-2355-106-10). Slowly and carefully disconnect governor discharge line from air dryer control port (Figure 30, Item 1). Apply soap-and-water solution air dryer exhaust port (Figure 30, Item 3).
 - a. No leaks should be present.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace air dryer (WP 0517). Return vehicle to service.

1. Engine running (TM 9-2355-106-10). Air compressor in loaded (compressing air) mode. Apply soap-and-water solution air dryer exhaust port (Figure 30, Item 3).
 - a. Permissible leakage is 1-inch bubble in 1 second.

Leakage is excessive.

STEP 1. Drain all air pressure from air tanks (TM 9-2355-106-10).

STEP 2. Replace air dryer (WP 0517). Return vehicle to service.

1. Close all air tank drain valves (TM 9-2355-106-10). Build up system pressure until governor cut-out and verify that air dryer purges with an audible escape of air (TM 9-2355-106-10). Governor cut-out should occur when system pressure reaches 120-125 psi (827.37-861.84 kPa). Governor cut-out is evident when system pressure stops increasing.
2. Pump the service brakes (TM 9-2355-106-10) to reduce system air pressure to governor cut-in (approximately 95 psi (655 kPa)). Verify that system air pressure again builds to governor cut-out pressure and is followed by an air dryer purge.

Air dryer does not function as described.

STEP 1. Go to Air Dryer Heater and Thermostat Troubleshooting (WP 0174).

END OF WORK PACKAGE

FIELD MAINTENANCE

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0333
WP 0335
WP 0426
WP 0517
WP 0597

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 41

TROUBLESHOOTING PROCEDURE

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 milliamperes can cause severe pain, 15 milliamperes can cause loss of muscle control, and 70 milliamperes 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.

CAUTION

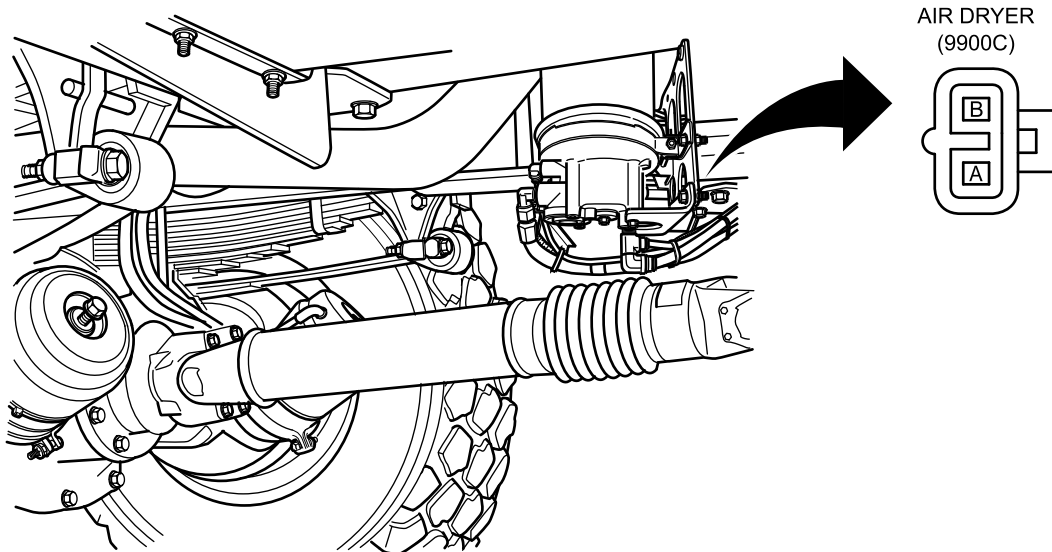
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Disconnect air dryer heater harness connector 9900C. Refer to Figure 1.



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Figure 1. Air Dryer.

4. Measure DC voltage between connector 9900C terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

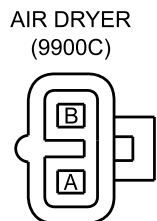
Does multimeter read between 10.5 volts and 13.5 volts?

DECISION

NO Go to Step 6.
YES Go to next step.

STEP

5. Measure DC voltage between connector 9900C terminals A and B with multimeter. Refer to Figure 2.



B230603964

Figure 2. Connector 9900C.

CONDITION/INDICATION

Does multimeter read between 10.5 volts and 13.5 volts?

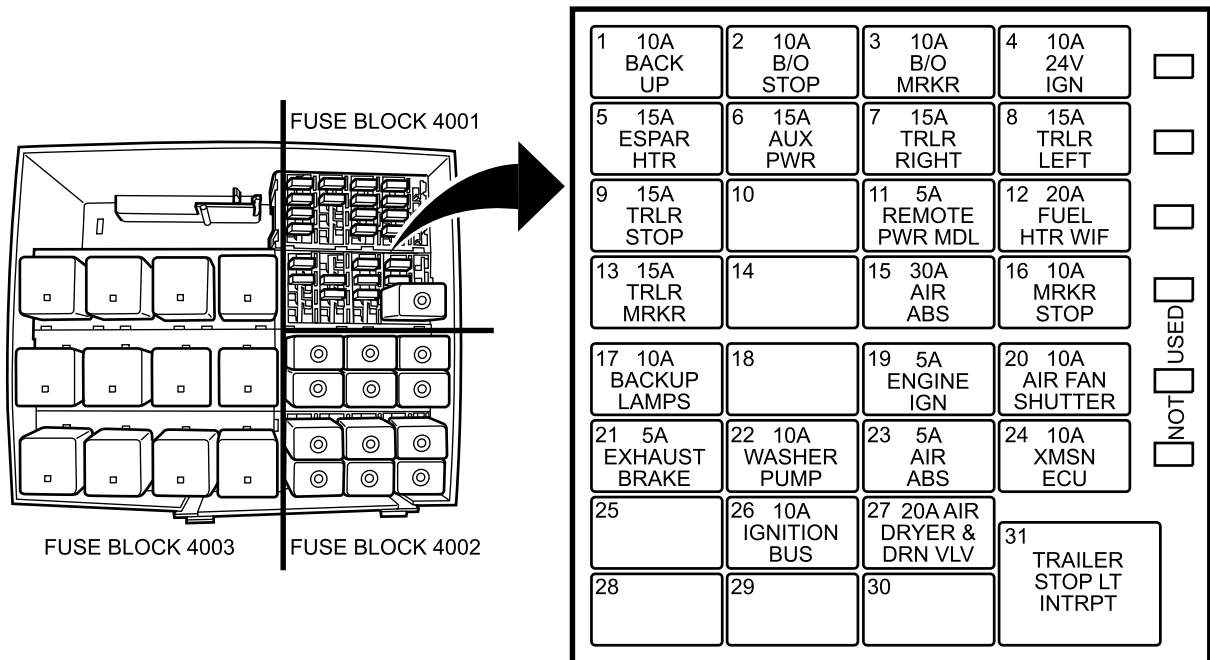
AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 13.
 YES Go to Step 23.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Remove and inspect air dryer fuse 27. Refer to Power Distribution Center (PDC) Fuse and Relay Removal and Installation (WP 0333). Refer to Figure 3.



B230601892

Figure 3. Power Distribution Center.

CONDITION/INDICATION

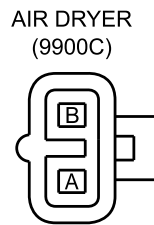
Is fuse open?

DECISION

YES Go to Step 19.
 NO Go to next step.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

9. Measure resistance between each fuse 27 socket terminal and connector 9900C terminal A with multimeter. Refer to Figure 4.



B230603964

Figure 4. Connector 9900C.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for either test?

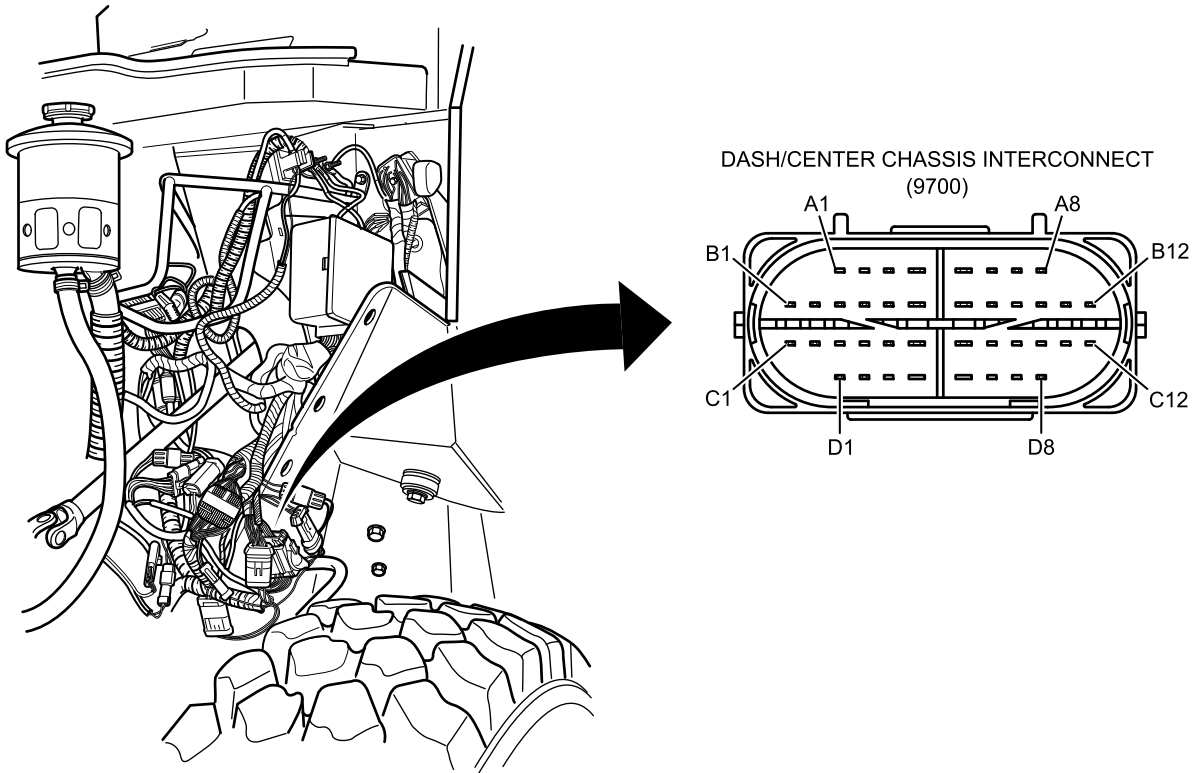
DECISION

YES Go to Step 27.
NO Go to next step.

STEP

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)

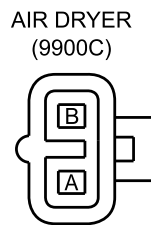
10. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
11. Disconnect dash/center chassis harness connector 9700/9714. Refer to Figure 5.



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Figure 5. Left Rear Engine Compartment.

12. Measure resistance between connector 9700 terminal B12 and connector 9900C terminal A with multimeter. Refer to Figure 5 and Figure 6.



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Figure 6. Connector 9900C.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

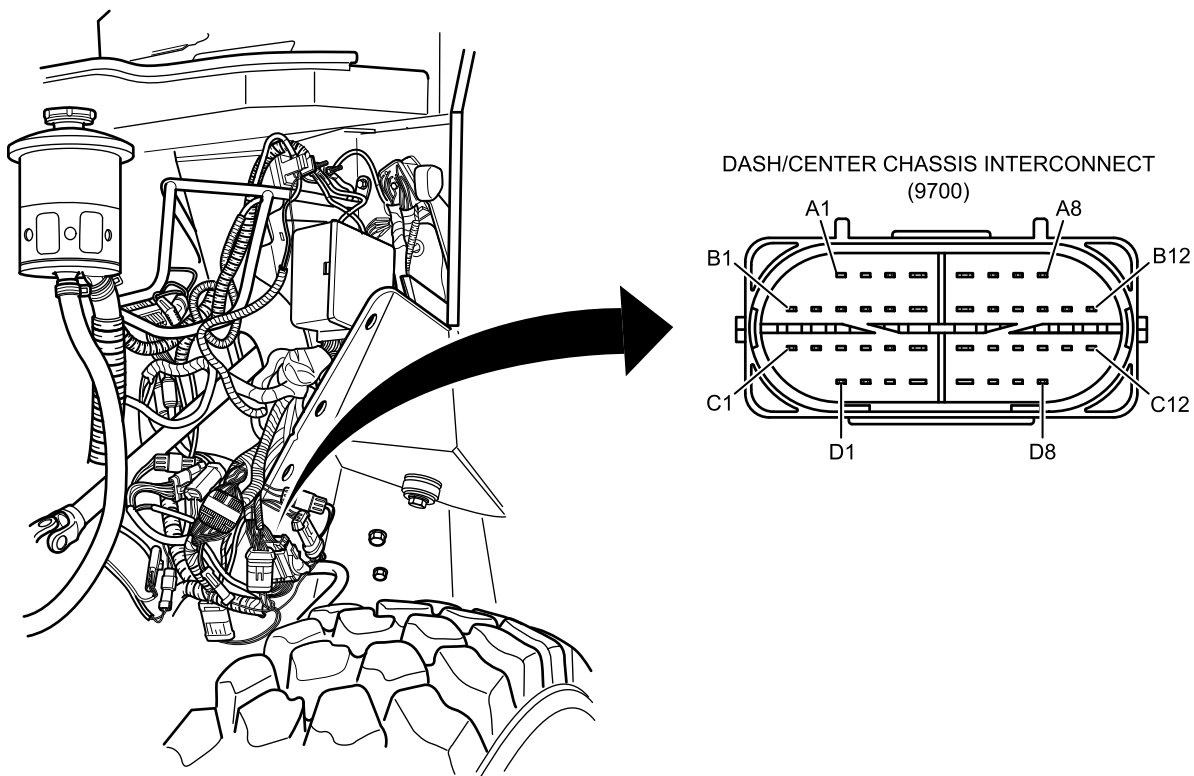
Does multimeter read less than 5 ohms?

DECISION

NO Go to Step 26.
 YES Go to Step 25.

STEP

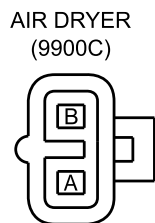
13. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
14. Disconnect dash/center chassis harness connector 9700/9714. Refer to Figure 7.



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Figure 7. Left Rear Engine Compartment.

15. Measure resistance between connector 9700 terminal C6 and connector 9900C terminal B with multimeter. Refer to Figure 7 and Figure 8.



B230603964

Figure 8. Connector 9900C.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

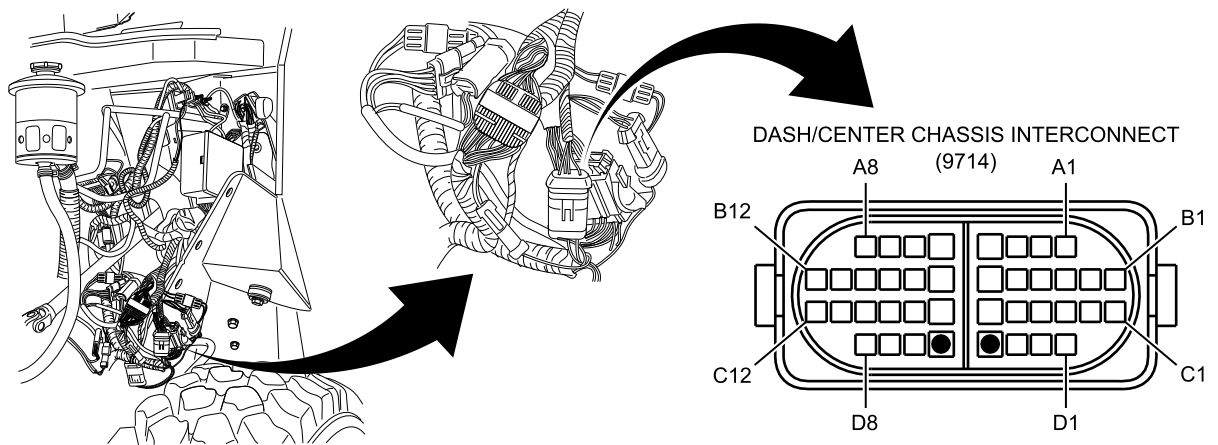
DECISION

YES Go to next step.

NO Go to Step 26.

STEP

16. Measure resistance between connector 9714 terminal C6 and ground with multimeter. Refer to Figure 9.



B230604050

Figure 9. Left Rear Engine Compartment.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

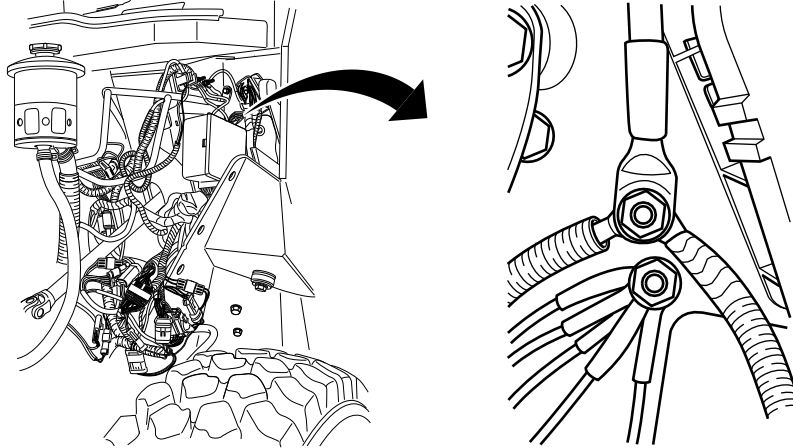
YES Go to Step 24.

NO Go to next step.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

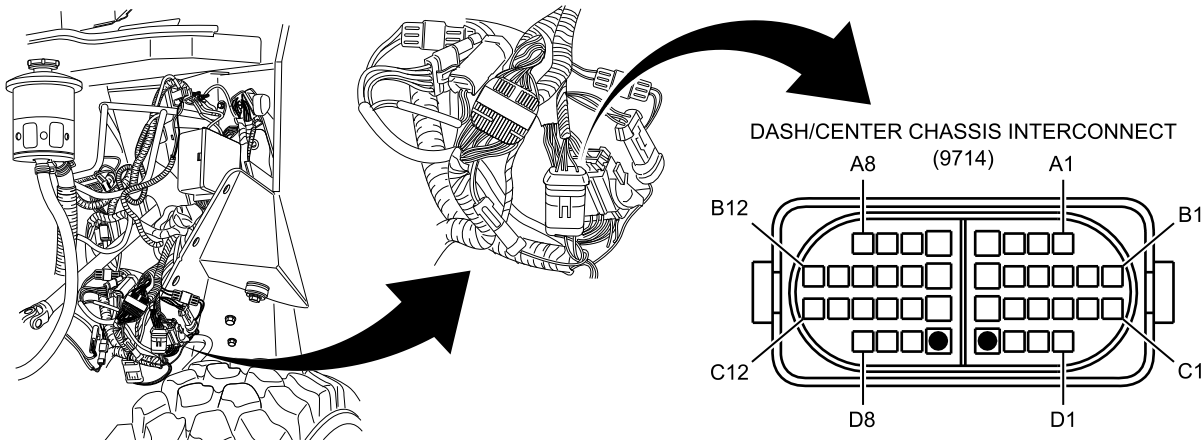
17. Clean terminals at chassis ground stud containing wire marked J11-GA. Refer to Figure 10.



B230604054

Figure 10. Left Rear Engine Compartment Chassis Ground Stud.

18. Measure resistance between connector 9714 terminal C6 and ground with multimeter. Refer to Figure 11.



B230604050

Figure 11. Left Rear Engine Compartment.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

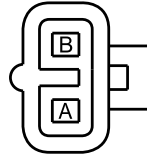
DECISION

- NO Go to Step 25.
- YES Return vehicle to service.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

19. Measure resistance between connector 9900C terminal A and ground with multimeter. Refer to Figure 12.

AIR DRYER
(9900C)



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Figure 12. Connector 9900C.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

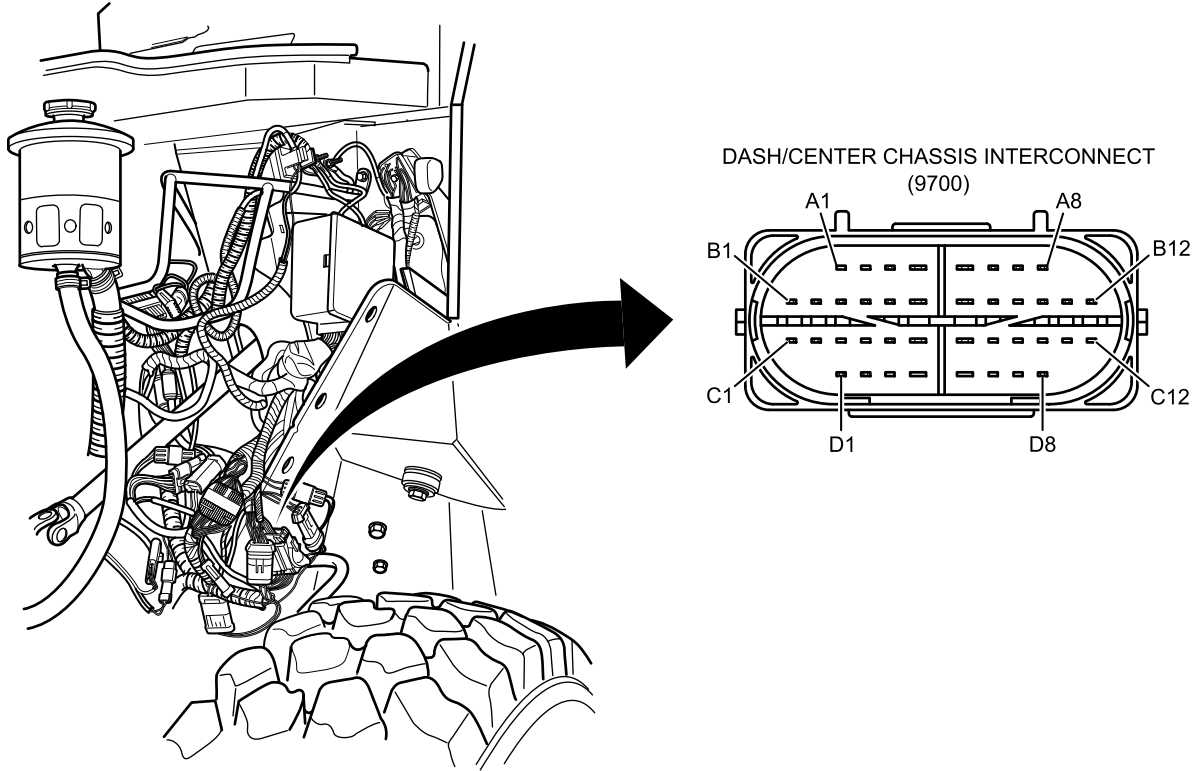
YES Go to Step 23.

NO Go to next step.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

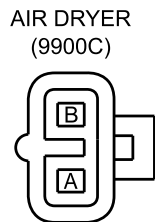
- 20. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597).
- 21. Disconnect dash/center chassis harness connector 9700/9714. Refer to Figure 13.



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Figure 13. Left Rear Engine Compartment.

- 22. Measure resistance between connector 9900C terminal A and ground with multimeter. Refer to Figure 14.



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Figure 14. Connector 9900C.

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does the multimeter read OL?

DECISION

NO Go to Step 26.
YES Go to Step 25.

MALFUNCTION

- 23. Air dryer is faulty.

ACTION

Replace air dryer (WP 0517).

END OF TEST**MALFUNCTION**

- 24. Dash/center chassis connector 9700/9714 is faulty.

ACTION

23. Insert appropriate terminal adapter from Terminal Adapter Kit into each terminal in each connector. Terminal friction should prevent adapter from falling out of connector when held hanging vertically from connector.
24. Replace harness that fails test. Go to Power Distribution Center Harness Removal and Installation (WP 0335). Go to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 25. Power distribution center harness is faulty.

ACTION

Replace power distribution center harness. Go to Power Distribution Center Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST

AIR DRYER HEATER AND THERMOSTAT TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 26. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Go to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 27. 12-volt power distribution is faulty.

ACTION

Go to Power Distribution Troubleshooting Procedure (WP 0059).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0523

WP 0525

WP 0782

Materials/Parts

Goggles, industrial (WP 0794, Item 20)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Engine hood open and secured (TM 9-2355-106-10)

Left side engine armor plate removed (WP 0597)

Left engine armor plate bracket removed (WP 0598)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0176

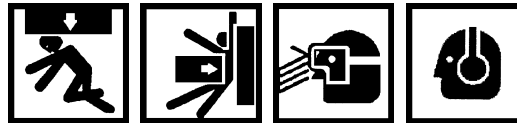
WP 0215

WP 0499

WP 0524

WP 0527

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.

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.

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.

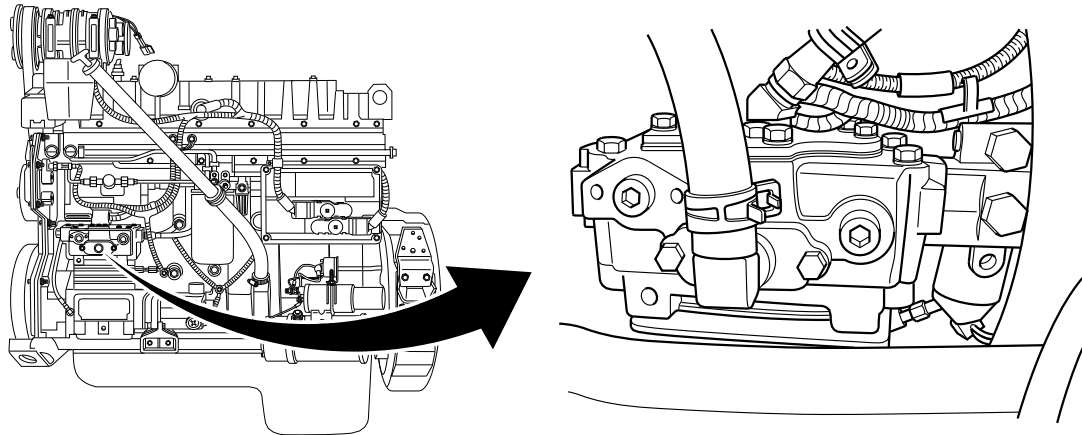
Wear ear and eye protection when releasing compressed air. Air under high pressure can cause small particles to become projectiles. Sudden release of air under high pressure can cause hearing damage. Failure to comply may result in damage to equipment and serious injury to personnel.

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.

Before working on air brake system or any auxiliary pressurized system, make sure air pressure has been drained from all reservoirs. Failure to comply may result in serious injury or death to personnel.

AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**STEP**

1. Inspect for oil leaks. Refer to Figure 1.



B231204933

Figure 1. Air Compressor, Below Air Filter.

CONDITION/INDICATION

Oil leaking at the front of compressor.

CORRECTIVE ACTION

Replace compressor-to-engine mounting gasket. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

CONDITION/INDICATION

Oil leaking from gasket between compressor and power steering pump.

CORRECTIVE ACTION

Replace gasket between compressor and power steering pump. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.

CONDITION/INDICATION

Oil leaking at air inlet hose or discharge hose fittings.

CORRECTIVE ACTION

Replace leaking hose fittings. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523) and Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.

CONDITION/INDICATION

Oil leaking from loose or damaged oil lines.

CORRECTIVE ACTION

Tighten oil line fittings to specifications, or replace damaged oil lines. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Oil leaking from compressor head gasket that extends down to nameplate on compressor.

CORRECTIVE ACTION

Replace air compressor. Inspect discharge line for carbon buildup. If restricted, replace discharge line. Refer to Air Compressor Removal and Installation (WP 0527) and Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.

CONDITION/INDICATION

Oil leaking from flange at rear of air compressor.

CORRECTIVE ACTION

Replace air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

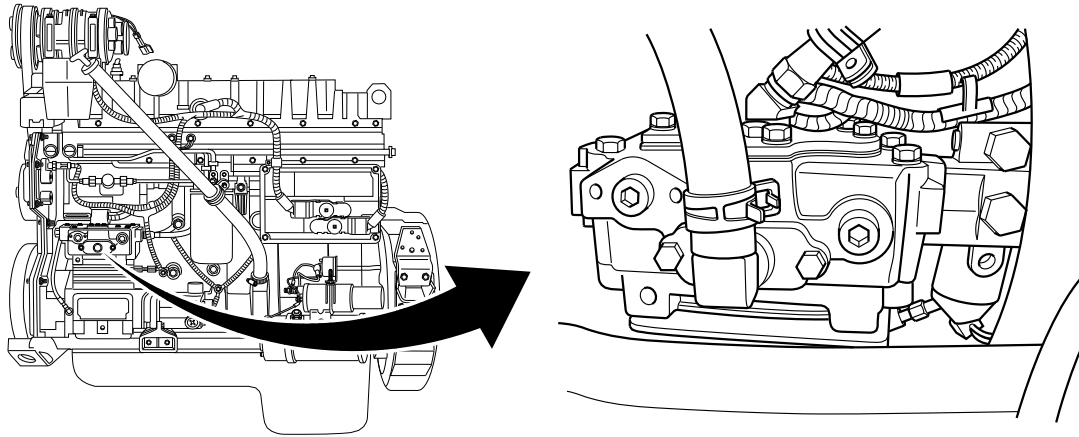
1. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
2. Observe amount of oil and water expelled while draining all air pressure from air tanks. A small amount of oil and water expelled is normal.

Excessive amount of oil expelled while draining air pressure from air tanks.

1. Interval between preventive maintenance service too long. Perform necessary compressed air system preventive maintenance according to schedule (TM 9-2355-106-10). Return vehicle to service.
2. Inspect for restricted or damaged air filter (TM 9-2355-106-10).
3. Inspect for restricted, kinked, or damaged air inlet line. Replace restricted, kinked, or damaged air inlet line. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523). Return vehicle to service.
4. Disconnect and inspect for carbon buildup or restrictions in air discharge line. Replace restricted line. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.
5. Inspect for incorrectly installed discharge line. Discharge line must maintain a constant down slope from the compressor to the air dryer. In cold climates, low points may allow ice to form and restrict flow. Correctly install air delivery line. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.
6. Inspect for leaking, pinched, or restricted compressor coolant lines. Replace leaking, pinched, or restricted coolant lines. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.
7. Check for proper governor operation. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0524). If check indicates faulty governor, replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525). Return vehicle to service.
8. Replace air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

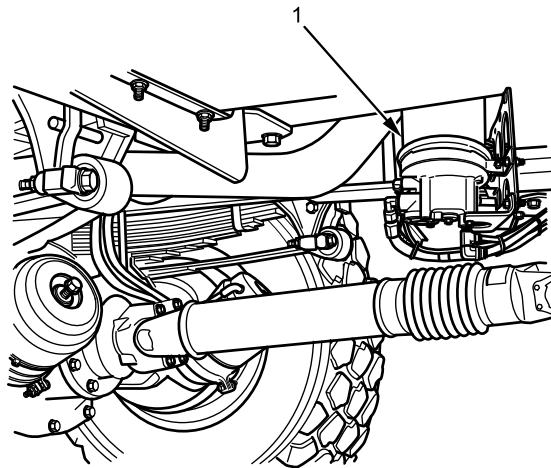
AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Start and idle engine (TM 9-2355-106-10).



B231204933

Figure 2. Air Compressor, Below Air Filter.



B231203743

Figure 3. Air Dryer, Left Rear Tire.

2. Observe air pressure gauges on dash.
3. Allow system pressure to build until governor cut-out and verify that air dryer purges with an audible escape of air (TM 9-2355-106-10). Governor cut-out should occur when system pressure reaches 120-125 psi (827-862 kPa). Governor cut-out is evident when system pressure stops increasing.

Air system does not build pressure.

1. If air dryer purges continuously, go to Air Dryer Heater and Thermostat Troubleshooting (WP 0174).
2. Inspect for air leaks at following areas:
 - a. Fittings and lines at the compressor, governor, air dryer, air tanks, brake valve, and air lines.
 - b. Compressor head gasket.
 - c. Governor to compressor gasket.
 - d. Air brake system components. Refer to Air Brake Component Operational Checkout Procedure (WP 0176).

Refer to Figure 2. Refer to (Figure 3, Item 1). If leaking is found, replace leaking lines or components. Refer to Chapter 5 Index in this manual for a listing of replacement procedures.

AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

3. Inspect air discharge line for restrictions, kinks, or damage.
 - a. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
 - b. Replace restricted, kinked, or damaged line. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.
4. Inspect for incorrectly installed discharge line. Discharge line must maintain a constant down slope from the compressor to the air dryer. In cold climates, low points may allow ice to form and restrict flow.
 - a. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).
5. Check for proper governor operation. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0524). If check indicates faulty governor, replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525). Return vehicle to service.
6. Replace faulty air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

Air compressor constantly cycles.

1. Inspect for air leaks in air brake system. Refer to Air Brake Component Operational Checkout Procedure (WP 0176).
2. Inspect for proper operation of air dryer. Refer to Air Brake Component Operational Checkout Procedure (WP 0173).
3. Check for proper governor operation. Refer to Air Compressor Governor Operational Checkout Procedure (WP 0524). If check indicates faulty governor, replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525). Return vehicle to service.
4. Replace air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

Air system builds too much pressure.

1. Inspect for incorrectly installed air dryer lines. Refer to Air Brake Component Operational Checkout Procedure (WP 0173).
 2. Inspect for pinched, kinked, or restricted air lines at governor. Refer to Air Compressor Governor Operational Checkout Procedures (WP 0176).
 3. Check for proper governor operation. Refer to Air Compressor Governor Operational Checkout Procedures (WP 0176). If check indicates faulty governor, replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525). Return vehicle to service.
 4. Replace air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.
1. Start and idle engine (TM 9-2355-106-10).
 2. Allow system pressure to build until governor cut-out and verify that air dryer purges with an audible escape of air (TM 9-2355-106-10). Governor cut-out should occur when system pressure reaches 120-125 psi (827-862 kPa). Governor cut-out is evident when system pressure stops increasing.
 3. Monitor air pressure gauges on dash; apply and release brake pedal repeatedly until gauge indicates air pressure below 80 psi (552 kPa).
 4. Monitor time required for air pressure to build from 85 psi (586 kPa) to 100 psi (689 kPa). Recovery time should not exceed 40 seconds.

AIR COMPRESSOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Time required for air pressure to increase from 85 psi (586 kPa) to 100 psi (689 kPa) exceeds 40 seconds.

1. Inspect for leaks in air brake system. Refer to Air Brake Component Operational Checkout Procedure (WP 0176).
2. Inspect for leaks at air inlet hose and fittings that allow unfiltered air into compressor. Replace leaking air inlet hose and air compressor. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523) and Air Compressor Removal and Installation (WP 0527). Return vehicle to service.
3. Inspect for pinched, kinked, or restricted air inlet hose. Replace pinched, kinked, or restricted air inlet hose. Refer to Air Compressor Supply Air Line Removal and Installation (WP 0523). Return vehicle to service.
4. Inspect for restricted or damaged air filter. Refer to Engine Air Filter Assembly Removal and Installation (TM 9-2355-106-10).
5. Inspect for air, engine coolant, or engine oil leaking from air compressor head gasket. Replace air compressor. Inspect discharge line for carbon buildup. If restricted, replace discharge line. Refer to Air Compressor Removal and Installation (WP 0527) and Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.
6. Inspect for incorrectly installed air discharge line. Discharge line must maintain a constant down slope from the compressor to the air dryer. In cold climates, low points may allow ice to form and restrict flow. Install air discharge line. Refer to Air Compressor Delivery Air Line Removal and Installation (WP 0524). Return vehicle to service.
7. Replace air compressor. Refer to Air Compressor Removal and Installation (WP 0527). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
AIR COMPRESSOR GOVERNOR OPERATIONAL CHECKOUT

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Pressure Test Kit (ZTSE4409) (WP 0795, Item 77)

WP 0175

WP 0782

Personnel Required

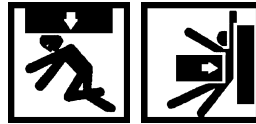
Maintainer (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0499
WP 0525

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Left engine armor plate removed (WP 0597)
Left engine armor plate bracket removed (WP 0598)

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.

AIR COMPRESSOR GOVERNOR OPERATIONAL CHECKOUT - (CONTINUED)

Air Compressor Governor hose

STEP

1. Inspect for pinched, kinked, or damaged reservoir hose (Figure 1, Item 2) to governor (Figure 1, Item 1).

CONDITION/INDICATION

Reservoir hose to governor is pinched, kinked, or damaged.

CORRECTIVE ACTION

Replace reservoir to governor hose. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

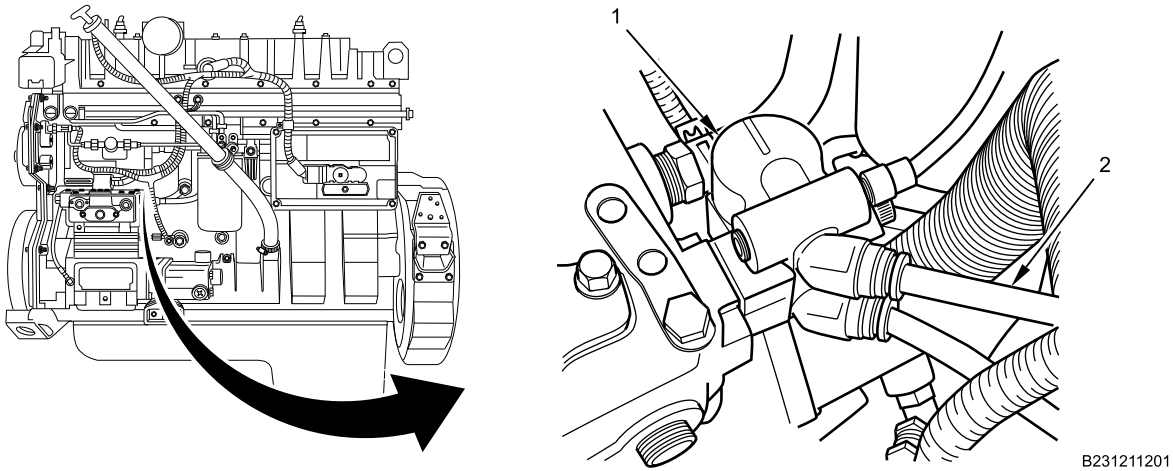


Figure 1. Air Compressor Governor hose

1. Drain all air pressure from air tanks. Refer to Air Reservoir Tank Removal and Installation (WP 0499).

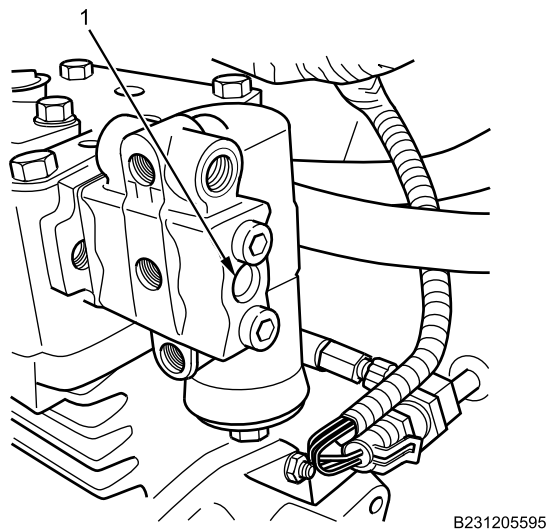


Figure 2. Air Compressor Governor.

2. Remove plug from unloader port (Figure 2, Item 1) at rear of governor, using 3/16-in. hex socket.

AIR COMPRESSOR GOVERNOR OPERATIONAL CHECKOUT - (CONTINUED)

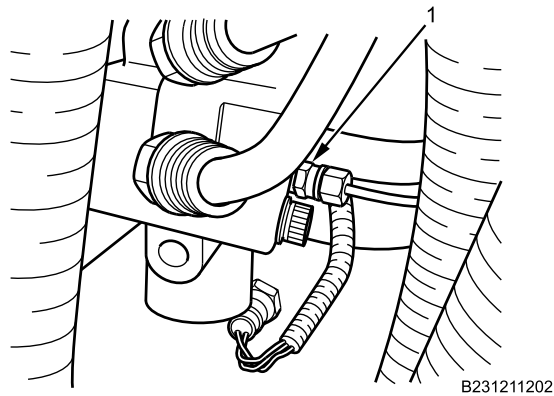


Figure 3. Pressure Test Kit (ZTSE4409) Adapter.

3. Install proper adapter (Figure 3, Item 1) from Pressure Test Kit (ZTSE4409) in unloader port of governor.

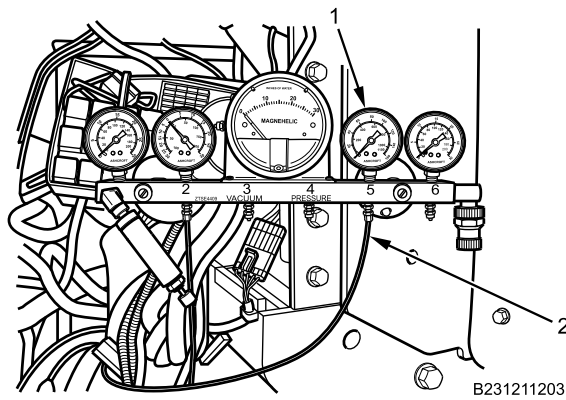


Figure 4. Pressure Test Kit (ZTSE4409) Gauges.

4. Connect pressure line (Figure 4, Item 2) between unloader port adapter and mechanical gauge 5 (Figure 4, Item 1).

AIR COMPRESSOR GOVERNOR OPERATIONAL CHECKOUT - (CONTINUED)

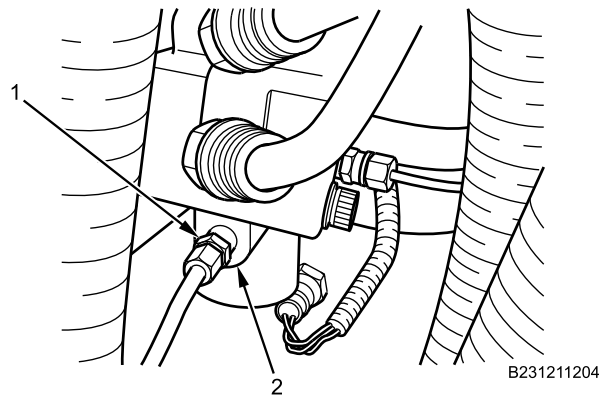


Figure 5. Pressure Test Kit (ZTSE4409) Adapter.

5. Install proper adapter (Figure 5, Item 1) from Pressure Test Kit (ZTSE4409) in exhaust port of governor (Figure 5, Item 2).

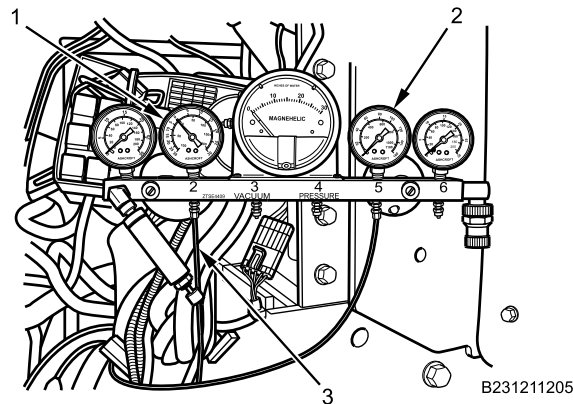
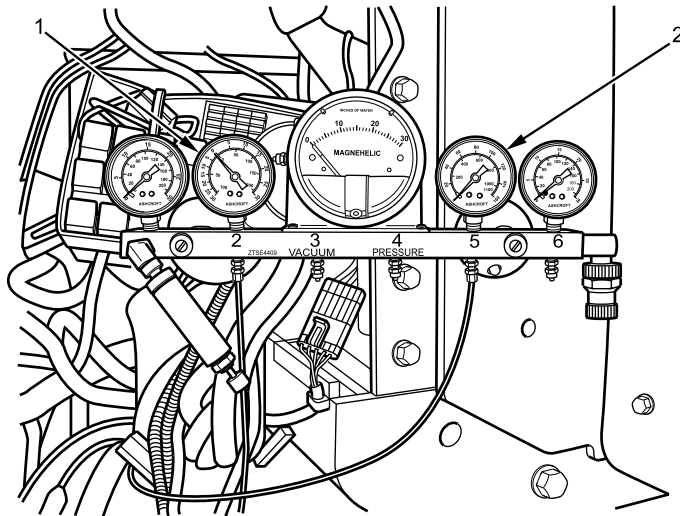


Figure 6. Pressure Test Kit (ZTSE4409) Gauges.

6. Connect line (Figure 6, Item 3) between exhaust port adapter and mechanical gauge 2 (Figure 6, Item 1).
7. Start and idle engine.
8. Observe gauge 5 (Figure 6, Item 2) as system pressure builds to governor cut-out (120-125 psi [827-862 kPa]). Gauge 5 or gauge 2 indicates pressure before governor cut-out.

Replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525).

AIR COMPRESSOR GOVERNOR OPERATIONAL CHECKOUT - (CONTINUED)

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Figure 7. Pressure Test Kit (ZTSE4409) Gauges.

1. Observe gauge 5 (Figure 7, Item 2) and gauge 2 (Figure 7, Item 1) while assistant repeatedly applies and releases service brakes until governor cut-in occurs (system pressure below 100 psi [689 kPa]).

Gauge 5 indicates 120-125 psi (827-862 kPa) and gauge 2 does not momentarily indicate 5-6 psi (34-41 kPa) when cut-in occurs.

Replace governor. Refer to Air Compressor Governor Removal and Installation (WP 0525).

Gauge 5 indicates 120-125 psi (827-862 kPa) and gauge 2 indicates 0 psi (0 kPa) when cut-out occurs.

Gauge 5 indicates 0 psi (0 kPa) and gauge 2 momentarily indicates 5-6 psi (34-41 kPa) when cut-in occurs.

Normal governor operation. Go to Air Compressor Operational Checkout Procedure (WP 0175).

END OF WORK PACKAGE

FIELD MAINTENANCE
ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) WP 0795, Item 70	WP 0424
	WP 0426
	WP 0427
	WP 0471

Tools and Special Tools

General Mechanic's Tool Kit (GMTK) (WP 0795, Item 37)	WP 0480
Terminal Test Kit (WP 0795, Item 122)	WP 0491
Jackstand (10-ton) (WP 0795, Item 62)	WP 0425
Jack, hydraulic, floor, 20-ton capacity (WP 0795, Item 59)	WP 0483
	WP 0494
	WP 0597
	WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
 TM 9-2355-106-23P
 WP 0011
 WP 0012
 WP 0009
 WP 0319
 WP 0335
 WP 0390

Equipment Condition

Parking brake set (TM 9-2355-106-10)
 Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
 Engine off (TM 9-2355-106-10)
 MAIN POWER switch off (TM 9-2355-106-10)
 Wheels chocked (TM 9-2355-106-10)
 Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 42
 WP 0789, Figure 43

 This procedure applies to the following DTCs:

- 2-1
- 2-2
- 2-3
- 2-4
- 2-5
- 2-6
- 2-7
- 2-10
- 3-1
- 3-2
- 3-3
- 3-4
- 3-5
- 3-6
- 3-7
- 3-10
- 4-1
- 4-2
- 4-3
- 4-4

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

- 4-5
- 4-6
- 4-7
- 4-10
- 5-1
- 5-2
- 5-3
- 5-4
- 5-5
- 5-6
- 5-7
- 5-10

TROUBLESHOOTING PROCEDURE**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.

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.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**CAUTION**

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Verify all tires are inflated to correct pressure (TM 9-2355-106-10).

CONDITION/INDICATION

Did any tires have incorrect pressure?

DECISION

NO Go to Step 6.
YES Go to next step.

STEP

2. Connect MSD. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
3. Clear ABS DTCs with MSD.
4. Operate vehicle within same conditions that previously set DTC.
5. Retrieve ABS DTCs with MSD or manually. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

Is previously set DTC now set?

DECISION

NO Return vehicle to service.
YES Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

6. Retrieve DTCs with MSD or manually. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

Is one or more of following DTCs set?

- 2-1
- 2-2
- 2-3
- 2-4
- 2-5
- 2-6
- 2-7
- 2-10

DECISION

YES Go to Step 10.
NO Go to next step.

STEP

7. Refer to retrieved DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 3-1
- 3-2
- 3-3
- 3-4
- 3-5
- 3-6
- 3-7
- 3-10

DECISION

YES Go to Step 66.
NO Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

8. Refer to retrieved DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 4-1
- 4-2
- 4-3
- 4-4
- 4-5
- 4-6
- 4-7
- 4-10

DECISION

YES Go to Step 122.

NO Go to next step.

STEP

9. Refer to retrieved DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 5-1
- 5-2
- 5-3
- 5-4
- 5-5
- 5-6
- 5-7
- 5-10

DECISION

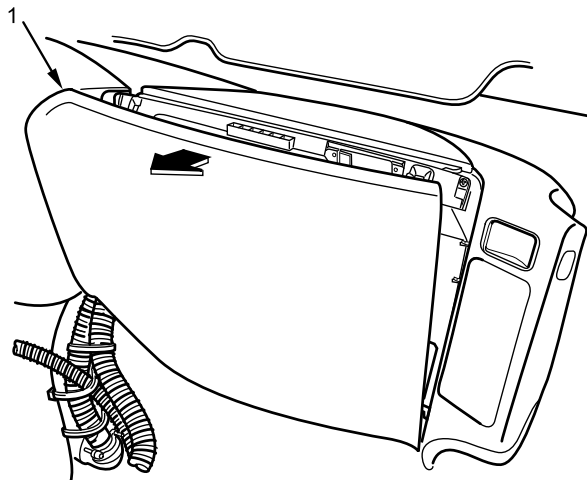
YES Go to Step 190.

NO Go to Step 258.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

10. Turn ignition switch OFF (TM 9-2355-106-10).



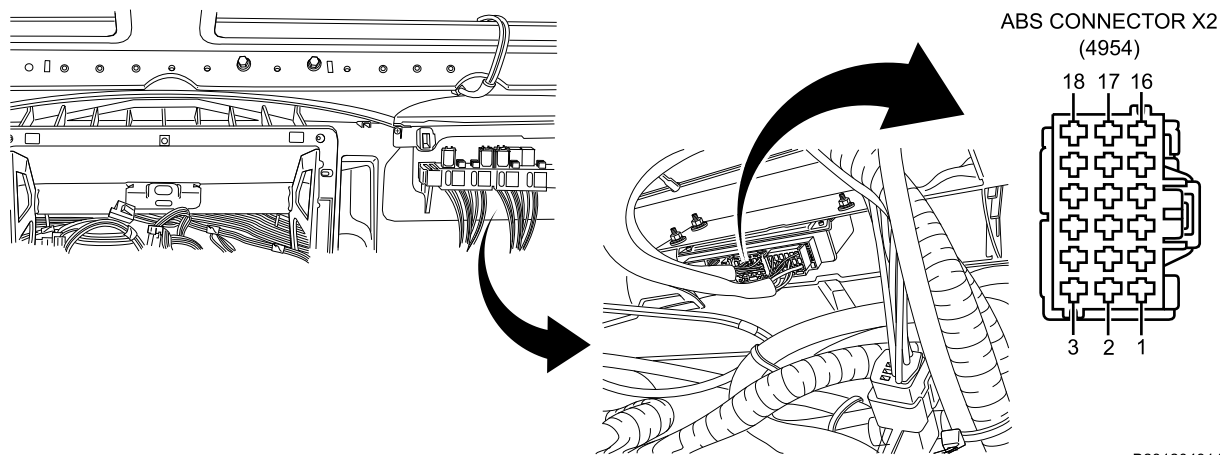
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Figure 1. Instrument Panel Right Side Closeout Panel.

11. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

12. Remove instrument panel right side closeout panel (Figure 1, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.

13. Disconnect connector 4954 (GRAY X2). Refer to Figure 2.



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Figure 2. Behind Right Side of Instrument Panel (IP).

14. Turn MAIN POWER switch ON (TM 9-2355-106-10).

15. Turn ignition switch ON (TM 9-2355-106-10).

16. Measure DC voltage between connector 4954 terminal 5 and ground with multimeter. Refer to Figure 2.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read 0 volts?

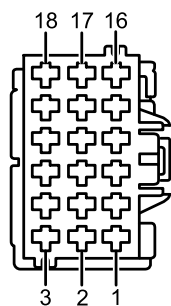
DECISION

NO Go to Step 29.
YES Go to next step.

STEP

17. Turn ignition switch OFF (TM 9-2355-106-10).
18. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
19. Measure resistance between connector 4954 terminal 5 and ground with multimeter. Refer to Figure 3.

ABS CONNECTOR X2
(4954)



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Figure 3. Connector 4954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 50.
YES Go to next step.

STEP

20. Measure resistance between connector 4954 terminals 5 and 8 with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

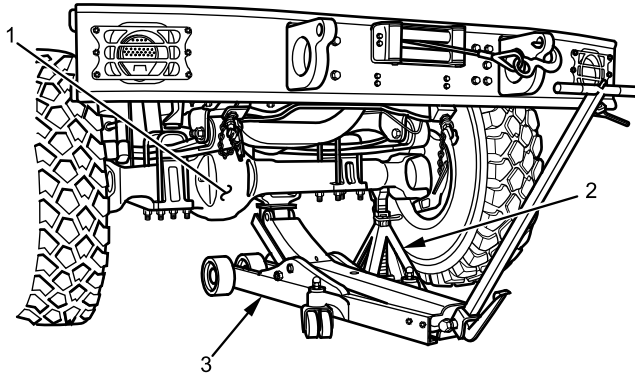
DECISION

NO Go to Step 58.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

21. Chock wheels not being serviced to prevent vehicle from moving.
22. Raise front axle (Figure 4, Item 1) with 20-ton floor jack (Figure 4, Item 3) until left wheel spins freely. Support left front axle with 10-ton jackstand (Figure 4, Item 2).



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Figure 4. Left Front Wheel Raised.

23. Verify proper wheel bearing end-play and adjust if necessary. Refer to Front Wheel Hub Removal and Installation (WP 0471).
24. Turn MAIN POWER switch ON (TM 9-2355-106-10).
25. Turn ignition switch ON (TM 9-2355-106-10).
26. Measure AC voltage between connector 4954 terminals 5 and 8 with multimeter. Refer to Figure 3.
27. With maintainer assistance, rotate wheel 0.5 rps minimum while observing multimeter.

CONDITION/INDICATION

Does multimeter read more than 0.25 volts?

DECISION

YES Go to Step 264.
NO Go to next step.

STEP

28. Visually inspect left front tone ring for damage. Refer to Front Axle Antilock Brake System (ABS) Tone Ring Removal and Installation (WP 0483).

CONDITION/INDICATION

Does inspection reveal damage?

DECISION

YES Go to Step 265.
NO Go to Step 266.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

29. Turn ignition switch OFF (TM 9-2355-106-10).

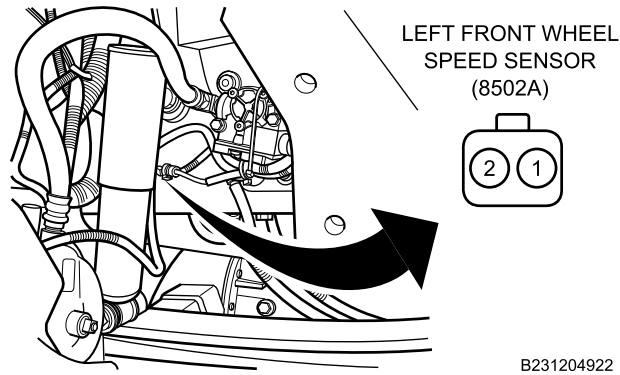


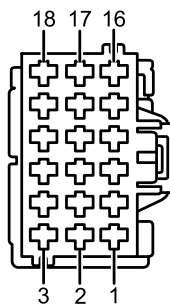
Figure 5. Behind Left Front Wheel.

30. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

31. Disconnect connector 8502A. Refer to Figure 5.

32. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X2
(4954)



B230603805

Figure 6. Connector 4954.

33. Turn ignition switch ON (TM 9-2355-106-10).

34. Measure DC voltage between connector 4954 terminal 5 and ground with multimeter. Refer to Figure 6.

35. Measure DC voltage between connector 4954 terminal 8 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

YES Go to Step 266.

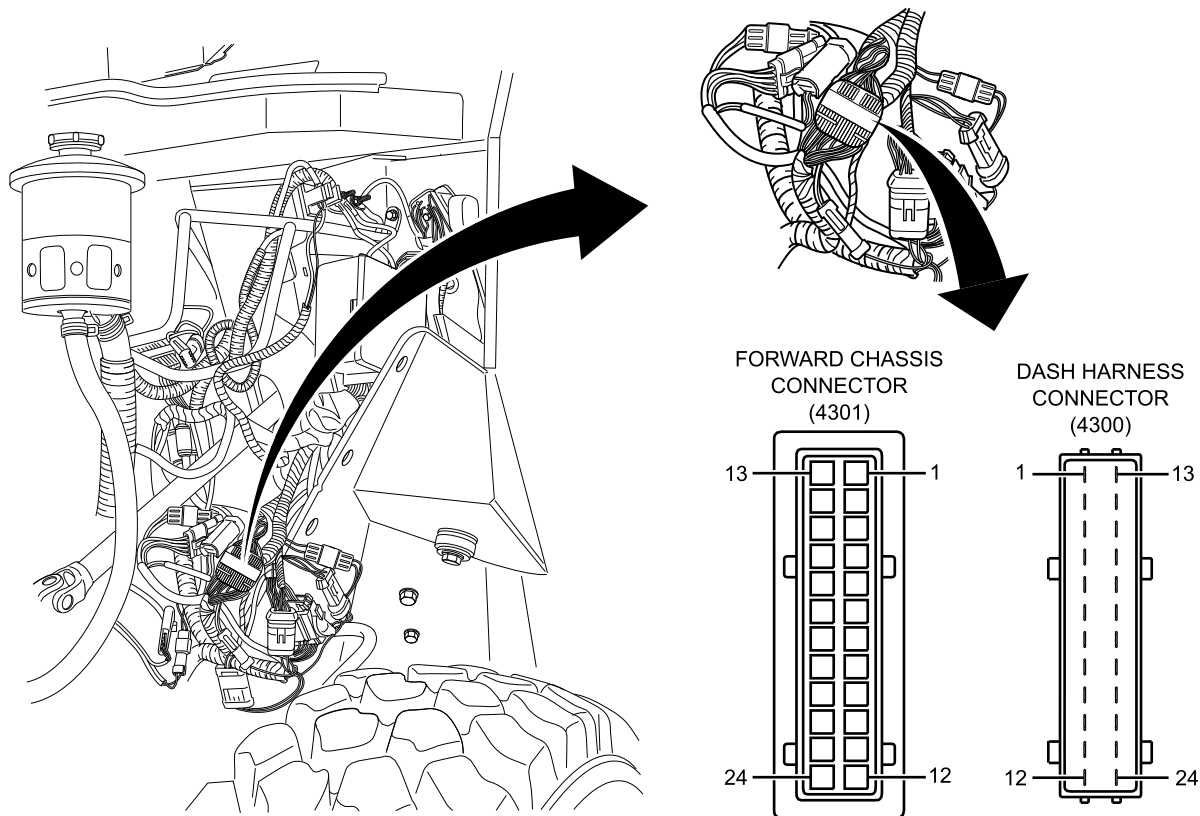
NO Go to next step.

STEP

36. Turn ignition switch OFF (TM 9-2355-106-10).

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

37. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
38. Remove engine air filter assembly (TM 9-2355-106-10).
39. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
40. Disconnect connector 4301/4300. Refer to Figure 7.



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Figure 7. Left Side Engine Compartment.

41. Turn MAIN POWER switch ON (TM 9-2355-106-10).
42. Turn ignition switch ON (TM 9-2355-106-10).
43. Measure DC voltage between connector 4954 terminal 5 and ground with multimeter. Refer to Figure 6.
44. Measure DC voltage between connector 4954 terminal 8 and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

YES Go to Step 263.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

45. Turn ignition switch OFF (TM 9-2355-106-10).

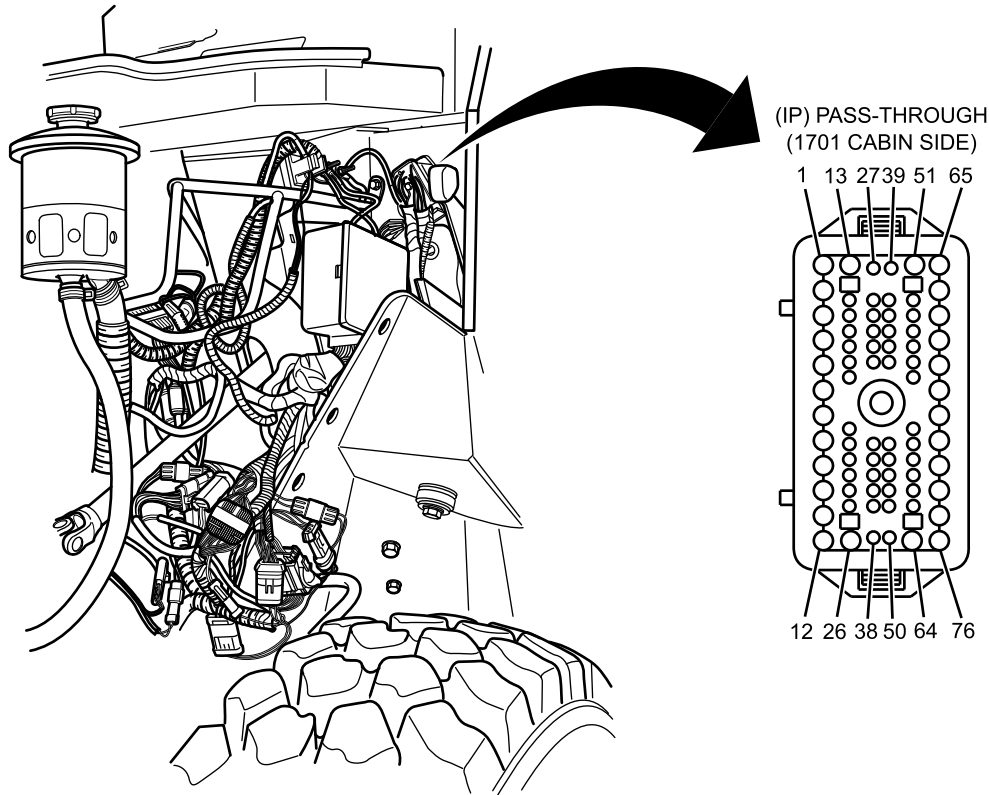


Figure 8. Left Side Firewall.

46. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 47. Disconnect connector 1701. Refer to Figure 8.
 48. Measure resistance between connector 1701 terminal 49 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 8
 49. Measure resistance between connector 1701 terminal 50 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 8

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 259.
 YES Go to Step 260.

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ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

50. Disconnect connector 1701. Refer to Figure 9

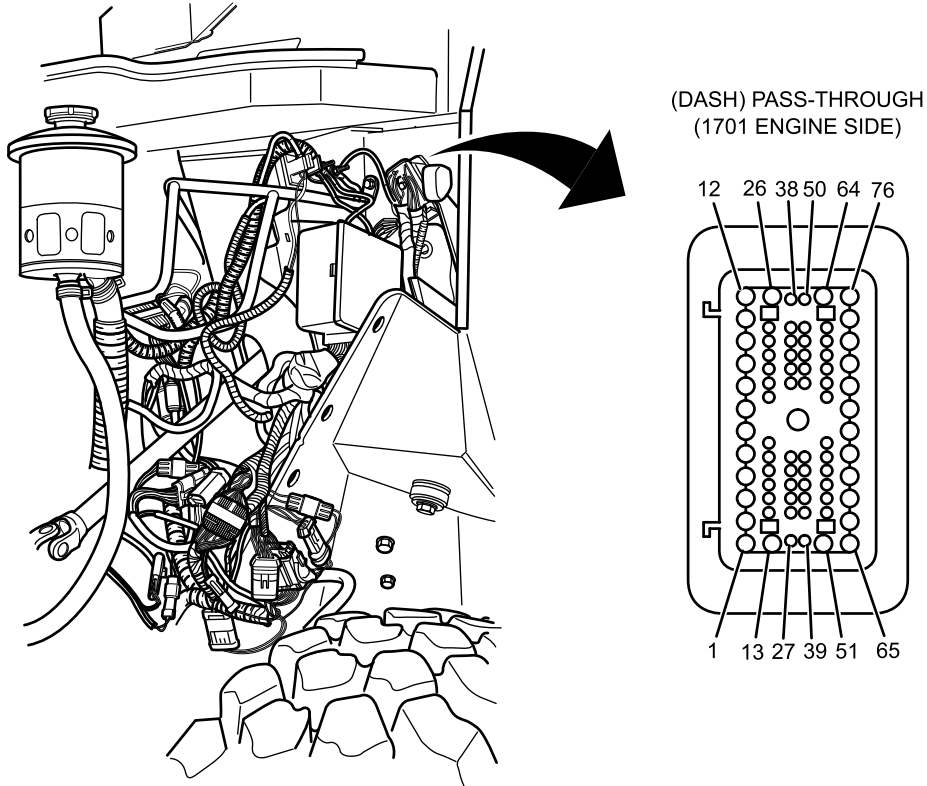


Figure 9. Left Side Firewall.

51. Measure resistance between connector 1701 terminal 49 and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

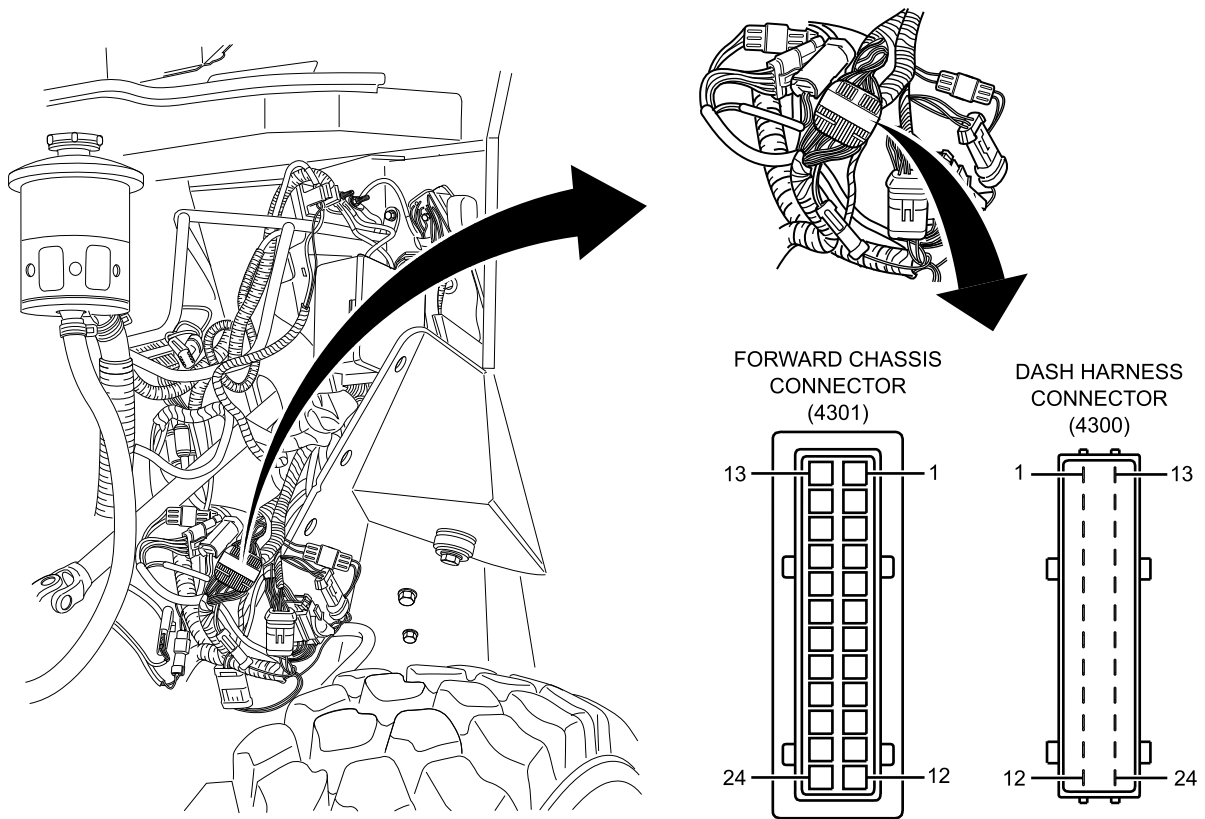
YES Go to Step 259.
 NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 52. Remove engine air filter assembly (TM 9-2355-106-10).
- 53. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 54. Disconnect connector 4301/4300. Refer to Figure 10.



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Figure 10. Left Side Engine Compartment.

- 55. Measure resistance between connector 4301 terminal 6 and ground with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

- YES Go to Step 260.
- NO Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

56. Disconnect connector 8502A. Refer to Figure 11.

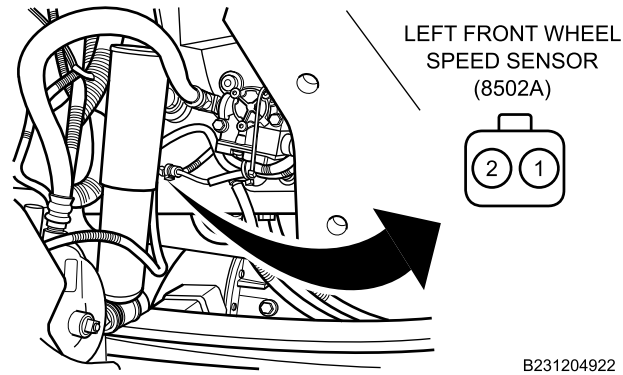


Figure 11. Behind Left Front Wheel.

57. Measure resistance between connector 8502A terminal 1 and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 263.
YES Go to Step 266.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

58. Disconnect connector 1701. Refer to Figure 12.

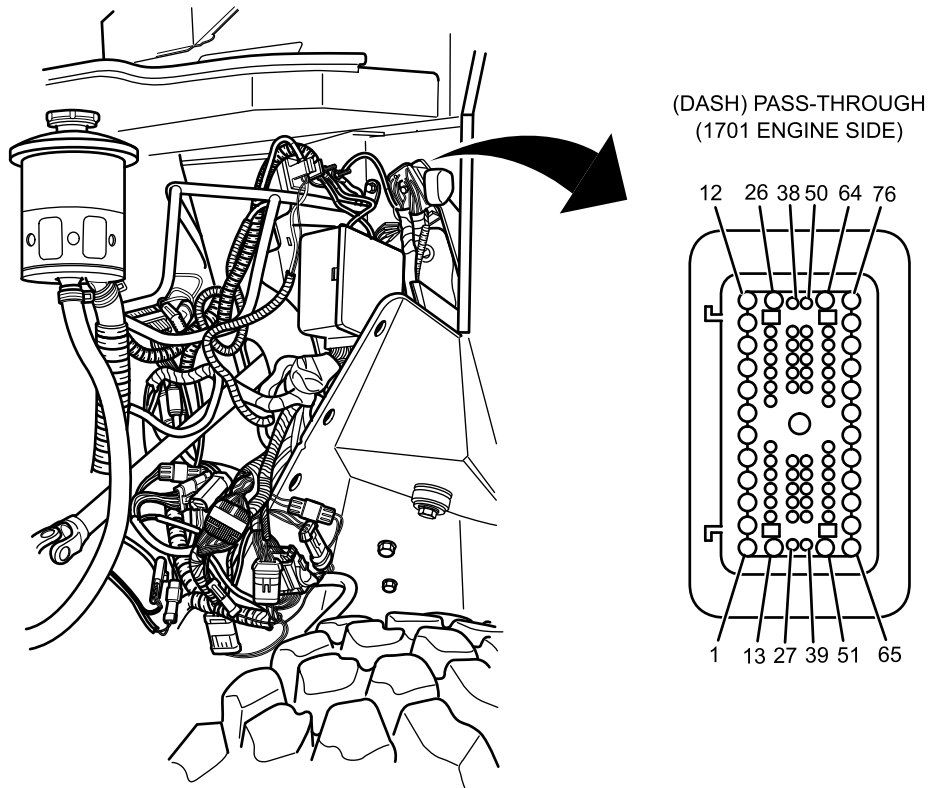


Figure 12. Left Side Firewall.

59. Measure resistance between connector 1701 terminals 49 and 50 with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

YES Go to Step 259.

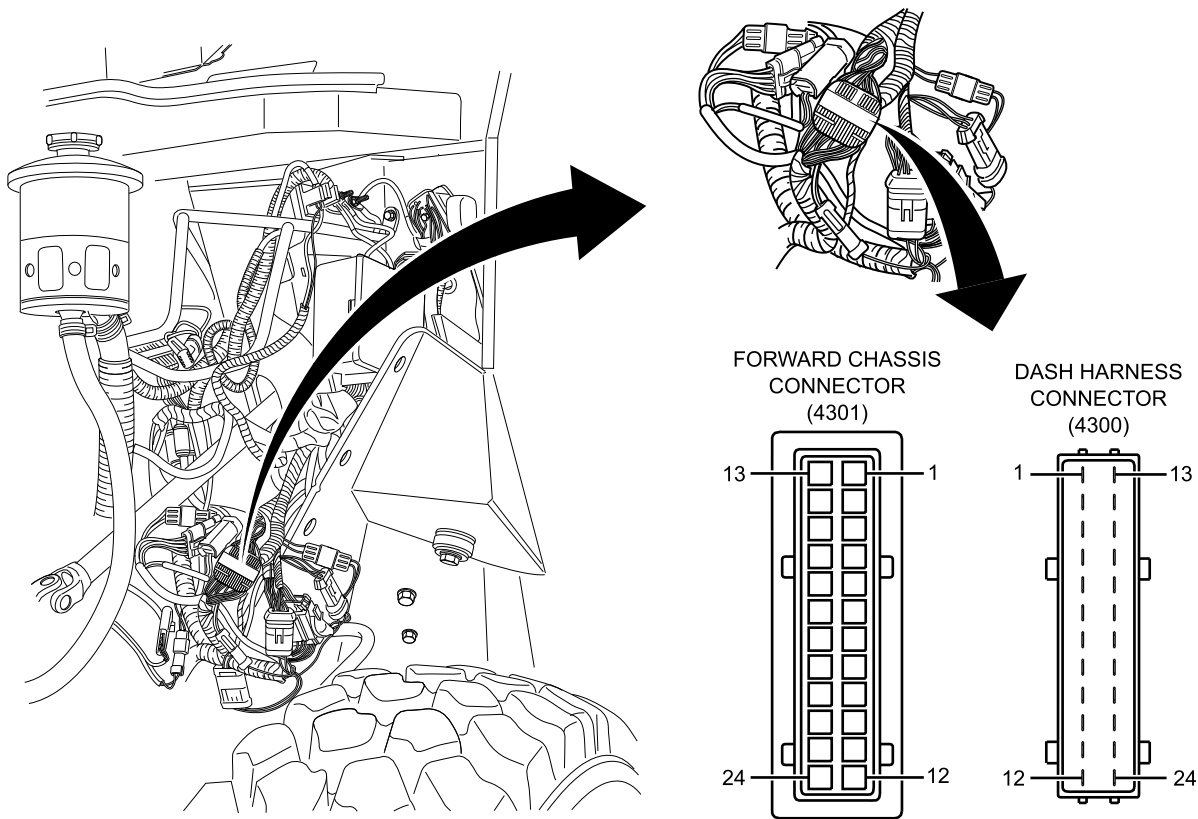
NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 60. Remove engine air filter assembly (TM 9-2355-106-10).
- 61. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 62. Disconnect connector 4301/4300. Refer to Figure 13.



B230603738

Figure 13. Left Side Engine Compartment.

- 63. Measure resistance between connector 4301 terminals 6 and 7 with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

- YES Go to Step 260.
- NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

64. Disconnect connector 8502A. Refer to Figure 14.

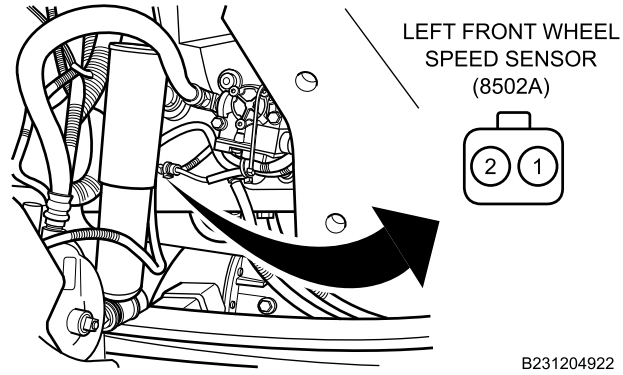


Figure 14. Behind Left Front Wheel.

65. Measure resistance between connector 8502A terminals 1 and 2 with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

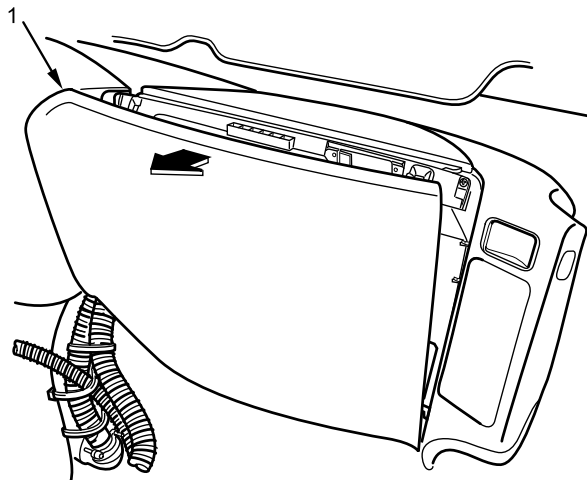
YES Go to Step 263.

NO Go to Step 266.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

66. Turn ignition switch OFF (TM 9-2355-106-10).



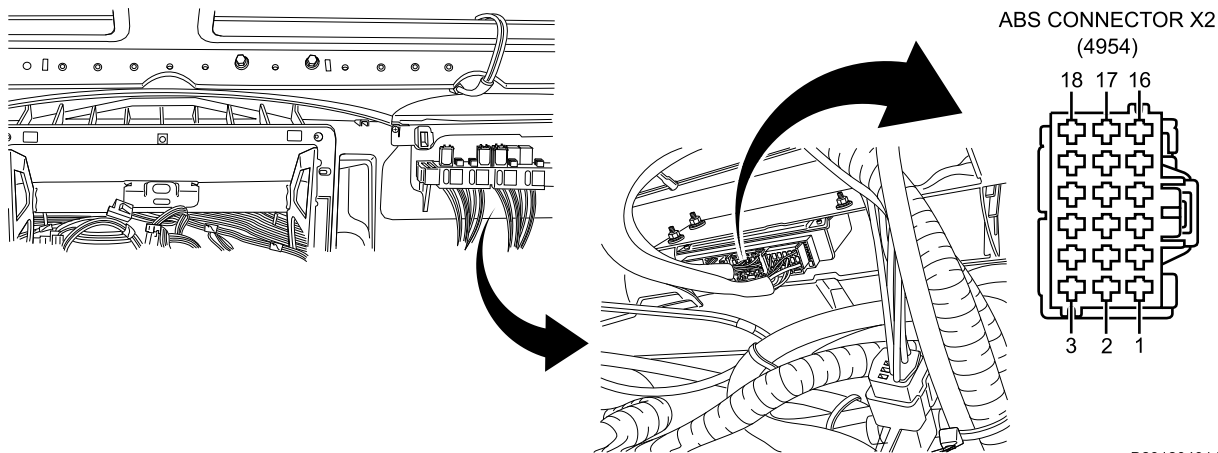
B230601329

Figure 15. Instrument Panel Right Side Closeout Panel.

67. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

68. Remove instrument panel right side closeout panel (Figure 15, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.

69. Disconnect connector 4954 (GRAY X2). Refer to Figure 16.



B231204914

Figure 16. Behind Right Side of Instrument Panel (IP).

70. Turn MAIN POWER switch ON (TM 9-2355-106-10).

71. Turn ignition switch ON (TM 9-2355-106-10).

72. Measure DC voltage between connector 4954 terminal 11 and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read 0 volts?

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

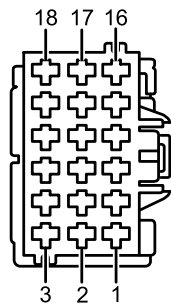
DECISION

NO Go to Step 85
 YES Go to next step.

STEP

73. Turn ignition switch OFF (TM 9-2355-106-10).
74. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
75. Measure resistance between connector 4954 terminal 11 and ground with multimeter. Refer to Figure 17.

ABS CONNECTOR X2
(4954)



B230603805

Figure 17. Connector 4954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 106.
 YES Go to next step.

STEP

76. Measure resistance between connector 4954 terminals 11 and 14 with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

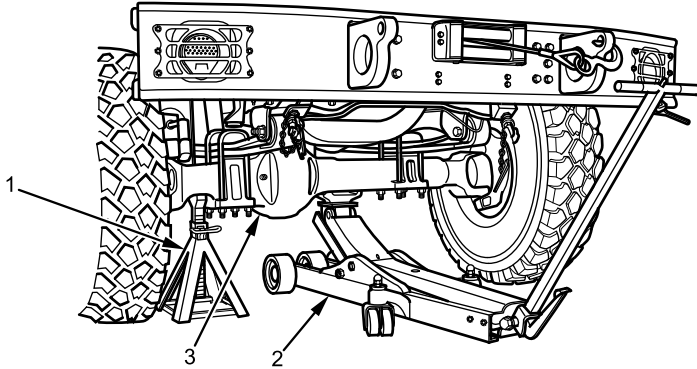
DECISION

NO Go to Step 114.
 YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

77. Chock wheels not being serviced to prevent vehicle from moving.
78. Raise front axle (Figure 18, Item 3) with 20-ton floor jack (Figure 18, Item 2) until right wheel spins freely. Support right front axle with 10-ton jackstand (Figure 18, Item 1).



B231011726

Figure 18. Right Front Wheel Raised.

79. Verify proper wheel bearing end-play and adjust if necessary. Refer to Front Wheel Hub Removal and Installation (WP 0471).
80. Turn MAIN POWER switch ON (TM 9-2355-106-10).
81. Turn ignition switch ON (TM 9-2355-106-10).
82. Measure AC voltage between connector 4954 terminals 11 and 14 with multimeter. Refer to Figure 17.
83. With maintainer assistance, rotate wheel 0.5 rps minimum while observing multimeter.

CONDITION/INDICATION

Does multimeter read more than 0.25 volts?

DECISION

YES Go to Step 264.
NO Go to next step.

STEP

84. Visually inspect right front tone ring for damage. Refer to Front Axle Antilock Brake System (ABS) Tone Ring Removal and Installation (WP 0483).

CONDITION/INDICATION

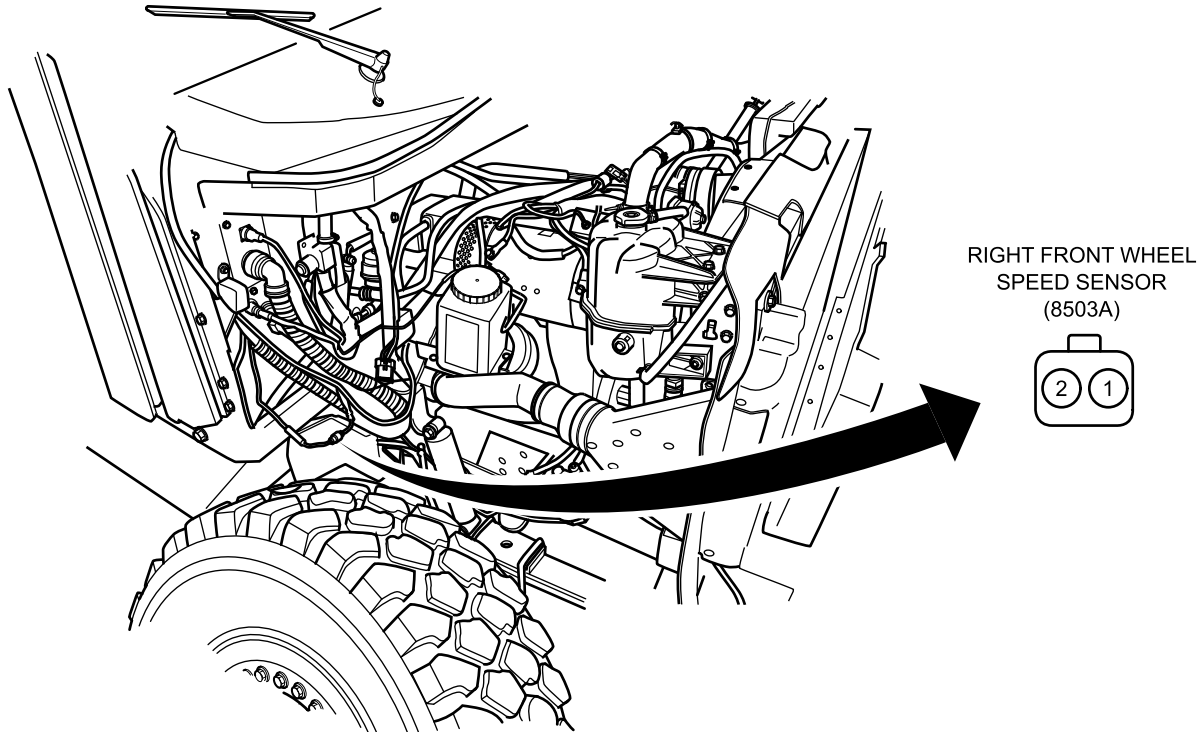
Does inspection reveal damage?

DECISION

YES Go to Step 267.
NO Go to Step 268.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

85. Turn ignition switch OFF (TM 9-2355-106-10).



B231204951

Figure 19. Behind Right Front Wheel.

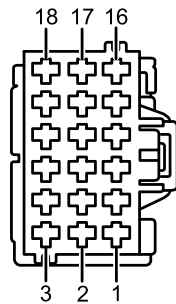
86. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

87. Disconnect connector 8503A. Refer to Figure 19.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

88. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X2
(4954)



B230603805

Figure 20. Connector 4954.

89. Turn ignition switch ON (TM 9-2355-106-10).

90. Measure DC voltage between connector 4954 terminal 11 and ground with multimeter. Refer to Figure 20.

91. Measure DC voltage between connector 4954 terminal 14 and ground with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

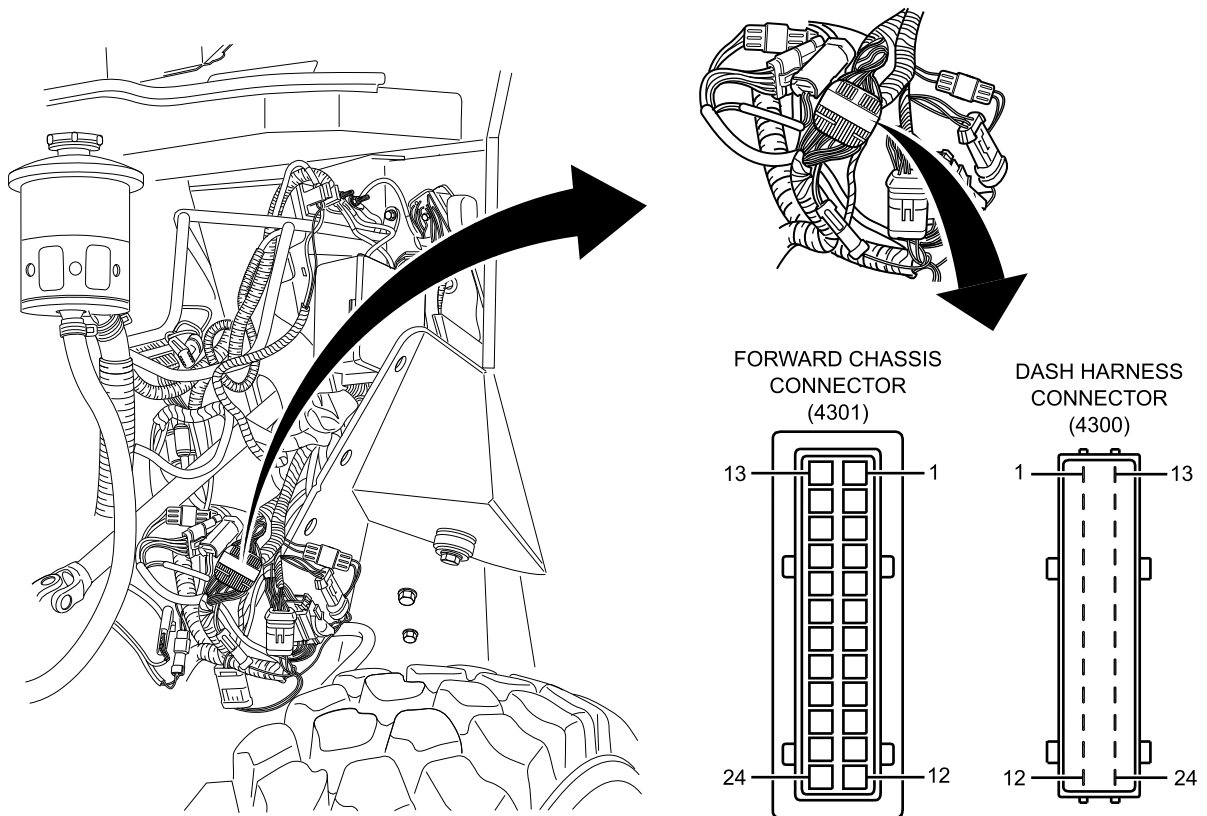
YES Go to Step 268.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

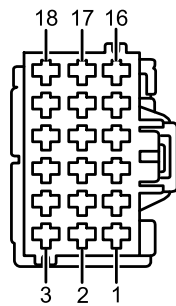
92. Turn ignition switch OFF (TM 9-2355-106-10).
93. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
94. Remove engine air filter assembly (TM 9-2355-106-10).
95. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
96. Disconnect connector 4301/4300. Refer to Figure 21.



B230603738

Figure 21. Left Side Engine Compartment.

97. Turn MAIN POWER switch ON (TM 9-2355-106-10).

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)**ABS CONNECTOR X2
(4954)

B230603805

Figure 22. Connector 4954.

98. Turn ignition switch ON (TM 9-2355-106-10).

99. Measure DC voltage between connector 4954 terminal 11 and ground with multimeter. Refer to Figure 22.

100. Measure DC voltage between connector 4954 terminal 14 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

YES Go to Step 263.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

101. Turn ignition switch OFF (TM 9-2355-106-10).

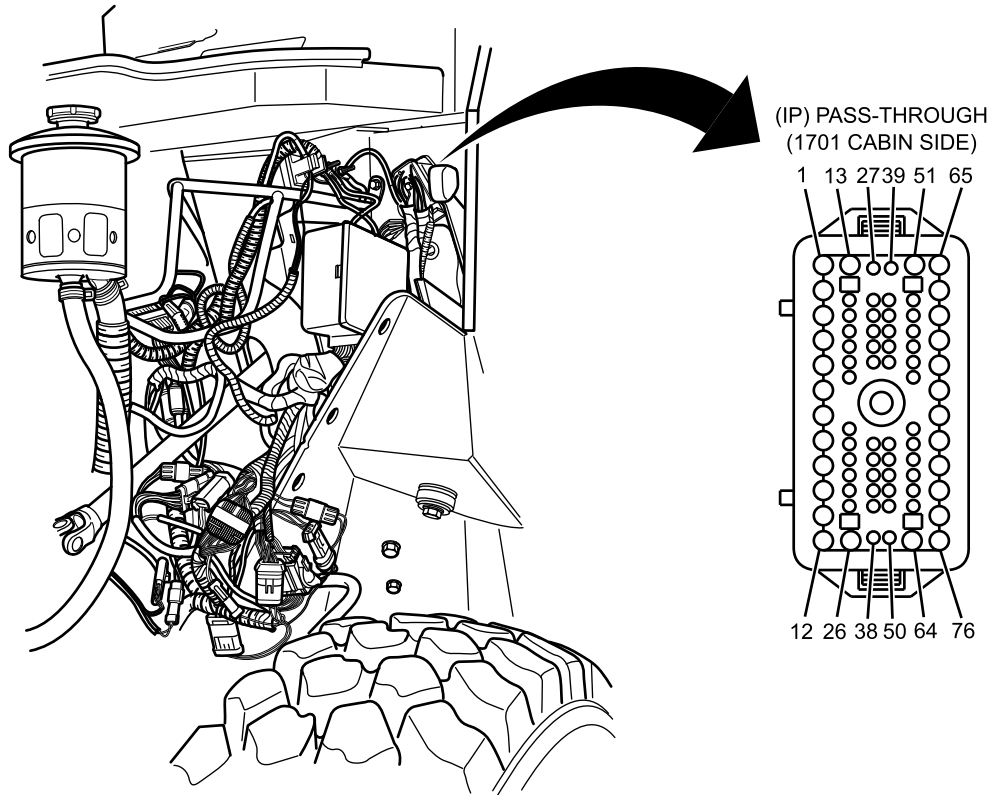


Figure 23. Left Side Firewall.

102. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

103. Disconnect connector 1701. Refer to Figure 23.

104. Measure resistance between connector 1701 terminal 51 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 23.

105. Measure resistance between connector 1701 terminal 65 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 23.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 259.

YES Go to Step 260

B230604024

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

106. Disconnect connector 1701. Refer to Figure 24.

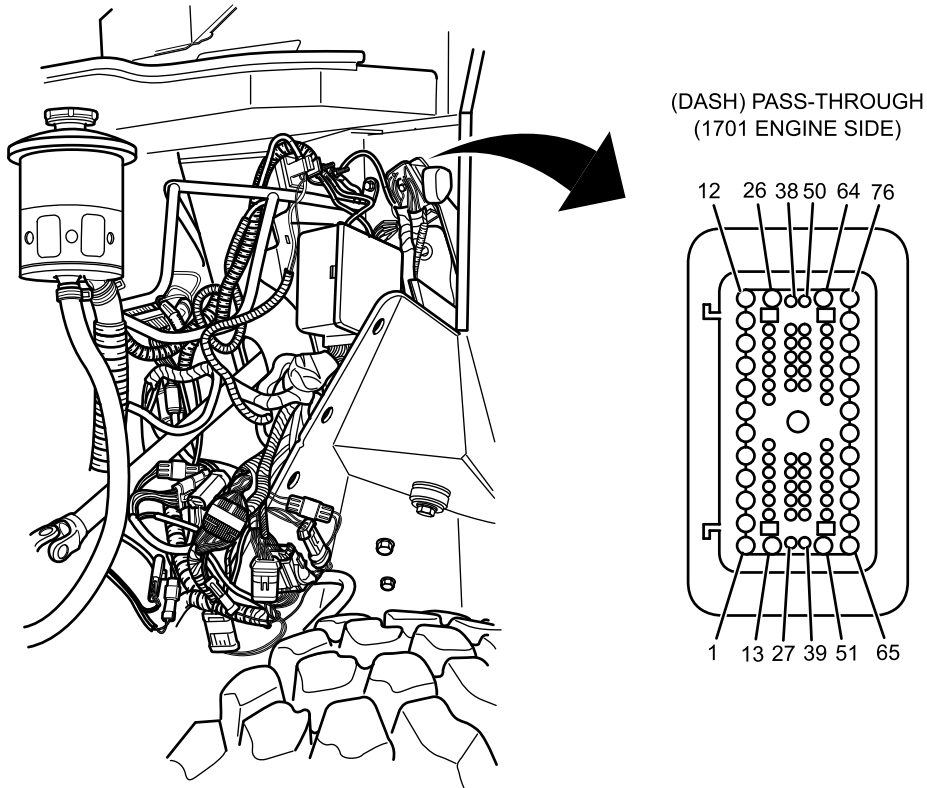


Figure 24. Left Side Firewall.

B230604025

107. Measure resistance between connector 1701 terminal 51 and ground with multimeter. Refer to Figure 24.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

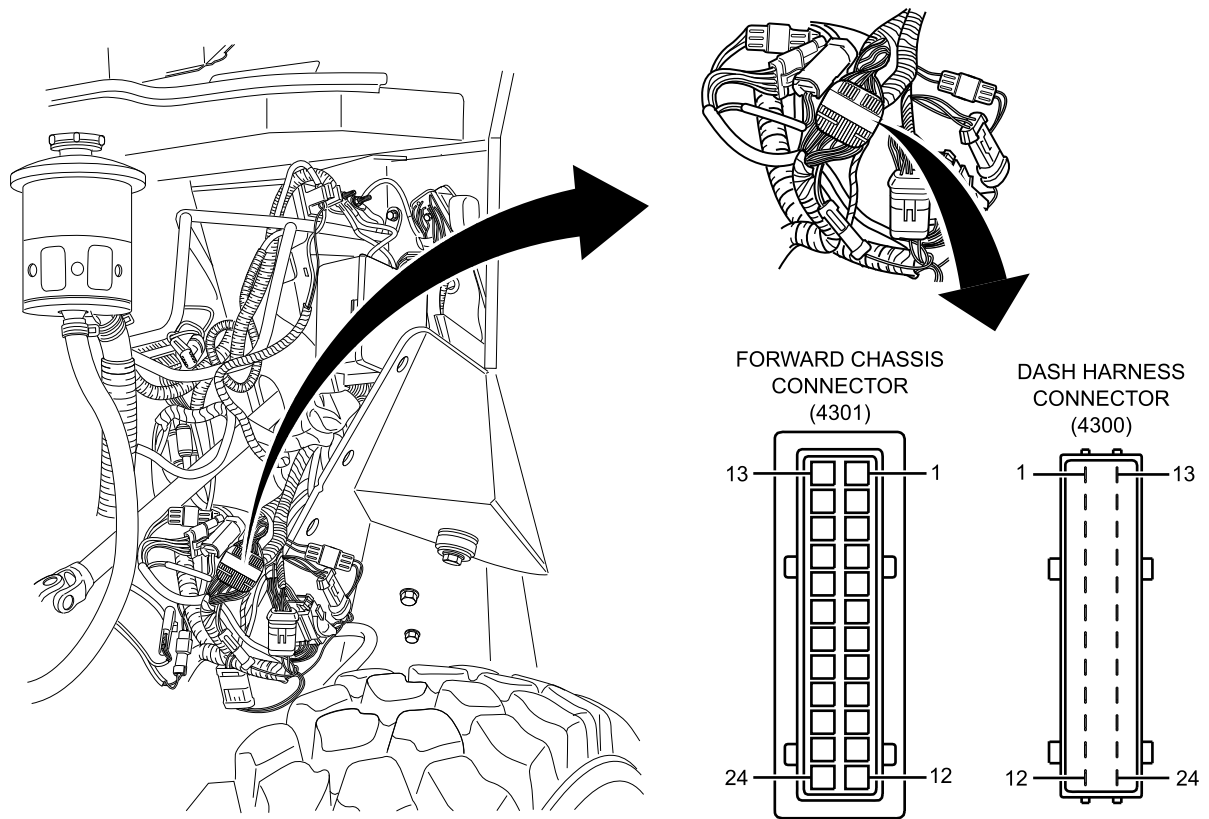
YES Go to Step 259.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

108. Remove engine air filter assembly (TM 9-2355-106-10).
109. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
110. Disconnect connector 4301/4300. Refer to Figure 25.



B230603738

Figure 25. Left Side Engine Compartment.

111. Measure resistance between connector 4301 terminal 14 and ground with multimeter. Refer to Figure 25.

CONDITION/INDICATION

Does multimeter read OL?

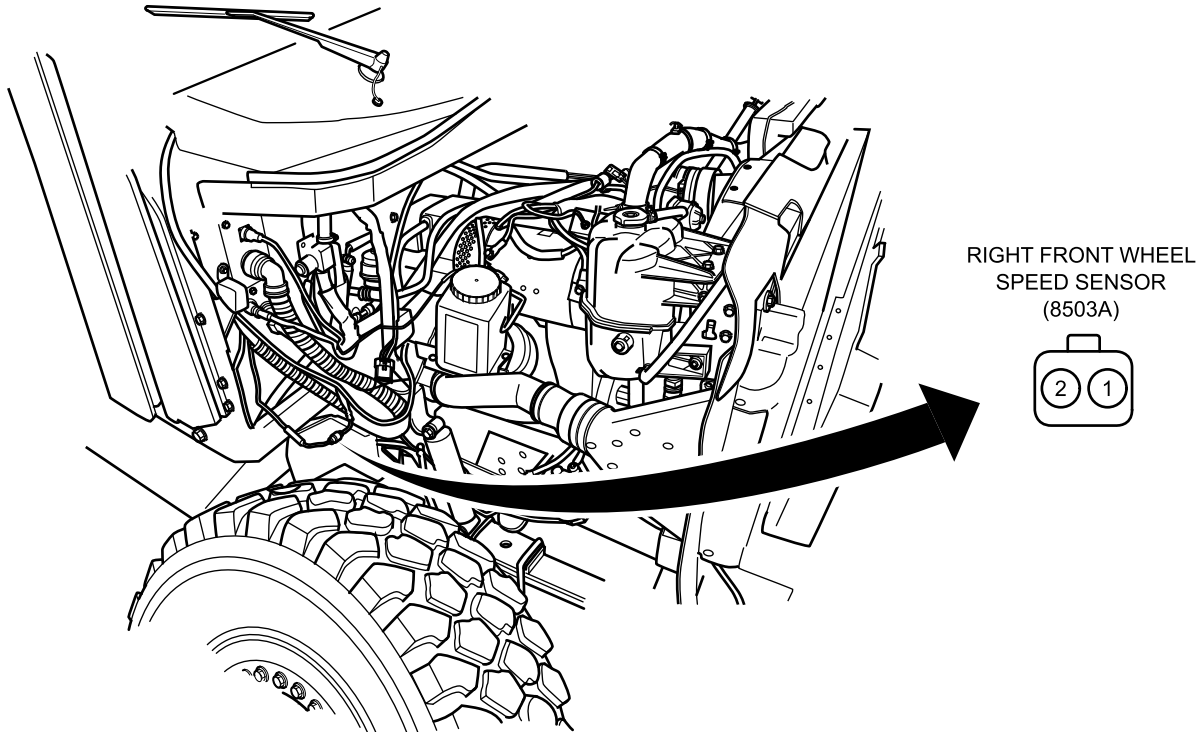
DECISION

YES Go to Step 260.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

112. Disconnect connector 8503A. Refer to Figure 26.



B231204951

Figure 26. Behind Right Front Wheel.

113. Measure resistance between connector 8503A terminal 1 and ground with multimeter. Refer to Figure 26.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 263.
YES Go to Step 268.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

114. Disconnect connector 1701. Refer to Figure 27.

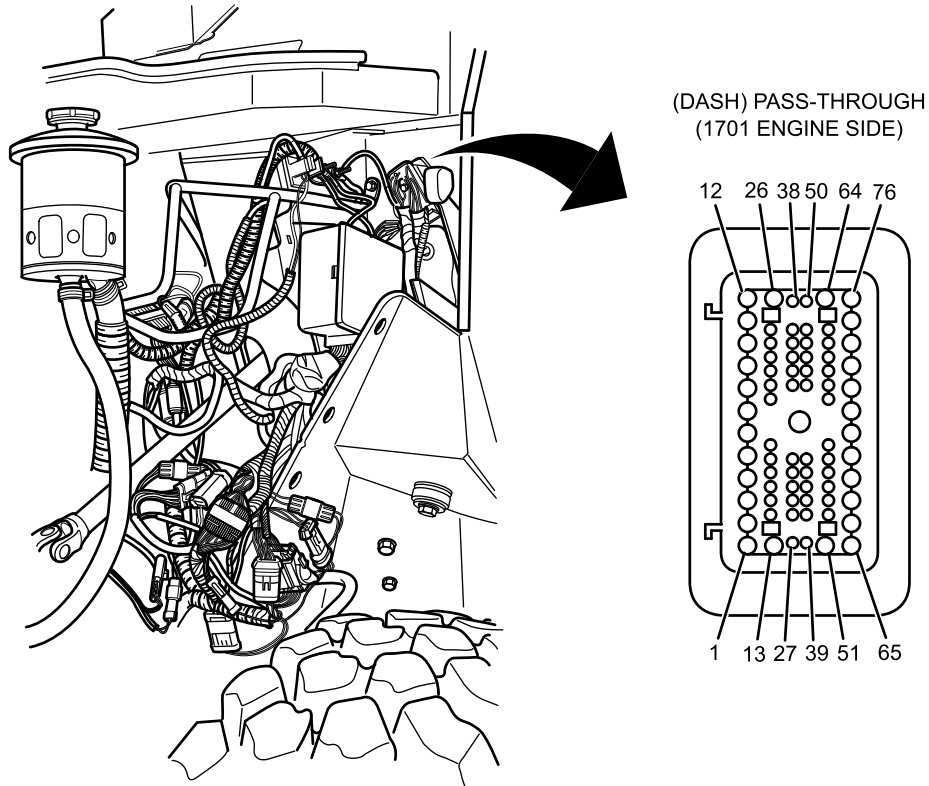


Figure 27. Left Side Firewall.

115. Measure resistance between connector 1701 terminals 51 and 65 with multimeter. Refer to Figure 27.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

YES Go to Step 259.

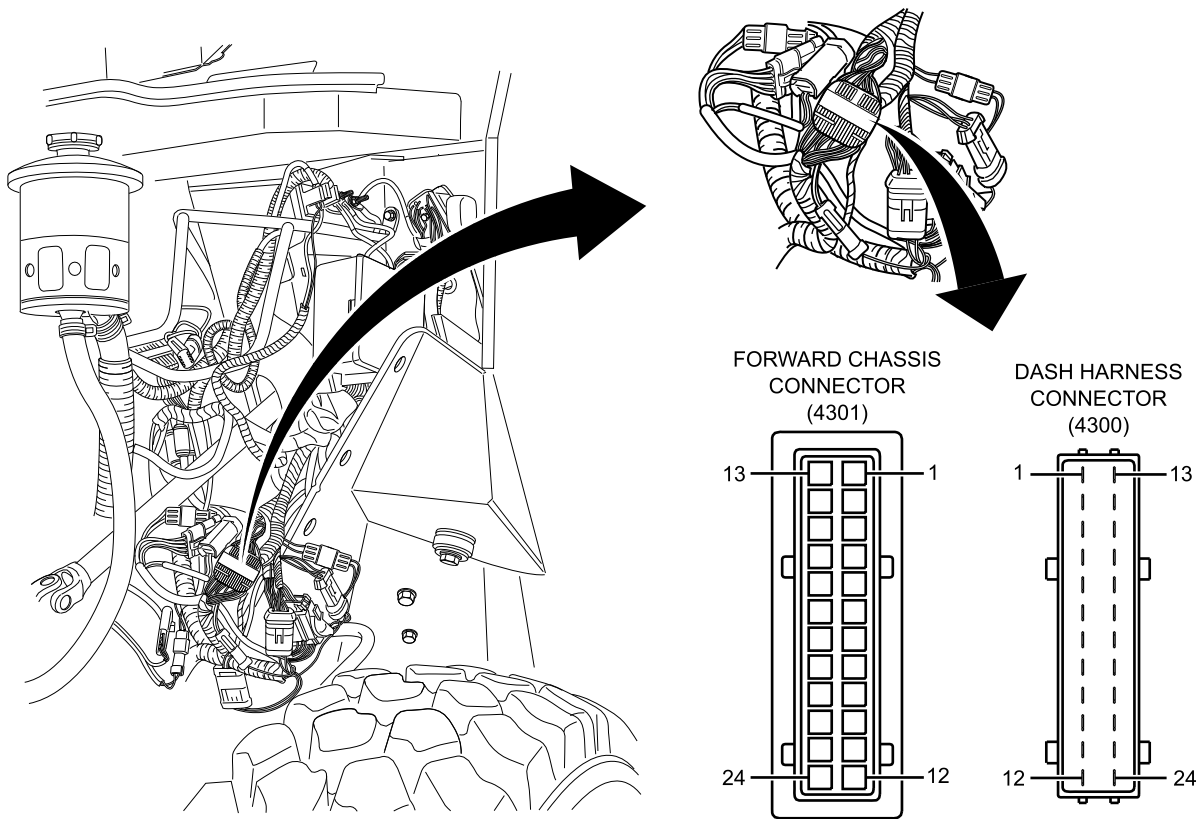
NO Go to next step.

B230604025

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 116. Remove engine air filter assembly (TM 9-2355-106-10).
- 117. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 118. Disconnect connector 4301/4300. Refer to Figure 28.



B230603738

Figure 28. Left Side Engine Compartment.

- 119. Measure resistance between connector 4301 terminals 14 and 15 with multimeter. Refer to Figure 28.

CONDITION/INDICATION

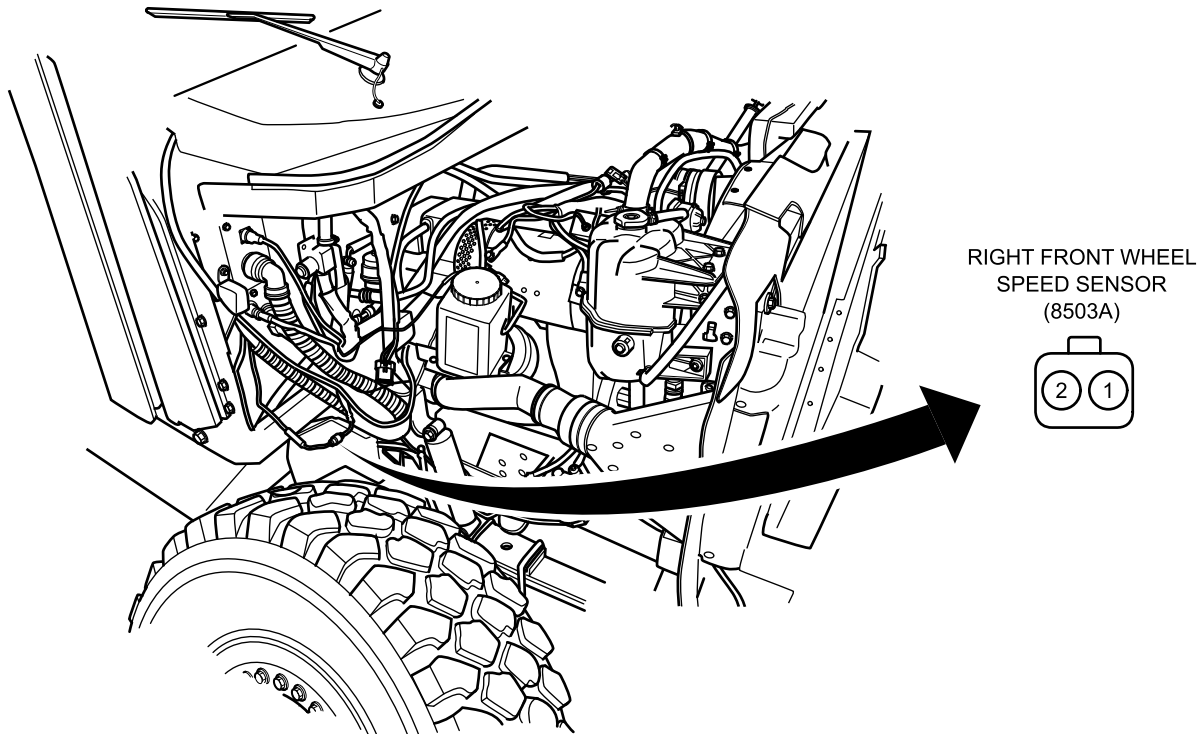
Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

- YES Go to Step 260.
- NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

120. Disconnect connector 8503A. Refer to Figure 29.



B231204951

Figure 29. Behind Right Front Wheel.

121. Measure resistance between connector 8503A terminals 1 and 2 with multimeter. Refer to Figure 29.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

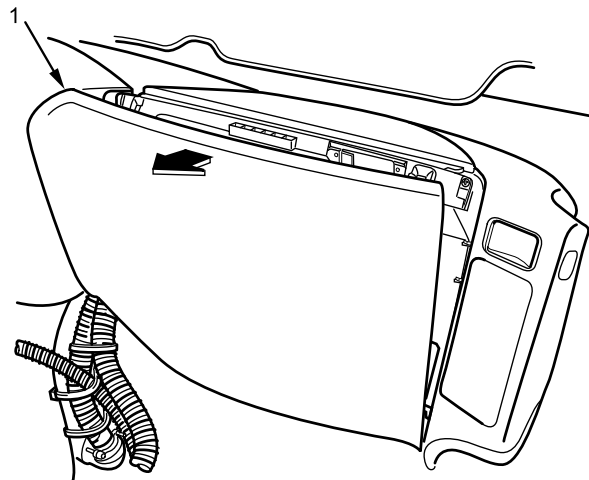
YES Go to Step 263.

NO Go to Step 268.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

122. Turn ignition switch OFF (TM 9-2355-106-10).



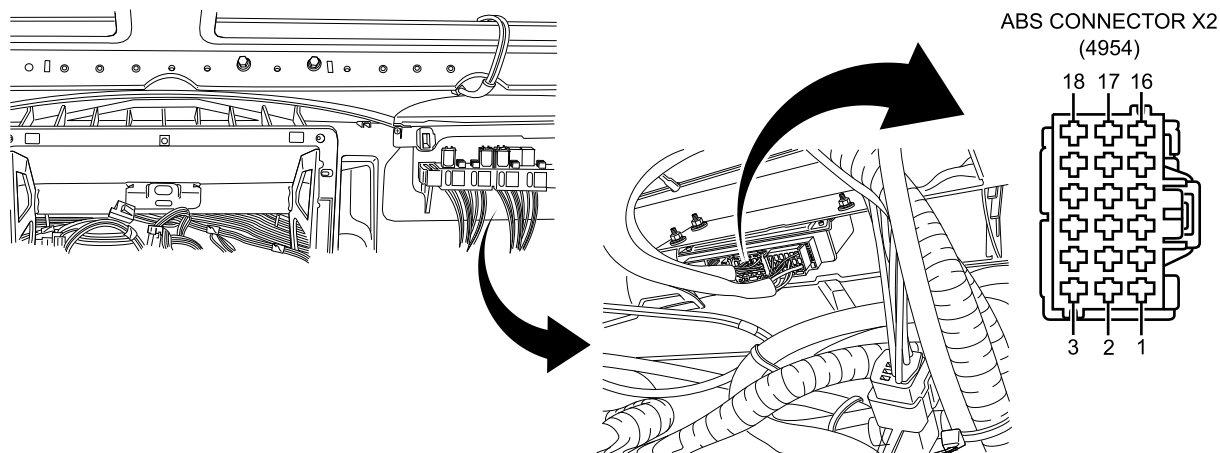
B230601329

Figure 30. Instrument Panel Right Side Closeout Panel.

123. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

124. Remove instrument panel right side closeout panel (Figure 30, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.

125. Disconnect connector 4954 (GRAY X2). Refer to Figure 31.



B231204914

Figure 31. Behind Right Side of Instrument Panel (IP).

126. Turn MAIN POWER switch ON (TM 9-2355-106-10).

127. Turn ignition switch ON (TM 9-2355-106-10).

128. Measure DC voltage between connector 4954 terminal 18 and ground with multimeter. Refer to Figure 31.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

NO Go to Step 142
YES Go to next step.

STEP

129. Turn ignition switch OFF (TM 9-2355-106-10).

130. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

131. Measure resistance between connector 4954 terminal 18 and ground with multimeter. Refer to Figure 31.

CONDITION/INDICATION

Does multimeter read OL?

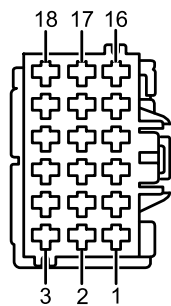
DECISION

NO Go to Step 172.
YES Go to next step.

STEP

132. Measure resistance between connector 4954 terminals 15 and 18 with multimeter. Refer to Figure 32.

ABS CONNECTOR X2
(4954)



B230603805

Figure 32. Connector 4954.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

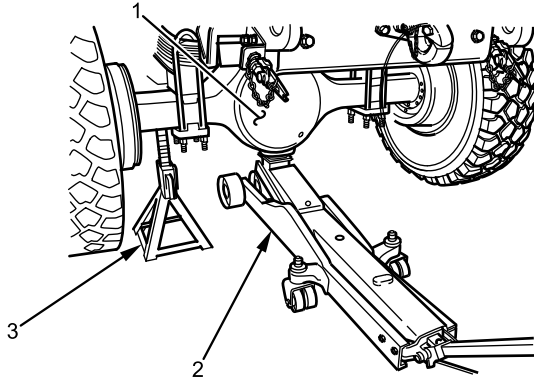
DECISION

NO Go to Step 182.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

133. Cage rear spring brakes (TM 9-2355-106-10).
 134. Chock wheels not being serviced to prevent vehicle from moving.
 135. Raise rear axle (Figure 33, Item 1) with 20-ton floor jack (Figure 33, Item 2) until left wheel spins freely. Support left rear axle with 10-ton jackstand (Figure 33, Item 3).



B231011727

Figure 33. Left Rear Wheel Raised

136. Verify proper wheel bearing end-play and adjust if necessary. Refer to Rear Hub Assembly Seal and Bearing Cup Removal and Installation (WP 0480).
 137. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 138. Turn ignition switch ON (TM 9-2355-106-10).
 139. Measure AC voltage between connector 4954 terminals 15 and 18 with multimeter. Refer to Figure 32.
 140. With maintainer assistance, rotate wheel 0.5 rps minimum while observing multimeter.

CONDITION/INDICATION

Does multimeter read more than 0.25 volts?

DECISION

YES Go to Step 264.
 NO Go to next step.

STEP

141. Visually inspect left rear tone ring for damage. Refer to Rear Antilock Brake System (ABS) Sensor Removal and Installation (WP 0491).

CONDITION/INDICATION

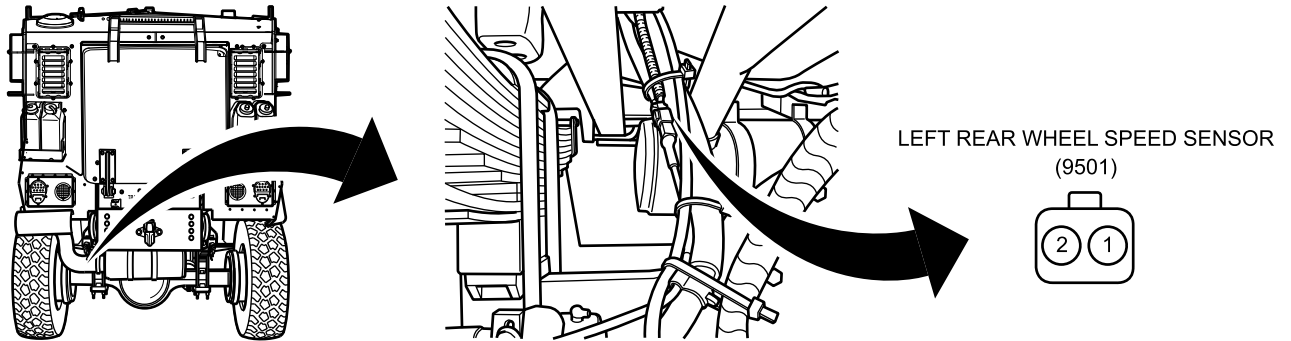
Does inspection reveal damage?

DECISION

YES Go to Step 269.
 NO Go to Step 270.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

142. Turn ignition switch OFF (TM 9-2355-106-10).



B230605021

Figure 34. Left Rear Axle.

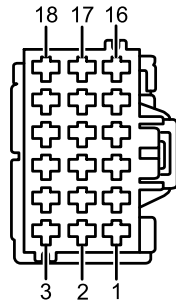
143. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

144. Disconnect connector 9501. Refer to Figure 34.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

145. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X2
(4954)



B230603805

Figure 35. Connector 4954.

146. Turn ignition switch ON (TM 9-2355-106-10).

147. Measure DC voltage between connector 4954 terminal 15 and ground with multimeter. Refer to Figure 35.

148. Measure DC voltage between connector 4954 terminal 18 and ground with multimeter. Refer to Figure 35.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

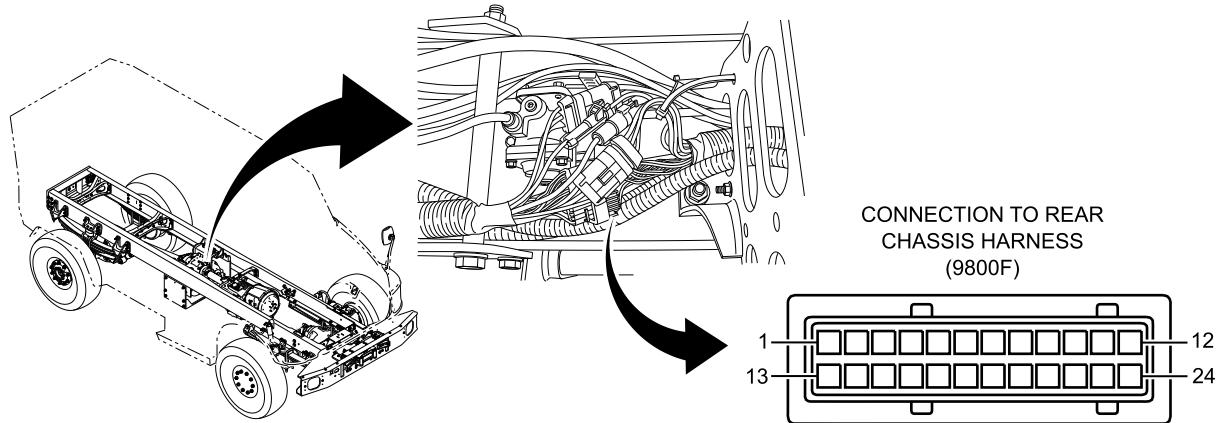
YES Go to Step 270.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

149. Turn ignition switch OFF (TM 9-2355-106-10).



B230605036

Figure 36. Inboard Left Frame Rail.

150. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

151. Disconnect connector 9800F from connector 9800M. Refer to Figure 36.

152. Turn MAIN POWER switch ON (TM 9-2355-106-10).

153. Turn ignition switch ON (TM 9-2355-106-10).

154. Measure DC voltage between connector 4954 terminal 15 and ground with multimeter. Refer to Figure 35.

155. Measure DC voltage between connector 4954 terminal 18 and ground with multimeter. Refer to Figure 35.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

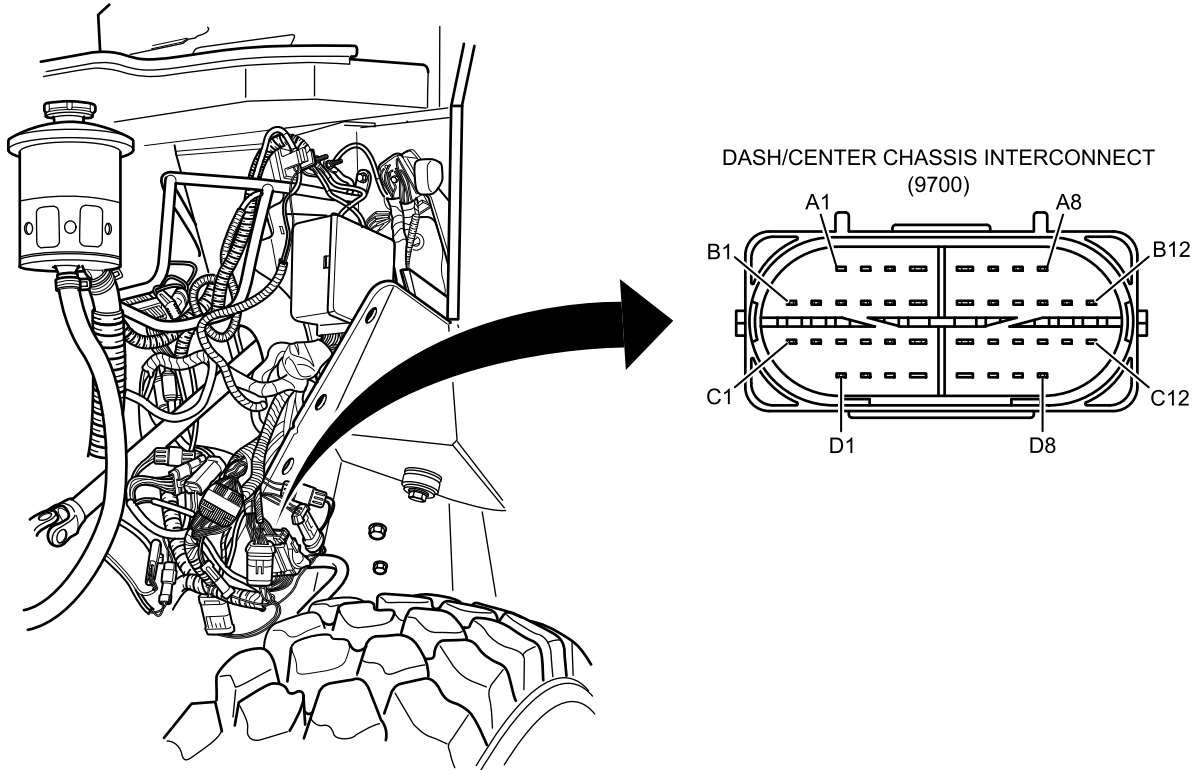
YES Go to Step 262.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 156. Turn ignition switch OFF (TM 9-2355-106-10).
- 157. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 158. Remove engine air filter assembly (TM 9-2355-106-10).
- 159. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 160. Turn ignition switch OFF (TM 9-2355-106-10).

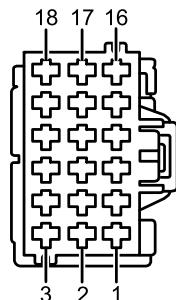


B230604051

Figure 37. Above Frame Inboard of Left Front Wheel.

- 161. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 162. Disconnect connector 9714/9700. Refer to Figure 37.
- 163. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X2 (4954)



B230603805

Figure 38. Connector 4954.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

164. Turn ignition switch ON (TM 9-2355-106-10).

165. Measure DC voltage between connector 4954 terminal 15 and ground with multimeter. Refer to Figure 38.

166. Measure DC voltage between connector 4954 terminal 18 and ground with multimeter. Refer to Figure 38.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

YES Go to Step 261.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

167. Turn ignition switch OFF (TM 9-2355-106-10).

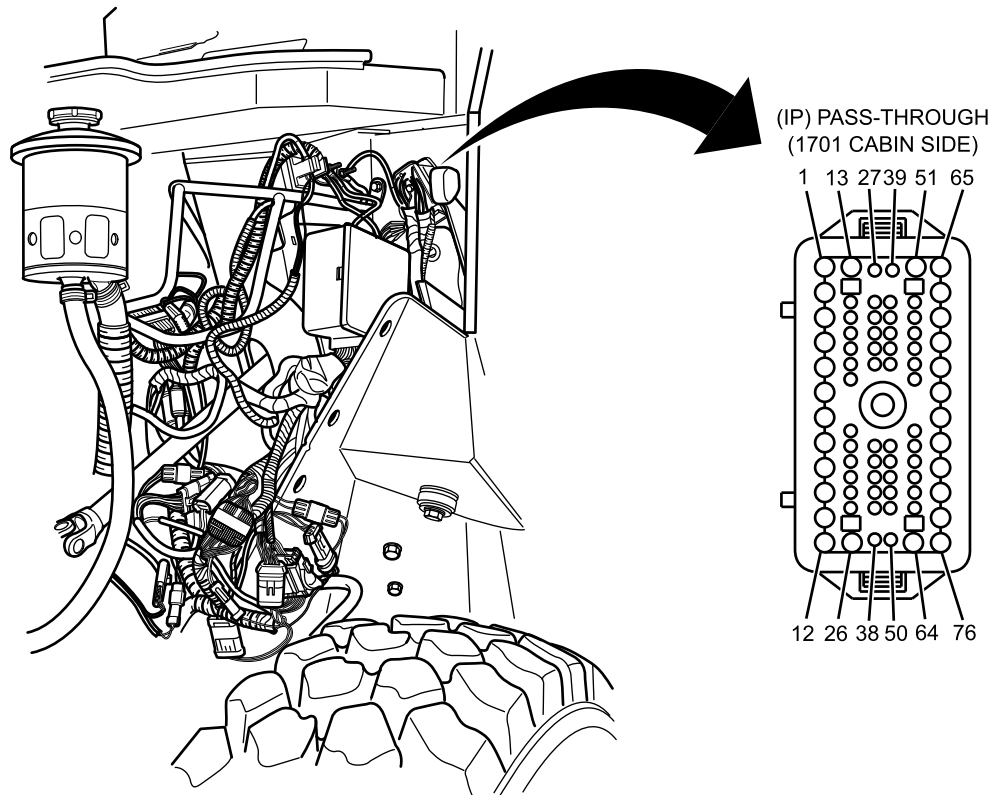


Figure 39. Left Side Firewall.

B230604024

168. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

169. Disconnect connector 1701. Refer to Figure 39.

170. Measure resistance between connector 1701 terminal 33 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 39.

171. Measure resistance between connector 1701 terminal 34 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 39.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

NO Go to Step 259.

YES Go to Step 260.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

172. Disconnect connector 1701. Refer to Figure 40.

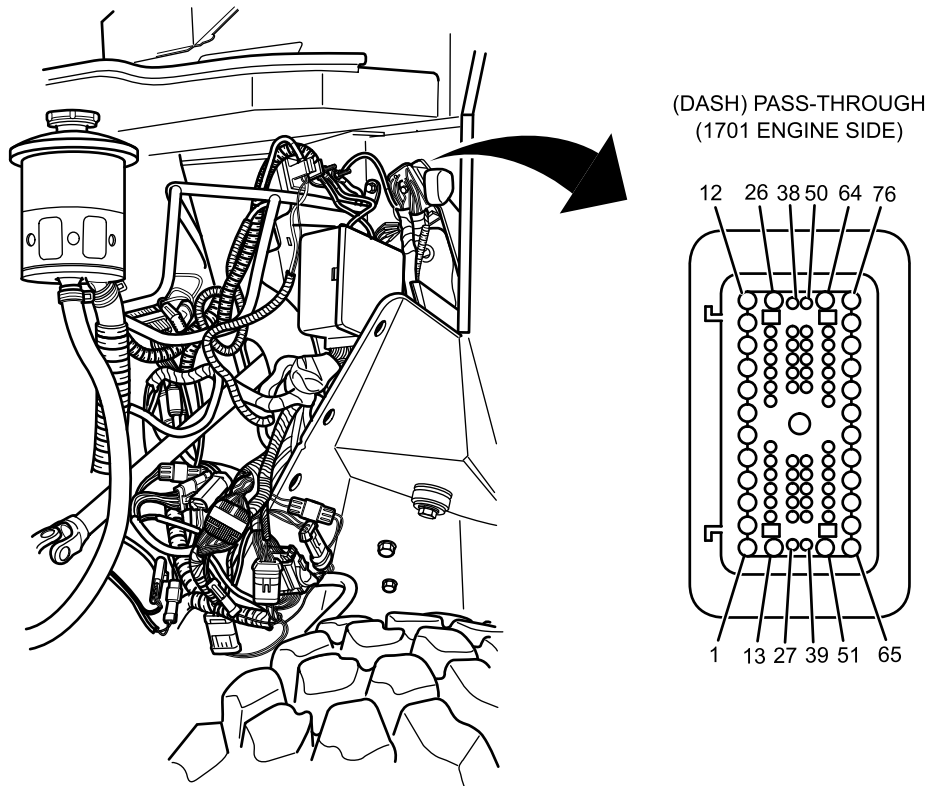


Figure 40. Left Side Firewall.

173. Measure resistance between connector 1701 terminal 33 and ground with multimeter. Refer to Figure 40.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 259.

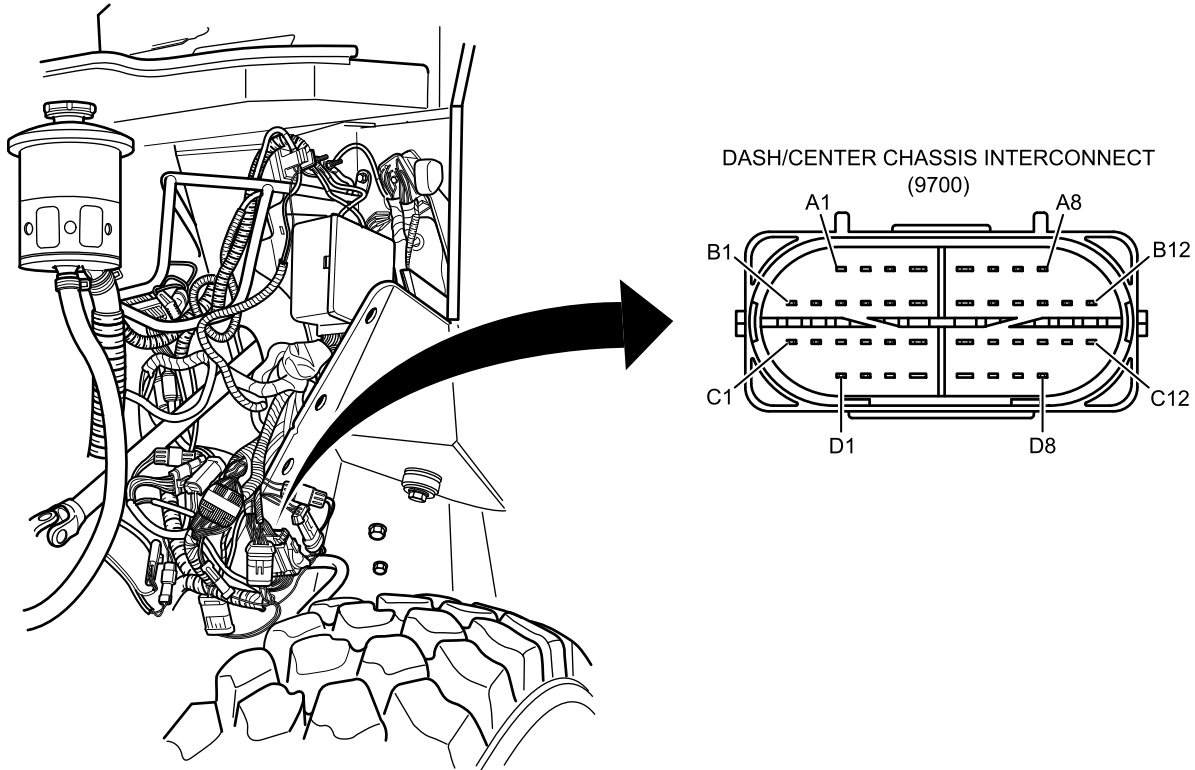
NO Go to next step.

B230604025

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 174. Remove engine air filter assembly (TM 9-2355-106-10).
- 175. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 176. Disconnect connector 9714/9700. Refer to Figure 41.



B230604051

Figure 41. Above Frame Inboard of Left Front Wheel.

- 177. Measure resistance between connector 9700 terminal A6 and ground with multimeter. Refer to Figure 41.

CONDITION/INDICATION

Does multimeter read OL?

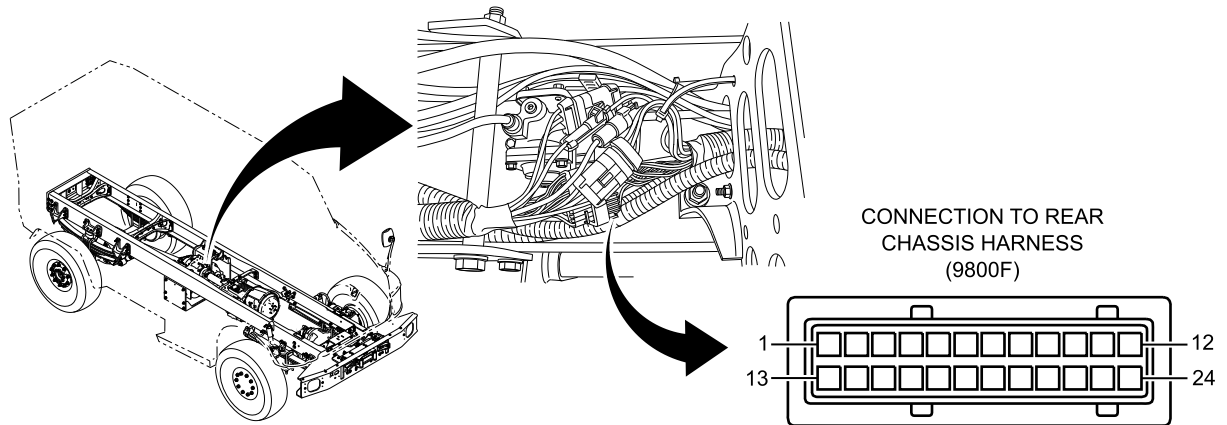
DECISION

- YES Go to Step 260.
- NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

178. Disconnect connector 9800F from connector 9800M. Refer to Figure 42.



B230605036

Figure 42. Inboard Left Frame Rail.

179. Measure resistance between connector 9800F terminal 14 and ground with multimeter. Refer to Figure 42.

CONDITION/INDICATION

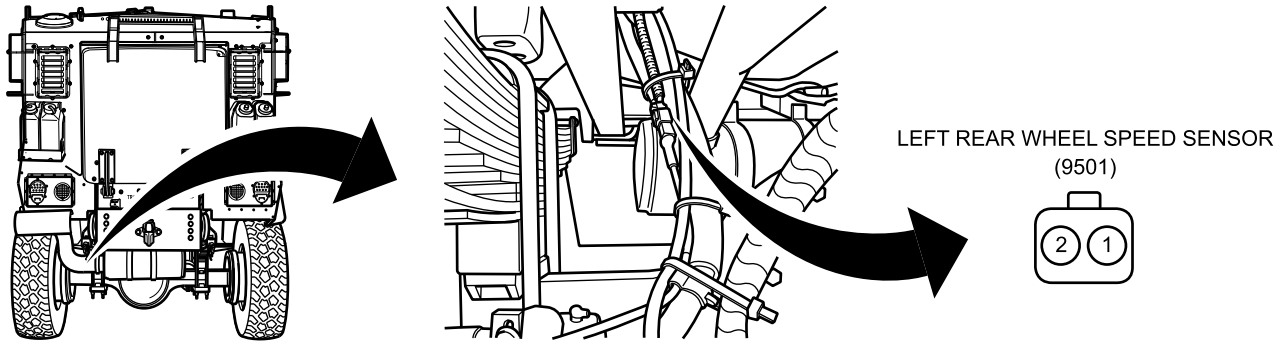
Does multimeter read OL?

DECISION

YES Go to Step 261.
NO Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

180. Disconnect connector 9501. Refer to Figure 43.



B230605021

Figure 43. Left Rear Axle.

181. Measure resistance between connector 9800F terminal 14 and ground with multimeter. Refer to Figure 42.

CONDITION/INDICATION

Does multimeter read OL?

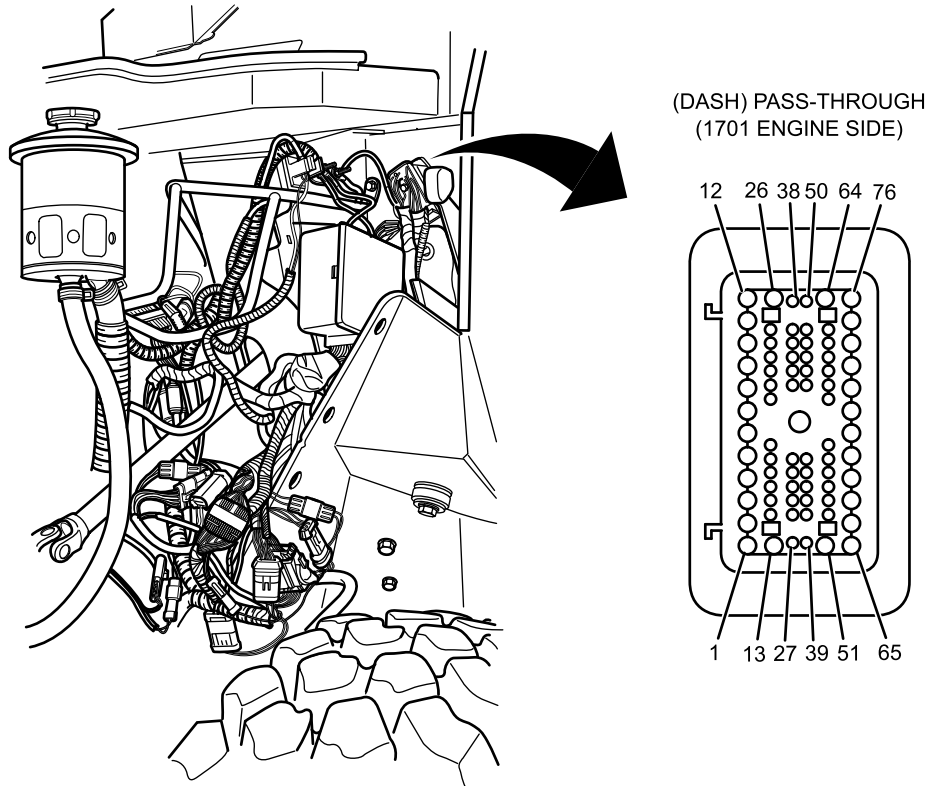
DECISION

NO Go to Step 262.
YES Go to Step 270.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

182. Disconnect connector 1701. Refer to Figure 44.



B230604025

Figure 44. Left Side Firewall.

183. Measure resistance between connector 1701 terminals 33 and 34 with multimeter. Refer to Figure 44.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

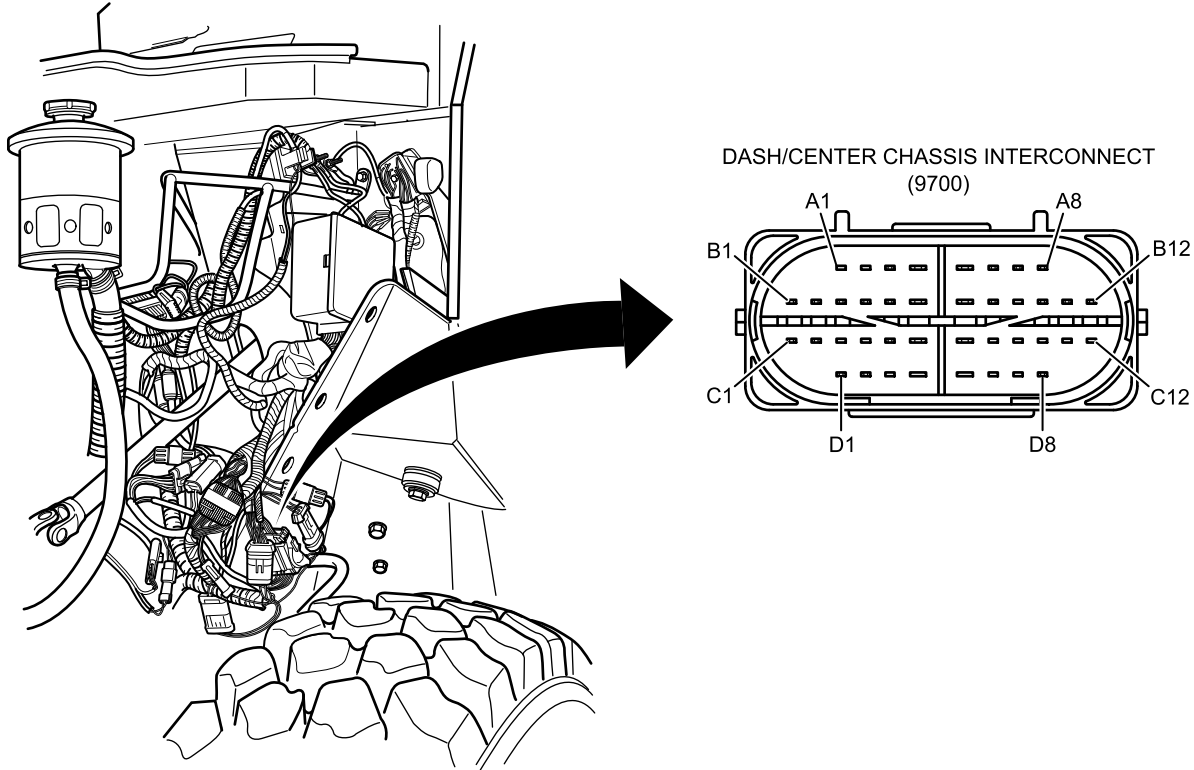
YES Go to Step 259.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

184. Disconnect connector 9714/9700. Refer to Figure 45.



B230604051

Figure 45. Above Frame Inboard of Left Front Wheel.

185. Measure resistance between connector 9700 terminals 13 and 14 with multimeter. Refer to Figure 45.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

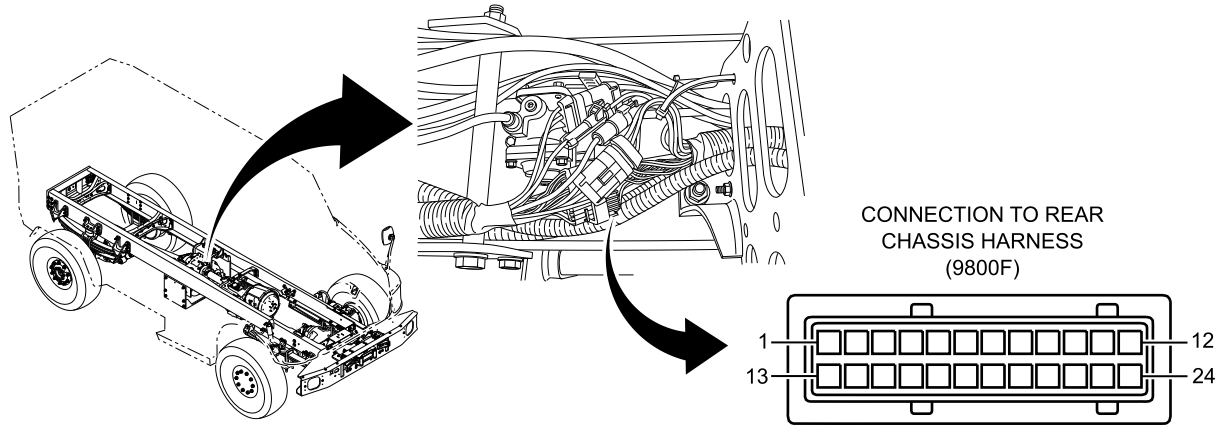
YES Go to Step 260.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

186. Disconnect connector 9800F from connector 9800M. Refer to Figure 46.



B230605036

Figure 46. Inboard Left Frame Rail.

187. Measure resistance between connector 9800F terminals 13 and 14 with multimeter. Refer to Figure 46.

CONDITION/INDICATION

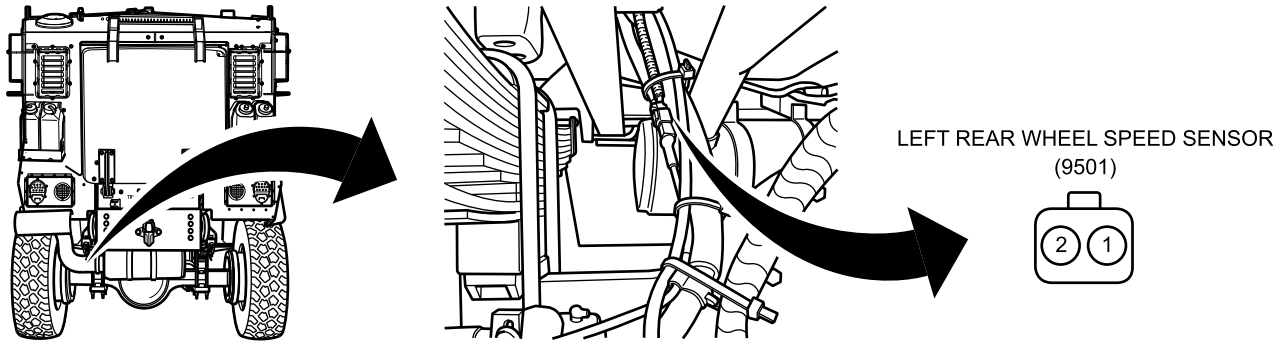
Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

YES Go to Step 261.
NO Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

188. Disconnect connector 9501. Refer to Figure 47.



B230605021

Figure 47. Left Rear Axle.

189. Measure resistance between connector 9501 terminals 1 and 2 with multimeter. Refer to Figure 47.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

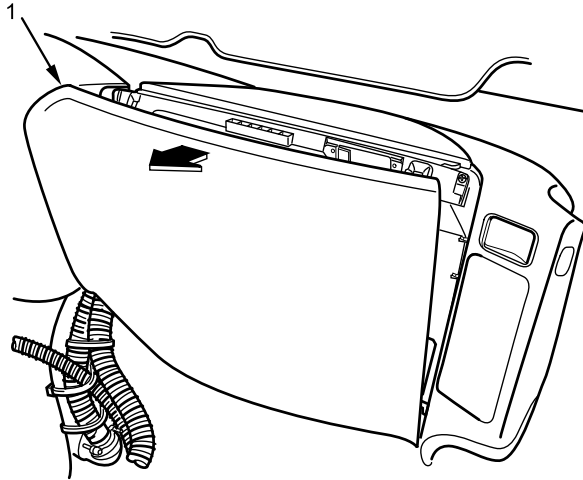
DECISION

YES Go to Step 262.

NO Go to Step 270.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****STEP**

190. Turn ignition switch OFF (TM 9-2355-106-10).



B230601329

Figure 48. Instrument Panel Right Side Closeout Panel.

191. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

192. Remove instrument panel right side closeout panel (Figure 48, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

193. Disconnect connector 4953. Refer to Figure 49.

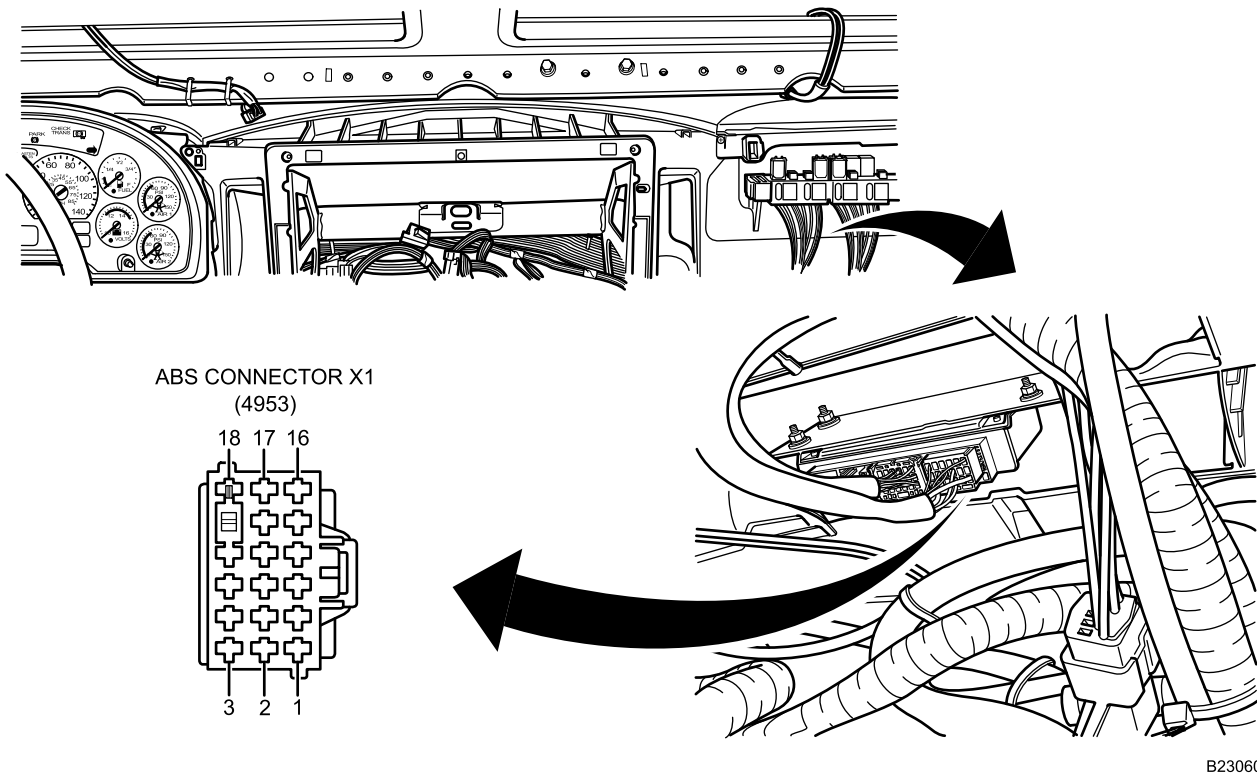


Figure 49. Behind Right Side of Instrument Panel (IP).

194. Turn MAIN POWER switch ON (TM 9-2355-106-10).

195. Turn ignition switch ON (TM 9-2355-106-10).

196. Measure DC voltage between connector 4953 terminal 10 and ground with multimeter. Refer to Figure 49.

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

NO Go to Step 210

YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

197. Turn ignition switch OFF (TM 9-2355-106-10).

198. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

199. Measure resistance between connector 4953 terminal 10 and ground with multimeter. Refer to Figure 49.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

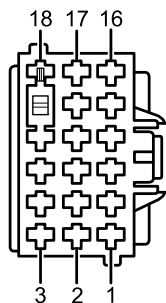
NO Go to Step 238.

YES Go to next step.

STEP

200. Measure resistance between connector 4953 terminals 10 and 11 with multimeter. Refer to Figure 50.

ABS CONNECTOR X1
(4953)



B230603804

Figure 50. Connector 4953.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

NO Go to Step 248.

YES Go to next step.

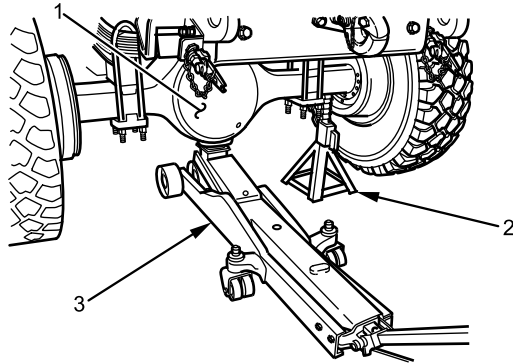
STEP

201. Cage rear spring brakes (TM 9-2355-106-10).

202. Chock wheels not being serviced to prevent vehicle from moving.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

203. Raise rear axle (Figure 51, Item 1) with 20-ton floor jack (Figure 51, Item 3) until left wheel spins freely.
Support right rear axle with 10-ton jackstand (Figure 51, Item 2).



B231011728

Figure 51. Right Rear Wheel Raised.

204. Verify proper wheel bearing end-play and adjust if necessary. Refer to Rear Hub Assembly Seal and Bearing Cup Removal and Installation (WP 0480).
205. Turn MAIN POWER switch ON (TM 9-2355-106-10).
206. Turn ignition switch ON (TM 9-2355-106-10).
207. Measure AC voltage between connector 4953 terminals 10 and 11 with multimeter. Refer to Figure 50.
208. With maintainer assistance, rotate wheel 0.5 rps minimum while observing multimeter.

CONDITION/INDICATION

Does multimeter read more than 0.25 volts?

DECISION

YES Go to Step 264.
NO Go to next step.

STEP

209. Visually inspect right rear tone ring for damage. Refer to Rear Antilock Brake System (ABS) Sensor Removal and Installation (WP 0491).

CONDITION/INDICATION

Does inspection reveal damage.

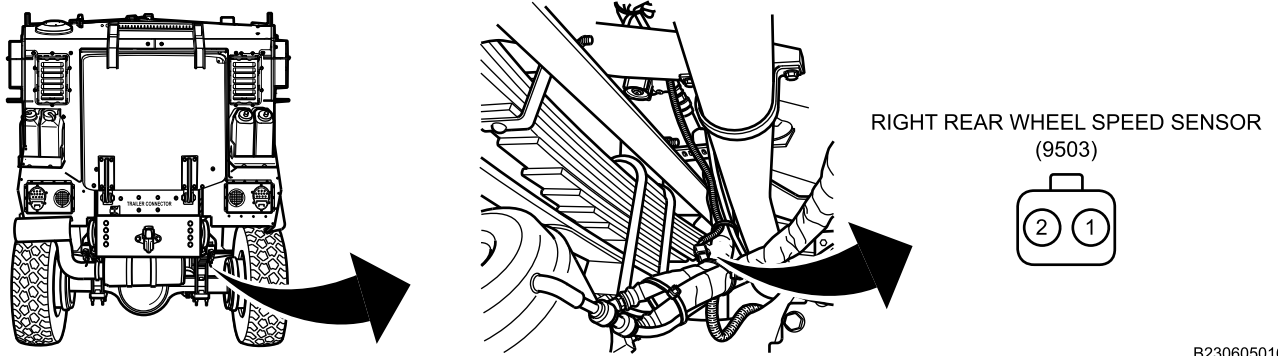
DECISION

YES Go to Step 271.
NO Go to Step 272.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

210. Turn ignition switch OFF (TM 9-2355-106-10).



B230605016

Figure 52. Right Rear Axle.

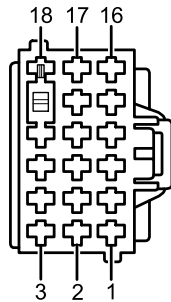
211. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

212. Disconnect connector 9503. Refer to Figure 52.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)**

213. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X1
(4953)



B230603804

Figure 53. Connector 4953.

214. Turn ignition switch ON (TM 9-2355-106-10).

215. Measure DC voltage between connector 4953 terminal 10 and ground with multimeter. Refer to Figure 53.

216. Measure DC voltage between connector 4953 terminal 11 and ground with multimeter. Refer to Figure 53.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

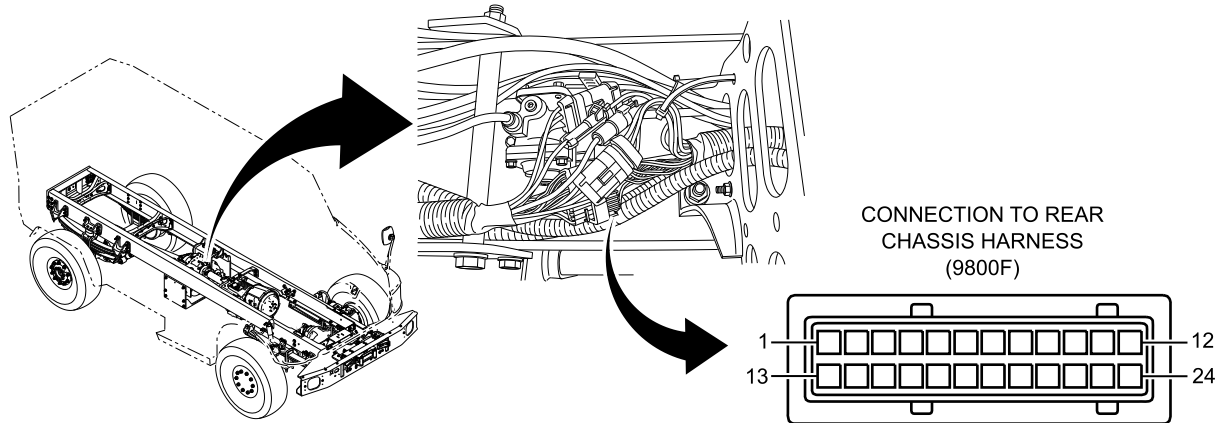
YES Go to Step 272.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

217. Turn ignition switch OFF (TM 9-2355-106-10).



B230605036

Figure 54. Inboard Left Frame Rail.

218. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

219. Disconnect connector 9800F from connector 9800M. Refer to Figure 54.

220. Turn MAIN POWER switch ON (TM 9-2355-106-10).

221. Turn ignition switch ON (TM 9-2355-106-10).

222. Measure DC voltage between connector 4953 terminal 10 and ground with multimeter. Refer to Figure 53.

223. Measure DC voltage between connector 4953 terminal 11 and ground with multimeter. Refer to Figure 53.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

DECISION

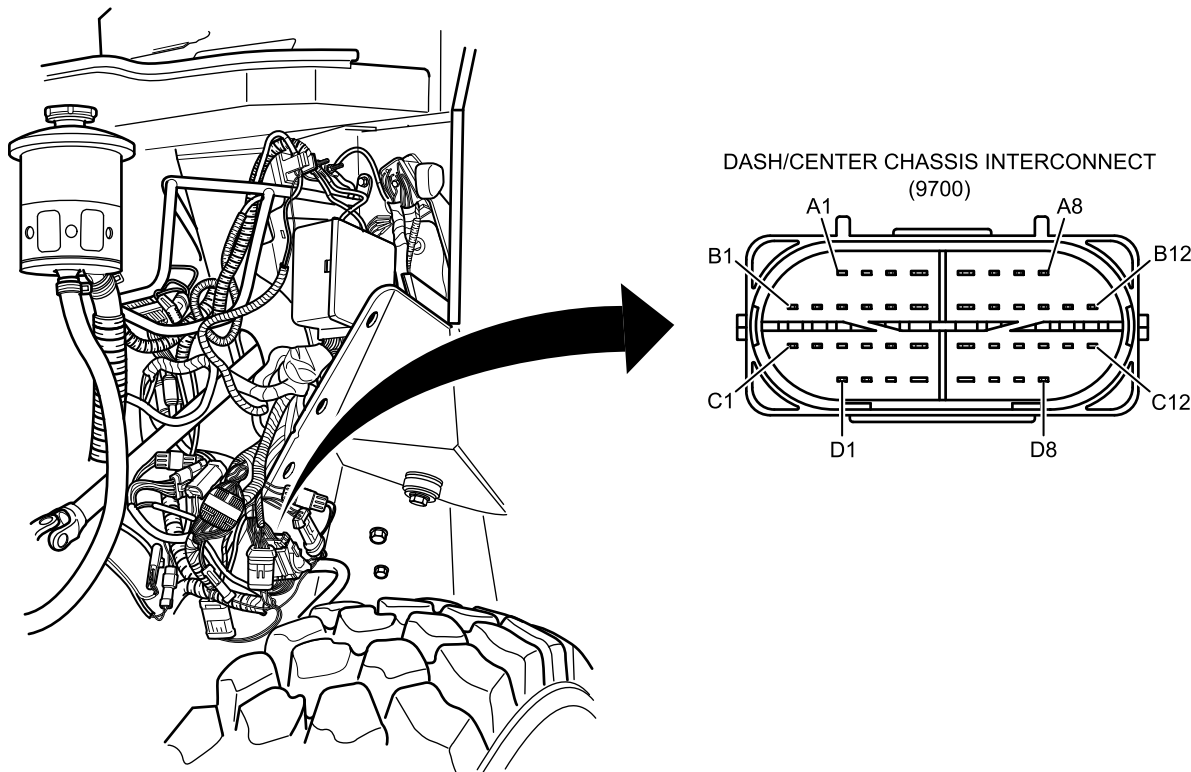
YES Go to Step 262.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 224. Turn ignition switch OFF (TM 9-2355-106-10).
- 225. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 226. Remove engine air filter assembly (TM 9-2355-106-10).
- 227. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 228. Disconnect connector 9714/9700. Refer to Figure 55.

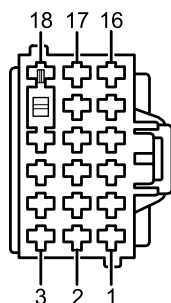


B230604051

Figure 55. Above Frame Inboard of Left Front Wheel.

- 229. Turn MAIN POWER switch ON (TM 9-2355-106-10).

ABS CONNECTOR X1 (4953)



B230603804

Figure 56. Connector 4953.

- 230. Turn ignition switch ON (TM 9-2355-106-10).
- 231. Measure DC voltage between connector 4953 terminal 10 and ground with multimeter. Refer to Figure 56.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

232. Measure DC voltage between connector 4953 terminal 11 and ground with multimeter. Refer to Figure 56.

CONDITION/INDICATION

Does multimeter read 0 volts for both tests?

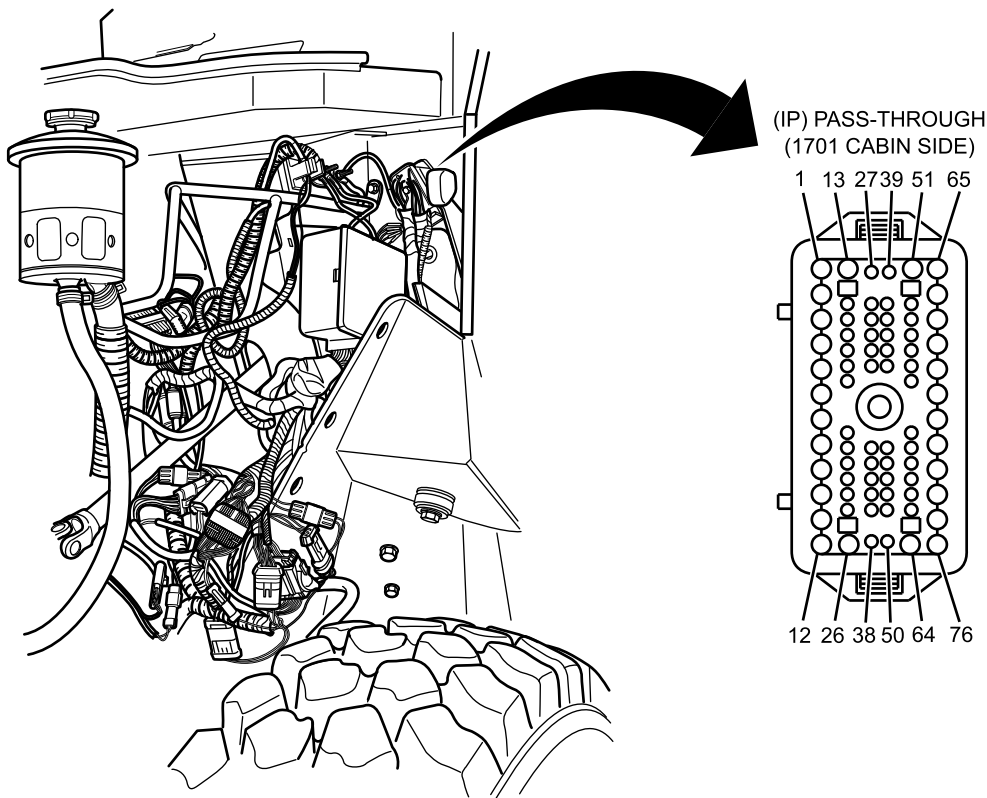
DECISION

YES Go to Step 261.

NO Go to next step.

STEP

233. Turn ignition switch OFF (TM 9-2355-106-10).



B230604024

Figure 57. Left Side Firewall.

234. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

235. Disconnect connector 1701. Refer to Figure 57.

236. Measure resistance between connector 1701 terminal 42 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 57.

237. Measure resistance between connector 1701 terminal 43 and all other connector 1701 terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 57.

CONDITION/INDICATION

Does multimeter read OL for each test?

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

NO Go to Step 259.
 YES Go to Step 260.

STEP

238. Disconnect connector 1701. Refer to Figure 58.

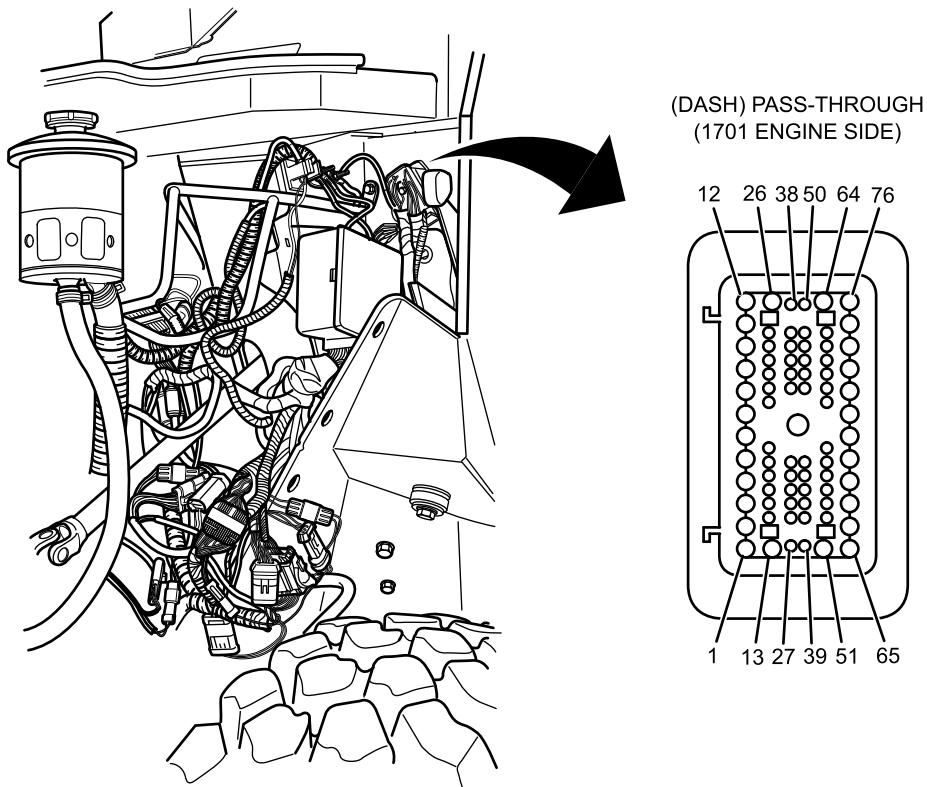


Figure 58. Left Side Firewall.

B230604025

239. Measure resistance between connector 1701 terminal 42 and ground with multimeter. Refer to Figure 58.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 259.
 NO Go to next step.

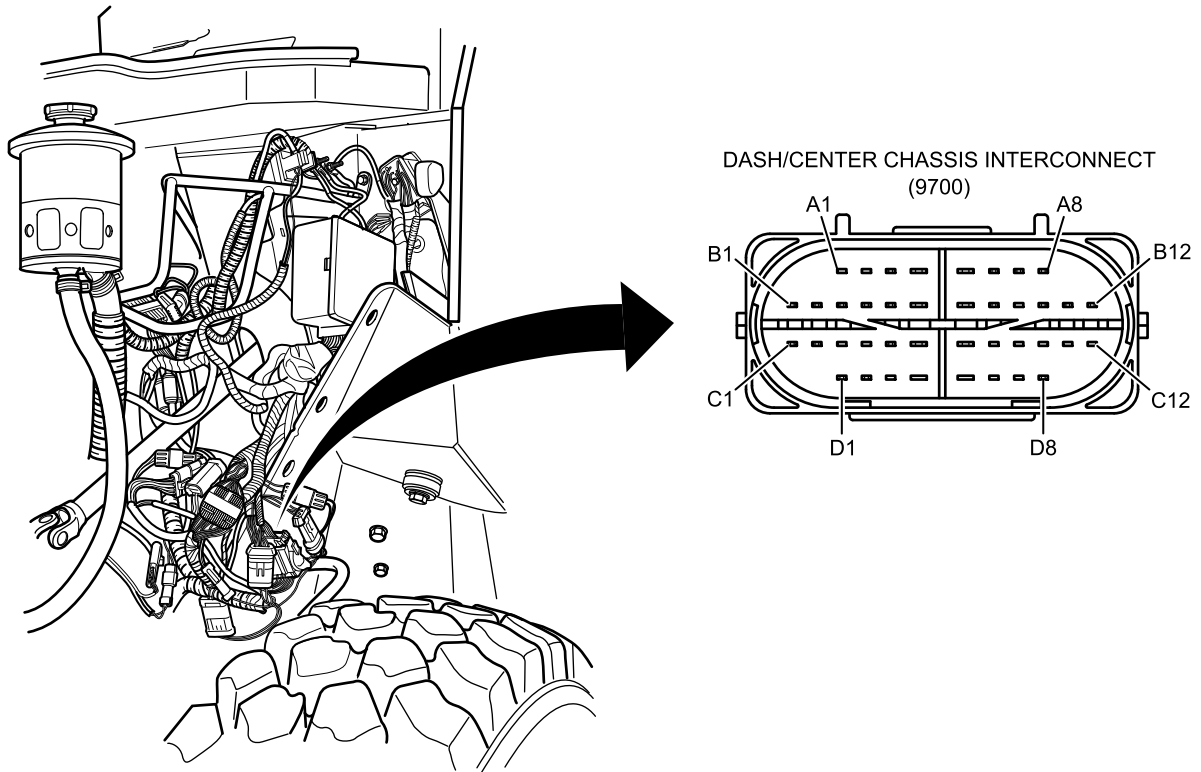
ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

240. Remove engine air filter assembly (TM 9-2355-106-10).

241. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

242. Disconnect connector 9714/9700. Refer to Figure 59.



B230604051

Figure 59. Above Frame Inboard of Left Front Wheel.

243. Measure resistance between connector 9700 terminal A8 and ground with multimeter. Refer to Figure 59.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

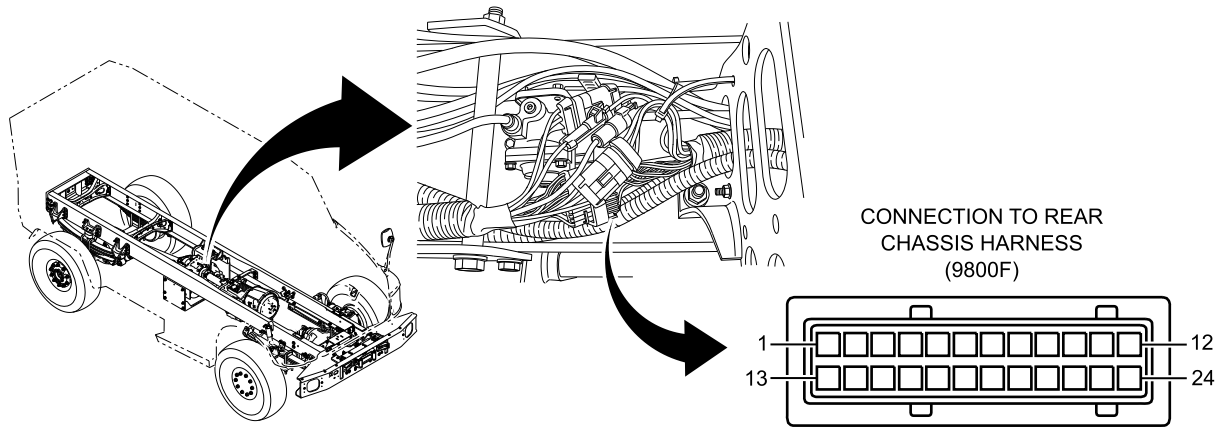
YES Go to Step 260.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

244. Disconnect connector 9800F from 9800M. Refer to Figure 60.



B230605036

Figure 60. Inboard Left Frame Rail.

245. Measure resistance between connector 9800F terminal 16 and ground with multimeter. Refer to Figure 60.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 261.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

246. Disconnect connector 9503. Refer to Figure 61.

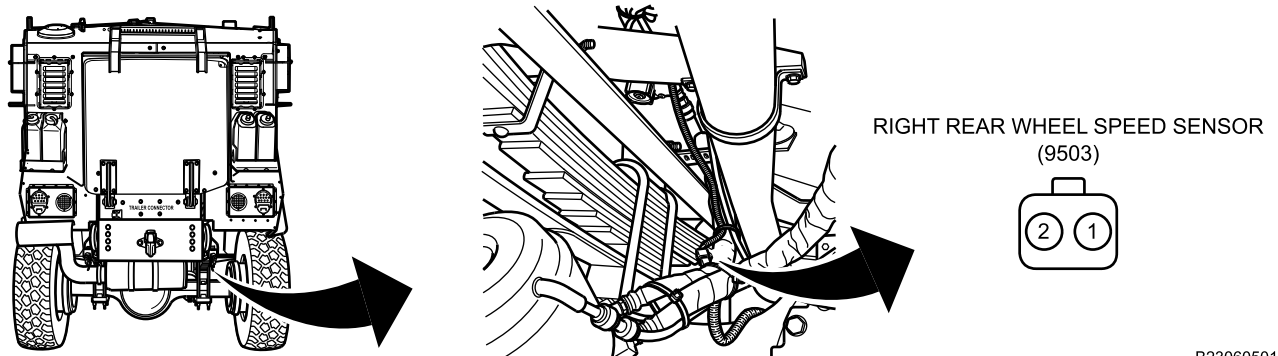


Figure 61. Right Rear Axle.

247. Measure resistance between connector 9800F terminal 16 and ground with multimeter. Refer to Figure 60.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 262.
YES Go to Step 272.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

248. Disconnect connector 1701. Refer to Figure 62.

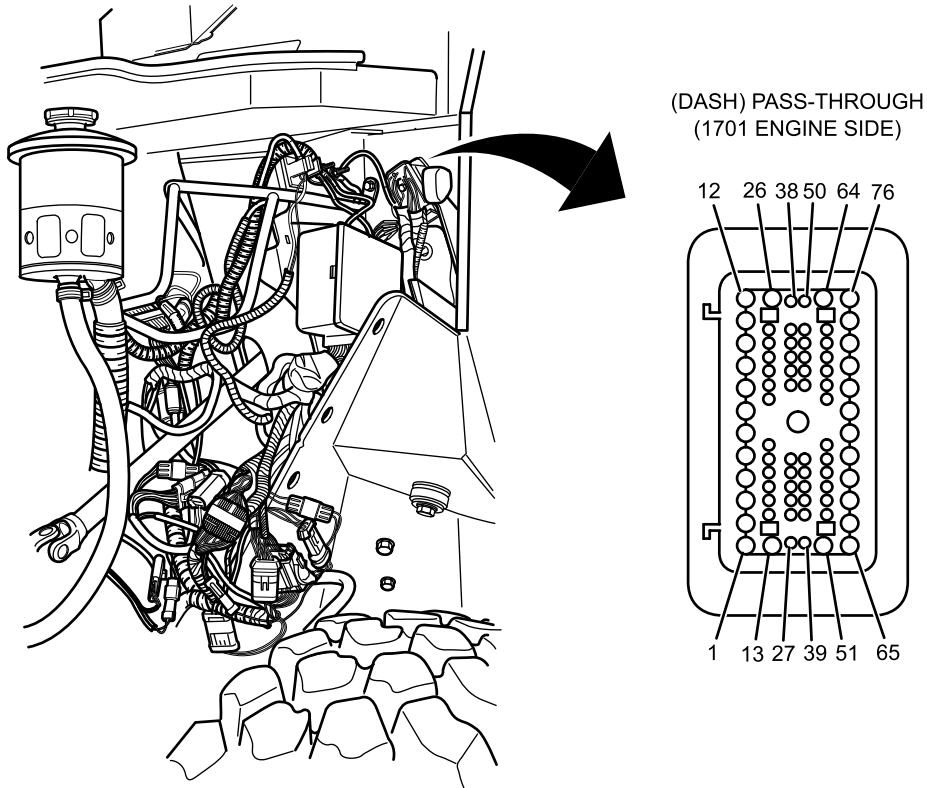


Figure 62. Left Side Firewall.

B230604025

249. Measure resistance between connector 1701 terminals 42 and 43 with multimeter. Refer to Figure 62.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

YES Go to Step 259.

NO Go to next step.

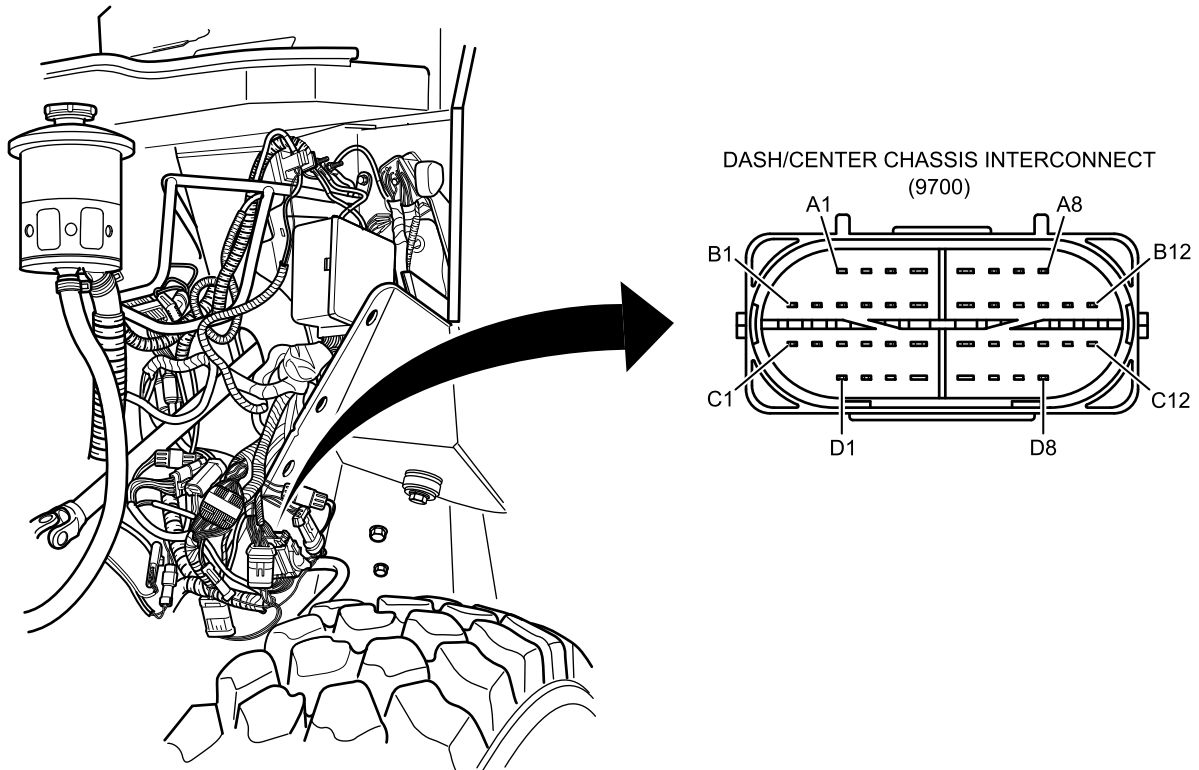
ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

250. Remove engine air filter assembly (TM 9-2355-106-10).

251. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

252. Disconnect connector 9714/9700. Refer to Figure 63.



B230604051

Figure 63. Above Frame Inboard of Left Front Wheel.

253. Measure resistance between connector 9700 terminals A8 and A7 with multimeter. Refer to Figure 63.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

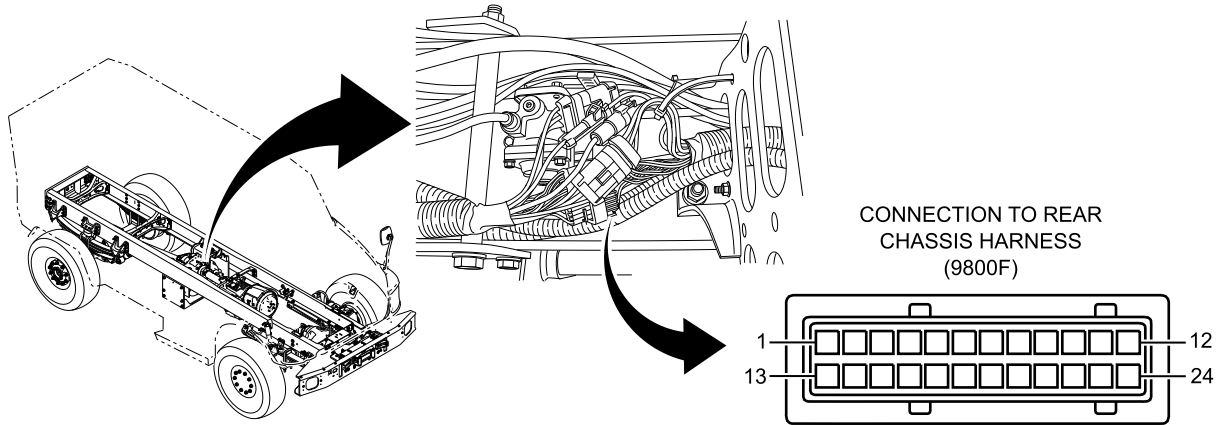
YES Go to Step 260.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

254. Disconnect connector 9800F from 9800M. Refer to Figure 64.



B230605036

Figure 64. Right Rear Axle.

255. Measure resistance between connector 9800F terminals 15 and 16 with multimeter. Refer to Figure 64.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

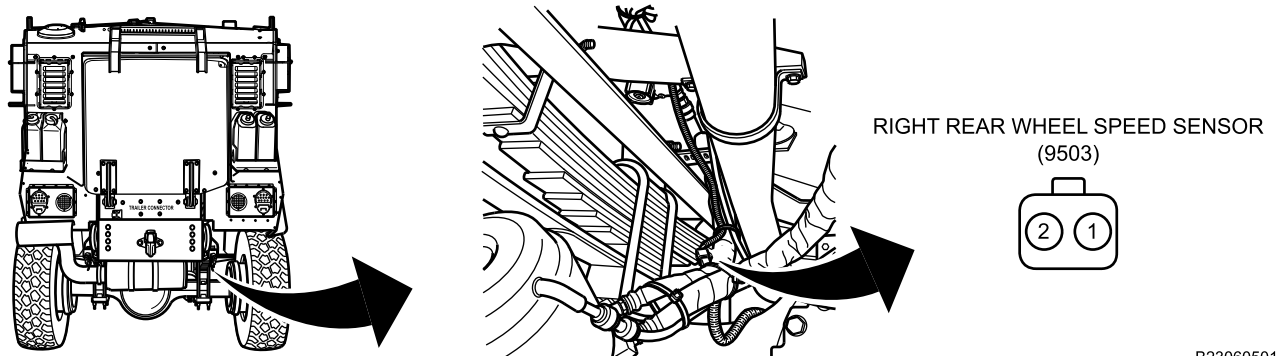
DECISION

YES Go to Step 261.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

256. Disconnect connector 9503. Refer to Figure 65.



B230605016

Figure 65. Right Rear Axle.

257. Measure resistance between connector 9503 terminals 1 and 2 with multimeter. Refer to Figure 65.

CONDITION/INDICATION

Does multimeter read between 1,500 ohms and 2,500 ohms?

DECISION

YES Go to Step 262.

NO Go to Step 272.

MALFUNCTION

- 258. This procedure does not apply to DTC that is set.

ACTION

Go to Antilock Brake System (ABS) Diagnostic Trouble Code (DTC) Index (WP 0009). Return vehicle to service.

END OF TEST

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 259. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 260. Power Distribution Center (PDC) harness is faulty.

ACTION

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 261. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 262. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 263. Forward chassis harness is faulty.

ACTION

Replace forward chassis harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 264. Antilock Brake System (ABS) control module is faulty.

ACTION

Replace ABS control module. Refer to Antilock Brake System (ABS) Control Module Removal and Installation (WP 0390). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 265. Left front tone ring is damaged. Left front wheel speed sensor is likely damaged.

ACTION

Replace left front tone ring and wheel speed sensor. Refer to Front Axle Antilock Brake System (ABS) Tone Ring Removal and Installation (WP 0483) and Front Antilock Braking System (ABS) Sensor Removal and Installation (WP 0425). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 266. Left front wheel speed sensor is faulty.

ACTION

Replace left front sensor. Refer to Front Antilock Brake System (ABS) Sensor Removal and Installation (WP 0425). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 267. Right front tone ring is damaged. Right front wheel speed sensor is likely damaged.

ACTION

Replace right front tone ring and wheel speed sensor. Refer to Front Axle Antilock Brake System (ABS) Tone Ring Removal and Installation (WP 0483) and Front Antilock Brake System (ABS) Sensor Removal and Installation (WP 0425). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 268. Right front wheel speed sensor is faulty.

ACTION

Replace right front wheel speed sensor. Refer to Front Antilock Braking System (ABS) Sensor Removal and Installation (WP 0425). Return vehicle to service.

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****END OF TEST****MALFUNCTION**

- 269. Left rear tone ring is damaged. Left rear wheel speed sensor is likely damaged.

ACTION

Replace left rear tone ring and wheel speed sensor. Refer to Rear Brake Drum and Hub Assembly Removal and Installation (WP 0494) and Rear Antilock Braking System (ABS) Sensor Removal and Installation (WP 0491). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 270. Left rear wheel speed sensor is damaged.

ACTION

Replace left rear sensor. Refer to Front Antilock Brake System (ABS) Sensor Removal and Installation (WP 0425). Return vehicle to service.

END OF TEST

**ANTILOCK BRAKE SYSTEM (ABS) WHEEL SPEED SENSOR TROUBLESHOOTING PROCEDURE -
(CONTINUED)****MALFUNCTION**

- 271. Right rear tone ring is damaged. Right rear wheel speed sensor is likely damaged.

ACTION

Replace right rear tone ring and wheel speed sensor. Refer to Rear Brake Drum and Hub Assembly Removal and Installation (WP 0494) and Rear Antilock Braking System (ABS) Sensor Removal and Installation (WP 0491). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 272. Right rear wheel speed sensor is faulty.

ACTION

Replace right rear wheel speed sensor. Refer to Rear Antilock Braking System (ABS) Sensor Removal and Installation (WP 0491). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Test Equipment**

Maintenance Support Device (MSD) (WP 0795, Item 70)

WP 0427

WP 0511

WP 0507

WP 0597

WP 0782

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

Terminal Test Kit (WP 0795, Item 122)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Engine hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0009

WP 0319

WP 0335

WP 0390

WP 0424

WP 0426

Drawings Required

WP 0789, Figure 42

WP 0789, Figure 43

ABS PMV DIAGNOSTIC TROUBLE CODES.

This procedure applies to following DTCs:

- 7-1
- 7-2
- 7-3
- 7-4
- 7-5
- 7-6
- 7-7
- 8-1
- 8-2
- 8-3
- 8-4
- 8-5
- 8-6
- 8-7
- 9-1
- 9-2
- 9-3
- 9-4
- 9-5
- 9-6
- 9-7
- 10-1
- 10-2

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

- 10-3
- 10-4
- 10-5
- 10-6
- 10-7

TROUBLESHOOTING PROCEDURE**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.

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

1. Connect MSD. Refer to Connecting Maintenance Support Device (MSD) (WP 0011).
2. Retrieve ABS DTCs with MSD or manually. Refer to Diagnostic Trouble Code (DTC) Access Procedure (WP 0012).

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 7-1
- 7-2
- 7-3
- 7-4
- 7-5
- 7-6
- 7-7

DECISION

YES Go to Step 6.
NO Go to next step.

STEP

3. Observe retrieved ABS DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 8-1
- 8-2
- 8-3
- 8-4
- 8-5
- 8-6
- 8-7

DECISION

YES Go to Step 15.
NO Go to next step.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

4. Observe retrieved ABS DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 9-1
- 9-2
- 9-3
- 9-4
- 9-5
- 9-6
- 9-7

DECISION

YES Go to Step 24.

NO Go to next step.

STEP

5. Observe retrieved ABS DTCs.

CONDITION/INDICATION

Is one or more of the following DTCs set?

- 10-1
- 10-2
- 10-3
- 10-4
- 10-5
- 10-6
- 10-7

DECISION

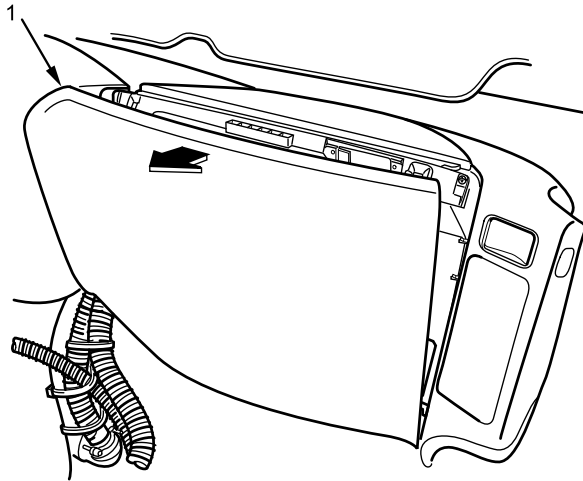
YES Go to Step 33.

NO Go to Step 182.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

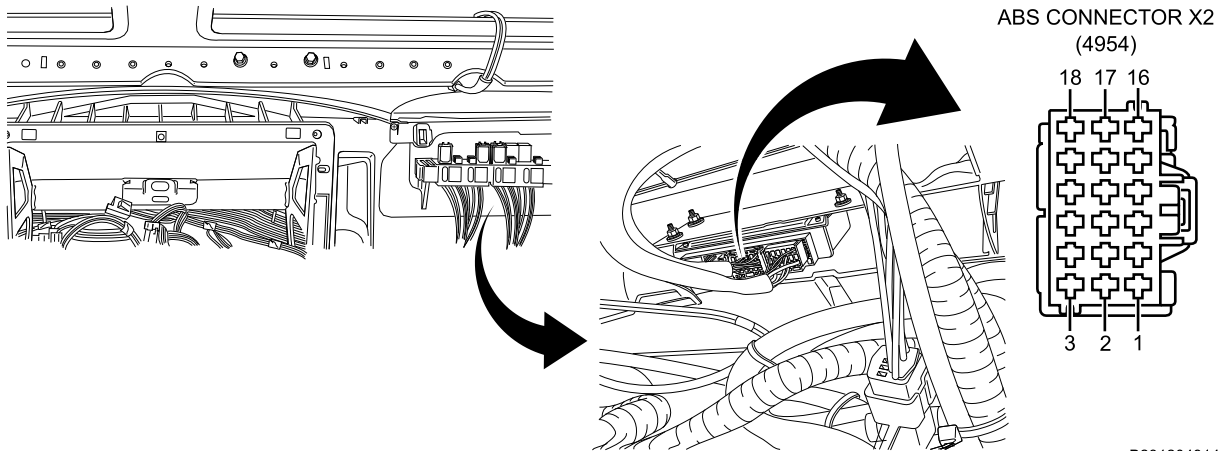
6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
8. Remove instrument panel right side closeout panel (Figure 1, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



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Figure 1. Instrument Panel Right Side Closeout Panel.

9. Disconnect connector 4954 from ABS control module. Refer to Figure 2.



B231204914

Figure 2. Behind Right Instrument Panel.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector 4954 terminal 3 and connector 4954 terminals 1 and then 2 with multimeter.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

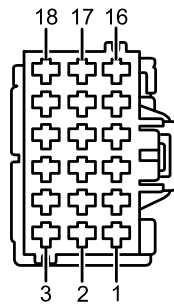
DECISION

NO Go to Step 42.
YES Go to next step.

STEP

11. Measure resistance between connector 4954 terminal 3 and ground with multimeter. Refer to Figure 3.

ABS CONNECTOR X2
(4954)



B230603805

Figure 3. Connector 4954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 50.
YES Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Turn MAIN POWER switch ON (TM 9-2355-106-10).
13. Turn ignition switch ON (TM 9-2355-106-10).
14. Measure DC voltage between connector 4954 terminal 3 and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

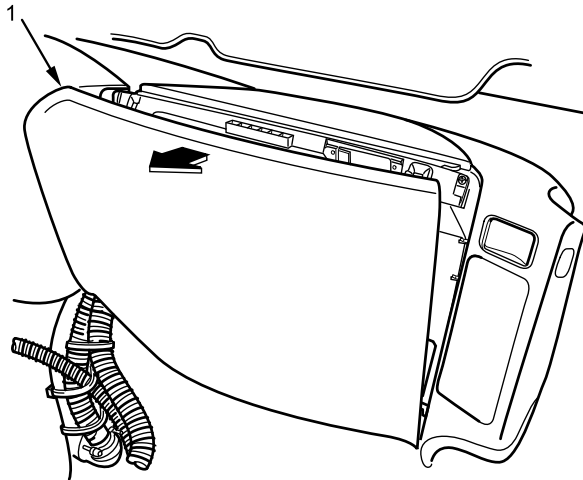
Does multimeter read 0 volts?

DECISION

NO Go to Step 58.
YES Go to Step 183.

STEP

15. Turn ignition switch OFF (TM 9-2355-106-10).
16. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
17. Remove instrument panel right side closeout panel (Figure 4, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



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Figure 4. Instrument Panel Right Side Closeout Panel.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Disconnect connector 4954 from ABS control module. Refer to Figure 5.

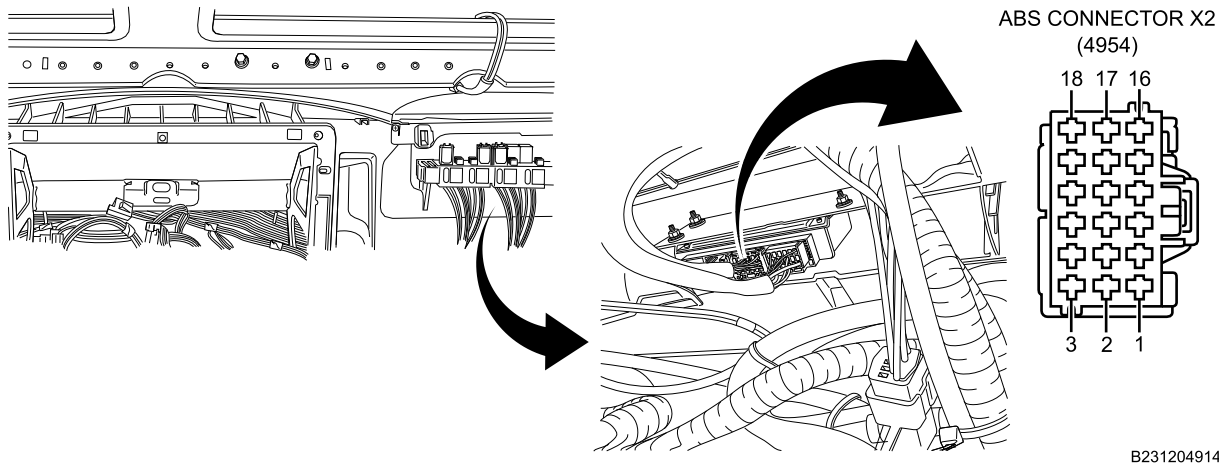


Figure 5. Behind Right Instrument Panel.

19. Measure resistance between connector 4954 terminal 6 and connector 4954 terminals 4 and 7 with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

NO Go to Step 72.
YES Go to next step.

STEP

20. Measure resistance between connector 4954 terminal 6 and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 80.
YES Go to next step.

STEP

21. Turn MAIN POWER switch ON (TM 9-2355-106-10).

22. Turn ignition switch ON (TM 9-2355-106-10).

23. Measure DC voltage between connector 4954 terminal 6 and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

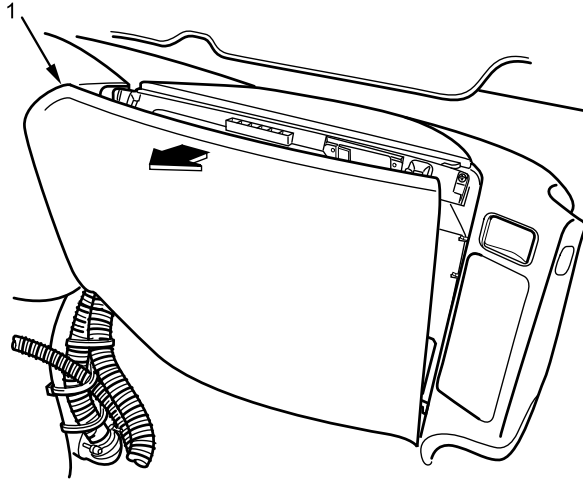
Does multimeter read 0 volts?

DECISION

NO Go to Step 88.
YES Go to Step 183.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

24. Turn ignition switch OFF (TM 9-2355-106-10).
25. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
26. Remove instrument panel right side closeout panel (Figure 6, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



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Figure 6. Instrument Panel Right Side Closeout Panel.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

27. Disconnect connector 4954 from ABS control module. Refer to Figure 7.

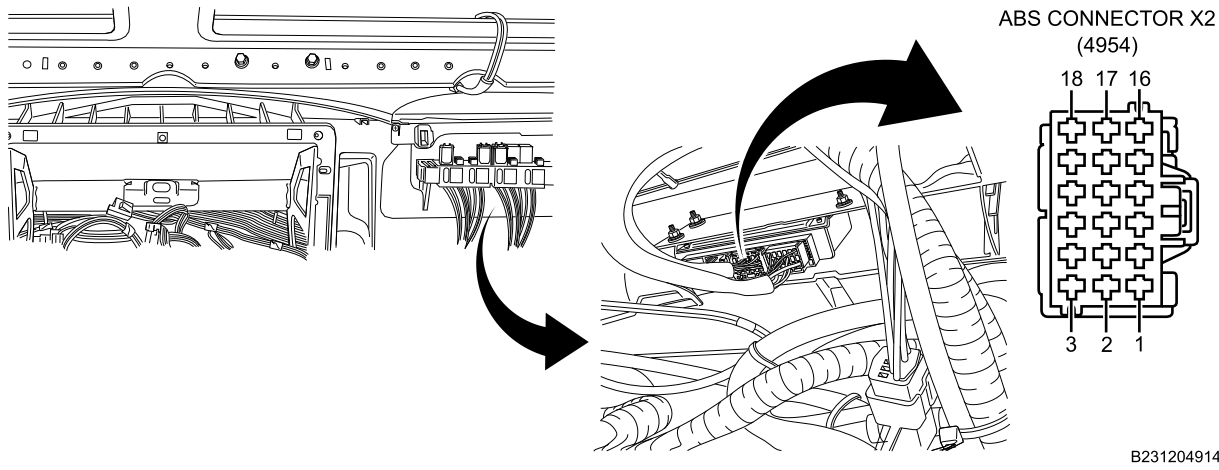


Figure 7. Behind Right Instrument Panel.

28. Measure resistance between connector 4954 terminal 12 and connector 4954 terminals 16 and then 17 with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

NO Go to Step 100.
YES Go to next step.

STEP

29. Measure resistance between connector 4954 terminal 12 and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 110.
YES Go to next step.

STEP

30. Turn MAIN POWER switch ON (TM 9-2355-106-10).

31. Turn ignition switch ON (TM 9-2355-106-10).

32. Measure DC voltage between connector 4954 terminal 12 and ground with multimeter. Refer to Figure 7.

CONDITION/INDICATION

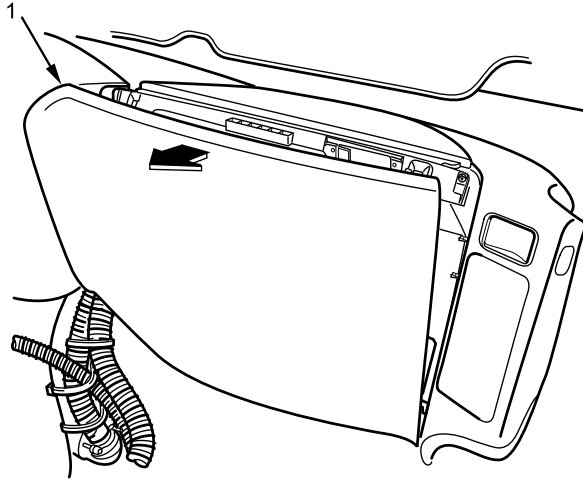
Does multimeter read 0 volts?

DECISION

NO Go to Step 118.
YES Go to Step 183.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

33. Turn ignition switch OFF (TM 9-2355-106-10).
34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
35. Remove instrument panel right side closeout panel (Figure 8, Item 1) by pulling top of panel towards back of vehicle and then pulling panel up.



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Figure 8. Instrument Panel Right Side Closeout Panel.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

36. Disconnect connector 4954 from ABS control module. Refer to Figure 9.

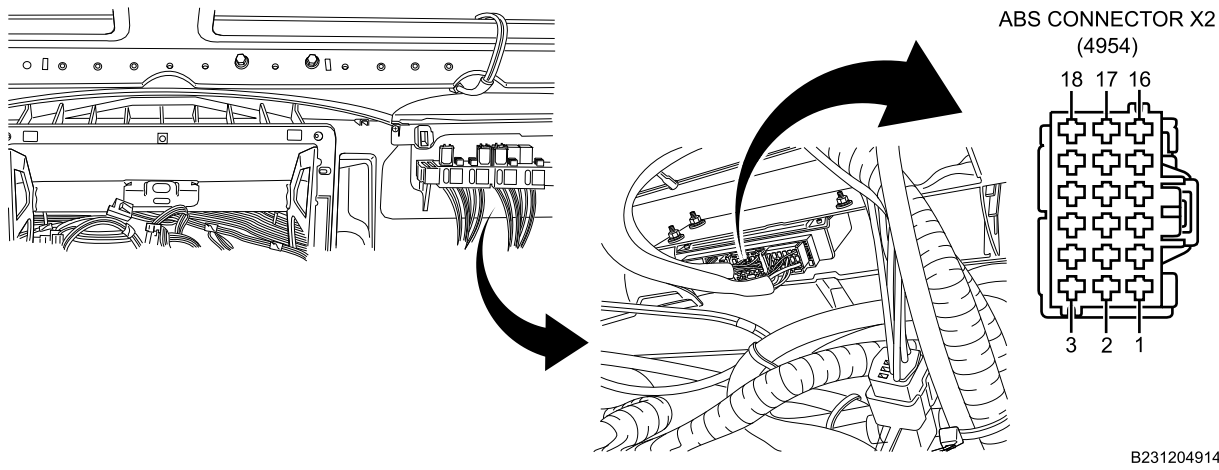


Figure 9. Behind Right Instrument Panel.

37. Measure resistance between connector 4954 terminal 9 and connector 4954 terminals 10 and 13 with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

NO Go to Step 136.
 YES Go to next step.

STEP

38. Measure resistance between connector 4954 terminal 9 and ground with multimeter. Refer to Figure 10.

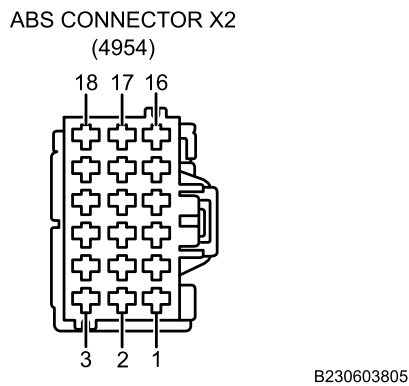


Figure 10. Connector 4954.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 146.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

YES Go to next step.

STEP

39. Turn MAIN POWER switch ON (TM 9-2355-106-10).
40. Turn ignition switch ON (TM 9-2355-106-10).
41. Measure DC voltage between connector 4954 terminal 9 and ground with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read 0 volts?

DECISION

- NO Go to Step 156.
YES Go to Step 183.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

42. Disconnect connector 1701. Refer to Figure 11.

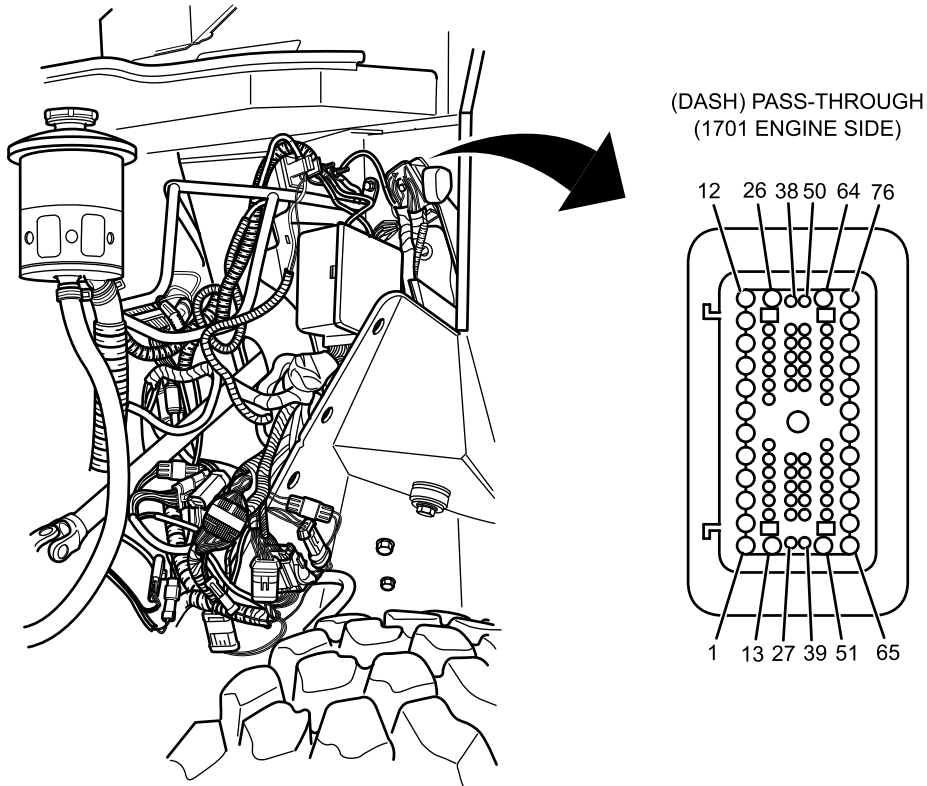


Figure 11. Left Side Firewall.

43. Measure resistance between connector 1701 (engine side) terminal 54 and connector 1701 (engine side) terminals 52 and 53 with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

YES Go to Step 184.

NO Go to next step.

STEP

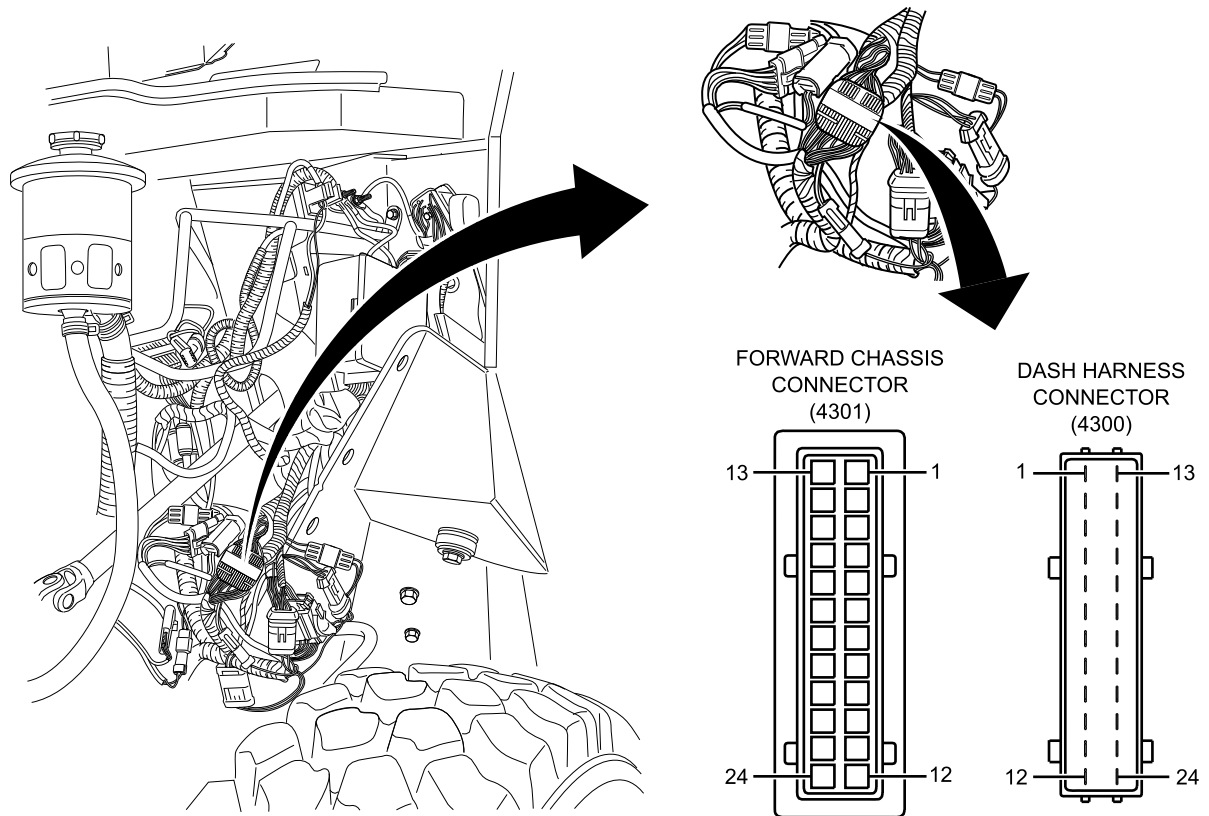
44. Remove engine air filter assembly (TM 9-2355-106-10).

45. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

46. Disconnect connector 4301/4300. Refer to Figure 12.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 12. Left Side Engine Compartment.

47. Measure resistance between connector 4301 terminal 2 and connector 4301 terminals 1 and 3 with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

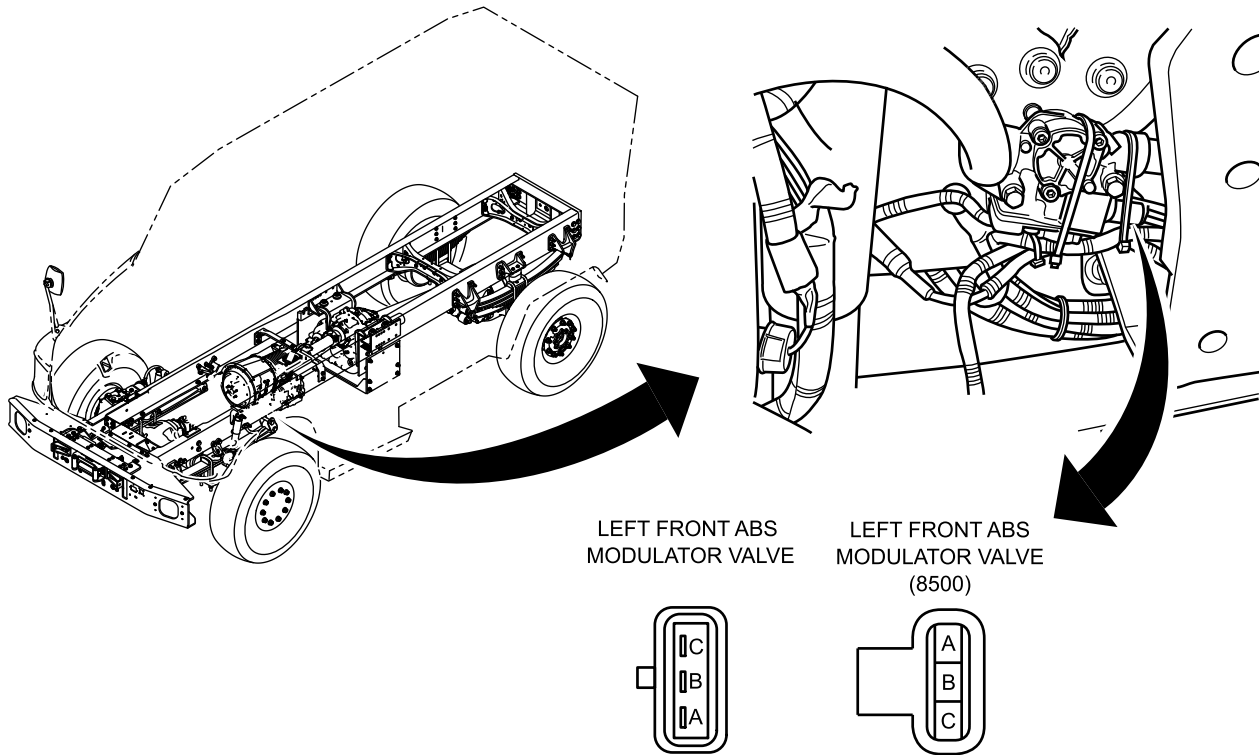
DECISION

YES Go to Step 179.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

48. Disconnect connector 8500 left front ABS modulator valve. Refer to Figure 13.



B230605081

Figure 13. Outboard Frame Inboard Left Front Wheel.

49. Measure resistance between left front ABS modulator valve, terminal B and terminals A, then C with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

YES Go to Step 174.

NO Go to Step 175.

STEP

50. Disconnect connector 1701. Refer to Figure 14.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

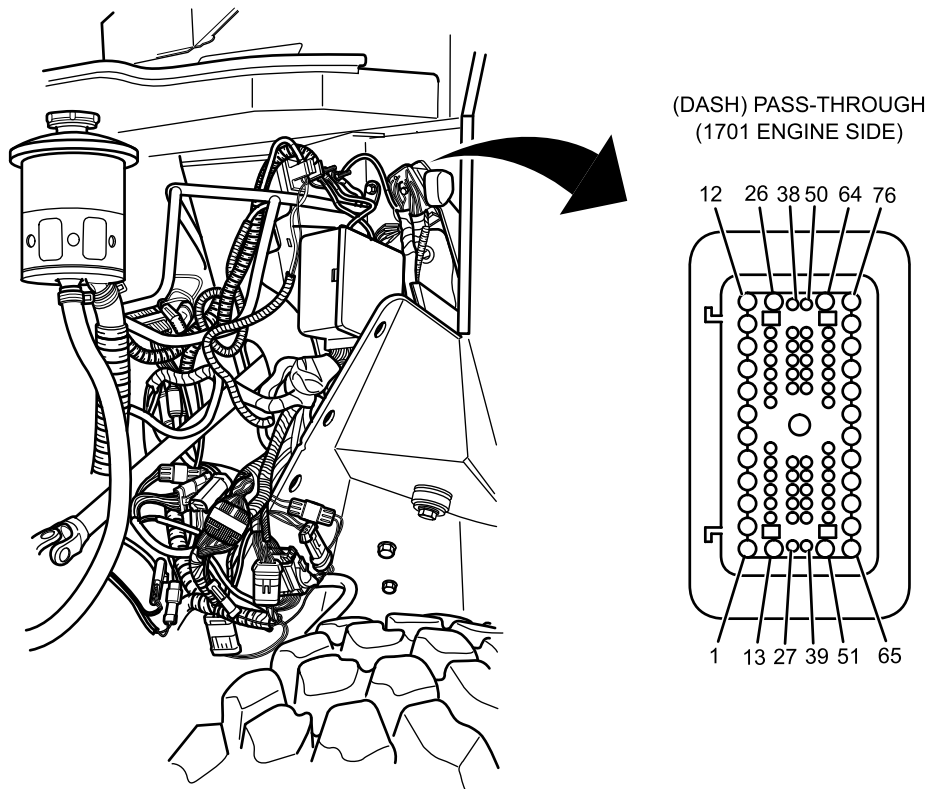


Figure 14. Left Side Firewall.

51. Measure resistance between connector 1701 (engine side) terminal 54 and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

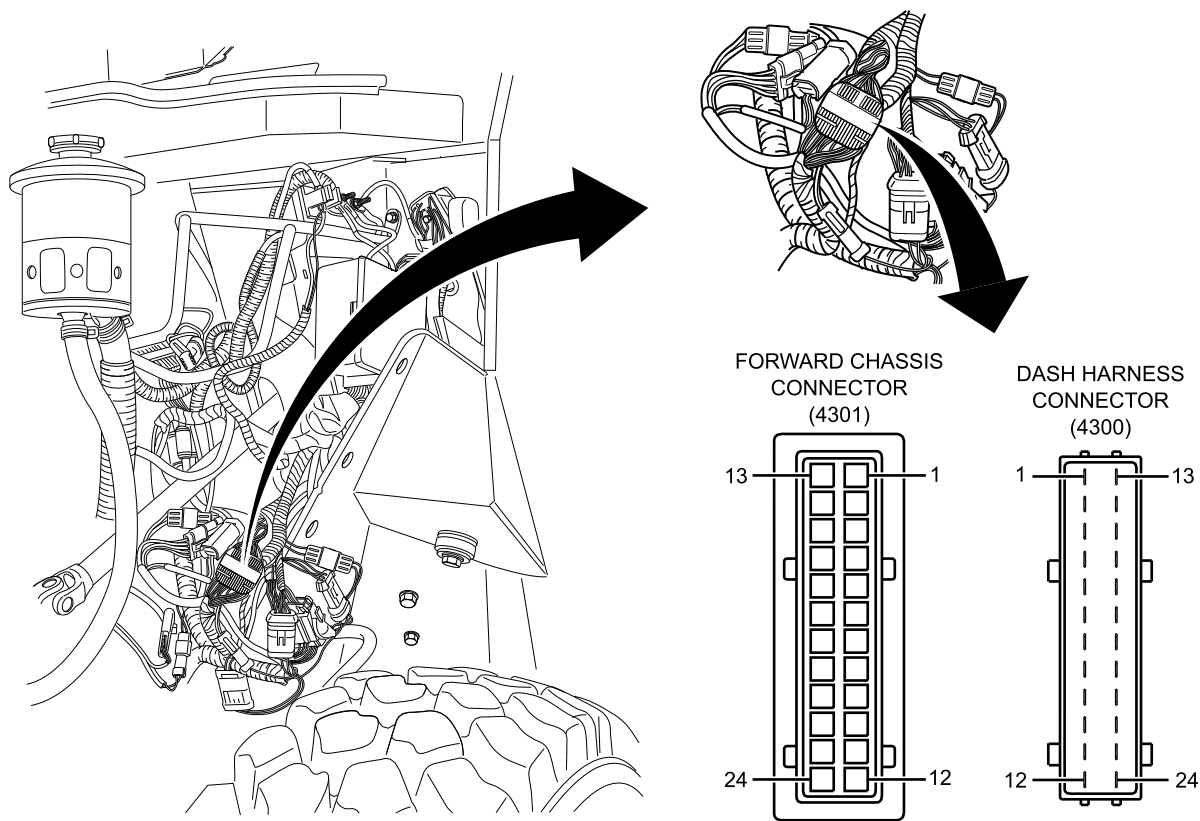
YES Go to Step 184.
NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

52. Remove engine air filter assembly (TM 9-2355-106-10).
53. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
54. Disconnect connector 4301/4300. Refer to Figure 15.



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Figure 15. Left Side Engine Compartment.

55. Measure resistance between connector 4301 terminal 2 and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

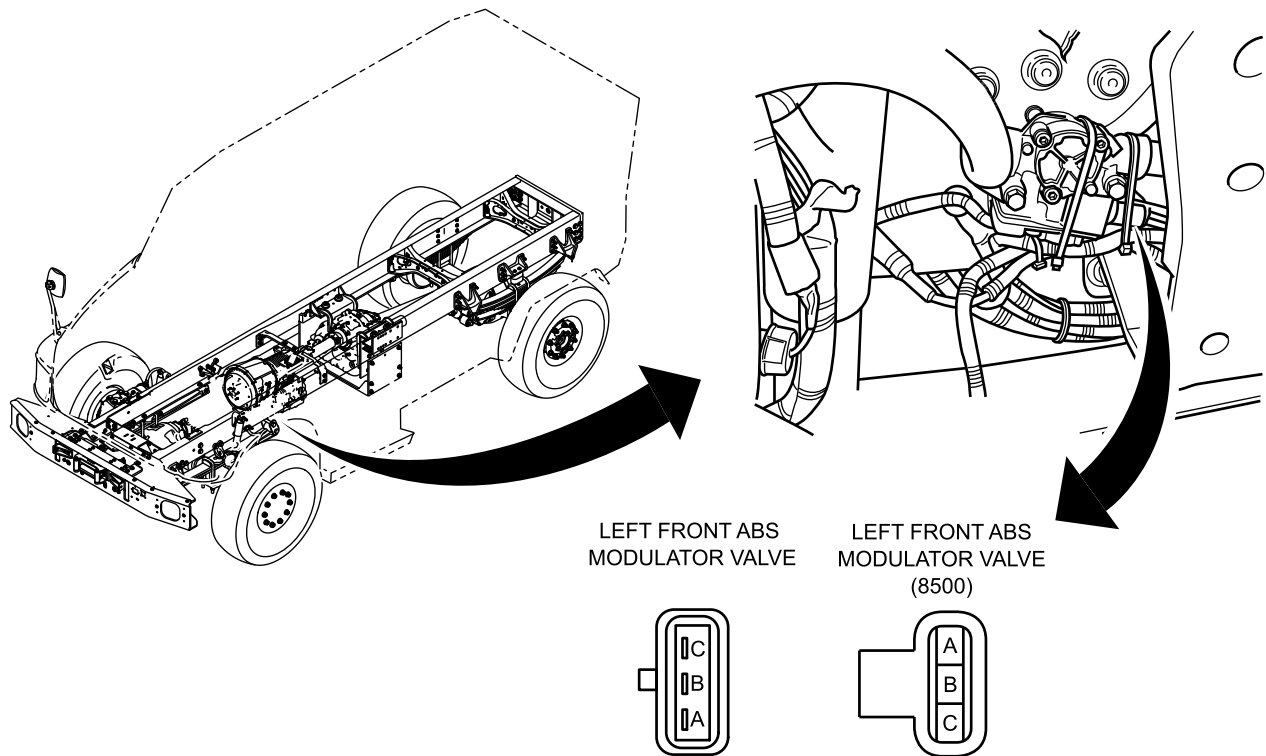
DECISION

YES Go to Step 179.
NO Go to next step.

STEP

56. Disconnect connector 8500 from left front ABS modulator valve. Refer to Figure 16.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 16. Outboard Frame Inboard Left Front Wheel.

57. Measure resistance between left front ABS modulator valve terminal B and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read OL?

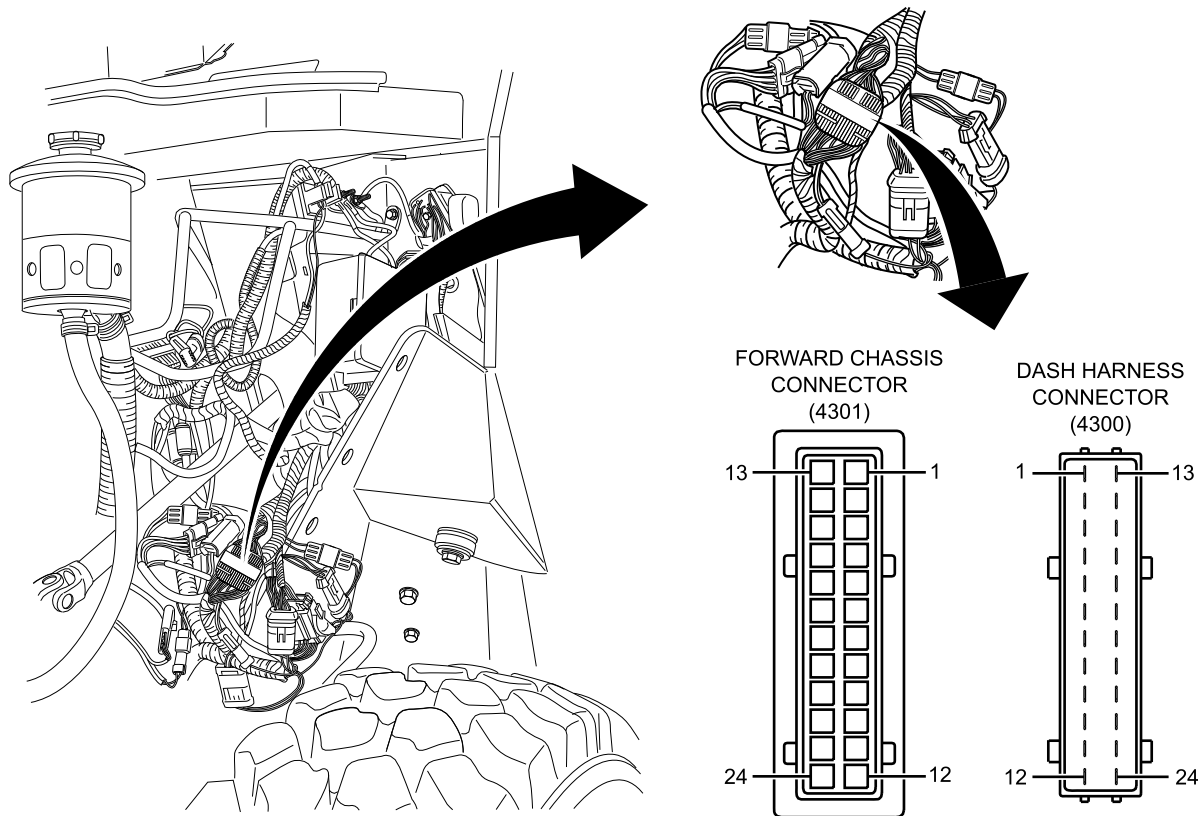
DECISION

YES Go to Step 174.
NO Go to Step 175.

STEP

58. Turn ignition switch OFF (TM 9-2355-106-10).
59. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
60. Remove engine air filter assembly (TM 9-2355-106-10).
61. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
62. Turn ignition switch OFF (TM 9-2355-106-10).

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 17. Left Side Engine Compartment.

63. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
64. Disconnect connector 4301/4300. Refer to Figure 17.
65. Turn MAIN POWER switch ON (TM 9-2355-106-10).
66. Turn ignition switch ON (TM 9-2355-106-10).
67. Measure DC voltage between ground and connector 4300 terminals 1, then 2, and then 3 with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 174.
NO Go to next step.

STEP

68. Turn ignition switch OFF (TM 9-2355-106-10).
69. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
70. Disconnect connector 1701. Refer to Figure 18.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

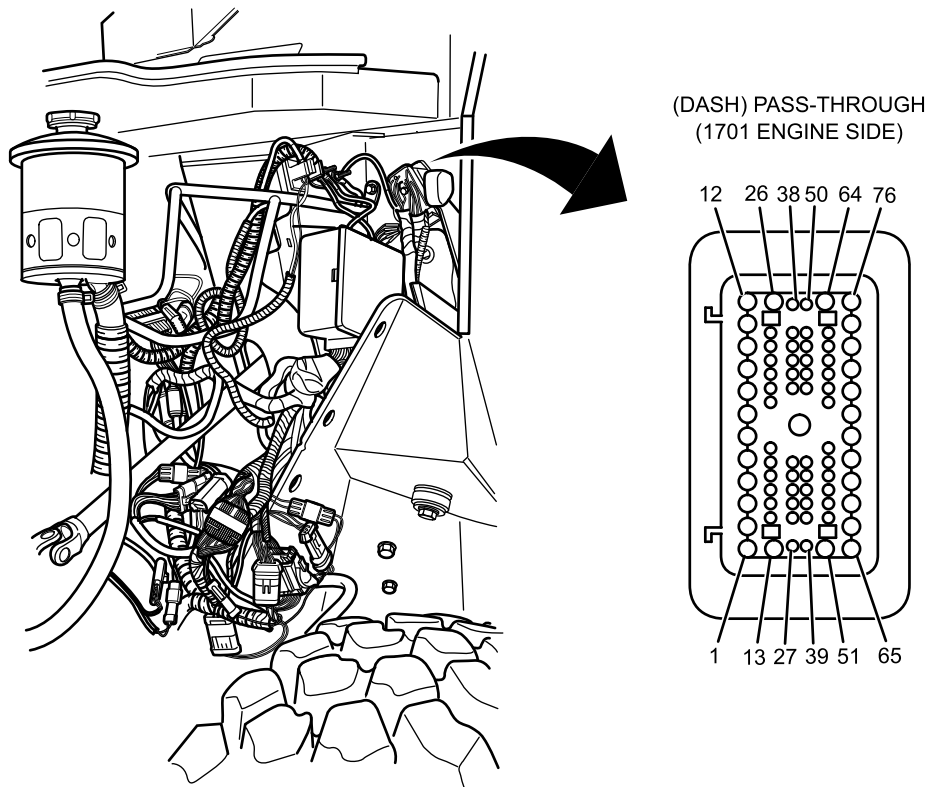


Figure 18. Left Side Firewall.

71. Measure resistance between connector 1701 (engine side) terminals 52, then 53, and then 54 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 184.
NO Go to Step 179.

STEP

72. Disconnect connector 1701. Refer to Figure 18.
73. Measure resistance between connector 1701 (engine side) terminal 56 and connector 1701 (engine side) terminals 55 and 57 with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

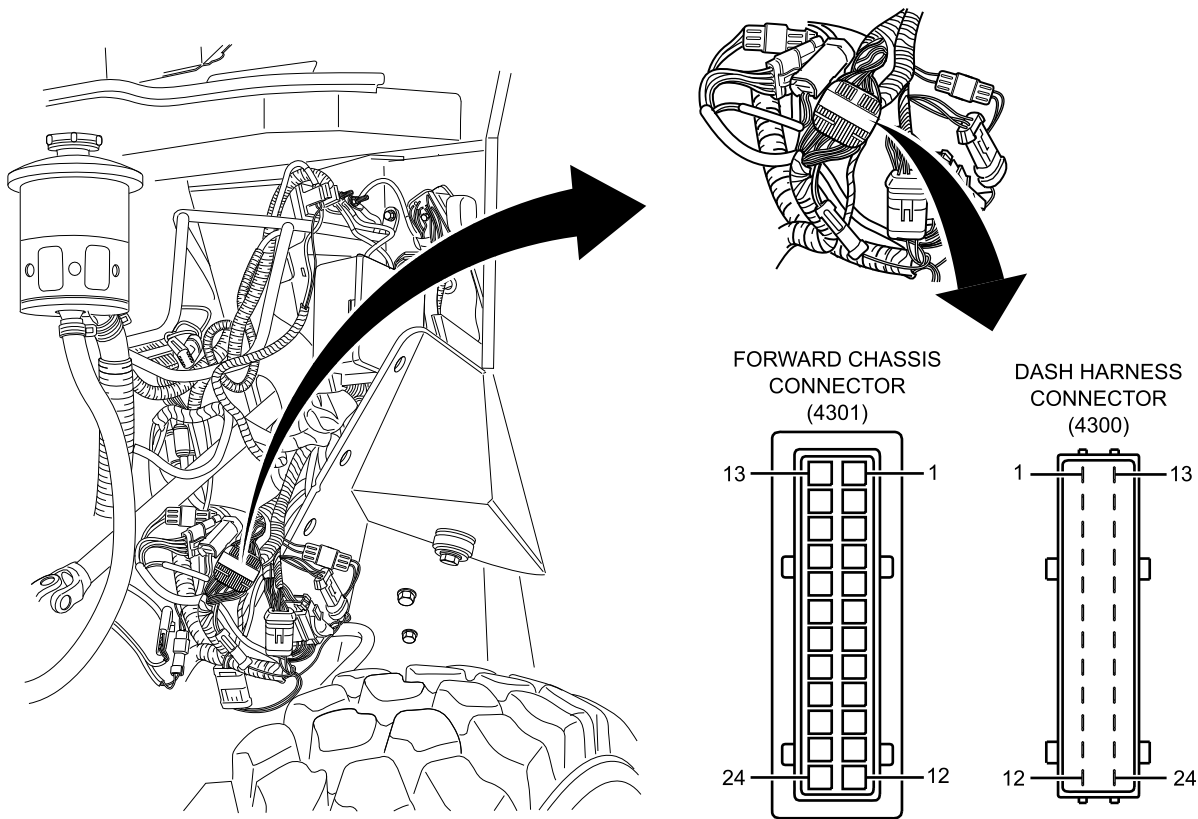
YES Go to Step 184.
NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

74. Remove engine air filter assembly (TM 9-2355-106-10).
75. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
76. Disconnect connector 4301/4300. Refer to Figure 19.



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Figure 19. Left Side Engine Compartment.

77. Measure resistance between connector 4301 terminal 17 and connector 4301 terminals 16 and 18 with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

YES Go to Step 179.
NO Go to next step.

STEP

78. Disconnect connector 8501 from right front ABS modulator valve. Refer to Figure 20.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

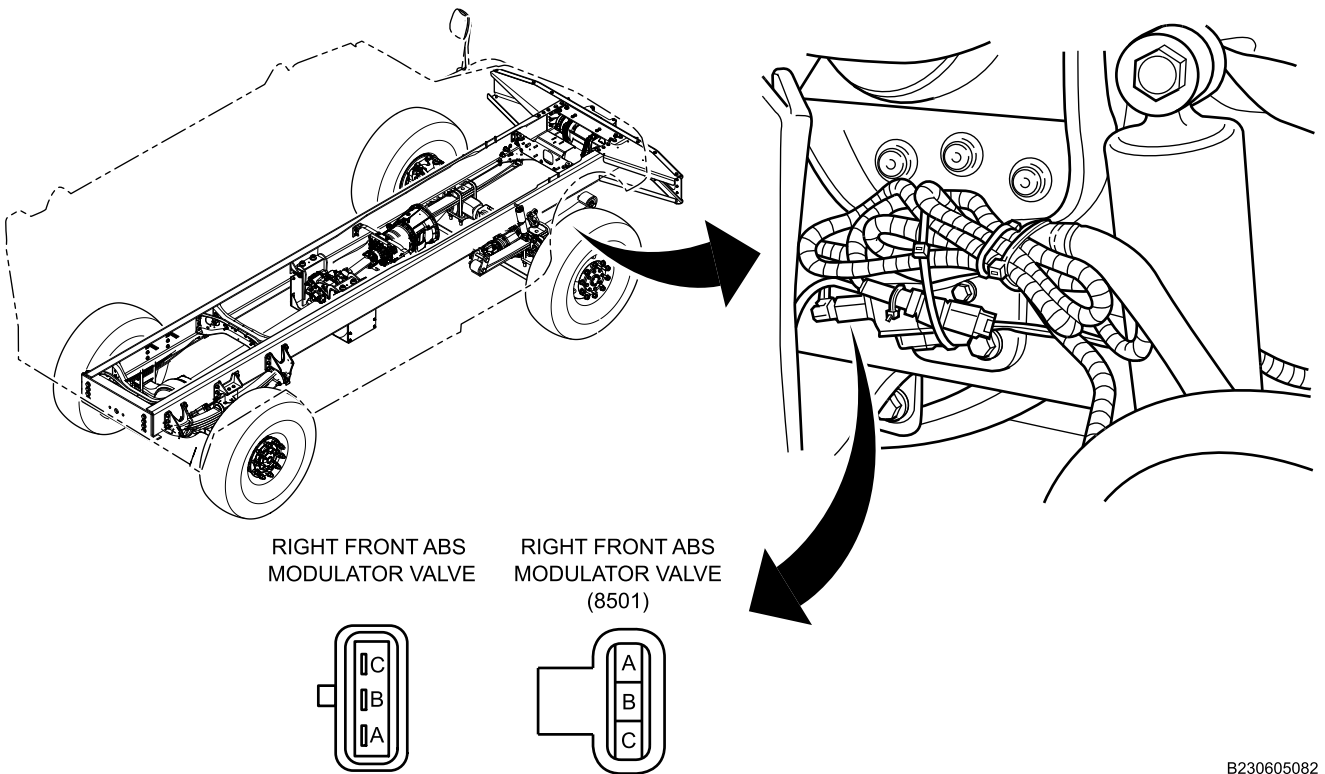


Figure 20. Outboard Frame Inboard Right Front Wheel.

79. Measure resistance between right front ABS modulator valve terminal B and terminals A, then C with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

YES Go to Step 174.

NO Go to Step 176.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

80. Disconnect connector 1701. Refer to Figure 21.

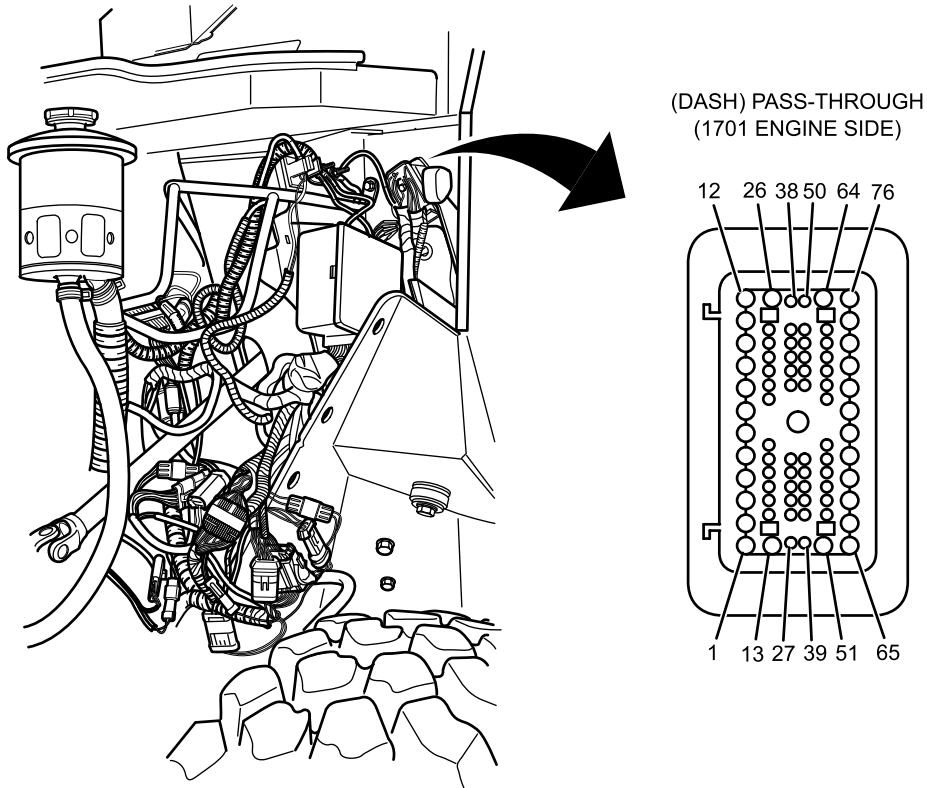


Figure 21. Left Side Firewall.

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81. Measure resistance between connector 1701 (engine side) terminal 56 and ground with multimeter. Refer to Figure 21.

CONDITION/INDICATION

Does multimeter read OL?

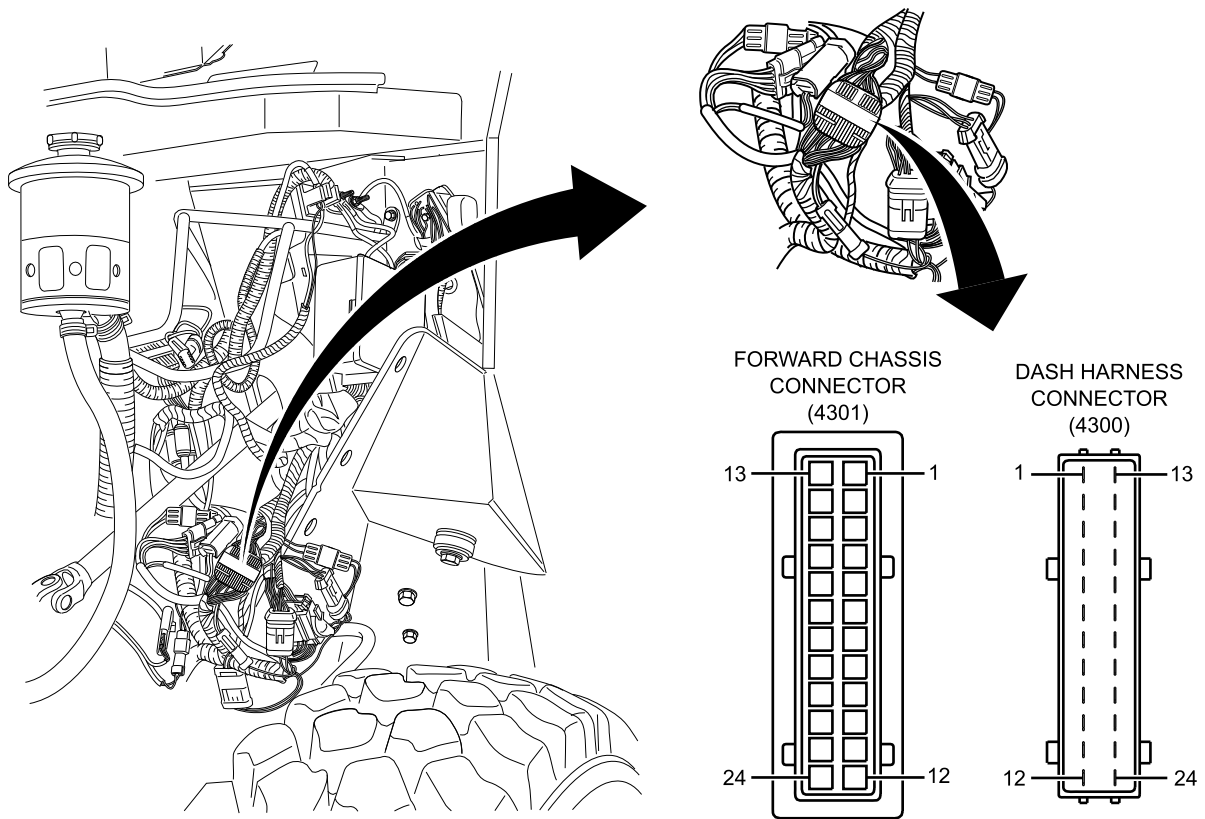
DECISION

YES Go to Step 184.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

- 82. Remove engine air filter assembly (TM 9-2355-106-10).
- 83. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
- 84. Disconnect connector 4301/4300. Refer to Figure 22.



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Figure 22. Left Side Engine Compartment.

- 85. Measure resistance between connector 4301 terminal 17 and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read OL?

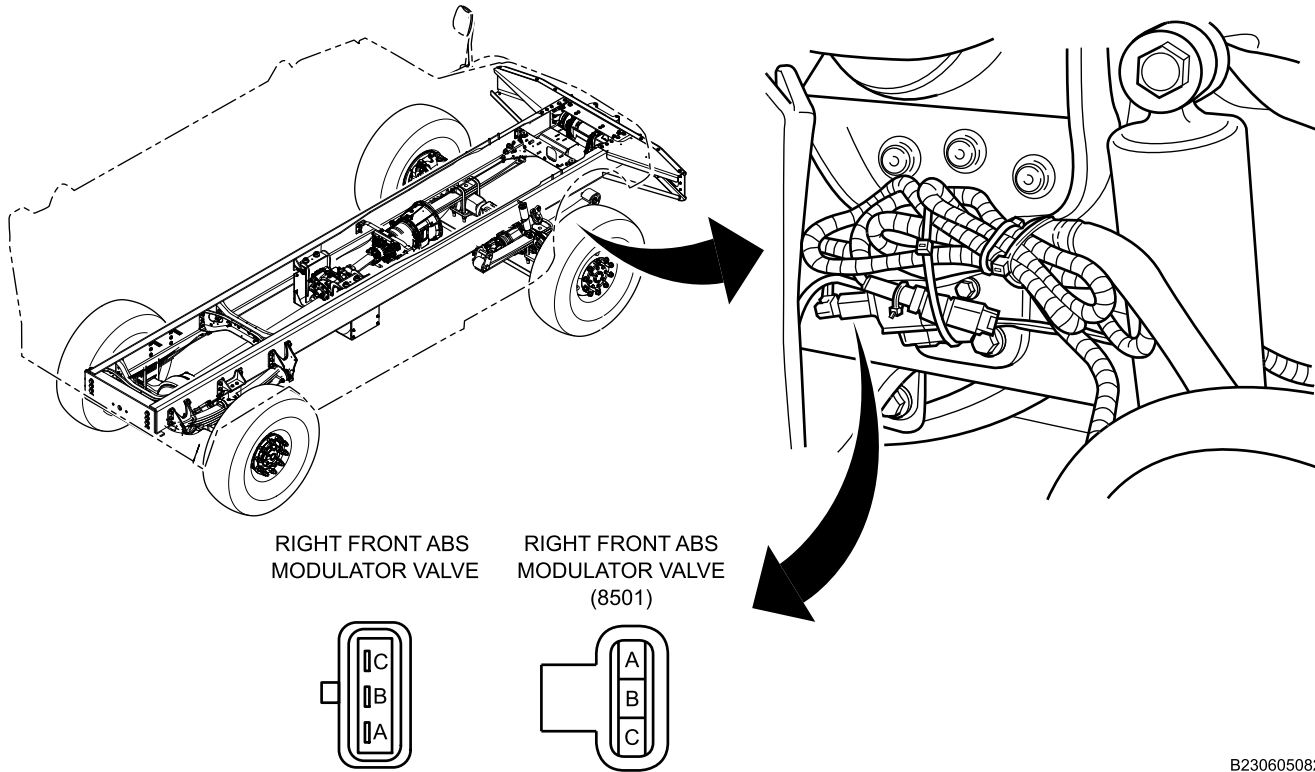
DECISION

- YES Go to Step 179.
- NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

86. Disconnect connector 8501 from right front ABS modulator valve. Refer to Figure 23.



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Figure 23. Outboard Frame Inboard Right Front Wheel.

87. Measure resistance between right front ABS modulator valve terminal B and ground with multimeter. Refer to Figure 23.

CONDITION/INDICATION

Does multimeter read OL?

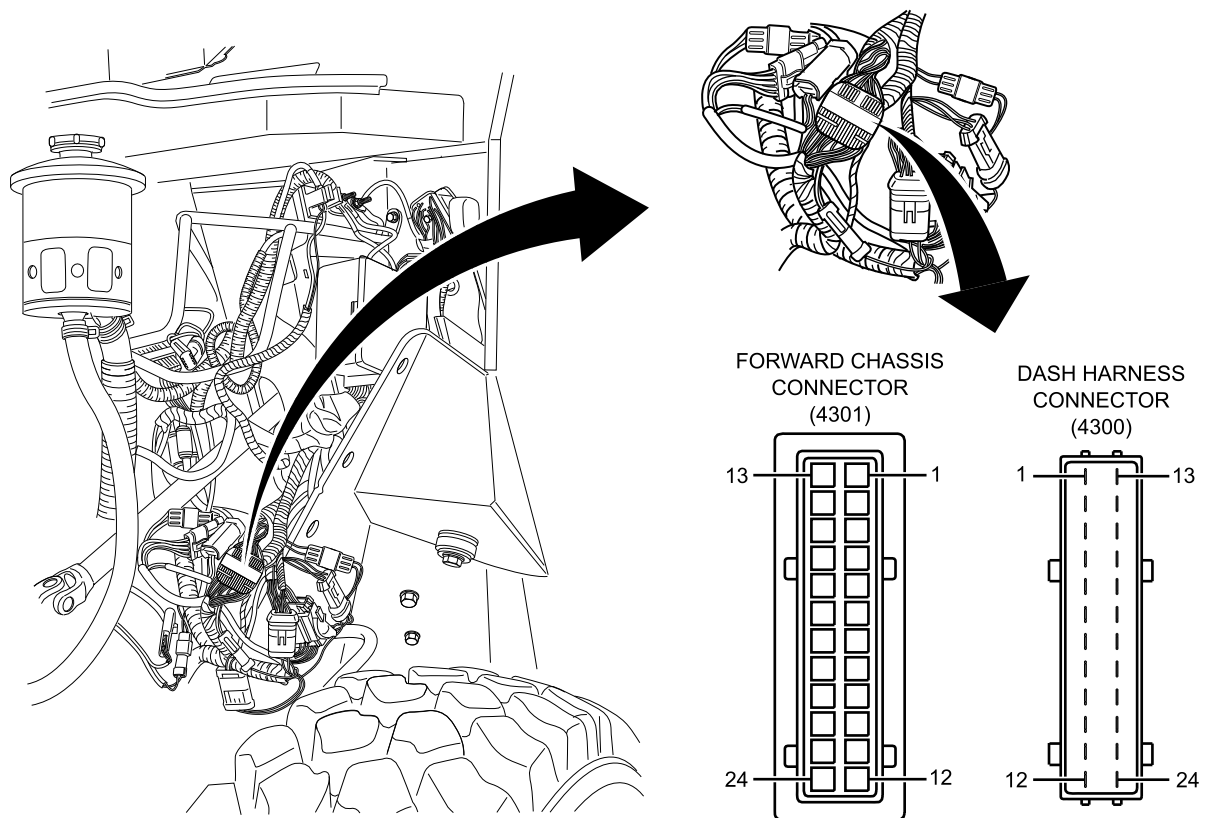
DECISION

- YES Go to Step 174.
- NO Go to Step 176.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

88. Turn ignition switch OFF (TM 9-2355-106-10).
89. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
90. Remove engine air filter assembly (TM 9-2355-106-10).
91. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
92. Disconnect connector 4301/4300. Refer to Figure 24.



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Figure 24. Left Side Engine Compartment.

93. Turn MAIN POWER switch ON (TM 9-2355-106-10).
94. Turn ignition switch ON (TM 9-2355-106-10).
95. Measure DC voltage between ground and connector 4301 terminals 16, then 17, and then 18 with multimeter. Refer to Figure 24.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 174.

NO Go to next step.

STEP

96. Turn ignition switch OFF (TM 9-2355-106-10).
97. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
98. Disconnect connector 1701. Refer to Figure 25.

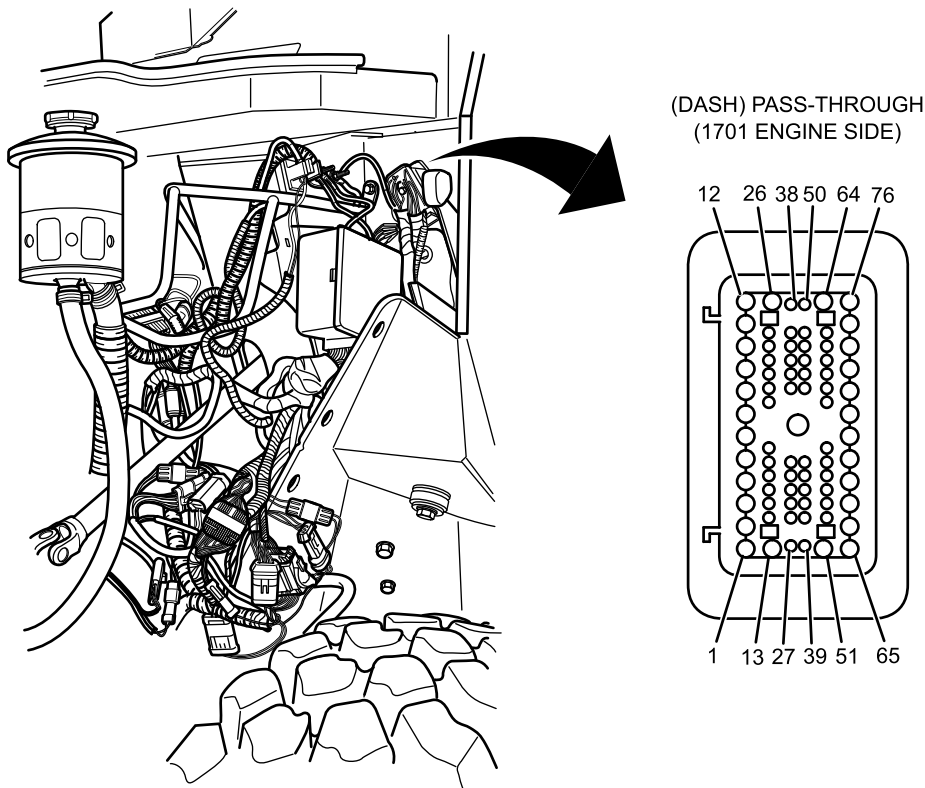


Figure 25. Left Side Firewall.

99. Measure resistance between connector 1701 (engine side) terminals 55, then 56, and then 57 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 25.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 184.

NO Go to Step 179.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

100. Disconnect connector 1701. Refer to Figure 26.

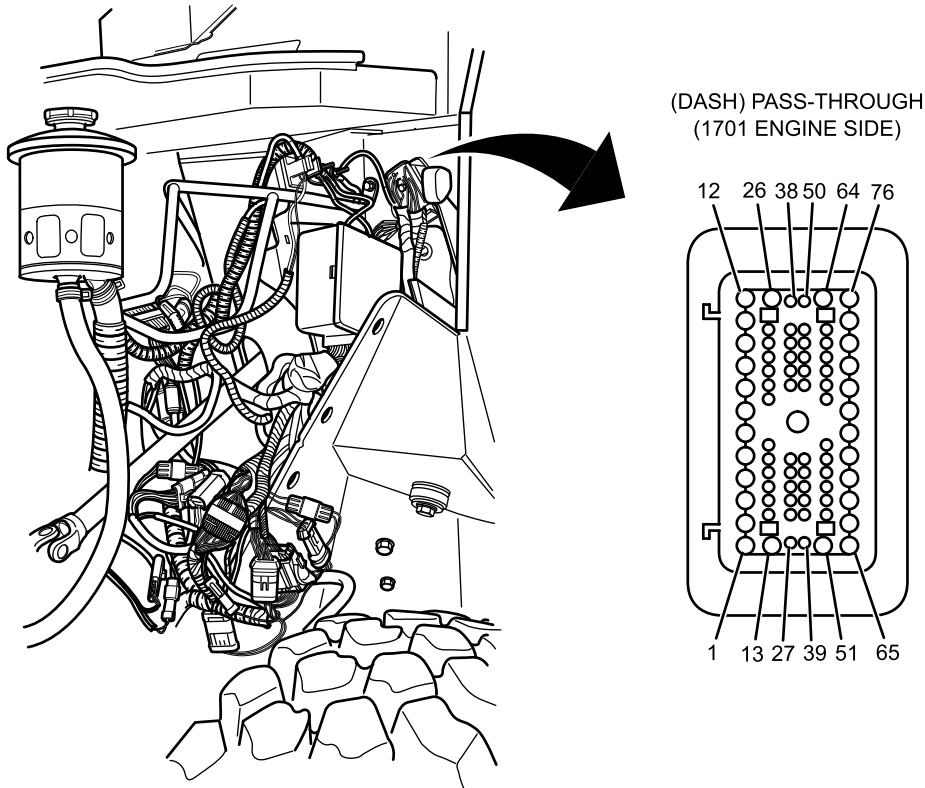


Figure 26. Left Side Firewall.

101. Measure resistance between connector 1701 (engine side) terminal 62 and connector 1701 (engine side) terminals 61 and then 63 with multimeter. Refer to Figure 26.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

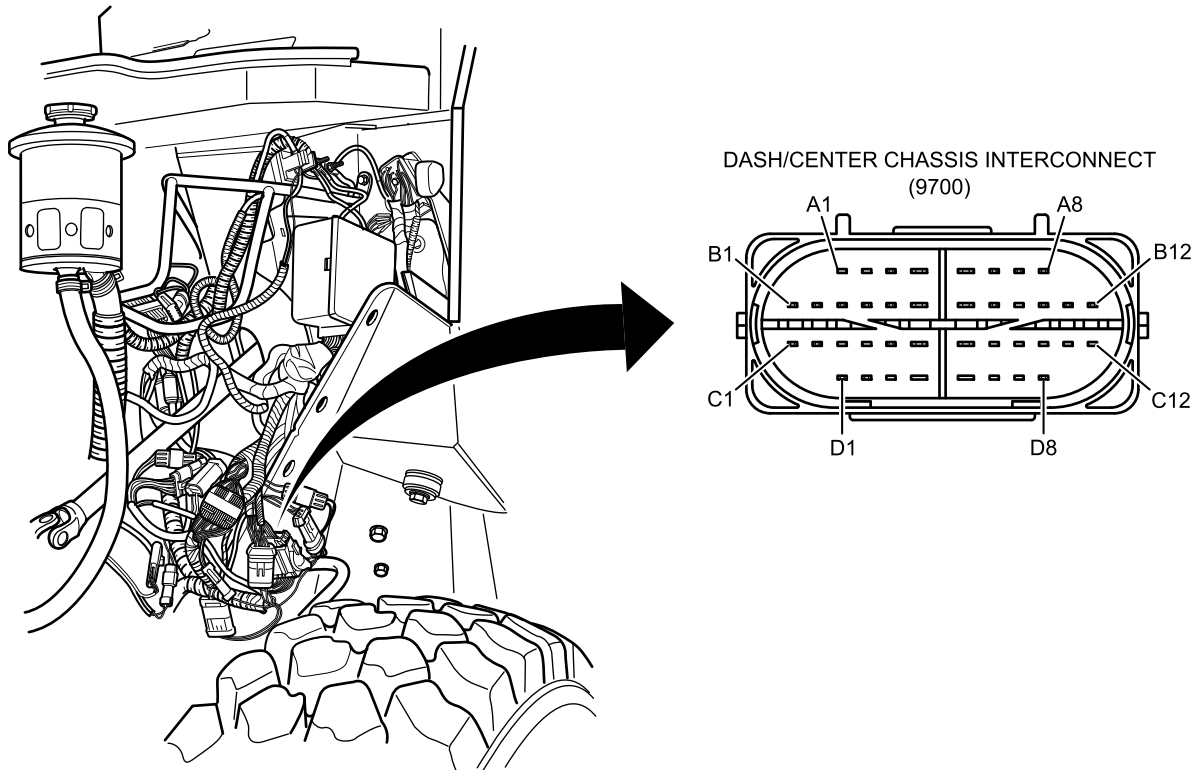
- YES Go to Step 184.
- NO Go to next step.

B230604025

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

102. Remove engine air filter assembly (TM 9-2355-106-10).
 103. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
 104. Disconnect connector 9700 from connector 9714. Refer to Figure 27.



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Figure 27. Above Frame Inboard of Left Front Wheel.

105. Measure resistance between connector 9700 terminal B2 and connector 9700 terminals B1 and then B3 with multimeter. Refer to Figure 27.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

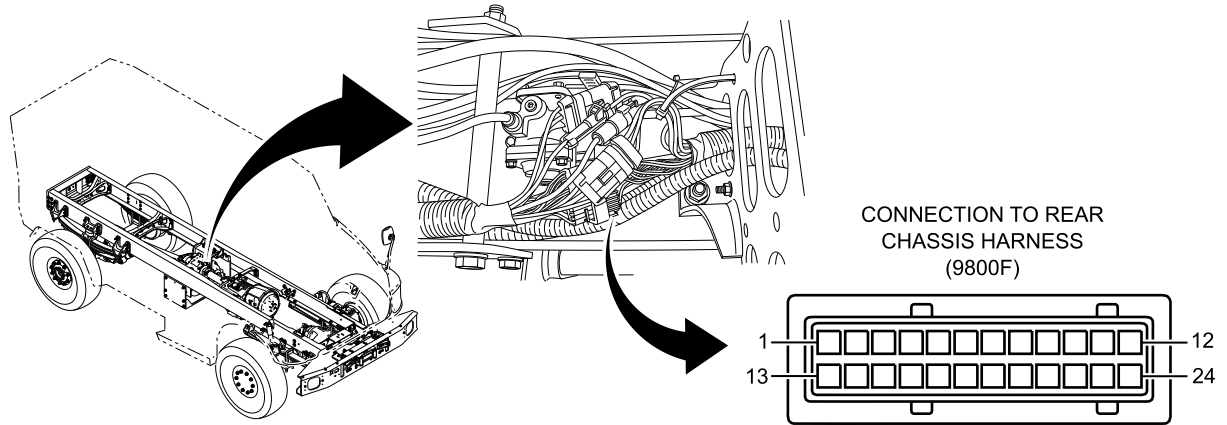
DECISION

YES Go to Step 179.
 NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

106. Disconnect connector 9800F from connector 9800M. Refer to Figure 28.



B230605036

Figure 28. Inboard Left Frame Rail.

107. Measure resistance between connector 9800F terminal 18 and connector 9800F terminals 17 and then 19 with multimeter. Refer to Figure 28.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

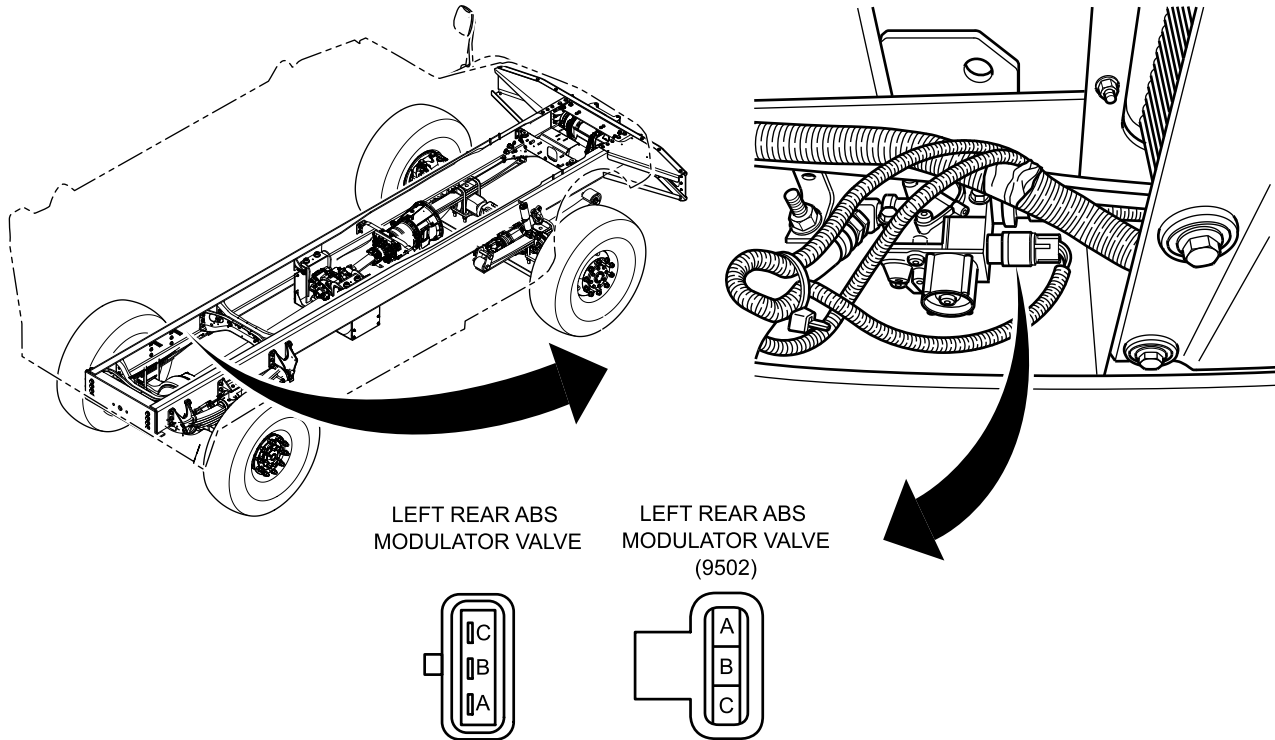
YES Go to Step 180.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

108. Disconnect connector 9502 from left rear ABS modulator valve. Refer to Figure 29.



B230605077

Figure 29. Inboard Left Frame Rail Near Left Rear Wheel.

109. Measure resistance between left rear ABS modulator valve terminal B and terminals A, then C with multimeter. Refer to Figure 29.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

NO Go to Step 177.
 YES Go to Step 181.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

110. Disconnect connector 1701. Refer to Figure 30.

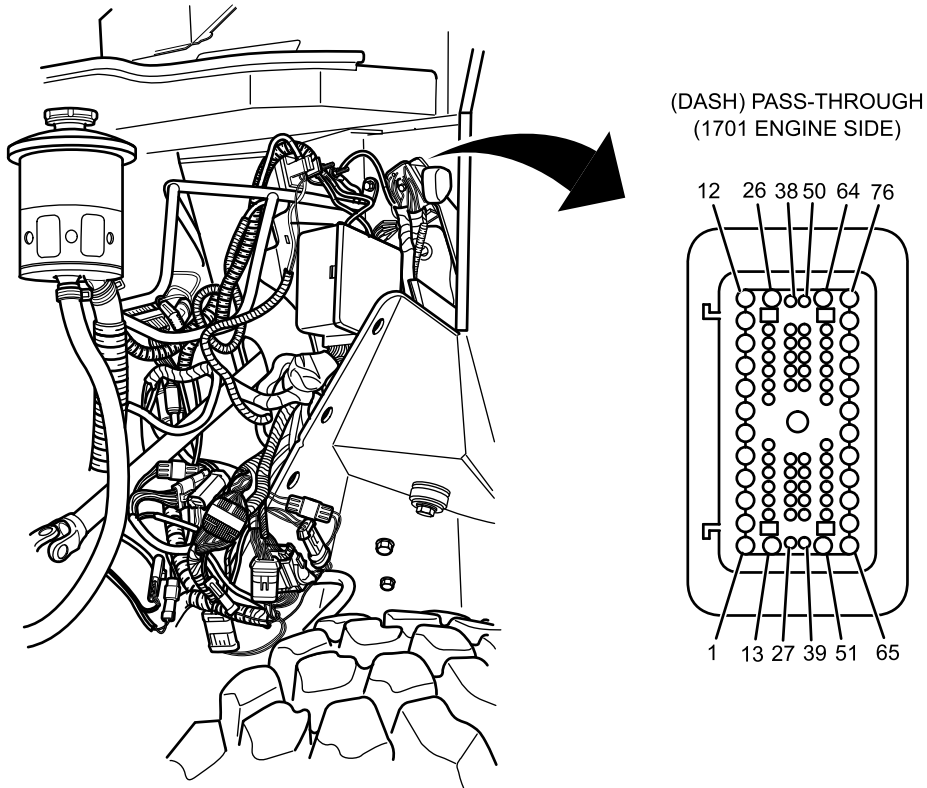


Figure 30. Left Side Firewall.

111. Measure resistance between connector 1701 (engine side) terminal 62 and ground with multimeter. Refer to Figure 30.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

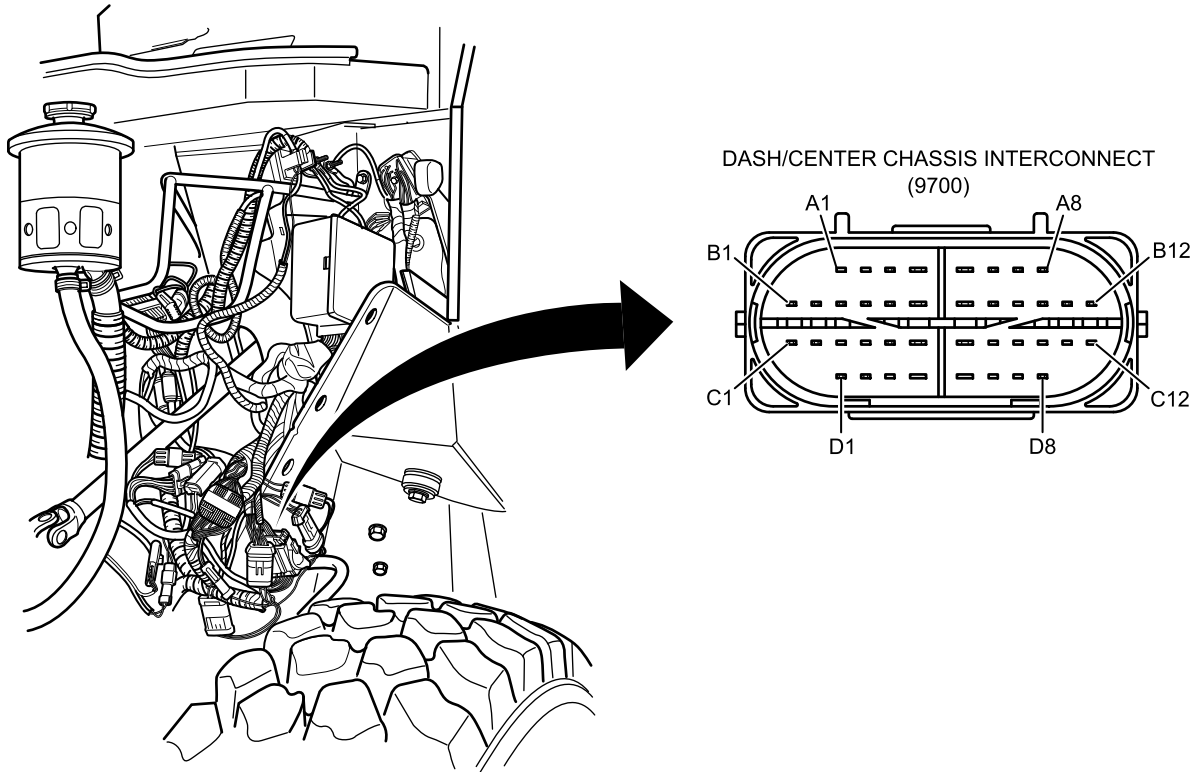
YES Go to Step 184.
 NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

112. Disconnect connector 9700 from connector 9714. Refer to Figure 31.



B230604051

Figure 31. Above Frame Inboard of Left Front Wheel.

113. Measure resistance between connector 9700 terminal B2 and ground with multimeter. Refer to Figure 31.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

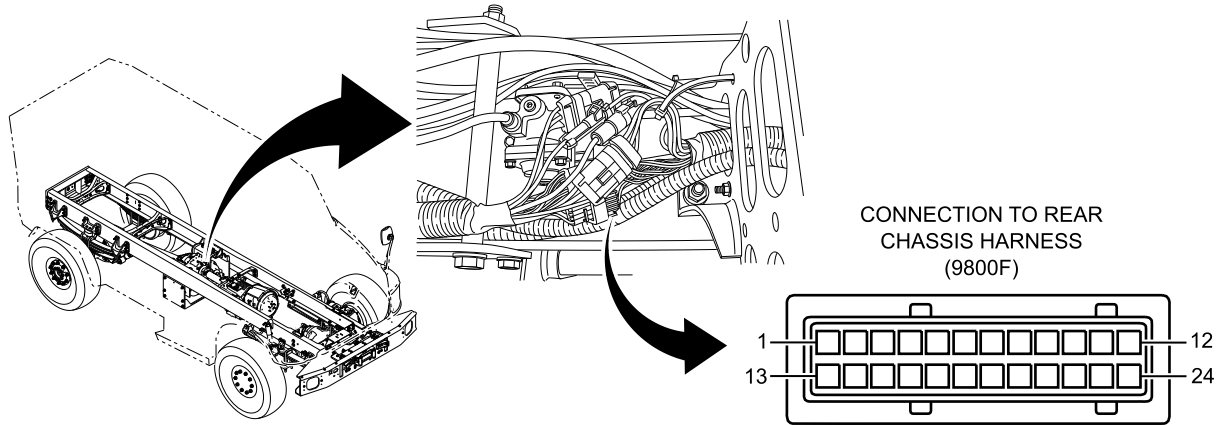
YES Go to Step 179.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

114. Disconnect connector 9800F from connector 9800M. Refer to Figure 32.



B230605036

Figure 32. Inboard Left Frame Rail.

115. Measure resistance between connector 9800F terminal 18 and ground with multimeter. Refer to Figure 32.

CONDITION/INDICATION

Does multimeter read OL?

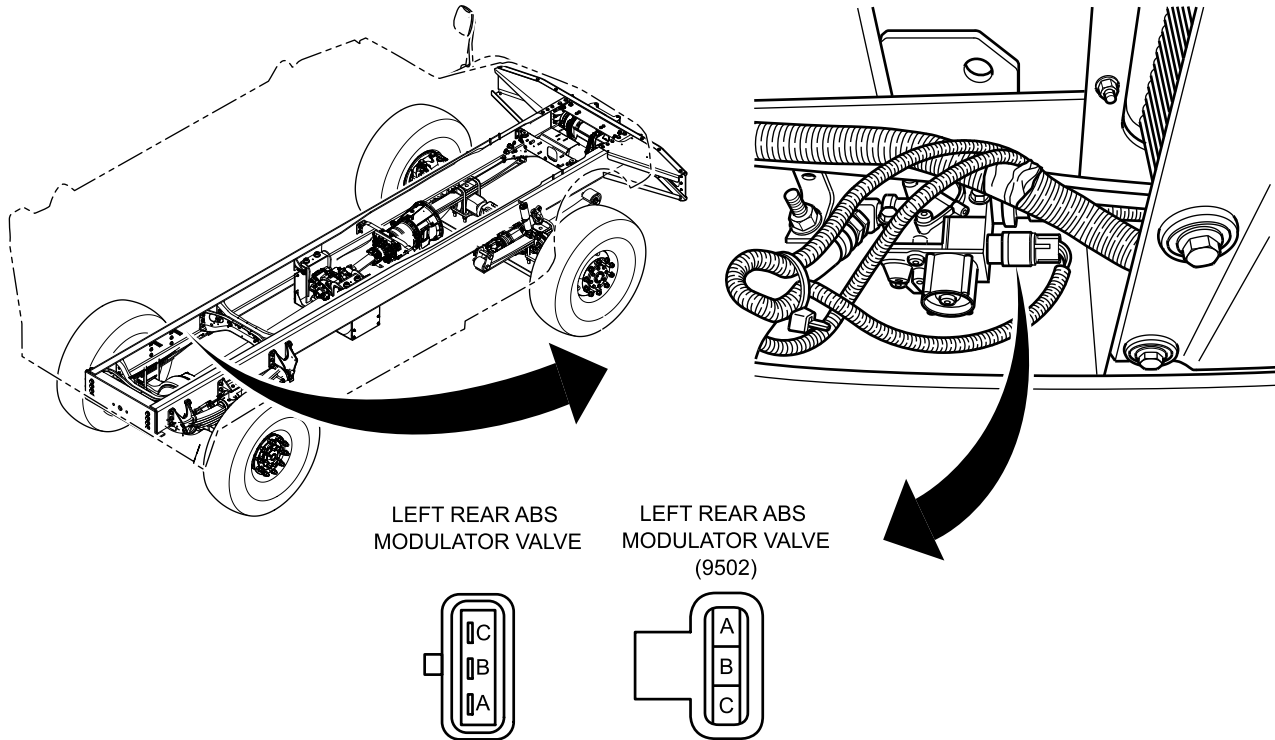
DECISION

YES Go to Step 180.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

116. Disconnect connector 9502 from left rear ABS modulator valve. Refer to Figure 33.



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Figure 33. Inboard Left Frame Rail Near Left Rear Wheel.

117. Measure resistance between left rear ABS modulator valve terminal B and ground with multimeter. Refer to Figure 33.

CONDITION/INDICATION

Does multimeter read OL?

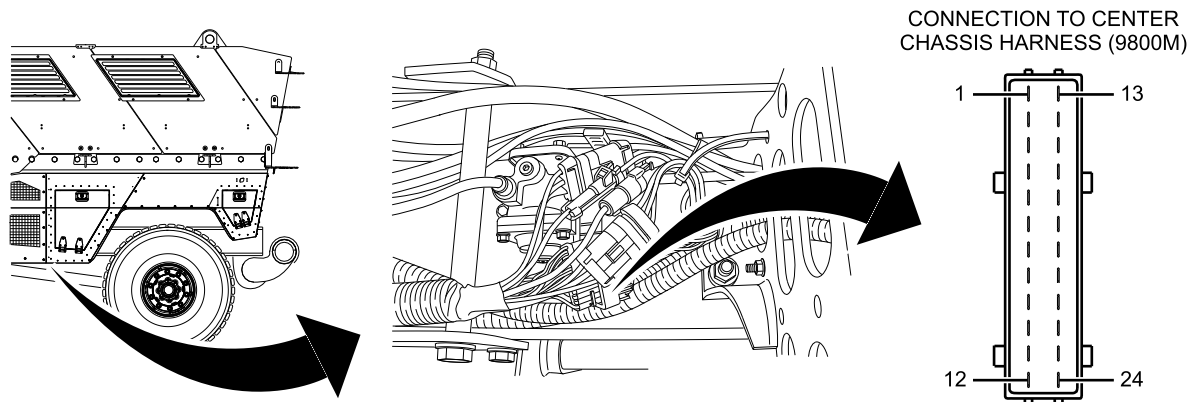
DECISION

NO Go to Step 175.
 YES Go to Step 181.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

118. Turn ignition switch OFF (TM 9-2355-106-10).
119. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
120. Disconnect connector 9800M from connector 9800F. Refer to Figure 34.



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Figure 34. Inboard Left Frame Rail Near Fuel Tank.

121. Turn MAIN POWER switch ON (TM 9-2355-106-10).
122. Turn ignition switch ON (TM 9-2355-106-10).
123. Measure DC voltage between ground and connector 9800M terminals 17, then 18, and then 19 with multimeter. Refer to Figure 34.

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 181.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

124. Turn ignition switch OFF (TM 9-2355-106-10).
125. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
126. Remove engine air filter assembly (TM 9-2355-106-10).
127. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
128. Turn MAIN POWER switch ON (TM 9-2355-106-10).

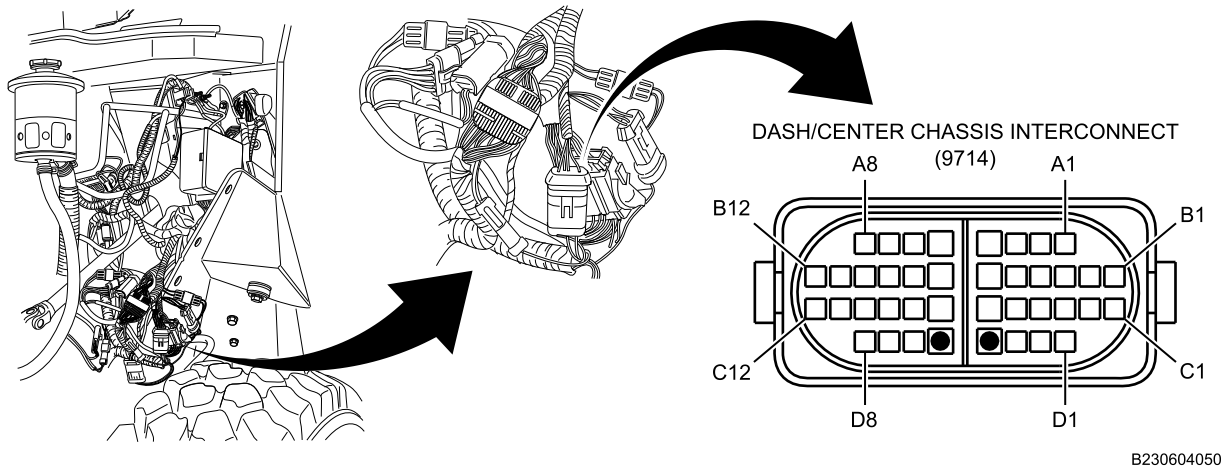


Figure 35. Above Frame Inboard of Left Front Wheel.

129. Turn ignition switch ON (TM 9-2355-106-10).
130. Disconnect connector 9714 from connector 9700. Refer to Figure 35.
131. Measure DC voltage between ground and connector 9714 terminals B1, then B2, and then B3 with multimeter. Refer to Figure 35.

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 180.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

132. Turn ignition switch OFF (TM 9-2355-106-10).
133. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
134. Disconnect connector 1701. Refer to Figure 36.

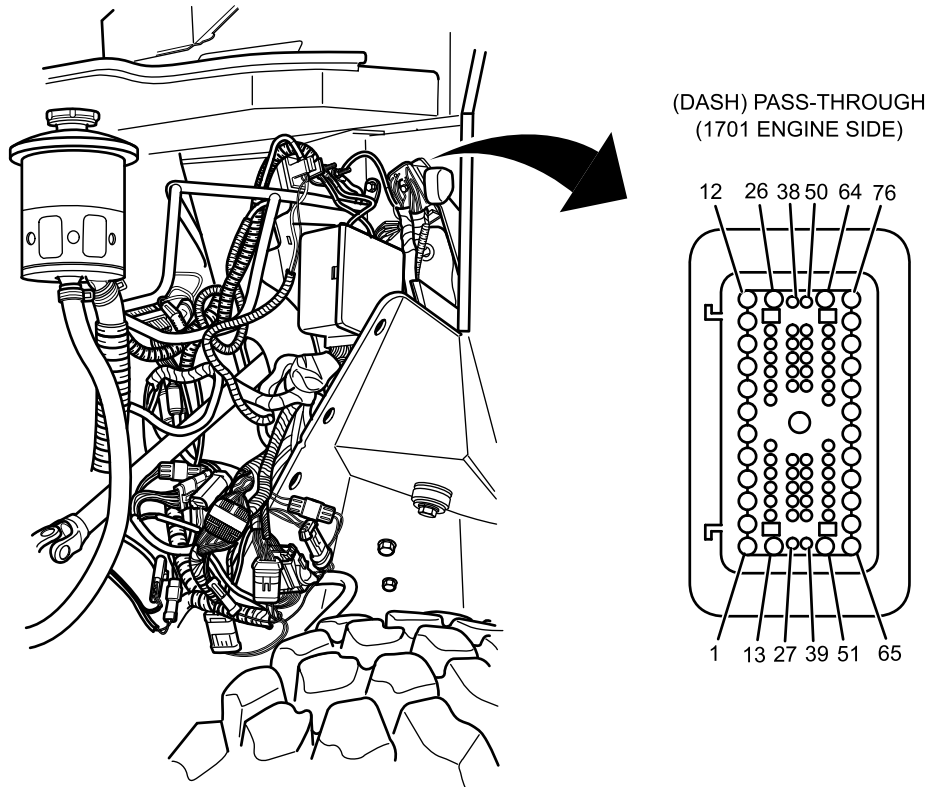


Figure 36. Left Side Firewall.

135. Measure resistance between connector 1701 (engine side) terminals 61 and 62, then 63 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 36.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 184.
 NO Go to Step 179.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

136. Disconnect connector 1701. Refer to Figure 36.

137. Measure resistance between connector 1701 (engine side) terminal 58 and connector 1701 (engine side) terminals 59 and then 60 with multimeter. Refer to Figure 36.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

YES Go to Step 184.

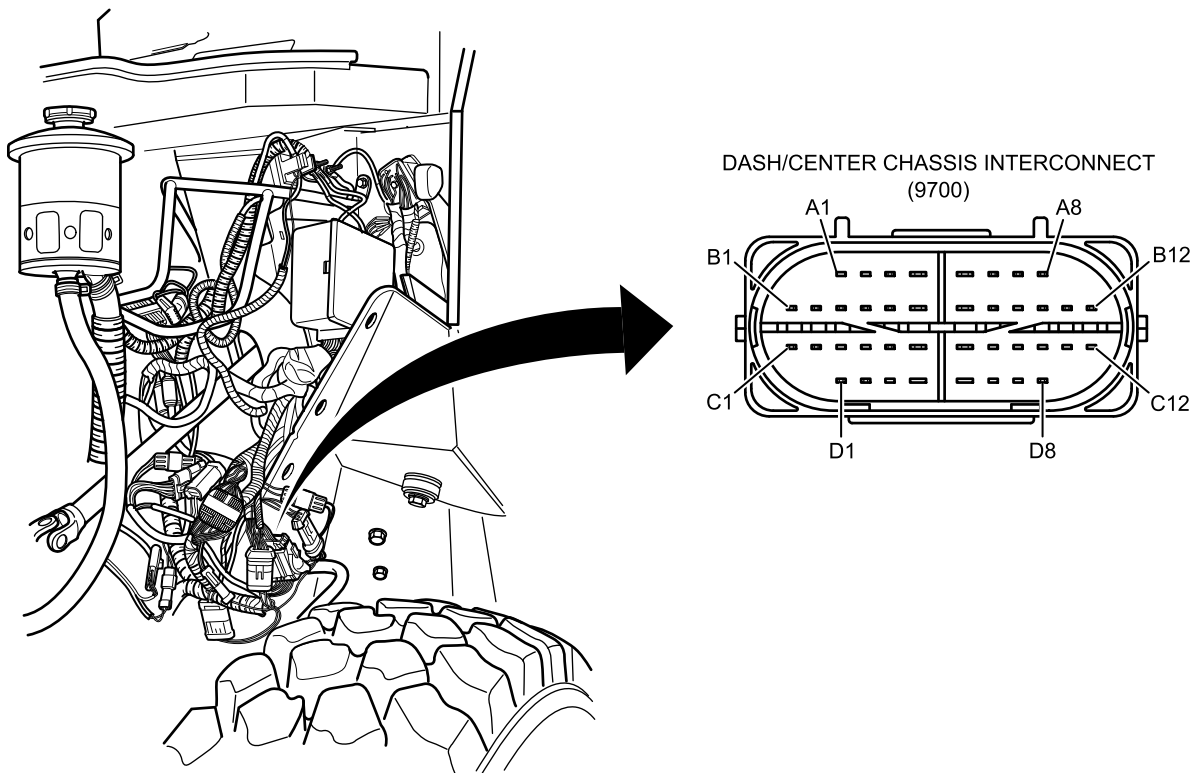
NO Go to next step.

STEP

138. Remove engine air filter assembly (TM 9-2355-106-10).

139. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).

140. Disconnect connector 9700 from connector 9714. Refer to Figure 37.



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Figure 37. Above Frame Inboard of Left Front Wheel.

141. Measure resistance between connector 9700 terminal B5 and connector 9700 terminals B4 and then B8 with multimeter. Refer to Figure 37.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

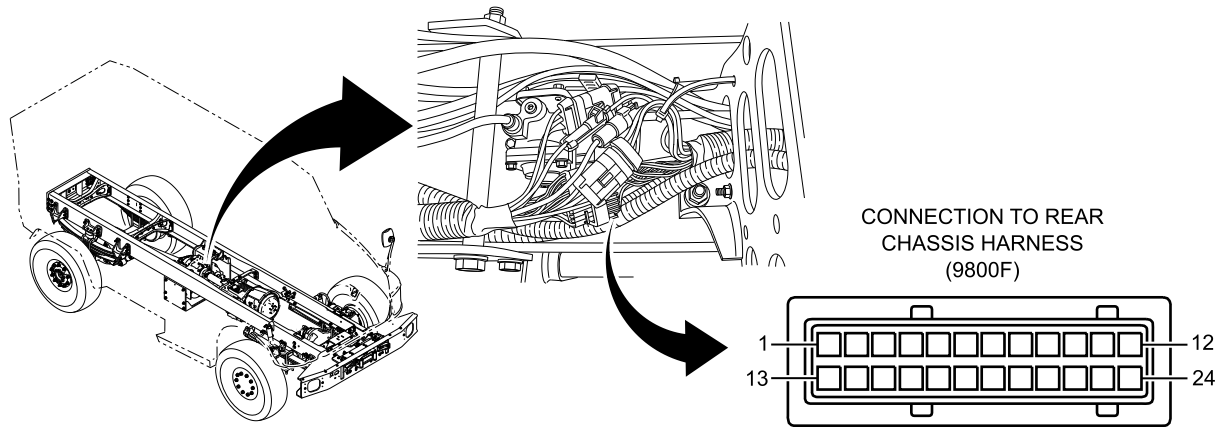
DECISION

YES Go to Step 179.

NO Go to next step.

STEP

142. Disconnect connector 9800F from connector 9800M. Refer to Figure 38.



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Figure 38. Inboard Left Frame Rail.

143. Measure resistance between connector 9800F terminal 21 and connector 9800F terminals 20 and then 22 with multimeter. Refer to Figure 38.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

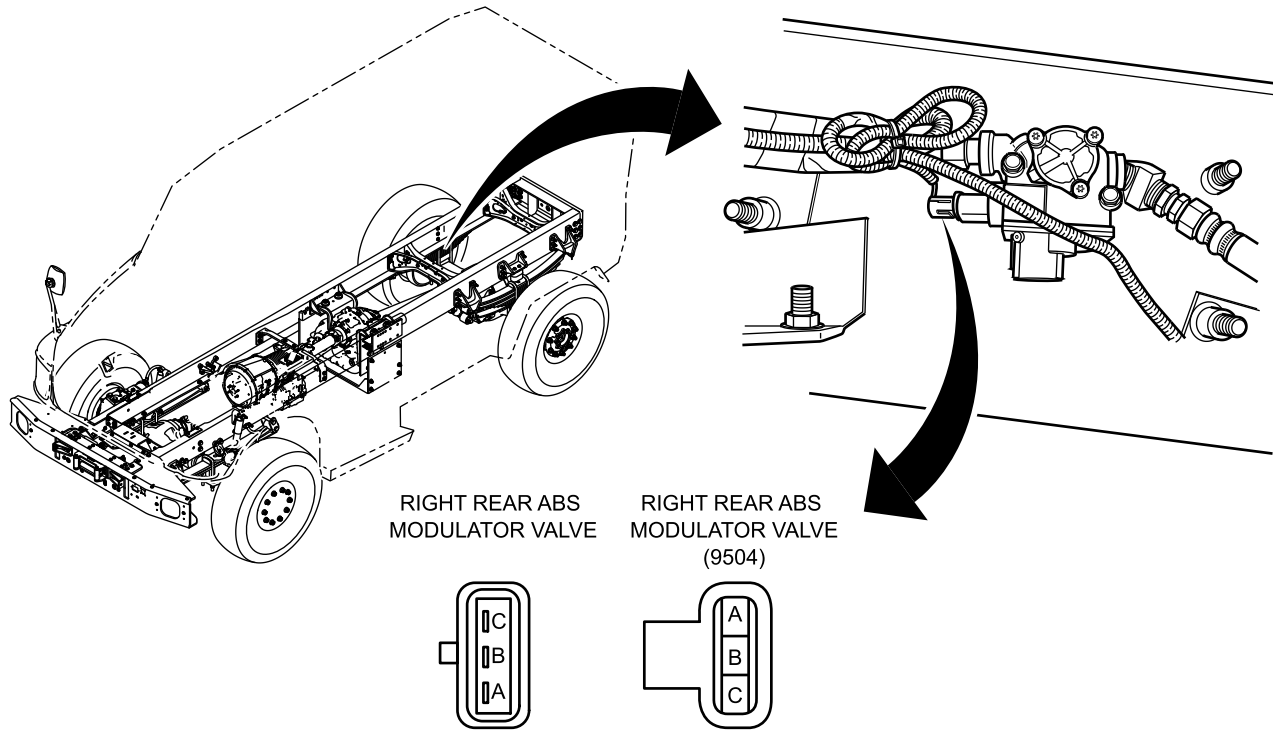
YES Go to Step 180.

NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

144. Disconnect connector 9504 from right rear ABS modulator valve. Refer to Figure 39.



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Figure 39. Inboard Right Frame Rail Near Right Rear Wheel.

145. Measure resistance between right rear ABS modulator valve terminal B and terminals A, then C with multimeter. Refer to Figure 39.

CONDITION/INDICATION

Does multimeter read between 5 ohms and 7 ohms for each test?

DECISION

NO Go to Step 178.
 YES Go to Step 181.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

146. Disconnect connector 1701. Refer to Figure 40.

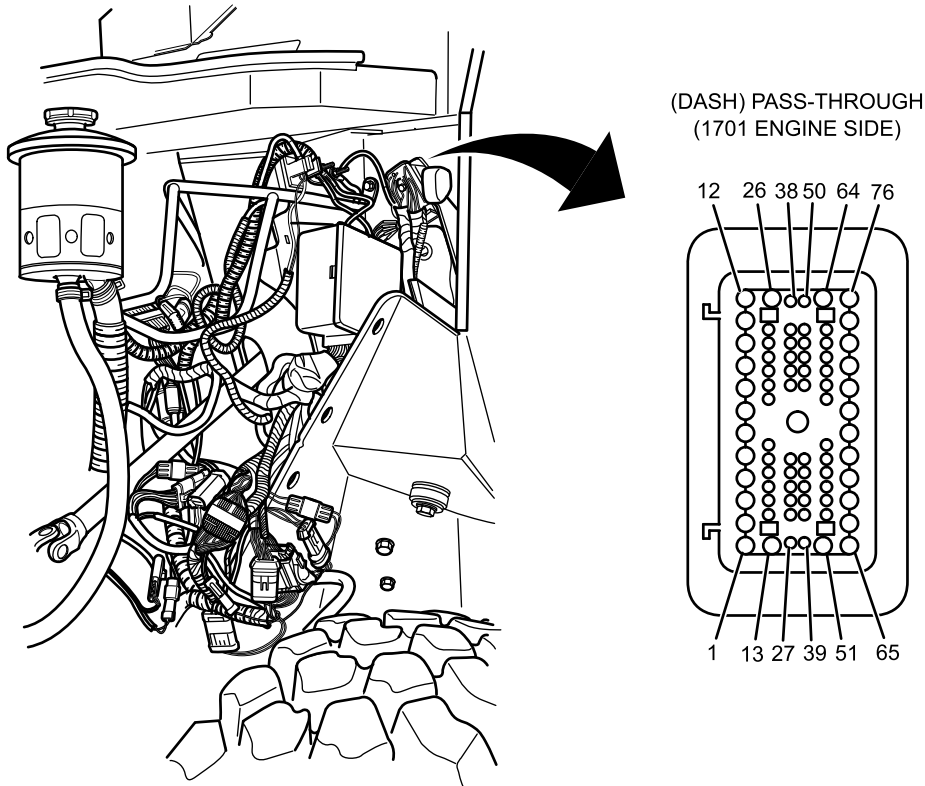


Figure 40. Left Side Firewall.

147. Measure resistance between connector 1701 (engine side) terminal 58 and ground with multimeter. Refer to Figure 40.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

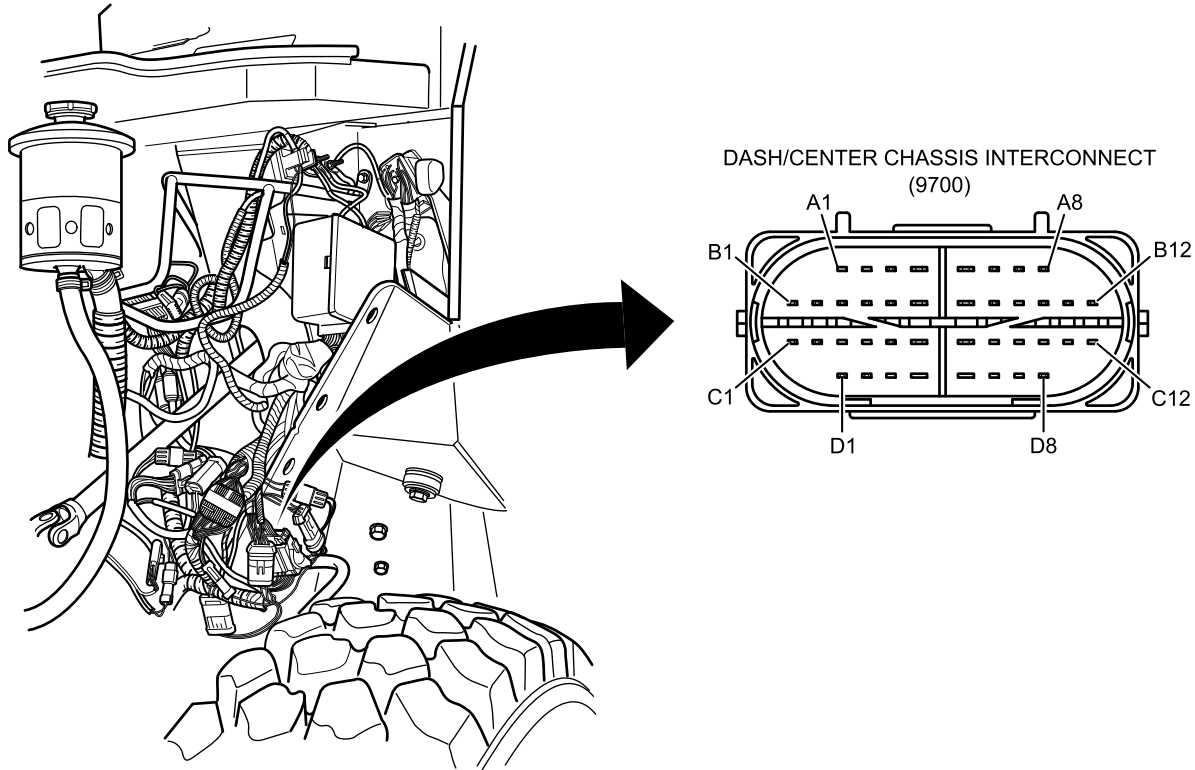
- YES Go to Step 184.
- NO Go to next step.

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ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

148. Remove engine air filter assembly (TM 9-2355-106-10).
149. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
150. Disconnect connector 9700 from connector 9714. Refer to Figure 41.



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Figure 41. Above Frame Inboard of Left Front Wheel.

151. Measure resistance between connector 9700 terminal B5 and ground with multimeter. Refer to Figure 41.

CONDITION/INDICATION

Does multimeter read OL?

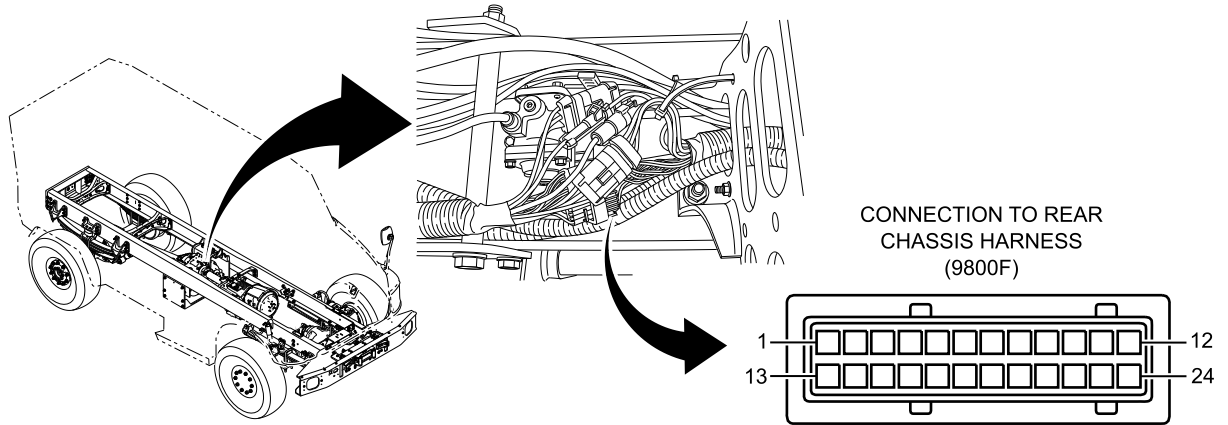
DECISION

YES Go to Step 179.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

152. Disconnect connector 9800F from connector 9800M. Refer to Figure 42.



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Figure 42. Inboard Left Frame Rail.

153. Measure resistance between connector 9800F terminal 21 and ground with multimeter. Refer to Figure 42.

CONDITION/INDICATION

Does multimeter read OL?

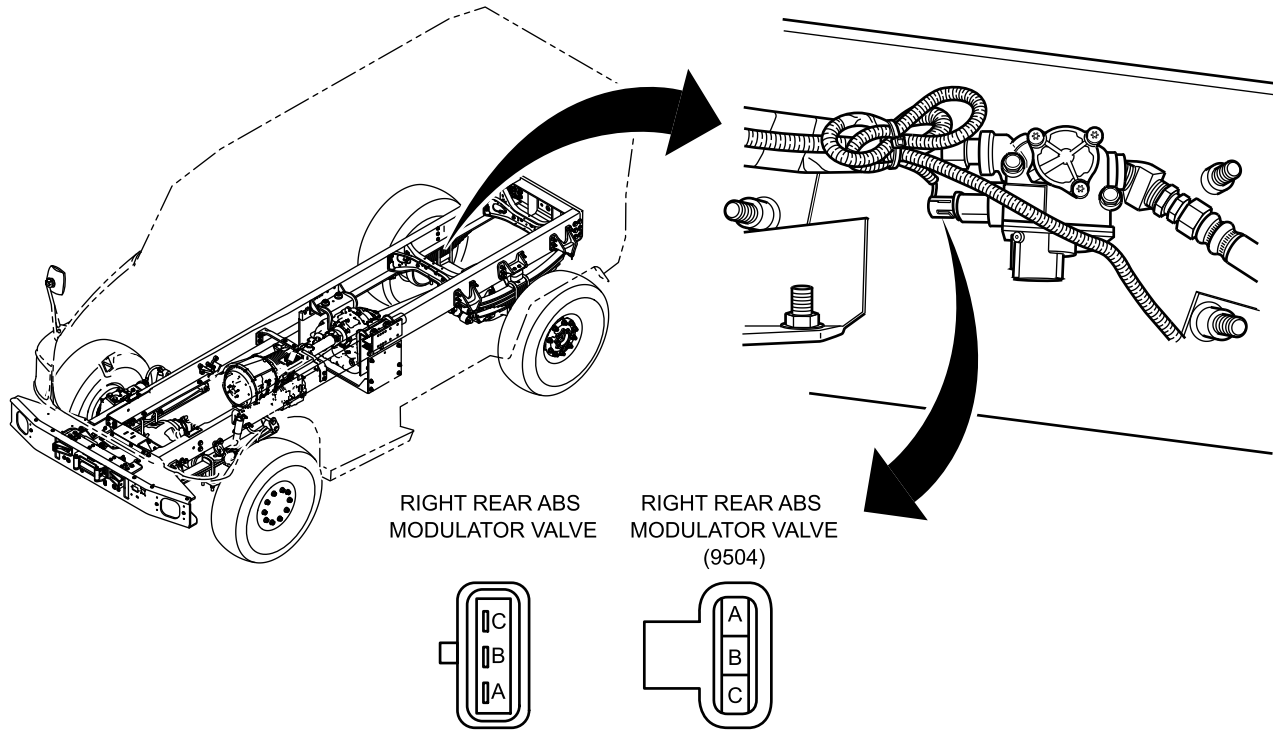
DECISION

YES Go to Step 180.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

154. Disconnect connector 9504 from right rear ABS modulator valve. Refer to Figure 43.



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Figure 43. Inboard Right Frame Rail Near Right Rear Wheel.

155. Measure resistance between right rear ABS modulator valve terminal B and ground with multimeter. Refer to Figure 43.

CONDITION/INDICATION

Does multimeter read OL?

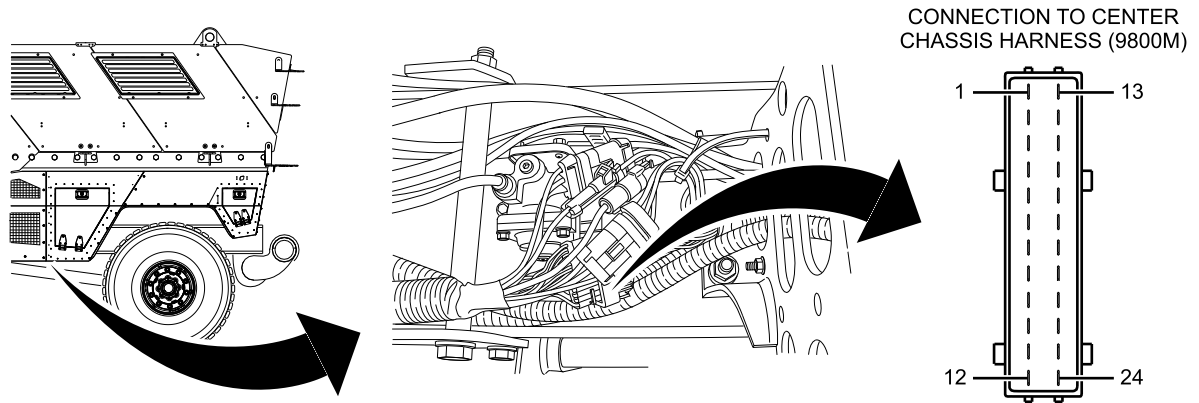
DECISION

NO Go to Step 178.
 YES Go to Step 181.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

156. Turn ignition switch OFF (TM 9-2355-106-10).
157. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
158. Disconnect connector 9800M from connector 9800F. Refer to Figure 44.



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Figure 44. Inboard Left Frame Rail Near Fuel Tank.

159. Turn MAIN POWER switch ON (TM 9-2355-106-10).
160. Turn ignition switch ON (TM 9-2355-106-10).
161. Measure DC voltage between ground and connector 9800M terminals 20, then 21, and then 22 with multimeter. Multimeter should read 0 volts for each test. Refer to Figure 44.

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 181.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

162. Turn ignition switch OFF (TM 9-2355-106-10).
163. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
164. Remove engine air filter assembly (TM 9-2355-106-10).
165. Remove left side engine armor plate and bracket. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0597) and Left Engine Armor Plate Bracket Removal and Installation (WP 0598).
166. Disconnect connector 9714 from connector 9700. Refer to Figure 45.

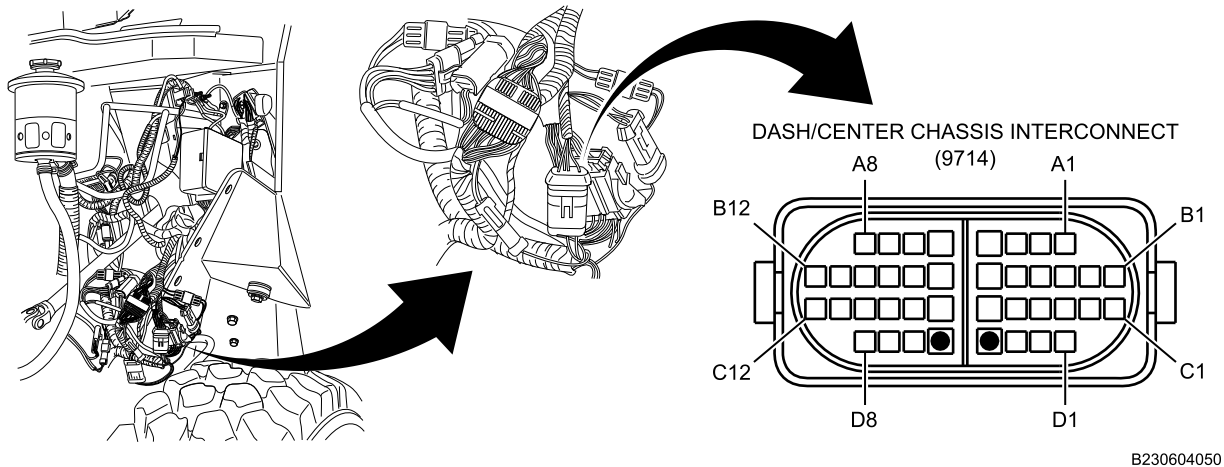


Figure 45. Above Frame Inboard of Left Front Wheel.

167. Turn MAIN POWER switch ON (TM 9-2355-106-10).
168. Turn ignition switch ON (TM 9-2355-106-10).
169. Measure DC voltage between ground and connector 9714 terminals B4 and B5, then B8 with multimeter. Multimeter should read 0 volts for each test. Refer to Figure 45.

CONDITION/INDICATION

Does multimeter read 0 volts for each test?

DECISION

YES Go to Step 180.
NO Go to next step.

ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

170. Turn ignition switch OFF (TM 9-2355-106-10).
 171. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 172. Disconnect connector 1701. Refer to Figure 46.

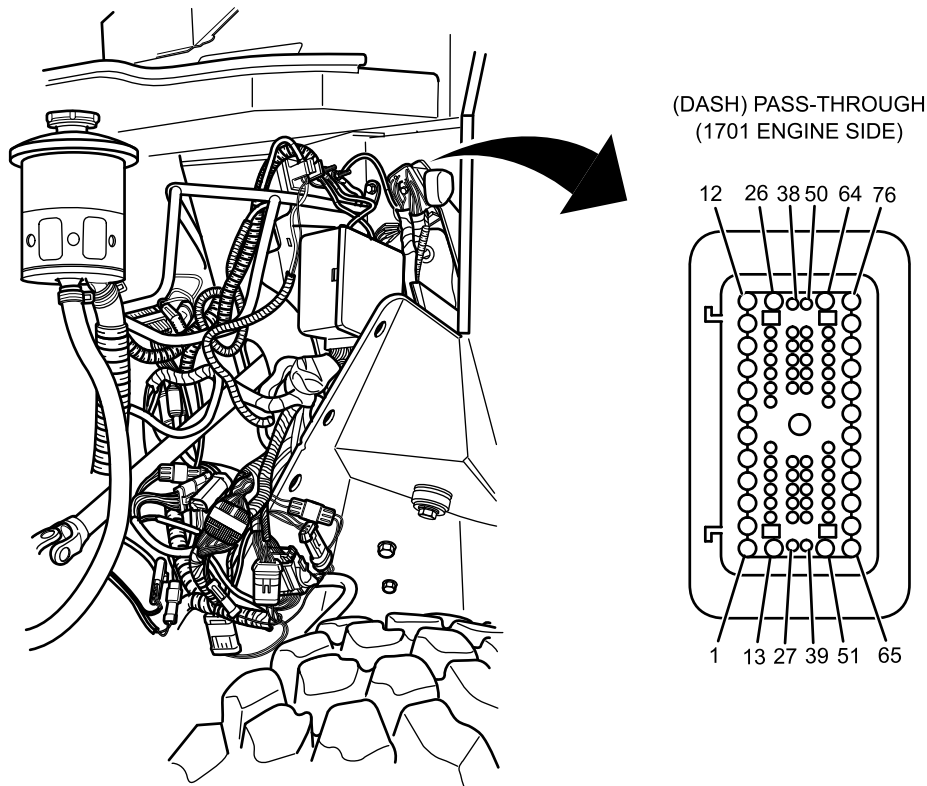


Figure 46. Left Side Firewall.

173. Measure resistance between connector 1701 (engine side) terminals 58, then 59, and then 60 and all other connector 1701 (engine side) terminals with multimeter. Multimeter should read OL for each test. Refer to Figure 46.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to Step 184.
 NO Go to Step 179.

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**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****MALFUNCTION**

- 174. Forward chassis harness is faulty.

ACTION

Replace forward chassis harness. Refer to Forward Chassis Harness Removal and Installation (WP 0424). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 175. Left front modulator valve is faulty.

ACTION

Replace left front modulator valve. Refer to Front Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0507). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 176. Right front modulator valve is faulty.

ACTION

Replace right front modulator valve. Refer to Front Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0507). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 177. Left rear modulator valve is faulty.

ACTION

Replace left front modulator valve. Refer to Rear Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0511). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 178. Right rear modulator valve is faulty.

ACTION

Replace left front modulator valve. Refer to Rear Antilock Braking System (ABS) Modulator Valve Removal and Installation (WP 0511). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 179. Power Distribution Center (PDC) harness is faulty.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)****ACTION**

Replace PDC harness. Refer to Power Distribution Center (PDC) Harness Removal and Installation (WP 0335). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 180. Center chassis harness is faulty.

ACTION

Replace center chassis harness. Refer to Center Chassis Harness Removal and Installation (WP 0426). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 181. Rear chassis harness is faulty.

ACTION

Replace rear chassis harness. Refer to Rear Chassis Harness Removal and Installation (WP 0427). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 182. This procedure does not apply to DTC that is set.

ACTION

Go to Antilock Brake System (ABS) Diagnostic Trouble Code (DTC) Index (WP 0009). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 183. Antilock Brake System (ABS) control module is faulty.

ACTION

Replace ABS control module. Refer to Antilock Brake System (ABS) Control Module Removal and Installation (WP 0390). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 184. Instrument Panel (IP) harness is faulty.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

**ANTILOCK BRAKE SYSTEM (ABS) PRESSURE MODULATOR VALVE (PMV) TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

END OF TEST

END OF WORK PACKAGE

FIELD MAINTENANCE
STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK) (WP 0795, Item 37)	WP 0180 WP 0216 WP 0471
Adapter, socket, wrench drive, 3/4-inch female - 1/2-inch male (WP 0795, Item 4)	WP 0472 WP 0475
Dial indicator set (WP 0795, Item 27)	WP 0531
Jackstand (10-ton) (2) (WP 0795, Item 62)	WP 0476
Jack, hydraulic, bottle, 20-ton capacity (WP 0795, Item 60)	WP 0477 WP 0536
Wrench, torque, 90-600 lb-ft, 3/4-inch drive (WP 0795, Item 144)	WP 0560 WP 0782
Jack, hydraulic, floor, 20-ton capacity (WP 0795, Item 59)	

Materials/Parts

Rag (WP 0794, Item 39)

References

TM 9-2355-106-10
TM 9-2355-106-23P

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

UNEVEN TIRE WEAR**STEP**

1. Check tire pressure (TM 9-2355-106-10).

CONDITION/INDICATION

Tire pressure is incorrect.

CORRECTIVE ACTION

Adjust to specified air pressure (TM 9-2355-106-10). Return vehicle to service.

1. Check toe-in setting. Refer to Front Axle Assembly Alignment Procedure (WP 0472).

Incorrect toe-in setting.

Adjust toe-in to specified setting. Refer to Front Axle Assembly Alignment Procedure (WP 0472). Return vehicle to service.

1. Check front wheel end play. Refer to Front Wheel Hub and Bearing Removal and Installation (WP 0471).

Excessive wheel end play.

Adjust wheel bearings. Refer to Front Wheel Hub and Bearing Removal and Installation (WP 0471). Return vehicle to service.

STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**HARD STEERING****STEP**

1. Check tire pressure (TM 9-2355-106-10).

CONDITION/INDICATION

Tire pressure is incorrect.

CORRECTIVE ACTION

Adjust to specified air pressure (TM 9-2355-106-10). Return vehicle to service.

1. Check power steering system. Refer to Power Steering Diagnosis and Troubleshooting Procedure (WP 0180).

Power steering system is faulty.

Repair power steering system. Refer to Power Steering Diagnosis and Troubleshooting Procedure (WP 0180). Return vehicle to service.

1. Review maintenance records for date when steering system was last lubricated.

Steering linkage needs lubrication.

Lubricate steering linkage. Refer to Preventive Maintenance Checks and Services (PMCS) Including Lubrication Instructions (WP 0216). Return vehicle to service.

TIE ROD ENDS, CLAMPS, AND TIE ROD INSPECTION**STEP**

1. Inspect tie rod ends for wear by performing the following steps:
 - a. Park vehicle on level surface with front wheels in straight-ahead position (TM 9-2355-106-10).
 - b. Chock rear wheels to prevent vehicle from moving (TM 9-2355-106-10).
 - c. Remove dirt and grease from tie rod end seals (TM 9-2355-106-10).
 - d. Place dial indicator base (Figure 1, Item 4) on bottom of tie rod arm (Figure 1, Item 1).
 - e. Place dial indicator tip (Figure 1, Item 2) on flat surface (Figure 1, Item 3) near grease fitting. Set dial indicator on zero.
 - f. From directly underneath tie rod, grasp end of tie rod assembly with both hands, as close as possible to tie rod end. Hands should be within 6 inches (152.4 mm) of tie rod end.
 - g. Repeat steps 1.a through step 1.f for opposite side of vehicle.

CONDITION/INDICATION

Dial indicates a reading of more than 0.060 inch (1.52 mm) at either tie rod end.

CORRECTIVE ACTION

Replace tie rod end. Refer to Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

1. Inspect tie rod end nut and cotter pin for secure mounting. Refer to Tie Rod Removal and Installation (WP 0531).

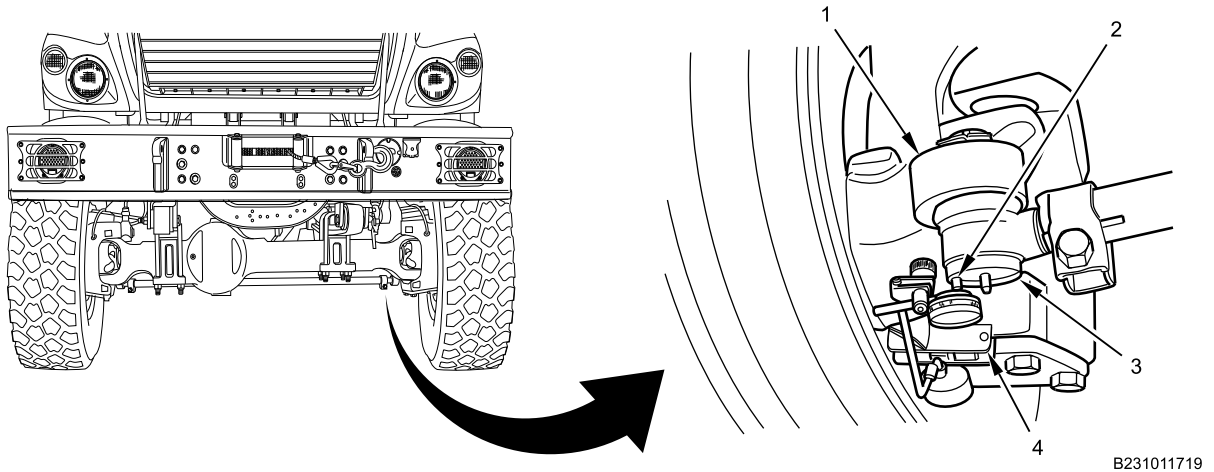
STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Figure 1. Tie Rod Ends.

Cotter pin is missing or tie rod nut is loose.

Tighten tie rod nut to 140 lb-ft (190 N•m). Install new cotter pin. Refer to Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

1. Visually inspect tie rod for bends or cracks.

Inspection reveals damage.

Replace tie rod. Refer to Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

1. Visually inspect tie rod clamps for bends or cracks.

Inspection reveals damage.

Replace tie rod clamps. Refer to Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

STEERING ARM, DRAG LINK INSPECTION**STEP**

1. Visually inspect steering arm for bends or cracks.

CONDITION/INDICATION

Inspection reveals damage.

CORRECTIVE ACTION

Replace steering arm. Refer to Steering Arm Removal and Installation (WP 0476). Return vehicle to service.

1. Visually inspect drag link for bends or cracks.

Inspection reveals damage.

Replace drag link. Refer to Steering Drag Link Removal and Installation (WP 0536). Return vehicle to service.

1. Check drag link fastener torque. Refer to Steering Drag Link Removal and Installation (WP 0536).

Drag link fasteners tightened higher than specified.

Tighten drag link fasteners to specified torque. Refer to Steering Drag Link Removal and Installation (WP 0536). Return vehicle to service.

1. Review maintenance records for date when steering system was last lubricated.

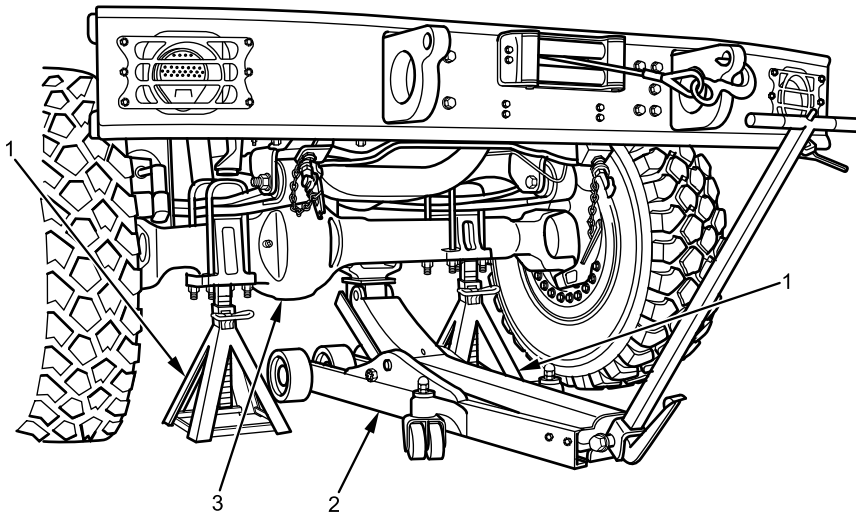
Lack of lubrication.

STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Lubricate linkage. Refer to Preventive Maintenance Checks and Services (PMCS) Including Lubrication Instructions (WP 0216). Return vehicle to service.

KING PINS INSPECTION**STEP**

1. Inspect steering knuckle king pin end play by performing the following steps:
 - a. Park vehicle on level surface with front wheels in straight-ahead position (TM 9-2355-106-10).
 - b. Chock rear wheels to prevent vehicle from moving (TM 9-2355-106-10).
 - c. Raise front axle (Figure 2, Item 3) with 20-ton floor jack (Figure 2, Item 2). Ensure wheels are raised above ground. Support front axle with 10-ton jackstands (Figure 2, Item 1).



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Figure 2. Front Axle Raised and Supported

- d. Install dial indicator base (Figure 3, Item 2) on axle beam (Figure 3, Item 1).
- e. Place dial indicator tip (Figure 3, Item 4) on top of upper steering knuckle stop lug (Figure 3, Item 5).

NOTE

Lower king pin grease fitting may need to be removed in order to place hydraulic jack under lower king pin cap.

- f. Place 20-ton hydraulic bottle jack (Figure 3, Item 7) under lower king pin cap area (Figure 3, Item 6).
- g. Raise jack (Figure 3, Item 7) until axle beam (Figure 3, Item 1) lifts off jackstand.
- h. Set dial indicator (Figure 3, Item 3) on zero.
- i. Lower jack (Figure 3, Item 7) until front axle is resting on jackstand.
- j. Measure and record dial indicator reading. Reading must be 0.005-0.015 in. (0.127-.381 mm).
- k. Repeat steps 1.a through 1.j for opposite side.

Steering Knuckle and King Pin.

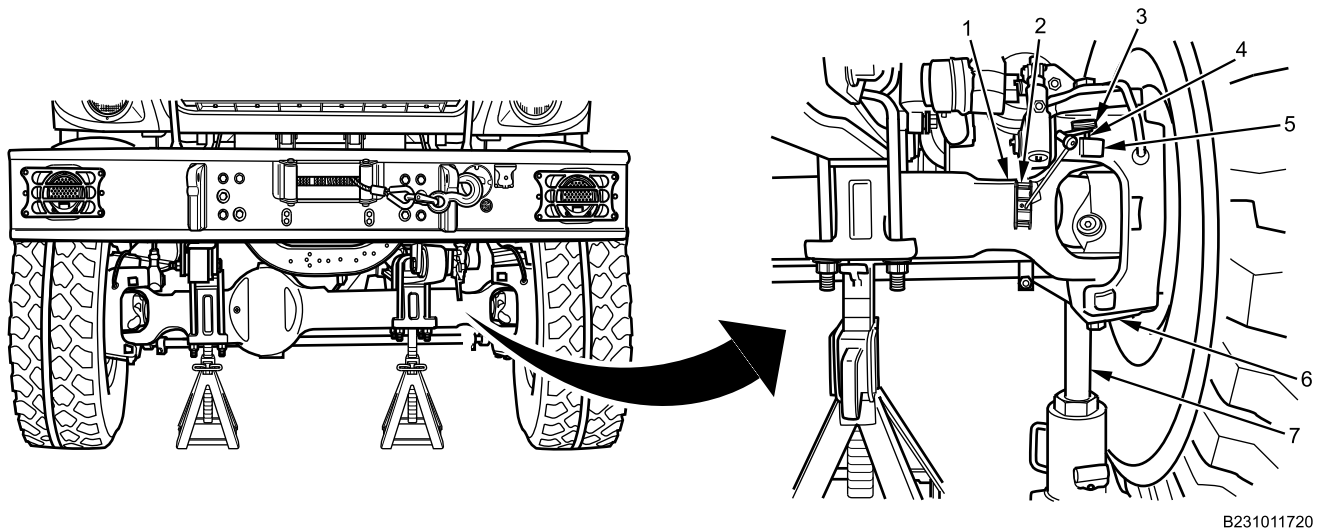
CONDITION/INDICATION

Reading is not within specification.

CORRECTIVE ACTION

King pin shims and thrust bearings are worn or damaged and must be replaced. Refer to Steering Knuckle and King Pin Removal and Installation (WP 0477). Return vehicle to service.

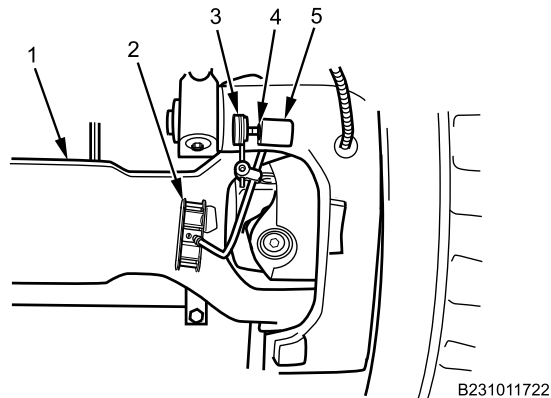
STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



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Figure 3. Steering Knuckle and King Pin.

1. Inspect upper king pin bushings by performing the following steps:
 - a. Park vehicle on level surface with front wheels in straight-ahead position (TM 9-2355-106-10).
 - b. Chock rear wheels to prevent vehicle from moving (TM 9-2355-106-10).
 - c. Raise front axle with 20-ton floor jack. Ensure wheels are raised above ground. Support front of vehicle with 10-ton high boy jackstand at each frame rail.
 - d. Install dial indicator base (Figure 4, Item 2) on axle beam (Figure 4, Item 1). Place indicator tip (Figure 4, Item 4) against side of steering knuckle stop lug (Figure 4, Item 5).



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Figure 4. Steering Knuckle and King Pin.

- e. Set dial indicator (Figure 4, Item 3) on zero.
- f. Move top of tire toward then away from vehicle.
- g. Repeat steps 2.a through 2.f for opposite side.

Dial indicator moves a total of 0.010 inch (0.254 mm). Upper king pin bushing is worn or damaged.

Replace both king pin bushings in axle. Refer to Upper and Lower King Pin Bushing Removal and Installation (WP 0475). Return vehicle to service.

STEERING SYSTEM OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Check lower king pin bushings by performing the following steps:
 - a. Install dial indicator base (Figure 5, Item 2) on axle beam (Figure 5, Item 1). Place indicator tip (Figure 5, Item 4) against side of steering knuckle stop lug (Figure 5, Item 3).

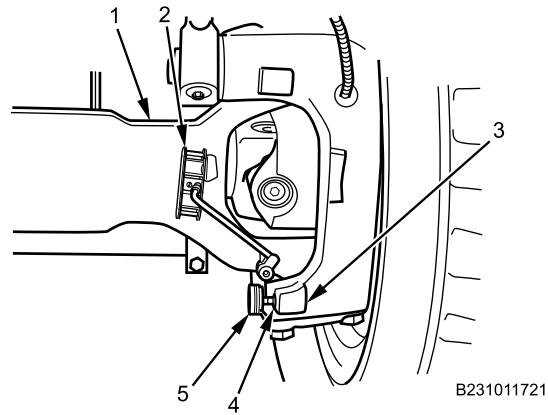


Figure 5. Steering Knuckle and King Pin.

- b. Set dial indicator (Figure 5, Item 5) on zero.
- c. Move bottom of tire toward then away from vehicle.
- d. Repeat steps 3.a through 3.c for opposite side.

Dial indicator moves a total of 0.010 inch (0.254 mm). Lower king pin bushing is worn or damaged.

Replace both king pin bushings in axle. Refer to Upper and Lower King Pin Bushing Removal and Installation (WP 0475). Return vehicle to service.

FRONT AXLE VIBRATION**STEP**

1. Visually inspect front shock absorbers for damage or leaking.

CONDITION/INDICATION

Damaged or leaking shock absorbers.

CORRECTIVE ACTION

Replace shock absorbers. Refer to Front Shock Absorber Removal and Installation (WP 0560). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Wrench, torque, dial, 300 lb-in., 3/8-inch drive
(WP 0795, Item 147)
Adapter, socket, wrench drive, 3/8-inch female -
1/2-inch male (WP 0795, Item 2)
Socket, deep-well, 1/2-inch drive, 6-pt, 1-1/4 inch
(WP 0795, Item 99)

WP 0537
WP 0539
WP 0540
WP 0542
WP 0543
WP 0783
WP 0403
WP 0533
WP 0782

Personnel Required

Maintainer (2)

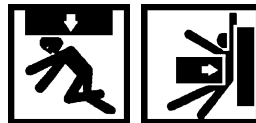
References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0472
WP 0538
WP 0531
WP 0532
WP 0477

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)
Left engine armor plate removed (WP 0597)
Left engine armor plate bracket removed (WP 0598)

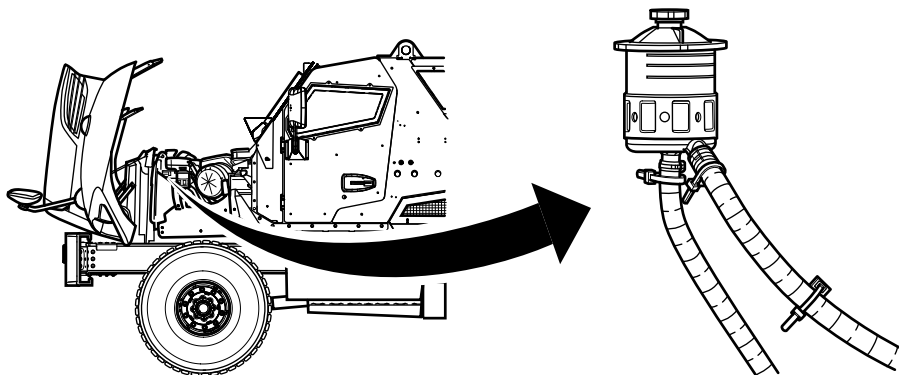
WARNING



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.

STEP

1. Inspect power steering reservoir for proper fluid level (TM 9-2355-106-10). Refer to Figure 1.



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Figure 1. Power Steering Reservoir and Filter Assembly.

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Fluid level not within specifications.

CORRECTIVE ACTION

Fill power steering reservoir with the specified amount and type of fluid. Refer to Lubrication Instructions (WP 0783). Return vehicle to service.

1. Inspect steering hoses (Figure 2, Item 1) and pump (Figure 2, Item 2) for oil leaks.

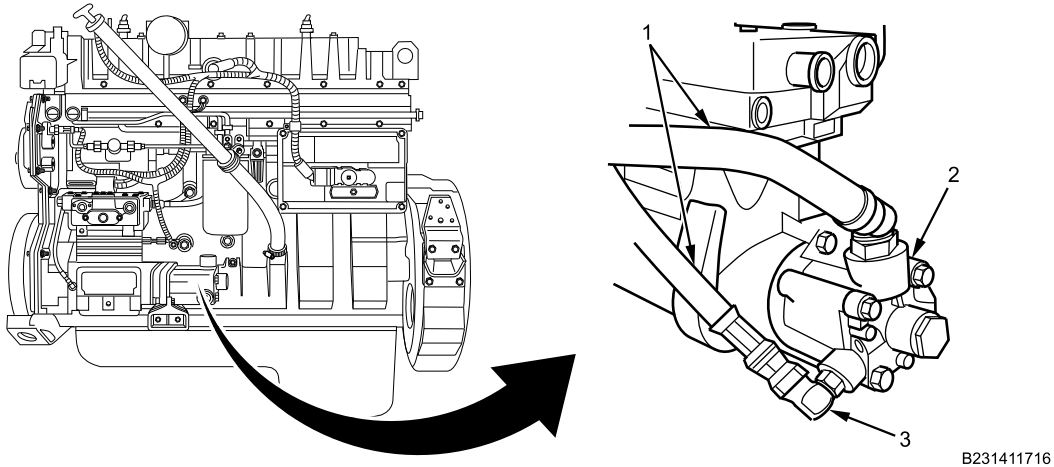


Figure 2. Power Steering Pump.

Oil leaking from steering pump.

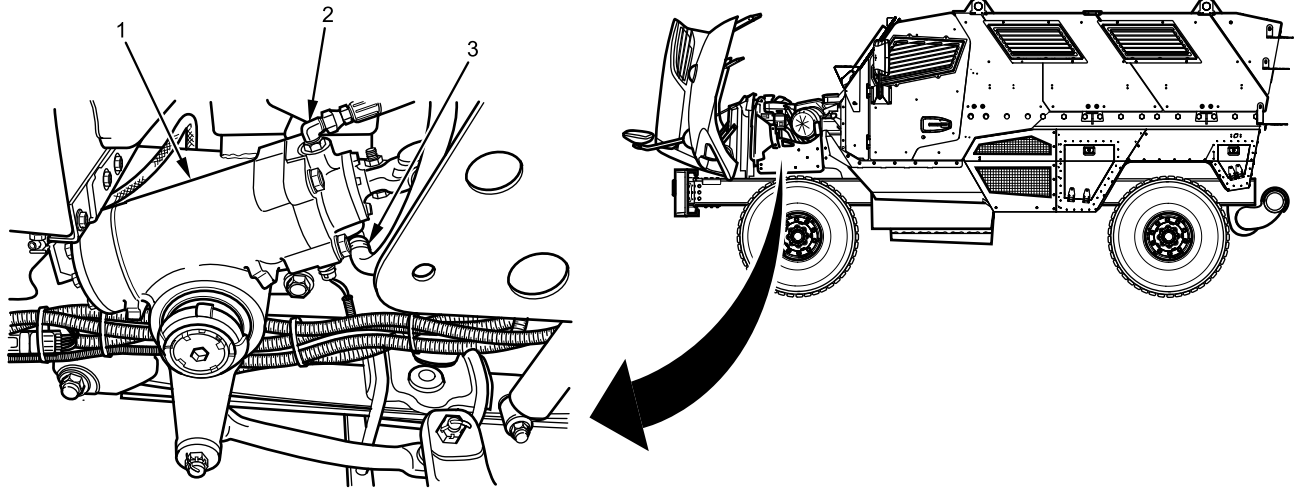
Replace steering pump assembly. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.

Oil leaking from steering pump hoses.

Replace leaking steering pump hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.

Oil leaking from elbow fitting on power steering pump pressure hose.

1. Remove power steering pump pressure hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540).
 2. Remove elbow fitting (Figure 2, Item 3) at steering pump.
 3. Inspect O-ring and elbow fitting for wear or damage. Replace worn or damaged component. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
1. Inspect steering gear (Figure 3, Item 1) for oil leaks.

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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Figure 3. Power Steering Gear.

Oil leaking from steering gear.

Replace steering gear assembly. Refer to Steering Gear Removal and Installation (WP 0537). Return vehicle to service.

1. Inspect upper steering gear hose for oil leaks.

Oil leaking from power steering hose.

Replace power steering hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.

Oil leaking from upper elbow fitting on power steering gear.

1. Remove power steering hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540).
 2. Remove elbow fitting (Figure 3, Item 2) at steering gear.
 3. Inspect O-ring and elbow fitting for wear or damage. Replace worn or damaged component. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
1. Inspect power steering gear return hose (Figure 3, Item 3) for oil leaks.

Oil leaking from power steering return hose.

Replace power steering return hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.

Oil leaking from lower elbow fitting on power steering gear.

1. Remove power steering return hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540).
 2. Remove lower elbow fitting at steering gear.
 3. Inspect O-ring and lower elbow fitting for wear or damage. Replace worn or damaged component. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
1. Inspect for foaming of oil or oil being forced out of reservoir.

Power steering oil filter is restricted or damaged.

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Replace restricted or damaged power steering oil filter. Refer to Power Steering Filter Removal and Installation (WP 0542). Return vehicle to service.

Air in system.

1. Bleed air from system. Refer to Bleeding Single Gear (WP 0538). Return vehicle to service.
2. Inspect for air leaks or restrictions in the power steering pump inlet hose. Replace leaking or restricted hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
3. Replace power steering pump. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.

Oil overheating.

Inspect for restriction in steering gear return. Replace restricted steering gear return hose. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.

1. Inspect for discolored power steering fluid.

Fluid is discolored or has burnt odor.

1. Inspect for incorrect power steering fluid. Drain, flush, and refill with recommended fluid. Refer to Power Steering Reservoir Drain/Fill Procedure (WP 0543). Return vehicle to service.
 2. Bleed air from system. Refer to Bleeding Single Gear (WP 0538). Return vehicle to service.
 3. Interval between fluid changes is too long. Change oil more often. Refer to Power Steering Reservoir Drain/Fill Procedure (WP 0543) and Lubrication Instructions (WP 0783). Return vehicle to service.
 4. Operating temperature too high. Inspect for the following condition(s):
 - a. Inspect power steering pressure and return hoses for restrictions, kinks, or damage. Replace restricted, kinked, or damaged hoses. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
 - b. Inspect reservoir for sufficient oil flow by removing reservoir cap and observing fluid flow in reservoir. Lack of fluid movement indicates insufficient flow. Replace power steering pump. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.
If the conditions are not present, replace power steering gear. Refer to Steering Gear Removal and Installation (WP 0537). Return vehicle to service.
1. Start and idle engine (TM 9-2355-106-10).
 2. Inspect for erratic steering or mechanical steering only while turning steering wheel from left to right wheel stops.

Erratic or mechanical steering detected while turning steering wheel from left to right wheel stops.

1. Inspect for air in system. If inspections reveals air in the system, bleed air from system. Refer to Bleeding Single Gear (WP 0538). Return vehicle to service.
 2. Inspect reservoir for sufficient oil flow by removing reservoir cap and observing fluid flow in reservoir. Lack of fluid movement indicates insufficient flow. Replace the power steering pump. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.
1. Start and idle engine (TM 9-2355-106-10).
 2. Have assistant visually inspect for hard steering while turning steering wheel from left to right wheel stops.

Hard steering detected while turning steering wheel in both directions.

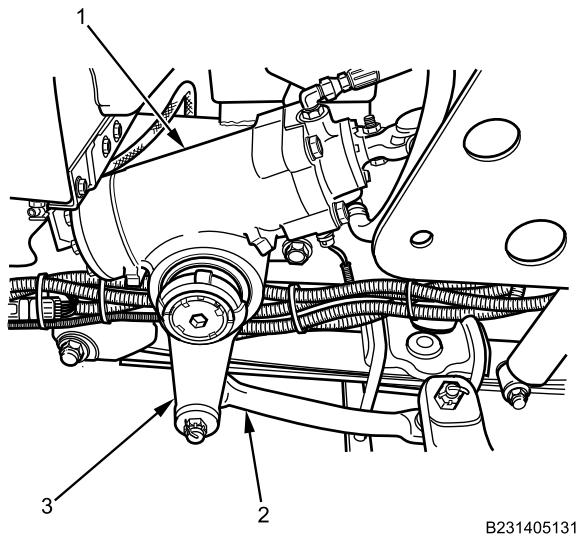
POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Figure 4. Power Steering Gear.

STEP 1. Disconnect drag link (Figure 4, Item 2) from pitman arm (Figure 4, Item 3). Refer to Steering Drag Link Removal and Installation (WP 0536).

STEP 2. Inspect for hard steering while turning steering wheel from left to right wheel stops.

1. Hard steering is present.

- a. Inspect for low power steering fluid level. Fill to proper level. Refer to Lubrication Instructions (WP 0783). Return vehicle to service.
- b. Inspect power steering and return hoses for restrictions, or damage. Replace restricted or damaged hoses. Refer to Power Steering Tubing and Hose Removal and Installation (WP 0540). Return vehicle to service.
- c. If hoses are not restricted or damaged, replace power steering pump. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.

2. Hard steering is not present.

- a. Inspect front end components for binding, damage, or out of alignment. Refer to Steering System Troubleshooting Procedure (WP 0179). Replace components as necessary. Refer to the following procedures:

Steering Knuckle and King Pin Removal and Installation (WP 0477). Return vehicle to service.

Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

Steering Drag Link Removal and Installation (WP 0536). Return vehicle to service.

Front Axle Assembly Alignment Procedure (WP 0472). Return vehicle to service.

1. Inspect for wheel being hard to turn in one direction while turning steering wheel from left to right wheel stops.

Wheel hard to turn in one direction.

1. Inspect for binding or damaged king pins or tie-rod ends. Refer to Steering System Troubleshooting Procedure (WP 0179). Replace as necessary. Refer to the following procedures:

Steering Knuckle and King Pin Removal and Installation (WP 0477). Return vehicle to service.

Tie Rod Removal and Installation (WP 0531). Return vehicle to service.

2. Replace power steering gear. Refer to Steering Gear Removal and Installation (WP 0537). Return vehicle to service.

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Inspect for not returning to straight ahead position from turns.

Steering does not return to straight ahead position from turns.

1. Inspect for seized, binding, or improperly torqued linkage ball sockets. Refer to Steering Drag Link Removal and Installation (WP 0536) and Tie Rod Removal and Installation (WP 0531). Return vehicle to service.
2. Inspect for seized or binding king pins. Refer to Steering System Troubleshooting Procedure (WP 0179). Replace as necessary. Refer to Steering Knuckle and King Pin Removal and Installation (WP 0477). Return vehicle to service.

1. Inspect for darting or wandering (oversteer).

Vehicle darts or wanders.

1. Air trapped in system. Bleed air from system. Refer to Bleeding Single Gear (WP 0538). Return vehicle to service.
2. Inspect for loose, worn, or incorrectly aligned front axle components. Refer to Steering System Troubleshooting Procedure (WP 0179). Align front axle as necessary. Refer to Front Axle Assembly Alignment Procedure (WP 0472). Return vehicle to service.
3. Inspect for conditions possibly causing misalignment between front and rear axles. Refer to Spring and Shock Absorber Troubleshooting Procedure (WP 0179).
4. Inspect for seized, binding, or improperly torqued linkage ball sockets. Refer to Steering Drag Link Removal and Installation (WP 0536) and Tie Rod Removal and Installation (WP 0531).

1. Inspect for excessive backlash or freeplay.

Steering feels loose or excessive play in steering system.

1. Inspect for worn universal joints. Replace universal joint. Refer to Steering Shaft Removal and Installation (WP 0532). Return vehicle to service.
2. Inspect for worn or damaged sector shaft or sector shaft splines. Replace steering gear. Refer to Steering Gear Removal and Installation (WP 0537). Return vehicle to service.
3. Inspect for worn or damaged pitman arm splines. Replace steering gear and pitman arm. Refer to the following procedures:
Steering Gear Removal and Installation (WP 0537). Return vehicle to service.
Replace pitman arm. Refer to Pitman Arm Removal and Installation (WP 0535). Return vehicle to service.

1. Inspect for binding steering input.

Steering is binding.

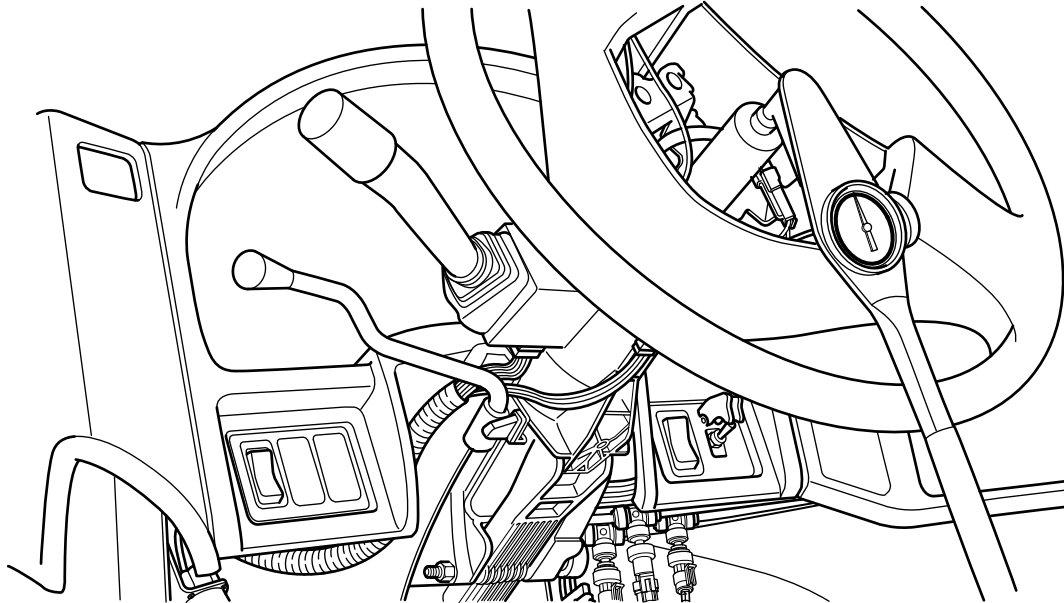
CAUTION

Do not allow steering wheel to turn more than one revolution in either direction when steering shaft is removed from gear, or clock spring damage may result.

1. Inspect for insufficient lubrication. Lubricate as necessary. Refer to Lubrication Instructions (WP 0783). Return vehicle to service.
2. Inspect for worn universal joints. If universal joints worn, replace steering shaft. Refer to Steering Shaft Removal and Installation (WP 0532). Return vehicle to service.
3. Inspect steering column bind using the following steps:
 - a. Remove steering wheel horn cap. Refer to Horn Button Assembly Removal and Installation (WP 0403).
 - b. Center steering wheel as follows:
 - (1) Turn steering wheel completely to right wheel stop.
 - (2) Count the number of complete rotations while turning from right wheel stop to left wheel stop.
 - (3) Divide the number of complete rotations by two.

POWER STEERING OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

- (4) Turn the steering wheel from the left wheel stop towards the right wheel stop by number of turns calculated in previous step.
- c. Remove the steering shaft. Refer to Steering Shaft Removal and Installation (WP 0532).
- d. Connect 1-1/4 socket and socket adapter to the torque wrench.



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Figure 5. Torque Wrench Assembly to Steering Wheel.

- e. Install torque wrench and socket assembly on the steering wheel nut. Refer to Figure 5.
 - f. Turn the steering wheel to the right one rotation.
 - g. Record torque wrench reading while turning steering wheel.
 - h. Turn the steering wheel to the left one rotation.
 - i. Record torque wrench reading while turning steering wheel.
 - j. If torque reading is more than 10 lb-in. (1.13 N•m) in either direction, replace the steering column. Refer to Steering Column Removal and Installation (WP 0533).
 - k. If torque reading is less than 10 lb-in. (1.13 N•m), replace the steering gear. Refer to Steering Gear Removal and Installation (WP 0537).
Return vehicle to service.
4. Inspect reservoir for insufficient oil flow. Replace the power steering pump if oil flow is low. Refer to Power Steering Pump Removal and Installation (WP 0539). Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE
SUSPENSION TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK) (WP 0795,)

WP 0559

WP 0557

WP 0556

WP 0560

WP 0782

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0179

WP 0472

WP 0532

WP 0476

WP 0536

WP 0537

WP 0558

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

Engine off (TM 9-2355-106-10)

Battery disconnect switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

TROUBLESHOOTING PROCEDURE
NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

SYMPTOM

VEHICLE PULLS LEFT OR RIGHT

MALFUNCTION

Improper wheel alignment.

CORRECTIVE ACTION

Adjust as necessary. Refer to Front Axle Alignment Procedure (WP 0472).

MALFUNCTION

Loose, damaged, or leaking shock absorber.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Shock Absorber Removal and Installation (WP 0560).

MALFUNCTION

A broken spring or loose spring bushings.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Broken or loose U-bolts.

CORRECTIVE ACTION

Tighten or replace as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Front or rear axle shifted on leaf springs.

CORRECTIVE ACTION

Repair as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or

SUSPENSION TROUBLESHOOTING PROCEDURE - (CONTINUED)

Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Worn steering components.

CORRECTIVE ACTION

Repair as necessary. Refer to Steering System Troubleshooting Procedures (WP 0179), Steering Shaft Removal and Installation (WP 0532), Steering Arm Removal and Installation (WP 0476), Steering Knuckle and King Pin Removal and Installation (WP 0477), Steering Drag Link Removal and Installation (WP 0536), or Steering Gear Removal and Installation (WP 0537).

SYMPTOM

VEHICLE BOTTOMS OUT

MALFUNCTION

Damaged or broken axle leaf spring.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Damaged rear suspension auxiliary spring

CORRECTIVE ACTION

Replace as necessary. Refer to Auxiliary Spring Removal and Installation (WP 0556).

SYMPTOM

VEHICLE LEANS TO ONE SIDE

MALFUNCTION

Weak or broken axle leaf spring.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Damaged rear suspension auxiliary spring.

CORRECTIVE ACTION

Replace as necessary. Refer to Auxiliary Spring Removal and Installation (WP 0556).

MALFUNCTION

Damaged or loose spring shackle bushings.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Spring Shackle Removal and Installation (WP 0558).

SYMPTOM

NOISY SUSPENSION

MALFUNCTION

Damaged or broken axle leaf spring.

CORRECTIVE ACTION

SUSPENSION TROUBLESHOOTING PROCEDURE - (CONTINUED)

Replace as necessary. Refer to Front Spring Assembly Removal and Installation (WP 0559), or Rear Spring Assembly Removal and Installation (WP 0557).

MALFUNCTION

Damaged rear suspension auxiliary spring.

CORRECTIVE ACTION

Replace as necessary. Refer to Auxiliary Spring Removal and Installation (WP 0556).

MALFUNCTION

Damaged or loose spring shackle bushings.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Spring Shackle Removal and Installation (WP 0558).

MALFUNCTION

Loose, damaged, or leaking shock absorber.

CORRECTIVE ACTION

Replace as necessary. Refer to Front Shock Absorber Removal and Installation (WP 0560).

END OF WORK PACKAGE

FIELD MAINTENANCE
CABIN DOOR OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0615

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0183
WP 0184
WP 0185
WP 0607
WP 0624

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Air pressure in primary and secondary tanks above
90 psi (620.5 kPa) (TM 9-2355-106-10)

WARNING

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. From outside vehicle, attempt to engage and disengage combat lock (TM 9-2355-106-10).

CONDITION/INDICATION

Combat lock will not engage or will not disengage.

CORRECTIVE ACTION

Refer to Cabin Door Combat Lock Troubleshooting Procedure (WP 0183).

NOTE

Once cabin door is unlatched from vehicle body, cabin door assist system should push door open and closed with little effort from personnel.

1. Pull on outside cabin door handle to open door to the full open position (TM 9-2355-106-10).
2. Push on outside cabin door handle to close door to the fully closed position (TM 9-2355-106-10).

Cabin door will not unlatch from vehicle body (cannot pull door open).

Refer to Cabin Door Lock Assembly Troubleshooting Procedure (WP 0184).

CABIN DOOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

Cabin door assist system does not push door open or does not pull door closed.

Refer to Cabin Door Assist System Troubleshooting Procedure (WP 0185).

Cabin door opens or closes too slowly or too fast.

NOTE

Cabin doors are identified by the location of the interior combat lock handle. Some door interior combat lock handles are located near the bottom of door. Other interior combat lock handles are located at top rear corner of door.

Refer to Cabin Door Linkage Inspection and Adjustment Procedure (Bottom) (WP 0615) or Cabin Door Linkage Inspection and Adjustment Procedure (Top Corner) (WP 0616).

1. From inside vehicle, attempt to engage and disengage combat lock.

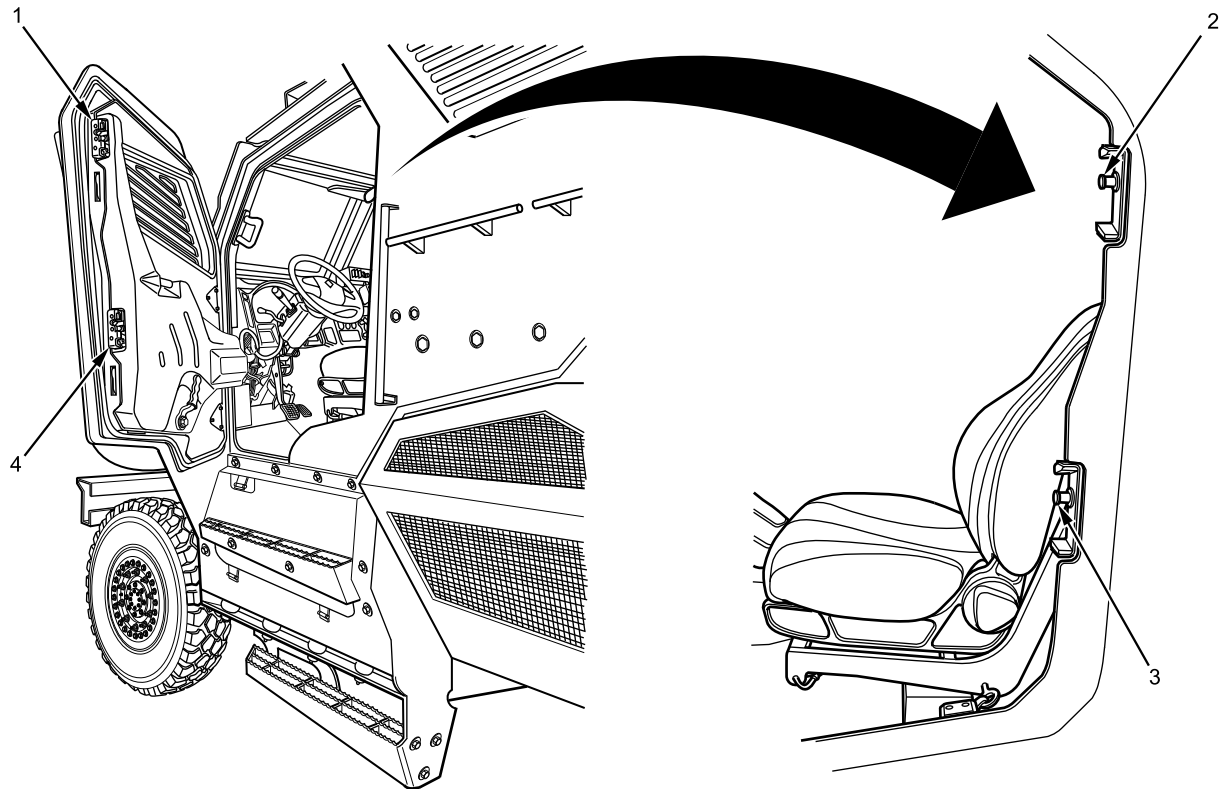
Combat lock will not engage or will not disengage.

Refer to Cabin Door Combat Lock Troubleshooting Procedure (WP 0183).

NOTE

Once cabin door is unlatched from vehicle body, cabin door assist system should push door open with little effort from personnel.

1. From inside vehicle, push on interior cabin door handle to open door to the full open position (TM 9-2355-106-10).
2. From inside vehicle, pull on interior cabin door handle to close door to the fully closed position (TM 9-2355-106-10).
3. When cabin door reaches the closed position, upper and lower lock assemblies (Figure 1, Item 1 and 4) should latch onto upper and lower door strikers (Figure 1, Item 2 and 3). (Door should latch closed.)

CABIN DOOR OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

B231805575

Figure 1. Upper and Lower Cabin Door Lock Assemblies. Left Door Shown; Right Door Similar.

Cabin door does not unlatch from vehicle body.

If interior handle is at the bottom of the door: replace door assembly. Refer to Cabin Door Removal and Installation (WP 0607). If interior door handle is at the top corner: replace cabin door interior handle assembly. Refer to Cabin Door Interior Handle Assembly Removal and Installation (Dual-Piston) (WP 0624).

Cabin door does not latch to vehicle body.

Refer to Cabin Door Lock Assembly Troubleshooting Procedure (WP 0184).

1. Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0627

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0182
WP 0607
WP 0628
WP 0626

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine shut off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Cabin door open and secured (WP 0608)

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the cabin doors depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Cabin Door Operational Checkout Procedure (WP 0182) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**STEP****WARNING**

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

This procedure covers two types of cabin doors. Some production doors have a one-piece interior combat lock handle location near the bottom of the door, others have a two-piece interior combat lock handle at top rear corner of door.

CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE - (CONTINUED)

1. Remove interior door trim panel from affected door. Refer to the appropriate procedure:
 - Cabin Door Trim Panel Removal and Installation (One-Piece) (WP 0626).
 - Cabin Door Trim Panel Removal and Installation (Two-Piece) (WP 0627).
2. Install interior combat lock handle (Figure 1, Item 1) with bolt (Figure 1, Item 2) and tighten securely.

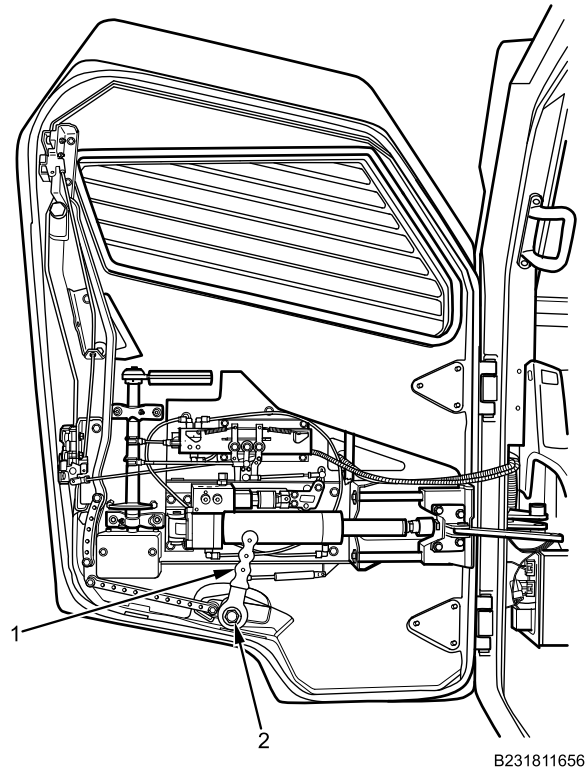


Figure 1. Combat Lock Handle — One Piece.

NOTE

Two-piece door with handle near top shown on left; one-piece door with handle near bottom shown on right.

3. Physically inspect and ensure combat lock linkage fasteners (Figure 2, Item 1) are not loose.

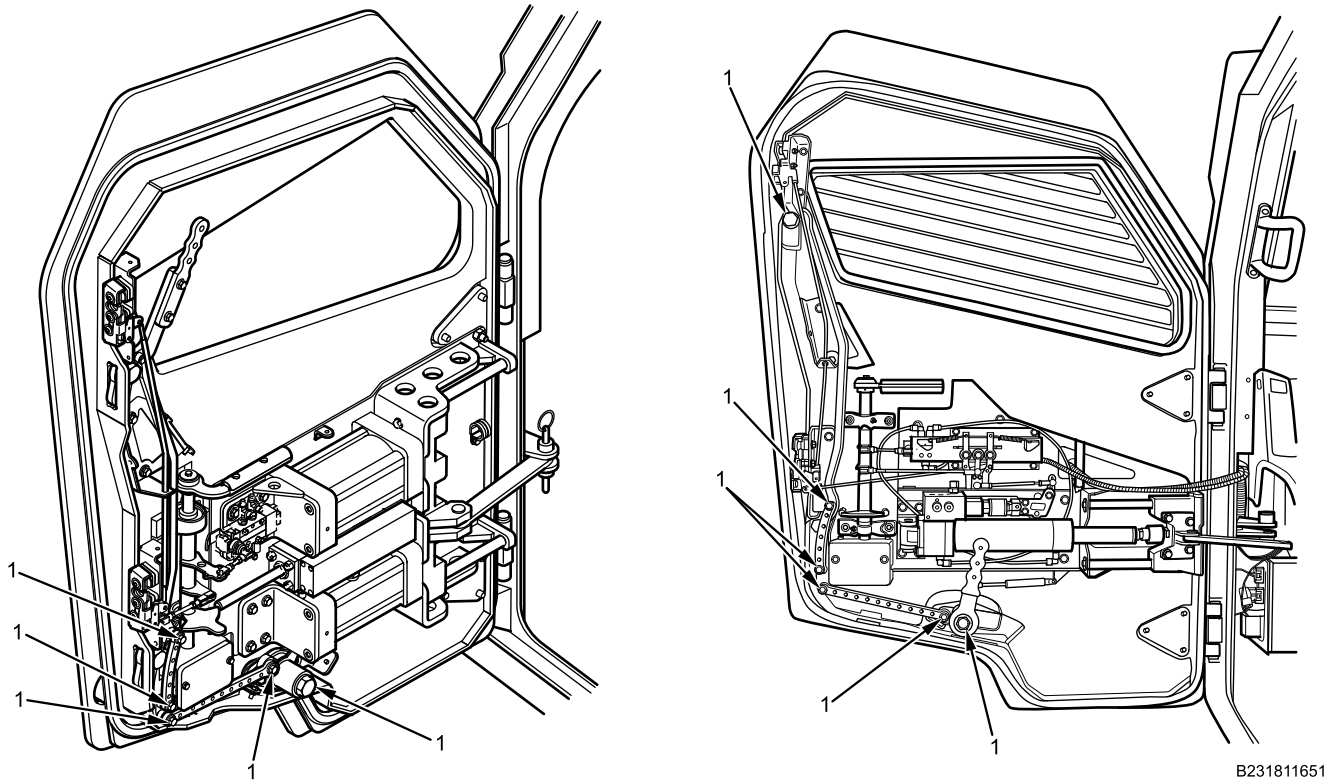
CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 2. Combat Lock Linkage Fasteners.

CONDITION/INDICATION

Are any combat lock linkage fasteners loose?

DECISION

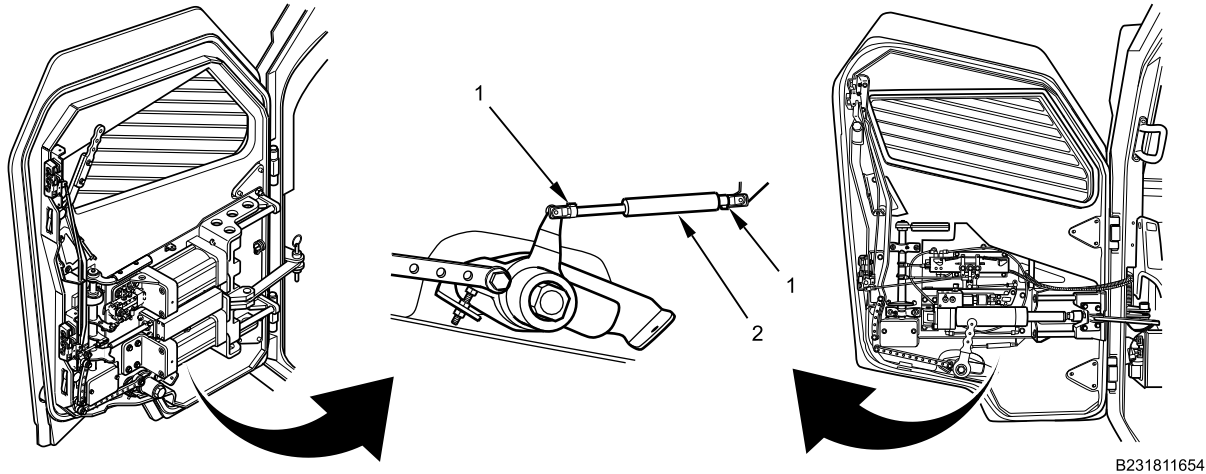
YES Go to Step 10.

NO Go to next step.

CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP****NOTE**

Two-piece door with handle near top shown on left; one-piece door with handle near bottom shown on right.

- Remove clevis pins (Figure 3, Item 1) from combat lock absorber (Figure 3, Item 2) and remove absorber.



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Figure 3. Combat Lock Absorber.

- Attempt to operate combat lock.

CONDITION/INDICATION

Does combat lock operate?

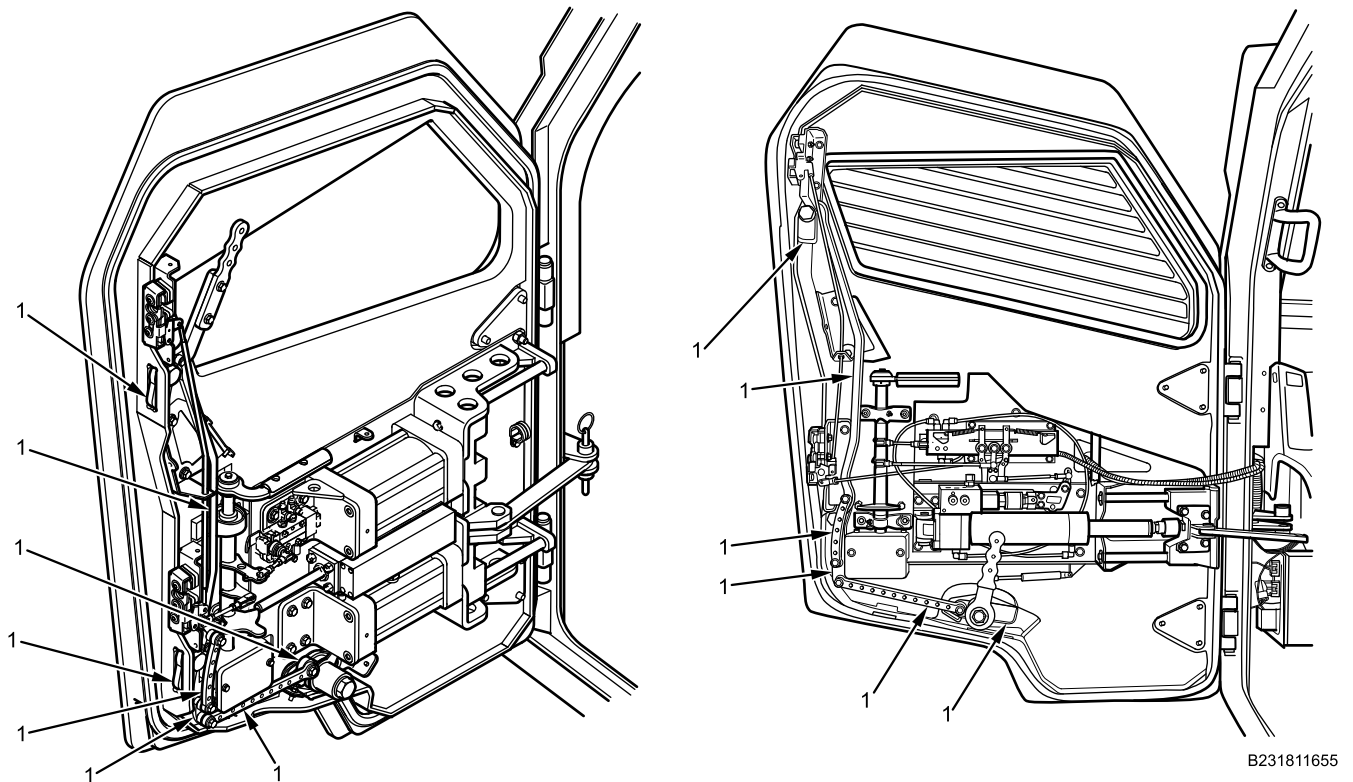
DECISION

YES Go to Step 7.
NO Go to next step.

STEP**NOTE**

Two-piece door with handle near top shown on left; one-piece door with handle near bottom shown on right.

- Visually inspect combat lock linkage (Figure 4, Item 1) for binding, damage, and bent parts.

CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE - (CONTINUED)

B231811655

Figure 4. Combat Lock Linkage.

CONDITION/INDICATION

Does combat lock linkage show evidence of binding, damage, or bent parts?

DECISION

YES Go to Step 8.

NO Go to Step 9.

MALFUNCTION

- 8. Absorber is faulty.

ACTION

If door has one-piece latch near bottom; replace door assembly. Refer to Cabin Door Removal and Installation (WP 0607). If door has two-piece latch near top corner; replace absorber. Refer to Cabin Door Combat Lock Assembly Removal and Installation (WP 0628).

END OF TEST

CABIN DOOR COMBAT LOCK TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 9. Combat lock assembly is faulty.

ACTION

If door has one-piece latch near bottom; replace door assembly. Refer to Cabin Door Removal and Installation (WP 0607). If door has two-piece latch near top corner; replace combat lock assembly. Refer to Cabin Door Combat Lock Assembly Removal and Installation (WP 0628).

END OF TEST**MALFUNCTION**

- 10. Door requires alignment.

ACTION

Align door. Refer to Cabin Door Removal and Installation (WP 0607).

END OF TEST**MALFUNCTION**

- 11. Fasteners require tightening.

ACTION

Tighten fasteners. Refer to Cabin Door Combat Lock Assembly Removal and Installation (WP 0628).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0613

WP 0615

WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0182
WP 0607
WP 0624
WP 0611
WP 0612

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF(TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the cabin doors depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Cabin Door Operational Checkout Procedure (WP 0182) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**STEP****WARNING**

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.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

This procedure is intended to cover cabin door with upper and lower interior combat door locks. Lower combat door lock-type cabin door models can be identified by the interior combat lock handle location near the bottom of the door. Upper combat door lock-type cabin door models have the interior combat lock handle at top rear corner of door.

1. Determine if cabin door will not unlatch from vehicle body, or door will not latch closed. Refer to results from Cabin Door Operational Checkout Procedure (WP 0182).

CONDITION/INDICATION

Is cabin door stuck closed?

DECISION

YES Go to next step.
NO Go to Step 12.

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. Push on interior cabin door handle to open door to the full open position (TM 9-2355-106-10).

CONDITION/INDICATION

Does cabin door unlatch from vehicle body?

DECISION

YES Go to Step 18.

NO Go to next step.

STEP**NOTE**

Right cabin door lower lock assembly shown; Right cabin door upper lock assembly and left cabin door lock assemblies similar.

4. Remove left front or right front seat to gain access to door that is stuck closed. Refer to the appropriate procedure:
- Driver Seat Removal and Installation (WP 0664).
 - Crew and Front Passenger Seat Removal and Installation (WP 0663).

NOTE

Right cabin door lower lock assembly shown; Right cabin door upper lock assembly and left cabin door lock assemblies similar.

5. With standard screwdriver, rotate upper and lower lock assembly bellcranks (Figure 1, Item 2) in direction shown to unlatch lock assemblies (Figure 1, Item 1) and open cabin door.

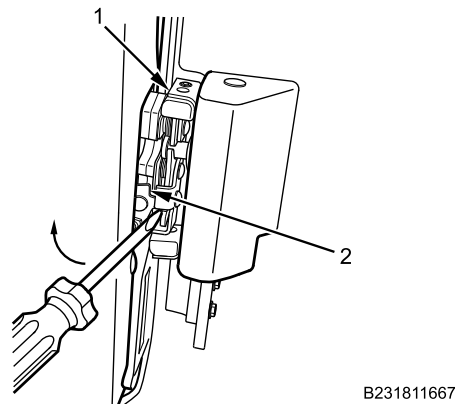


Figure 1. Cabin Door Lower Lock Assembly.

6. Ensure cabin door linkage is adjusted properly. Refer to Cabin Door Linkage Inspection and Adjustment Procedure (Lower Interior Combat Door Lock-type) (WP 0615) or Cabin Door Linkage Inspection and Adjustment Procedure (Upper Interior Combat Door Lock-type) (WP 0616).

CONDITION/INDICATION

Is cabin door linkage adjusted properly?

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to next step.
NO Go to Step 19.

STEP

7. Ensure cabin door is aligned properly. Refer to Cabin Door Removal and Installation (WP 0607).

CONDITION/INDICATION

Is cabin door aligned properly?

DECISION

YES Go to next step.
NO Go to Step 17.

STEP

8. Ensure cabin door strikers and door stops are installed and adjusted properly. Refer to Cabin Door Striker and Cabin Door Check Stop Assemblies Removal and Installation (WP 0613).

CONDITION/INDICATION

Are cabin door strikers and stops properly installed and adjusted?

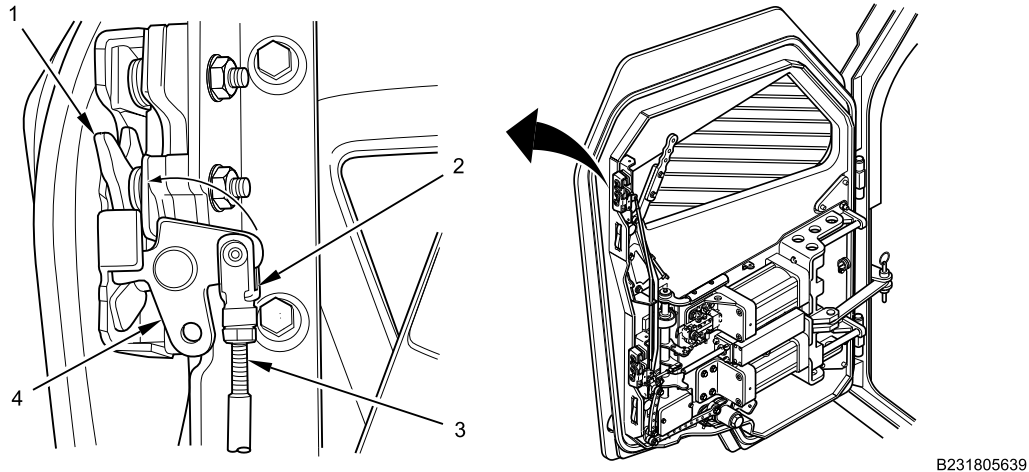
DECISION

YES Go to next step.
NO Go to Step 21.

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP****NOTE**

Cabin door upper interior combat lock-type left door shown, right door similar; Lower interior combat lock-type left and right doors similar.

9. Remove clevis pin (Figure 2, Item 2) and lock rod (Figure 2, Item 3) from bellcrank (Figure 2, Item 4).



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Figure 2. Cabin Door Upper Lock Assembly.

10. Rotate latch (Figure 2, Item 1) inward toward door to close latch.
 11. Rotate bellcrank (Figure 2, Item 4) in direction shown. Latch (Figure 2, Item 1) should open.

CONDITION/INDICATION

Did latch open?

DECISION

YES Go to Step 20.
 NO Go to Step 22.

STEP

12. Ensure cabin door linkage is adjusted properly. Refer to Cabin Door Linkage Inspection and Adjustment Procedure (Lower Interior Combat Door Lock-type) (WP 0615) or Cabin Door Linkage Inspection and Adjustment Procedure (Upper Interior Combat Door Lock-type) (WP 0616).

CONDITION/INDICATION

Is cabin door linkage adjusted properly?

DECISION

YES Go to next step.
 NO Go to Step 19.

STEP

13. Ensure cabin door is aligned properly. Refer to Cabin Door Removal and Installation (WP 0607).

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Is cabin door aligned properly?

DECISION

YES Go to next step.

NO Go to Step 17.

STEP

14. Ensure cabin door strikers and door stops are installed and adjusted properly. Refer to Cabin Door Striker and Cabin Door Check Stop Assemblies Removal and Installation (WP 0613).

CONDITION/INDICATION

Are cabin door strikers and stops properly installed and adjusted?

DECISION

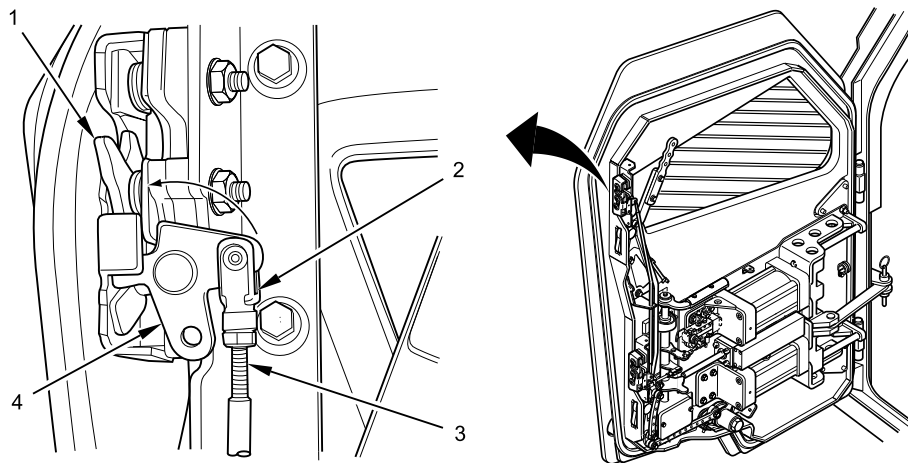
YES Go to next step.

NO Go to Step 21.

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP****NOTE**

Cabin door upper interior combat lock-type left door shown, right door similar; Lower interior combat lock-type left and right doors similar.

15. Remove clevis pin (Figure 3, Item 2) and lock rod (Figure 3, Item 3) from upper door lock bellcrank (Figure 3, Item 4).



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Figure 3. Cabin Door Upper Lock Assembly.

16. Rotate upper door lock latch (Figure 3, Item 1) upward to close. Latch should close and should not open when force is applied to latch.

CONDITION/INDICATION

Does door lock latch close and stay closed when force is applied?

DECISION

YES Go to Step 20.

NO Go to Step 22.

MALFUNCTION

- 17. Door requires alignment.

ACTION

Align door. Refer to Cabin Door Removal and Installation (WP 0607).

END OF TEST**MALFUNCTION**

- 18. Interior door handle assembly is faulty.

ACTION

Lower interior combat lock-type models: replace door assembly. Refer to Cabin Door Removal and Installation (WP 0607). Upper interior combat lock-type models: replace cabin door interior handle assembly. Refer to

CABIN DOOR LOCK ASSEMBLY TROUBLESHOOTING PROCEDURE - (CONTINUED)

Cabin Door Interior Handle Assembly Removal and Installation (Dual-Piston Upper Interior Combat Lock-type) (WP 0624).

END OF TEST**MALFUNCTION**

- 19. Cabin door linkage requires adjustment.

ACTION

Refer to Cabin Door Linkage Inspection and Adjustment Procedure (Lower Interior Combat Lock-type) (WP 0615) or Cabin Door Linkage Inspection and Adjustment Procedure (Upper Interior Combat Lock-type) (WP 0616).

END OF TEST**MALFUNCTION**

- 20. Lower lock assembly is faulty.

ACTION

Replace lower lock assembly. Refer to Lower Cabin Door Lock, Spacer, and Bracket Removal and Installation (WP 0612).

END OF TEST**MALFUNCTION**

- 21. Cabin door strikers or stops require proper installation or replacement.

ACTION

Refer to Cabin Door Striker and Cabin Door Check Stop Assemblies Removal and Installation (WP 0613).

END OF TEST**MALFUNCTION**

- 22. Upper lock assembly is faulty.

ACTION

Replace upper door lock assembly. Refer to Upper Cabin Door Lock, Spacer, and Bracket Removal and Installation (WP 0611).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Test Equipment**

Pressure Test Kit (WP 0795, Item 77)

WP 0618

WP 0619

WP 0620

Tools and Special ToolsGeneral Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0621

WP 0622

WP 0500

Materials/Parts

Goggles, industrial (WP 0794, Item 20)

WP 0626

WP 0627

WP 0600

Personnel Required

Maintainer - (2)

WP 0598

WP 0782

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0182

WP 0607

WP 0608

WP 0617

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch OFF (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the cabin doors depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Cabin Door Operational Checkout Procedure (WP 0182) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**WARNING**

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.

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.

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

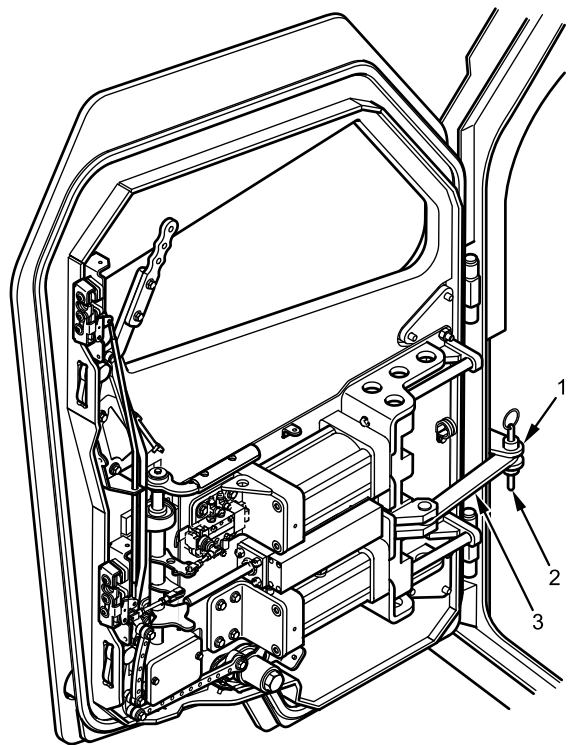
Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

This procedure is intended to cover two styles of cabin door. Doors can be identified by the position of the interior combat lock handle. Some are a single cylinder located near the bottom of the door. Others have a dual cylinder and a combat lock handle at top rear corner of door.

STEP**NOTE**

Left upper interior combat lock configuration shown; lower left and right door configurations are similar.

1. Ensure check link (Figure 1, Item 3) and retaining pin (Figure 1, Item 2) are installed on A-pillar bracket (Figure 1, Item 1).



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Figure 1. Cabin Door Check Link.

CONDITION/INDICATION

Was check link and retaining pin installed on A-pillar bracket?

DECISION

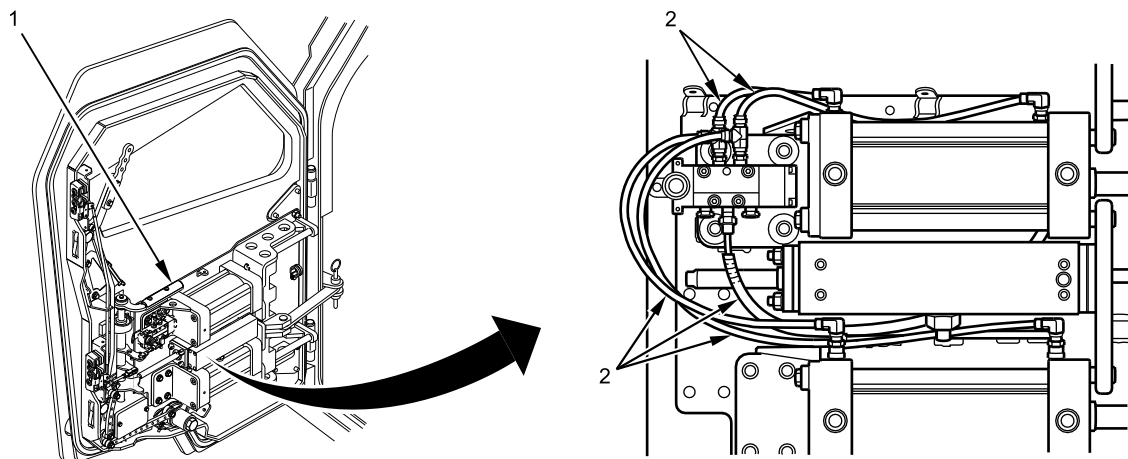
YES Go to next step.
NO Go to Step 53.

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP****WARNING**

Cabin door must be secured in the open position by using heavy duty winch straps to prevent accidental closure during vehicle maintenance. Pull check link retaining pin prior to securing door open. Failure to comply may result in serious injury or death to personnel.

Use the appropriate lifting strap sling or chain hoist for the type of load. Always clean and inspect lifting strap slings and chain hoists prior to use. Inspect for damage such as wear, corrosion, elongation, tears, or punctures. Replace lifting strap slings or chain hoists that are damaged. Failure to comply may result in component damage and death or injury to personnel.

2. Open and secure door. Refer to Securing Cabin Door for Service (WP 0608).
3. Remove door trim from door that does not operate properly. Remove both sides if necessary. Refer to Cabin Door Trim Panel Removal and Installation (One-Piece) (WP 0626) or Cabin Door Trim Panel Removal and Installation (Two-Piece) (WP 0627).
4. Turn MAIN POWER switch ON (TM 9-2355-106-10).
5. Start engine (TM 9-2355-106-10).
6. Allow primary air tank pressure to build to 100 psi (689.5 kPa).
7. Pull interior door handle (Figure 2, Item 1) while inspecting air lines (Figure 2, Item 2) for leaks.



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Figure 2. Cabin Door Actuator Air Lines.

8. Push interior door handle (Figure 2, Item 1) while inspecting air lines (Figure 2, Item 2) for leaks.

CONDITION/INDICATION

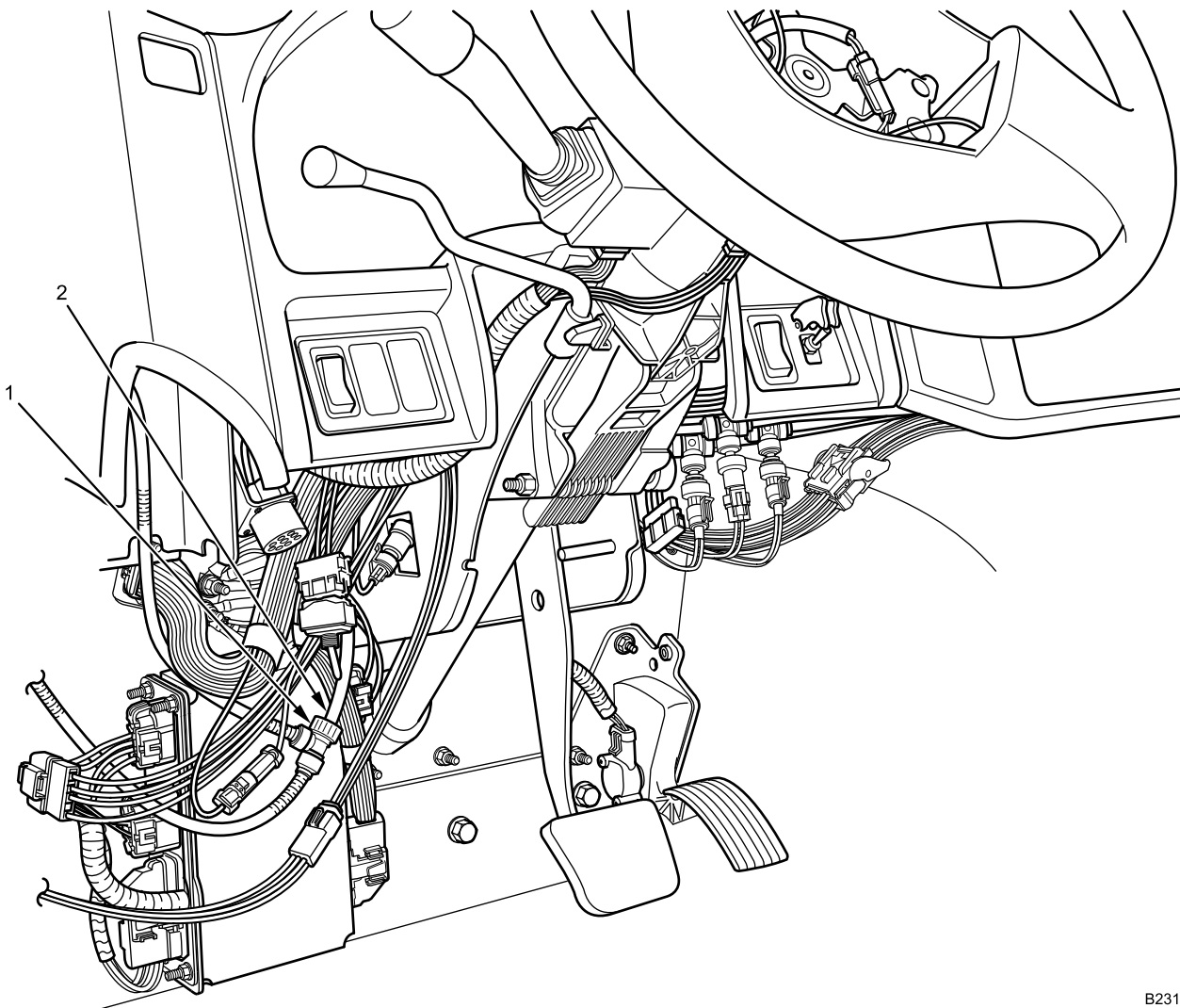
Is an air line leaking?

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

- YES Go to Step 48.
NO Go to next step.

STEP

9. Turn ignition switch OFF (TM 9-2355-106-10).
10. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
11. Apply and release brake pedal until primary air tank pressure drops below 75 psi (517 kPa) (TM 9-2355-106-10).
12. Disconnect BLUE air hose (Figure 3, Item 2) from air hose tee (Figure 3, Item 1).



B231805692

Figure 3. Cabin Doors Supply Air Line Tee.

13. Install pressure test kit air line (Figure 4, Item 2) on gauge 5 (Figure 4, Item 1).

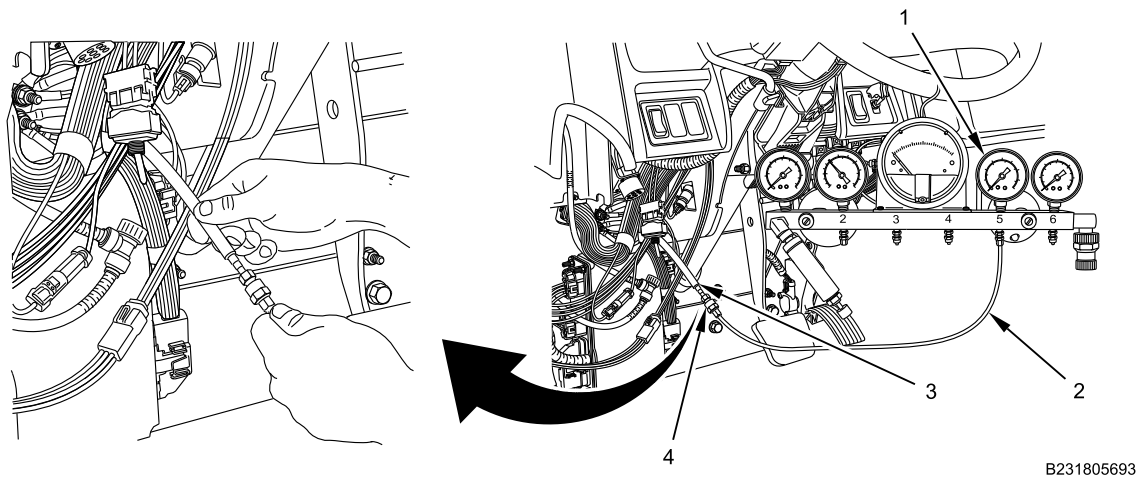
CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)

Figure 4. Pressure Test Kit Installed in Cabin.

14. Install barbed fitting (Figure 4, Item 4) on other end of test kit air line (Figure 4, Item 2).

CAUTION

Do not force barbed fitting into BLUE air hose. Barbed fitting can become stuck causing damage to air hose.

15. With assistant, hold barbed fitting (Figure 4, Item 4) on BLUE air hose (Figure 4, Item 3) securely.
16. Turn MAIN POWER switch ON (TM 9-2355-106-10).
17. Start engine (TM 9-2355-106-10).

NOTE

Test gauge will not read pressure until primary air tank pressure is above 75-90 psi (517-620.5 kPa).

18. Allow primary and secondary air tank pressure to climb to 100 psi (689.5 kPa) (TM 9-2355-106-10).

CONDITION/INDICATION

Does test gauge read above 75 psi (517 kPa)?

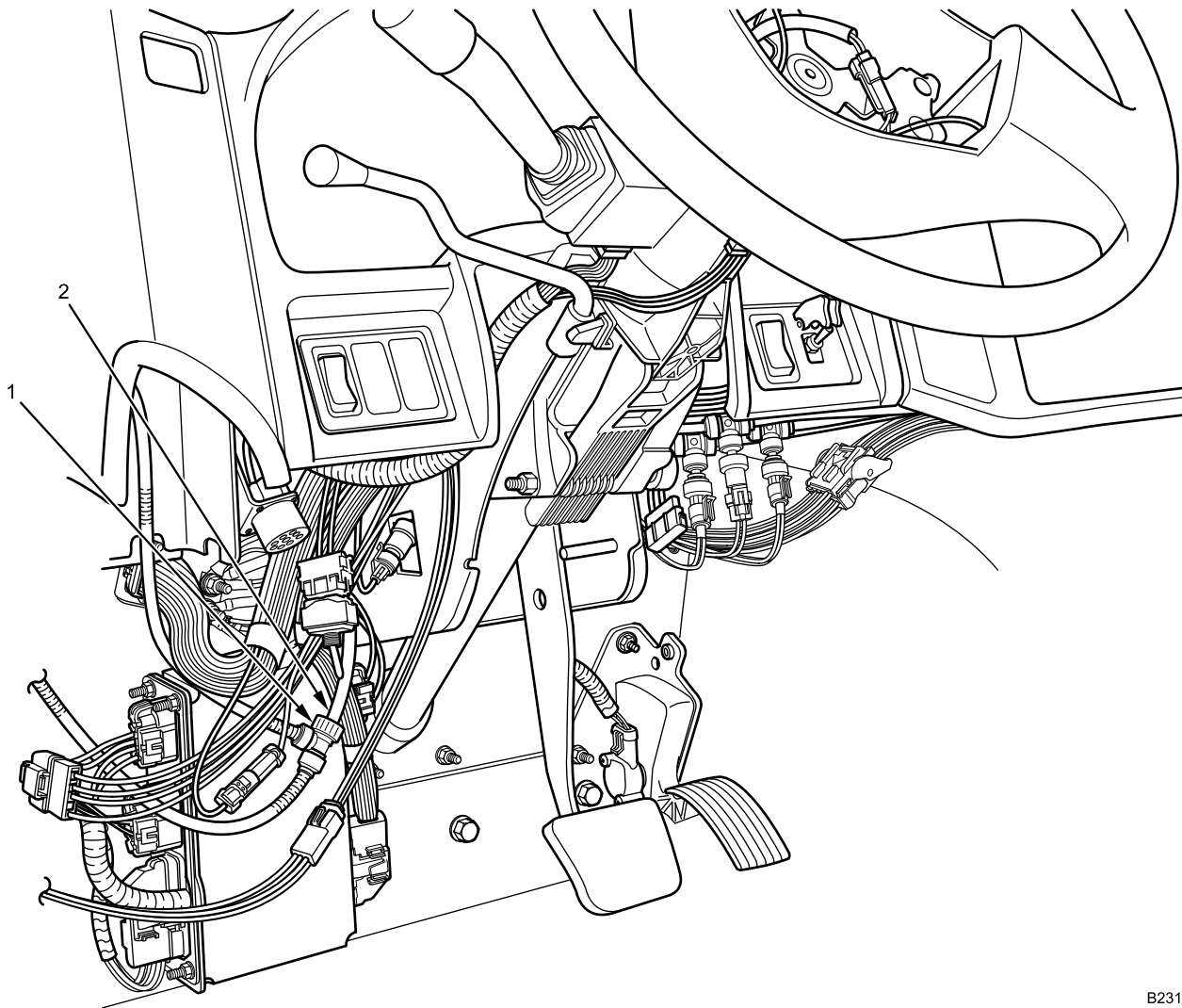
DECISION

YES Go to Step 29.
NO Go to next step.

STEP

19. Turn ignition switch OFF (TM 9-2355-106-10).
20. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
21. Remove barbed fitting (Figure 4, Item 4) from BLUE air hose (Figure 4, Item 3).
22. Connect BLUE air hose (Figure 5, Item 2) to air hose tee (Figure 5, Item 1).

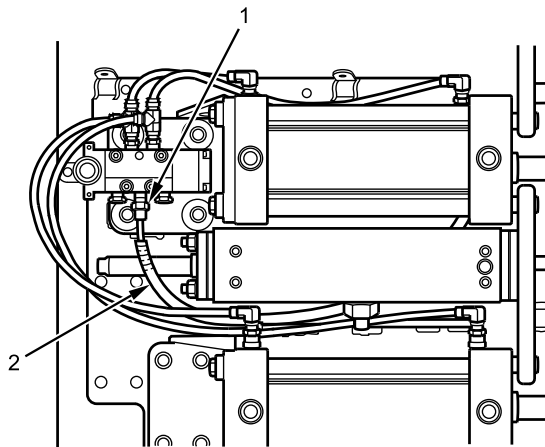
CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)



B231805692

Figure 5. Cabin Doors Supply Air Line Tee.

23. Remove opposite side door trim panel. Refer to Cabin Door Trim Panel Removal and Installation (One-Piece) (WP 0626) or Cabin Door Trim Panel Removal and Installation (Two-Piece) (WP 0627).
24. Disconnect left and right cabin door air supply lines (Figure 6, Item 2) from manual air valve fitting (Figure 6, Item 1).

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)

B231805694

Figure 6. Cabin Door Air Supply Line.

25. Turn MAIN POWER switch ON (TM 9-2355-106-10).
26. Start engine (TM 9-2355-106-10).
27. Allow primary and secondary air tank pressure to increase to 80 psi (552 kPa) or more (TM 9-2355-106-10).

CONDITION/INDICATION

Do left and right door air supply lines emit about the same amount of air?

DECISION

YES Go to Step 46.
NO Go to next step.

STEP

28. Refer to results from last test.

CONDITION/INDICATION

Does left door supply air line emit less air than right door supply air line?

DECISION

YES Go to Step 50.
NO Go to Step 52.

STEP

29. Turn ignition switch OFF (TM 9-2355-106-10).
30. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
31. Remove left side engine armor. Refer to Left Side Engine Armor Plate Removal and Installation (WP 0598).
32. Apply and release brake pedal until primary air tank pressure drops below 75 psi (517 kPa) (TM 9-2355-106-10).

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

There are two BLUE air hoses with unions under the PDC. The smaller diameter BLUE air hose is for the cabin door assist system.

33. Disconnect BLUE air hose (Figure 7, Item 2) from air hose union (Figure 7, Item 1).

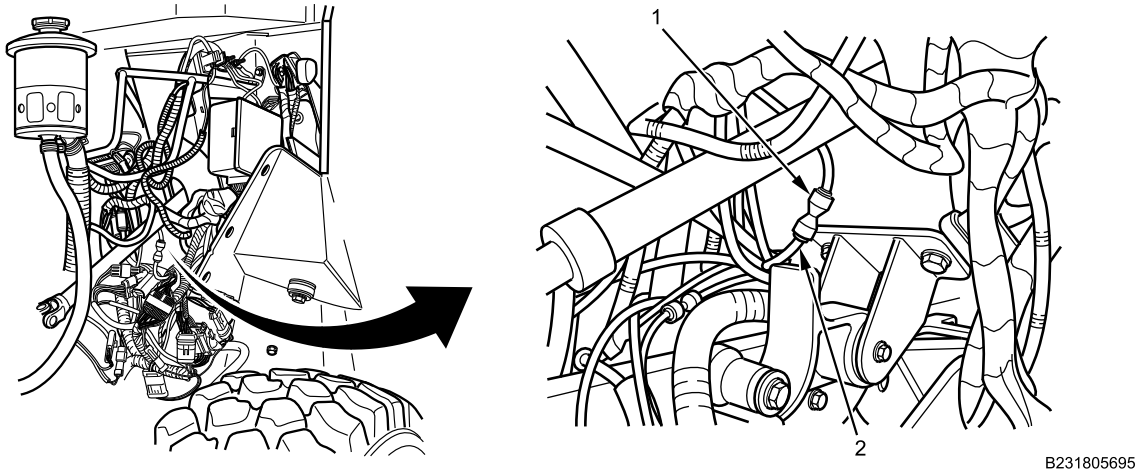


Figure 7. Left Side Engine Compartment Area.

CAUTION

Do not force barbed fitting into BLUE air hose. Barbed fitting can become stuck causing damage to air hose.

34. With assistant, hold barbed fitting (Figure 8, Item 2) on BLUE air hose (Figure 8, Item 1) securely.

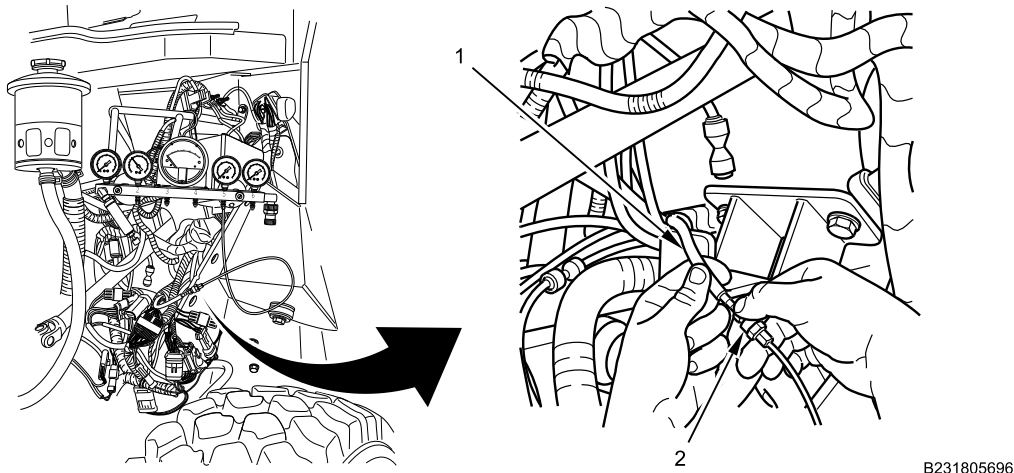


Figure 8. Pressure Test Kit Installed in Engine Compartment.

35. Turn MAIN POWER switch ON (TM 9-2355-106-10).
36. Start engine (TM 9-2355-106-10).

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**NOTE**

Test gauge will not read pressure until primary air tank pressure is above 75-90 psi (517-620.5 kPa).

37. Allow primary and secondary air tank pressure to climb to 100 psi (689.5 kPa) (TM 9-2355-106-10).

CONDITION/INDICATION

Does test gauge read above 75 psi (517 kPa)?

DECISION

YES Go to Step 51.

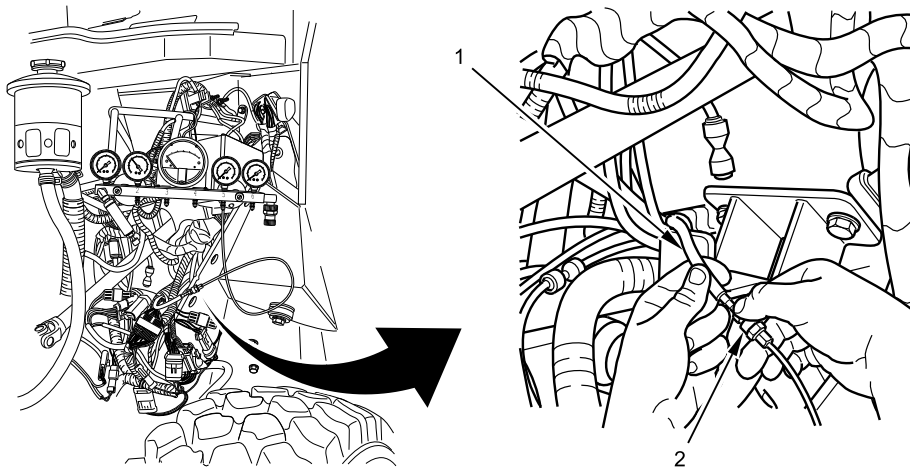
NO Go to next step.

STEP

38. Turn ignition switch OFF (TM 9-2355-106-10).

39. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

40. Remove barbed fitting (Figure 9, Item 2) from BLUE air hose (Figure 9, Item 1).

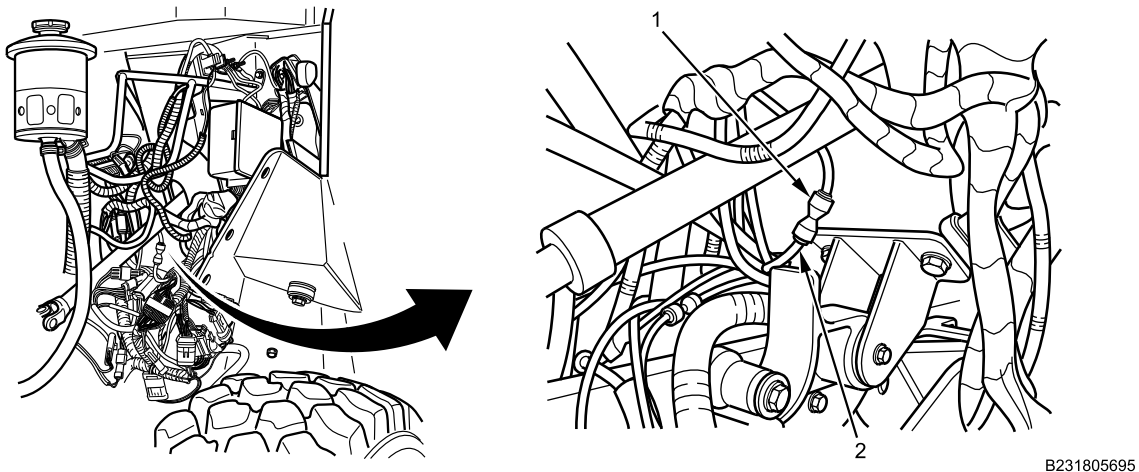


B231805696

Figure 9. Pressure Test Kit Installed in Engine Compartment.

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)

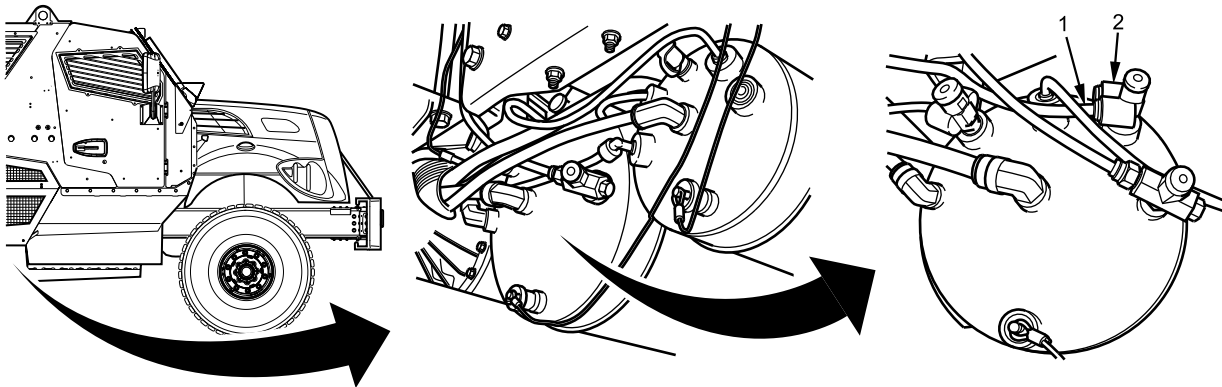
41. Install BLUE hose (Figure 10, Item 2) on air hose union (Figure 10, Item 1).



B231805695

Figure 10. Left Side Engine Compartment Area.

42. Disconnect BLUE air hose (Figure 11, Item 1) from primary air tank limit valve.(Figure 11, Item 2).



B231805697

Figure 11. Primary Air Tank Reservoir.

43. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 44. Start engine (TM 9-2355-106-10).
 45. Allow primary and secondary air tank pressure to climb to 100 psi (689.5 kPa) (TM 9-2355-106-10).

CONDITION/INDICATION

Does air emit from primary air tank limit valve when primary air tank pressure exceeds 75-90 psi (517-620.5 kPa)?

DECISION

YES Go to Step 47.
 NO Go to Step 49.

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 46. Actuator assembly is faulty.

ACTION

- One-piece models with handle near bottom: Replace cabin door assembly for door that does not operate properly. Refer to Cabin Door Removal and Installation (WP 0607). Return vehicle to service.
- Two-piece models with handle in top corner: Replace actuator assembly for door that does not operate properly. Refer to Dual-Pneumatic Door Actuator Removal and Installation (WP 0617). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 47. Air hose is faulty.

ACTION

Replace air hose. Refer to Cabin Door Assist System Supply Air Line Tubing Removal and Installation (WP 0622). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 48. Air line is faulty.

ACTION

Replace leaking air line. Refer to Cabin Door Assist System Actuator Air Line Tubing Removal and Installation (WP 0618). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 49. Limit valve is faulty.

ACTION

Replace limit valve. Refer to Cabin Door Assist System Limit Valve Removal and Installation (WP 0500). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. Left door air supply line is faulty.

ACTION

Replace air line. Refer to Left Cabin Door Assist System Supply Air Line Tubing Removal and Installation (WP 0619). Return vehicle to service.

CABIN DOOR ASSIST SYSTEM TROUBLESHOOTING PROCEDURE - (CONTINUED)**END OF TEST****MALFUNCTION**

- 51. Air hose is faulty.

ACTION

Replace air hose. Refer to Cabin Door Assist System Supply Pass-Through Air Line Tubing Removal and Installation (WP 0621). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 52. Right door air supply line is faulty.

ACTION

Replace air line. Refer to Right Cabin Door Assist System Supply Air Line Tubing Removal and Installation (WP 0620). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 53. Check link is disconnected.

ACTION

Install check link. Refer to Securing Cabin Door for Service (WP 0608). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
WINCH TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Gloves, rubber (WP 0795, Item 38)
Terminal Test Kit (WP 0795, Item 122)

WP 0342
WP 0344
WP 0604
WP 0678
WP 0782

Materials/Parts

Goggles, industrial (WP 0794, Item 20)
Face Shield, industrial (WP 0794, Item 16)

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0032
WP 0448

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Winch remote control disconnected (TM
9-2355-106-10)

Drawings Required

WP 0789, Figure 48

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**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.

Use extreme caution when testing or working on or around winch power cables. Power to winch is always live regardless of ignition switch and MAIN POWER switch states. 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, seek medical assistance. Failure to comply may result in serious injury or death to personnel.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

1. With assistance, measure resistance between each remote control electrical connector terminals A, B, and C and metal connector casing with multimeter. Refer to Figure 1.

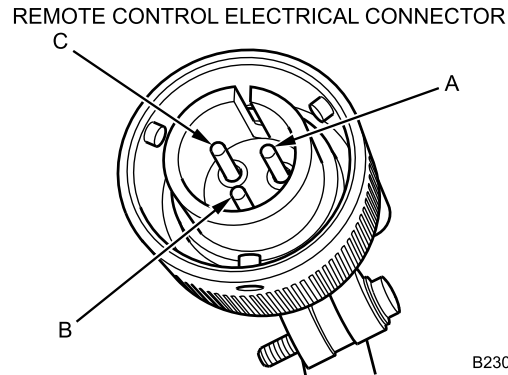


Figure 1. Remote Control Electrical Connector.

CONDITION/INDICATION

Did multimeter read OL on all three tests?

DECISION

NO Go to Step 20.
 YES Go to next step.

STEP

2. With assistance, measure resistance between remote control electrical connector terminals A and B with multimeter while pressing the remote control switch cable-out position (Figure 2, Item 1). Refer to Figure 1.

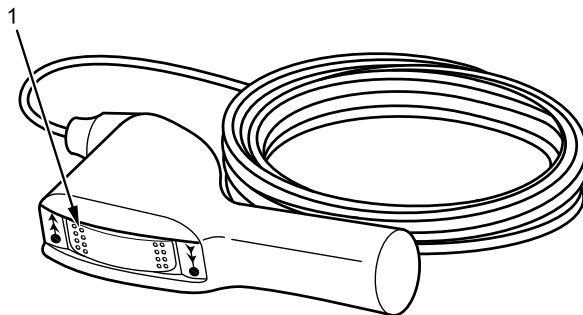


Figure 2. Remote Control Cable-Out Switch.

CONDITION/INDICATION

Does multimeter read less than 1 ohm?

DECISION

NO Go to Step 20.
 YES Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

3. With assistance, measure resistance on remote control electrical connector terminals A and C with multimeter while pressing the remote control switch cable-in position (Figure 4, Item 1). Refer to Figure 3.

REMOTE CONTROL ELECTRICAL CONNECTOR

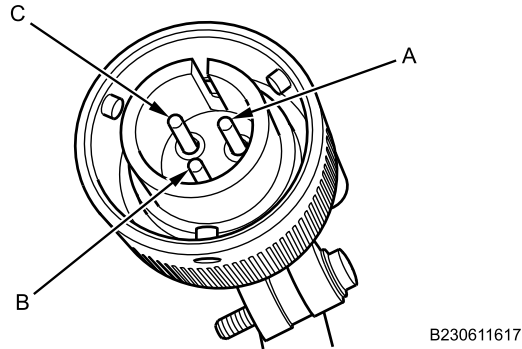


Figure 3. Remote Control Electrical Connector.

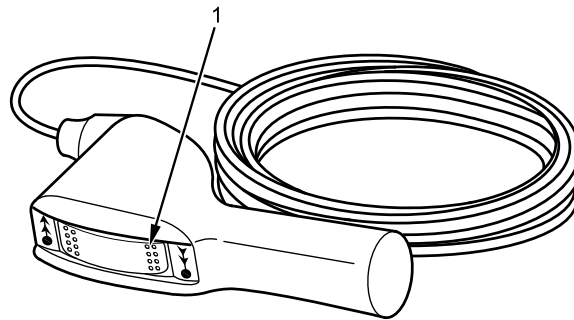


Figure 4. Remote Control Cable-In Switch.

CONDITION/INDICATION

Does multimeter read less than 1 ohm?

DECISION

NO Go to Step 20.
 YES Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

4. Measure DC voltage on winch battery cable junction block between positive (Figure 5, Item 1) and negative (Figure 5, Item 2) terminals with multimeter.

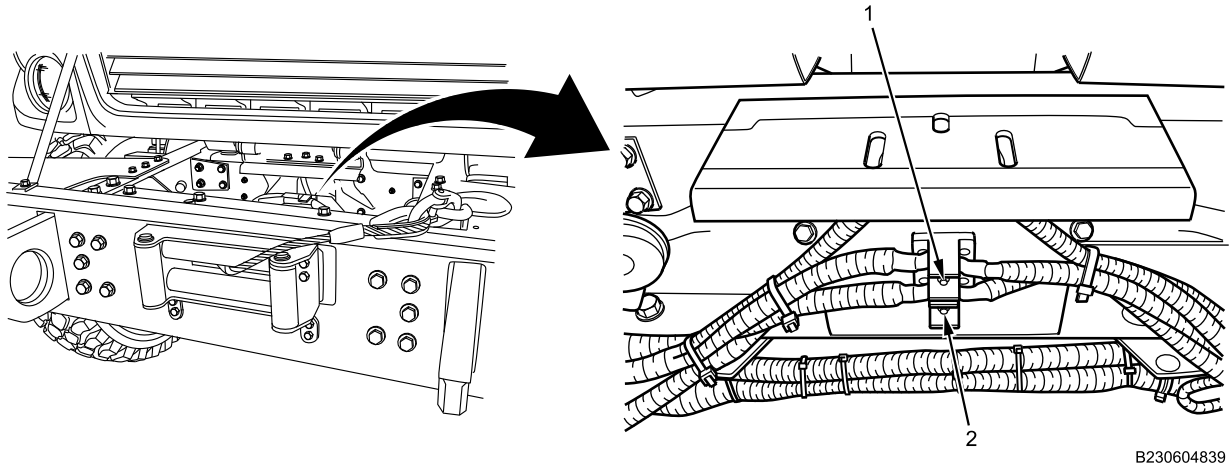


Figure 5. Winch Power and Ground Junction Block.

CONDITION/INDICATION

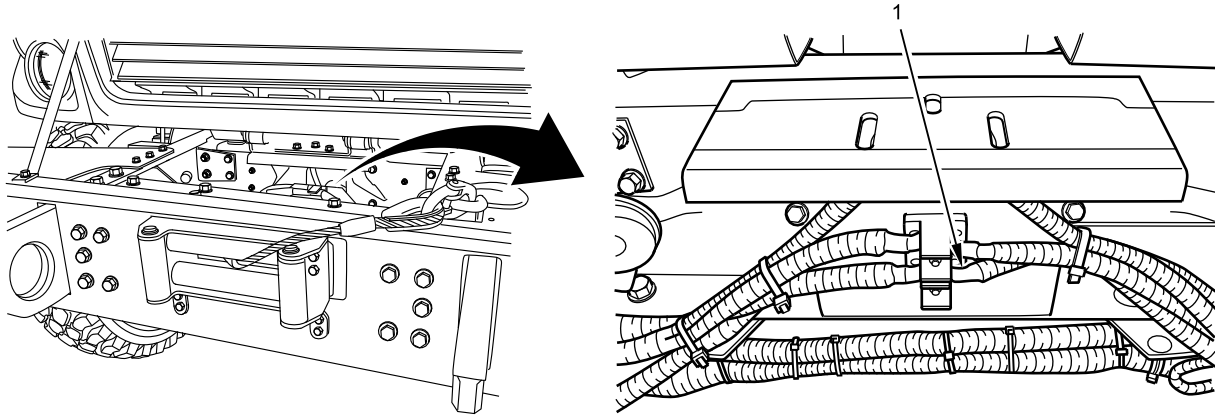
Does multimeter read between 22V and 26V?

DECISION

YES Go to Step 24.
NO Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Measure resistance between winch ground cable (Figure 6, Item 1) and ground with multimeter.



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Figure 6. Winch Ground Cable at Junction Block.

CONDITION/INDICATION

Does multimeter read less than 1 ohm?

DECISION

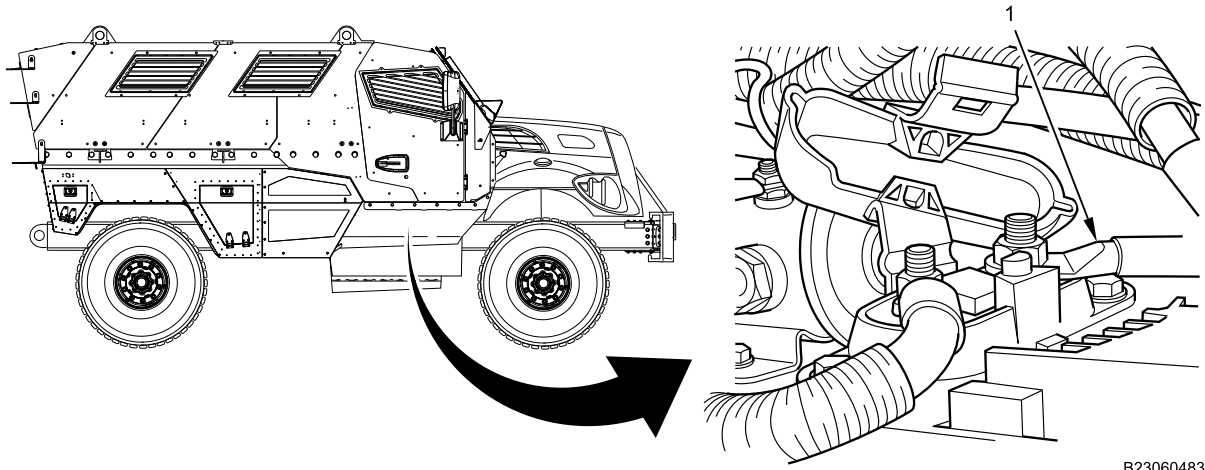
NO Go to Step 27.
YES Go to next step.

STEP

6. Remove Exterior Battery Box Armor Door. Refer to Exterior Battery Box Armor Door Removal and Installation (WP 0604).

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)

7. Measure DC voltage between winch power feed cable (Figure 7, Item 1) and ground with multimeter.



B230604835

Figure 7. Megafuse Winch Power Feed.

CONDITION/INDICATION

Does multimeter read between 22V and 26V?

DECISION

YES Go to Step 25.
NO Go to next step.

STEP

8. Measure resistance between winch power feed cable (Figure 7, Item 1) and ground with multimeter.

CONDITION/INDICATION

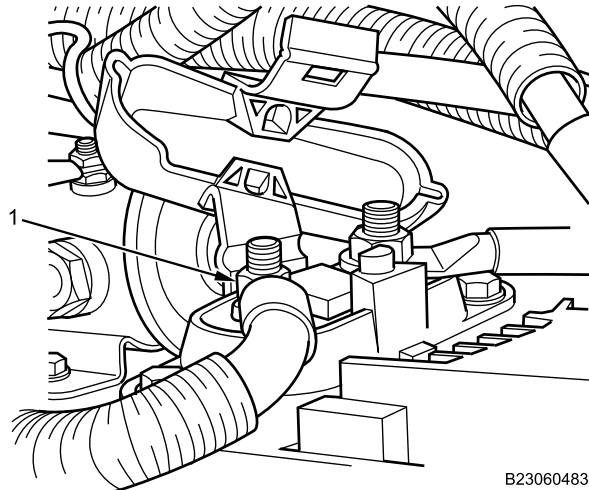
Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 13.
NO Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

9. Measure DC voltage between megafuse power feed cable (Figure 8, Item 1) and ground with multimeter.



B230604834

Figure 8. Megafuse Power Feed.

CONDITION/INDICATION

Does multimeter read between 22V and 26V?

DECISION

YES Go to Step 17.
NO Go to next step.

STEP

10. Measure resistance between megafuse power feed cable (Figure 8, Item 1) and ground with multimeter.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 15.
NO Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

11. Measure DC voltage between 24V switch solenoid post (Figure 9, Item 1) and ground with multimeter.

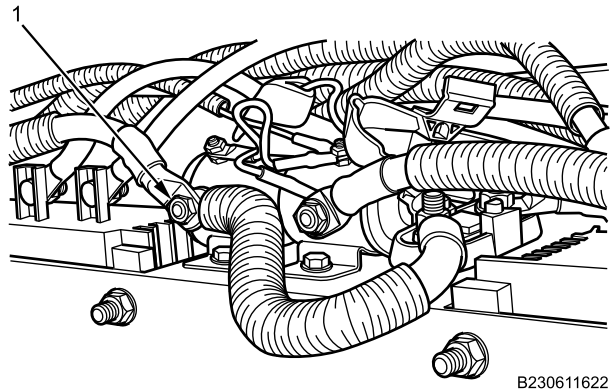


Figure 9. Megafuse Power Feed Cable.

CONDITION/INDICATION

Does multimeter read between 22V and 26V?

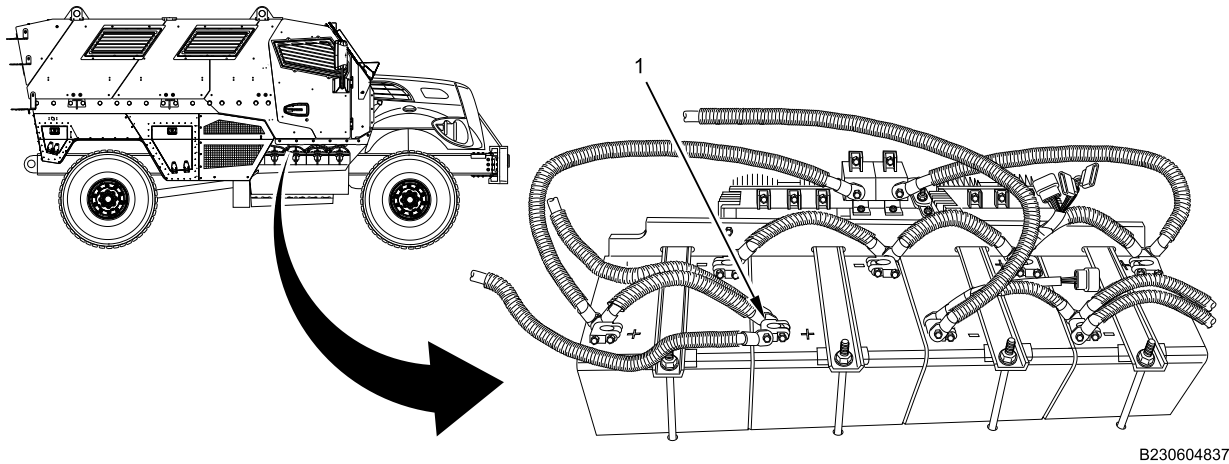
DECISION

YES Step 22.

NO Go to next step.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

12. Measure DC voltage from battery positive cable terminal (Figure 10, Item 1) to ground with multimeter.



B230604837

Figure 10. 24V Battery Positive Terminal Test Point.

CONDITION/INDICATION

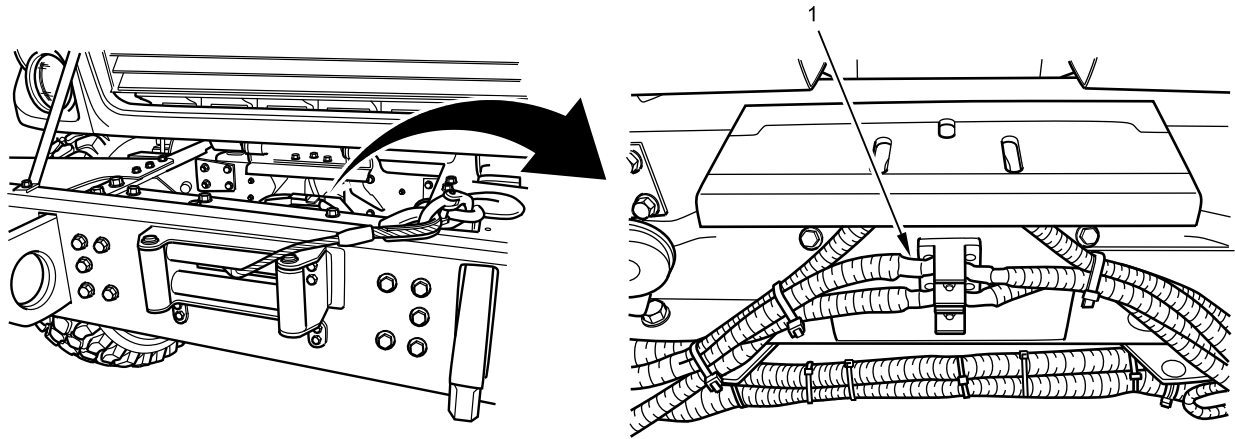
Does multimeter read between 22V and 26V?

DECISION

NO Go to Step 21.
YES Go to Step 18.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

13. Disconnect winch power cable. Refer to Battery Cable Junction Block Support Assembly Removal and Installation (WP 0415).
14. Measure resistance between winch power feed cable (Figure 11, Item 1) and ground with multimeter.



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Figure 11. Winch Power Feed Cable.

CONDITION/INDICATION

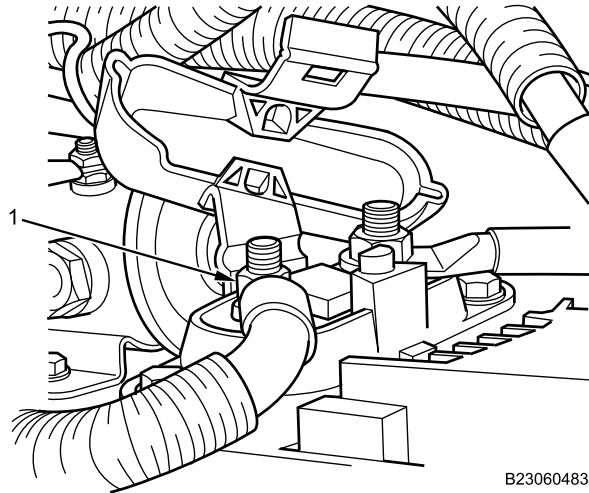
Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 28.
YES Go to Step 26.

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

15. Disconnect batteries. Refer to Battery Disconnect Procedure (WP 0404).
 16. Measure resistance between megafuse power feed cable (Figure 12, Item 1) and ground with multimeter.



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Figure 12. Megafuse Power Feed.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 19
 YES Go to Step 23.

MALFUNCTION

- 17. Faulty megafuse.

ACTION

Replace megafuse. Refer to Winch Megafuse and Holder Removal and Installation (WP 0448). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 18. Faulty cable.

ACTION

Replace 24V battery disconnect switch solenoid feed cable. Refer to 24V Battery Disconnect Switch Solenoid Feed Cable Removal and Installation (WP 0343).

END OF TEST

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 19. Faulty cable.

ACTION

Replace megafuse. Refer to Winch Megafuse and Holder Removal and Installation (WP 0448). Replace 24V battery disconnect switch solenoid feed cable. Refer to 24V Battery Disconnect Switch Solenoid Feed Cable Removal and Installation (WP 0343).

END OF TEST**MALFUNCTION**

- 20. Winch remote control faulty.

ACTION

Replace winch remote control.

END OF TEST**MALFUNCTION**

- 21. Faulty battery or batteries.

ACTION

Refer to Battery Power Troubleshooting Procedures (WP 0032).

END OF TEST**MALFUNCTION**

- 22. Faulty cable.

ACTION

Replace megafuse power feed cable. Refer to Winch Megafuse Feed Cable Removal and Installation (WP 0344).

END OF TEST**MALFUNCTION**

- 23. Faulty cable.

ACTION

Replace megafuse. Refer to Winch Megafuse and Holder Removal and Installation (WP 0448). Replace megafuse power feed cable. Refer to Winch Megafuse Feed Cable Removal and Installation (WP 0344).

END OF TEST

WINCH TROUBLESHOOTING PROCEDURE - (CONTINUED)**MALFUNCTION**

- 24. Faulty winch assembly.

ACTION

Replace winch assembly. Refer to Winch Assembly Removal and Installation (WP 0678).

END OF TEST**MALFUNCTION**

- 25. Faulty cable.

ACTION

Replace winch power feed cable. Refer to Winch Feed Cables Removal and Installation (WP 0416).

END OF TEST**MALFUNCTION**

- 26. Faulty cable.

ACTION

Replace megafuse. Refer to Winch Megafuse and Holder Removal and Installation (WP 0448). Replace winch power feed cable. Refer to Winch Feed Cables Removal and Installation (WP 0416).

END OF TEST**MALFUNCTION**

- 27. Faulty cable.

ACTION

Replace winch ground cable. Refer to Winch Feed and Ground Cables Removal and Installation (WP 0417).

END OF TEST**MALFUNCTION**

- 28. Faulty winch assembly.

ACTION

Replace megafuse. Refer to Winch Megafuse and Holder Removal and Installation (WP 0448). Replace winch assembly. Refer to Winch Assembly Removal and Installation (WP 0678).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION)

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0581
WP 0690
WP 0692
WP 0696
WP 0699
WP 0700
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0319
WP 0309
WP 0310
WP 0432
WP 0443
WP 0444
WP 0580

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Hydraulic pump cover removed (WP 0690)

Drawings Required

WP 0789, Figure 28

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

TROUBLESHOOTING PROCEDURE

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.

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.

Check for hydraulic leak location visually from at least an arm's length away and not within the path of the leak. If leak is suspected in a blind area, use scrap pieces of material such as cardboard or wood to check for location. Never use hand or other body parts. Failure to comply may result in serious injury, amputation, or death to personnel.

Never touch any part of a hydraulic assembly before it is known that the 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.

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.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

CAUTION

Hydraulic reservoir must contain a minimum of 1.25 gallons (4.73 L) of hydraulic fluid for proper operation. Failure to comply may result in electric motor failure or damage to equipment.

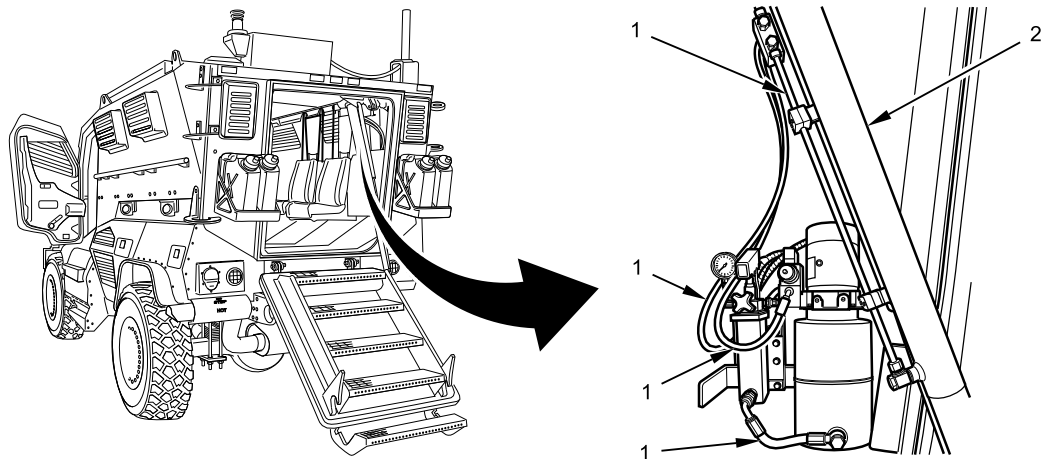
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Visually check hydraulic lines (Figure 1, Item 1) for leaks, and hydraulic cylinder (Figure 1, Item 2) for damage or missing parts (TM 9-2355-106-10).



B230606029

Figure 1. Hydraulic Cylinder.

CONDITION/INDICATION

Do hydraulic lines or hydraulic cylinder have any leaks, missing parts, or damage?

DECISION

YES Go to Step 56.
NO Go to next step.

STEP

2. Check hydraulic reservoir for proper hydraulic fluid level. Refer to Rear Door/Ramp Hydraulic Reservoir Fluid Fill Procedure (WP 0699).

CONDITION/INDICATION

Does hydraulic reservoir contain at least 1.25 gal. (4.73 L) hydraulic fluid?

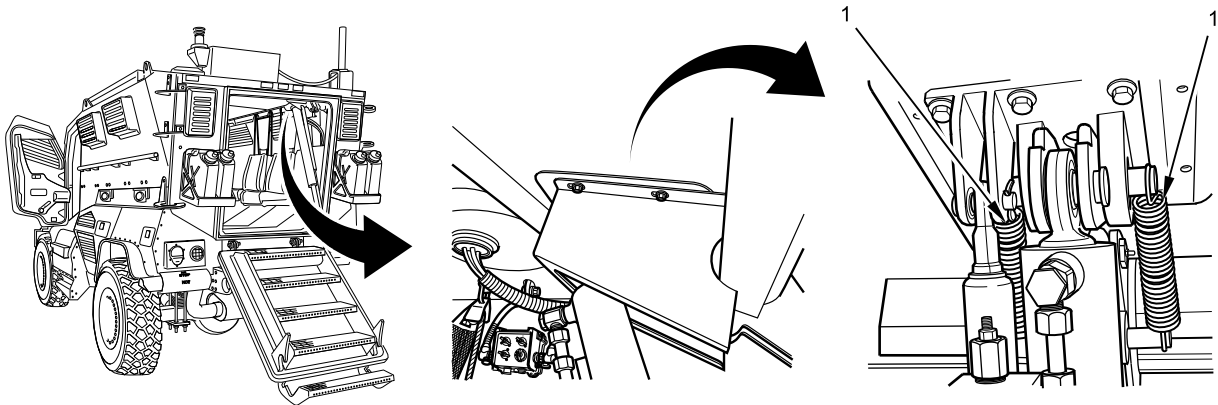
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

DECISION

NO Go to Step 59.
YES Go to next step.

STEP

3. Visually check hydraulic ramp springs (Figure 2, Item 1) for damage or missing parts.



B230605629

Figure 2. Hydraulic Ramp Springs.

CONDITION/INDICATION

Do hydraulic ramp springs have any missing or damaged parts?

DECISION

YES Go to Step 56.
NO Go to next step.

STEP

4. Manually open/close rear ramp door (TM 9-2355-106-10).

CONDITION/INDICATION

Does rear ramp door open/close manually?

DECISION

NO Go to Step 56.
YES Go to next step.

STEP

5. Make sure both plungers (Figure 3, Item 1 and 2) on pump are open by turning counterclockwise (TM 9-2355-106-10).

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

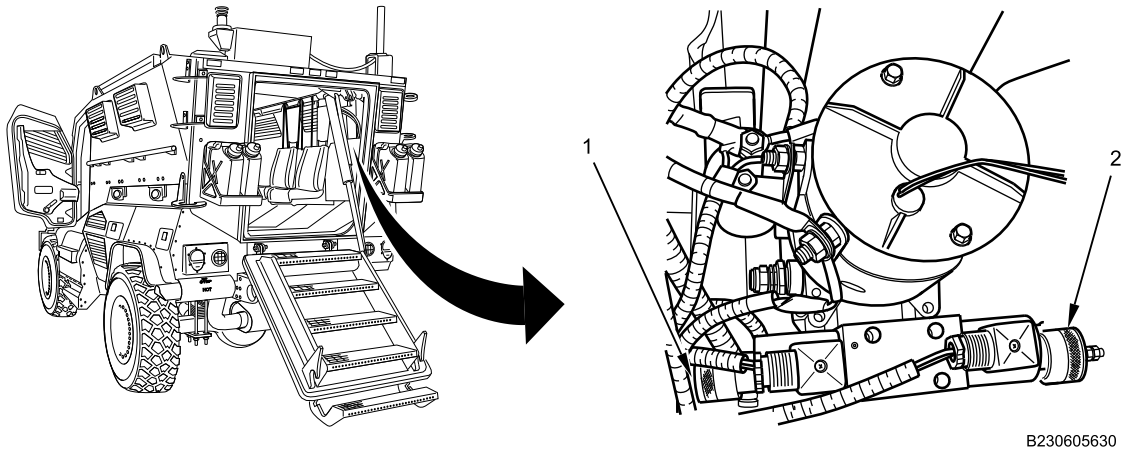


Figure 3. Manual Solenoid Valves.

6. Turn MAIN POWER switch ON (TM 9-2355-106-10).
7. Using rear door/ramp rear switch (Figure 4, Item 1), open ramp (TM 9-2355-106-10).

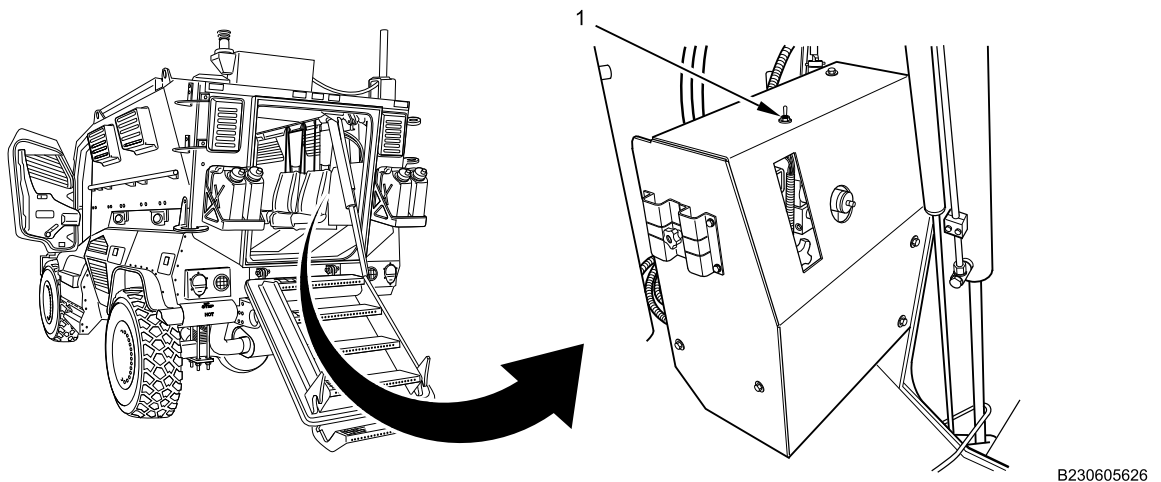


Figure 4. Rear Door/Ramp Rear Switch.

CONDITION/INDICATION

Did ramp open?

DECISION

NO Go to Step 9.
YES Go to next step.

STEP

8. Using rear door/ramp rear switch, close ramp (TM 9-2355-106-10).

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

CONDITION/INDICATION

Did ramp close?

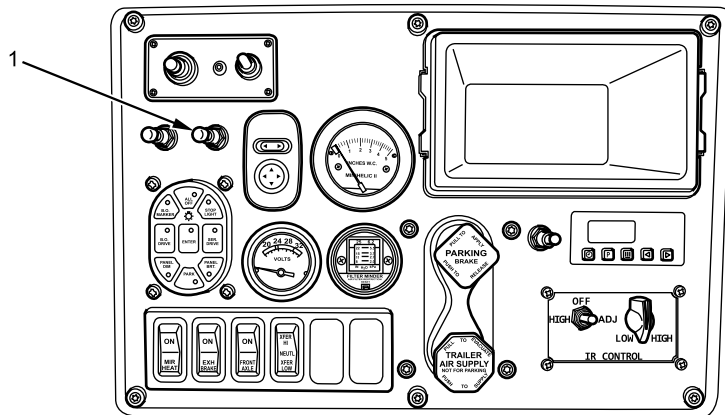
DECISION

YES Go to Step 38.

NO Go to Step 37.

STEP

9. Using master rear door/ramp switch (Figure 5, Item 1), open ramp (TM 9-2355-106-10).



B230605625

Figure 5. Master Rear Door/Ramp Switch.

CONDITION/INDICATION

Did ramp open?

DECISION

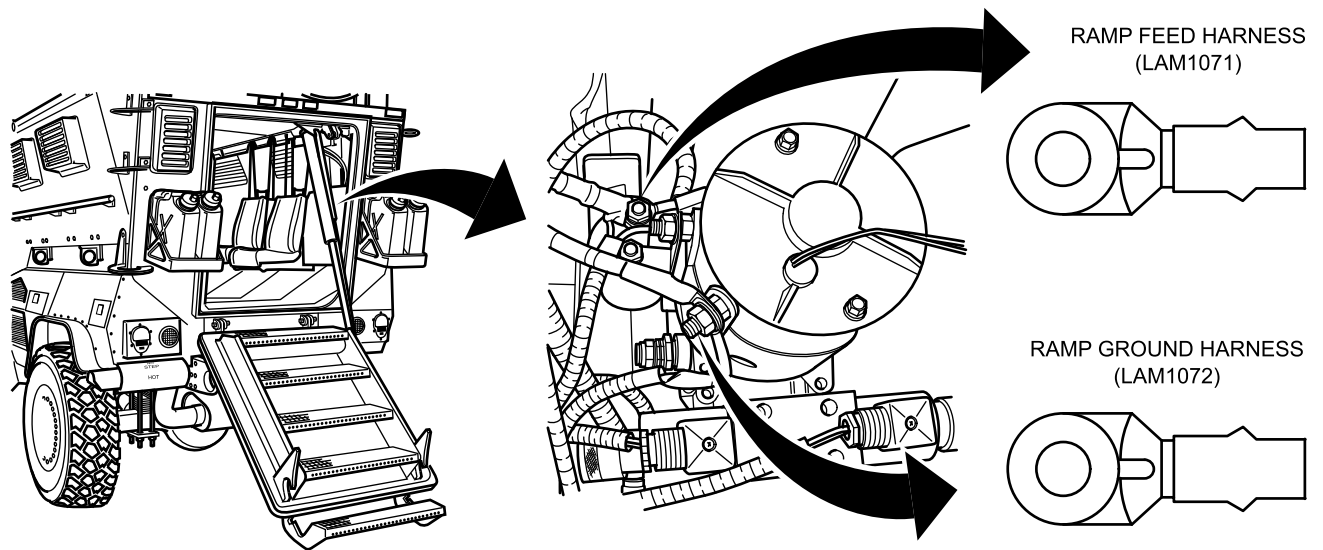
YES Go to Step 51.

NO Go to next step.

STEP

10. Measure DC voltage between terminals LAM1071 and LAM1072 with multimeter. Refer to Figure 6.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)



B230611621

Figure 6. Top of Hydraulic Pump Solenoid.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

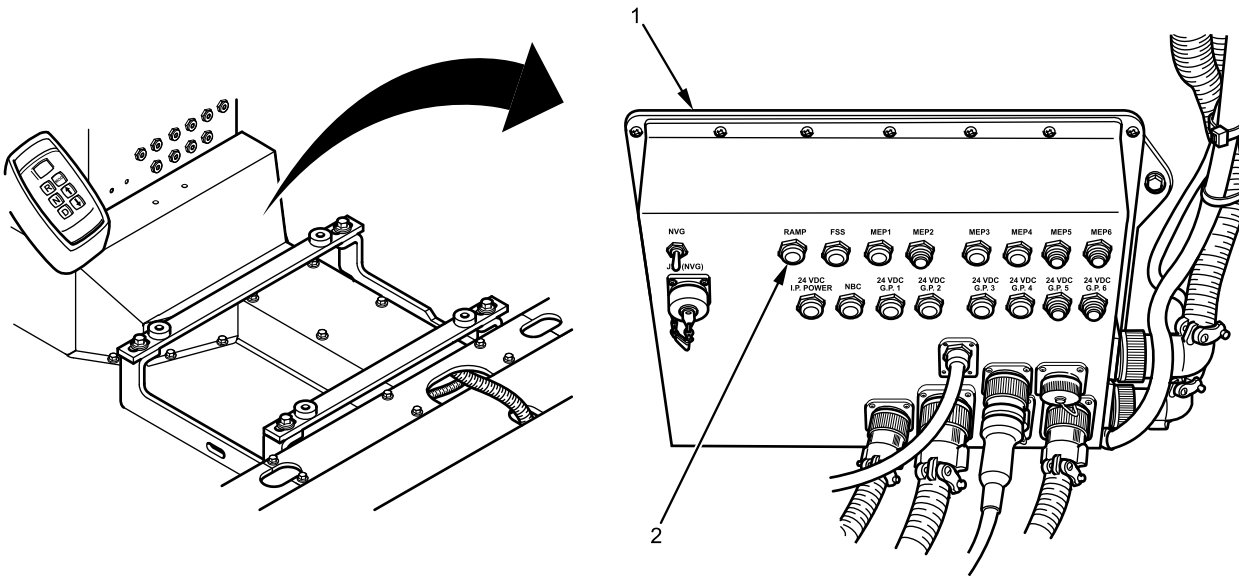
YES Go to Step 21.

NO Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

11. Check ramp circuit breaker (Figure 7, Item 2) on 24V Power Distribution Module (PDM) (Figure 7, Item 1) to determine if it is tripped (TM 9-2355-106-10).



B230605628

Figure 7. Ramp Circuit Breaker.

CONDITION/INDICATION

Is ramp circuit breaker tripped?

DECISION

YES Go to Step 17.
NO Go to next step.

STEP

12. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
13. Remove front cable shield. Refer to 24V Power Distribution Module (PDM) Removal and Installation (WP 0443).
14. Disconnect LAM1035. Refer to Figure 8.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

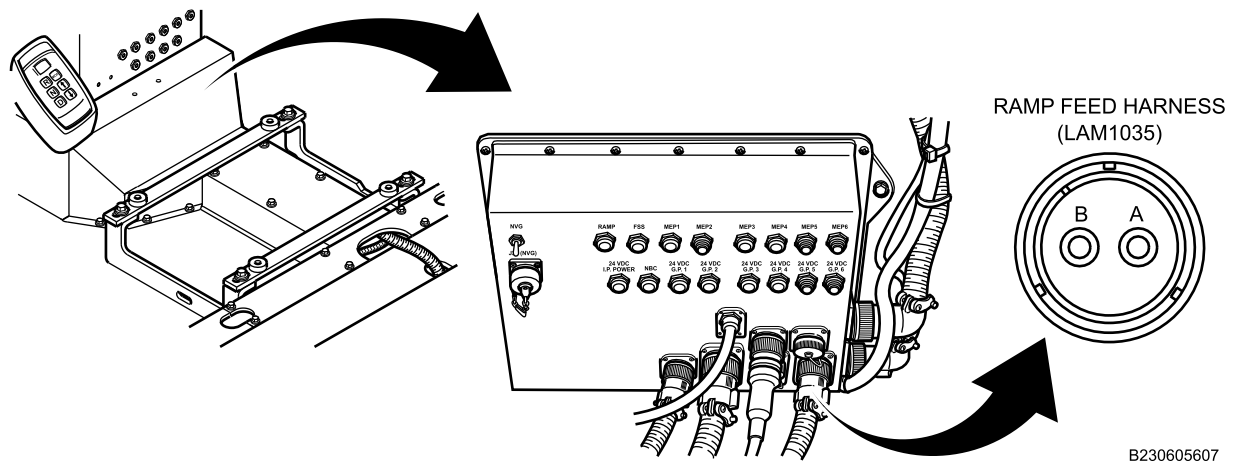


Figure 8. Lower Right of 24V Power Distribution Center (PDC).

15. Turn MAIN POWER switch ON (TM 9-2355-106-10).
16. Measure DC voltage between terminals A and B on 24V PDC J7. Refer to Figure 9.

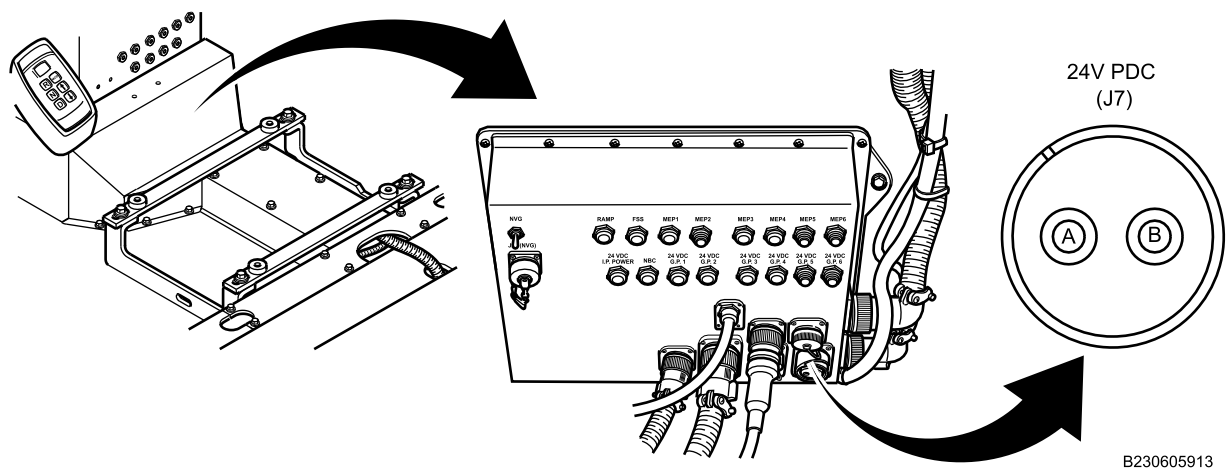


Figure 9. Lower Right Corner of 24V PDC J7.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).
 YES Go to Step 57.

STEP

17. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
18. Reset ramp circuit breaker (TM 9-2355-106-10).
19. Turn MAIN POWER switch ON (TM 9-2355-106-10).

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

20. Using master door/ramp switch, open ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did circuit breaker trip?

DECISION

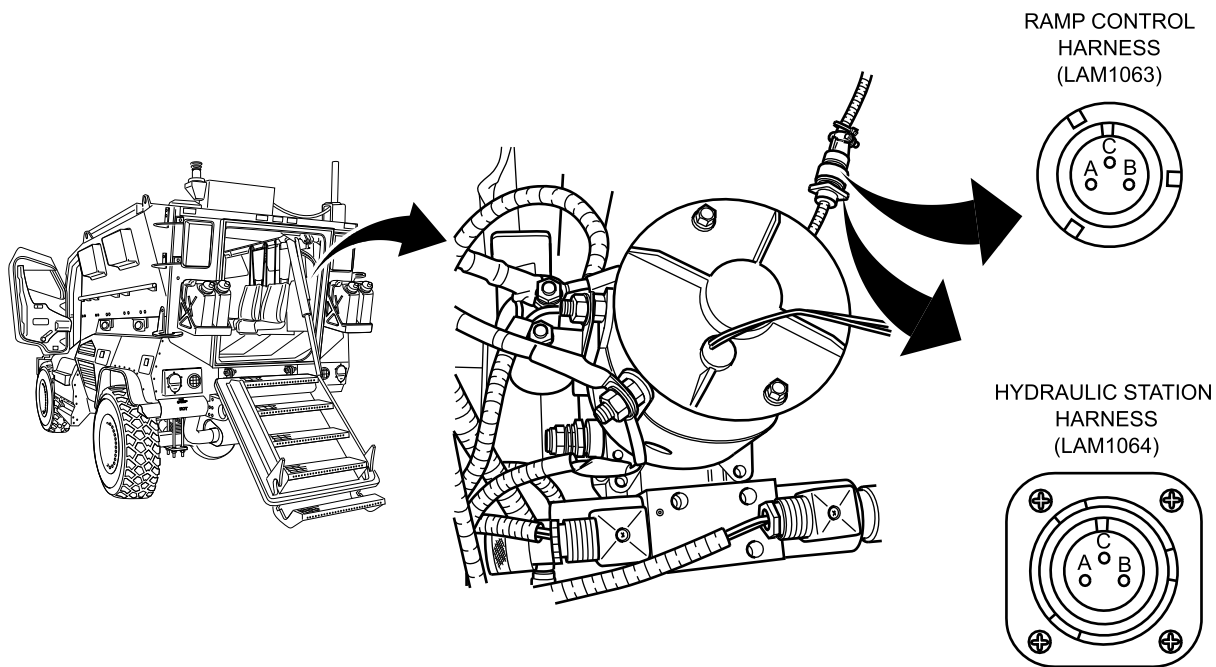
NO Return vehicle to service.

YES Go to Step 26.

STEP

21. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

22. Disconnect connectors LAM1063/LAM1064. Refer to Figure 10.



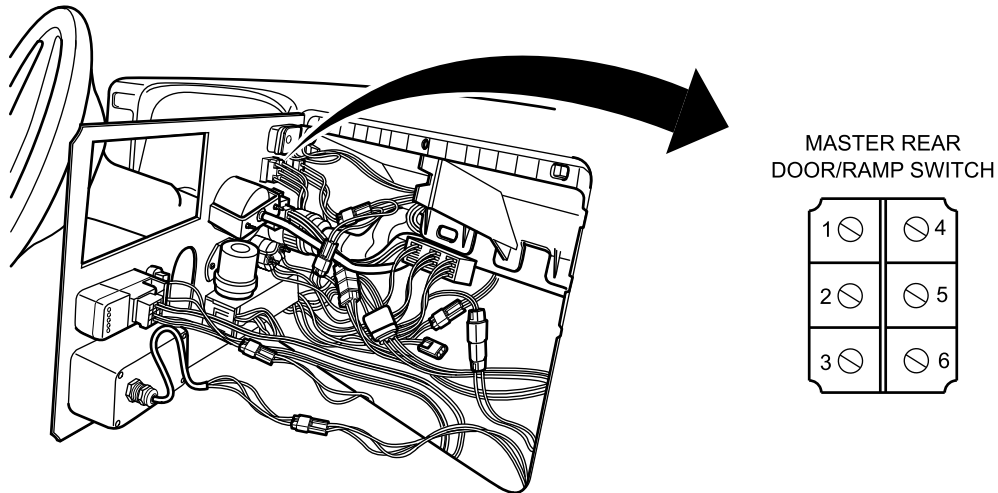
B230611625

Figure 10. Right Side of Hydraulic Pump.

23. Remove center Instrument Panel (IP) trim to gain access to master rear door/ramp switch. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581).

24. With assistance, measure resistance between LAM1063 terminal B and master rear door/ramp switch terminal 1 with multimeter. Refer to Figure 10. Refer to Figure 11.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)



B230606013

Figure 11. Behind Center IP Panel.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 40.
YES Go to next step.

STEP

25. With assistance, measure resistance between LAM1063 terminal C and ramp master rear door/ramp switch terminal 3 with multimeter. Refer to Figure 10. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 45.
YES Go to Step 56.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

- 26. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 27. Reset ramp breaker (TM 9-2355-106-10).
- 28. Remove front cable shield. Refer to 24V Power Distribution Module (PDM) Removal and Installation (WP 0443).
- 29. Disconnect connector LAM1035. Refer to Figure 12.

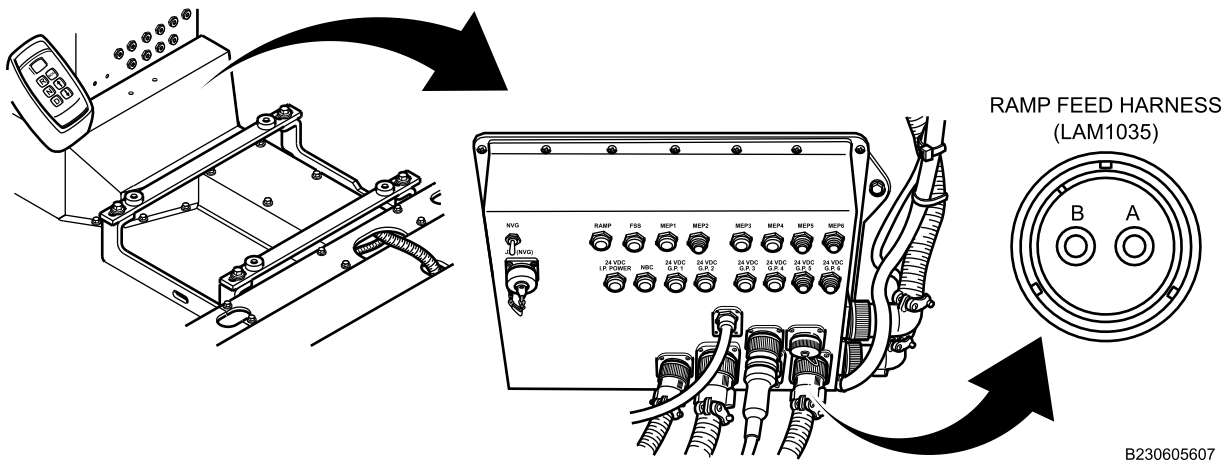


Figure 12. Lower Right of 24V Power Distribution Center (PDC).

- 30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 31. Measure DC voltage between terminals A and B on 24V PDC J7 with multimeter. Refer to Figure 13.

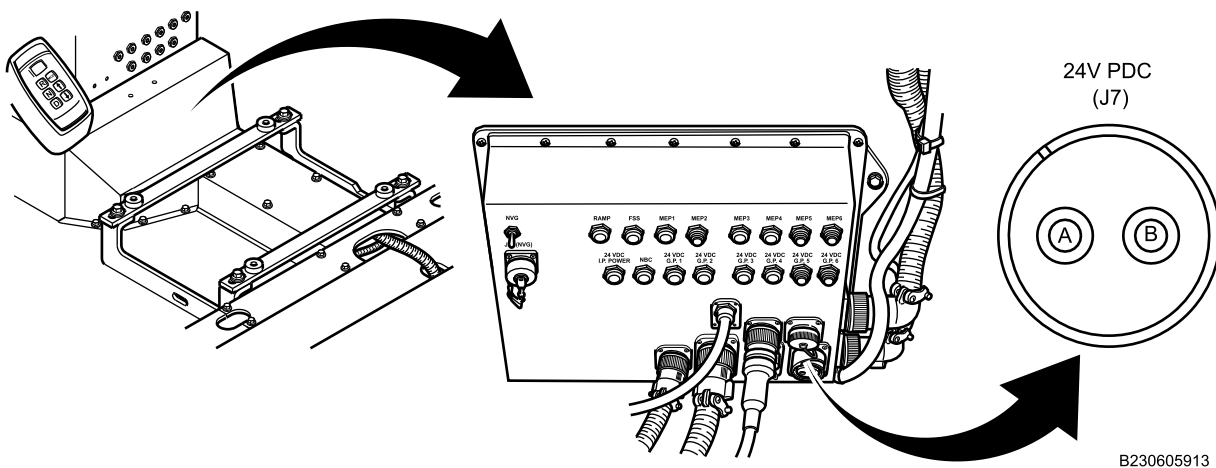


Figure 13. Lower Right of 24V PDC J7.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).
 YES Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

32. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
33. Measure resistance between LAM1035 terminal B and ground with multimeter. Refer to Figure 14.

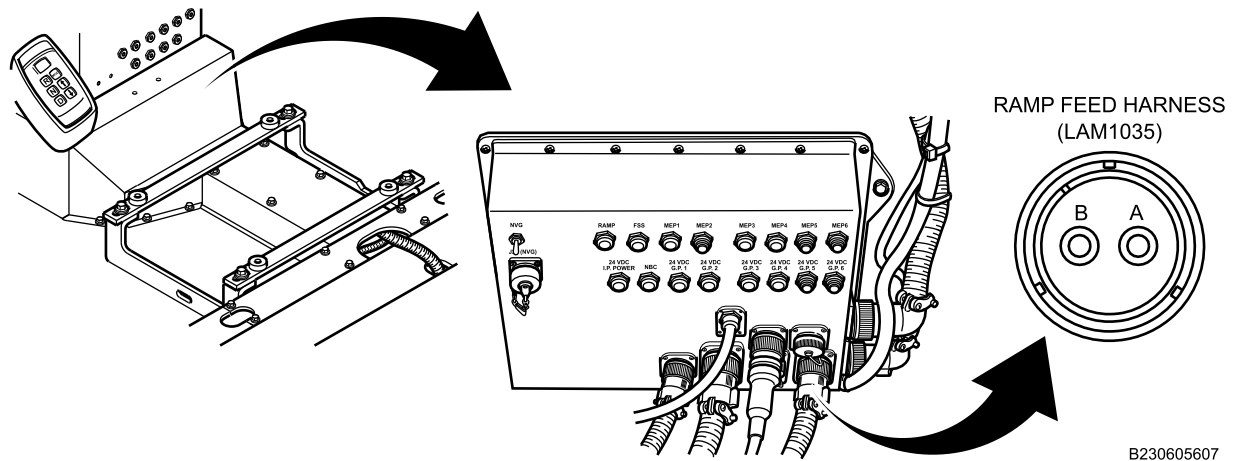


Figure 14. Lower Right of 24V Power Distribution Center (PDC).

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

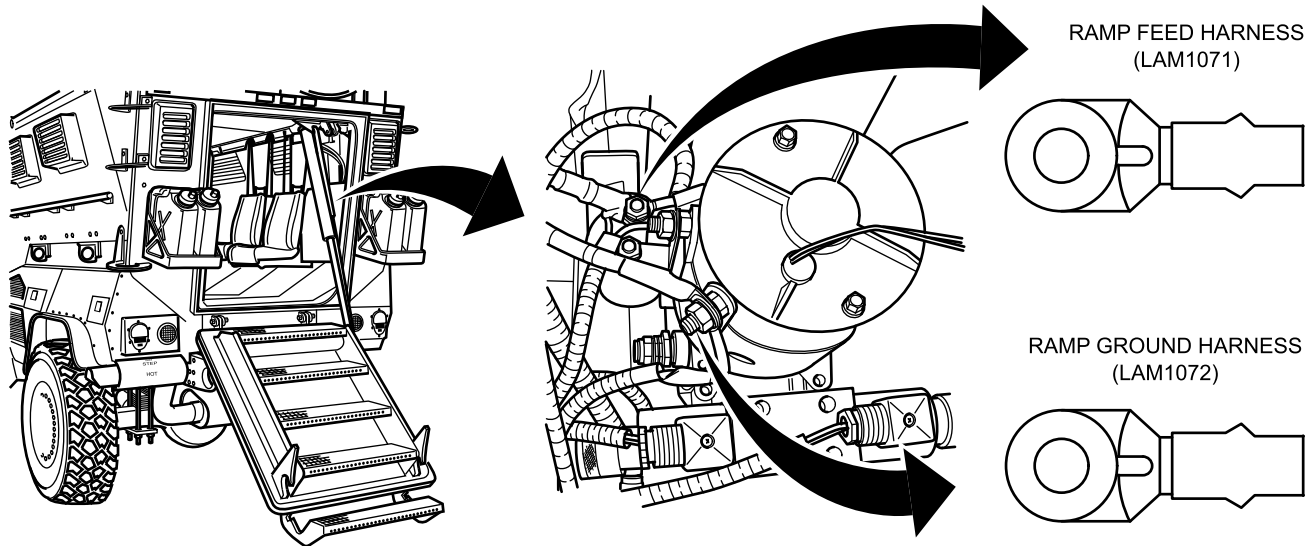
DECISION

YES Go to Step 49.
NO Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

34. Disconnect terminals LAM1071 and LAM1072. Refer to .Figure 15



B230611621

Figure 15. Top of Hydraulic Pump Solenoid.

35. Measure resistance between terminals LAM1071 and LAM1072 with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 57.
YES Go next step.

STEP

36. Measure resistance between each connector LAM1035 terminal and metal connector case with multimeter. Refer to Figure 16.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

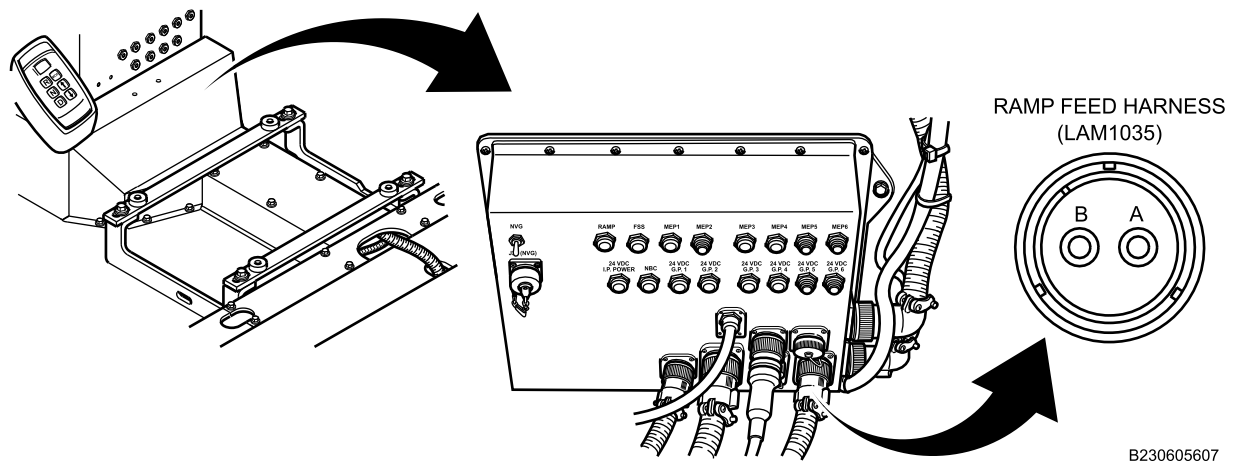


Figure 16. Lower Right of 24V Power Distribution Center (PDC).

CONDITION/INDICATION

Did multimeter read OL for each test?

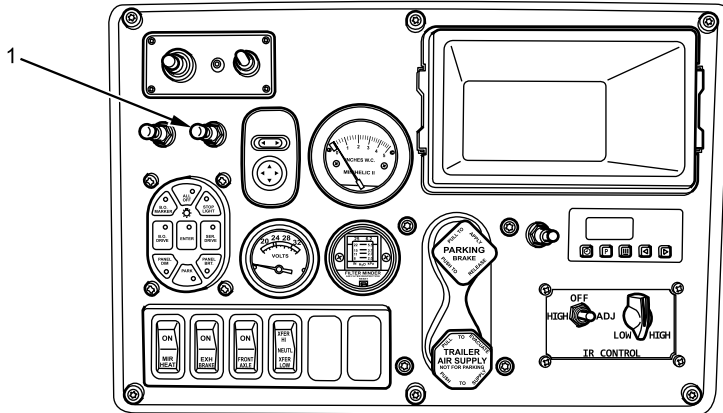
DECISION

NO Go to Step 57.
YES Go to Step 56.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

37. Using master rear door/ramp switch (Figure 17, Item 1), close ramp (TM 9-2355-106-10).



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Figure 17. Master Rear Door/Ramp Switch.

CONDITION/INDICATION

Does ramp close?

DECISION

YES Go to Step 51.
NO Go to Step 56.

STEP

38. Using master rear door/ramp switch (Figure 17, Item 1), open ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did ramp open?

DECISION

NO Go to Step 58.
YES Go to next step.

STEP

39. Using master rear door/ramp switch (Figure 17, Item 1), close ramp.

CONDITION/INDICATION

Did ramp close?

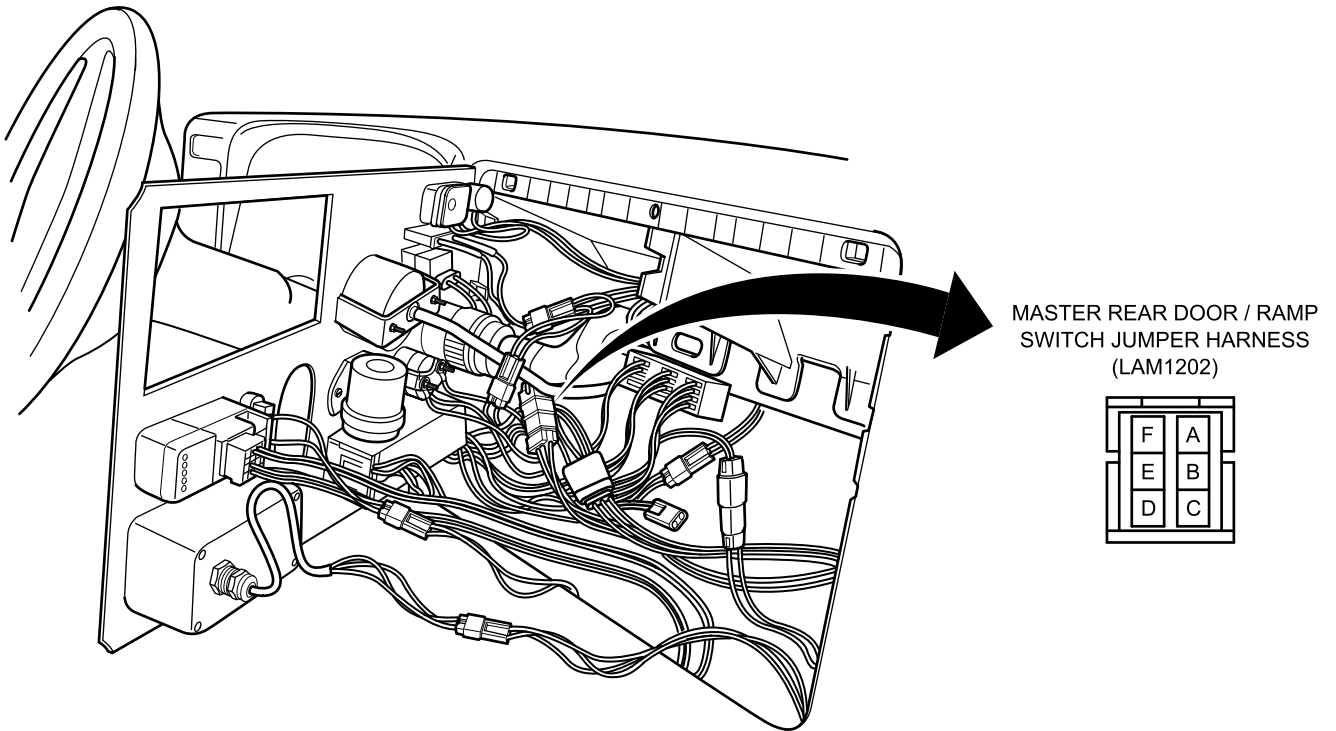
DECISION

NO Go to Step 58.
YES Return vehicle to service.

STEP

40. Disconnect connectors LAM1202/1955. Refer to Figure 18.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

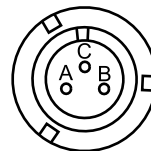


B230605613

Figure 18. Behind IP Center Trim Panel.

41. With assistance, measure resistance between connector LAM1202 terminal A and connector LAM1063 terminal B with multimeter. Refer to Figure 18 and Figure 19.

RAMP CONTROL HARNESS (LAM1063)



B230604153

Figure 19. Connector LAM1063.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

DECISION

YES Go to Step 62.
NO Go to next step.

STEP

42. Remove IP right side closeout panel. Refer to Instrument Panel (IP) Right Side Closeout Removal and Installation (WP 0580).
43. Disconnect connectors LAM1053/1956. Refer to Figure 20.

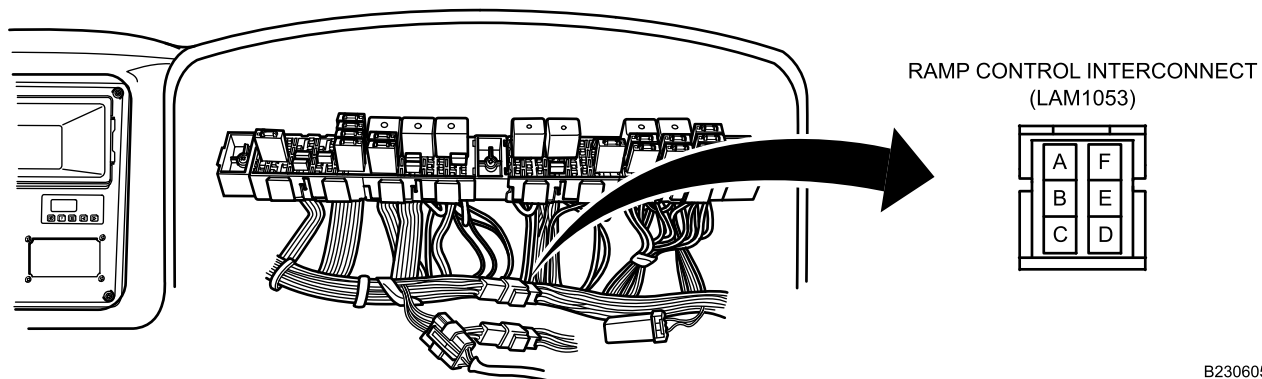


Figure 20. Behind IP Center Trim Panel.

44. With assistance, measure resistance between connector LAM1053 terminal A and connector LAM1063 terminal B with multimeter. Refer to Figure 20 and Figure 22.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

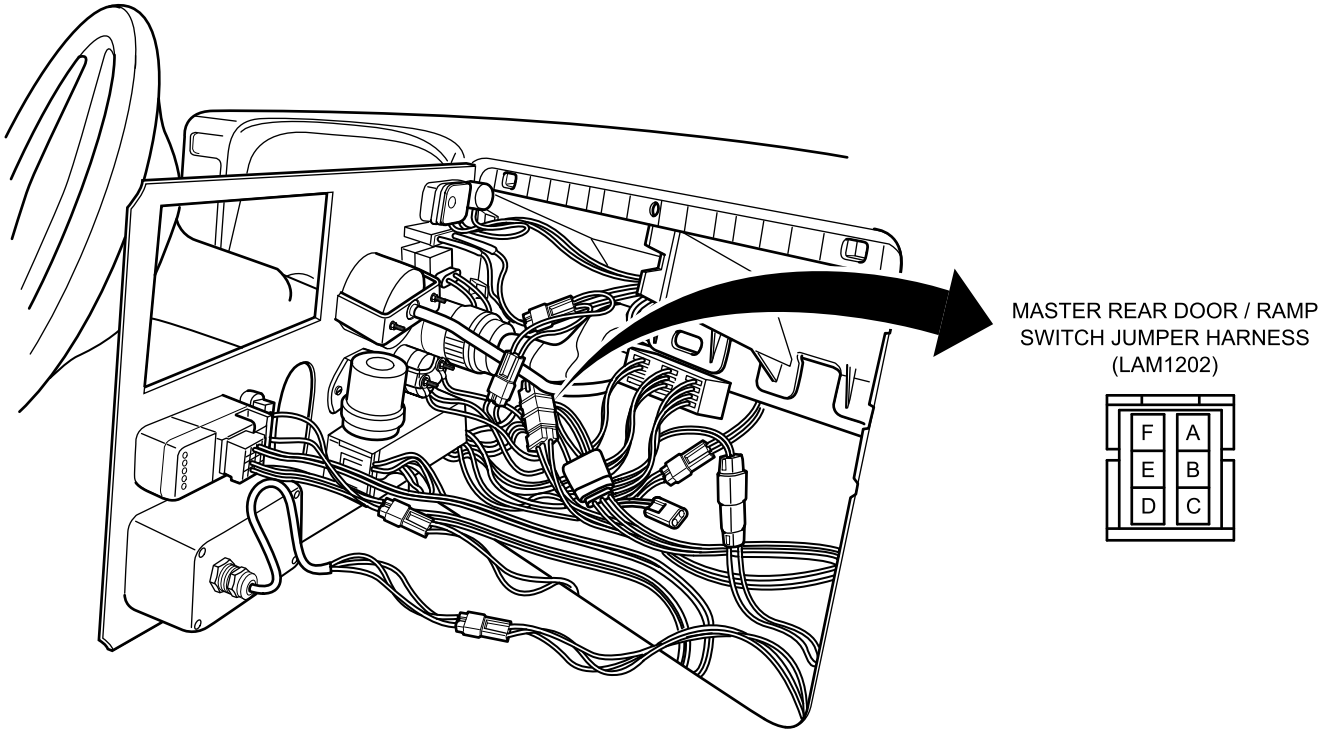
DECISION

YES Go to Step 60.
NO Go to Step 61.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

STEP

45. Disconnect connectors LAM1202/1955. Refer to Figure 21.

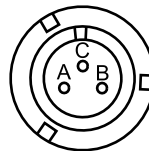


B230605613

Figure 21. Behind IP Center Trim Panel.

46. With assistance, measure resistance between connector LAM1202 terminal C and connector LAM1063 terminal C with multimeter. Refer to Figure 21 and Figure 22.

RAMP CONTROL HARNESS
(LAM1063)



B230604153

Figure 22. Connector LAM1063.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 62.
NO Go to next step.

STEP

47. Disconnect connectors LAM1053/1956. Refer to Figure 23.

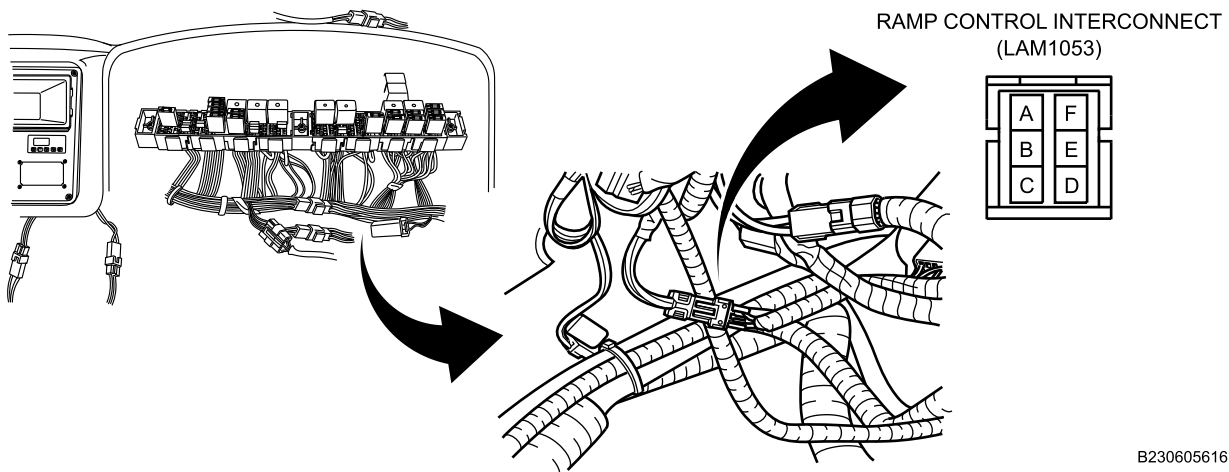
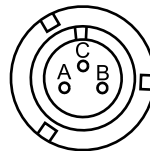


Figure 23. Below Instrument Panel (IP) Power Distribution Center.

48. With assistance, measure resistance between connector LAM1053 terminal C and connector LAM1063 terminal C with multimeter. Refer to Figure 23 and Figure 24.

RAMP CONTROL HARNESS (LAM1063)



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Figure 24. Connector LAM1063.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

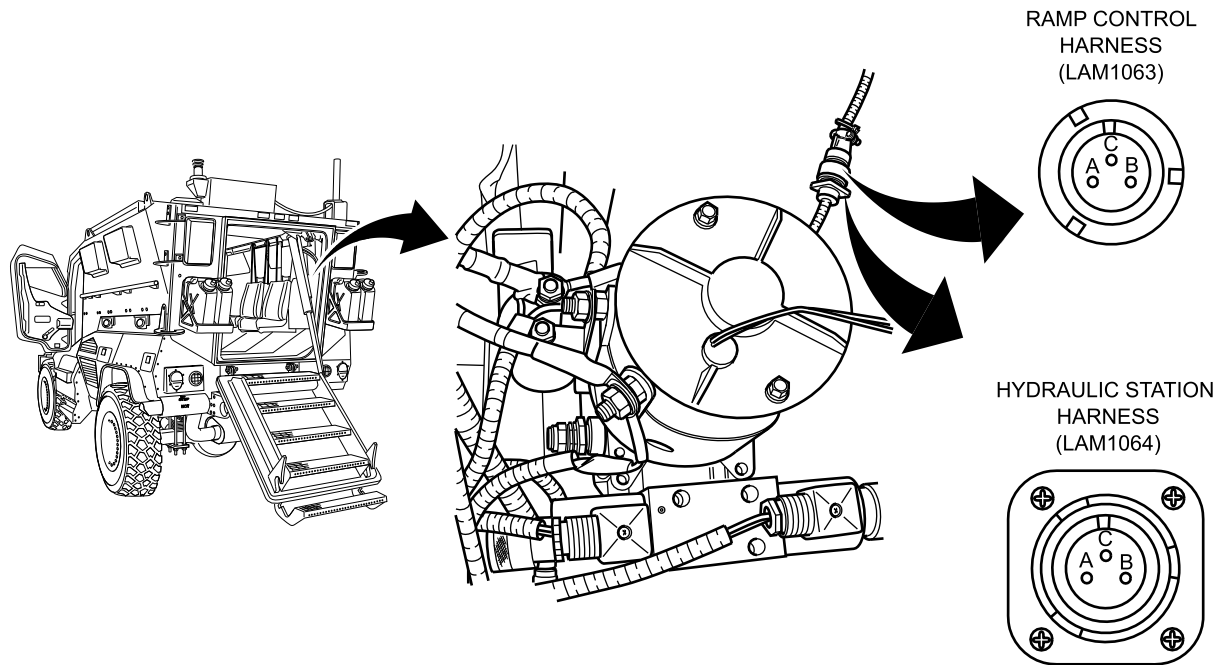
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)**DECISION**

YES Go to Step 60.

NO Go to Step 61.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)**STEP**

51. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
52. Disconnect connectors LAM1063/LAM1064. Refer to Figure 27.

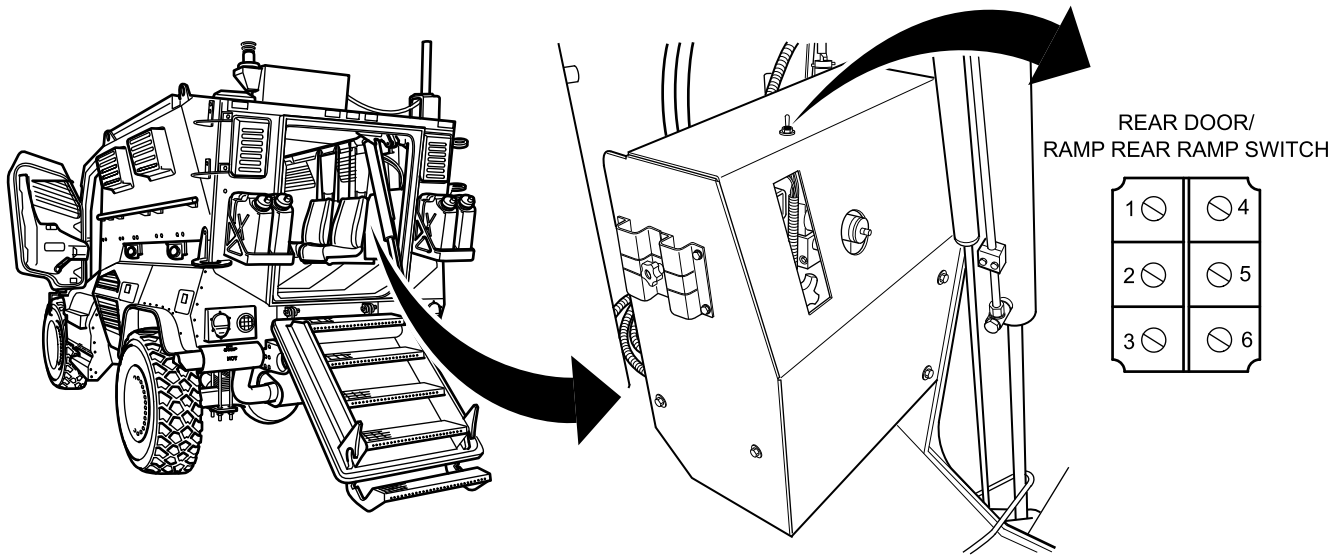


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Figure 27. Right Side of Hydraulic Pump.

53. Measure resistance between LAM1064 terminal A to rear door/ramp rear ramp switch terminal 5 with multimeter. Refer to Figure 27. Refer to Figure 28.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)



B230611627

Figure 28. Rear Door/Ramp Rear Ramp Switch.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

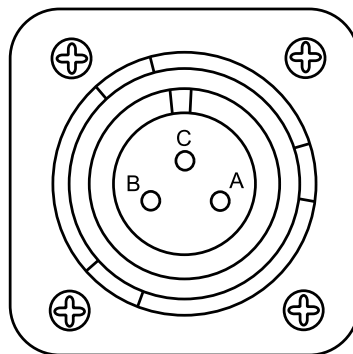
DECISION

NO Go to Step 56.
YES Go to next step.

STEP

54. Measure resistance between LAM1064 terminal B and rear door/ramp rear ramp switch terminal 4 with multimeter. Refer to Figure 29 and Figure 30.

HYDRAULIC STATION HARNESS
(LAM1064)

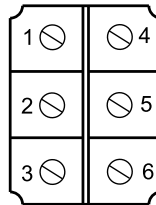


B230604154

Figure 29. Connector LAM1064.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)

REAR DOOR/
RAMP REAR RAMP SWITCH



B230605657

Figure 30. Rear Door/Ramp Rear Ramp Switch.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 56.
YES Go to next step.

STEP

55. Measure resistance between LAM1064 terminal C and rear door/ramp rear switch terminal 3 with multimeter. Refer to Figure 29. Refer to Figure 30.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 57.
NO Go to next step.

MALFUNCTION

- 56. Faulty hydraulic assembly.

ACTION

Replace hydraulic assembly, hydraulic cylinder, and hydraulic hoses with current production assembly. Remove push-type operation hydraulic pump assembly. Refer to Rear Door/Ramp Hydraulic Pump Removal and Installation (Push-Type Operation) (WP 0692). Refer to Rear Door/Ramp Hydraulic Cylinder Removal and Installation (Push-Type Operation) (WP 0696). Refer to Rear Door/Ramp Hydraulic Hoses Removal and Installation (Push-Type Operation) (WP 0700).

END OF TEST

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)**MALFUNCTION**

- 57. Faulty harness.

ACTION

Replace rear door ramp feed harness. Refer to Rear Door Ramp Feed Harness Removal and Installation (WP 0444). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 58. Faulty switch.

ACTION

Replace master rear door/ramp switch. Refer to Master Rear Door/Ramp Switch Removal and Installation (WP 0309). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 59. Hydraulic fluid level too low.

ACTION

Fill reservoir with hydraulic fluid to proper operating level. Refer to Rear Door/Ramp Hydraulic Reservoir Fluid Fill Procedure (WP 0699). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 60. Faulty harness.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 61. Faulty harness.

ACTION

Replace rear door ramp hydraulic system control harness. Refer to Rear Door Ramp Hydraulic System Control Harness Removal and Installation (WP 0432). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 62. Faulty harness.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PUSH-TYPE OPERATION) - (CONTINUED)**ACTION**

Replace master rear door/ramp switch jumper harness. Refer to Master Rear Door/Ramp Switch Jumper Harness Removal and Installation (WP 0310).

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION)**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0581
WP 0690
WP 0693
WP 0699
WP 0789
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0319
WP 0309
WP 0310
WP 0432
WP 0443
WP 0444

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Hydraulic pump cover removed (WP 0690)

Drawings Required

WP 0789, Figure 28

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

TROUBLESHOOTING PROCEDURE

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.

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.

Check for hydraulic leak location visually from at least an arm's length away and not within the path of the leak. If leak is suspected in a blind area, use scrap pieces of material such as cardboard or wood to check for location. Never use hand or other body parts. Failure to comply may result in serious injury, amputation, or death to personnel.

Never touch any part of a hydraulic assembly before it is known that the 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.

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.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

CAUTION

Hydraulic reservoir must contain a minimum of 1.25 gallons (4.73 L) of hydraulic fluid for proper operation. Failure to comply may result in electric motor failure or damage to equipment.

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedure Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Check hydraulic reservoir for proper hydraulic fluid level. Refer to Rear Door/Ramp Hydraulic Reservoir Fluid Fill Procedure (WP 0699).

CONDITION/INDICATION

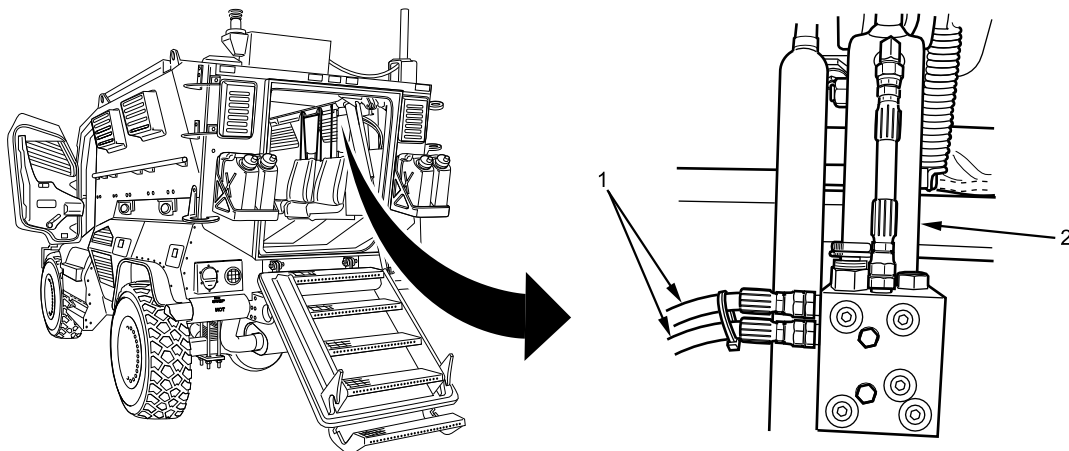
Does hydraulic reservoir contain at least 1.25 gal. (4.73 L) hydraulic fluid?

DECISION

NO Go to Step 48.
YES Go to next step.

STEP

2. Visually check hydraulic lines (Figure 1, Item 1) for leaks, and hydraulic cylinder (Figure 1, Item 2) for damage or missing parts (TM 9-2355-106-10).



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Figure 1. Hydraulic Lines and Cylinder.

CONDITION/INDICATION

Do hydraulic lines or hydraulic cylinder have any leaks, missing parts, or damage?

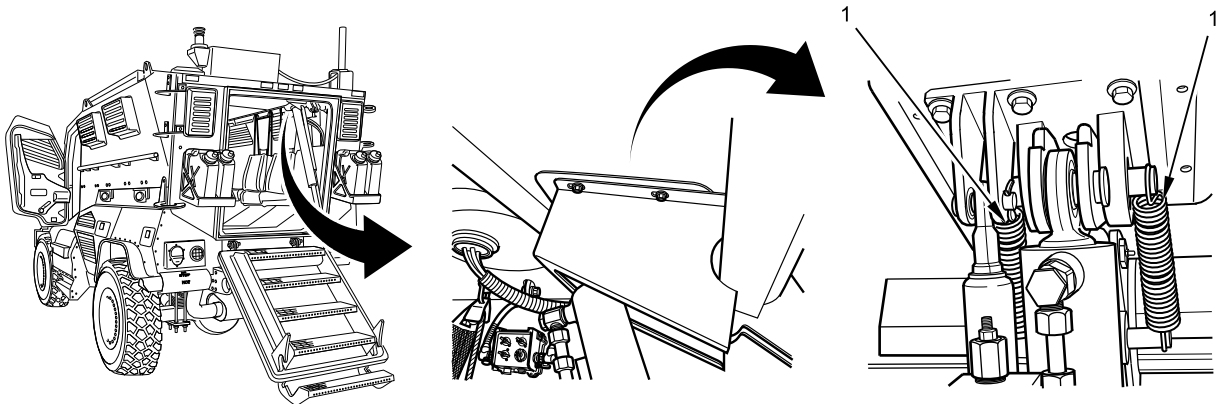
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

DECISION

YES Go to Step 56.
NO Go to next step.

STEP

3. Visually check hydraulic ramp springs (Figure 2, Item 1) for damage or missing parts (TM 9-2355-106-10).



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Figure 2. Hydraulic Ramp Springs.

CONDITION/INDICATION

Do hydraulic ramp springs have any missing or damaged parts?

DECISION

YES Go to Step 56.
NO Go to next step.

STEP

4. Manually open/close rear ramp door (TM 9-2355-106-10).

CONDITION/INDICATION

Does rear ramp door open/close manually?

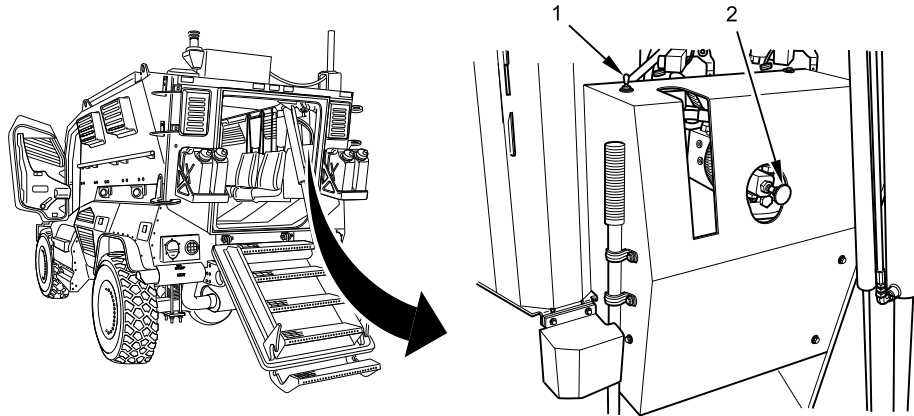
DECISION

NO Go to Step 56.
YES Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

5. Make sure plunger is in neutral position (Figure 3, Item 2) (TM 9-2355-106-10).



B230611629

Figure 3. Manual Solenoid Valve and Rear Door/Ramp Rear Switch.

6. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 7. Using rear door/ramp rear switch (Figure 3, Item 1), open ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did ramp open?

DECISION

NO Go to Step 9.
 YES Go to next step.

STEP

8. Using rear door/ramp rear switch, close ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did ramp close?

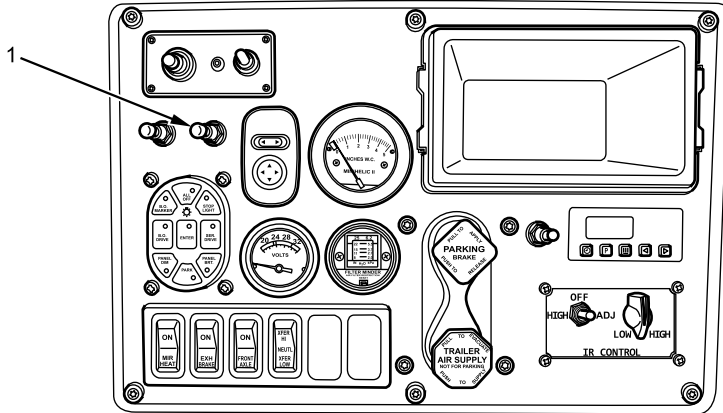
DECISION

YES Go to Step 38.
 NO Go to Step 37.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

9. Using master rear door/ramp switch (Figure 4, Item 1), open ramp (TM 9-2355-106-10).



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Figure 4. Master Rear/Door Ramp Switch.

CONDITION/INDICATION

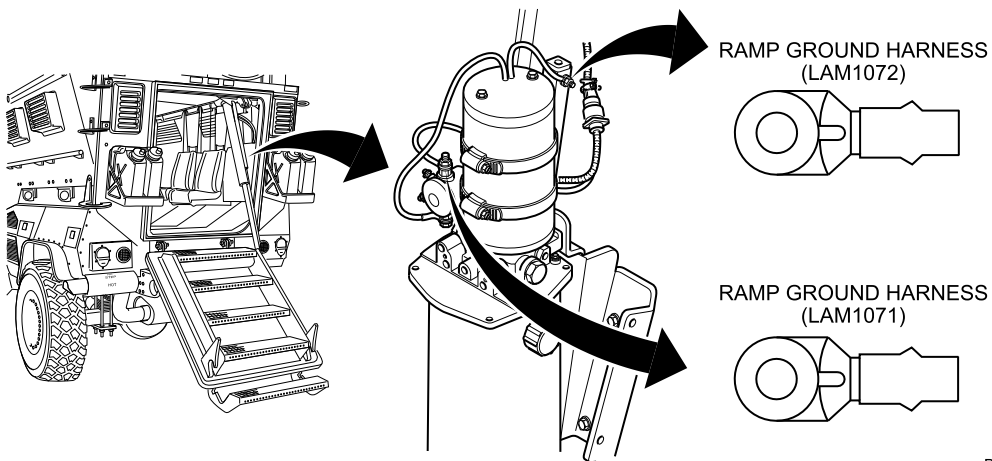
Did ramp open?

DECISION

YES Go to Step 51.
NO Go to next step.

STEP

10. Measure DC voltage between terminals LAM1071 and LAM1072 with multimeter. Refer to Figure 5.



B230611628

Figure 5. Sides of Hydraulic Pump Motor.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

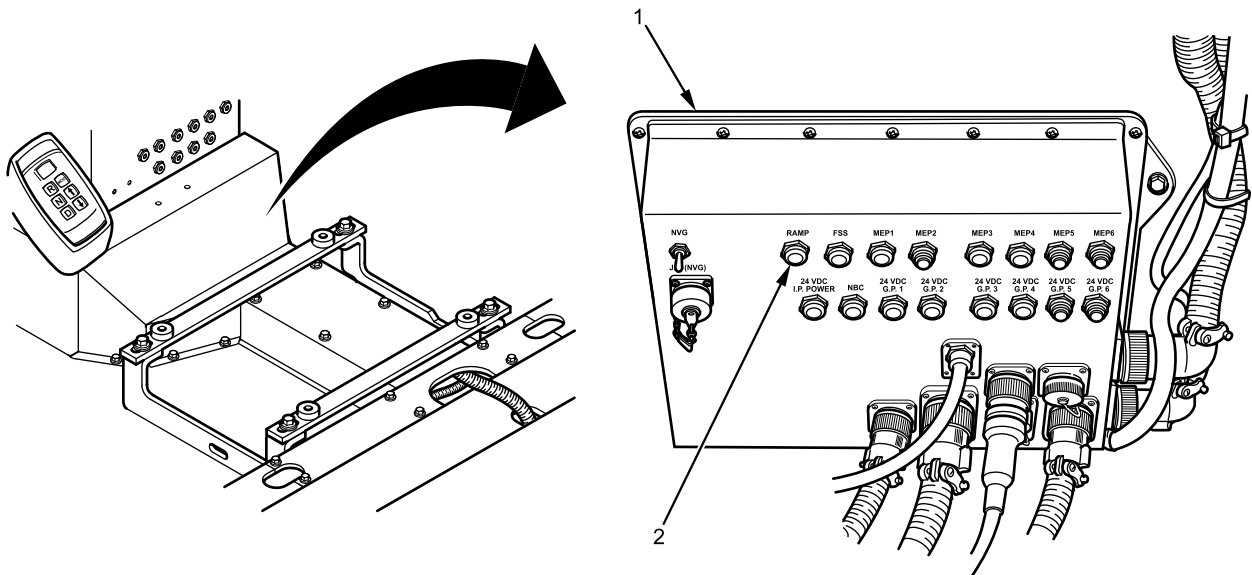
DECISION

YES Go to Step 21.

NO Go to next step.

STEP

11. Check ramp breaker (Figure 6, Item 2) on 24V Power Distribution Module (PDM) (Figure 6, Item 1) to determine if it is tripped. (TM 9-2355-106-10).



B230605628

Figure 6. Ramp Circuit Breaker.

CONDITION/INDICATION

Is ramp circuit breaker tripped?

DECISION

YES Go to Step 17.

NO Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

12. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
13. Remove front cable shield. Refer to 24V Power Distribution Module (PDM) Removal and Installation (WP 0443).
14. Disconnect LAM1035. Refer to Figure 7.

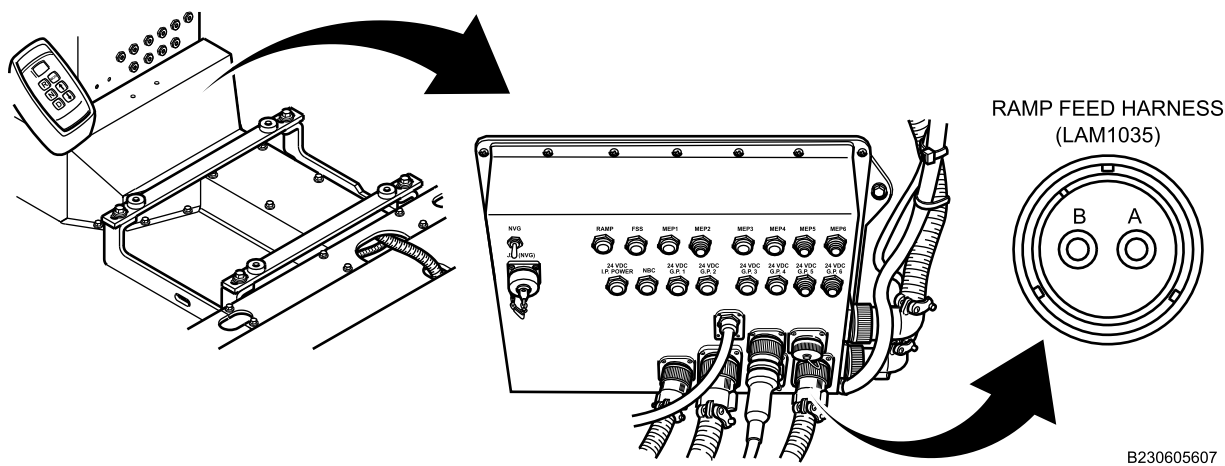


Figure 7. Lower Right of 24V Power Distribution Center (PDC).

15. Turn MAIN POWER switch ON (TM 9-2355-106-10).
16. Measure DC voltage between terminals A and B on 24V PDC J7. Refer to Figure 8.

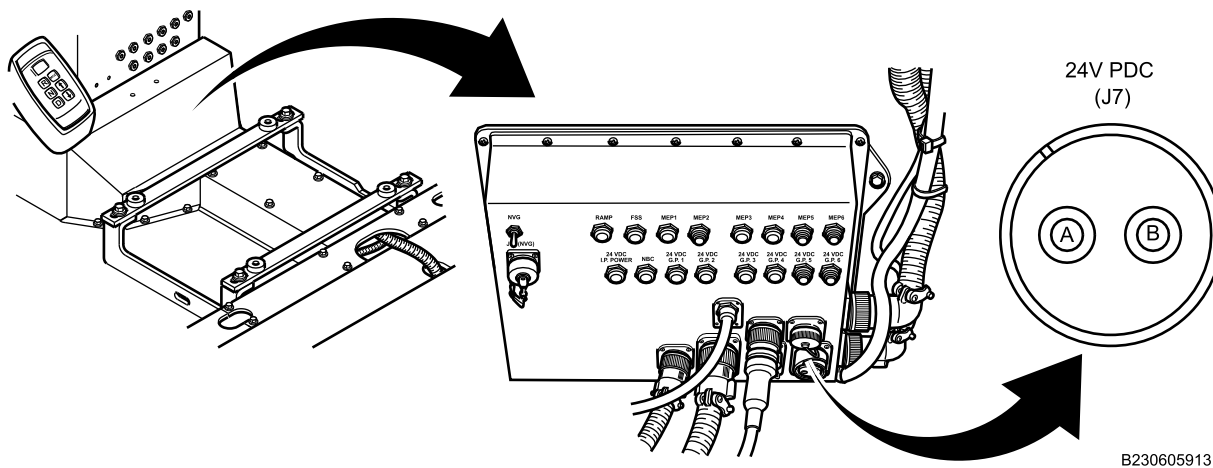


Figure 8. Lower Right Corner of 24V PDC J7.

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).
 YES Go to Step 57.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

17. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
18. Reset ramp circuit breaker (TM 9-2355-106-10).
19. Turn MAIN POWER switch ON (TM 9-2355-106-10).
20. Using master rear door/ramp switch, open ramp (TM 9-2355-106-10).

CONDITION/INDICATION

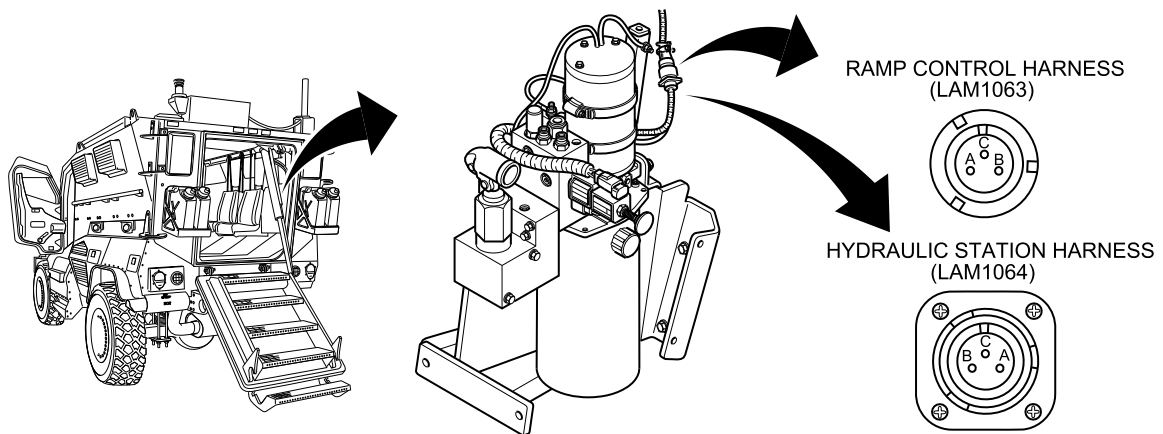
Did circuit breaker trip?

DECISION

NO Return vehicle to service.
YES Go to Step 26.

STEP

21. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
22. Disconnect LAM1063/LAM1064. Refer to Figure 9.

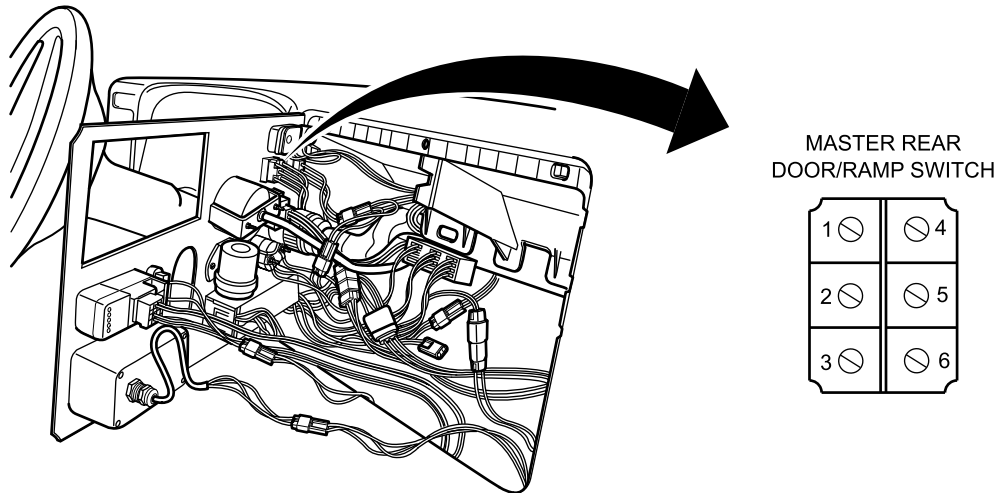


B230611631

Figure 9. Right Side of Hydraulic Pump.

23. Remove center Instrument Panel (IP) trim to gain access to master rear door/ramp switch. Refer to Instrument Panel (IP) Center Trim Panel Removal and Installation (WP 0581). Refer to Figure 9.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)



B230606013

Figure 10. Behind Center IP Panel.

24. Measure resistance between LAM1063 terminal B and master rear door/ramp switch terminal 1 with multimeter. Refer to Figure 9 and Figure 10.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 40.
YES Go to next step.

STEP

25. Measure resistance between LAM1063 terminal C and ramp master rear door/ramp switch terminal 3 with multimeter. Refer to Figure 9. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 44.
YES Go to Step 56.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

- 26. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
- 27. Reset ramp breaker (TM 9-2355-106-10).
- 28. Remove front cable shield. Refer to 24V Power Distribution Module (PDM) Removal and Installation (WP 0443).
- 29. Disconnect connector LAM1035. Refer to Figure 11.

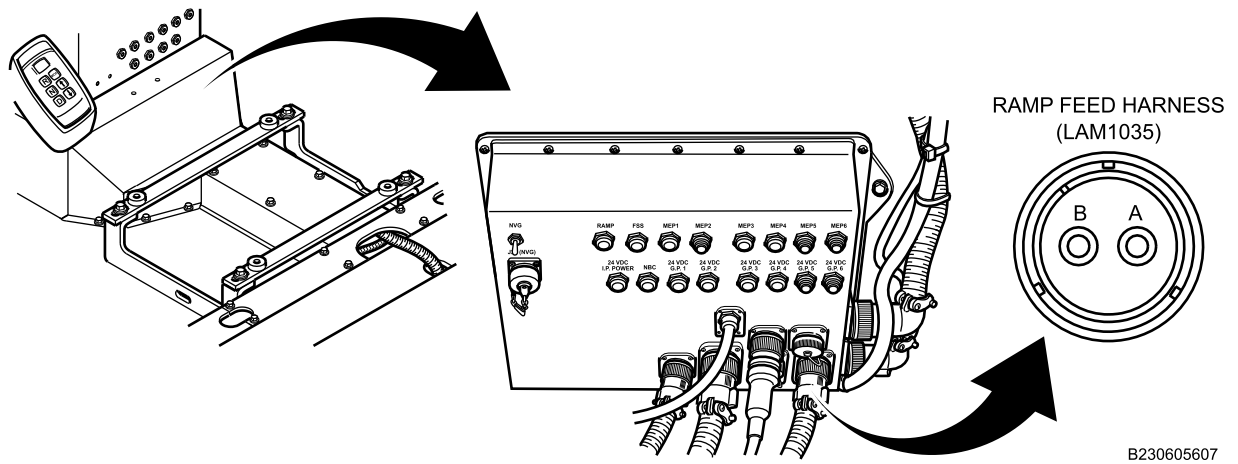


Figure 11. Lower Right of 24V Power Distribution Center (PDC).

- 30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
- 31. Measure DC voltage between terminals A and B on 24V PDC J7 with multimeter. Refer to Figure 12.

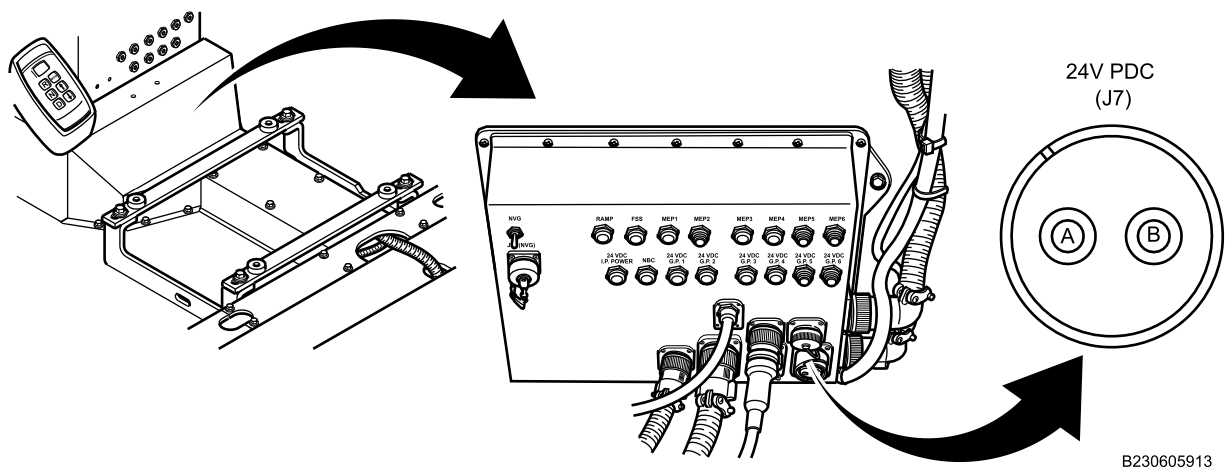


Figure 12. Lower Right of 24V PDC J7.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

CONDITION/INDICATION

Does multimeter read between 21V and 27V?

DECISION

NO Refer to Power Distribution Troubleshooting Procedure (WP 0059).
 YES Go to next step.

STEP

- 32. Turn MAIN POWER switch OFF (TM 9-235-106-10).
- 33. Measure resistance between LAM1035 terminal B and ground with multimeter. Refer to Figure 13.

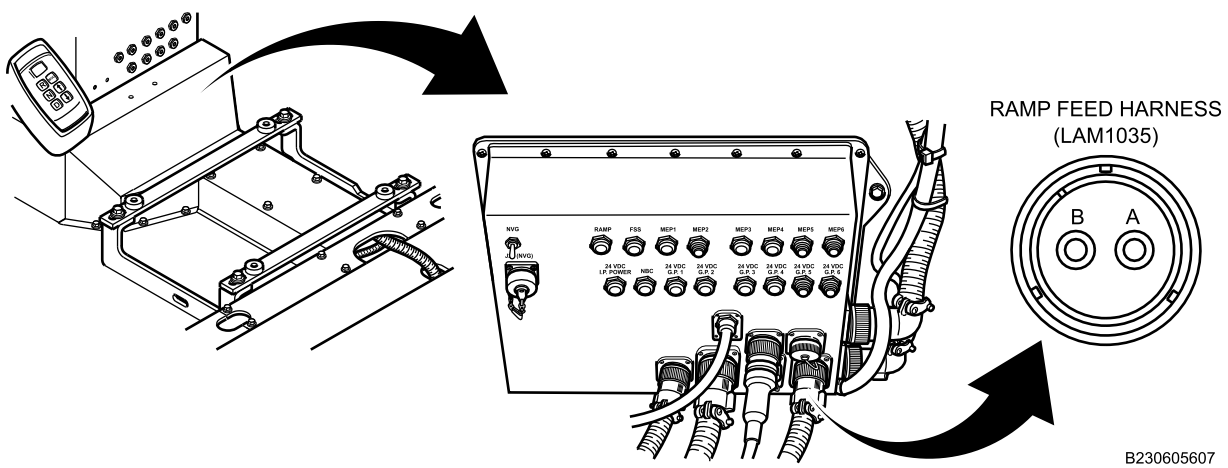


Figure 13. Lower Right of 24V Power Distribution Center (PDC).

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

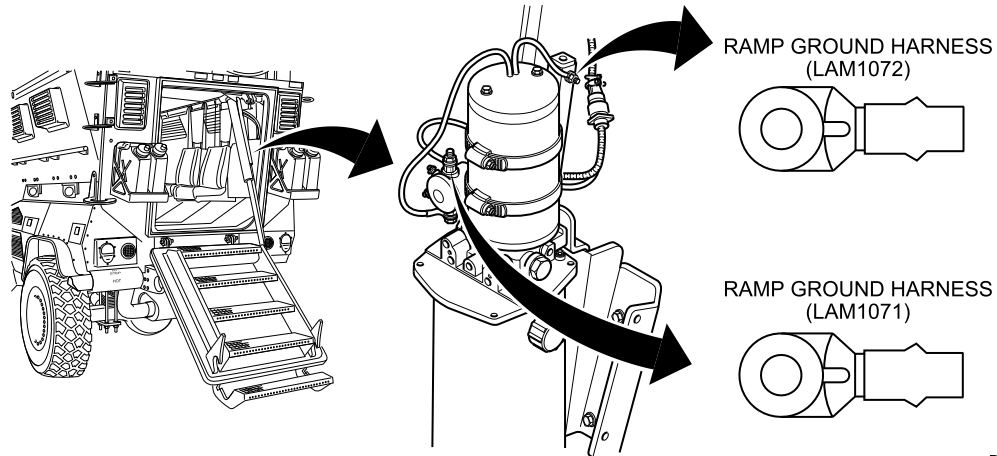
DECISION

YES Go to Step 49.
 NO Go to next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

34. Remove terminals LAM1071 and LAM1072. Refer to Figure 14.



B230611628

Figure 14. Top of Hydraulic Pump Solenoid.

35. Measure resistance between terminals LAM1071 and LAM1072 with multimeter. Refer to Figure 19.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

NO Go to Step 57.
YES Go next step.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

36. Measure resistance between each connector LAM1035 terminal and metal connector case with multimeter. Refer to Figure 15.

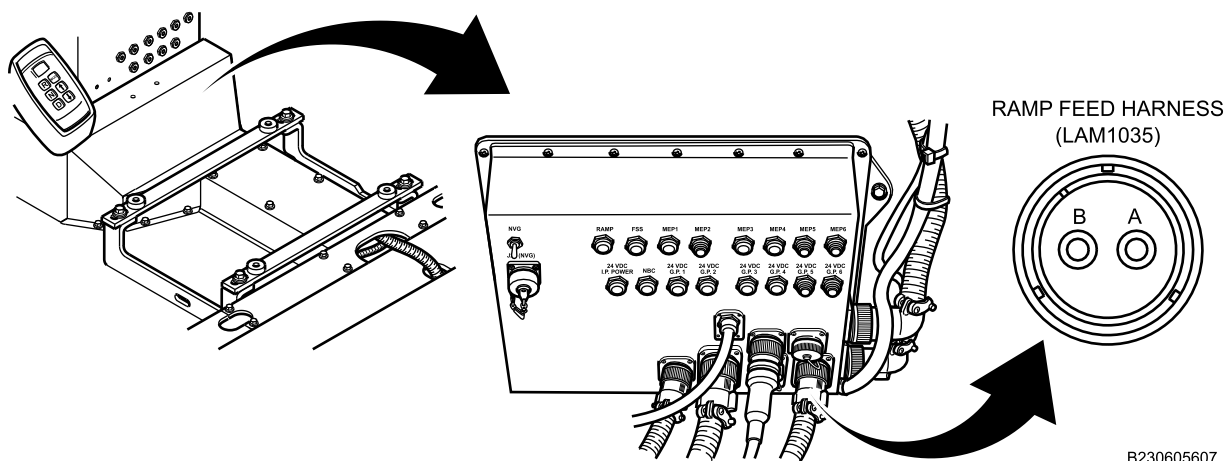


Figure 15. Lower Right of 24V Power Distribution Center (PDC).

CONDITION/INDICATION

Did multimeter read OL for each test?

DECISION

NO Go to Step 57.
 YES Go to Step 56.

STEP

37. Using master rear door/ramp switch (Figure 16, Item 1), close ramp (TM 9-2355-106-10).

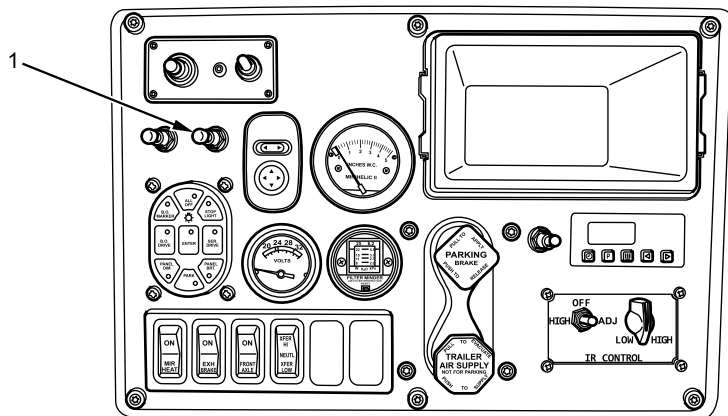


Figure 16. Master Rear Door/Ramp Switch.

CONDITION/INDICATION

Does ramp close?

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)**DECISION**

YES Go to Step 57.

NO Go to Step 56.

STEP

38. Using master rear door/ramp switch (Figure 16, Item 1), open ramp (TM 9-2355-106-10).

CONDITION/INDICATION

Did ramp open?

DECISION

NO Go to Step 58.

YES Go to next step.

STEP

39. Using master rear door/ramp switch (Figure 16, Item 1), close ramp.

CONDITION/INDICATION

Did ramp close?

DECISION

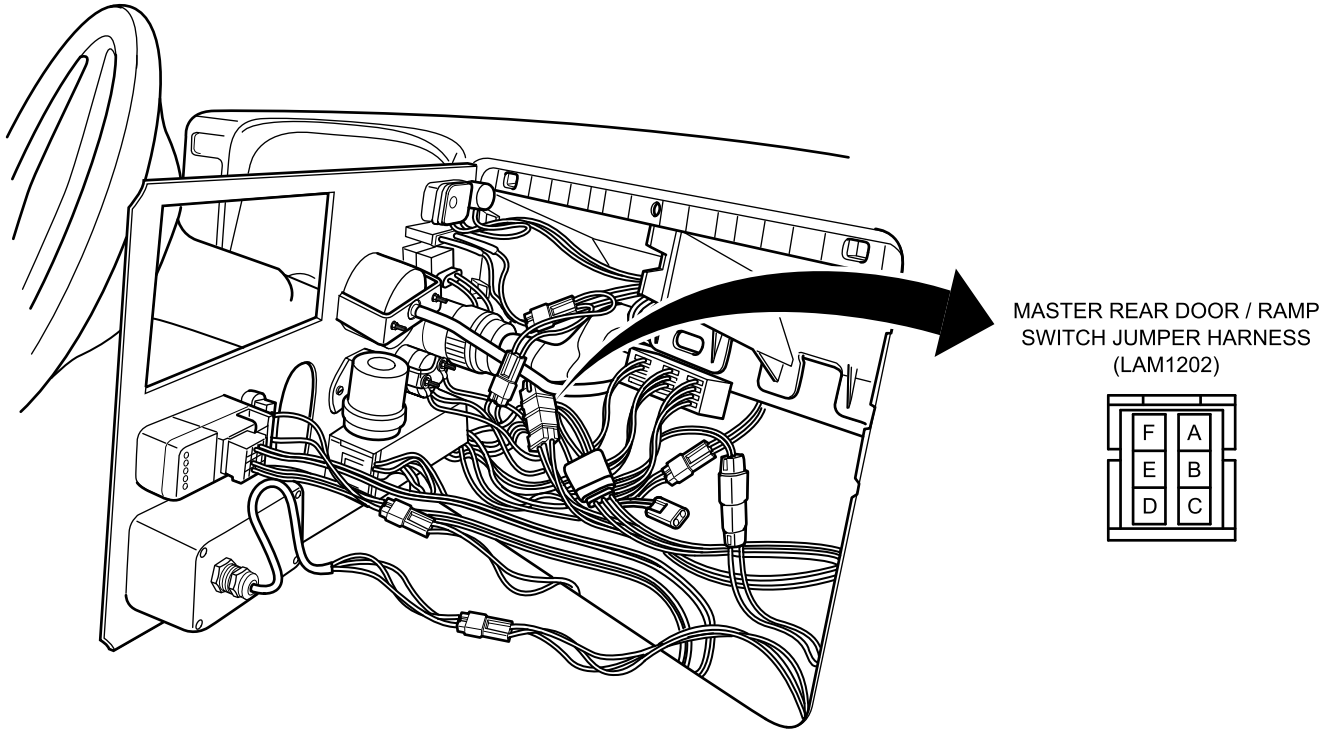
NO Go to Step 58.

YES Return vehicle to service.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

40. Disconnect connector LAM1202. Refer to Figure 17.

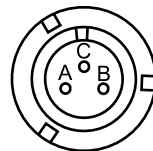


B230605613

Figure 17. Behind IP Center Trim Panel.

41. Measure resistance between connector LAM1202 terminal A and connector LAM1063 terminal B with multimeter. Refer to Figure 17. Refer to Figure 18.

RAMP CONTROL HARNESS (LAM1063)



B230604153

Figure 18. Connector LAM1063.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

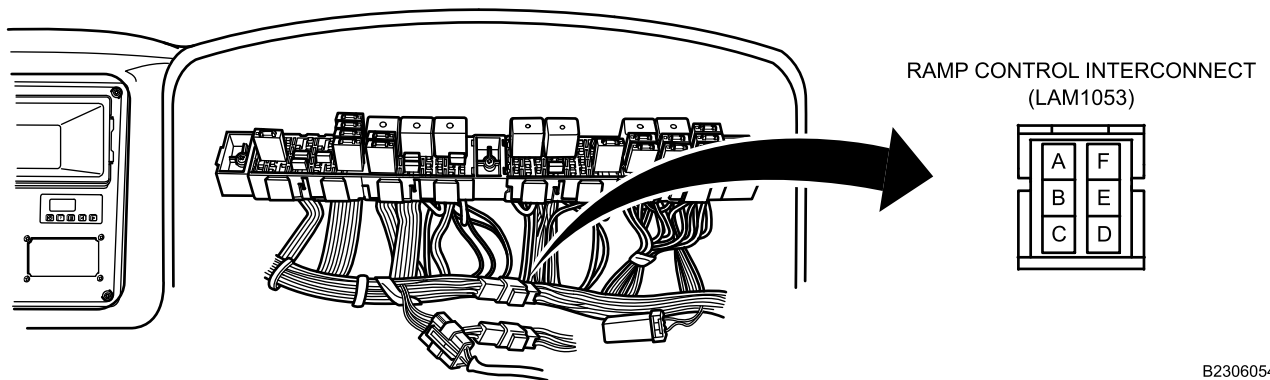
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

DECISION

YES Go to Step 61.
NO Go to next step.

STEP

42. Disconnect LAM1053. Refer to Figure 19.



B230605479

Figure 19. Below Instrument Panel (IP) Power Distribution Center.

43. Measure resistance between connector LAM1053 terminal A and connector LAM1063 terminal B with multimeter. Refer to Figure 19 and Figure 18.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

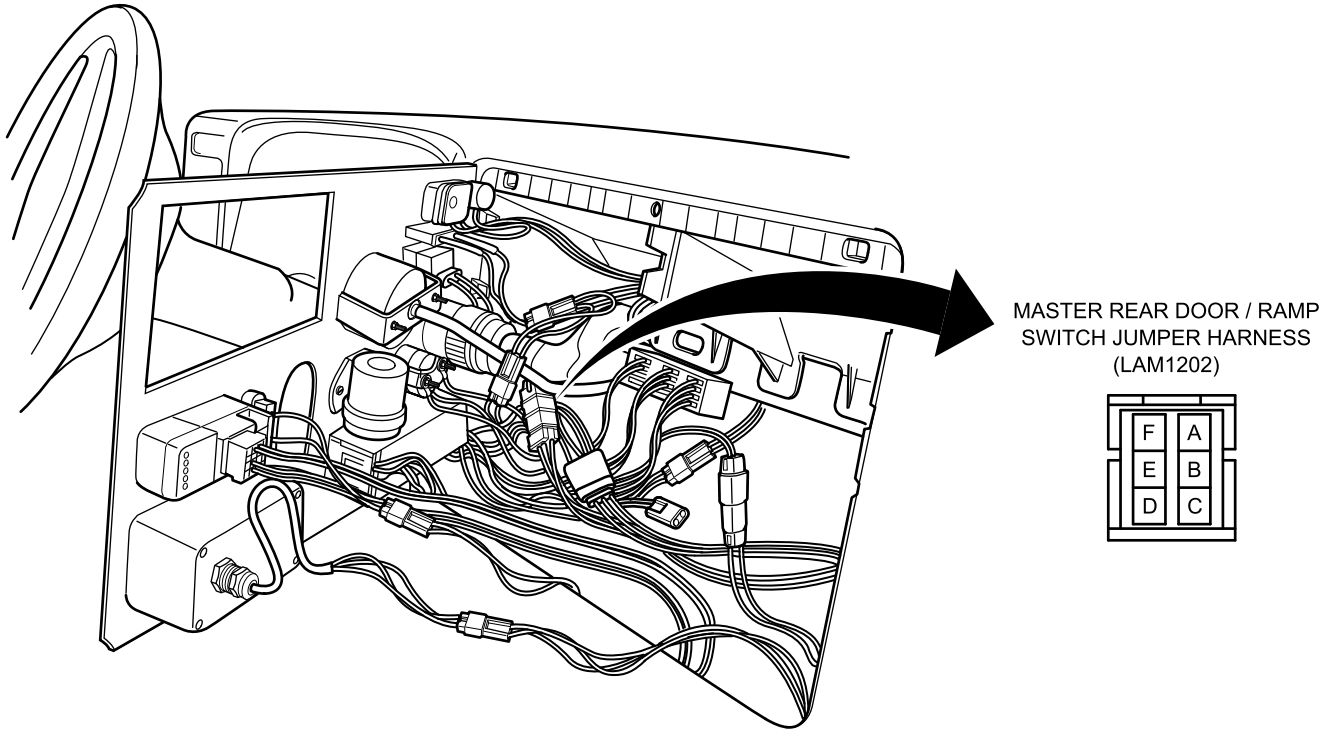
DECISION

YES Go to Step 60.
NO Go to Step 62.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

STEP

44. Disconnect connector LAM1202. Refer to Figure 20.

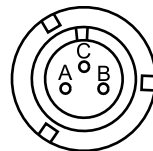


B230605613

Figure 20. Behind IP Center Trim Panel.

45. Measure resistance between connector LAM1202 terminal C and connector LAM1063 terminal C with multimeter. Refer to Figure 20 and Figure 21.

RAMP CONTROL HARNESS (LAM1063)



B230604153

Figure 21. Connector LAM1063.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

DECISION

YES Go to Step 61.
NO Go to next step.

STEP

46. Disconnect connector LAM1053. Refer to Figure 22.

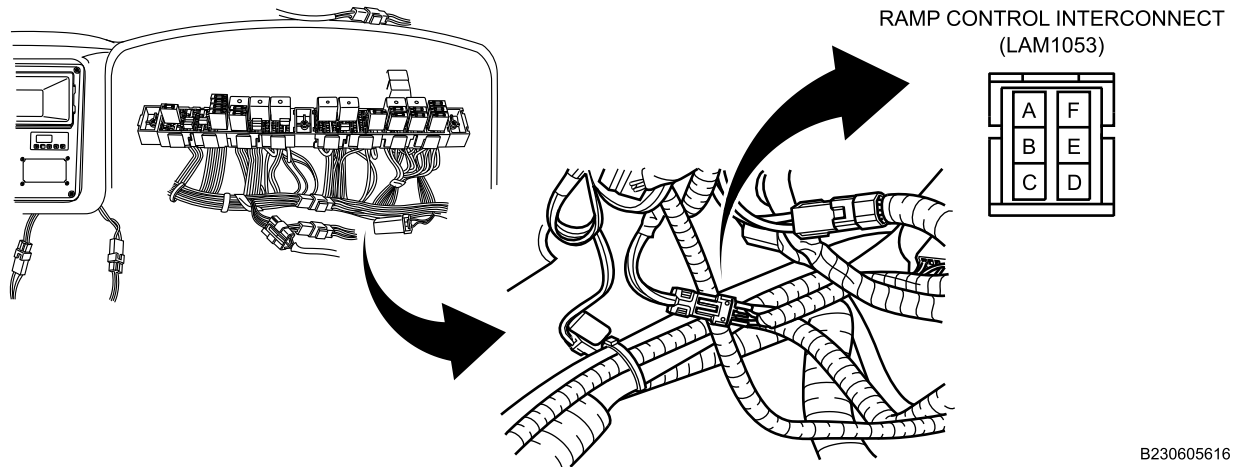


Figure 22. Below Instrument Panel (IP) Power Distribution Center.

47. Measure resistance between connector LAM1053 terminal C and connector LAM1063 terminal C with multimeter. Refer to Figure 22 and Figure 21.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 60.
NO Go to Step 62.

STEP

48. Visually check hydraulic lines and hydraulic cylinder for leaks (TM 9-2355-106-10).

CONDITION/INDICATION

Do hydraulic lines or hydraulic cylinder have any leaks?

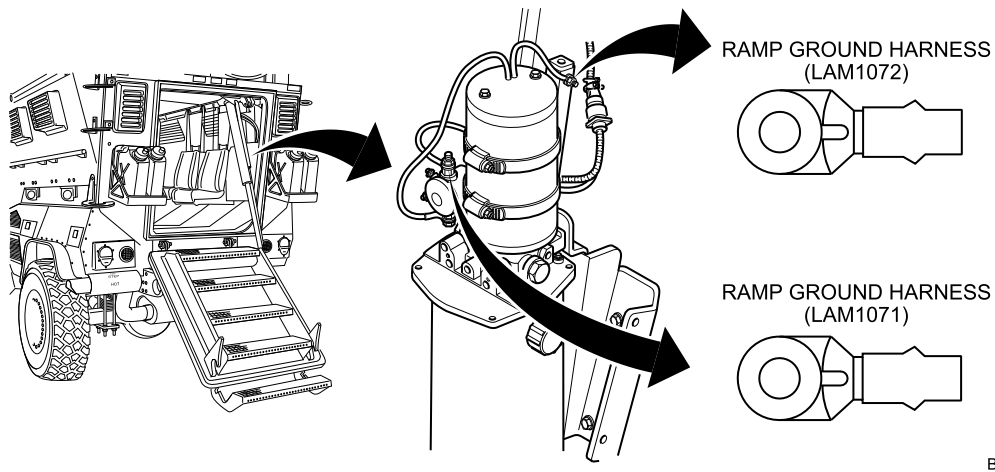
DECISION

NO Go to Step 59.
YES Go to Step 56.

STEP

49. Disconnect terminals LAM1071 and LAM1072. Refer to Figure 23.

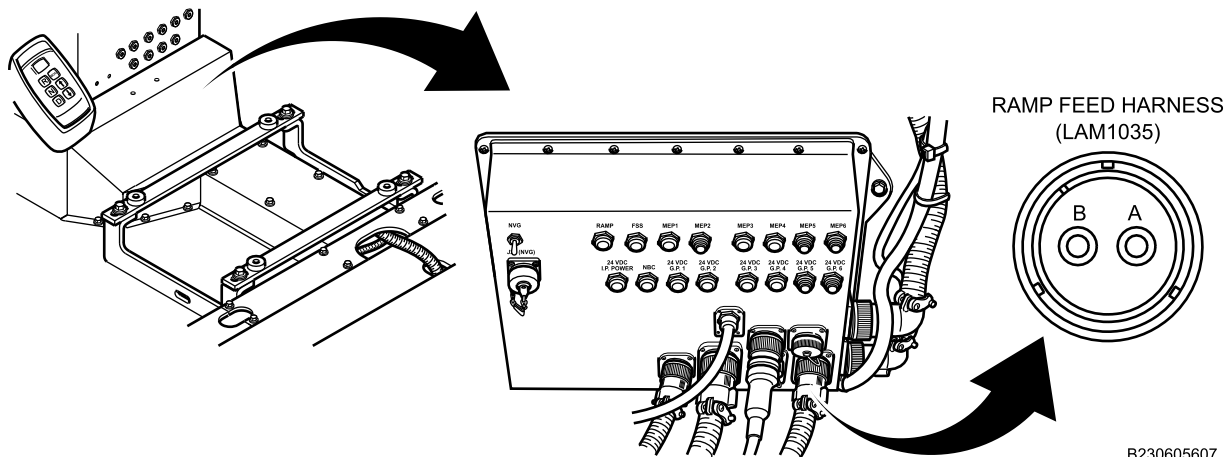
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)



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Figure 23. Top of Hydraulic Pump Solenoid.

50. Measure resistance between LAM1035 terminal B and ground with multimeter. Refer to Figure 24.



B230605607

Figure 24. Lower Right of 24V Power Distribution Center (PDC).

CONDITION/INDICATION

Does multimeter read OL?

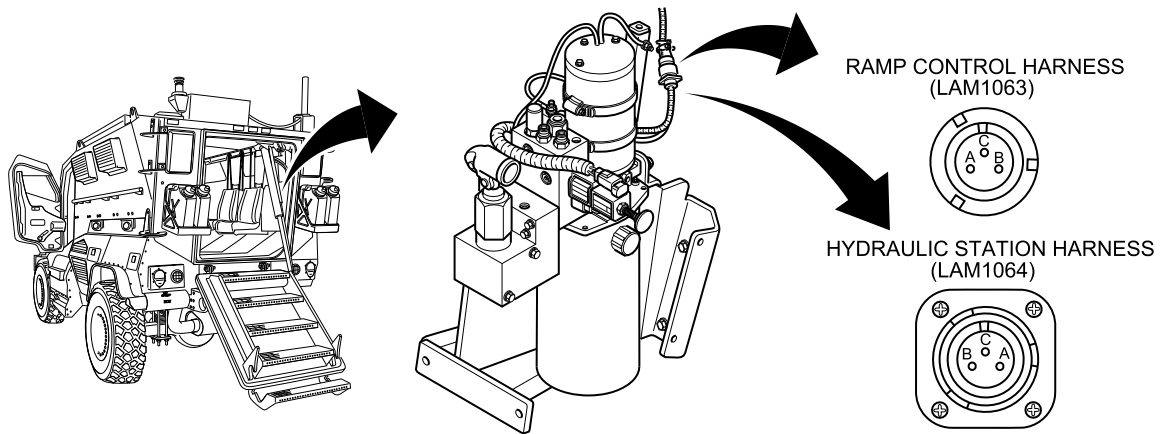
DECISION

NO Go to Step 57.
 YES Go to Step 56.

STEP

51. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
52. Disconnect connectors LAM1063/LAM1064. Refer to Figure 25.

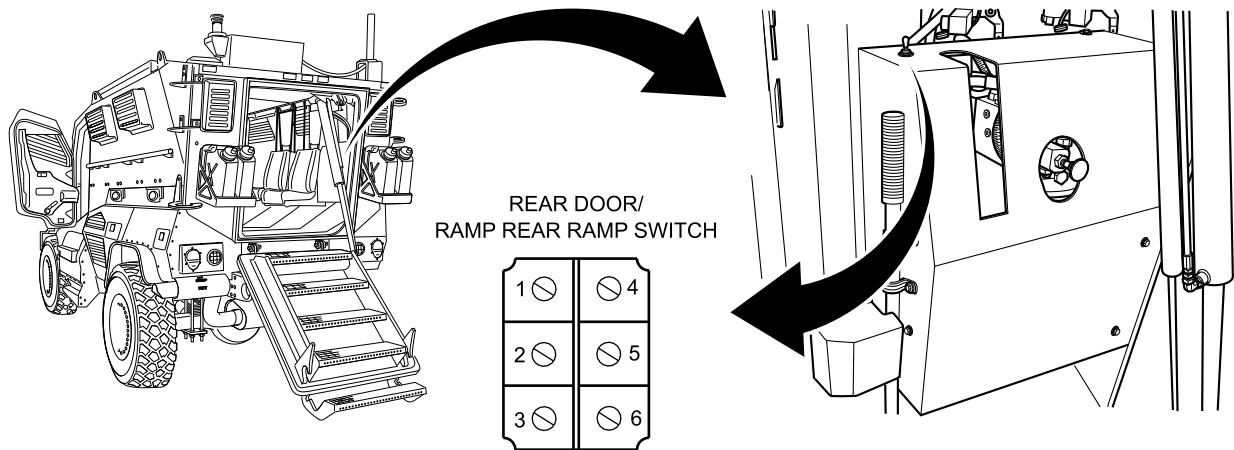
REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)



B230611631

Figure 25. Right Side of Hydraulic Pump.

53. Measure resistance between LAM1064 terminal A to rear door/ramp rear ramp switch terminal 5 with multimeter. Refer to Figure 25 and Figure 26.



B230611632

Figure 26. Rear Door/Ramp Rear Ramp Switch.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

NO Go to Step 56.
 YES Go to next step.

STEP

54. Measure resistance between LAM1064 terminal B and rear door/ramp rear ramp switch terminal 4 with multimeter. Refer to Figure 25 and Figure 26.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

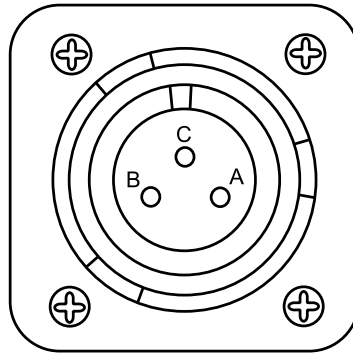
DECISION

NO Go to Step 56.
 YES Go to next step.

STEP

55. Measure resistance between LAM1064 terminal C and rear door/ramp rear switch terminal 3 with multimeter. Refer to Figure 27 and Figure 28.

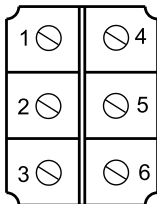
HYDRAULIC STATION HARNESS
(LAM1064)



B230604154

Figure 27. Connector LAM1064.

REAR DOOR/
RAMP REAR RAMP SWITCH



B230605657

Figure 28. Rear Door/Ramp rear Ramp Switch.

CONDITION/INDICATION

Does multimeter read less than 3 ohms?

DECISION

YES Go to Step 57.
 NO Go to next step.

MALFUNCTION

- 56. Faulty hydraulic assembly.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)**ACTION**

Replace hydraulic assembly with current production assembly. Remove hydraulic assembly. Refer to Rear Door/Ramp Hydraulic Pump Removal and Installation (Pull-Type Operation) (WP 0693).

END OF TEST**MALFUNCTION**

- 57. Faulty harness.

ACTION

Replace rear door ramp feed harness. Refer to Rear Door Ramp Feed Harness Removal and Installation (WP 0444). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 58. Faulty switch.

ACTION

Replace master rear door/ramp switch. Refer to Master Rear Door/Ramp Switch Removal and Installation (WP 0309). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 59. Hydraulic fluid level too low.

ACTION

Fill reservoir with hydraulic fluid to proper operating level. Refer to Rear Door/Ramp Hydraulic Reservoir Fluid Fill Procedure (WP 0699). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 60. Faulty harness.

ACTION

Replace IP harness. Refer to Instrument Panel (IP) Harness Removal and Installation (WP 0319). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 61. Faulty harness.

ACTION

Replace master rear door/ramp switch jumper. Refer to Master Rear Door/Ramp Switch Jumper Harness Removal and Installation (WP 0310). Return vehicle to service.

REAR DOOR/RAMP HYDRAULIC LIFT COMPONENTS TROUBLESHOOTING PROCEDURE (PULL-TYPE OPERATION) - (CONTINUED)**END OF TEST****MALFUNCTION**

- 62. Faulty harness.

ACTION

Replace rear door ramp hydraulic system control harness. Refer to Rear Door Ramp Hydraulic System Control Harness Removal and Installation (WP 0432). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:**Test Equipment**

Refrigerant recovery station (WP 0795, Item 84)

WP 0207

WP 0208

WP 0209

Tools and Special ToolsGeneral Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

WP 0211

WP 0212

WP 0213

Refrigeration Ordnance Service Tool Kit
(WP 0795, Item 85)

WP 0244

WP 0708

Materials/PartsFaceshield, industrial (WP 0794, Item 16)
Gloves (WP 0794, Item 18)

WP 0707

WP 0722

WP 0758

WP 0759

Personnel Required

Maintainer (HVAC Certified)

WP 0782

Equipment Condition**References**TM 9-2355-106-10
TM 9-2355-106-23P
WP 0190
WP 0202
WP 0204
WP 0206

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Hood open and secured (TM 9-2355-106-10)

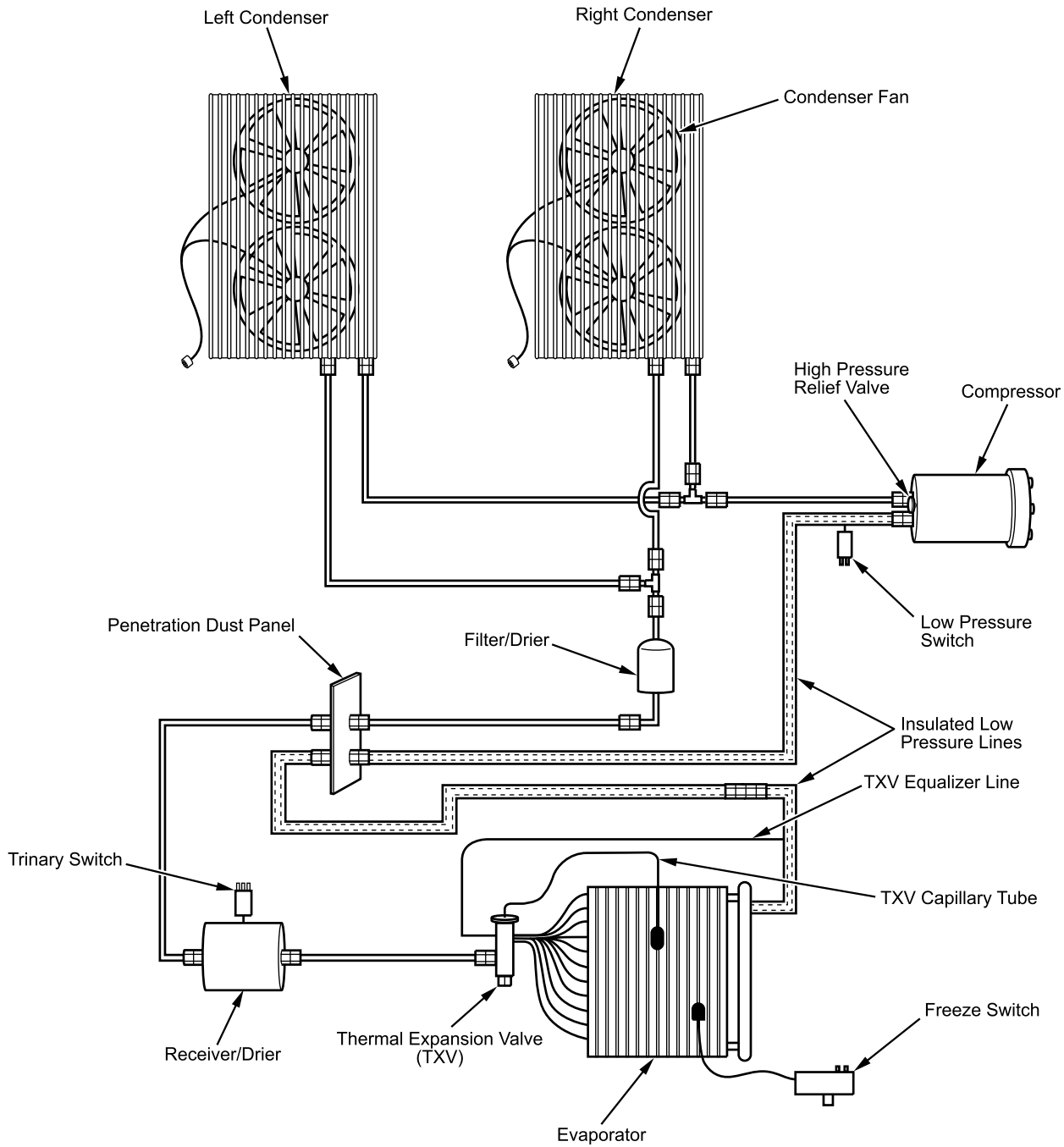
WORK PACKAGE OVERVIEW

This work package provides troubleshooting procedures for the A/C refrigerant system. This work package does not include electrical diagnosis of the Heating Ventilating Air Conditioning (HVAC)/Life Support System (LSS).

For HVAC/LSS troubleshooting information, refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).

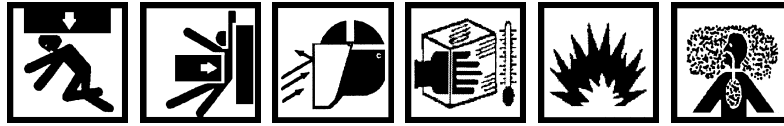
AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

A/C REFRIGERANT SYSTEM DIAGRAM



B235202696

Figure 1. A/C Refrigerant System Diagram.

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**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.

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.

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.

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.

Do not install or remove air-conditioning testing or charging equipment while engine is running. Wait 30 seconds after engine shutdown to allow high side and low side pressures to equalize. Failure to comply may result in damage to equipment and environment, and 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.

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.

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.

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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. Failure to comply may result in damage to environment and serious injury or death to personnel.

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. Failure to comply may result in damage to equipment and environment, and serious injury or death to personnel.

CAUTION

Valve for vacuum gauge must be closed until you are instructed to open it. If valve is open during system charging, excess pressure may damage electronic vacuum gauge.

When charging A/C system, keep refrigerant tank upright. If tank is not in upright position, liquid refrigerant may enter system and cause compressor damage.

Overcharging system will result in excessively high head pressures during operation and may damage compressor.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

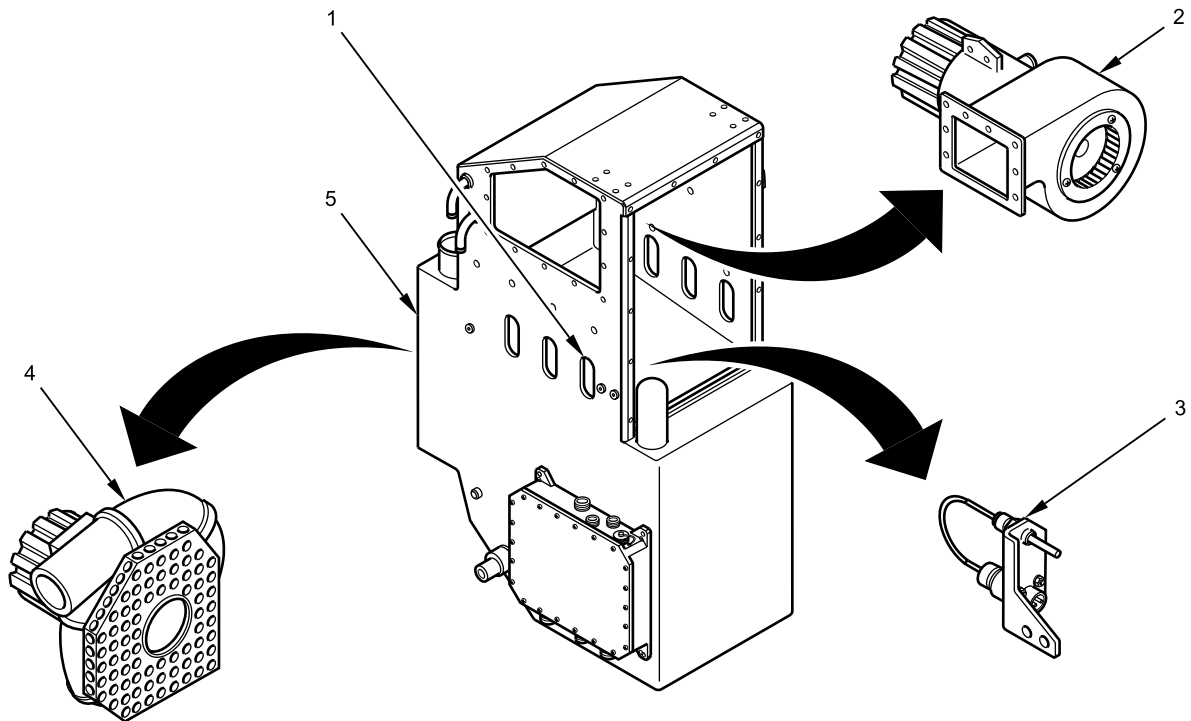
Ambient air temperature should be above 98°F (36.6°C) to perform a complete performance test. Performing this test at a lower ambient temperature will not determine if system is capable of cooling cabin air temperature to its maximum capability. The system should be capable of decreasing the cabin air temperature by 30°F (16.6°C) after 30 minutes of run time. Recycled Air (RA) temperature sensor is monitored by Climate Control Unit (CCU) and will shut compressor off when RA temperature is below 67°F ($\pm 4^\circ\text{F}$) (19.4°C [$\pm 15^\circ\text{C}$]).

STEP

1. Prepare the recovery/recharging station according to the setup instructions described in the recovery/recharging station user's guide.
2. Connect recovery/recharging station. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).
3. Close high- and low-side valves on recovery/recharging station control panel.

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

4. Place a thermometer in hole (Figure 2, Item 1) in forward side of HVAC box (Figure 2, Item 5), near RA temperature sensor (Figure 2, Item 3).



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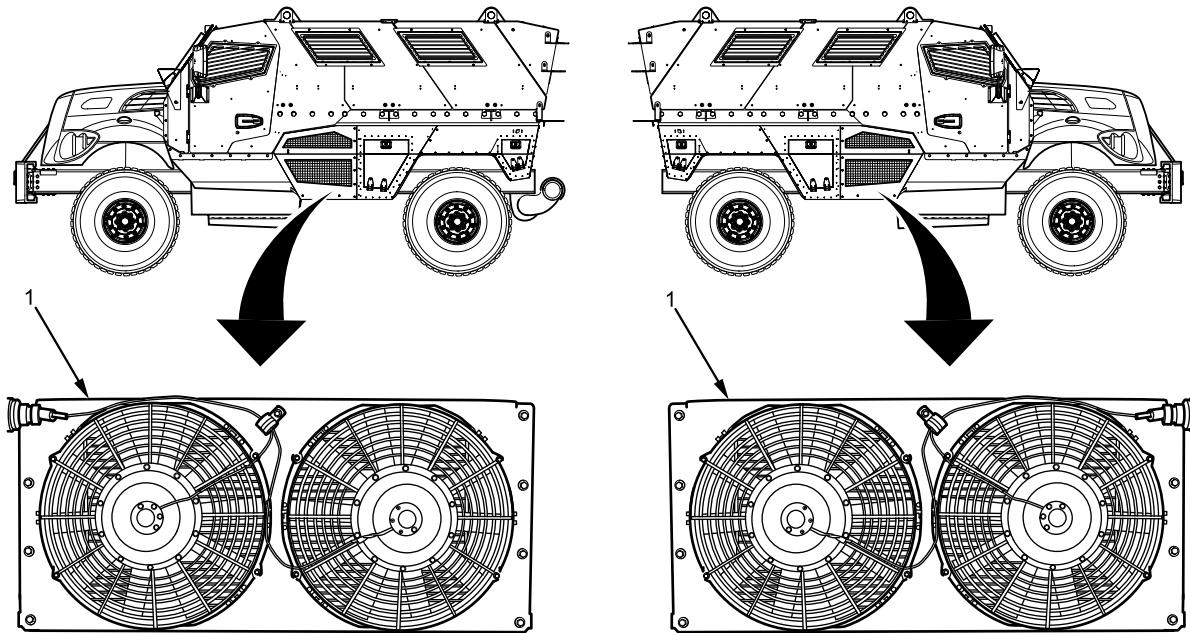
Figure 2. Recycled Air (RA) Temperature Sensor, Recycled Air (RA) Blower, and Fresh Air (FA) Blower Locations.

5. Turn MAIN POWER switch ON (TM 9-2355-106-10).
6. Start engine (TM 9-2355-106-10).
7. Turn LSS switch on HVAC/LSS control panel to ON position (TM 9-2355-106-10).
8. Turn mode control knob on HVAC/LSS control panel to COOL position (TM 9-2355-106-10).
9. Turn RA blower speed control knob on HVAC/LSS control panel to maximum position (TM 9-2355-106-10).
10. Turn temperature control knob on HVAC/LSS control panel to coldest position (TM 9-2355-106-10).
11. Close all doors and hatches to seal cabin (TM 9-2355-106-10).

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

12. Inspect for the following normal conditions:

- Engine speed increases to 1,300 rpm (\pm 800 rpm) within 10 seconds.
- All four condenser fans (Figure 3, Item 1) should turn on and off as a group to regulate A/C high-side pressure. Fans should turn on between 145 psi (1,000 kPa) and 203 psi (1,400 kPa). Fans should turn off between 207 psi (1,427 kPa) and 257 psi (1775 kPa).



B239103790

Figure 3. A/C Condenser Fans Location.

- Difference between outside air temperature and thermometer placed near RA temperature sensor is 30°F (16.6°C) after 30 minutes of run time unless cabin temperature drops below 67°F (\pm 4°F) (19.4°C [\pm 15°C]). A complete system check cannot be performed unless outside air temperature is at least 98°F (36.6°C).

CONDITION/INDICATION

Engine speed does not increase to 1,300 rpm (\pm 800 rpm) within 10 seconds.

CORRECTIVE ACTION

Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).

CONDITION/INDICATION

One or more condenser fans are not operating.

CORRECTIVE ACTION

Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).

CONDITION/INDICATION

Low-side refrigerant pressure drops below 7 psi (48.2 kPa).

CORRECTIVE ACTION

Check for insufficient refrigerant charge. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).

CONDITION/INDICATION

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

High-side refrigerant pressure rises above 435 psi (\pm 32 psi) (3000 kPa [\pm 220 kPa]).

CORRECTIVE ACTION

Check for excessive refrigerant charge. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).

1. Observe recovery/recharging station low- and high-side pressure gauges.

Low low-side pressure, high high-side pressure.

- Visually inspect refrigerant lines for a restriction between A/C compressor discharge port and receiver/drier.
- Replace filter/drier. Refer to Heating Ventilating and Air Conditioning (HVAC) Receiver/Drier Removal and Installation (WP 0758).

Extremely low low-side pressure, normal or low high-side pressure.

- Check for low refrigerant charge. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).
- Check for moisture freezing in Thermal Expansion Valve (TXV). Refer to Air Conditioning (A/C) Thermal Expansion Valve Operational Checkout Procedure (WP 0190).
- Visually inspect refrigerant lines for a restriction between outlet of receiver/drier and A/C compressor.
- Replace receiver/drier. Refer to Heating Ventilating and Air Conditioning (HVAC) Receiver/Drier Removal and Installation (WP 0758).

High low-side pressure, normal to slightly low high-side pressure.

- Check for stuck open TXV. Refer to Air Conditioning (A/C) Thermal Expansion Valve Operational Checkout Procedure (WP 0190).
- Replace A/C compressor. Refer to Heating Ventilating and Air Conditioning (HVAC) Compressor Removal and Installation (WP 0708).

High low-side pressure, high high-side pressure.

- Check for excessive refrigerant charge. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).
- Visually inspect condenser units and condenser fans for an airflow restriction.
- Check for proper condenser fan operation. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check for proper trinary switch operation. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check for excessive Polyalkylene Glycol (PAG) oil or moisture in system. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).

High low-side pressure, normal to slightly high high-side pressure.

- Check for 3-way valve allowing coolant flow to heater core. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check RA blower operation. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check for open doors and hatches, allowing warm air into cabin.
- Visually inspect low pressure lines for missing insulation.

Low low-side pressure, low high-side pressure.

- Check for low refrigerant charge and refrigerant leaks. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).
- Check for properly operating freeze switch. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).

AIR CONDITIONING (A/C) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

- Check for properly operating RA temperature sensor. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check for properly operating A/C compressor. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202).
- Check for loose or worn A/C compressor drive belt. Refer to A/C Belt Removal and Installation (WP 0244).

Oscillating pressure gauge needles.

- An oscillating low pressure gauge needle could indicate a faulty TXV. Refer to Air Conditioning (A/C) Thermal Expansion Valve Operational Checkout Procedure (WP 0190).
- An oscillating high pressure gauge needle could indicate a faulty A/C compressor. Replace A/C compressor. Refer to Heating Ventilating and Air Conditioning (HVAC) Compressor Removal and Installation (WP 0708).

1. Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**AIR CONDITIONING (A/C) THERMAL EXPANSION VALVE (TXV) OPERATIONAL CHECKOUT PROCEDURE**

INITIAL SETUP:**Materials/Parts**

Faceshield, industrial (WP 0794, Item 16)
Gloves (WP 0794, Item 18)

WP 0782

Equipment Condition

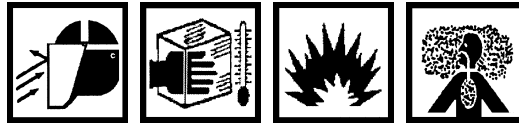
Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Heating Ventilating and Air Conditioning/Life Support System (HVAC/LSS) upper panel removed (WP 0770)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0189
WP 0707
WP 0758
WP 0759
WP 0770

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the HVAC system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202) before performing the tests in this troubleshooting procedure.

AIR CONDITIONING (A/C) THERMAL EXPANSION VALVE (TXV) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)**WARNING**

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.

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.

Do not install or remove air-conditioning testing or charging equipment while engine is running. Wait 30 seconds after engine shutdown to allow high side and low side pressures to equalize. Failure to comply may result in damage to equipment and environment, and 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.

Refrigerant evaporates very quickly and may displace oxygen in 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.

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.

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. Failure to comply may result in damage to environment and serious injury or death to personnel.

AIR CONDITIONING (A/C) THERMAL EXPANSION VALVE (TXV) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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. Failure to comply may result in damage to equipment and environment, and serious injury or death to personnel.

Valve for vacuum gauge must be closed until you are instructed to open it. If valve is open during system charging, excess pressure may damage electronic vacuum gauge.

When charging A/C system, keep refrigerant tank upright. If tank is not in upright position, liquid refrigerant may enter system and cause compressor damage.

CAUTION

Overcharging system will result in excessively high head pressures during operation and may damage compressor.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

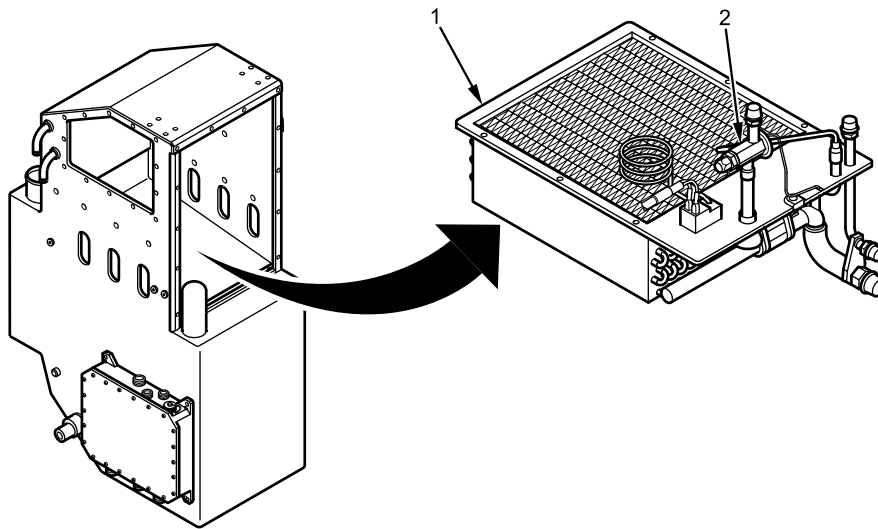
1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Start engine (TM 9-2355-106-10).
3. Turn LSS switch on HVAC/LSS control panel to ON position (TM 9-2355-106-10).
4. Turn mode control knob on HVAC/LSS control panel to COOL position (TM 9-2355-106-10).
5. Turn Recycled Air (RA) blower speed control knob on HVAC/LSS control panel to maximum position (TM 9-2355-106-10).
6. Turn temperature control knob on HVAC/LSS control panel to coldest position (TM 9-2355-106-10).

NOTE

TXV and evaporator should be cold but not frosted or iced up. Frost or ice on TXV or evaporator indicates a stuck open TXV or a faulty freeze switch. A warm TXV and evaporator could indicate a stuck closed or clogged TXV. Refrigerant with moisture contamination can cause water to freeze at TXV orifice. When water reaches the TXV, extreme cold that results from the pressure drop freezes the water, forming an ice blockage. As the system shuts down and the TXV warms, the ice will melt, allowing refrigerant to flow again. As the high- and low-side pressures achieve normal operating conditions, the moisture will cycle through the system and eventually freeze again in the TXV, starting this undesired cycle over again.

7. Visually and physically inspect external conditions of TXV (Figure 1, Item 2) and evaporator (Figure 1, Item 1).

AIR CONDITIONING (A/C) THERMAL EXPANSION VALVE (TXV) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



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Figure 1. Thermal Expansion Valve (TXV) and Evaporator Assembly.

CONDITION/INDICATION

TXV is suspected of freezing internally.

CORRECTIVE ACTION

Discharge system, evacuate for 30 minutes or more, and recharge system. Refer to Air Conditioning (A/C) Service/Recharge Procedure (WP 0707).

CONDITION/INDICATION

TXV is still suspected of freezing internally.

CORRECTIVE ACTION

Receiver/drier may be saturated with moisture. Replace receiver/drier. Refer to Heating Ventilating and Air Conditioning (HVAC) Receiver/Drier Removal and Installation (WP 0758).

CONDITION/INDICATION

TXV is suspected of being stuck open, closed, or oscillating in between.

CORRECTIVE ACTION

Replace TXV. Refer to Heating Ventilating and Air Conditioning (HVAC) Main Evaporator Assembly Removal and Installation (WP 0759).

END OF WORK PACKAGE

FIELD MAINTENANCE
FIRE SUPPRESSION SYSTEM (FSS) TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0200
WP 0201
WP 0737
WP 0741
WP 0742
WP 0782

Personnel Required

Maintainer - (2)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0192
WP 0193
WP 0194
WP 0195
WP 0196
WP 0197
WP 0198
WP 0199

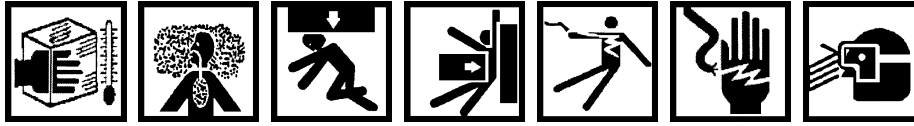
Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
Battery disconnect switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Engine hood open and secured (TM 9-2355-106-10)

Drawings Required

Schematic (WP 0789, Figure 29)

TROUBLESHOOTING PROCEDURE

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**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.

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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

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.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

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.

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn battery disconnect switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Turn FSS control panel FUSE switch ON (TM 9-2355-106-10).
4. Turn FSS control panel DIMMER control knob to brightest position (TM 9-2355-106-10). GREEN light on FSS control panel should be illuminated.

CONDITION/INDICATION

Is GREEN light on FSS control panel illuminated?

DECISION

YES Go to next step.

NO Go to Step 49.

STEP

5. Press and hold LAMP TEST button on FSS control panel (TM 9-2355-106-10). All four RED LEDs should illuminate.

CONDITION/INDICATION

Do all four RED LEDs on FSS control panel illuminate?

DECISION

YES Go to next step.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

NO Go to Step 59.

STEP

6. Release LAMP TEST button on FSS control panel.

CONDITION/INDICATION

Do any of the RED LEDs stay illuminated?

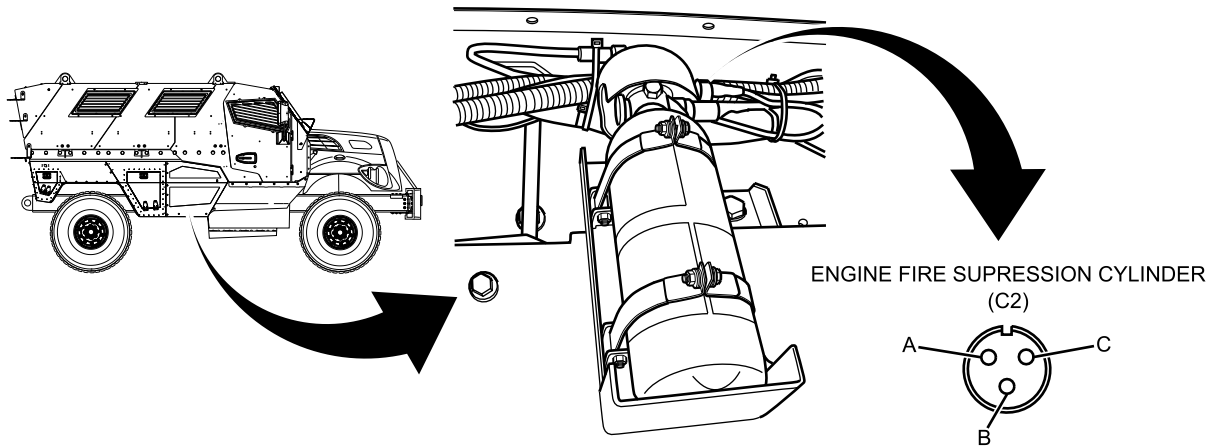
DECISION

YES Go to Step 50.

NO Go to next step.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
 8. Turn battery disconnect switch OFF (TM 9-2355-106-10).
 9. Disconnect connector C2. Refer to Figure 1



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Figure 1. Outside Center of Right Side Frame Rail Area.

10. Disconnect connector C4. Refer to Figure 2

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

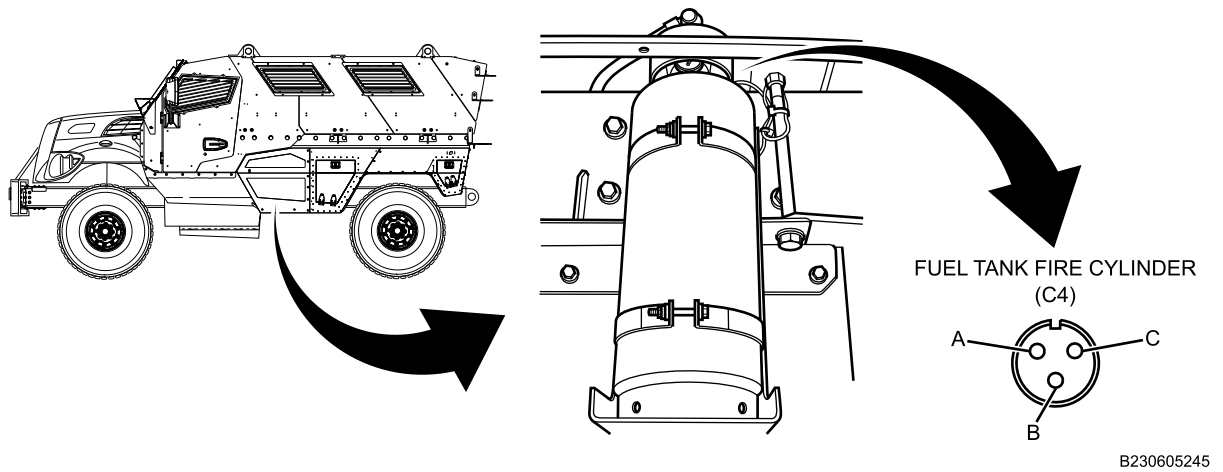


Figure 2. Outside Center of Left Side Frame Rail Area.

11. Disconnect connector C6. Refer to Figure 3

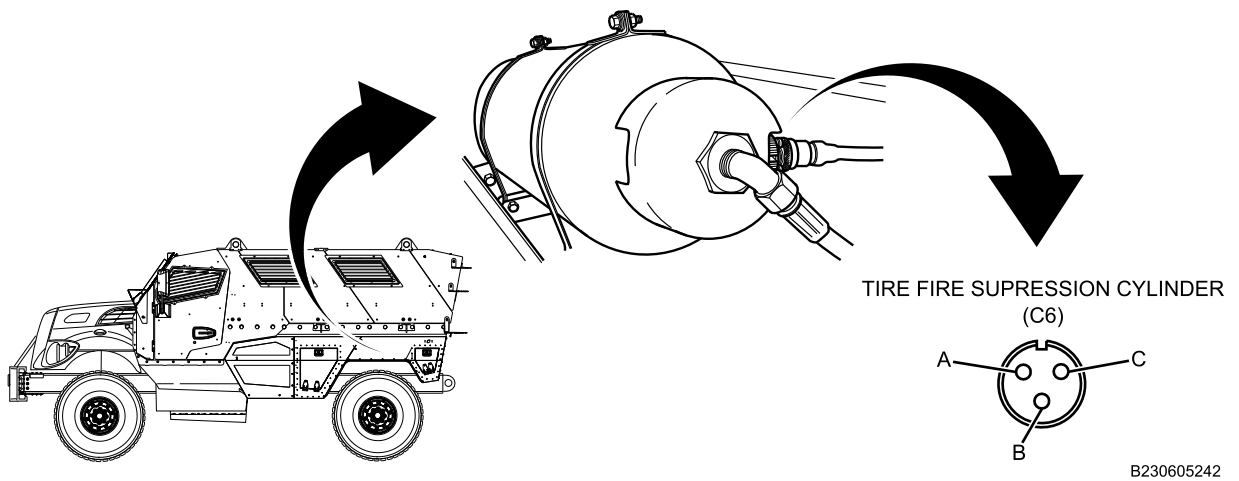


Figure 3. Backside of Left Rear Stowage Box Area.

12. Disconnect connector C3. Refer to Figure 4

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

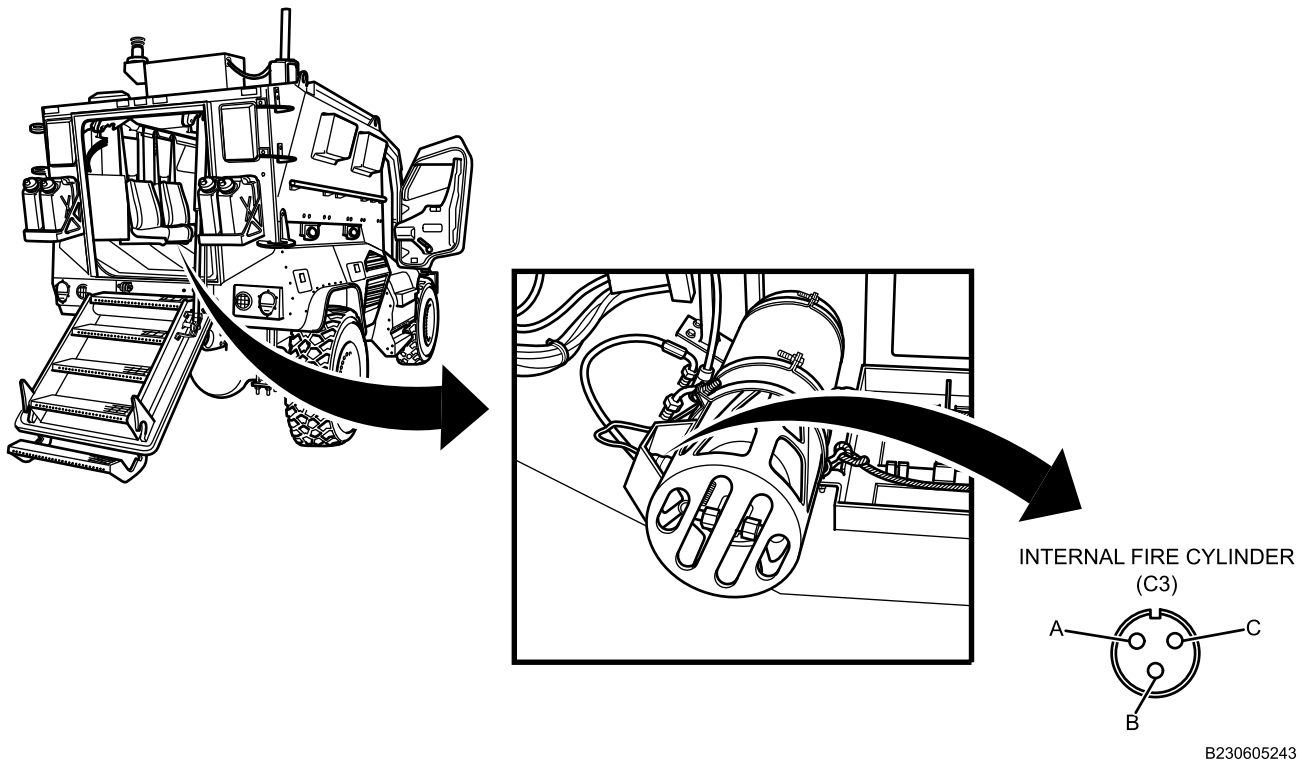
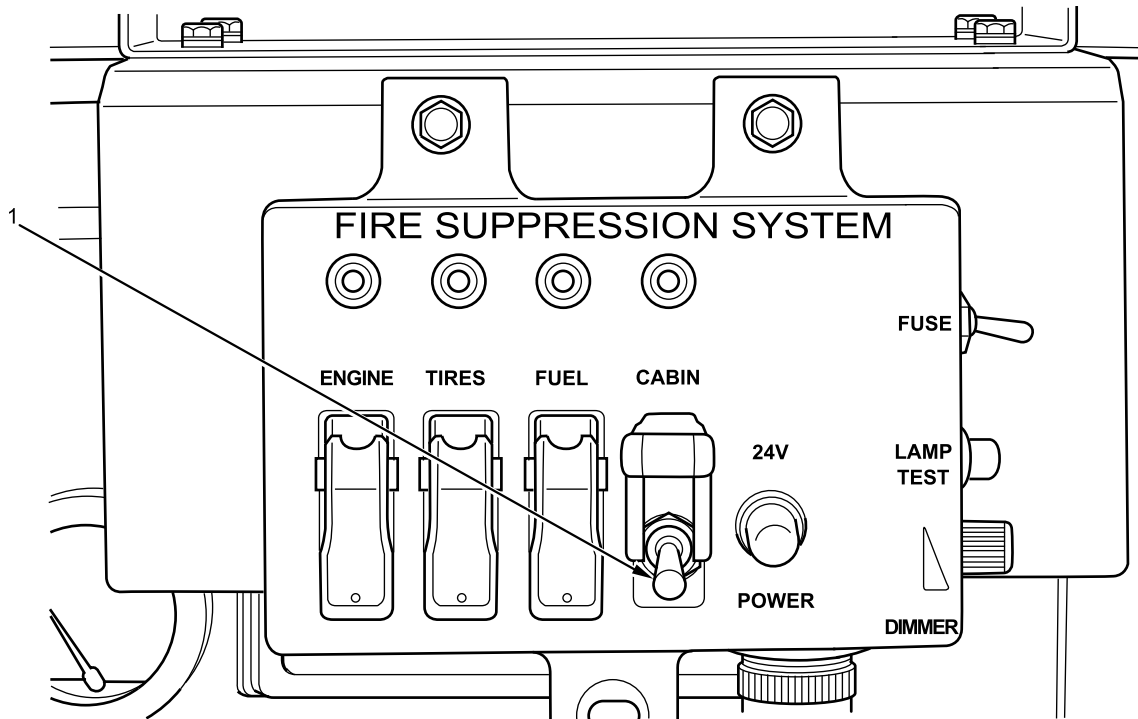


Figure 4. Center Cabin Floor Area.

13. Turn battery disconnect switch ON (TM 9-2355-106-10).
14. Turn ignition switch ON (TM 9-2355-106-10).
15. With assistance from maintainer, measure and record DC voltage between connector C3 terminals B and C with multimeter while holding CABIN switch (Figure 5, Item 1) on FSS control panel in the up position. Refer to Figure 4

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)



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Figure 5. FSS Control Panel.

16. Release CABIN switch (Figure 5, Item 1).

CONDITION/INDICATION

Did multimeter read more than 22.5V?

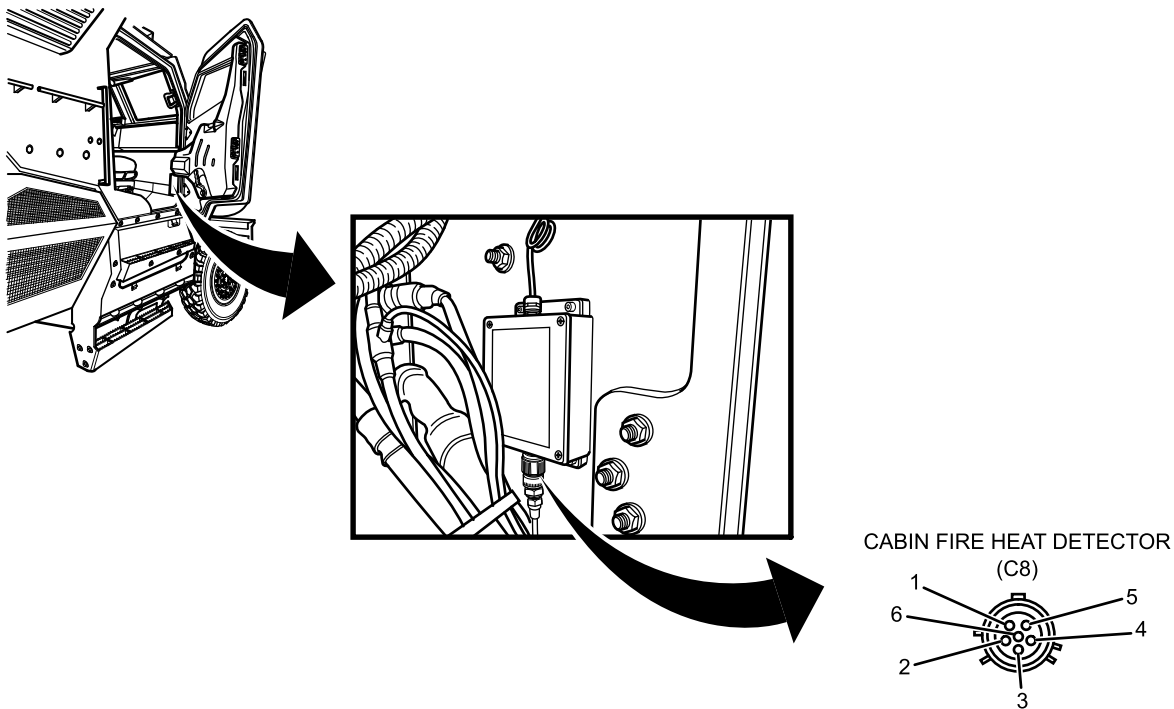
DECISION

YES Go to next step.
NO Go to Step 51.

STEP

17. Turn ignition switch OFF (TM 9-2355-106-10).
18. Turn battery disconnect switch OFF (TM 9-2355-106-10).
19. Disconnect connector C8. Refer to Figure 6

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)



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Figure 6. Right Side Front Cabin Area.

20. Turn battery disconnect switch ON (TM 9-2355-106-10).
21. Turn ignition switch ON (TM 9-2355-106-10).
22. Measure and record DC voltage between connector C8 terminals 1 and 2 with multimeter. Refer to Figure 6
23. Measure and record DC voltage between connector C8 terminals 2 and 4 with multimeter. Refer to Figure 6

CONDITION/INDICATION

Did multimeter read more than 22.5V for both tests?

DECISION

YES Go to next step.

NO Go to Step 52.

STEP

24. Turn ignition switch OFF (TM 9-2355-106-10).
25. Turn battery disconnect switch OFF (TM 9-2355-106-10).
26. Connect a jumper wire between connector C8 terminals 1 and 5. Refer to Figure 6
27. Turn battery disconnect switch ON (TM 9-2355-106-10).
28. Turn ignition switch ON (TM 9-2355-106-10).
29. Measure DC voltage between connector C3 terminals B and C with multimeter. Refer to Figure 7

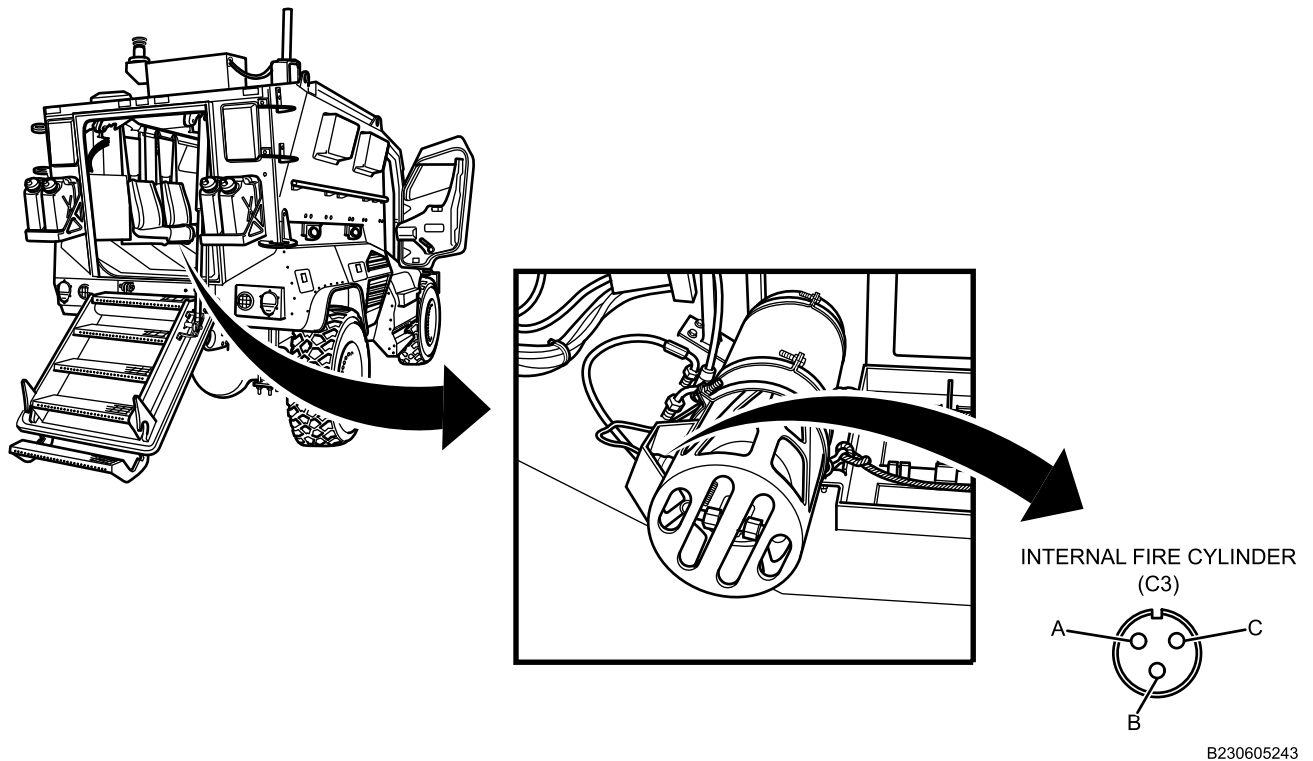
Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

Figure 7. Center Cabin Floor Area.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

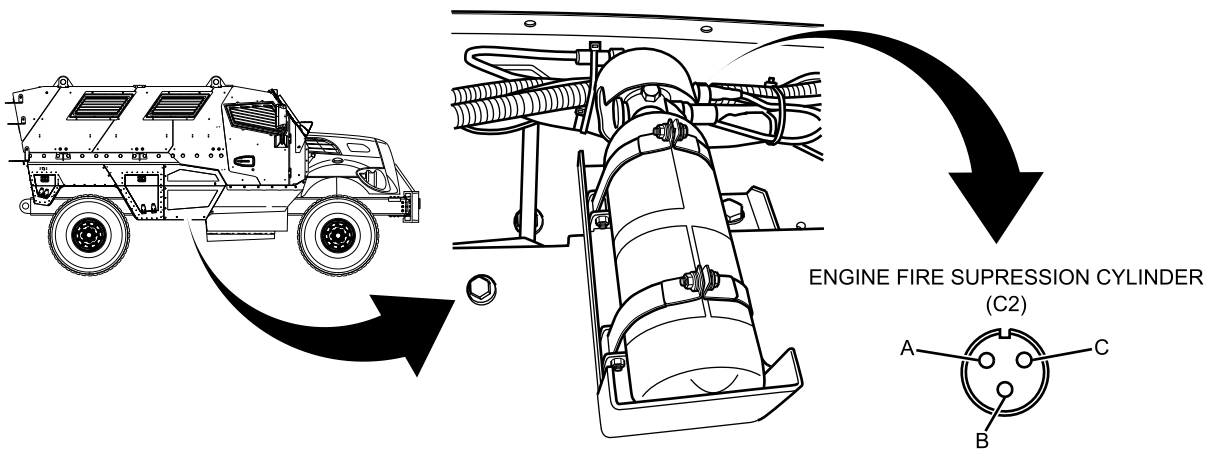
YES Go to next step.

NO Go to Step 53.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

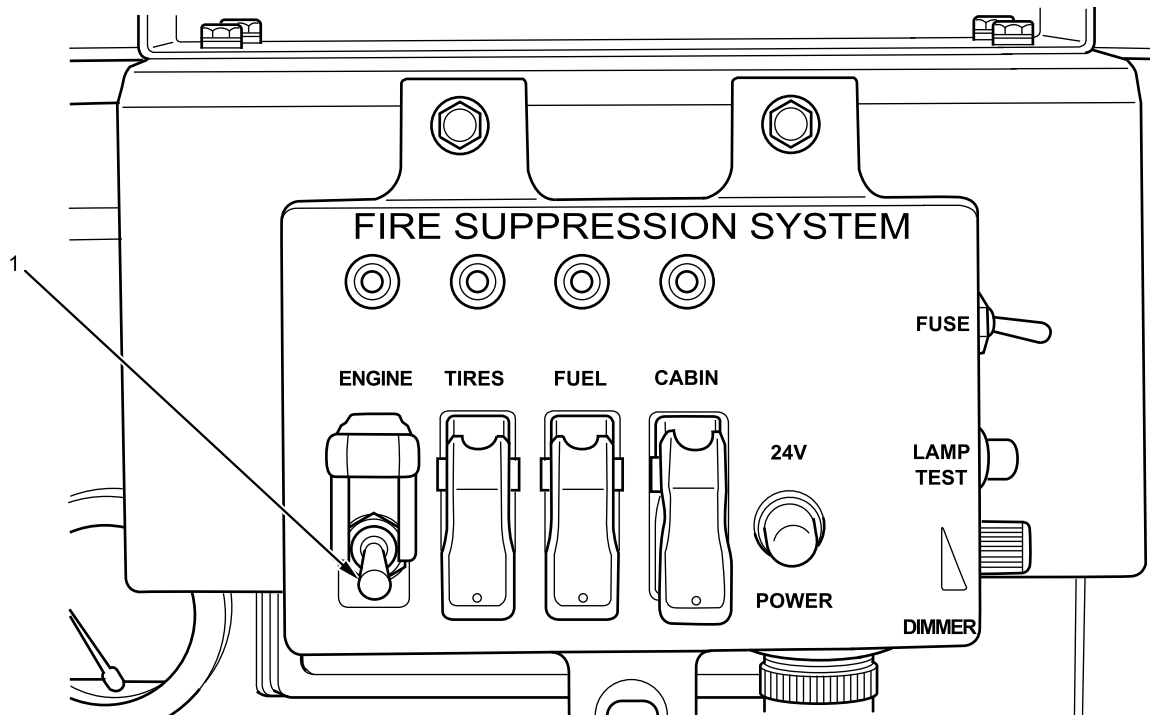
STEP

30. With assistance from maintainer, measure and record DC voltage between connector C2 terminals B and C with multimeter while holding ENGINE switch (Figure 9, Item 1) on FSS control panel in the up position. Refer to Figure 8.



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Figure 8. Outside Center of Right Side Frame Rail Area.



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Figure 9. FSS Control Panel.

31. Release ENGINE switch (Figure 9, Item 1).

CONDITION/INDICATION

Did multimeter read more than 22.5V?

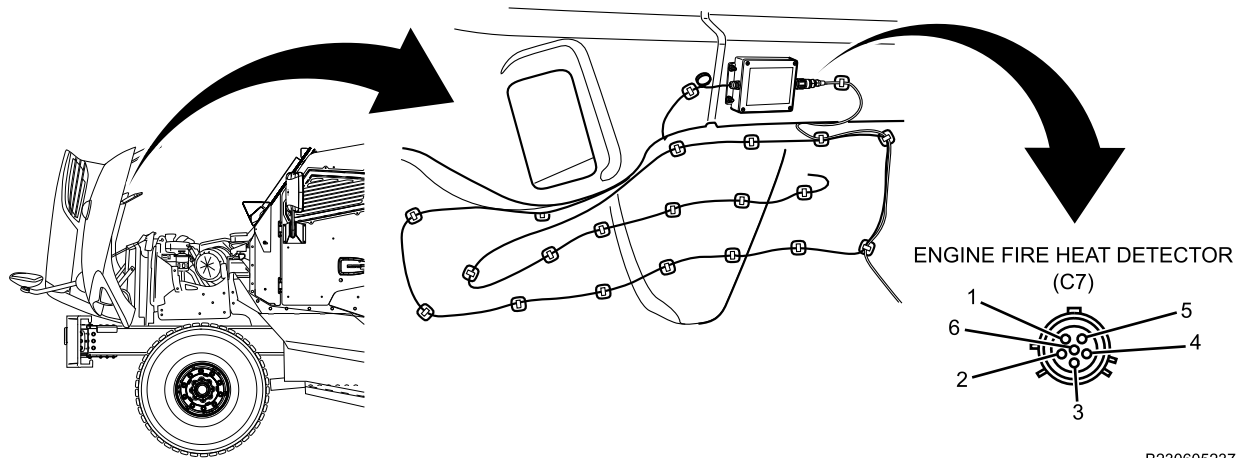
Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**DECISION**

YES Go to next step.

NO Go to Step 54.

STEP

32. Turn ignition switch OFF (TM 9-2355-106-10).
33. Turn battery disconnect switch OFF (TM 9-2355-106-10).
34. Disconnect connector C7. Refer to Figure 10



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Figure 10. Backside of Hood Area.

35. Turn battery disconnect switch ON (TM 9-2355-106-10).
36. Turn ignition switch ON (TM 9-2355-106-10).
37. Measure and record DC voltage between connector C7 terminals 1 and 2 with multimeter. Refer to Figure 10.
38. Measure and record DC voltage between connector C7 terminals 2 and 4 with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Did multimeter read more than 22.5V for both tests?

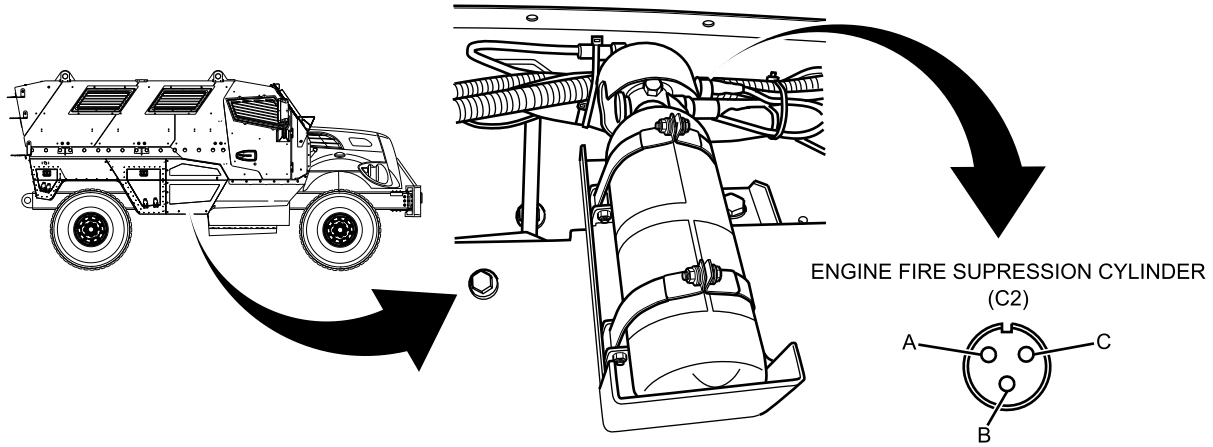
DECISION

YES Go to next step.

NO Go to Step 55.

STEP

39. Turn ignition switch OFF (TM 9-2355-106-10).
40. Turn battery disconnect switch OFF (TM 9-2355-106-10).
41. Connect a jumper wire between connector C7 terminals 1 and 5. Refer to Figure 10.
42. Turn battery disconnect switch ON (TM 9-2355-106-10).
43. Turn ignition switch ON (TM 9-2355-106-10).
44. Measure DC voltage between connector C2 terminals B and C with multimeter. Refer to Figure 11.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

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Figure 11. Outside Center of Right Side Frame Rail Area.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to next step.

NO Go to Step 56.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)

STEP

45. With maintainer assistance, measure and record DC voltage between connector C4 terminals C and B with multimeter while holding FUEL switch (Figure 13, Item 1) in the up position. Refer to Figure 12

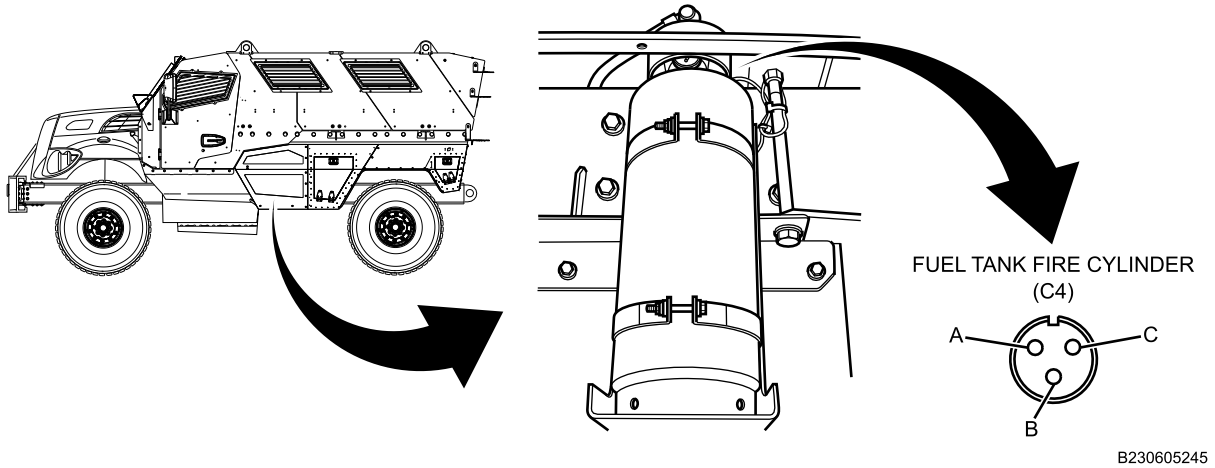


Figure 12. Outside Center of Left Side Frame Rail Area.

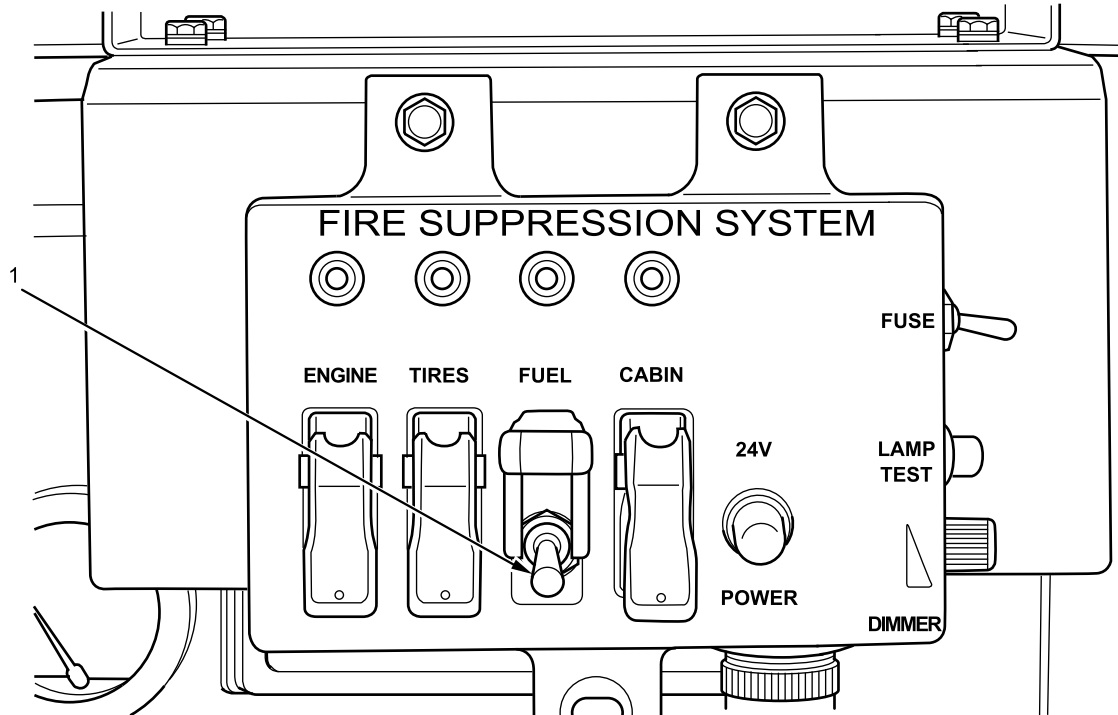


Figure 13. FSS Control Panel.

46. Release FUEL switch.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**CONDITION/INDICATION**

Did multimeter read more than 22.5V?

DECISION

YES Go to next step.

NO Go to Step 57.

STEP

47. With maintainer assistance, measure and record DC voltage between connector C6 terminals C and B with multimeter while holding TIRES switch (Figure 15, Item 1) in the up position. Refer to Figure 14.

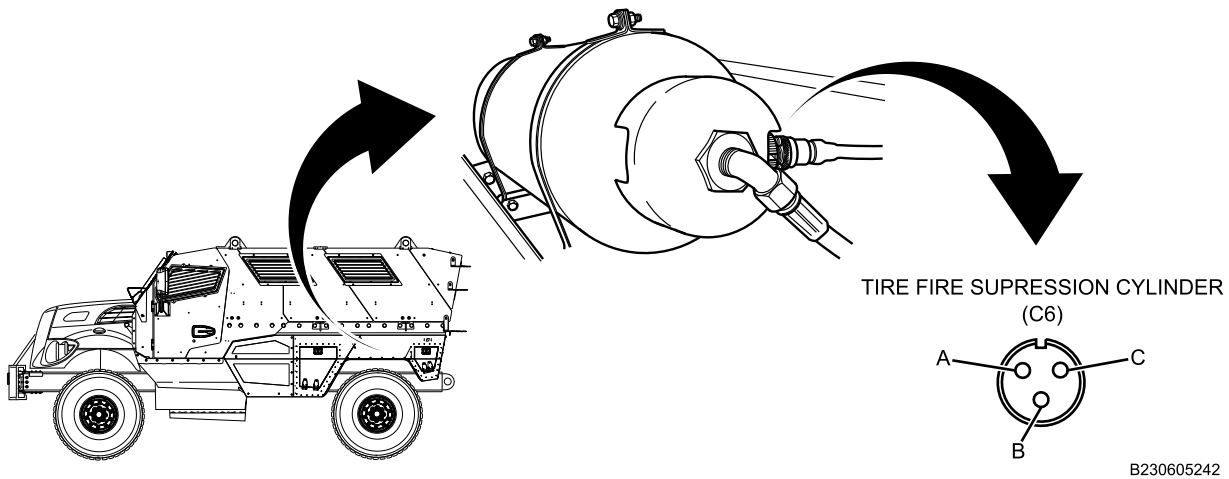
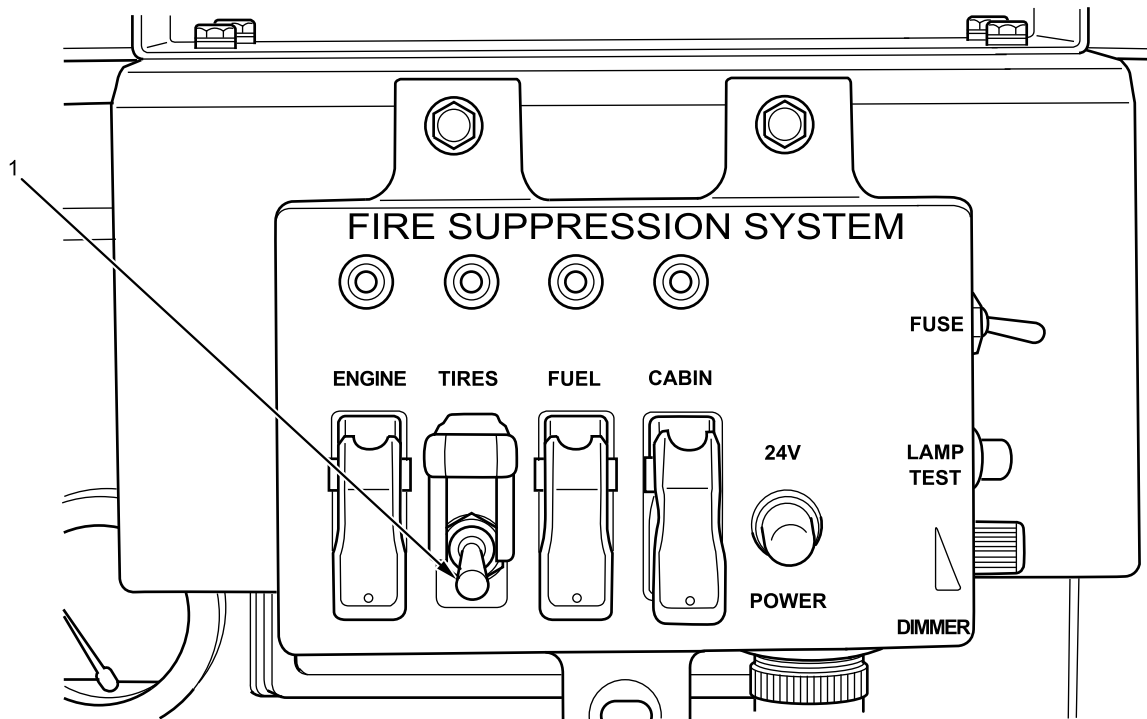


Figure 14. Backside of Left Rear Stowage Box Area.

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)



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Figure 15. FSS Control Panel.

48. Release TIRES switch.

CONDITION/INDICATION

Did multimeter read more than 22.5V?

DECISION

YES Go to Step 60.

NO Go to Step 58.

MALFUNCTION

- 49. FSS control panel troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Control Panel Power and Ground Troubleshooting Procedure (WP 0192).

END OF TEST

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**MALFUNCTION**

- 50. FSS extinguisher pressure fault troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Extinguisher Pressure Fault Troubleshooting Procedure (WP 0193).

END OF TEST**MALFUNCTION**

- 51. Cabin extinguisher control circuit fault troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Cabin Extinguisher Control Circuit Fault Troubleshooting Procedure (WP 0194).

END OF TEST**MALFUNCTION**

- 52. Cabin fire detector power and ground troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Cabin Fire Detector Power and Ground Troubleshooting Procedure (WP 0195).

END OF TEST**MALFUNCTION**

- 53. Cabin fire detector troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Cabin Fire Detector Fire Detection Circuit Troubleshooting Procedure (WP 0196).

END OF TEST**MALFUNCTION**

- 54. Engine extinguisher control circuit fault troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Engine Extinguisher Control Circuit Fault Troubleshooting Procedure (WP 0197).

END OF TEST

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**MALFUNCTION**

- 55. Engine fire detector power and ground troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Engine Fire Detector Power and Ground Troubleshooting Procedure (WP 0198).

END OF TEST**MALFUNCTION**

- 56. Engine fire detector troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Engine Fire Detector Fire Detection Circuit Troubleshooting Procedure (WP 0199).

END OF TEST**MALFUNCTION**

- 57. Fuel tank extinguisher control circuit fault troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Fuel Tank Extinguisher Control Circuit Fault Troubleshooting Procedure (WP 0200).

END OF TEST**MALFUNCTION**

- 58. Tires extinguisher control circuit fault troubleshooting required.

ACTION

Refer to Fire Suppression System (FSS) Tires Extinguisher Control Circuit Fault Troubleshooting Procedure (WP 0201).

END OF TEST

Fire Suppression System (FSS) Troubleshooting Procedure - (CONTINUED)**MALFUNCTION**

- 59. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 60. There are no tests for the cabin and engine fire sensors. If cabin or engine fire sensor is suspected of a fault, replace applicable fire sensor.

ACTION

- If cabin sensor is suspected of a fault, replace sensor. Refer to Fire Suppression System (FSS) Cabin Sensor Removal and Installation (WP 0742). Return vehicle to service.
- If engine sensor is suspected of a fault, replace sensor. Refer to Fire Suppression System (FSS) Engine Compartment Sensor Removal and Installation (WP 0741). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0750
WP 0743
WP 0747
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0191
WP 0737
WP 0741
WP 0739
WP 0740
WP 0742
WP 0745

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Hood open and secured (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**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.

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.

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 anti-recoil plug. Failure to comply may result in damage to equipment and 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.

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.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

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.

Replace fire extinguisher immediately after use, even if only partly used. Failure to comply may result in serious injury or death to personnel.

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

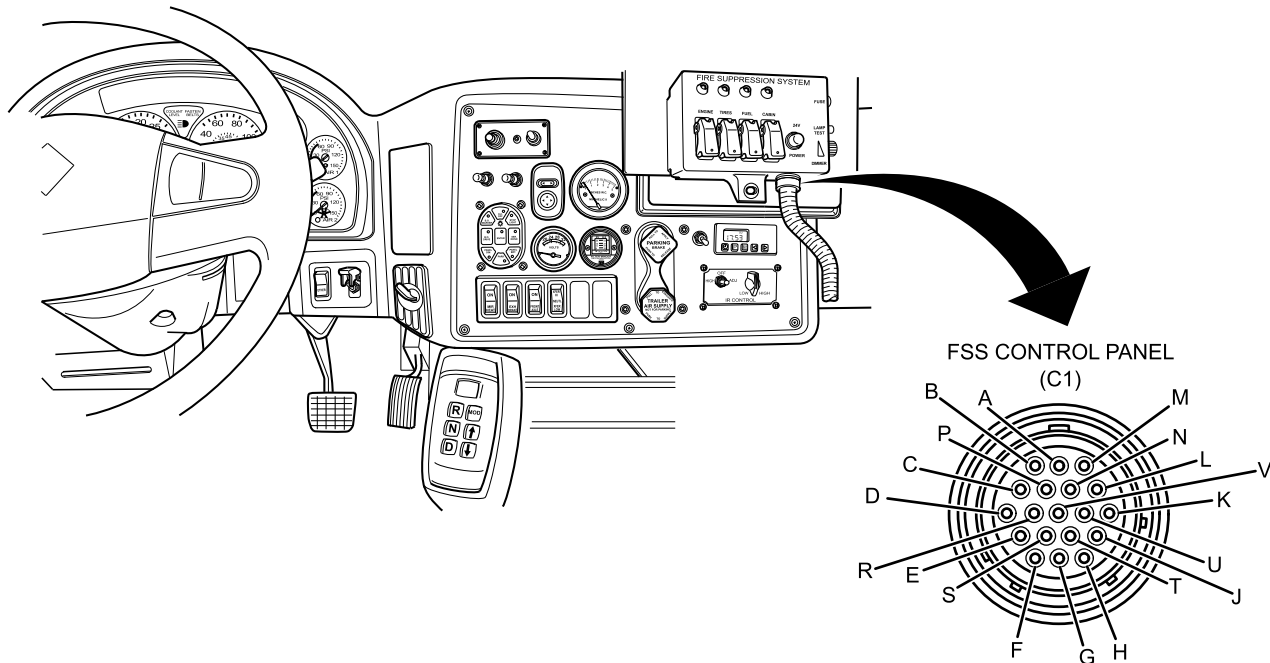
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

1. Disconnect connector C1. Refer to Figure 1.



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Figure 1. Center Instrument Panel (IP) Area.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Measure DC voltage between connector C1 terminals A and B with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 51.
NO Go to next step.

STEP

4. Measure DC voltage between connector C1 terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

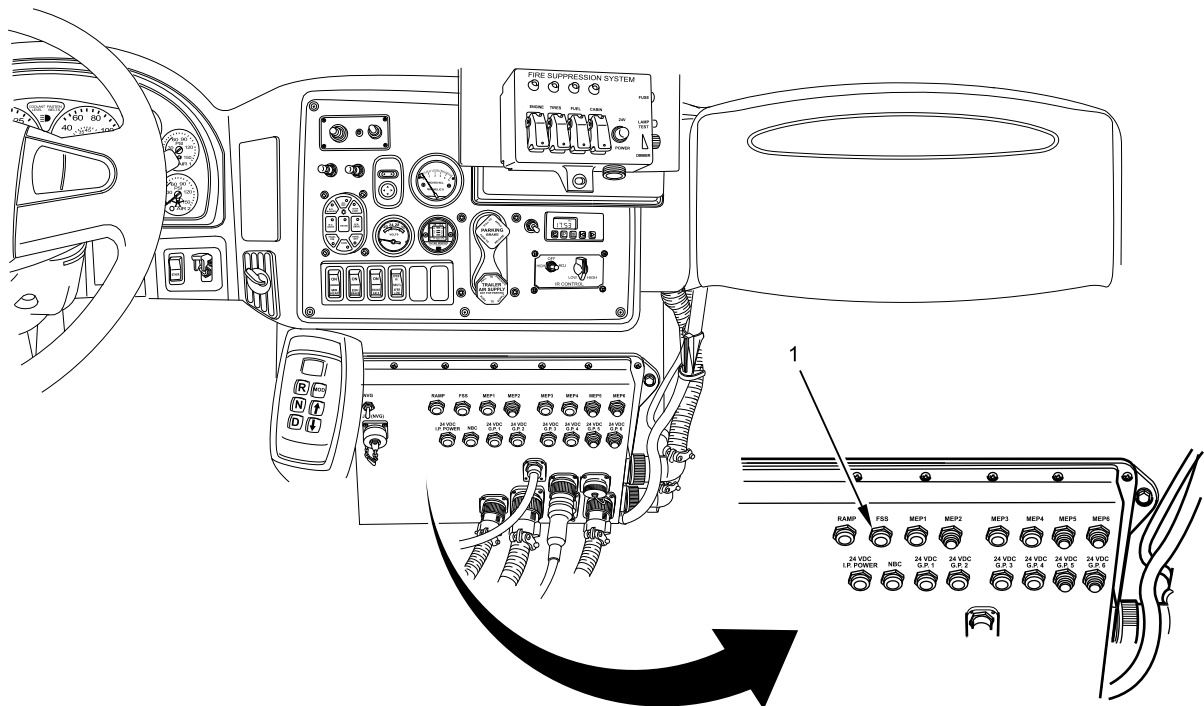
DECISION

YES Go to Step 7.
NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Visually inspect 5 amp FSS circuit breaker reset button (Figure 2, Item 1) and compare with other circuit breaker reset buttons in Power Distribution Module (PDM). Refer to Figure 2.



B230605231

Figure 2. Center IP Near Floor Area.

CONDITION/INDICATION

Is 5 amp FSS circuit breaker reset button popped out?

DECISION

- YES Go to next step.
- NO Go to Step 7.

STEP

6. Press 5 amp FSS circuit breaker reset button (Figure 2, Item 1) on PDM.

CONDITION/INDICATION

Did circuit breaker reset button pop back out?

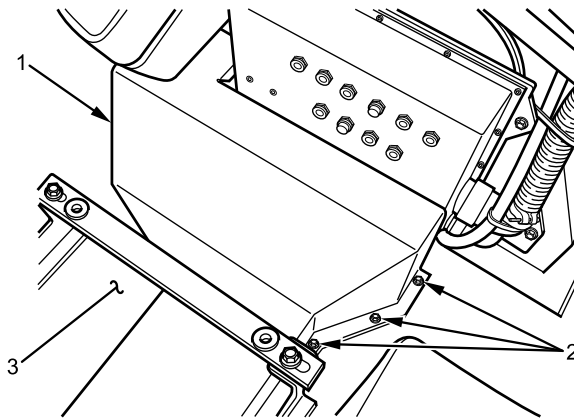
DECISION

- YES Go to Step 44.
- NO Go to Step 13.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

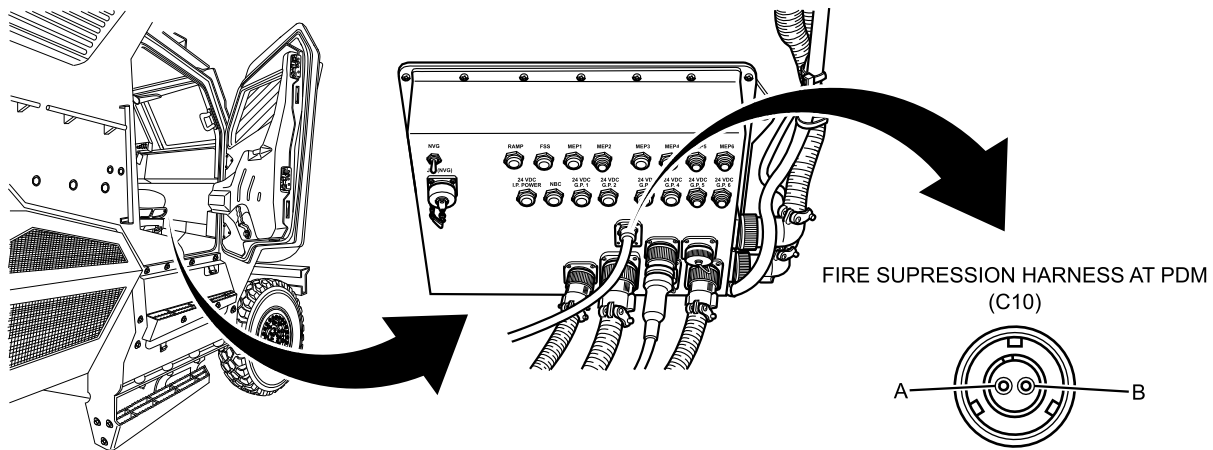
7. Remove shift control module. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452).



B239102113

Figure 3. PDM Harness Electrical Storage Shield.

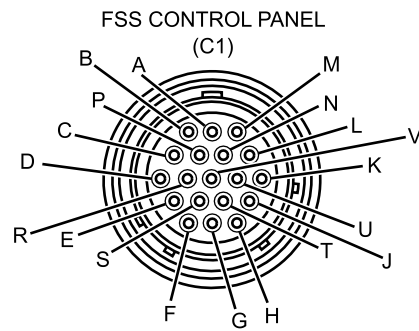
8. Remove eight bolts (Figure 3, Item 2) from PDM harness electrical storage shield (Figure 3, Item 1). Three bolts shown; five bolts hidden from view.
9. Remove PDM harness electrical storage shield (Figure 3, Item 1) from floor (Figure 3, Item 3).



B230605240

Figure 4. Center IP Near Floor Area.

10. Disconnect connector C10. Refer to Figure 4.
11. Connect jumper wire between connector C10 terminals A and B. Refer to Figure 4.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

B230605211

Figure 5. Connector C1.

12. Measure resistance between connector C1 terminals A and B with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Refer to Power Distribution Troubleshooting Procedure (WP 0059).

NO Go to Step 44.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

13. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

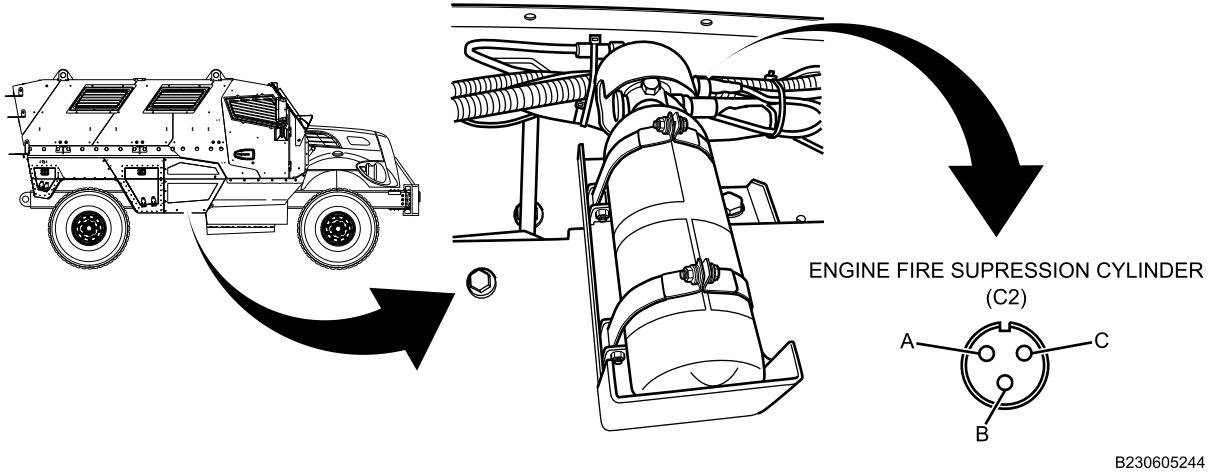


Figure 6. Outside Center of Right Side Frame Rail Area.

14. Disconnect connector C2. Refer to Figure 6.

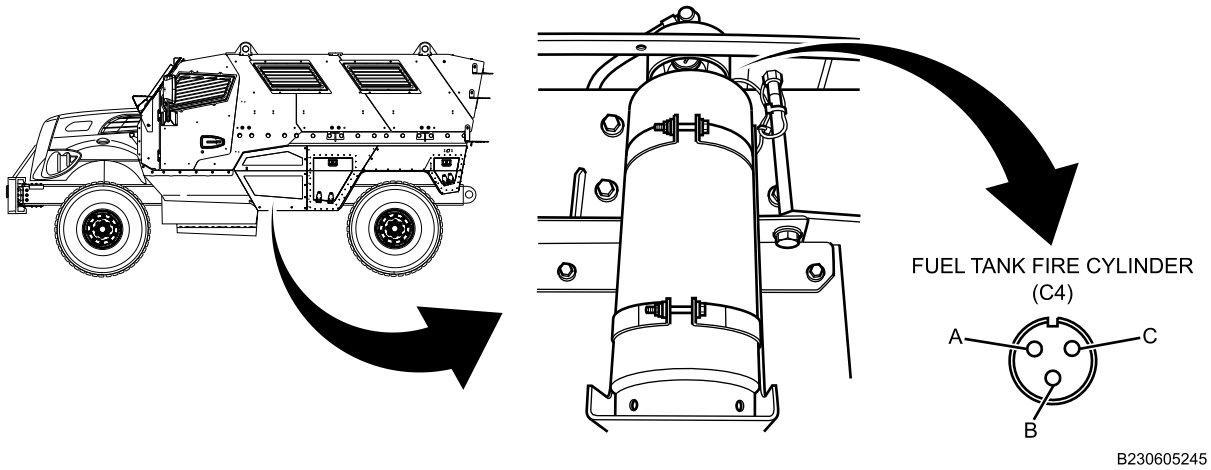


Figure 7. Outside Center of Left Side Frame Rail Area.

15. Disconnect connector C4. Refer to Figure 7.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

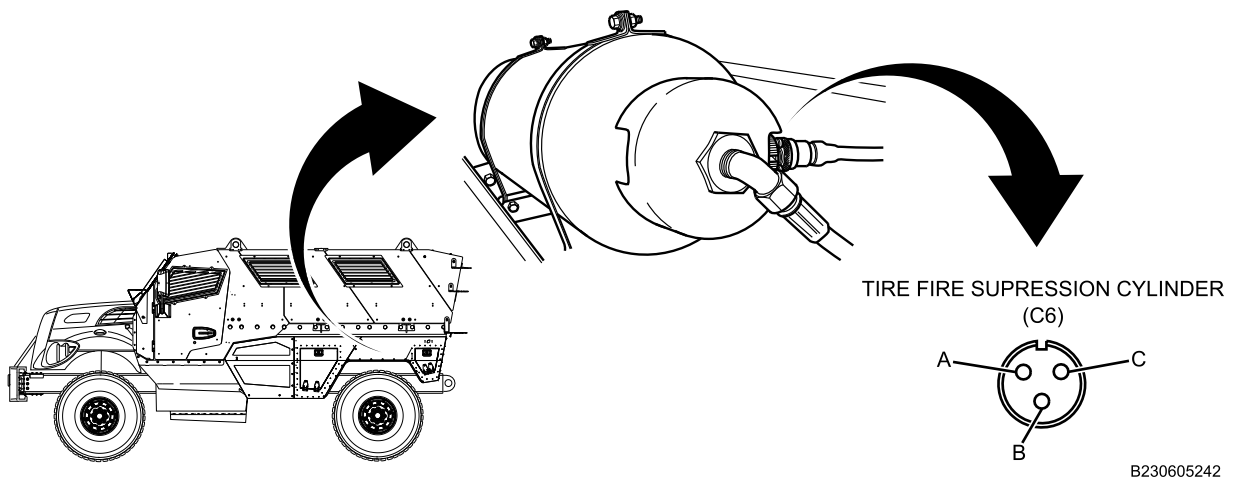


Figure 8. Backside of Left Rear Stowage Box Area.

16. Disconnect connector C6. Refer to Figure 8.

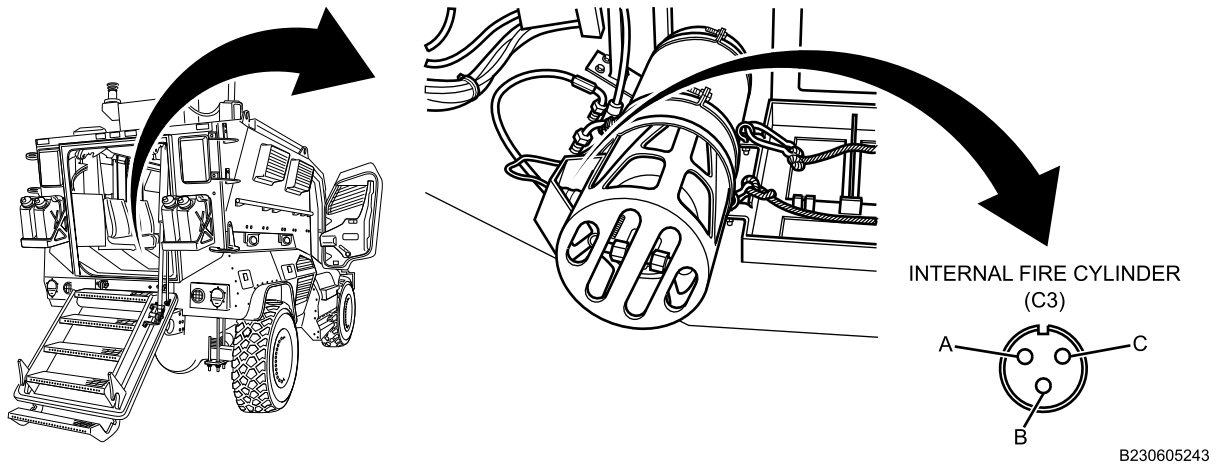


Figure 9. Center Cabin Floor Area.

17. Disconnect connector C3. Refer to Figure 9.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Disconnect connector C8. Refer to Figure 10.

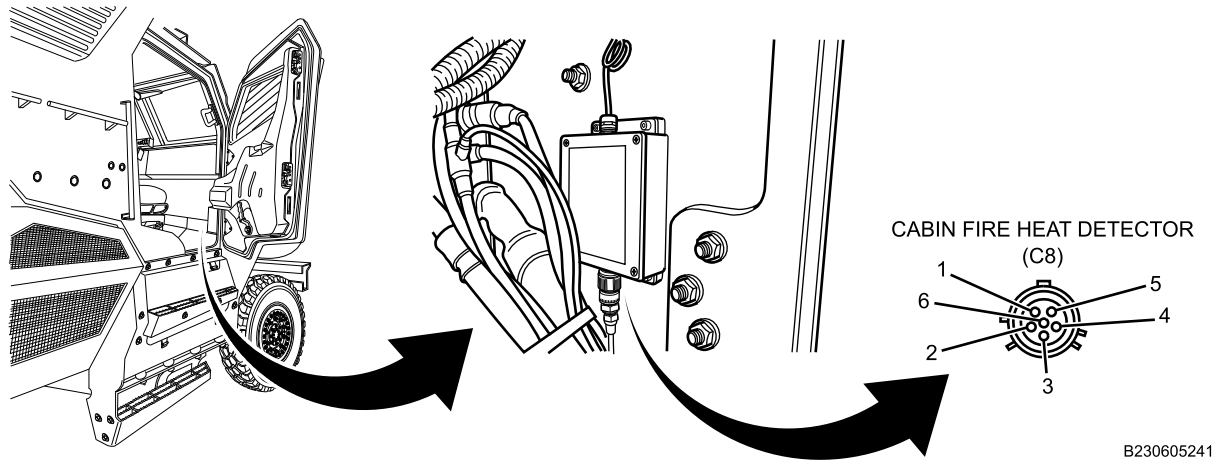


Figure 10. Right Side Front Cabin Area.

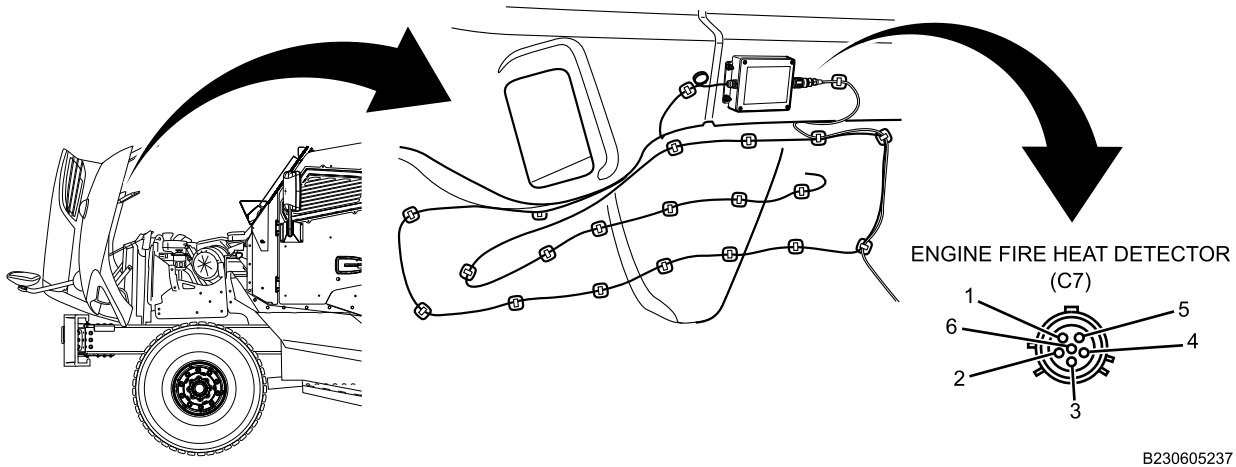


Figure 11. Backside of Hood Area.

19. Disconnect connector C7. Refer to Figure 11.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

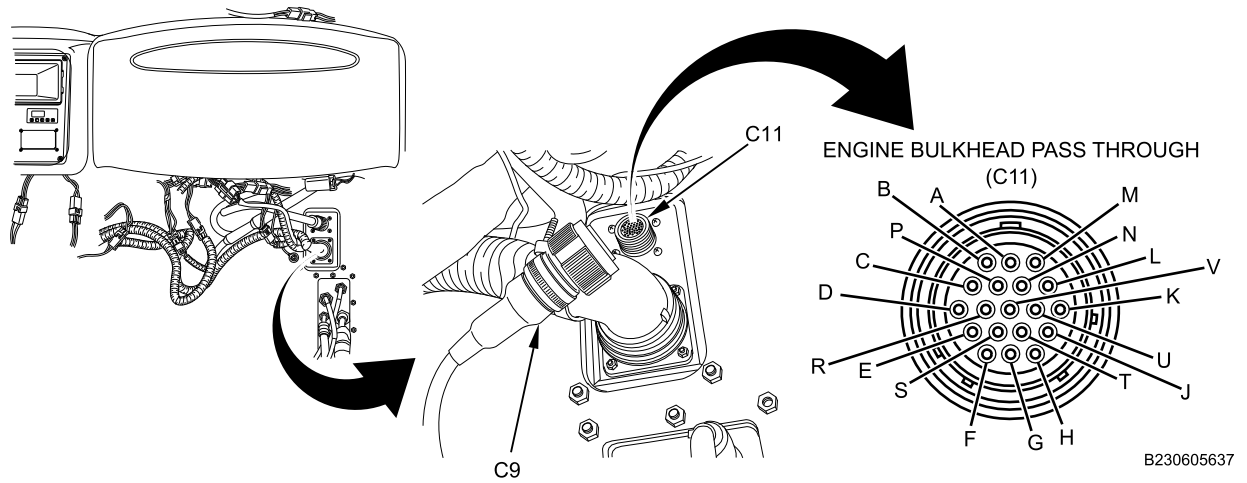


Figure 12. Right Side Underhood Firewall Area.

20. Disconnect connector C9 from connector C11. Refer to Figure 12.

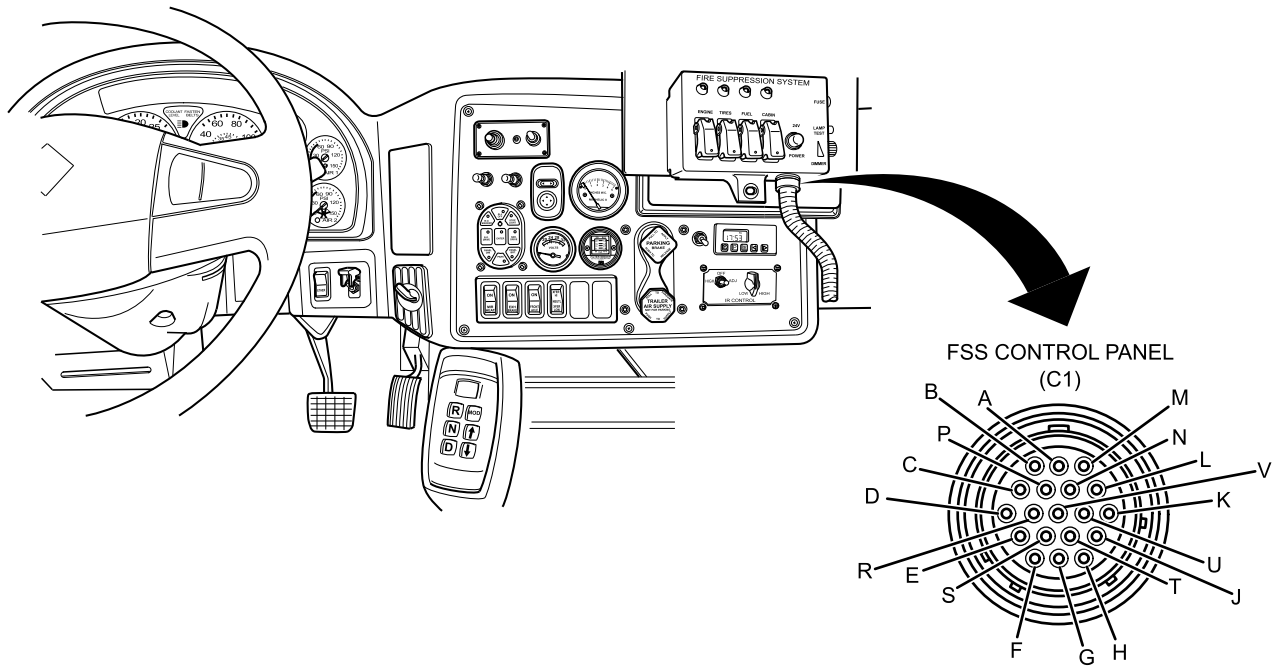
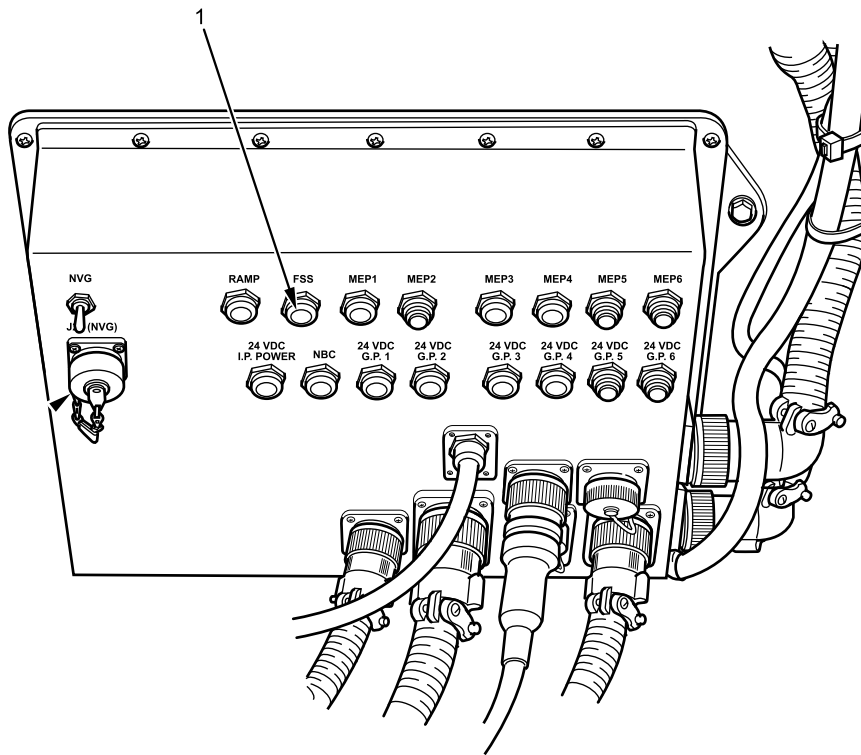


Figure 13. Center Instrument Panel (IP) Area.

21. Connect connector C1. Refer to Figure 13.
22. Turn MAIN POWER switch ON (TM 9-2355-106-10).
23. Ensure FSS control panel FUSE switch is ON (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

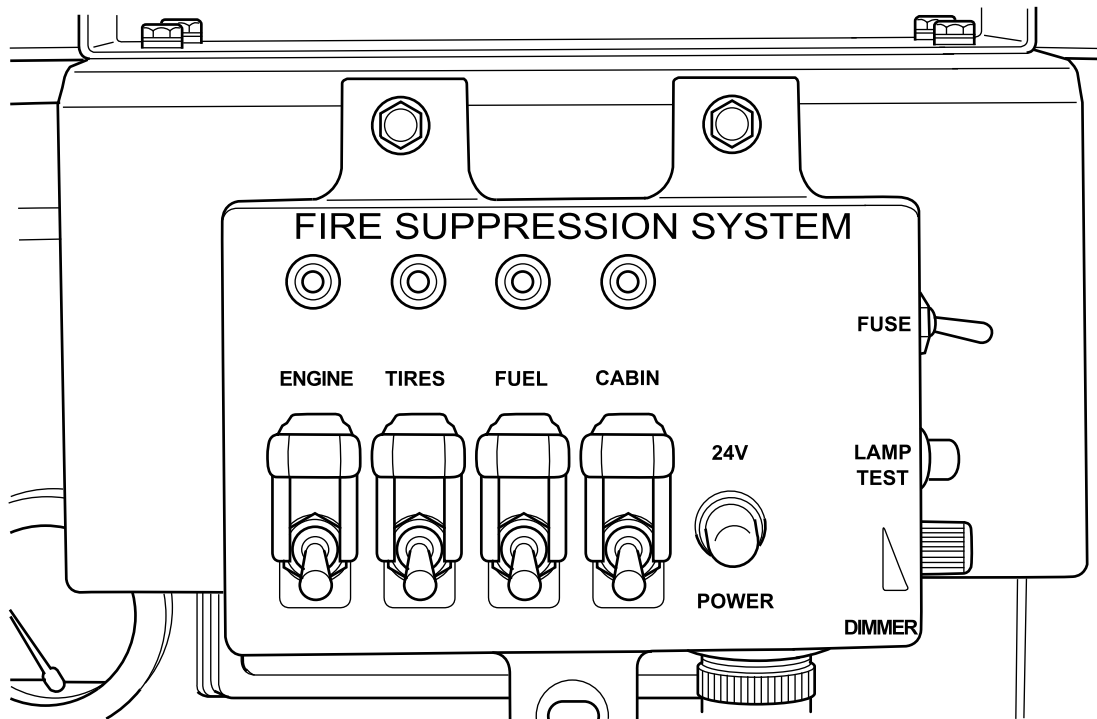


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Figure 14. Center IP Near Floor Area.

24. Press 5 amp FSS circuit breaker reset button (Figure 14, Item 1) on PDM.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230605236

Figure 15. FSS Control Panel.

25. Hold and release each of the following switches on FSS control panel in the up position. Refer to Figure 15.

- ENGINE
- TIRES
- FUEL
- CABIN

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

YES Go to Step 44.
NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

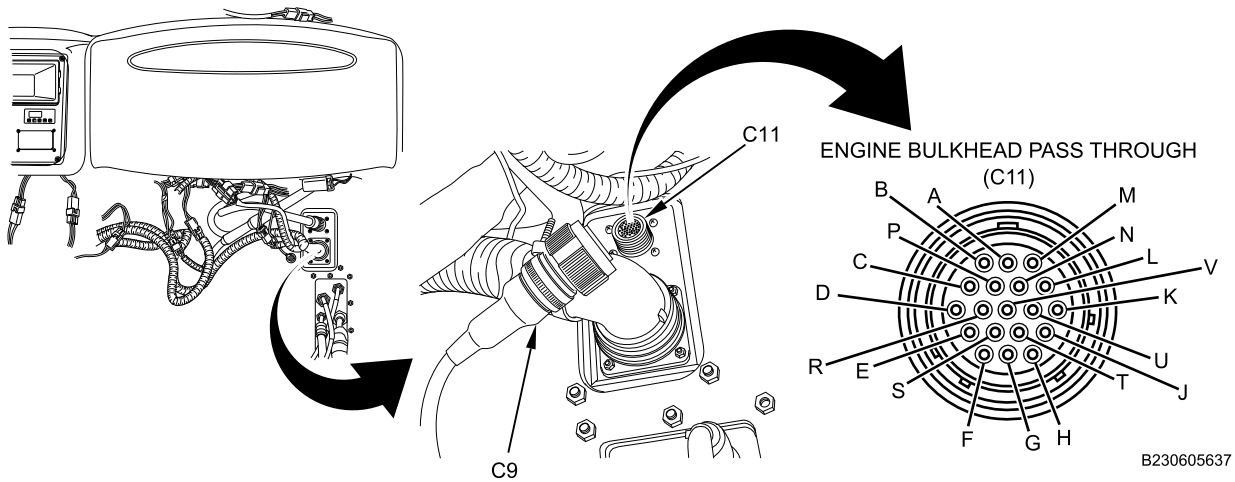
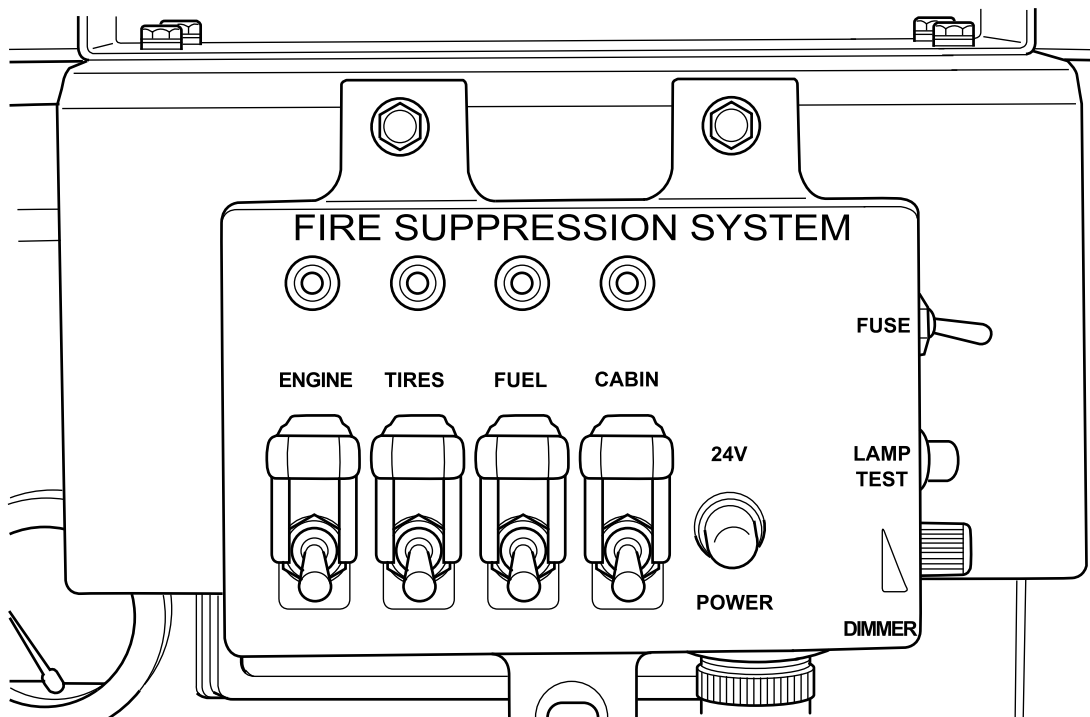


Figure 16. Right Side Underhood Firewall Area.

26. Connect connector C9 to connector C11. Refer to Figure 16.

27. Hold and release each of the following switches on FSS control panel in the up position. Refer to Figure 17.

- ENGINE
- TIRES
- FUEL



B230605236

Figure 17. FSS Control Panel.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

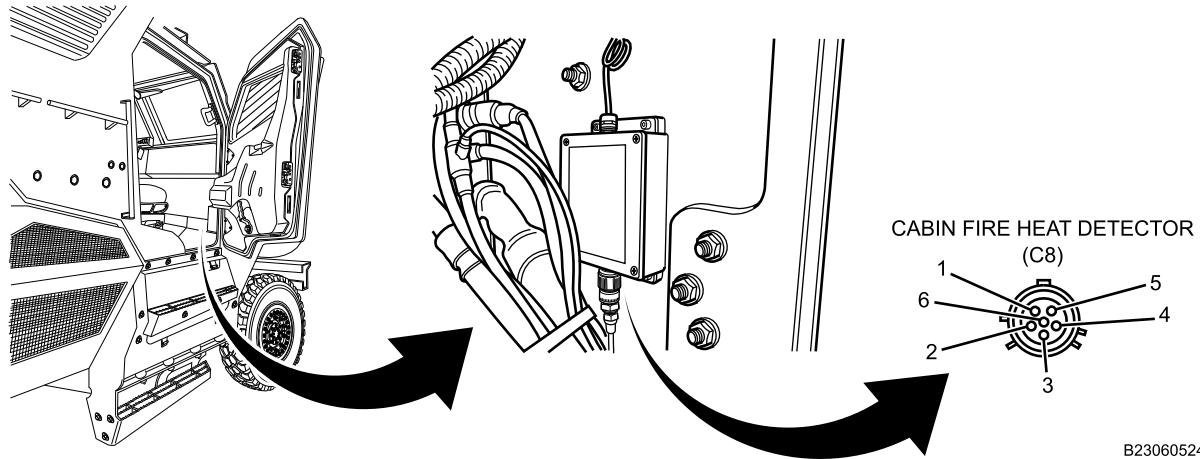
YES Go to Step 48.

NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

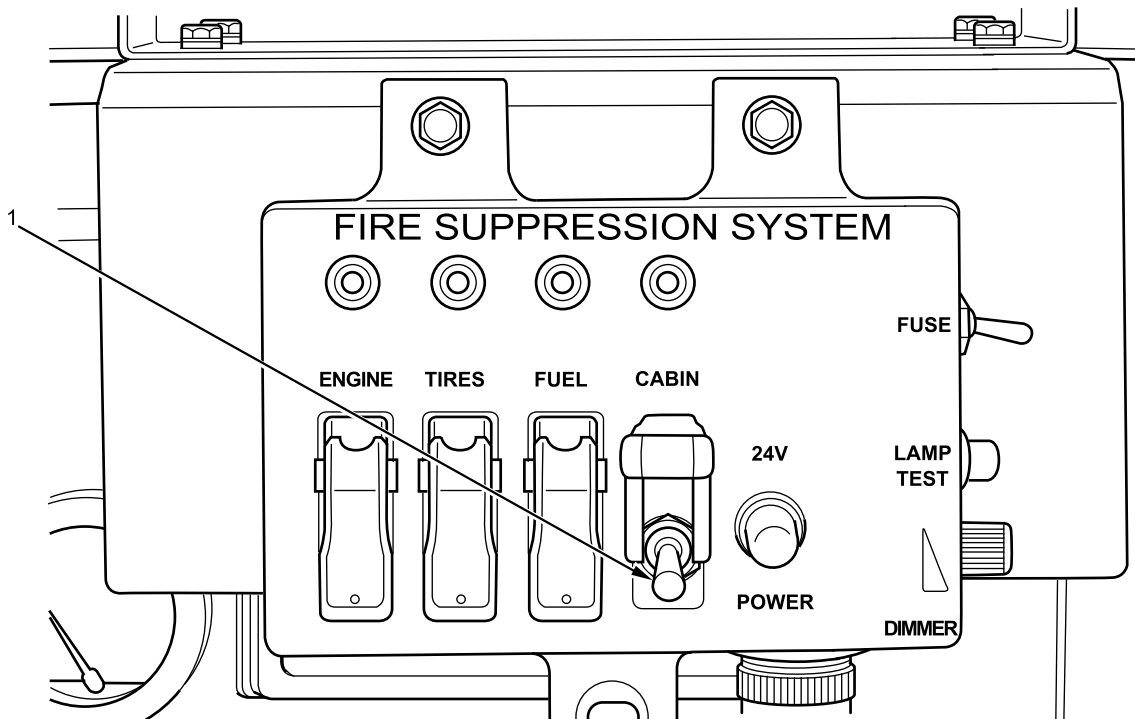
STEP

28. Connect a jumper wire between connector C8 terminals 4 and 5. Refer to Figure 18.



B230605241

Figure 18. Right Side Front Cabin Area.



B230605235

Figure 19. FSS Control Panel.

29. Hold and release CABIN switch (Figure 19, Item 1) on FSS control panel in the up position.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****DECISION**

YES Go to Step 44.
NO Go to next step.

STEP

30. Remove jumper wire from connector C8. Refer to Figure 18.
31. Connect connector C8. Refer to Figure 18.
32. Hold and release CABIN switch (Figure 19, Item 1) on FSS control panel in the up position.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

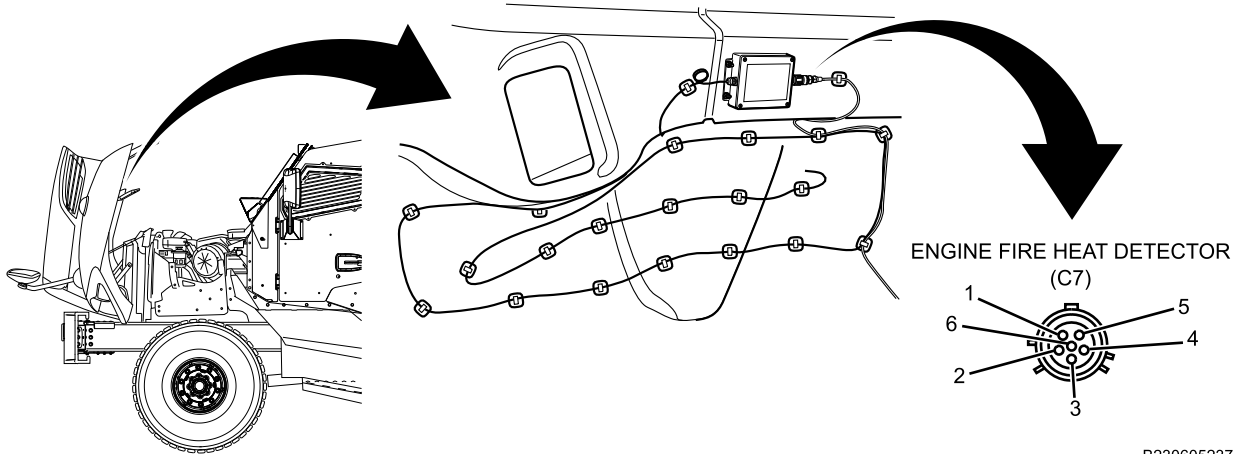
DECISION

YES Go to Step 45.
NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

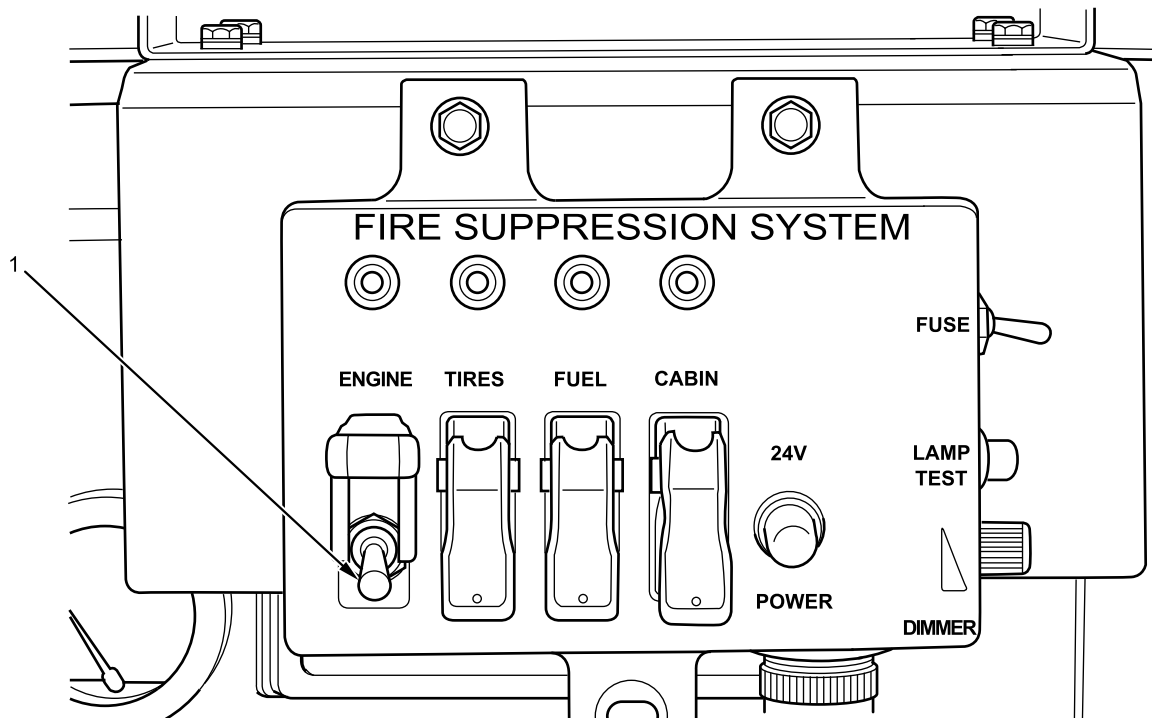
33. Connect a jumper wire between connector C7 terminals 4 and 5. Refer to Figure 20.



B230605237

Figure 20. Backside of Hood Area.

34. Hold and release ENGINE switch (Figure 21, Item 1) on FSS control panel in the up position.



B230605232

Figure 21. FSS Control Panel.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

DECISION

YES Go to Step 48.
NO Go to next step.

STEP

35. Remove jumper wire from connector C7. Refer to Figure 20.
36. Connect connector C7. Refer to Figure 20.
37. Hold and release ENGINE switch (Figure 21, Item 1) on FSS control panel in the up position.

CONDITION/INDICATION

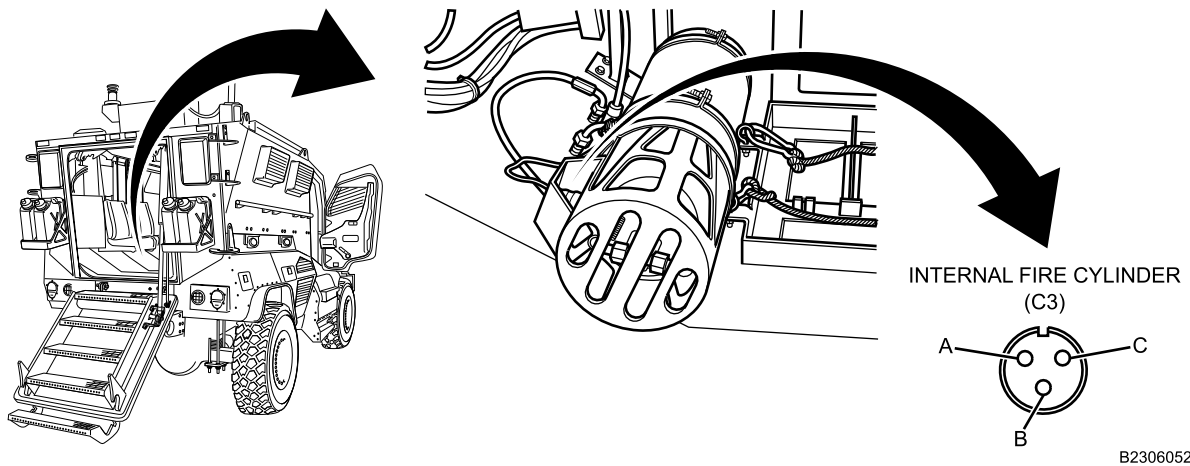
Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

YES Go to Step 49.
NO Go to next step.

STEP

38. Connect connector C3. Refer to Figure 22.



B230605243

Figure 22. Center Cabin Floor Area.

CONDITION/INDICATION

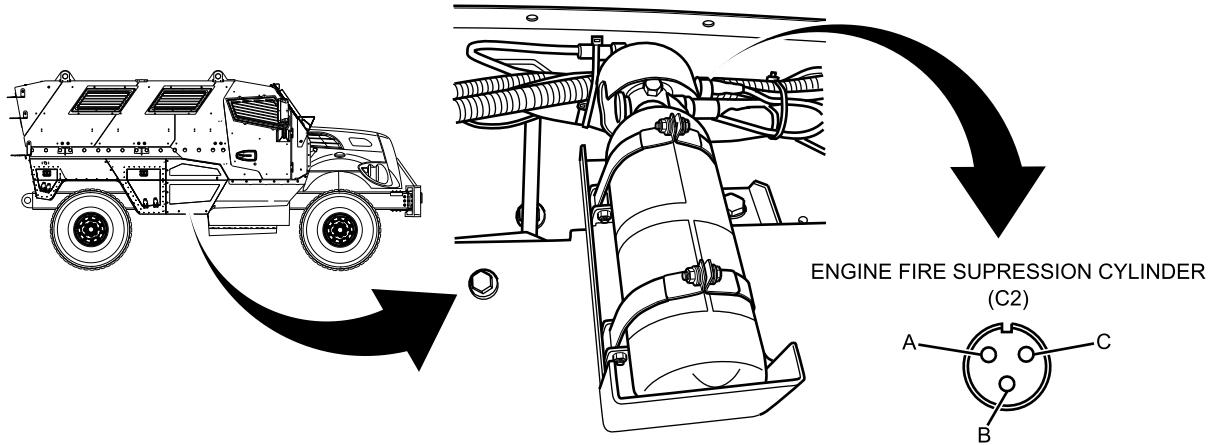
Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

YES Go to Step 46.
NO Go to next step.

STEP

39. Connect connector C2. Refer to Figure 23.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

B230605244

Figure 23. Outside Center of Right Side Frame Rail Area.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

DECISIONYES Go to Step 50.

NO Go to next step.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****STEP**

40. Connect connector C6. Refer to Figure 24.

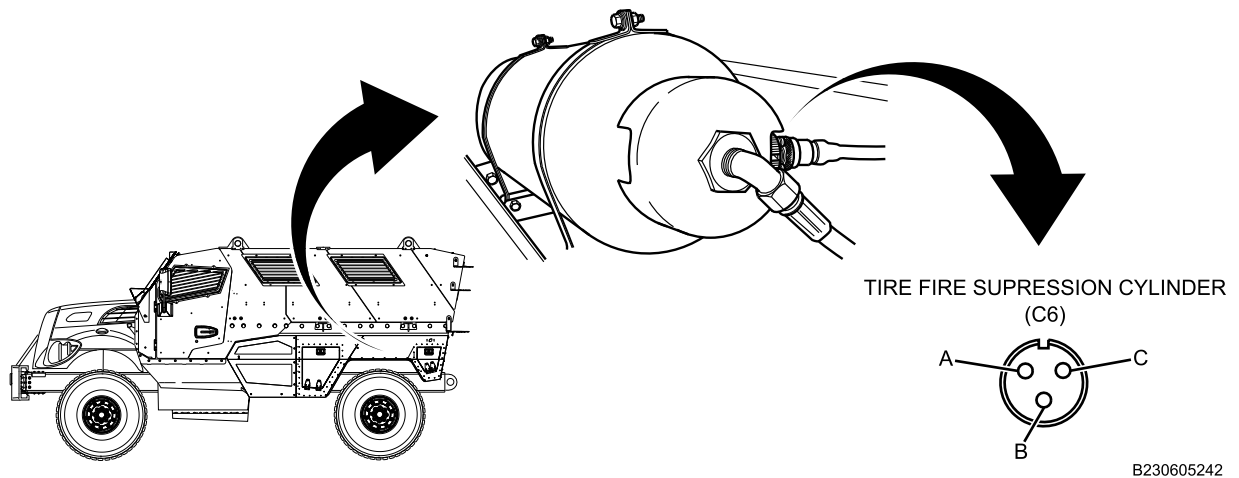


Figure 24. Backside of Left Rear Stowage Box Area.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

YES Go to Step 53.

NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

41. Connect connector C4. Refer to Figure 25.

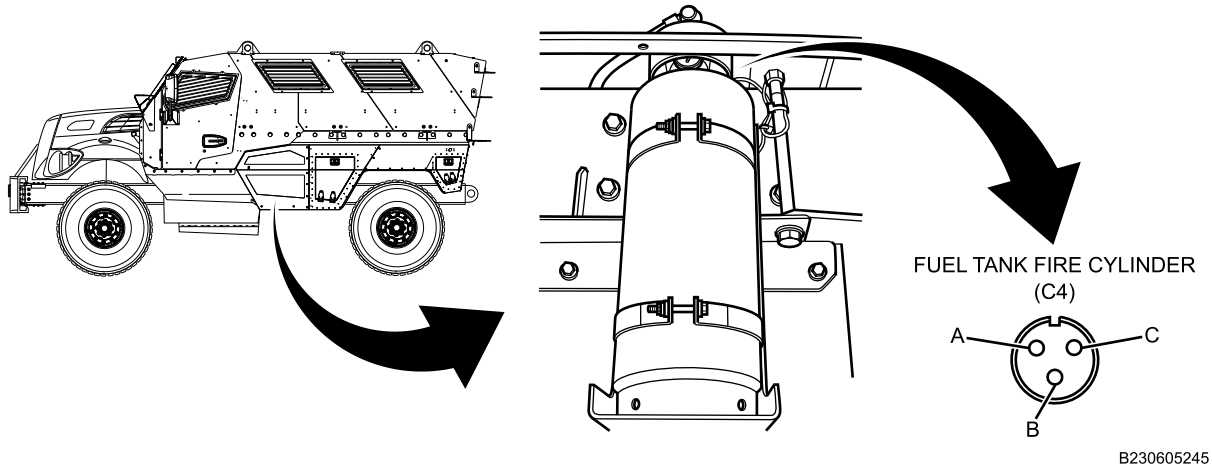


Figure 25. Outside Center of Left Side Frame Rail Area.

CONDITION/INDICATION

Did 5 amp FSS circuit breaker reset button pop back out?

DECISION

YES Go to Step 52.
NO Go to next step.

STEP

42. Remove and visually inspect the following harnesses for damage that could cause an intermittent short circuit. Harnesses with melted insulation, exposed bare wires, and smash/pinch damage should be considered damaged.

- FSS cabin harness. Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739).
- FSS chassis harness. Refer to Fire Suppression System (FFS) Chassis Harness Removal and Installation (WP 0740)

CONDITION/INDICATION

Was a damaged harness found?

DECISION

YES Go to Step 47.
NO Go to Step 43.

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****MALFUNCTION**

- 43. All FSS extinguishers must be replaced. There are no functional tests to determine which one is faulty.

ACTION

- Replace cabin FSS cylinder. Refer to Fire Suppression System (FSS) Cabin Cylinder Removal and Installation (WP 0745).
- Replace engine FSS cylinder. Refer to Fire Suppression System (FSS) Engine Cylinder Removal and Installation (WP 0750).
- Replace tire FSS cylinder. Refer to Fire Suppression System (FSS) Tire Cylinder Removal and Installation (WP 0747).
- Replace fuel tank FSS cylinder. Refer to Fire Suppression System (FSS) Fuel Tank Cylinder Removal and Installation (WP 0747).

Return vehicle to service.

END OF TEST**MALFUNCTION**

- 44. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 45. Cabin fire detector is faulty.

ACTION

Replace cabin detector. Refer to Fire Suppression System (FSS) Cabin Sensor Removal and Installation (WP 0742). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 46. Cabin cylinder is faulty.

ACTION

Replace cabin cylinder. Refer to Fire Suppression System (FSS) Cabin Cylinder Removal and Installation (WP 0745). Return vehicle to service.

END OF TEST

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****MALFUNCTION**

- 47. Harness is faulty.

ACTION

Replace damaged harness.

- Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.
- Refer to Fire Suppression System (FFS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 48. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 49. Engine fire detector is faulty.

ACTION

Replace engine fire detector. Refer to Fire Suppression System (FSS) Engine Compartment Sensor Removal and Installation (WP 0741). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 50. Engine FSS cylinder is faulty.

ACTION

Replace engine FSS cylinder. Refer to Fire Suppression System (FSS) Engine Cylinder Removal and Installation (WP 0750). Return vehicle to service.

END OF TEST

**FIRE SUPPRESSION SYSTEM (FSS) CONTROL PANEL POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****MALFUNCTION**

- 51. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 52. Fuel tank FSS cylinder is faulty.

ACTION

Replace fuel tank FSS cylinder. Refer to Fire Suppression System (FSS) Fuel Tank Cylinder Removal and Installation (WP 0743). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 53. Tires FSS cylinder is faulty.

ACTION

Replace tires FSS cylinder. Refer to Fire Suppression System (FSS) Tire Cylinder Removal and Installation (WP 0747). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0743
WP 0747
WP 0782

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739
WP 0740
WP 0745
WP 0750

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

TROUBLESHOOTING PROCEDURE

WARNING



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.

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 anti-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.

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.

Replace fire extinguisher immediately after use, even if only partly used. Failure to comply may result in serious injury or death to personnel.

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.

**FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING
PROCEDURE - (CONTINUED)**

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Turn MAIN POWER switch ON (TM 9-2355-106-10).
2. Turn ignition switch ON (TM 9-2355-106-10).
3. Turn FSS control panel FUSE switch ON (TM 9-2355-106-10).
4. Turn FSS control panel DIMMER control knob to brightest position (TM 9-2355-106-10).
5. Observe RED LEDs on FSS control panel (TM 9-2355-106-10).

CONDITION/INDICATION

Does RED ENGINE LED stay on?

DECISION

YES Go to Step 8.
NO Go to next step.

STEP

6. Refer to results from Step 5.

CONDITION/INDICATION

Does RED TIRES LED stay on?

DECISION

YES Go to Step 26.
NO Go to next step.

STEP

7. Refer to results from Step 5.

CONDITION/INDICATION

Does RED FUEL LED stay on?

DECISION

YES Go to Step 44.

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 62.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector C2. Refer to Figure 1.

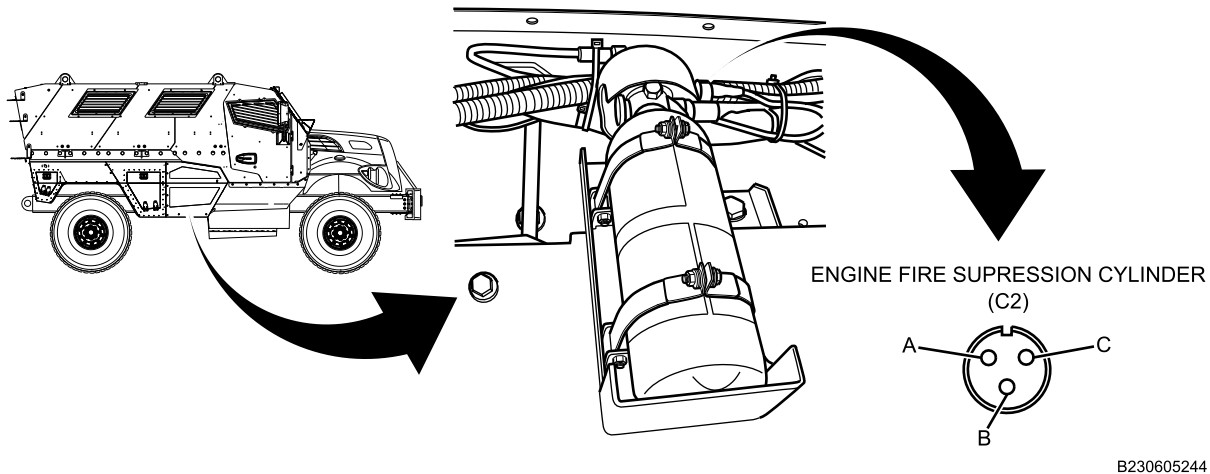


Figure 1. Outside Center of Right Side Frame Rail Area.

11. Connect a jumper wire between connector C2 terminals A and B. Refer to Figure 1.
12. Turn MAIN POWER switch ON (TM 9-2355-106-10).
13. Turn ignition switch ON (TM 9-2355-106-10).
14. Ensure FSS control panel FUSE switch is ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED ENGINE LED turn off?

DECISION

YES Go to Step 75.
NO Go to next step.

STEP

15. Turn ignition switch OFF (TM 9-2355-106-10).
16. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
17. Remove jumper wire from connector C2. Refer to Figure 1.

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

18. Disconnect connector C9. Refer to Figure 2.

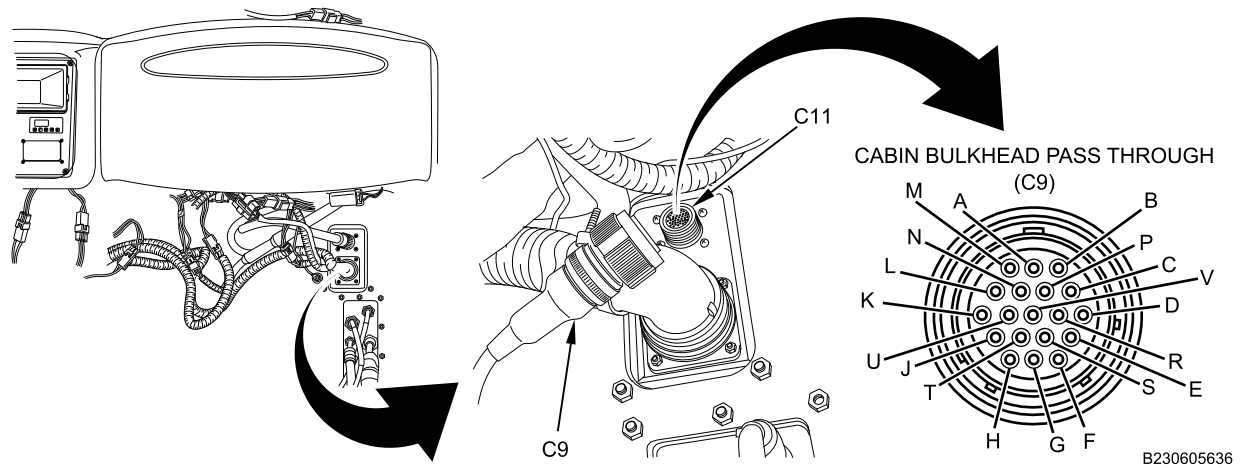


Figure 2. Right Side Engine Compartment Near Firewall.

19. Connect jumper wire between connector C9 terminals A and H. Refer to Figure 2.

20. Turn MAIN POWER switch ON (TM 9-2355-106-10).

21. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED ENGINE LED turn off?

DECISION

YES Go to Step 76.

NO Go to next step.

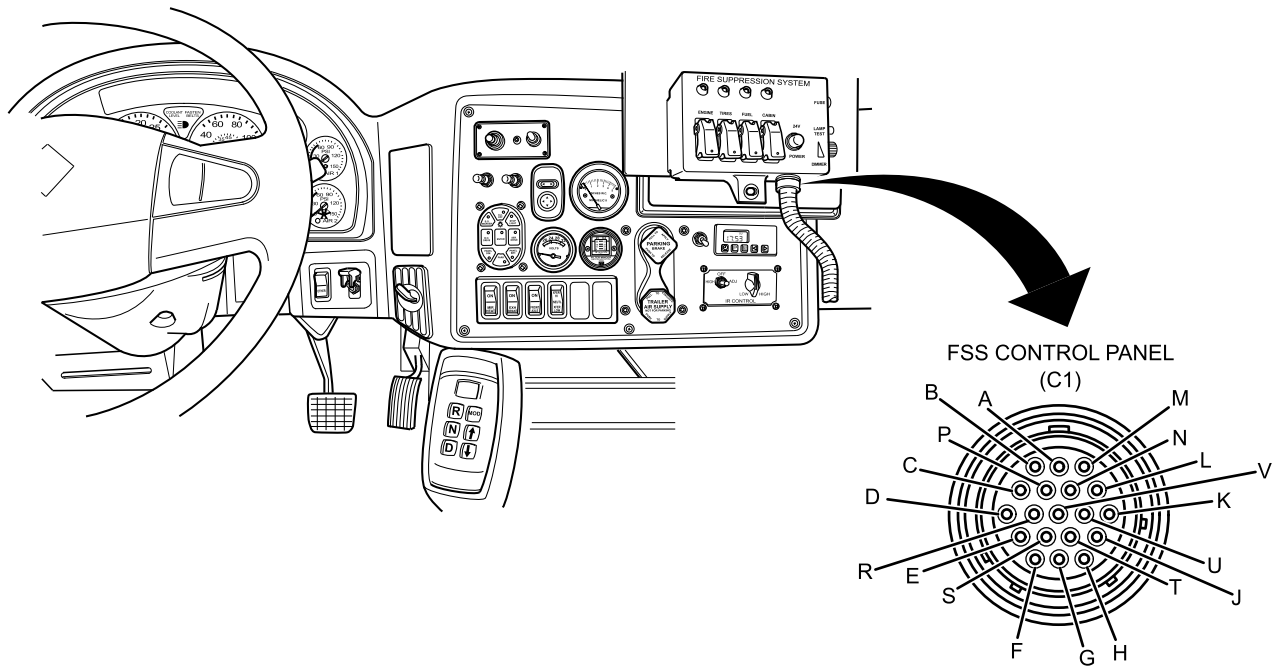
STEP

22. Turn ignition switch OFF (TM 9-2355-106-10).

23. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

24. Disconnect connector C1. Refer to Figure 3.



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Figure 3. Center Instrument Panel (IP) Area.

25. Measure resistance between connector C1 terminals A and H with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.

NO Go to Step 74

STEP

26. Turn ignition switch OFF (TM 9-2355-106-10).

27. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

28. Disconnect connector C6. Refer to Figure 4.

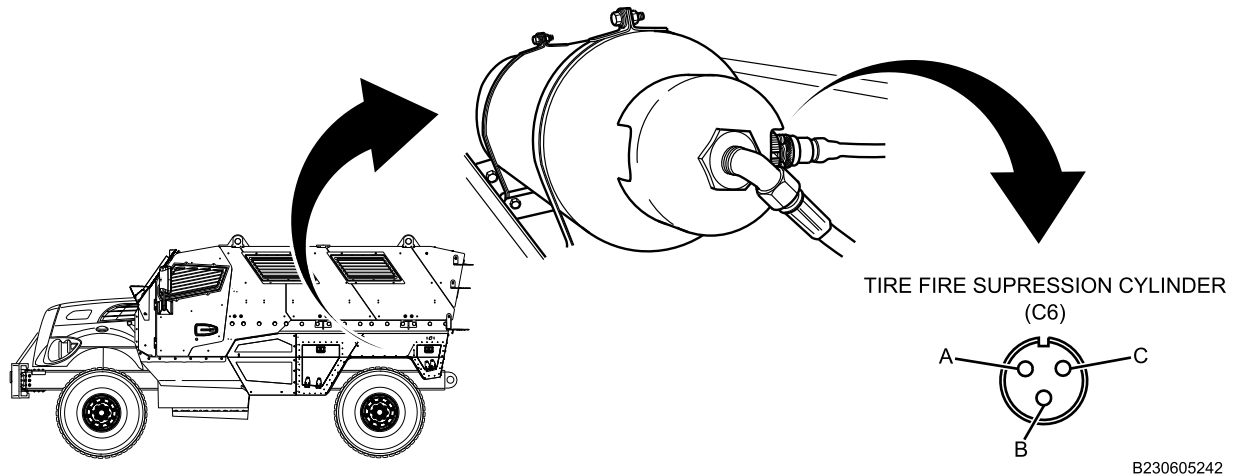


Figure 4. Backside of Left Rear Stowage Box Area.

29. Connect a jumper wire between connector C6 terminals A and B. Refer to Figure 4.
30. Turn MAIN POWER switch ON (TM 9-2355-106-10).
31. Turn ignition switch ON (TM 9-2355-106-10).
32. Ensure FSS control panel FUSE switch is ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED TIRES LED turn off?

DECISION

YES Go to Step 79.
NO Go to next step.

STEP

33. Turn ignition switch OFF (TM 9-2355-106-10).
34. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
35. Remove jumper wire from connector C6. Refer to Figure 4.

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

36. Disconnect connector C9. Refer to Figure 5.

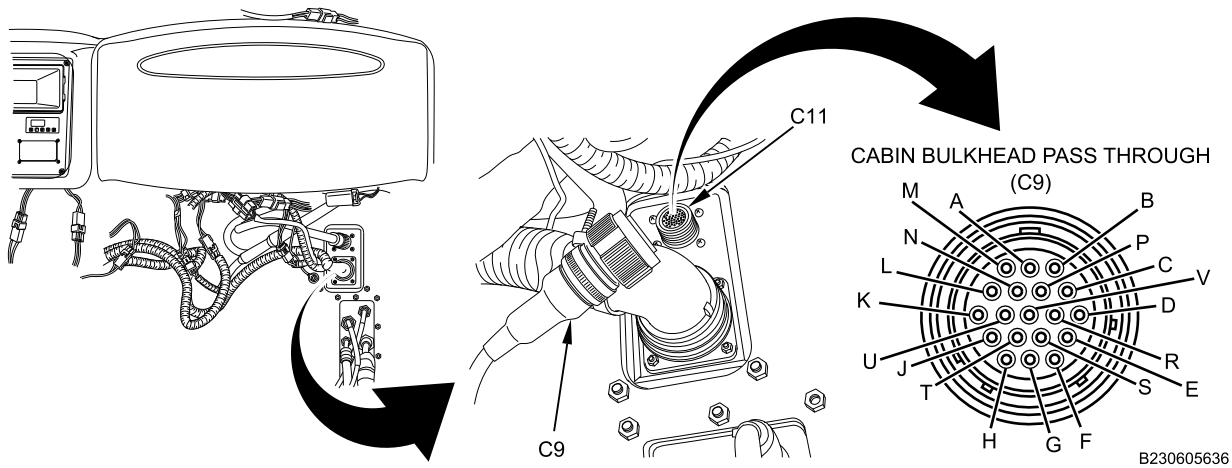


Figure 5. Right Side Engine Compartment Near Firewall.

37. Connect jumper wire between connector C9 terminals A and K. Refer to Figure 5.

38. Turn MAIN POWER switch ON (TM 9-2355-106-10).

39. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED TIRES LED turn off?

DECISION

YES Go to Step 76.

NO Go to next step.

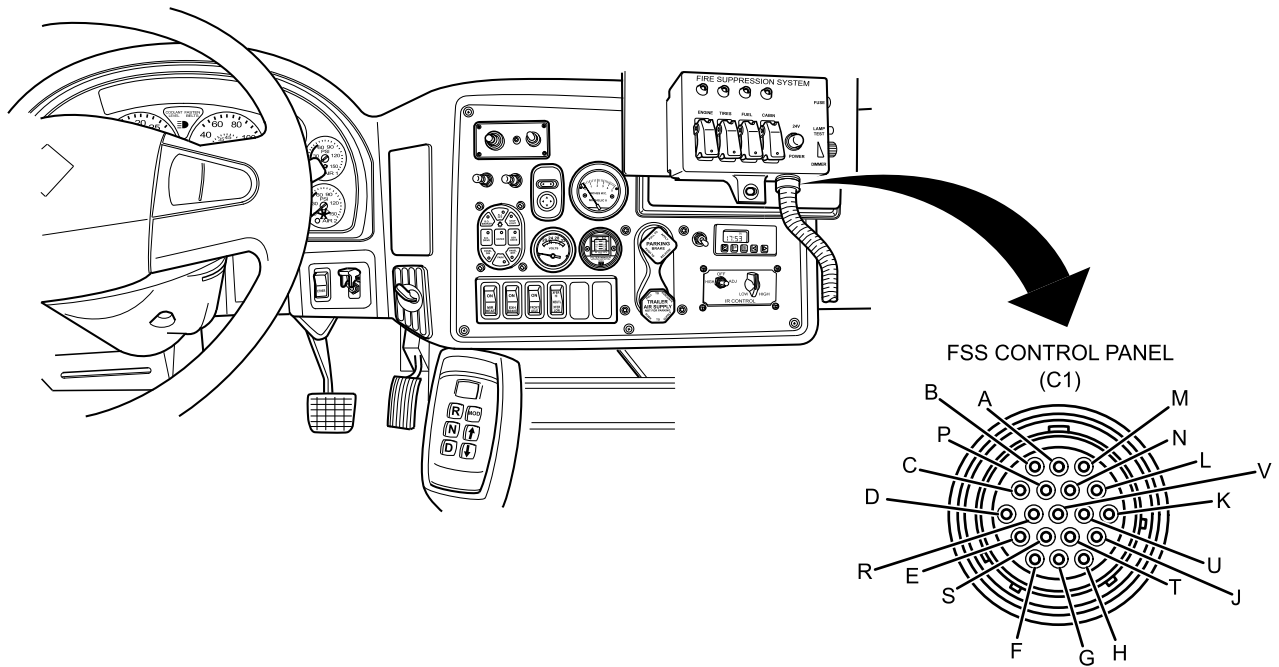
STEP

40. Turn ignition switch OFF (TM 9-2355-106-10).

41. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

42. Disconnect connector C1. Refer to Figure 6.



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Figure 6. Center Instrument Panel (IP) Area.

43. Measure resistance between connector C1 terminals A and K with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.

NO Go to Step 74.

STEP

44. Turn ignition switch OFF (TM 9-2355-106-10).

45. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

54. Disconnect connector C9. Refer to Figure 8.

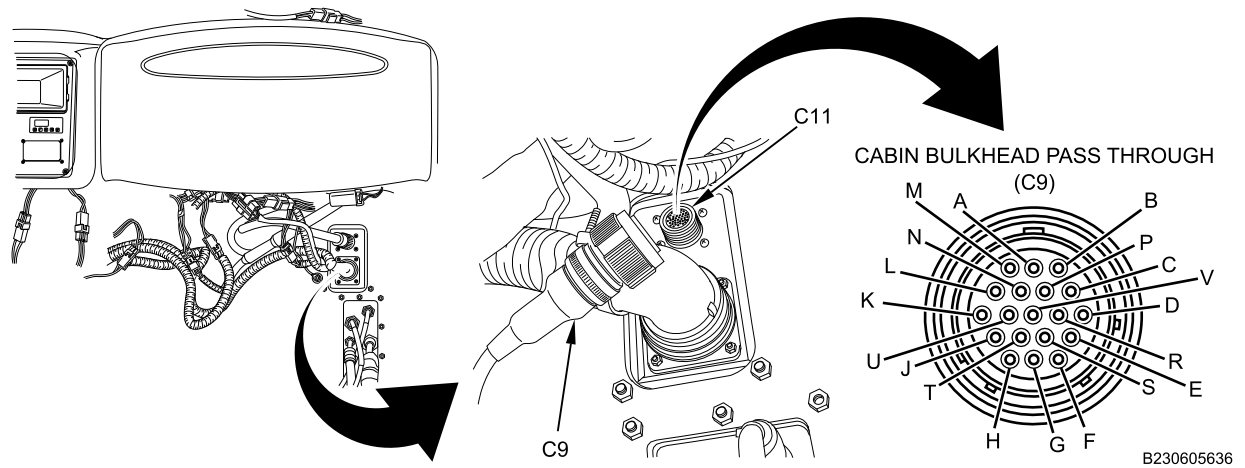


Figure 8. Right Side Engine Compartment Near Firewall.

55. Connect jumper wire between connector C9 terminals A and L. Refer to Figure 8.

56. Turn MAIN POWER switch ON (TM 9-2355-106-10).

57. Turn ignition switch ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED FUEL LED turn off?

DECISION

YES Go to Step 76.

NO Go to next step.

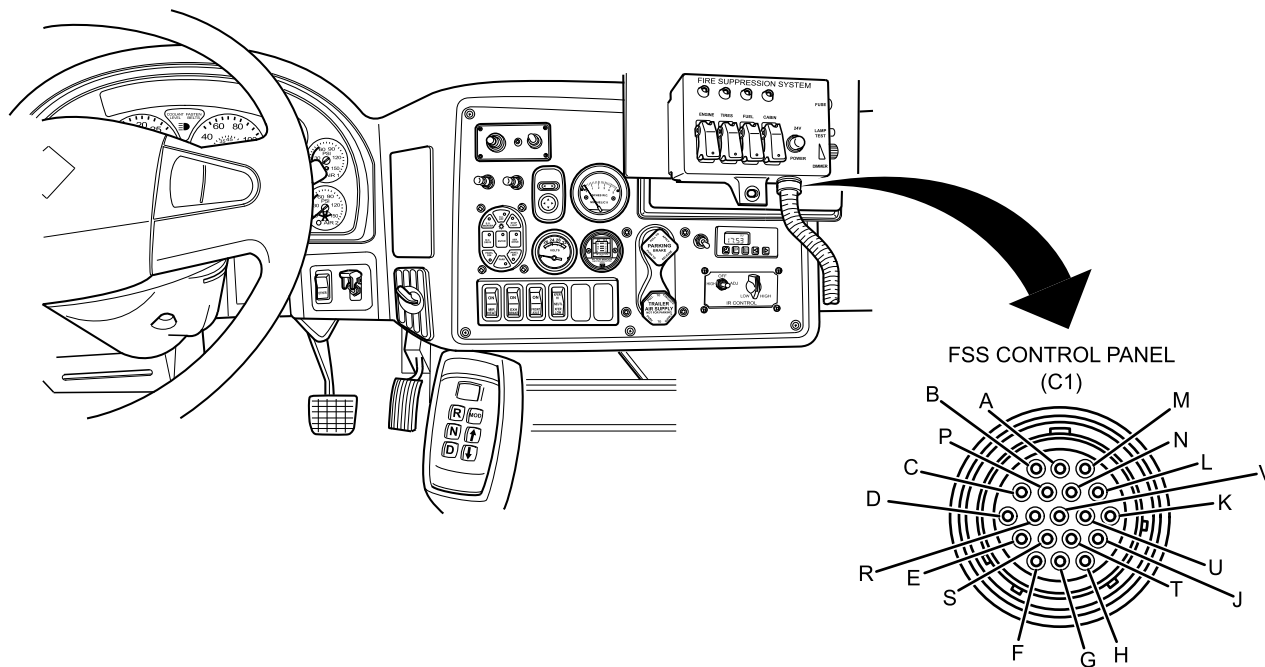
STEP

58. Turn ignition switch OFF (TM 9-2355-106-10).

59. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

60. Disconnect connector C1. Refer to Figure 9.



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Figure 9. Center Instrument Panel (IP) Area.

61. Measure resistance between connector C1 terminals A and L with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.
 NO Go to Step 74.

STEP

- 62. Turn ignition switch OFF (TM 9-2355-106-10).
- 63. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

64. Disconnect connector C3. Refer to Figure 10.

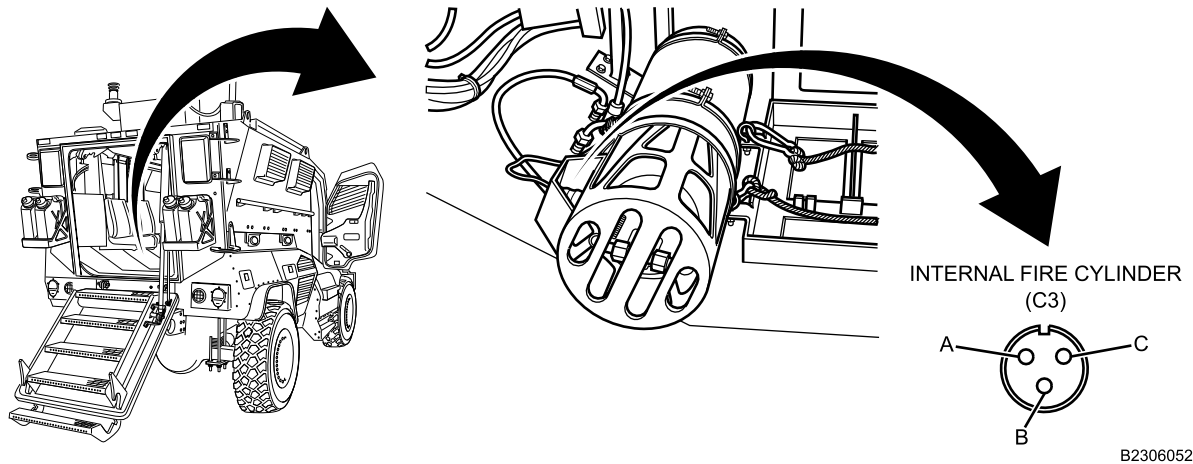


Figure 10. Center Cabin Floor Area.

65. Connect a jumper wire between connector C3 terminals A and B. Refer to Figure 10.
66. Turn MAIN POWER switch ON (TM 9-2355-106-10).
67. Turn ignition switch ON (TM 9-2355-106-10).
68. Ensure FSS control panel FUSE switch is ON (TM 9-2355-106-10).

CONDITION/INDICATION

Did RED CABIN LED turn off?

DECISION

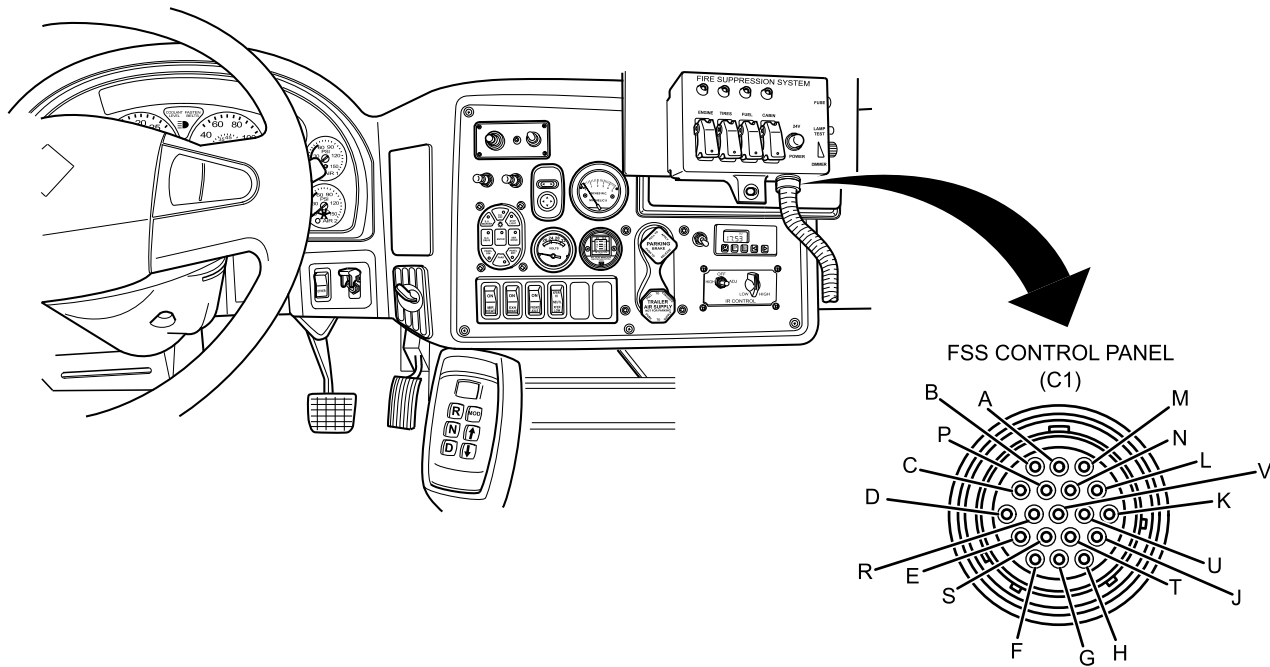
YES Go to Step 73.
NO Go to next step.

STEP

69. Turn ignition switch OFF (TM 9-2355-106-10).
70. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

71. Disconnect connector C1. Refer to Figure 11.



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Figure 11. Center Instrument Panel (IP) Area.

72. Measure resistance between connector C1 terminals A and J with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 77.

NO Go to Step 74.

MALFUNCTION

- 73. Cabin cylinder is faulty.

ACTION

Replace cabin cylinder. Refer to Fire Suppression System (FSS) Cabin Cylinder Removal and Installation (WP 0745). Return vehicle to service.

END OF TEST

MALFUNCTION

- 74. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

**FIRE SUPPRESSION SYSTEM (FSS) EXTINGUISHER PRESSURE FAULT TROUBLESHOOTING
PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 75. Engine FSS cylinder is faulty.

ACTION

Replace engine FSS cylinder. Refer to Fire Suppression System (FSS) Engine Cylinder Removal and Installation (WP 0750). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 76. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 77. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 78. Fuel tank FSS cylinder is faulty.

ACTION

Replace fuel tank FSS cylinder. Refer to Fire Suppression System (FSS) Fuel Tank Cylinder Removal and Installation (WP 0743). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 79. Tires FSS cylinder is faulty.

ACTION

Replace tires FSS cylinder. Refer to Fire Suppression System (FSS) Tire Cylinder Removal and Installation (WP 0747). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) CABIN EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) CABIN EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

TROUBLESHOOTING PROCEDURE

WARNING



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.

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 anti-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.

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.

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.

FIRE SUPPRESSION SYSTEM (FSS) CABIN EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

Replace fire extinguisher immediately after use, even if only partly used. Failure to comply may result in serious injury or death to personnel.

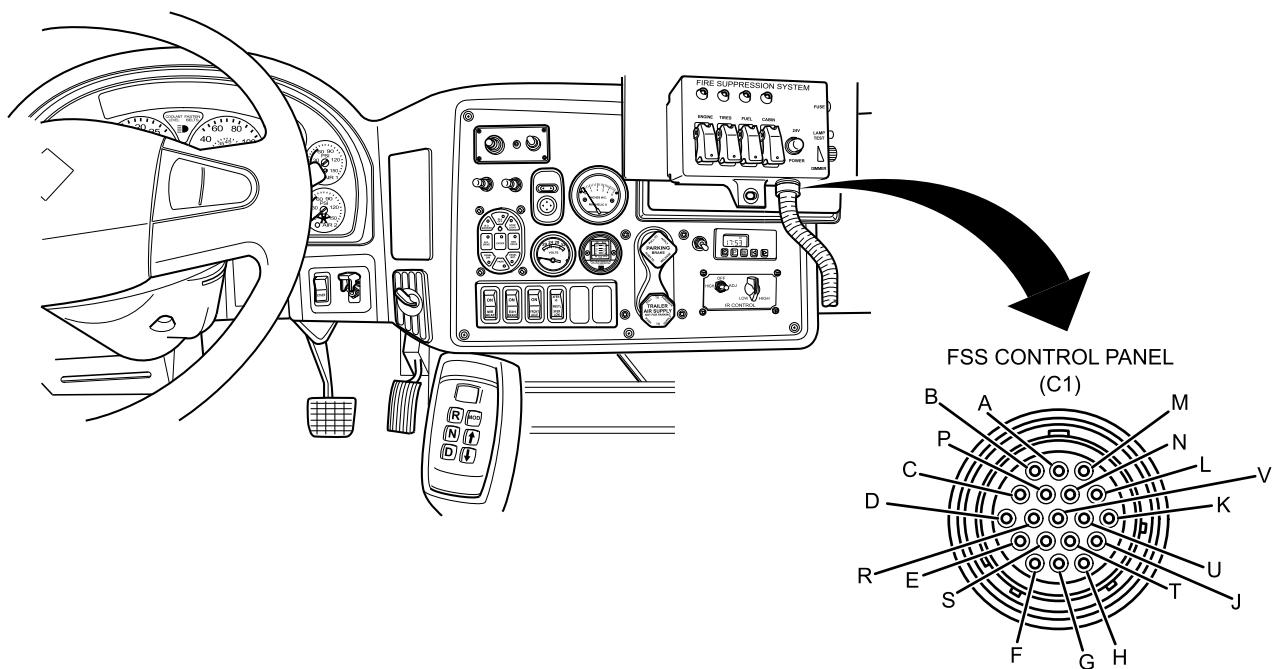
CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP



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Figure 1. Center Instrument Panel (IP) Area.

1. Disconnect connector C1. Refer to Figure 1.
2. Connect jumper wire between connector C1 terminals A and N. Refer to Figure 1.

FIRE SUPPRESSION SYSTEM (FSS) CABIN EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

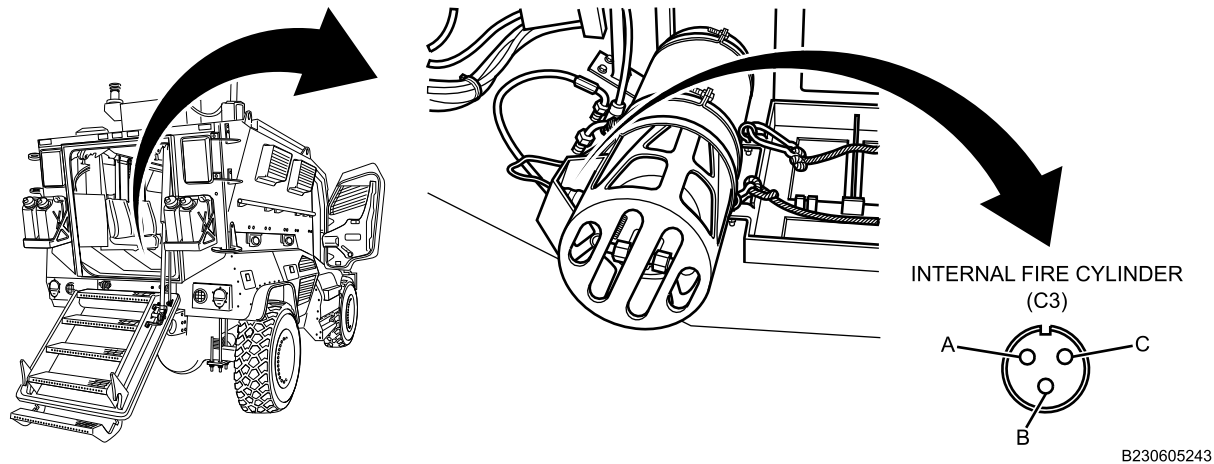


Figure 2. Center Cabin Floor Area.

3. Disconnect connector C3. Refer to Figure 2.
4. Measure resistance between connector C3 terminals B and C with multimeter. Refer to Figure 2.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 6.
NO Go to Step 5.

MALFUNCTION

- 5. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST

MALFUNCTION

- 6. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST

END OF WORK PACKAGE

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING
PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off(TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**TROUBLESHOOTING PROCEDURE****WARNING**

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.

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.

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Do not drop or strike FSS extinguisher. Extinguisher can discharge accidentally and chemical agent can escape through holes in side of anti-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.

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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.

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. Failure to comply may result in serious injury or death to personnel.

FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

CAUTION

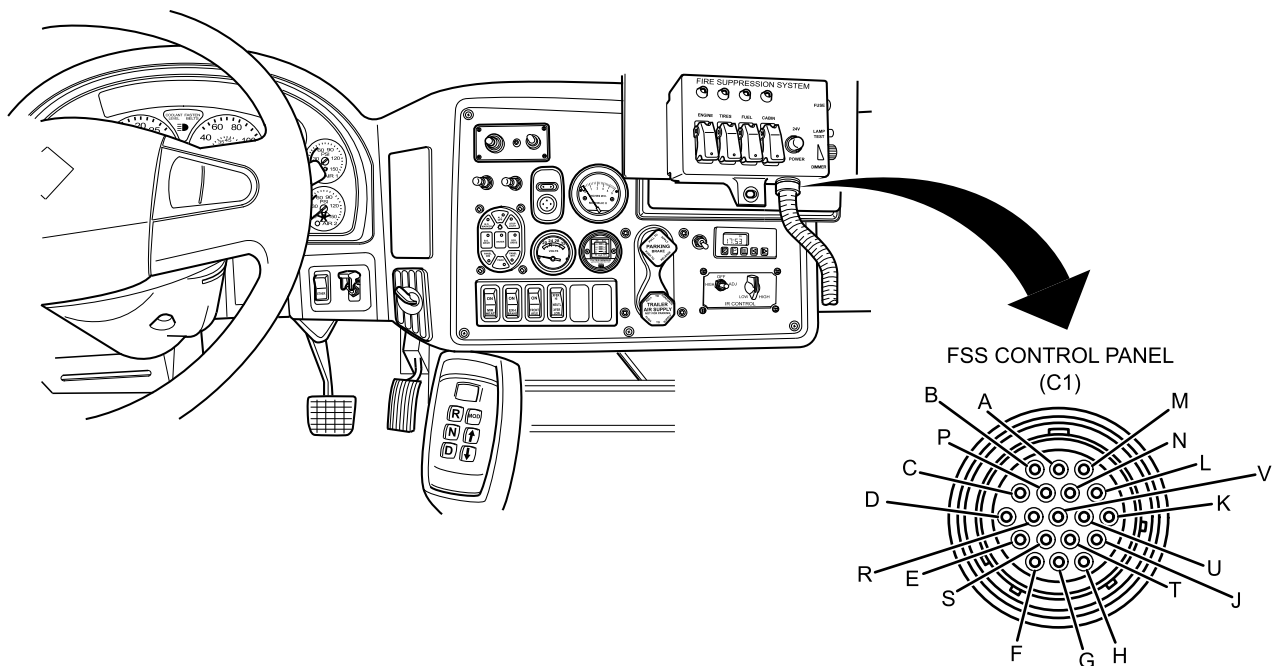
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

1. Disconnect connector C1. Refer to Figure 1.



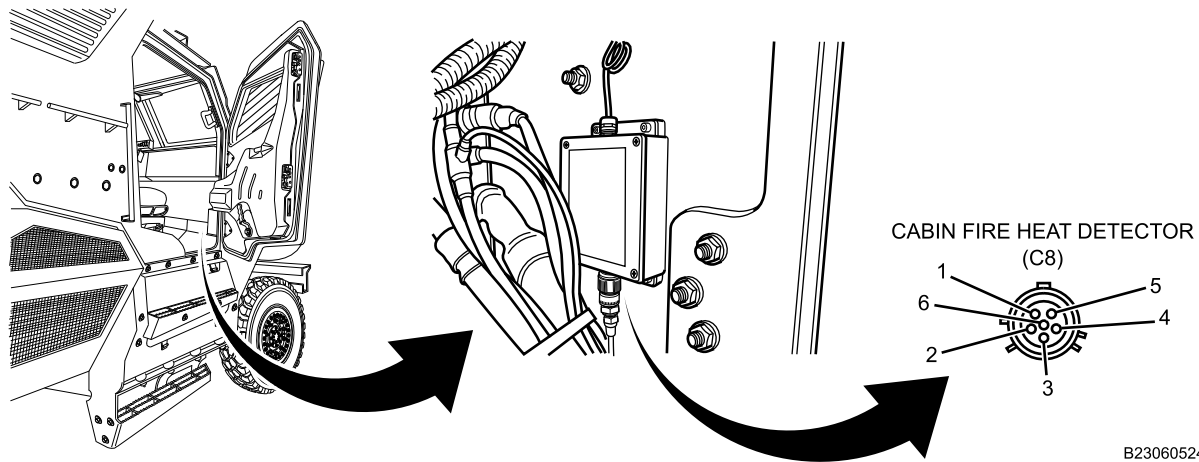
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Figure 1. Center Instrument Panel (IP) Area.

2. Connect jumper wire between connector C1 terminals A and G. Refer to Figure 1.

FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

3. Disconnect connector C8. Refer to Figure 2.



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Figure 2. Right Side Front Cabin Area.

4. Measure resistance between connector C8 terminals 1 and 2 with multimeter. Refer to Figure 2. Note multimeter reading.
5. Move jumper wire connection from connector C1 terminal G to connector C1 terminal C. Jumper wire will now be connected between connector C1 terminals A and C. Refer to Figure 1.
6. Measure resistance between connector C8 terminals 2 and 4 with multimeter. Refer to Figure 2. Note multimeter reading.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

DECISION

YES Go to Step 8.
NO Go to Step 7.

MALFUNCTION

- 7. Harness is faulty.

ACTION

Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST

**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****MALFUNCTION**

- 8. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE

**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****WARNING**

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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

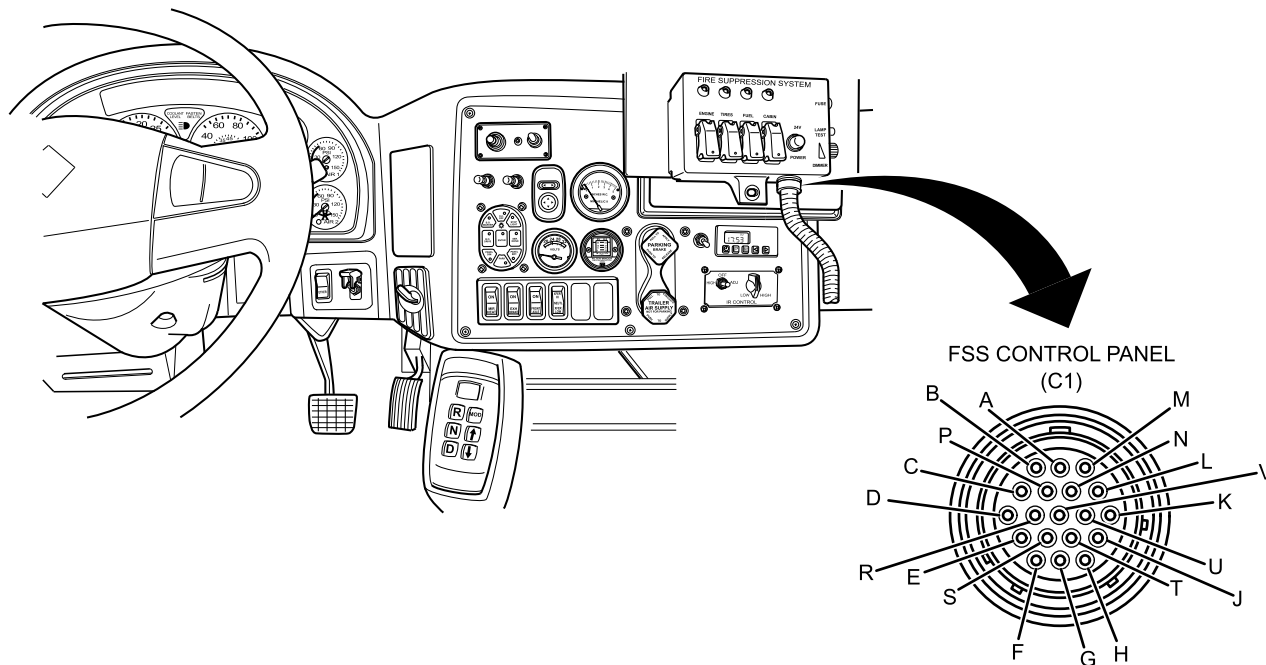
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR FIRE DETECTION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

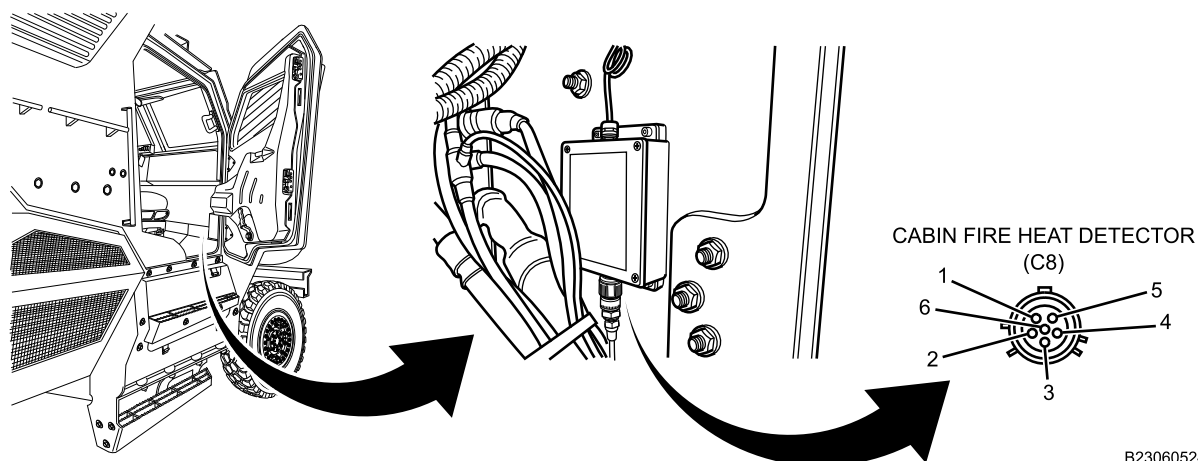
1. Disconnect connector C1. Refer to Figure 1.



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Figure 1. Center Instrument Panel (IP) Area.

2. Disconnect connector C8. Refer to Figure 2.



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Figure 2. Right Side Front Cabin Area.

3. Measure resistance between connector C1 terminal E and connector C8 terminal 5 with multimeter. Refer to Figure 2.

**FIRE SUPPRESSION SYSTEM (FSS) CABIN FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 5.
NO Go to next step.

MALFUNCTION

- 4. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739).
Return vehicle to service.

END OF TEST**MALFUNCTION**

- 5. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0740

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine OFF (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739

Drawings Required(WP 0789, Figure 29)

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****WARNING**

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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)**

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

1. Disconnect connector C9. Refer to Figure 1.

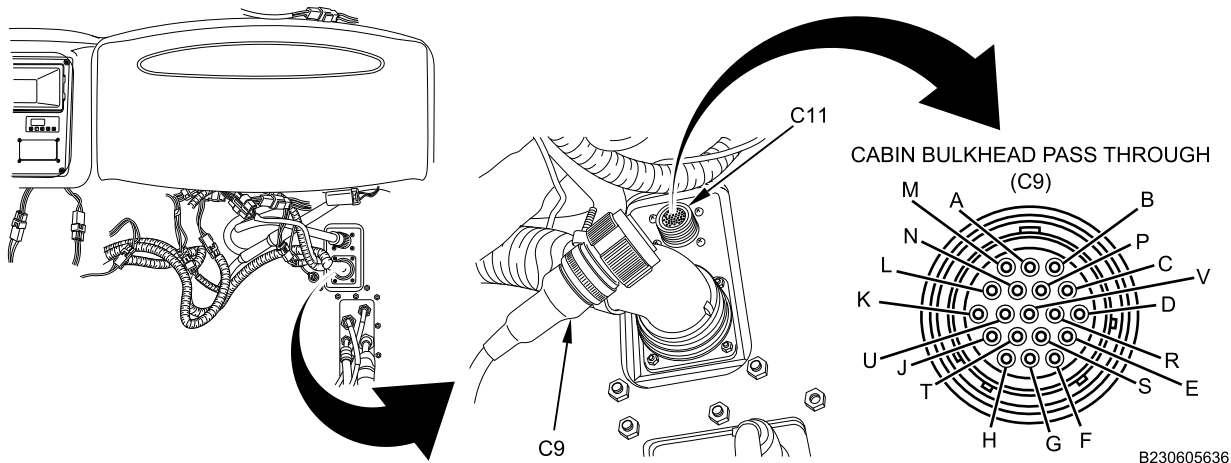
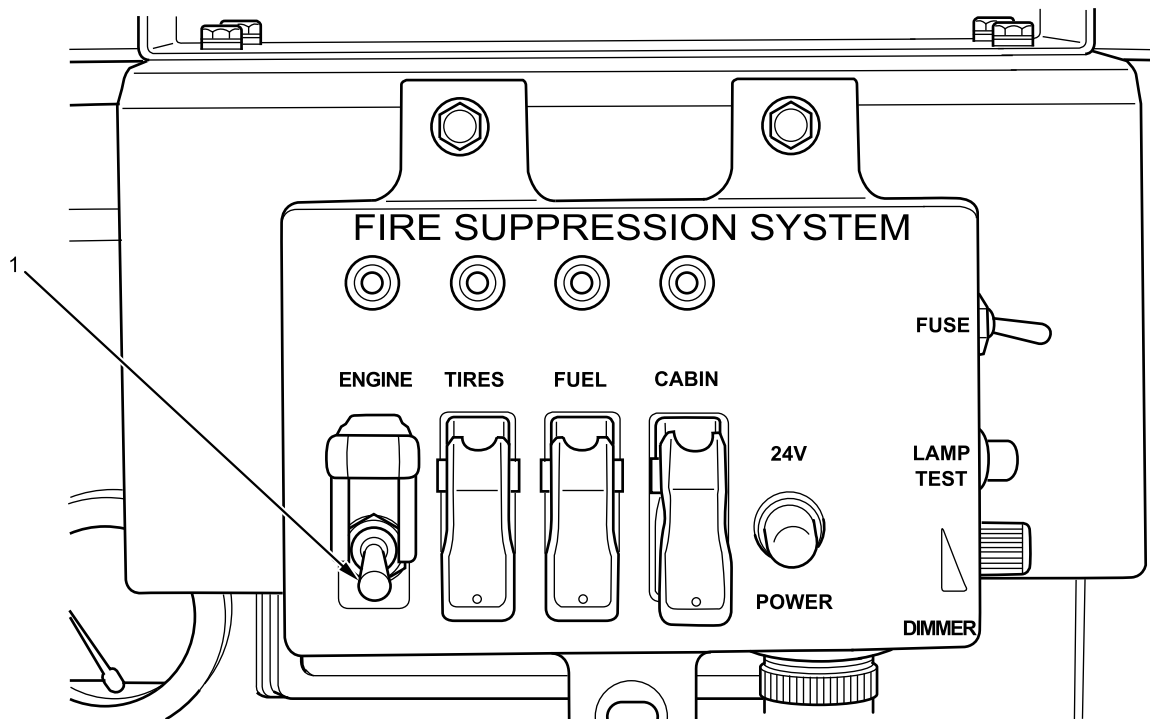


Figure 1. Right Side Engine Compartment Near Firewall.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. With assistance from maintainer, measure DC voltage between connector C9 terminals A and M with multimeter while holding ENGINE switch (Figure 2, Item 1) on FSS control panel in the up position. Refer to Figure 1.



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Figure 2. FSS Control Panel.

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Does multimeter read more than 22.5V?

DECISION

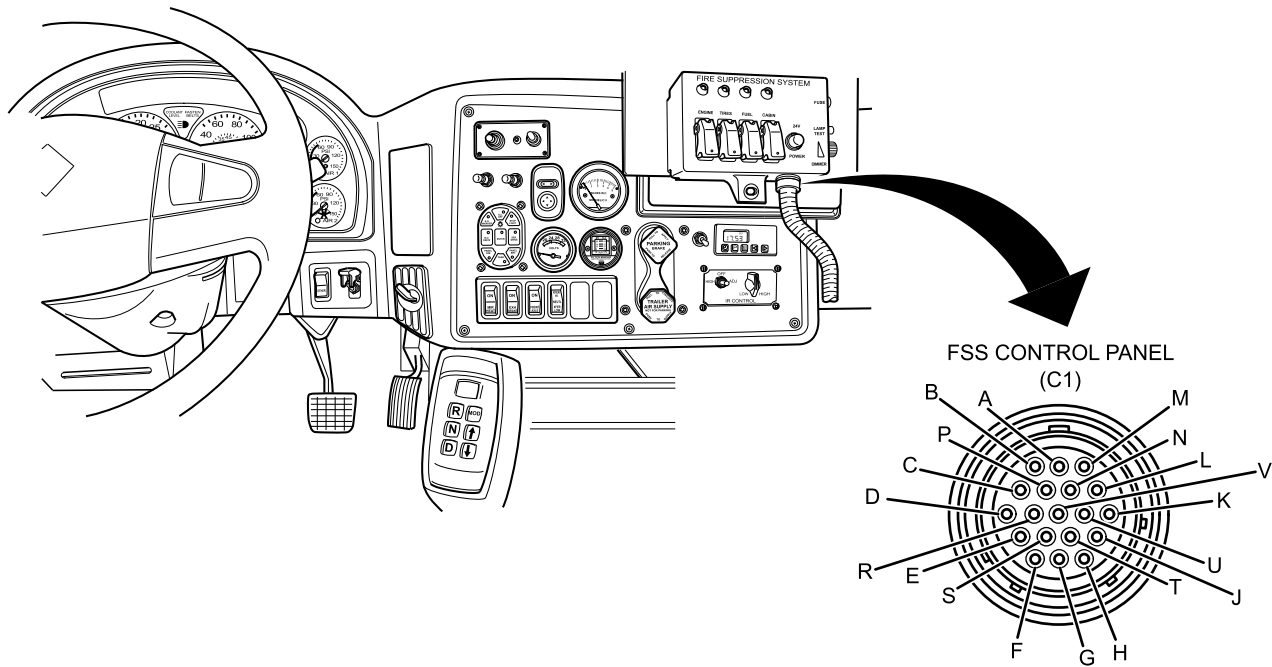
YES Go to Step 12.

NO Go to next step.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

5. Turn ignition switch OFF (TM 9-2355-106-10).
6. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
7. Disconnect connector C1. Refer to Figure 3.

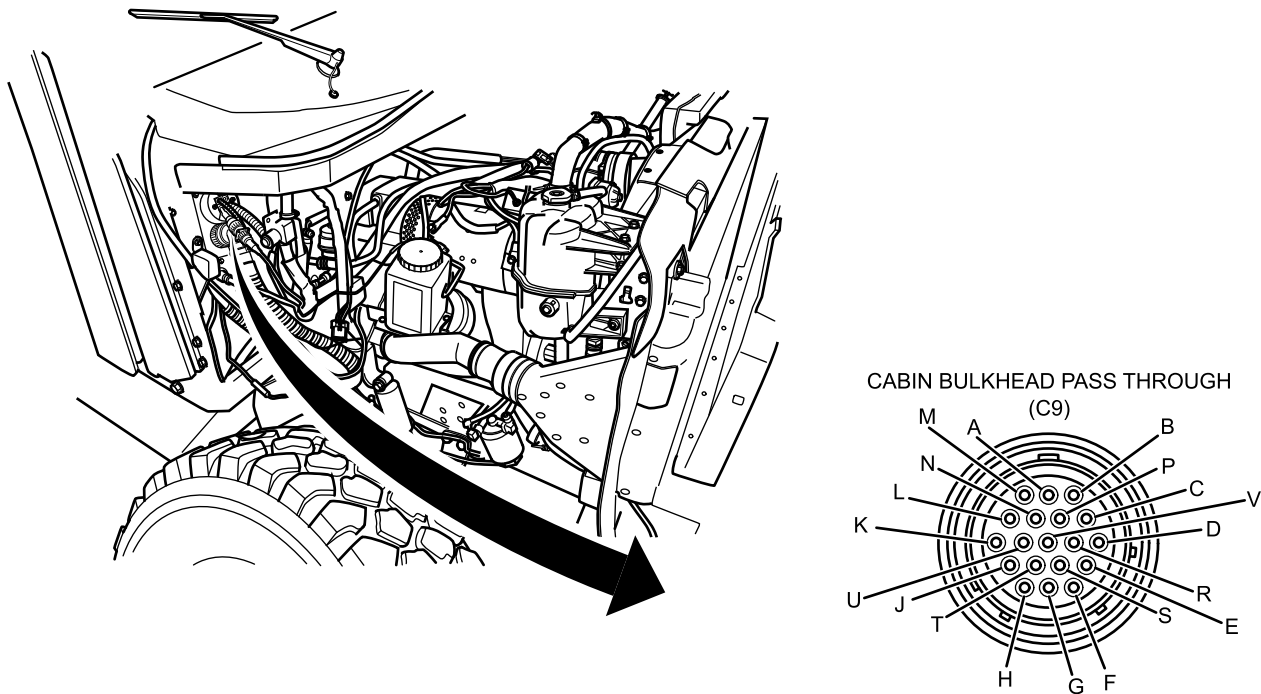


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Figure 3. Center Instrument Panel (IP) Area.

8. Connect jumper wire between connector C1 terminals A and M. Refer to Figure 3.
9. Measure resistance between connector C9 terminals A and M with multimeter. Refer to Figure 4.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 4. Connector C9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 11.

NO Go to Step 10.

MALFUNCTION

- 10. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****MALFUNCTION**

- 11. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 12. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch OFF (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739
WP 0740

Drawings Required

WP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**TROUBLESHOOTING PROCEDURE****WARNING**

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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

1. Disconnect connector C9. Refer to Figure 1.

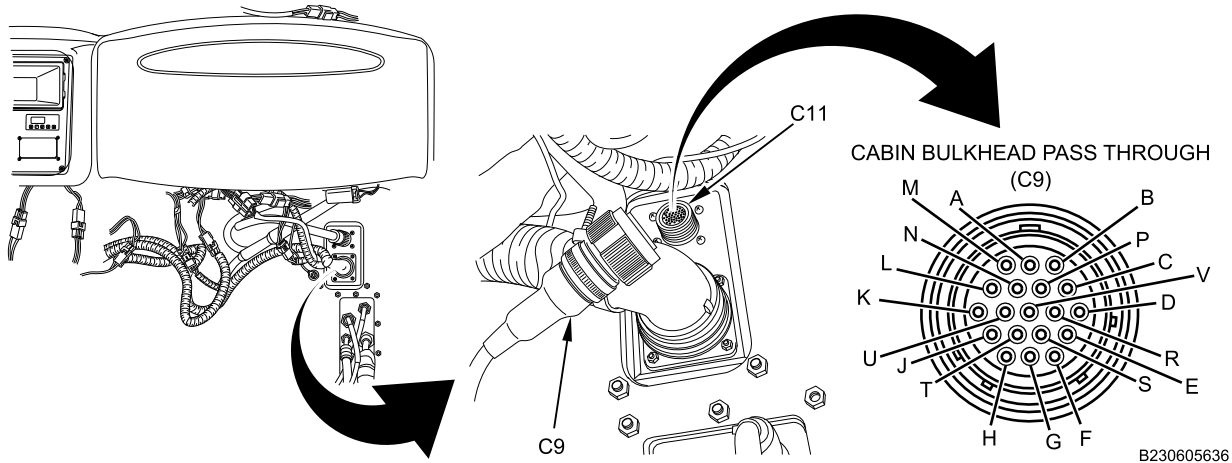


Figure 1. Right Side Engine Compartment Near Firewall.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Ensure FSS control panel FUSE switch is ON (TM 9-2355-106-10).
5. Measure DC voltage between connector C9 terminals A and U with multimeter. Refer to Figure 1. Note multimeter reading.
6. Measure DC voltage between connector C9 terminals A and V with multimeter. Refer to Figure 1. Note multimeter reading.

CONDITION/INDICATION

Did multimeter read more than 22.5V for each test?

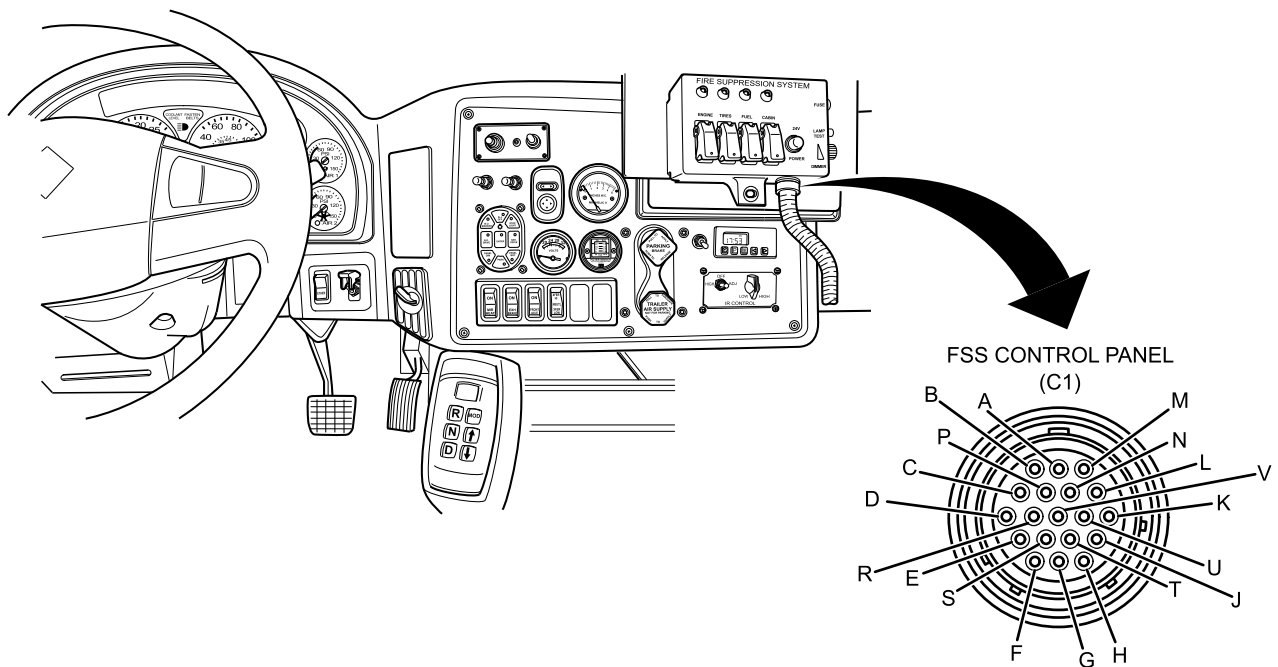
DECISION

YES Go to Step 15.
NO Go to next step.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
9. Disconnect connector C1. Refer to Figure 2.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 2. Center Instrument Panel (IP) Area.

10. Connect jumper wire between connector C1 terminals A and U. Refer to Figure 2.
11. Measure resistance between connector C9 terminals A and U. Refer to Figure 1. Note multimeter reading.
12. Move jumper wire connection at connector C1 from terminal U to terminal V. Jumper wire should be connected between terminals A and V. Refer to Figure 2.
13. Measure resistance between connector C9 terminals A and V. Refer to Figure 1. Note multimeter reading.

CONDITION/INDICATION

Does multimeter read less than 5 ohms for each test?

DECISION

YES Go to Step 16.
NO Go to Step 14.

MALFUNCTION

- 14. Harness is faulty.

ACTION

Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR POWER AND GROUND TROUBLESHOOTING
PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 15. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FFS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 16. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0740

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM
9-2355-106-10)

Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Hood open and secured (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739

Drawings RequiredWP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

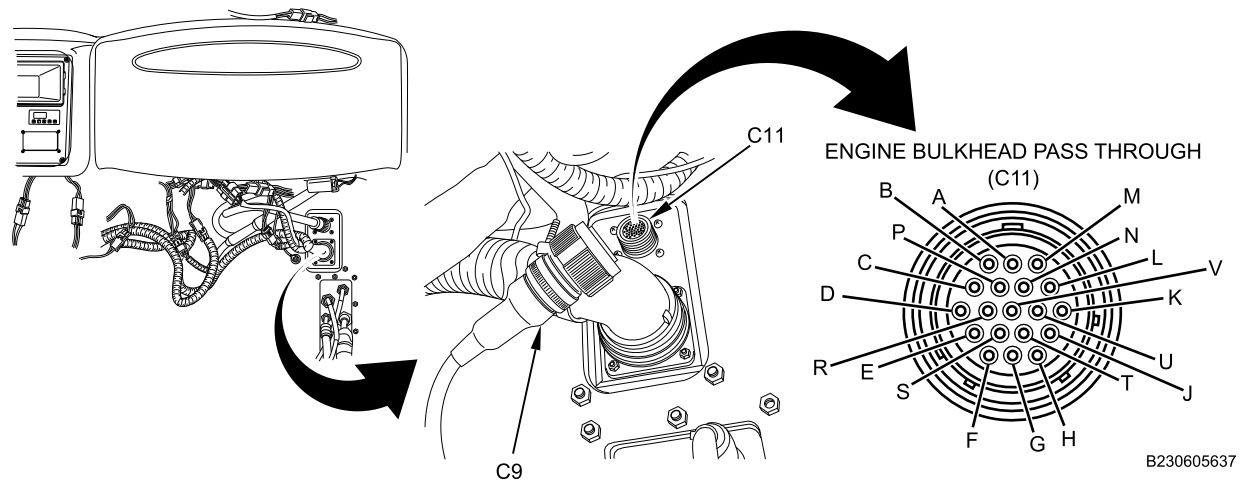
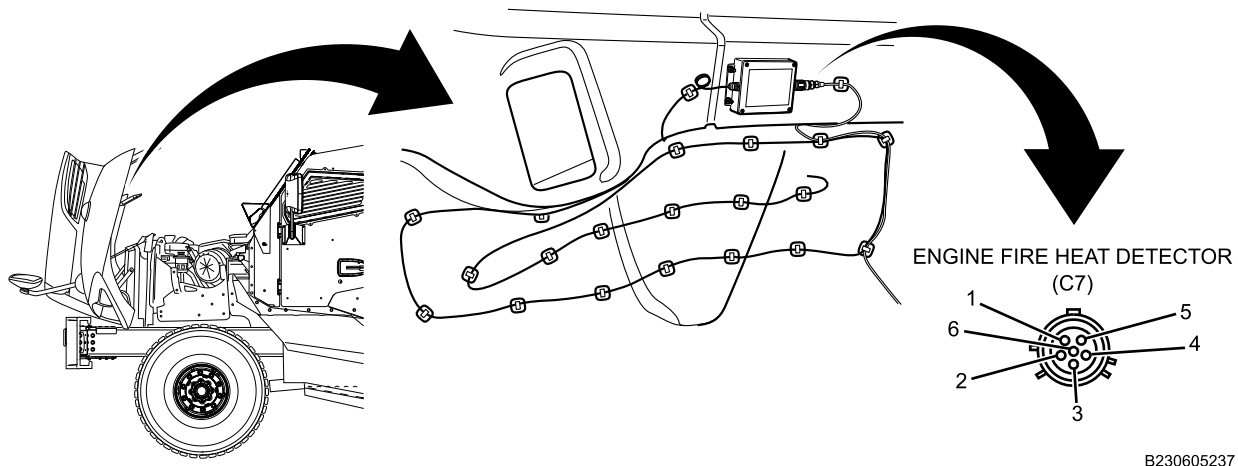


Figure 1. Right Side Instrument Panel Area.

1. Disconnect connector C9 from connector C11. Refer to Figure 1.

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)**



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Figure 2. Backside of Hood Area.

2. Disconnect connector C7. Refer to Figure 2.
3. With assistant, measure resistance between connector C11 terminal D and connector C7 terminal 5 with multimeter. Refer to Figure 2.

CONDITION/INDICATION

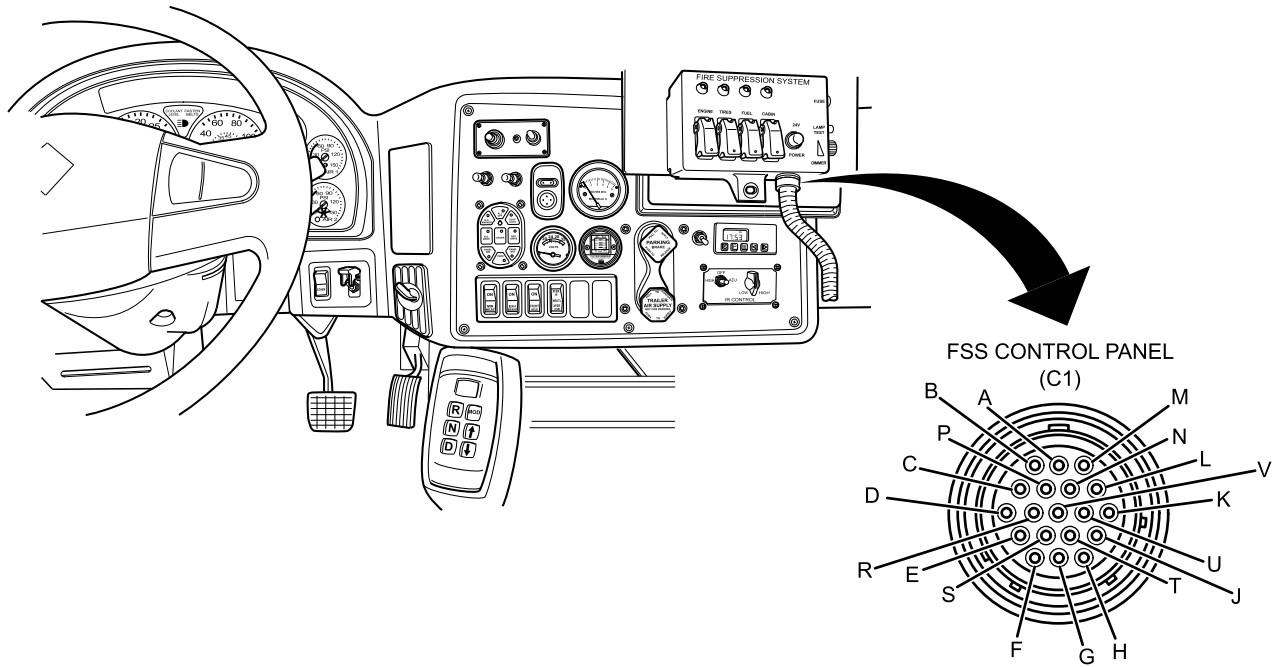
Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 6.

FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT TROUBLESHOOTING PROCEDURE - (CONTINUED)

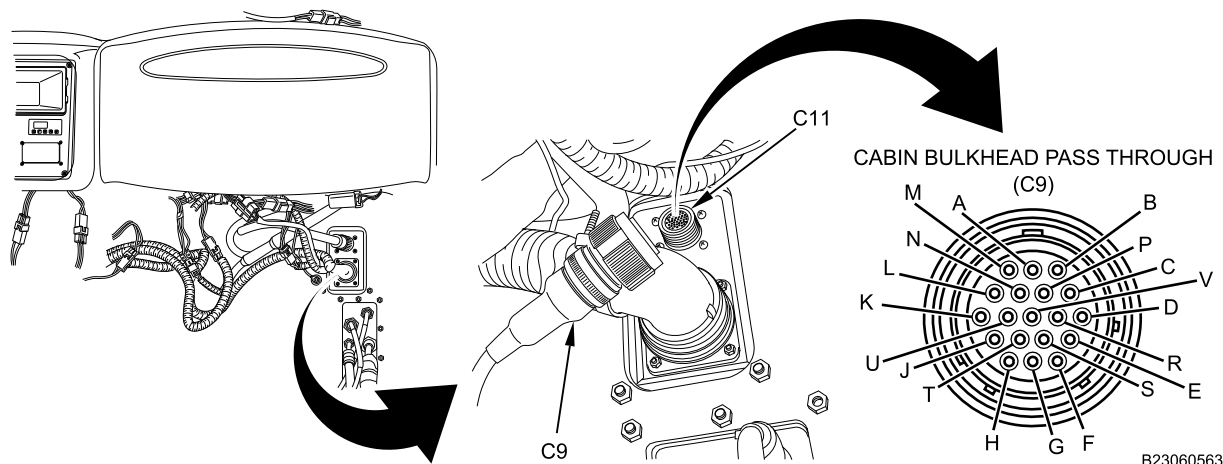
STEP



B230605246

Figure 3. Center Instrument Panel (IP) Area.

4. Disconnect connector C1. Refer to Figure 3.



B230605636

Figure 4. Right Side Instrument Panel Area.

5. With assistance, measure resistance between connector C1 terminal D and connector C9 terminal D with multimeter. Refer to Figure 3. Refer to Figure 4.

**FIRE SUPPRESSION SYSTEM (FSS) ENGINE FIRE DETECTOR FIRE DETECTION CIRCUIT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 8.

NO Go to Step 7.

MALFUNCTION

- 6. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 7. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 8. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0740

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739

Drawings RequiredWP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

TROUBLESHOOTING PROCEDURE

WARNING



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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

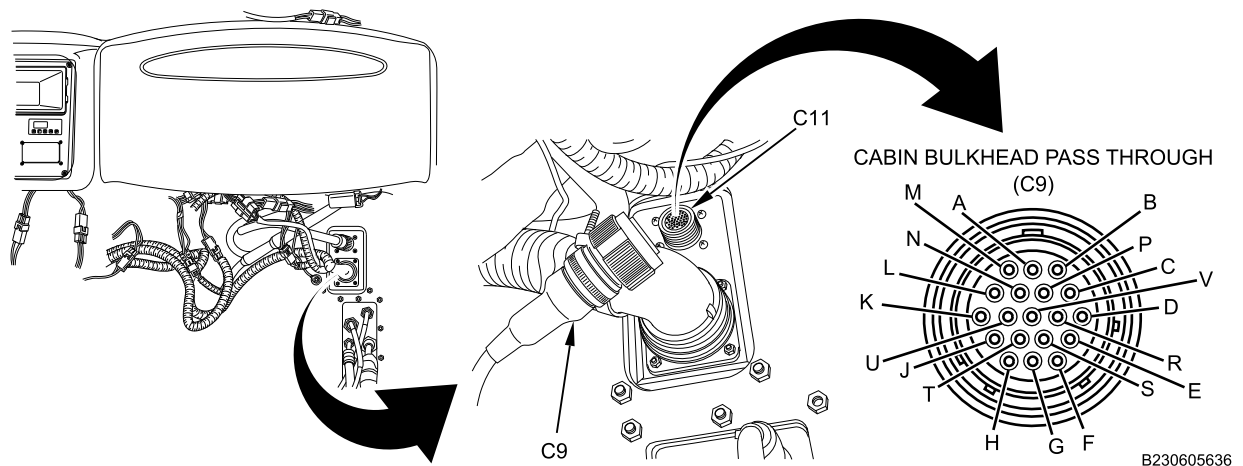
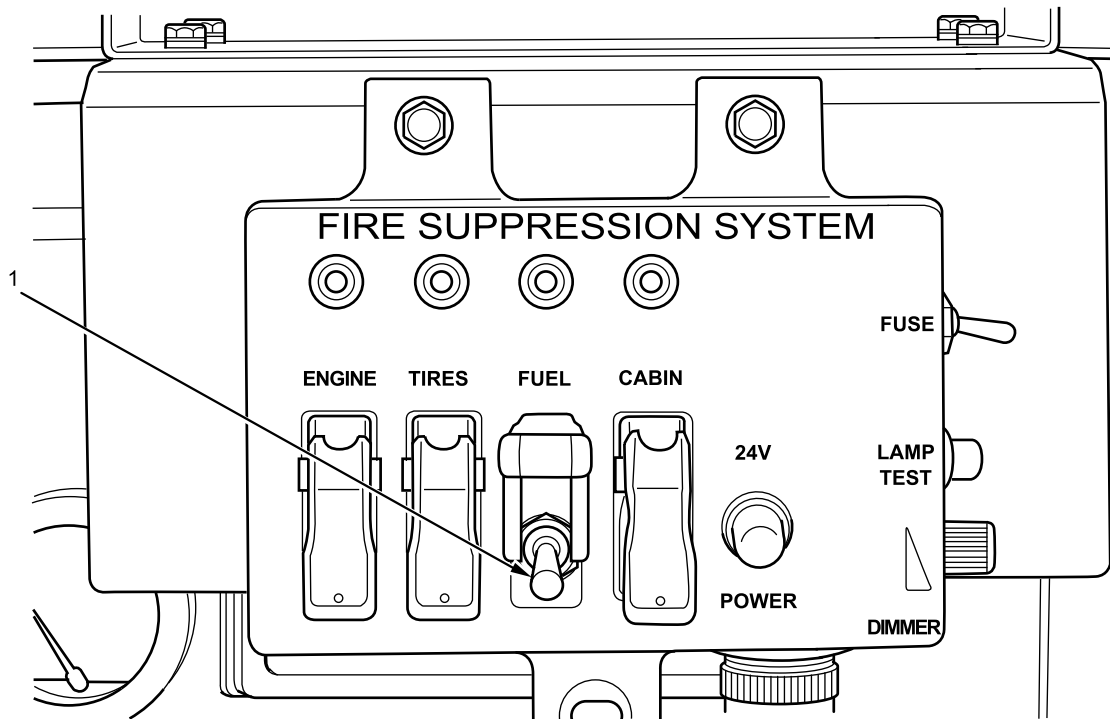


Figure 1. Right Side Engine Compartment Near Firewall.

1. Disconnect connector C9. Refer to Figure 1.
2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Ensure FSS FUSE switch is ON (TM 9-2355-106-10).

FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 2. FSS Control Panel.

5. With assistant, measure DC voltage between connector C9 terminals A and R with multimeter while holding FUEL switch (Figure 2, Item 1) on FSS control panel in the up position.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

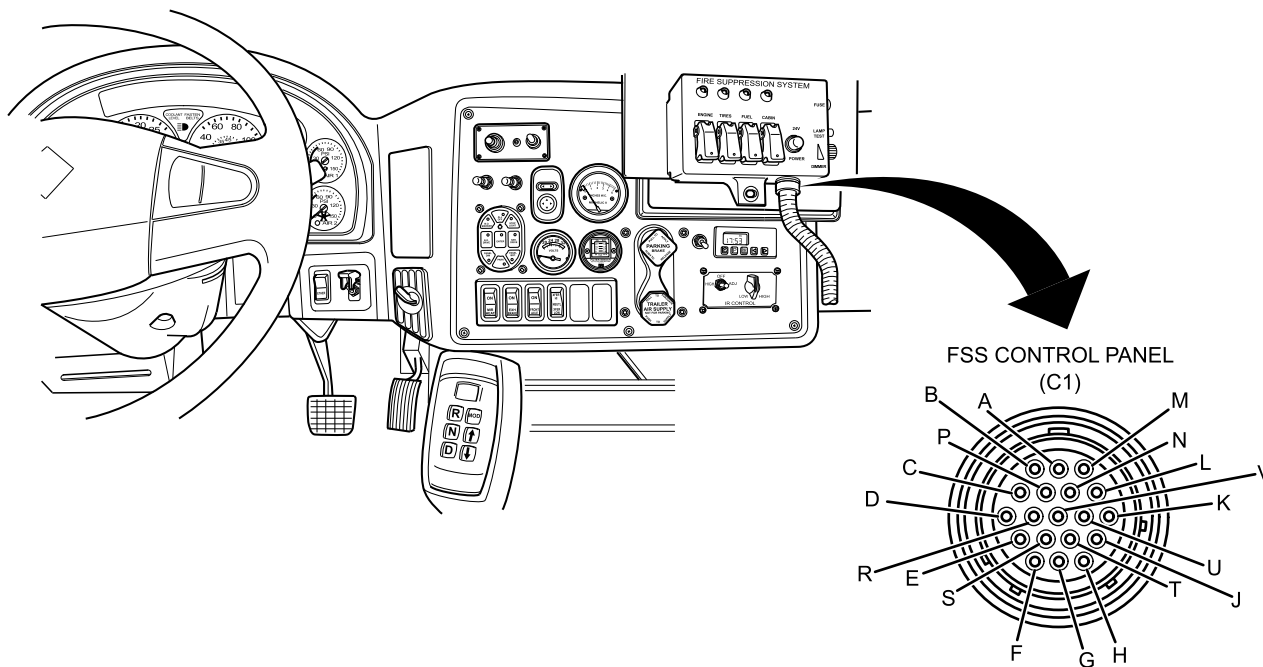
DECISION

YES Go to Step 13.
NO Go to next step.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

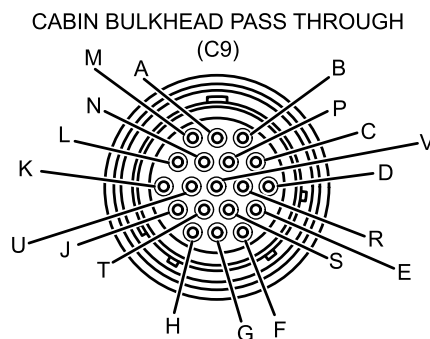
FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 3. Center Instrument Panel (IP) Area.

8. Disconnect connector C1. Refer to Figure 3.
9. Connect jumper wire between connector C1 terminals A and R. Refer to Figure 3.
10. Measure resistance between connector C9 terminals A and R with multimeter. Refer to Figure 4.



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Figure 4. Connector C9.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

- YES Go to Step 12.
- NO Go to Step 11.

**FIRE SUPPRESSION SYSTEM (FSS) FUEL TANK EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****MALFUNCTION**

- 11. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 12. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 13. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE**FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0740

WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0191
WP 0737
WP 0739

Drawings RequiredWP 0789, Figure 29

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the FSS depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Fire Suppression System (FSS) Troubleshooting Procedure (WP 0191) before performing the tests in this troubleshooting procedure.

FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

TROUBLESHOOTING PROCEDURE

WARNING



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.

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 anti-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. Failure to comply may result in serious injury or death to personnel.

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.

FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)

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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

STEP

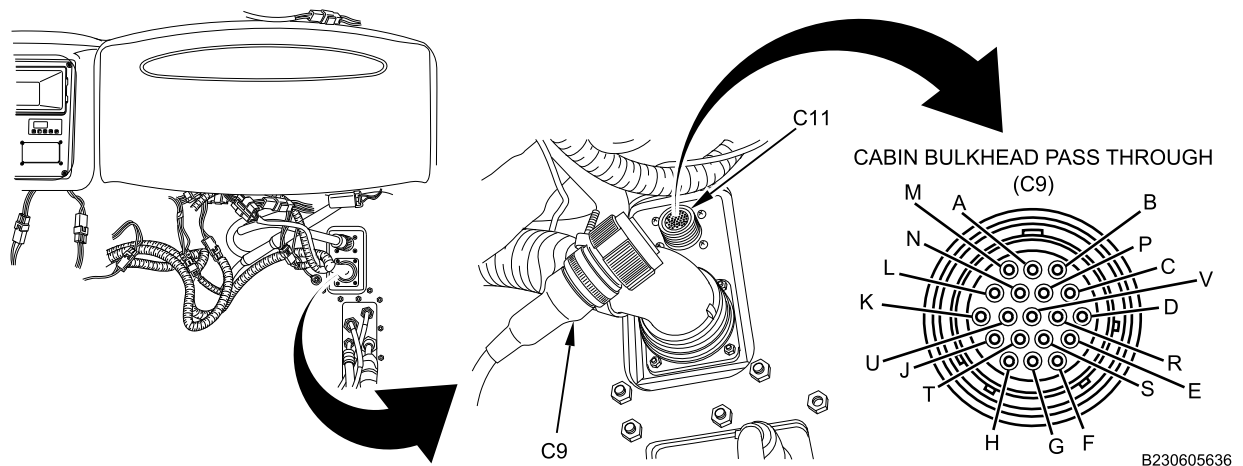
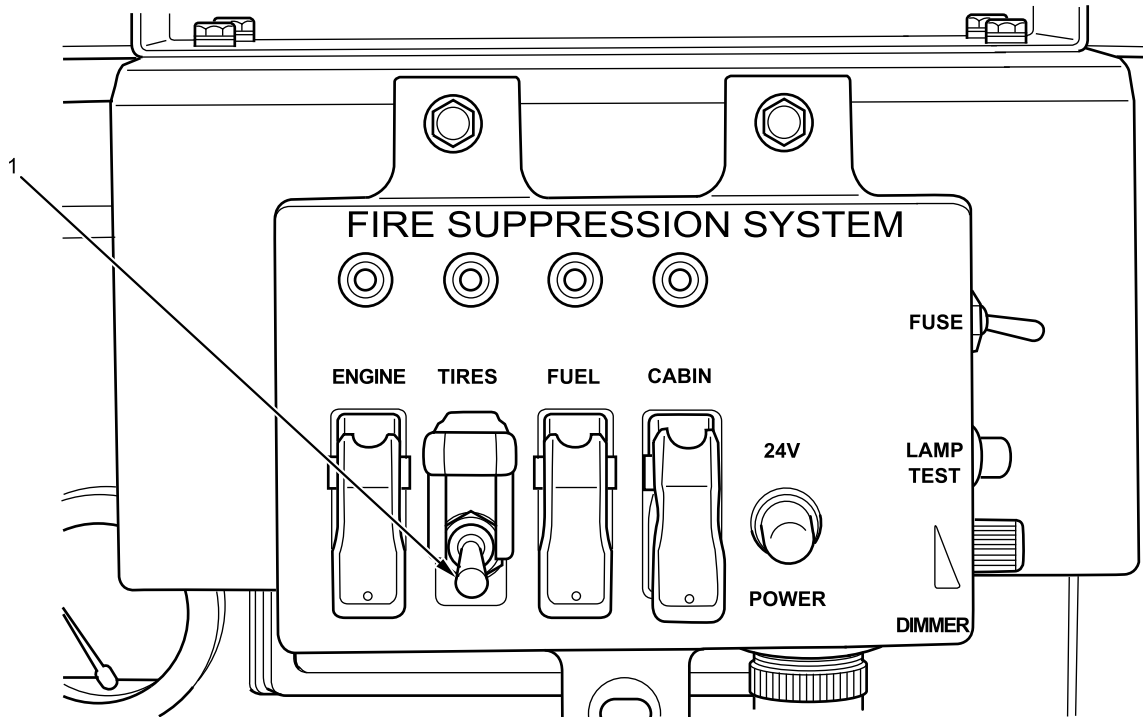


Figure 1. Right Side Engine Compartment Near Firewall.

1. Disconnect connector C9 from connector C11. Refer to Figure 1.
2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Ensure FSS FUSE switch is ON (TM 9-2355-106-10).

**FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)**



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Figure 2. FSS Control Panel.

5. With assistant, measure DC voltage between connector C9 terminals A and P with multimeter while holding TIRES switch (Figure 2, Item 1) on FSS control panel in the up position.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

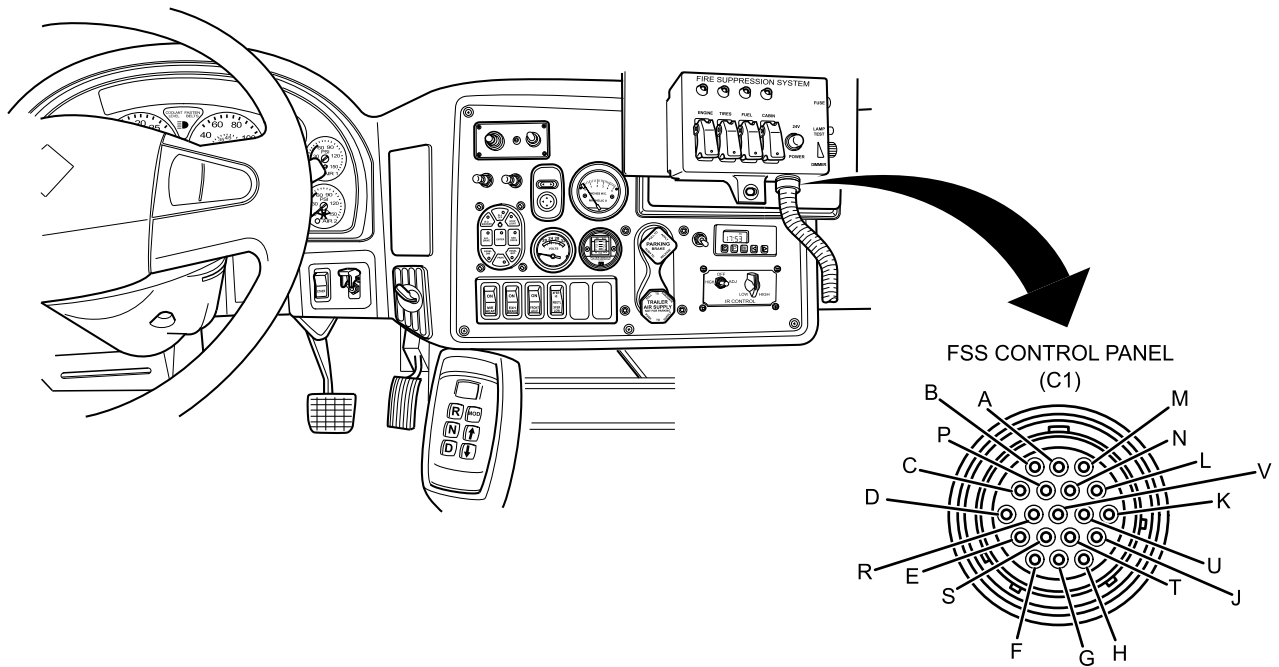
DECISION

YES Go to Step 13.
NO Go to next step.

STEP

6. Turn ignition switch OFF (TM 9-2355-106-10).
7. Turn MAIN POWER switch OFF (TM 9-2355-106-10).

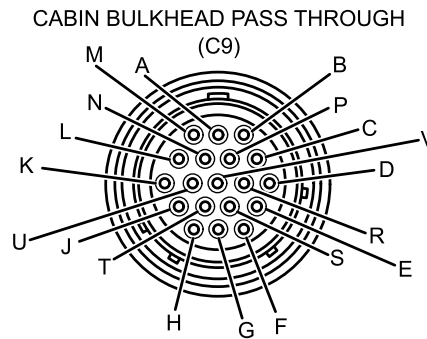
FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT TROUBLESHOOTING PROCEDURE - (CONTINUED)



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Figure 3. Center Instrument Panel (IP) Area.

8. Disconnect connector C1. Refer to Figure 3.
9. Connect jumper wire between connector C1 terminals A and P. Refer to Figure 3.



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Figure 4. Connector C9.

10. Measure resistance between connector C9 terminals A and P with multimeter. Refer to Figure 4.

**FIRE SUPPRESSION SYSTEM (FSS) TIRES EXTINGUISHER CONTROL CIRCUIT FAULT
TROUBLESHOOTING PROCEDURE - (CONTINUED)****CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 12.

NO Go to Step 11.

MALFUNCTION

- 11. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Cabin Harness Removal and Installation (WP 0739). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 12. FSS control panel is faulty.

ACTION

Replace FSS control panel. Refer to Fire Suppression System (FSS) Control Unit Removal and Installation (WP 0737). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 13. Harness is faulty.

ACTION

Replace harness. Refer to Fire Suppression System (FSS) Chassis Harness Removal and Installation (WP 0740). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE

INITIAL SETUP:

Test Equipment

Refrigerant recovery station (WP 0795, Item 84)

WP 0207

WP 0208

WP 0209

Tools and Special Tools

General Mechanic's Tool Kit (GMTK)

WP 0210

(WP 0795, Item 37)

WP 0211

Refrigeration Ordnance Service Tool Kit

WP 0212

(WP 0795, Item 85)

WP 0213

WP 0214

WP 0244

Materials/Parts

Faceshield, industrial (WP 0794, Item 16)

WP 0245

Gloves (WP 0794, Item 19)

WP 0707

WP 0782

References

TM 9-2355-106-10

TM 9-2355-106-23P

WP 0189

WP 0203

WP 0204

WP 0205

WP 0206

Equipment Condition

Parking brake set (TM 9-2355-106-10)

Transmission set in NEUTRAL (N) (TM 9-2355-106-10)

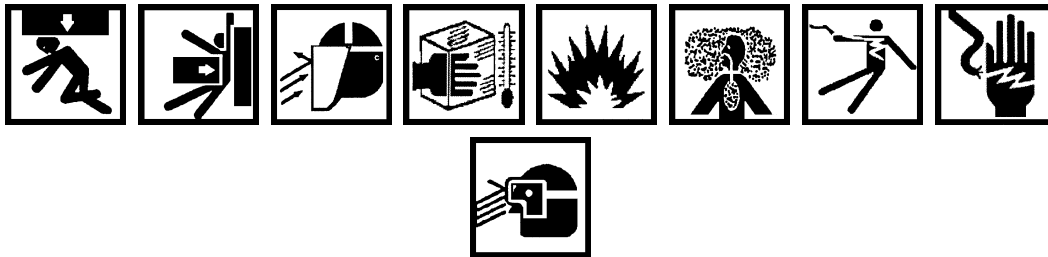
Engine off (TM 9-2355-106-10)

MAIN POWER switch off (TM 9-2355-106-10)

Wheels chocked (TM 9-2355-106-10)

Hood open and secured (TM 9-2355-106-10)

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.

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.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

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.

Do not install or remove air-conditioning testing or charging equipment while engine is running. Wait 30 seconds after engine shutdown to allow high side and low side pressures to equalize. Failure to comply may result in damage to equipment and environment, and 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.

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.

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.

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. Failure to comply may result in damage to environment and 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.

NOTE

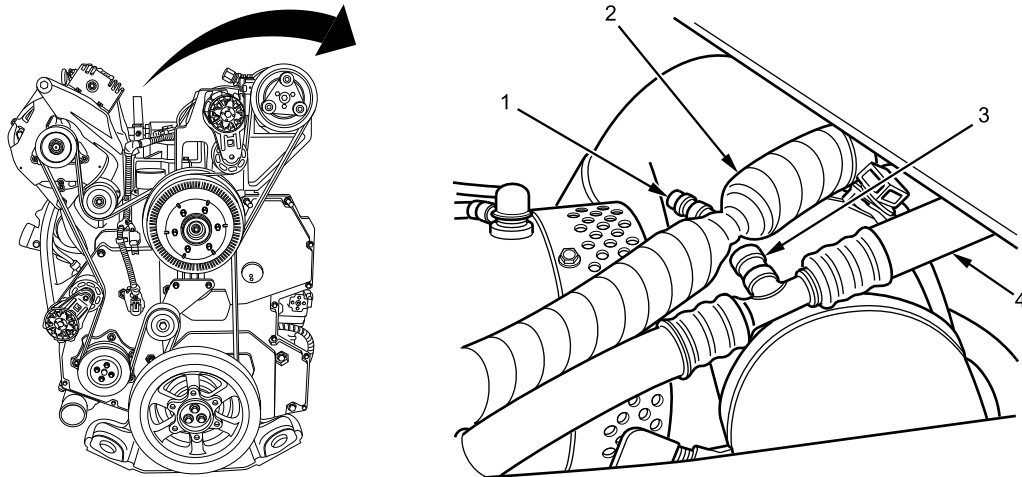
Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

The Climate Control Unit (CCU) will not command the A/C compressor on unless the cabin temperature is above 67°F (± 4°F) (19.4°C [± 15°C]) as measured by the Recycled Air (RA) temperature sensor.

STEP

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Prepare the recovery/recharging station according to the setup instructions described in the recovery/recharging station user's guide.
2. Remove protective cap and connect recovery/recharging station BLUE hose to low-side service port (Figure 1, Item 1) on low-side line (Figure 1, Item 2).



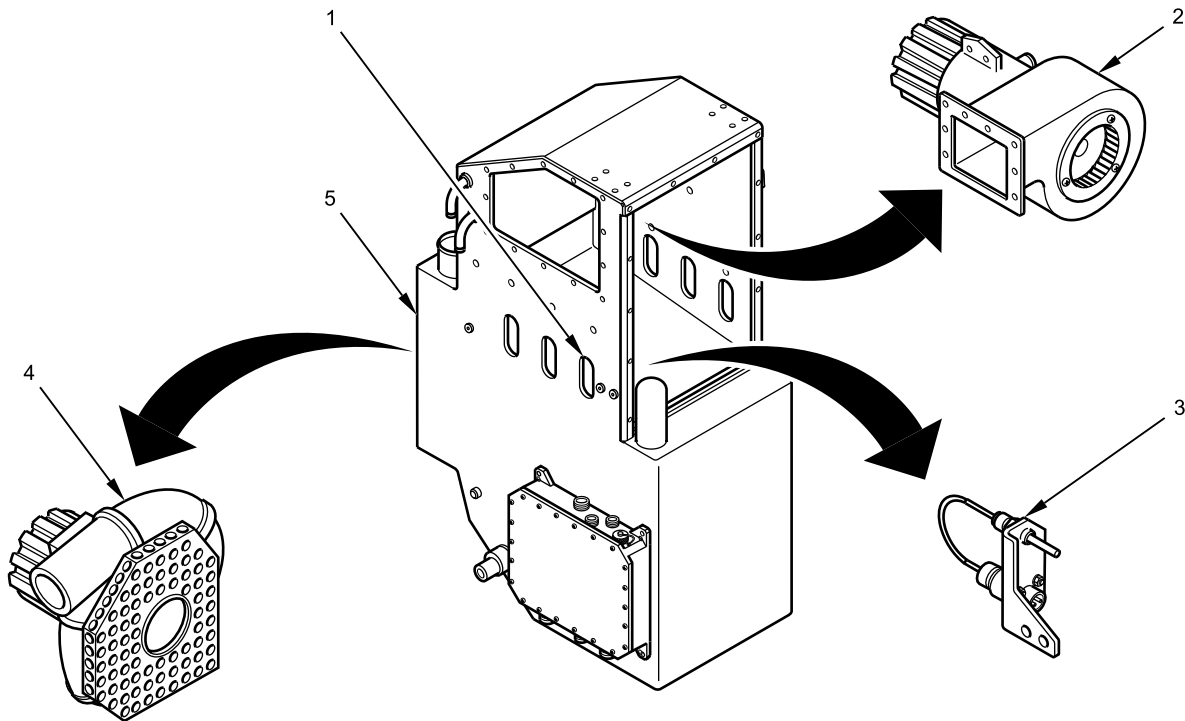
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Figure 1. HVAC Service Ports.

3. Remove protective cap and connect recovery/recharging station RED hose to high-side service port (Figure 1, Item 3) on high-side line (Figure 1, Item 4).
4. Close both valves on recovery/recharging station refrigerant tank.
5. Close HIGH and LOW valves on recovery/recharging station control panel.
6. Open high- and low-side hose valves near service ports (Figure 1, Item 1 and 3) by turning knobs clockwise.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

7. Place a thermometer in hole (Figure 2, Item 1) in forward side of HVAC box (Figure 2, Item 5), near RA temperature sensor (Figure 2, Item 3).



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Figure 2. Recycled Air (RA) Temperature Sensor, Recycled Air (RA) Blower, and Fresh Air (FA) Blower Locations.

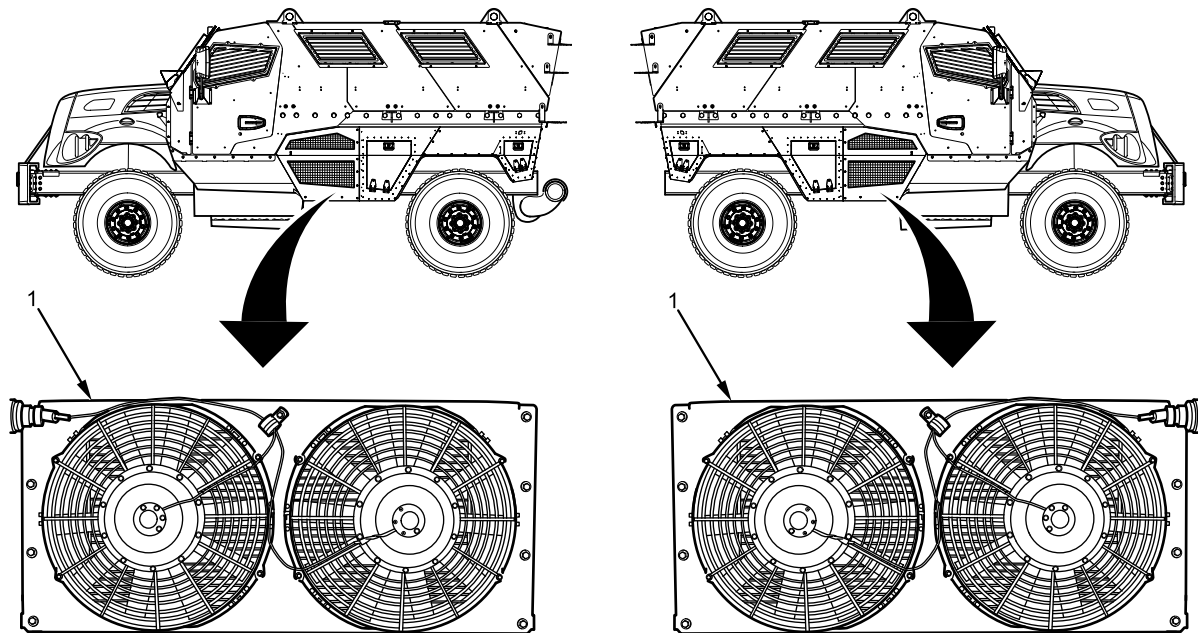
8. Turn MAIN POWER switch ON (TM 9-2355-106-10).
9. Start engine (TM 9-2355-106-10).
10. Turn LSS switch on HVAC/LSS control panel to ON position (TM 9-2355-106-10).
11. Turn mode control knob on HVAC/LSS control panel to COOL position (TM 9-2355-106-10).
12. Turn RA blower speed control knob on HVAC/LSS control panel to maximum position (TM 9-2355-106-10).
13. Turn temperature control knob on HVAC/LSS control panel to coldest position (TM 9-2355-106-10).
14. Close all doors and hatches to seal cabin (TM 9-2355-106-10).

NOTE

When checking FA blower operation, turn RA blower speed control to minimum position (TM 9-2355-106-10). This will help reduce background noise so maintainer can verify FA blower operation.

15. Inspect for the following normal conditions:
 - Engine speed increases to 1,300 rpm (\pm 800 rpm) within 10 seconds.
 - RA blower (Figure 2, Item 2) is running at maximum speed.
 - FA blower (Figure 2, Item 4) is on.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



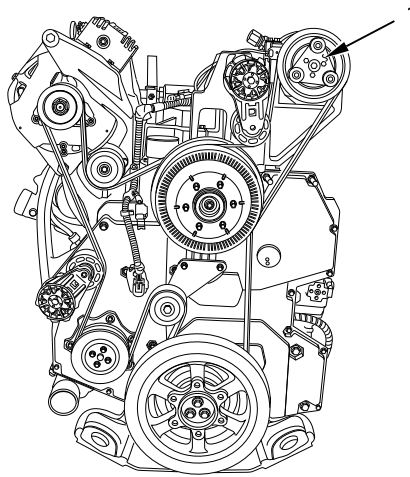
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Figure 3. A/C Condenser Fans Location.

All four condenser fans (Figure 3, Item 1) should turn on and off as a group to regulate A/C high-side pressure between 174 psi (± 29 psi) and 232 psi (± 25.4 psi) (1,200 kPa [± 200 kPa] and 1,600 kPa [± 175 kPa]).

- A/C compressor clutch (Figure 4, Item 1) engages (spins) and does not turn off unless cabin temperature drops below 67°F (± 4 °F) (19.4°C [± 15 °C]).
- Cabin pressure between 0.8-2.8 inch Water Column (W.C.) (200-700 pascal) (TM 9-2355-106-10).
- Difference between outside air temperature and thermometer placed near RA temperature sensor is 30°F (16.6°C) after 30 minutes of run time unless cabin temperature drops below 67°F (± 4 °F) (19.4°C [± 15 °C]). A complete system check cannot be performed unless outside air temperature is at least 98°F (36.6°C).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)



B239103791

Figure 4. A/C Compressor Clutch Location.

CONDITION/INDICATION

HVAC/LSS system is completely nonfunctional. (Engine speed does not increase, A/C compressor does not engage, FA blower is off, RA blower is off, and condenser fans are off.)

CORRECTIVE ACTION

Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

CONDITION/INDICATION

A/C compressor clutch engages on system initial startup then shuts off for 5 minutes or longer.

CORRECTIVE ACTION

STEP 1. Ensure proper refrigerant charge. Refer to A/C Service/Recharge Procedure (WP 0707).

STEP 2. Ensure RA temperature sensor is operating properly. Refer to RA Temperature Sensor Troubleshooting Procedure (WP 0208).

STEP 3. Ensure trinary switch is operating properly. Refer to HVAC Trinary Switch Troubleshooting Procedure (WP 0211).

STEP 4. Ensure condenser fans operate properly. Refer to HVAC Condenser Fans Troubleshooting Procedure (WP 0213).

STEP 5. Ensure low pressure cutout switch operates properly. Refer to HVAC Low Pressure Cutout Switch Tests (WP 0210).

STEP 6. Ensure freeze switch operates properly. Refer to HVAC Freeze Switch Troubleshooting Procedure (WP 0209).

CONDITION/INDICATION

A/C compressor clutch never engages.

CORRECTIVE ACTION

STEP 1. Ensure proper refrigerant charge. Refer to A/C Service/Recharge Procedure (WP 0707).

STEP 2. Ensure RA temperature sensor is operating properly. Refer to RA Temperature Sensor Troubleshooting Procedure (WP 0208).

STEP 3. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 4. Ensure A/C compressor clutch circuits are operating properly. Refer to Air Conditioning Heating Ventilating and Air Conditioning (HVAC) Compressor Control Troubleshooting Procedure (WP 0212).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

STEP 5. Ensure low pressure cutout switch is operating properly. Refer to HVAC Low Pressure Cutout Switch Troubleshooting Procedure (WP 0210).

STEP 6. Ensure trinary switch is operating properly. Refer to HVAC Trinary Switch Troubleshooting Procedure (WP 0211).

STEP 7. Ensure freeze switch is operating properly. Refer to HVAC Freeze Switch Troubleshooting Procedure (WP 0209).

STEP 8. Ensure A/C compressor clutch circuits are operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Compressor Control Troubleshooting Procedure (WP 0212).

CONDITION/INDICATION

A/C compressor locks up (will not spin with clutch engaged).

CORRECTIVE ACTION

STEP 1. Ensure proper refrigerant and PAG oil charge. Refer to A/C Service/Recharge Procedure (WP 0707).

STEP 2. Ensure A/C drive belt is not frayed, cracked, or excessively worn. Refer to Air Conditioner (A/C) Belt Removal and Installation (WP 0244).

STEP 3. Ensure A/C drive belt tensioner is not loose. Refer to Air Conditioning (A/C) Belt Tensioner Removal and Installation (WP 0245).

STEP 4. Ensure trinary switch is operating properly. Refer to HVAC Trinary Switch Troubleshooting Procedure (WP 0211).

CONDITION/INDICATION

All condenser fans do not operate.

CORRECTIVE ACTION

STEP 1. Ensure trinary medium switch is operating properly. Refer to HVAC Trinary Switch Troubleshooting Procedure (WP 0211).

STEP 2. Ensure condenser fan circuits are operating properly. Refer to HVAC Condenser Fans Troubleshooting Procedure (WP 0213).

CONDITION/INDICATION

Some condenser fans do not operate.

CORRECTIVE ACTION

Refer to HVAC Condenser Fans Troubleshooting Procedure (WP 0213).

CONDITION/INDICATION

FA blower does not operate.

CORRECTIVE ACTION

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure FA blower circuits are operating properly. Refer to HVAC/LSS FA Blower Troubleshooting Procedure (WP 0205).

CONDITION/INDICATION

RA blower not operating or not operating properly.

CORRECTIVE ACTION

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure RA blower circuits are operating properly. Refer to HVAC/LSS RA Blower Troubleshooting Procedure (WP 0204).

CONDITION/INDICATION

Heat from heater core in COOL mode.

CORRECTIVE ACTION

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure 3-way valve is operating properly. Refer to HVAC 3-Way Valve Troubleshooting Procedure (WP 0206).

CONDITION/INDICATION

Engine speed does not increase to 1,300 rpm (\pm 800 rpm) within 10 seconds.

CORRECTIVE ACTION

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure HVAC high idle circuits are operating properly. Refer to HVAC High Idle Circuit Troubleshooting Procedure (WP 0207).

CONDITION/INDICATION

Insufficient cabin cooling.

CORRECTIVE ACTION**NOTE**

System is operating to specification if difference between outside air temperature and cabin air temperature is 30°F (16.6°C) (all doors closed, COOL mode selected, temperature control knob at coldest temperature selection, engine running at high idle, RA blower at maximum speed, and 30 minutes of run time). No repair is necessary. In this situation, if RA temperature drops below 67°F (\pm 4°F) (19.4°C [\pm 15°C]), A/C compressor will be commanded off.

STEP 1. Ensure 3-way valve is operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC) 3-Way Valve Troubleshooting Procedure (WP 0206).

STEP 2. Ensure proper refrigerant and PAG oil charge. Refer to Air Conditioning (A/C) Service Recharge Procedure (WP 0707).

STEP 3. Ensure refrigerant system is operating properly. Refer to Air Conditioning (A/C) System Troubleshooting Procedure (WP 0189).

STEP 4. Inspect A/C compressor drive belt for fraying, cracking, and uneven wear. If belt requires replacement, refer to Air Conditioner (A/C) Belt Removal and Installation (WP 0244).

STEP 5. Ensure A/C compressor circuits are operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Compressor Control Troubleshooting Procedure (WP 0212).

STEP 6. Ensure trinary switch is operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Trinary Switch Troubleshooting Procedure (WP 0211).

STEP 7. Ensure condenser fans operate properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Condenser Fans Troubleshooting Procedure (WP 0213).

STEP 8. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

STEP 9. Ensure RA temperature sensor is operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Recycled Air (RA) Temperature Sensor Troubleshooting Procedure (WP 0208).

STEP 10. Ensure RA blower is operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Recycled Air (RA) Blower Troubleshooting Procedure (WP 0204).

CONDITION/INDICATION

Insufficient or excessive cabin pressure.

CORRECTIVE ACTION

Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Cabin Pressure Troubleshooting Procedure (WP 0214).

NOTE

The following test will not work unless ambient temperature is below 79.7°F (26.5°C). The heater system cannot be properly tested unless ambient temperature is below 79.7°F (26.5°C).

1. Turn mode select switch on HVAC/LSS operator control panel to HEAT position (TM 9-2355-106-10).
2. Turn temperature control knob on HVAC/LSS operator control panel to warmest setting (TM 9-2355-106-10).
3. Wait 5 minutes for HVAC system to stabilize.
4. Inspect for the following normal conditions:
 - Cabin temperature begins to rise.
 - A/C compressor is off.
 - HVAC condenser fans are off.
 - Engine returns to normal idle speed.

No or low heat output from heater core.

STEP 1. Ensure 3-way valve is operating properly. Refer to HVAC 3-Way Valve Troubleshooting Procedure (WP 0206).

STEP 2. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 3. Ensure RA temperature sensor is operating properly. Refer to RA Temperature Sensor Troubleshooting Procedure (WP 0208).

A/C compressor is on in HEAT mode.

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure A/C compressor circuits are operating properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Compressor Control Troubleshooting Procedure (WP 0212).

HVAC condenser fans are on in HEAT mode.

Ensure HVAC condenser fan circuits operate properly. Refer to Heating Ventilating and Air Conditioning (HVAC) Condenser Fans Troubleshooting Procedure (WP 0213).

Engine does not return to normal idle.

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Ensure HVAC high idle circuits are operating properly. Refer to HVAC High Idle Circuit Troubleshooting Procedure (WP 0207).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATIONAL CHECKOUT PROCEDURE - (CONTINUED)

1. Turn mode select switch on HVAC/LSS operator control panel to DRY position (TM 9-2355-106-10).
2. Wait 5 minutes for HVAC system to stabilize.
3. Inspect for the following normal conditions:
 - Engine speed increases to 1,300 rpm (± 800 rpm) within 10 seconds.
 - Compressor clutch engages and does not turn off unless cabin temperature drops below 67°F (± 4 °F) (19.4°C [± 15 °C]). In cold ambient air temperature conditions, the A/C low-side pressure could drop below 7 psi (48.2 kPa). If this happens, the CCU will command A/C compressor clutch off. The clutch will not be commanded back on until low-side pressure first rises to 21 psi (± 5 psi) (144.8 kPa [± 34.5 kPa]) and then a 5-minute timer has expired.
 - All four condenser fans should turn on and off as a group to regulate A/C high-side pressure between 174 psi (± 29 psi) and 232 psi (± 25.4 psi) (1,200 kPa [± 200 kPa] and 1,600 kPa [± 175 kPa]).
 - 3-way valve opens or closes to regulate cabin temperature, depending on temperature control knob position. Vary the temperature control knob position to verify HVAC output air temperature changes.

Engine speed does not increase to 1,300 rpm (± 800 rpm) within 10 seconds in DRY mode, but operates properly in COOL mode.

Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

A/C compressor clutch does not engage in DRY mode but operates properly in COOL mode.

Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

HVAC output air temperature is not correct in DRY mode but operates properly in COOL and HEAT modes. (Output air temperature does not change depending on temperature control knob position.)

Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

1. Turn mode select switch on HVAC/LSS operator control panel to VENT position (TM 9-2355-106-10).
2. Wait 5 minutes for HVAC system to stabilize.
3. Inspect for the following normal conditions:
 - A/C compressor clutch is off.
 - HVAC condenser fans are off.
 - Engine returns to normal idle speed.
 - HVAC output air temperature is near outside air temperature (no heating or cooling of HVAC output air).

One or more normal conditions are not correct.

STEP 1. Ensure HVAC/LSS operator control panel and CCU are operating properly. Refer to HVAC/LSS Operator Panel and CCU Power and Ground Troubleshooting Procedure (WP 0203).

STEP 2. Return vehicle to service.

END OF WORK PACKAGE

FIELD MAINTENANCE**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR
PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)
Terminal Test Kit (WP 0795, Item 122)

WP 0770
WP 0777
WP 0782

Personnel Required

Maintainer - (2)

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
Right front passenger seat removed (WP 0666)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0059
WP 0202
WP 0452
WP 0666
WP 0769

Drawings Required

WP 0789, Figure 75

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the HVAC system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202) before performing the tests in this troubleshooting procedure.

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR
PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE -
(CONTINUED)****TROUBLESHOOTING PROCEDURE****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.

CAUTION

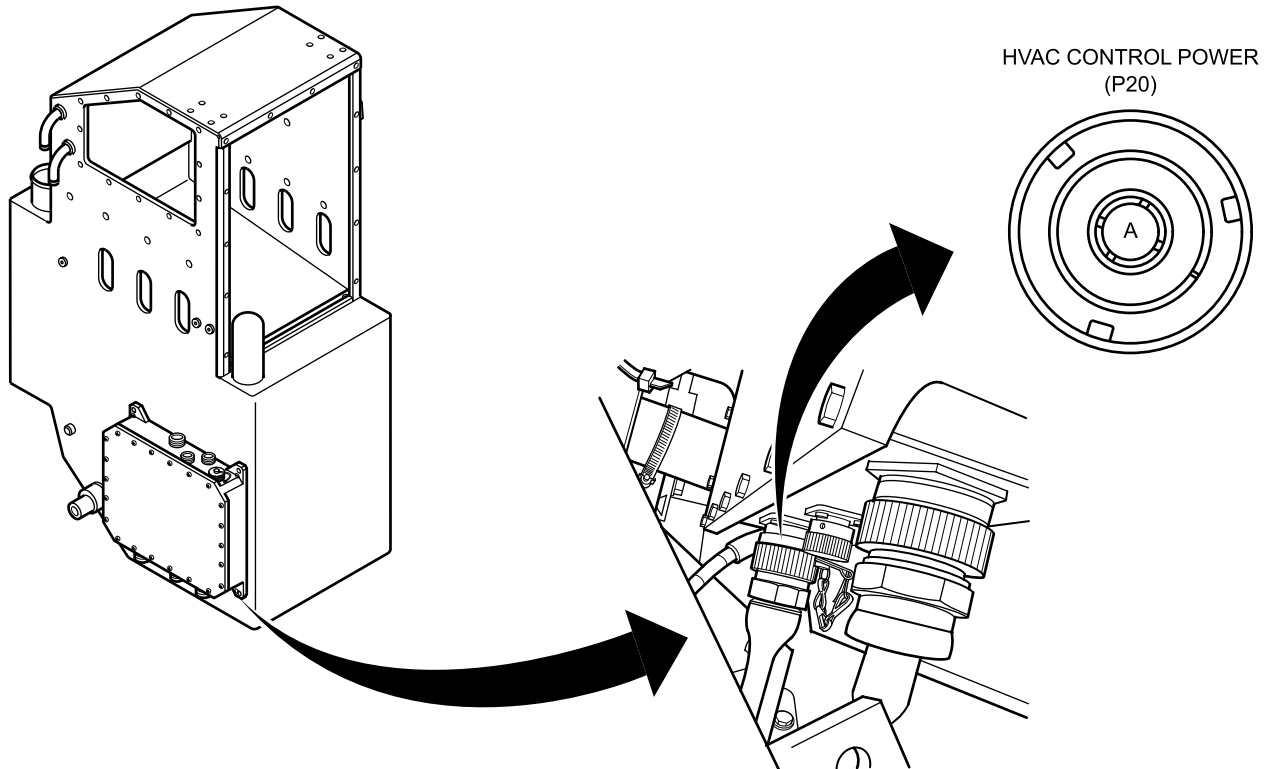
Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

1. Turn LSS switch OFF (TM 9-2355-106-10).
2. Disconnect connector P20. Refer to Figure 1.



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Figure 1. HVAC/LSS Box Area.

3. Turn MAIN POWER switch ON (TM 9-2355-106-10).
4. Measure DC voltage between connector P20 terminal A and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

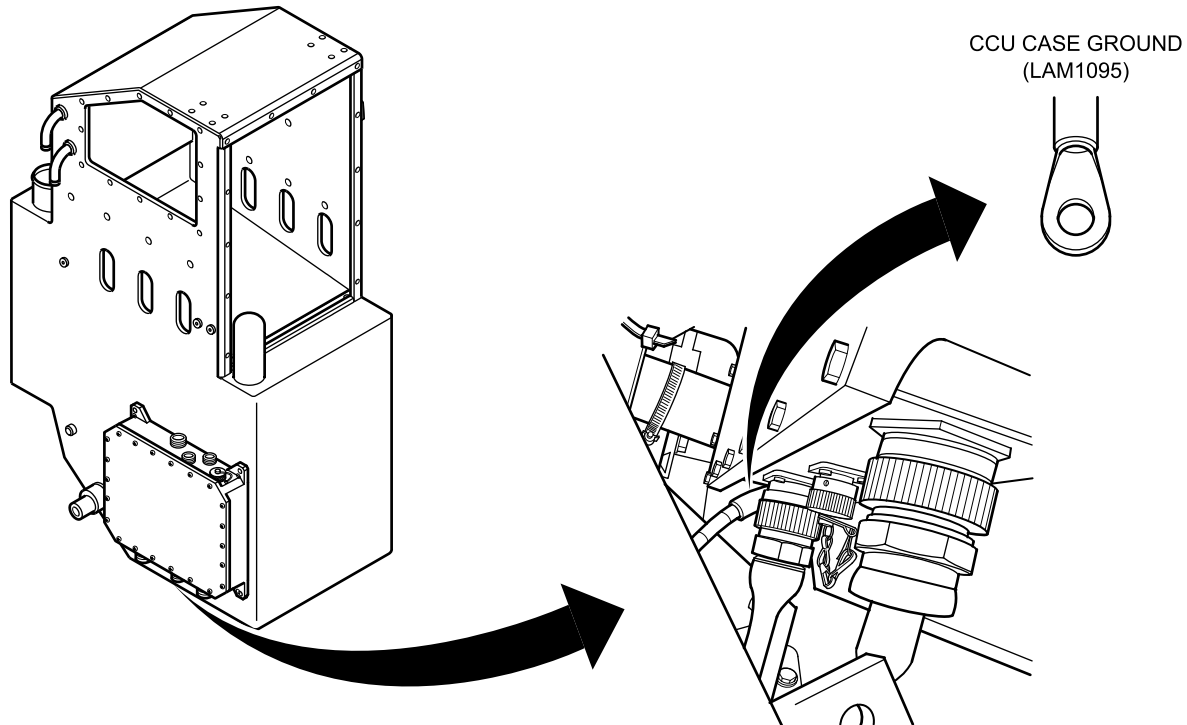
Does multimeter read less than 22.5V?

DECISION

YES Go to Step 100.
NO Go to next step.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

5. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
6. Measure resistance between LAM1095 and ground with multimeter. Refer to Figure 2.



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Figure 2. CCU Case Ground.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

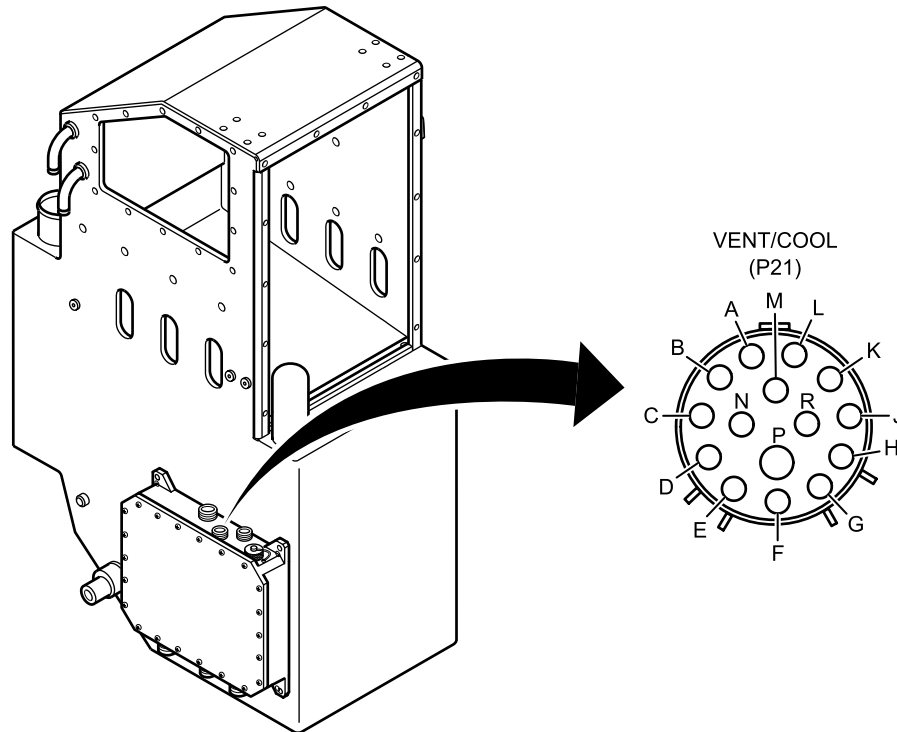
YES Go to next step.
NO Go to Step 106.

STEP

7. Connect connector P20. Refer to Figure 1.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

8. Disconnect connector P21. Refer to Figure 3.



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Figure 3. HVAC/LSS Box Area.

9. Turn LSS switch ON (TM 9-2355-106-10).
 10. Measure resistance between connector P21 terminals L and M with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.
 NO Go to Step 112.

STEP

11. Measure resistance between connector P21 terminal L and ground with multimeter. Refer to Figure 3.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

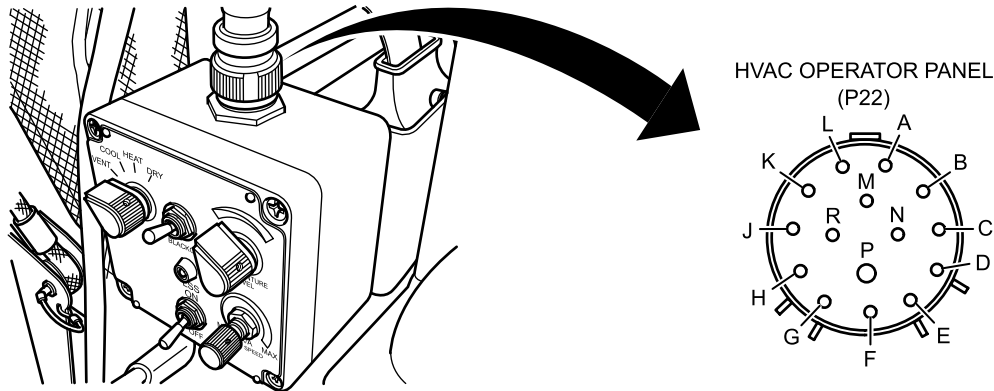
YES Go to Step 15.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to next step.

STEP

12. Disconnect connector P22. Refer to Figure 4.



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Figure 4. HVAC/LSS Operator Panel Area.

13. Measure resistance between connector P22 terminal L and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 136.

STEP

14. Measure resistance between connector P22 terminal M and ground with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.
NO Go to Step 136.

STEP

15. Disconnect connector P22. Refer to Figure 4.

16. Measure resistance between connector P22 terminal L and all other terminals on connector P22. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL for each test?

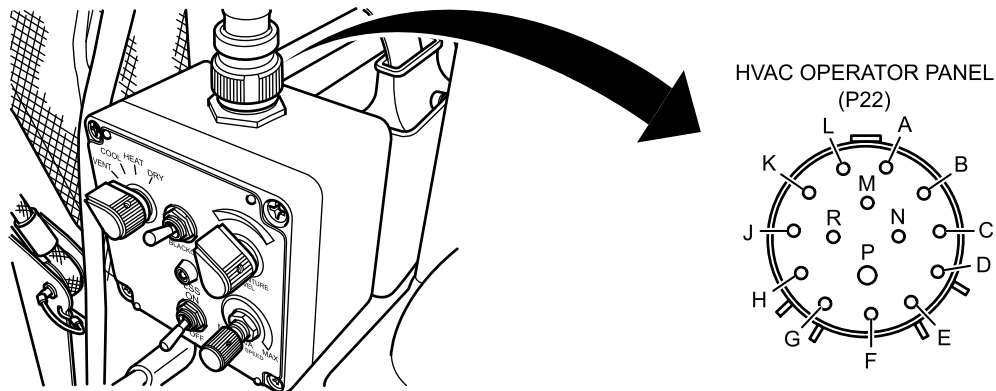
DECISION

YES Go to next step.
NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

17. Measure resistance between connector P22 terminal M and all other terminals on connector P22. Refer to Figure 5.



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Figure 5. HVAC/LSS Operator Panel Area.

CONDITION/INDICATION

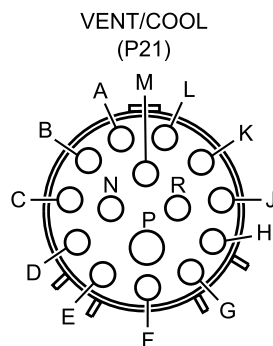
Does multimeter read OL for each test?

DECISION

YES Go to next step.
 NO Go to Step 136.

STEP

18. Connect connector P22. Refer to Figure 5.
19. Turn HVAC/LSS operator panel mode switch to VENT position (TM 9-2355-106-10).
20. Measure resistance between connector P21 terminals F and B with multimeter. Refer to Figure 6.



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Figure 6. Connector P21.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR
PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE -
(CONTINUED)****DECISION**

YES Go to next step.
NO Go to Step 115.

STEP

21. Measure resistance between connector P21 terminal F and ground with multimeter. Refer to Figure 6.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 25.
NO Go to next step.

STEP

22. Disconnect connector P22. Refer to Figure 5.

23. Measure resistance between connector P22 terminal F and ground with multimeter. Refer to Figure 5.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

24. Measure resistance between connector P22 terminal B and ground with multimeter. Refer to Figure 7.

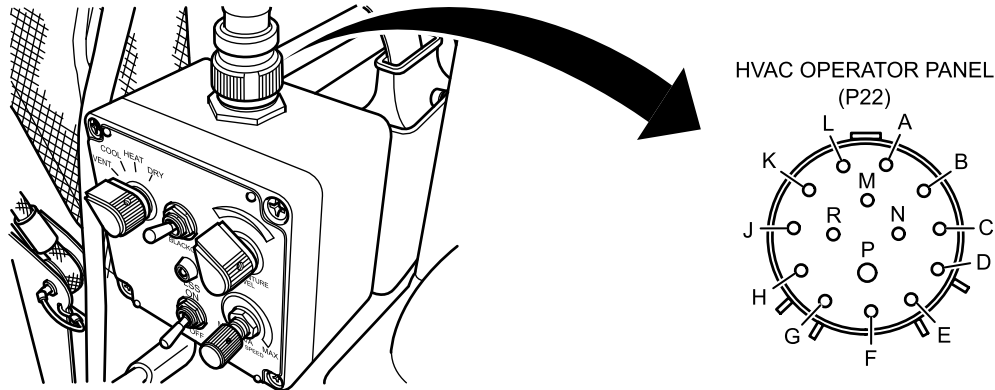


Figure 7. HVAC/LSS Operator Panel Area.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

25. Disconnect connector P22. Refer to Figure 7.

26. Measure resistance between connector P22 terminal F and all other terminals on connector P22. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

27. Measure resistance between connector P22 terminal B and all other terminals on connector P22. Refer to Figure 7.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

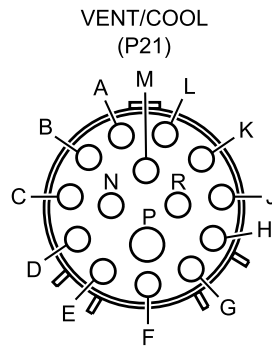
YES Go to next step.

NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

28. Connect connector P22. Refer to Figure 7.
29. Turn HVAC/LSS operator panel mode switch to COOL position (TM 9-2355-106-10).
30. Measure resistance between connector P21 terminals F and C with multimeter. Refer to Figure 8.



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Figure 8. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 118.

STEP

31. Measure resistance between connector P21 terminal C and ground with multimeter. Refer to Figure 8.

CONDITION/INDICATION

Does multimeter read OL?

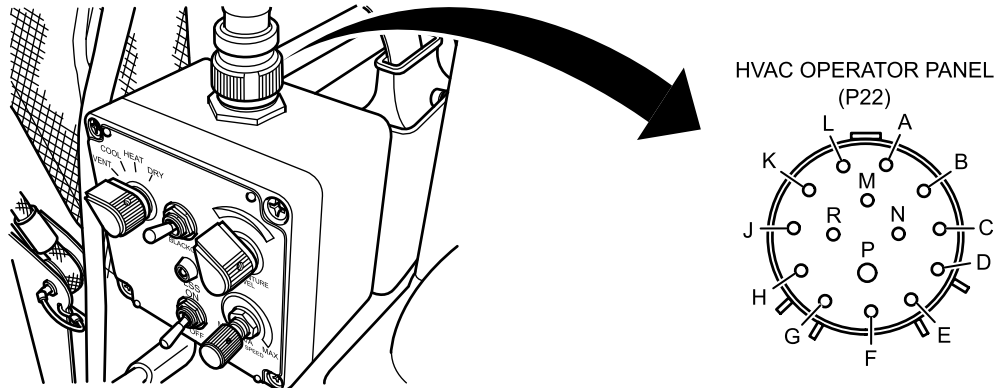
DECISION

YES Go to Step 34.
NO Go to next step.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

32. Disconnect connector P22. Refer to Figure 9



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Figure 9. HVAC/LSS Operator Panel Area.

33. Measure resistance between connector P22 terminal C and ground with multimeter. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

34. Disconnect connector P22. Refer to Figure 9.

35. Measure resistance between connector P22 terminal C and all other terminals on connector P22. Refer to Figure 9.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

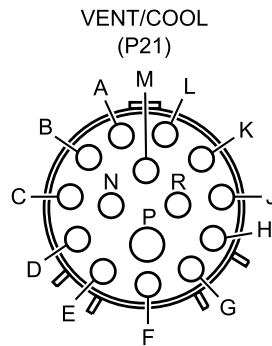
YES Go to next step.

NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

36. Connect connector P22. Refer to Figure 9.
37. Turn HVAC/LSS operator panel mode switch to HEAT position (TM 9-2355-106-10).
38. Measure resistance between connector P21 terminals F and D with multimeter. Refer to Figure 10.



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Figure 10. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 120.

STEP

39. Measure resistance between connector P21 terminal D and ground with multimeter. Refer to Figure 10.

CONDITION/INDICATION

Does multimeter read OL?

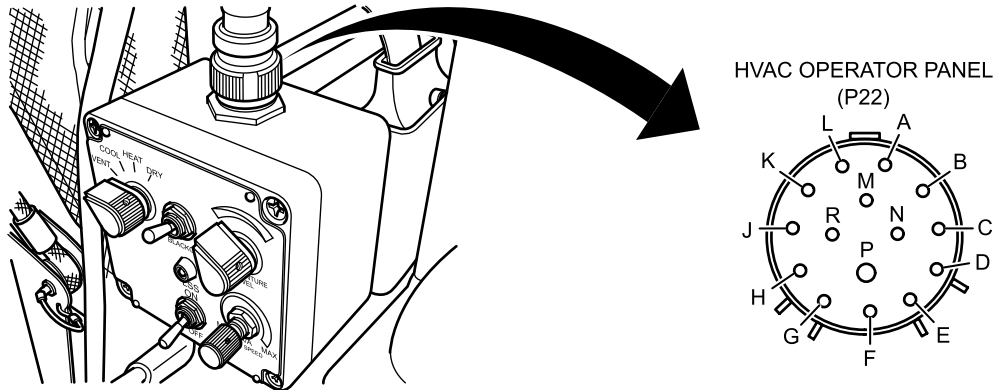
DECISION

YES Go to Step 42.
NO Go to next step.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

40. Disconnect connector P22. Refer to Figure 11.



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Figure 11. HVAC/LSS Operator Panel Area.

41. Measure resistance between connector P22 terminal D and ground with multimeter. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.
 NO Go to Step 136.

STEP

42. Disconnect connector P22. Refer to Figure 11.

43. Measure resistance between connector P22 terminal D and all other terminals on connector P22. Refer to Figure 11.

CONDITION/INDICATION

Does multimeter read OL for each test?

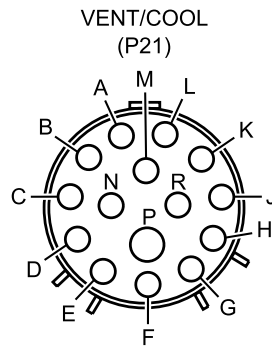
DECISION

YES Go to next step.
 NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

44. Connect connector P22. Refer to Figure 11.
45. Turn HVAC/LSS operator panel mode switch to DRY position (TM 9-2355-106-10).
46. Measure resistance between connector P21 terminals F and E with multimeter. Refer to Figure 12.



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Figure 12. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

DECISION

YES Go to next step.
NO Go to Step 122.

STEP

47. Measure resistance between connector P21 terminal E and ground with multimeter. Refer to Figure 12.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 50.
NO Go to next step.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

48. Disconnect connector P22. Refer to Figure 13.

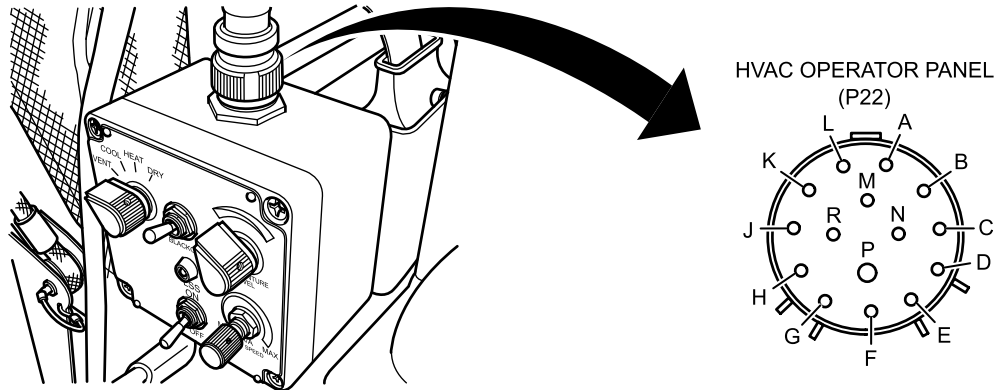


Figure 13. HVAC/LSS Operator Panel Area.

49. Measure resistance between connector P22 terminal E and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.
NO Go to Step 136.

STEP

50. Disconnect connector P22. Refer to Figure 13.

51. Measure resistance between connector P22 terminal E and all other terminals on connector P22. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.
NO Go to Step 136.

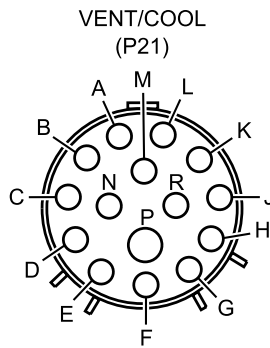
STEP

52. Connect connector P22. Refer to Figure 13.

53. Turn HVAC/LSS operator panel temperature switch to maximum heat position (TM 9-2355-106-10).

54. Measure resistance between connector P21 terminals F and H with multimeter. Refer to Figure 14.

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR
PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE -
(CONTINUED)**



B230603930

Figure 14. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 124.

STEP

55. Measure resistance between connector P21 terminal H and ground with multimeter. Refer to Figure 14.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 58.

NO Go to next step.

STEP

56. Disconnect connector P22. Refer to Figure 13.

57. Measure resistance between connector P22 terminal H and ground with multimeter. Refer to Figure 13.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

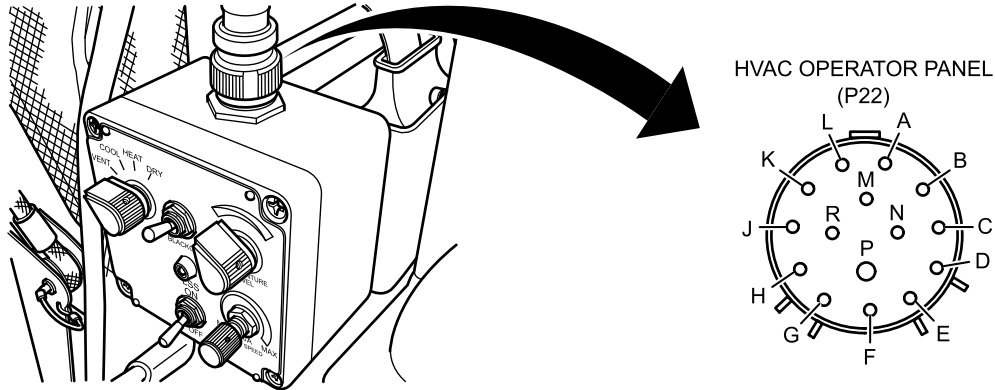
YES Go to Step 139.

NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

58. Disconnect connector P22. Refer to Figure 15.



B230604335

Figure 15. HVAC/LSS Operator Panel Area.

59. Measure resistance between connector P22 terminal H and all other terminals on connector P22. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

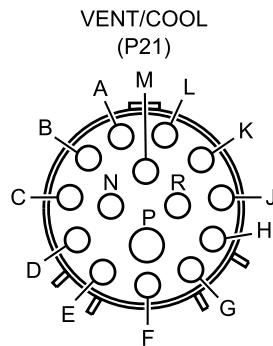
YES Go to next step.
NO Go to Step 136.

STEP

60. Connect connector P22. Refer to Figure 15.

61. Turn HVAC/LSS operator panel temperature switch to medium heat position (TM 9-2355-106-10).

62. Measure resistance between connector P21 terminals F and J with multimeter. Refer to Figure 16.



B230603930

Figure 16. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**DECISION**

YES Go to next step.
NO Go to Step 126.

STEP

63. Measure resistance between connector P21 terminal J and ground with multimeter. Refer to Figure 16.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 66.
NO Go to next step.

STEP

64. Disconnect connector P22. Refer to Figure 15.

65. Measure resistance between connector P22 terminal J and ground with multimeter. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.
NO Go to Step 136.

STEP

66. Disconnect connector P22. Refer to Figure 15

67. Measure resistance between connector P22 terminal J and all other terminals on connector P22. Refer to Figure 15.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.
NO Go to Step 136.

STEP

68. Connect connector P22. Refer to Figure 15.

69. Turn HVAC/LSS operator panel temperature switch to minimum heat position (TM 9-2355-106-10).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

70. Measure resistance between connector P21 terminals F and K with multimeter. Refer to Figure 17.

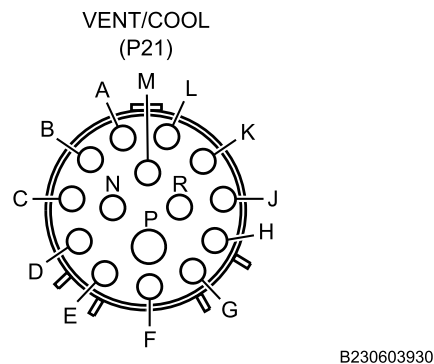


Figure 17. Connector P21.

CONDITION/INDICATION

Does the multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 128.

STEP

71. Measure resistance between connector P21 terminal K and ground with multimeter. Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

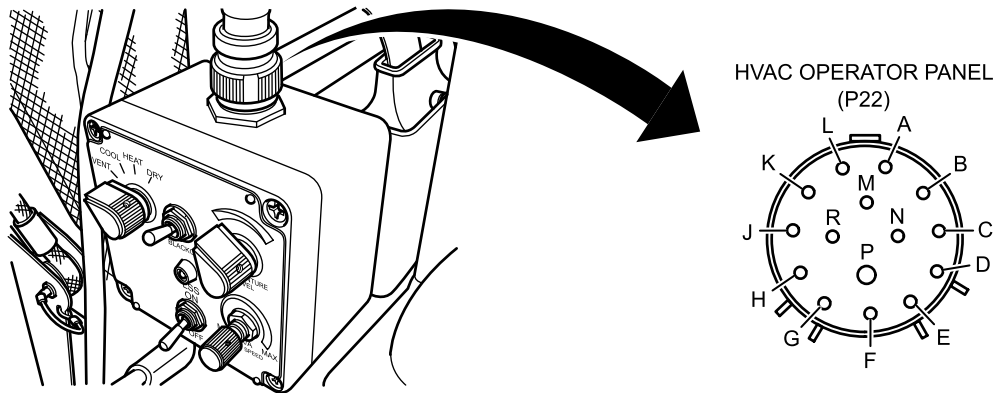
YES Go to Step 74.

NO Go to next step.

STEP

72. Disconnect connector P22. Refer to Figure 18.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604335

Figure 18. HVAC/LSS Operator Panel Area.

73. Measure resistance between connector P22 terminal K and ground with multimeter. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

74. Disconnect connector P22. Refer to Figure 18.

75. Measure resistance between connector P22 terminal K and all other terminals on connector P22. Refer to Figure 18.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

76. Connect connector P22. Refer to Figure 18.

77. Measure resistance between connector P21 terminals N and P while slowly rotating R/A FAN SPEED adjustment knob (TM 9-2355-106-10). Refer to Figure 17.

CONDITION/INDICATION

Does multimeter read smoothly between 1.0 ohm at maximum speed position, and 10K ohms at minimum speed position while turning R/A FAN SPEED knob?

DECISION

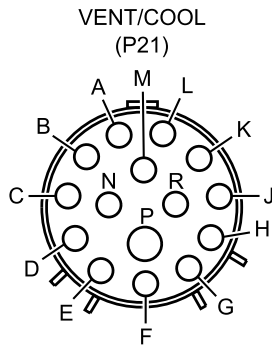
YES Go to next step.

NO Go to Step 130.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

78. Measure resistance between connector P21 terminal N and ground with multimeter. Refer to Figure 19.



B230603930

Figure 19. Connector P21.

CONDITION/INDICATION

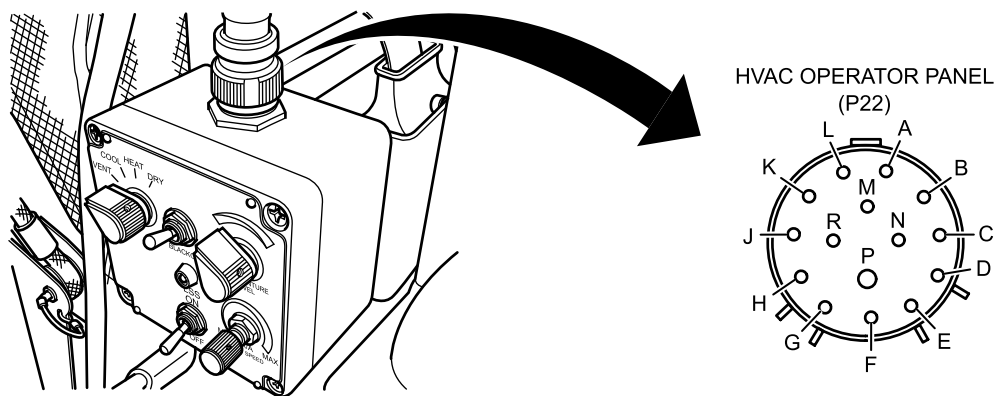
Does multimeter read OL?

DECISION

YES Go to Step 82.
NO Go to next step.

STEP

79. Disconnect connector P22. Refer to Figure 20.



B230604335

Figure 20. HVAC/LSS Operator Panel Area.

80. Measure resistance between connector P22 terminal N and ground with multimeter. Refer to Figure 20.

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR
PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE -
(CONTINUED)****CONDITION/INDICATION**

Does multimeter read OL?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

81. Measure resistance between connector P22 terminal P and ground with multimeter. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

82. Disconnect connector P22. Refer to Figure 20.

83. Measure resistance between connector P22 terminal N and all other terminals on connector P22. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

84. Measure resistance between connector P22 terminal P and all other terminals on connector P22. Refer to Figure 20.

CONDITION/INDICATION

Does multimeter read OL for each test?

DECISION

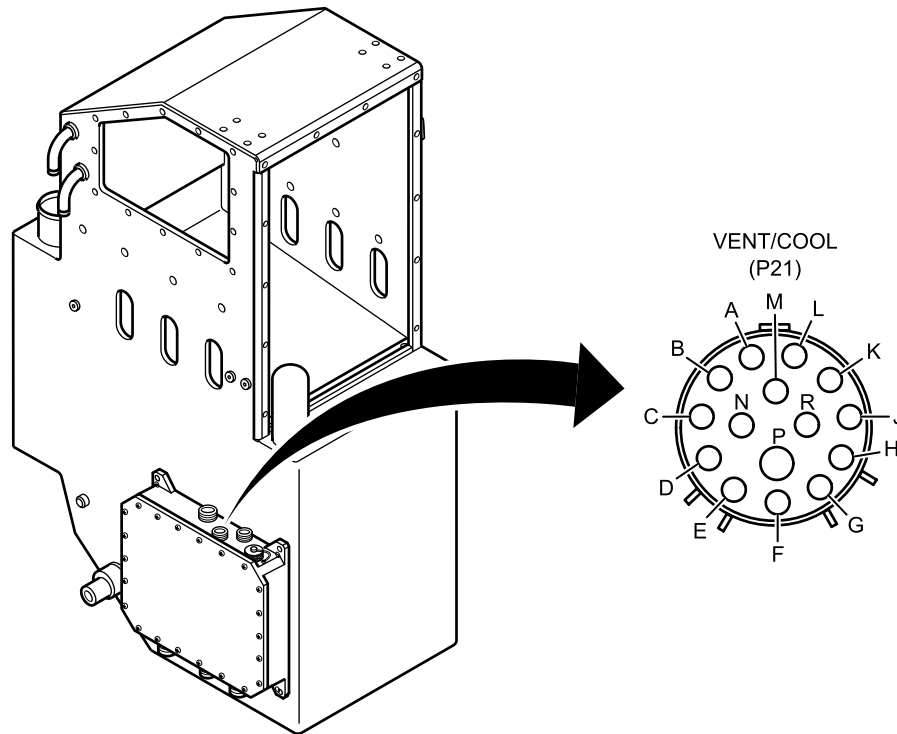
YES Go to next step.

NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

85. Connect connector P21. Refer to Figure 21.



B230604333

Figure 21. HVAC/LSS Box Area.

86. Turn MAIN POWER switch ON (TM 9-2355-106-10).

87. Measure DC voltage between connector P22 terminal L and ground. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to next step.

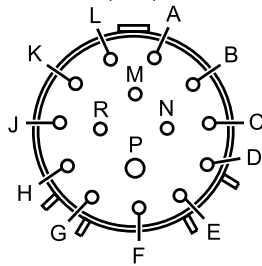
NO Go to Step 138.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

88. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
 89. Connect a jumper wire between connector P22 terminals L and M. Refer to Figure 22.

HVAC OPERATOR PANEL
(P22)



B230603931

Figure 22. Connector P22.

90. Turn MAIN POWER switch ON (TM 9-2355-106-10).
 91. Measure DC voltage between connector P22 terminal A and ground with multimeter. Refer to Figure 22.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

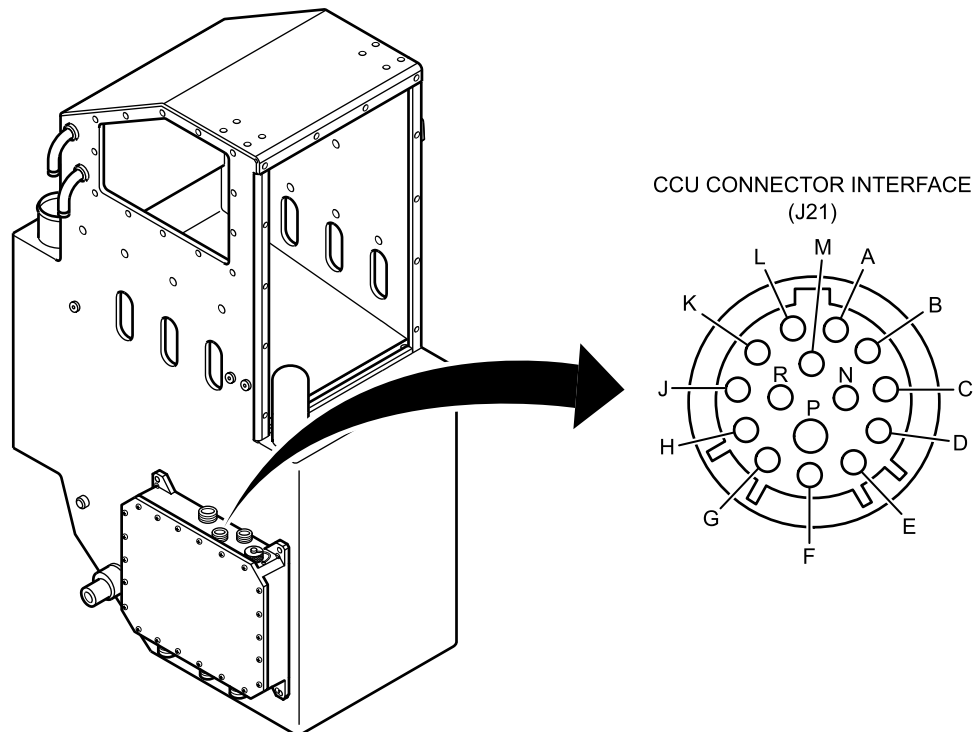
DECISION

YES Go to next step.
 NO Go to Step 132.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

92. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
93. Disconnect connector P21. Refer to Figure 21.
94. Turn MAIN POWER switch ON (TM 9-2355-106-10).
95. Measure DC voltage between connector interface J21 terminal N and ground with multimeter. Refer to Figure 23.



B230611657

Figure 23. HVAC/LSS Box Area.

CONDITION/INDICATION

Does multimeter read between 4.5V and 5.5V?

DECISION

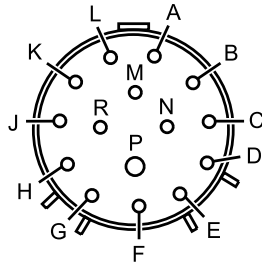
YES Go to next step.
NO Go to Step 138.

STEP

96. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
97. Connect connector P21. Refer to Figure 23.
98. Turn MAIN POWER switch ON (TM 9-2355-106-10).
99. Measure DC voltage between connector P22 terminals R and L with multimeter. Refer to Figure 24.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

HVAC OPERATOR PANEL
(P22)



B230603931

Figure 24. Connector P22.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

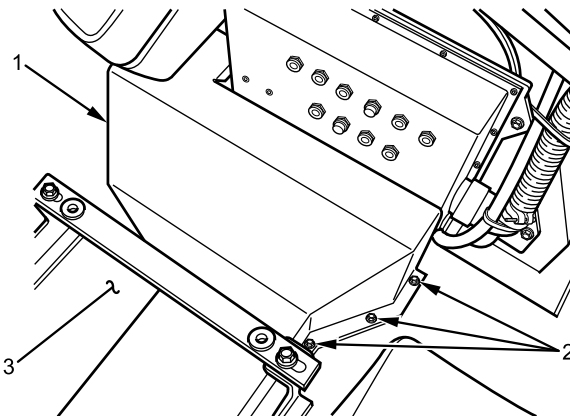
DECISION

YES Return to HVAC/LSS Operational Checkout Procedure (WP 0202). If the other systems test good and problem persists, replace CCU (WP 0769).
NO Go to Step 134.

STEP

100. Remove shift control module. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452).

101. Remove eight bolts (Figure 3, Item 2) from PDM harness electrical storage shield (Figure 3, Item 1). Three bolts shown; five bolts hidden from view.



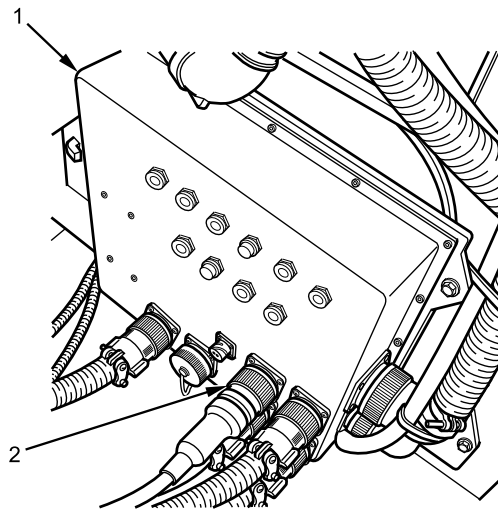
B239102113

Figure 25. PDM Harness Electrical Storage Shield.

102. Remove PDM harness electrical storage shield (Figure 3, Item 1) from floor (Figure 3, Item 3).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

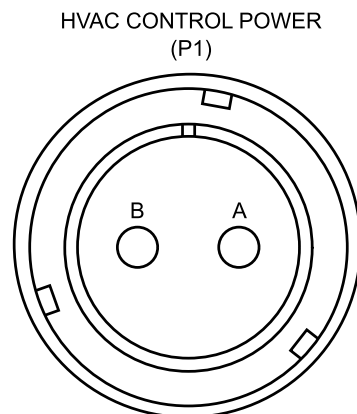
103. Disconnect connector P1 (Figure 26, Item 2) from power distribution module (Figure 26, Item 1).



B239102115

Figure 26. HVAC/LSS Control Power Wiring Harness Connection at 24V Power Distribution Module.

104. Measure resistance between connector P1 terminal B and ground with multimeter. Refer to Figure 27.



B230604329

Figure 27. Connector P1.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

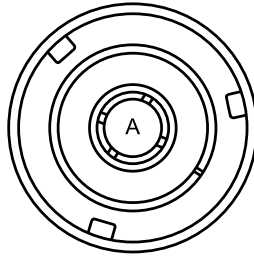
YES Go to next step.

NO Reset Nuclear, Biological, and Chemical (NBC) 100 amp circuit breaker in 24V Power Distribution Module (PDM) (TM 9-2355-106-10) and go to Step 137.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

105. Measure resistance between connector P20 terminal A and connector P1 terminal B with multimeter. Refer to Figure 28 and Figure 27.

HVAC CONTROL POWER
(P20)



B230604288

Figure 28. Connector P20.

CONDITION/INDICATION

Does multimeter read less than 2 ohms?

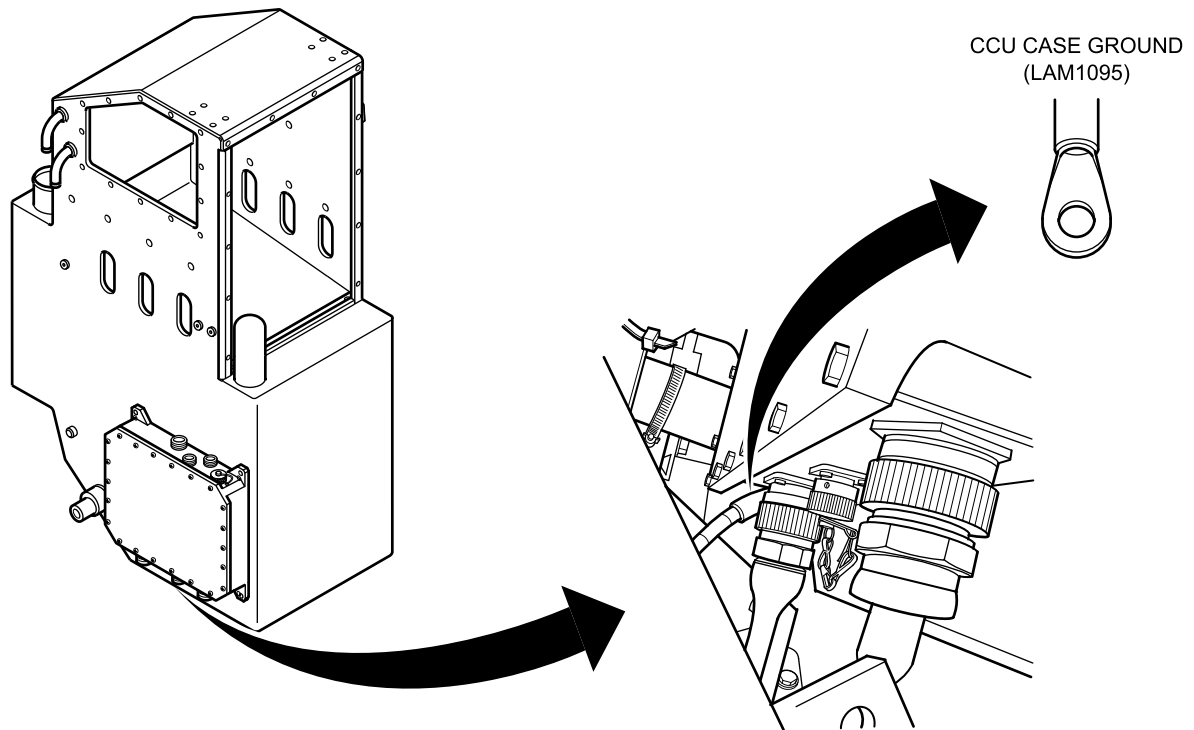
DECISION

YES Refer to Power Distribution Troubleshooting Procedure (WP 0059).

NO Go to Step 137.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

106. Disconnect CCU case ground ring terminal LAM1095. Refer to Figure 29.



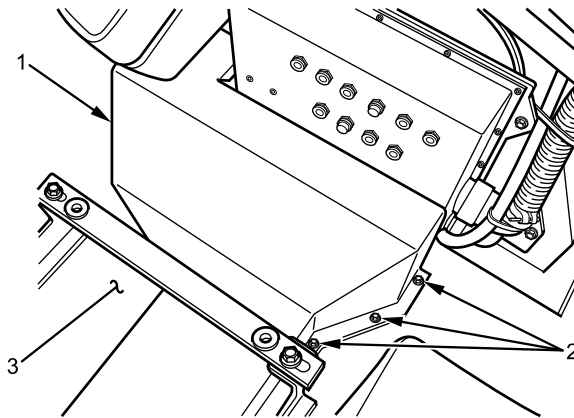
B230604330

Figure 29. HVAC/LSS Control Power Wiring Harness Connection at Climate Control Unit (CCU) Box.

107. Remove shift control module. Refer to Transmission Auto Shift Control Module Removal and Installation (WP 0452).

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

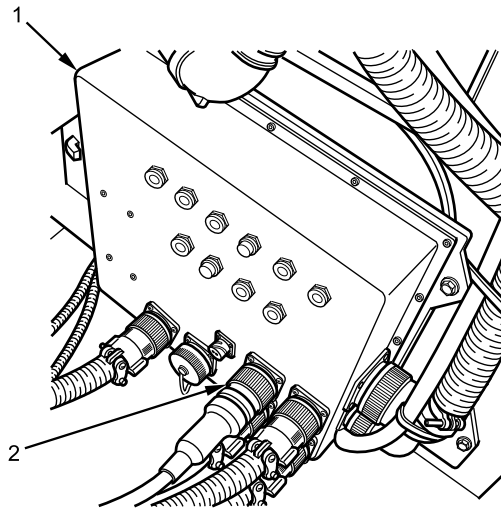
108. Remove eight bolts (Figure 30, Item 2) from PDM harness electrical storage shield (Figure 30, Item 1).
Three bolts shown. Five bolts hidden from view.



B239102113

Figure 30. PDM Harness Electrical Storage Shield.

109. Remove PDM harness electrical storage shield (Figure 30, Item 1) from floor (Figure 30, Item 3).
110. Disconnect connector P1 (Figure 31, Item 2) from power distribution module (Figure 31, Item 1).



B239102115

Figure 31. HVAC/LSS Control Power Wiring Harness Connection at 24V Power Distribution Module.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

111. With assistant, measure resistance between connector P1 terminal A and CCU case ground ring terminal LAM1095 with multimeter. Refer to Figure 32 and Figure 33.

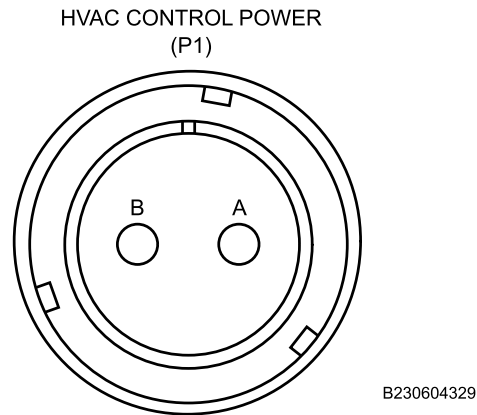


Figure 32. Connector P1.

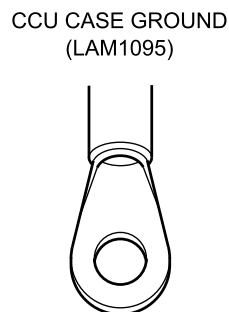


Figure 33. CCU Case Ground Connector.

CONDITION/INDICATION

Does the multimeter read less than 2 ohms?

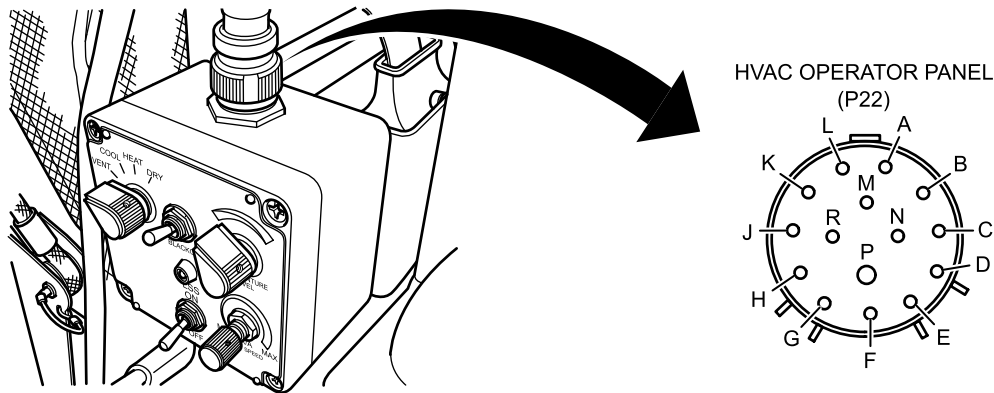
DECISION

YES Refer to Power Distribution Troubleshooting Procedure (WP 0059).
NO Go to Step 137.

STEP

112. Disconnect connector P22. Refer to Figure 34.

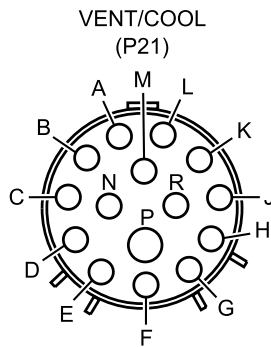
HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604335

Figure 34. HVAC/LSS Operator Panel Area.

113. Measure resistance between connector P22 terminal L and connector P21 terminal L with multimeter. Refer to Figure 34 and Figure 35.



B230603930

Figure 35. Connector P21.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

114. Measure resistance between connector P22 terminal M and connector P21 terminal M with multimeter. Refer to Figure 34 and Figure 35.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

115. Disconnect connector P22. Refer to Figure 34.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

116. Measure resistance between connector P22 terminal F and connector P21 terminal F with multimeter. Refer to Figure 34 and Figure 35.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 136.

STEP

117. Measure resistance between connector P21 terminal B and connector P22 terminal B with multimeter. Refer to Figure 37 and Figure 36.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

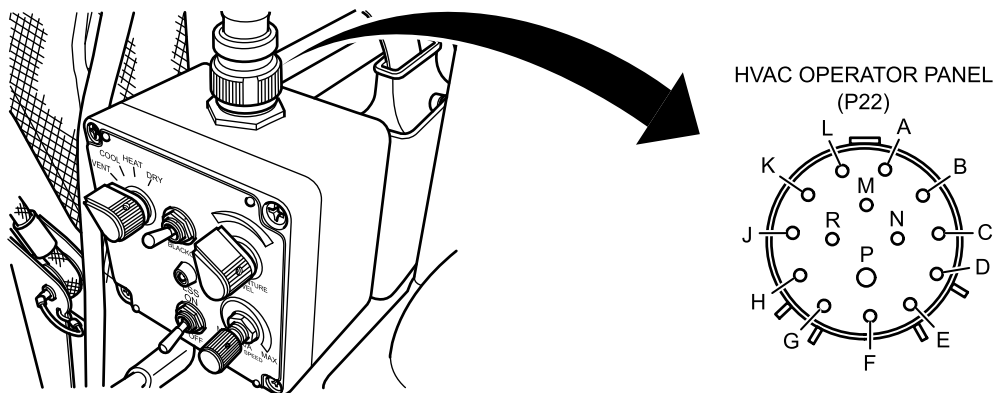
DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

118. Disconnect connector P22. Refer to Figure 36.



B230604335

Figure 36. HVAC/LSS Operator Panel Area.

119. Measure resistance between connector P22 terminal C and connector P21 terminal C with multimeter. Refer to Figure 36 and Figure 37.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

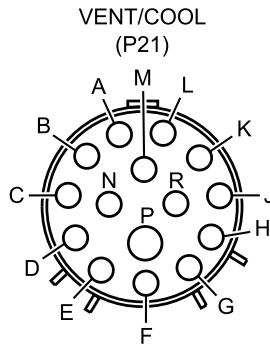
NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

120. Disconnect connector P22. Refer to Figure 36.

121. Measure resistance between connector P22 terminal D and connector P21 terminal D with multimeter. Refer to Figure 36 and Figure 37.



B230603930

Figure 37. Connector P21.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

122. Disconnect connector P22. Refer to Figure 36.

123. Measure resistance between connector P22 terminal E and connector P21 terminal E with multimeter. Refer to Figure 36 and Figure 37.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

NO Go to Step 136.

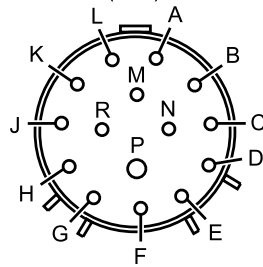
HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

124. Disconnect connector P22. Refer to Figure 36.

125. Measure resistance between connector P22 terminal H and connector P21 terminal H with multimeter. Refer to Figure 38 and Figure 39.

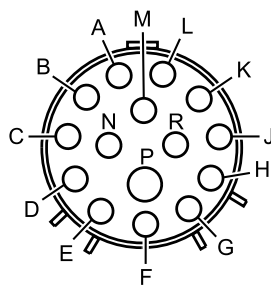
HVAC OPERATOR PANEL
(P22)



B230603931

Figure 38. Connector P22.

VENT/COOL
(P21)



B230603930

Figure 39. Connector P21.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

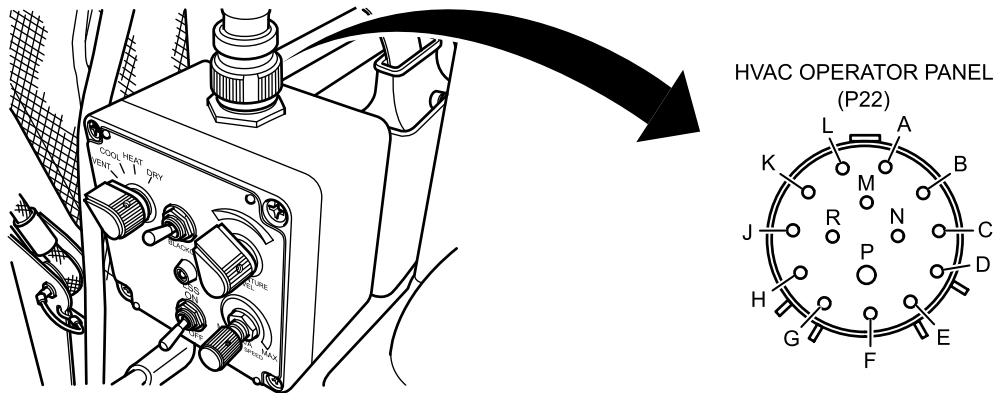
YES Go to Step 139.

NO Go to Step 136.

STEP

126. Disconnect connector P22. Refer to Figure 40.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604335

Figure 40. HVAC/LSS Operator Panel Area.

127. Measure resistance between connector P22 terminal J and connector P21 terminal J with multimeter. Refer to Figure 40 and Figure 39.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

NO Go to Step 136.

STEP

128. Disconnect connector P22. Refer to Figure 40.

129. Measure resistance between connector P22 terminal K and connector P21 terminal K with multimeter. Refer to Figure 40 and Figure 39.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

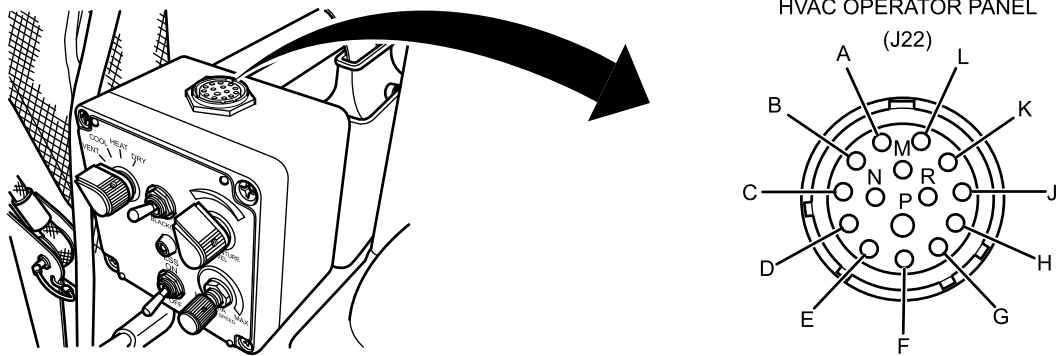
NO Go to Step 136.

STEP

130. Disconnect connector P22. Refer to Figure 40.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

131. Measure resistance between connector interface J22 terminals N and P while slowly rotating R/A FAN SPEED adjustment knob (TM 9-2355-106-10). Refer to Figure 41.



B230604337

Figure 41. Connector Interface J22.

CONDITION/INDICATION

Does multimeter read smoothly between 1.0 ohm at maximum speed position and 10K ohms at minimum speed position while turning R/A FAN SPEED knob?

DECISION

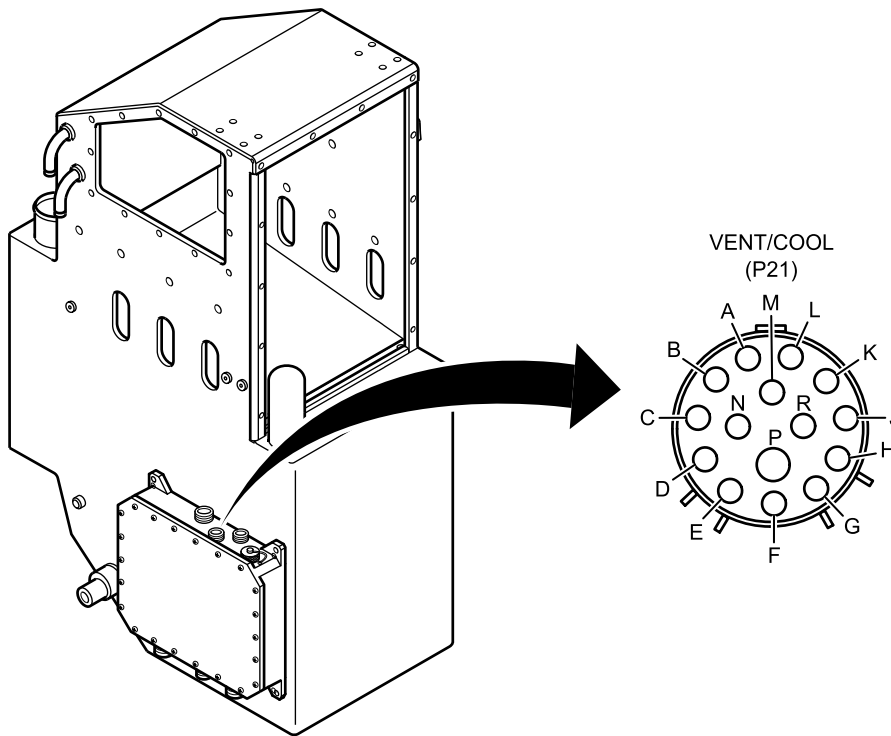
YES Go to Step 136.

NO Go to Step 139.

STEP

132. Disconnect connector P21. Refer to Figure 42.

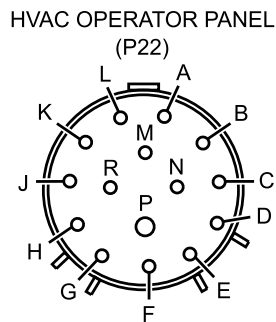
HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)



B230604333

Figure 42. HVAC/LSS Box Area.

133. Measure resistance between connector P22 terminal A and connector P21 terminal A with multimeter. Refer to Figure 43 and Figure 42.



B230603931

Figure 43. Connector P22.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

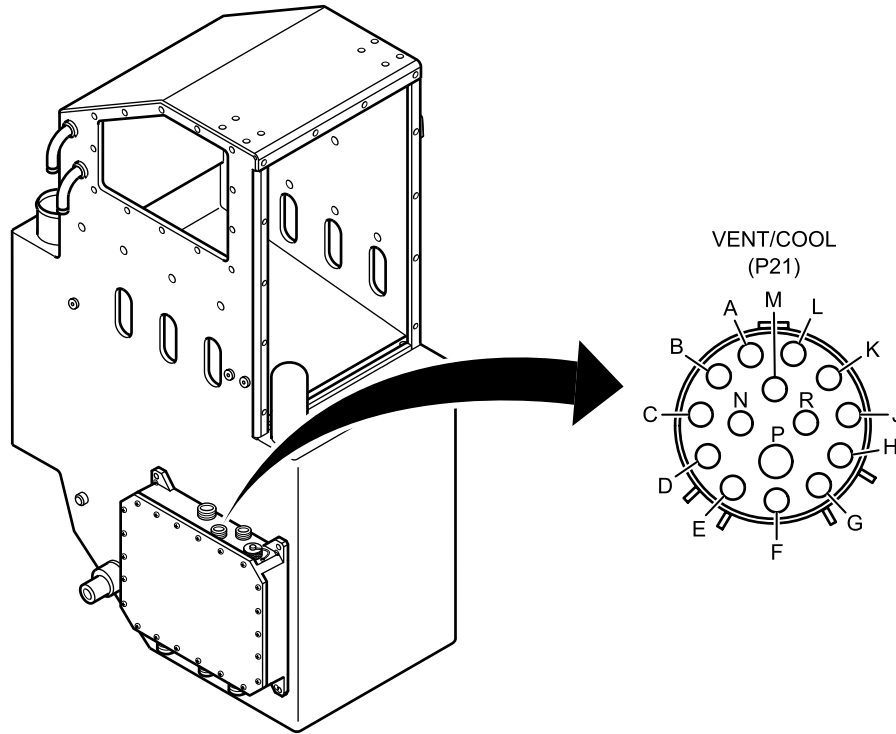
DECISION

YES Go to Step 139.
 NO Go to Step 136.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

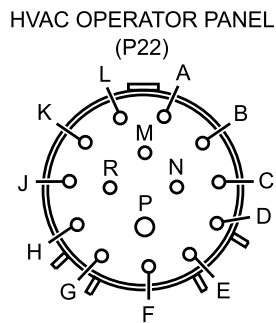
134. Disconnect connector P21. Refer to Figure 44.



B230604333

Figure 44. HVAC/LSS Box Area.

135. Measure resistance between connector P22 terminal R and connector P21 terminal R with multimeter. Refer to Figure 45 and Figure 44.



B230603931

Figure 45. Connector P22.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) OPERATOR PANEL AND CLIMATE CONTROL UNIT (CCU) POWER AND GROUND TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 139.

NO Go to Step 136.

MALFUNCTION

- 136. Harness is faulty.

ACTION

Replace operator panel harness. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operator Panel Removal and Installation (WP 0770). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 137. Harness is faulty.

ACTION

Replace HVAC/LSS control power wiring harness. Refer to Heating Ventilating and Air Conditioning (HVAC) Life Support System (LSS) Control Power Wiring Harness Removal and Installation (WP 0777). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 138. CCU is faulty.

ACTION

Replace CCU. Refer to Climate Control Unit (CCU) Box Removal and Installation (WP 0769). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 139. HVAC/LSS operator panel is faulty.

ACTION

Replace HVAC/LSS operator panel. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operator Panel Removal and Installation (WP 0770). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0202
WP 0769
WP 0766
WP 0767
WP 0779
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM 9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
HVAC/LSS upper panel removed (WP 0767)

Drawings Required

WP 0789, Figure 75

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the HVAC system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

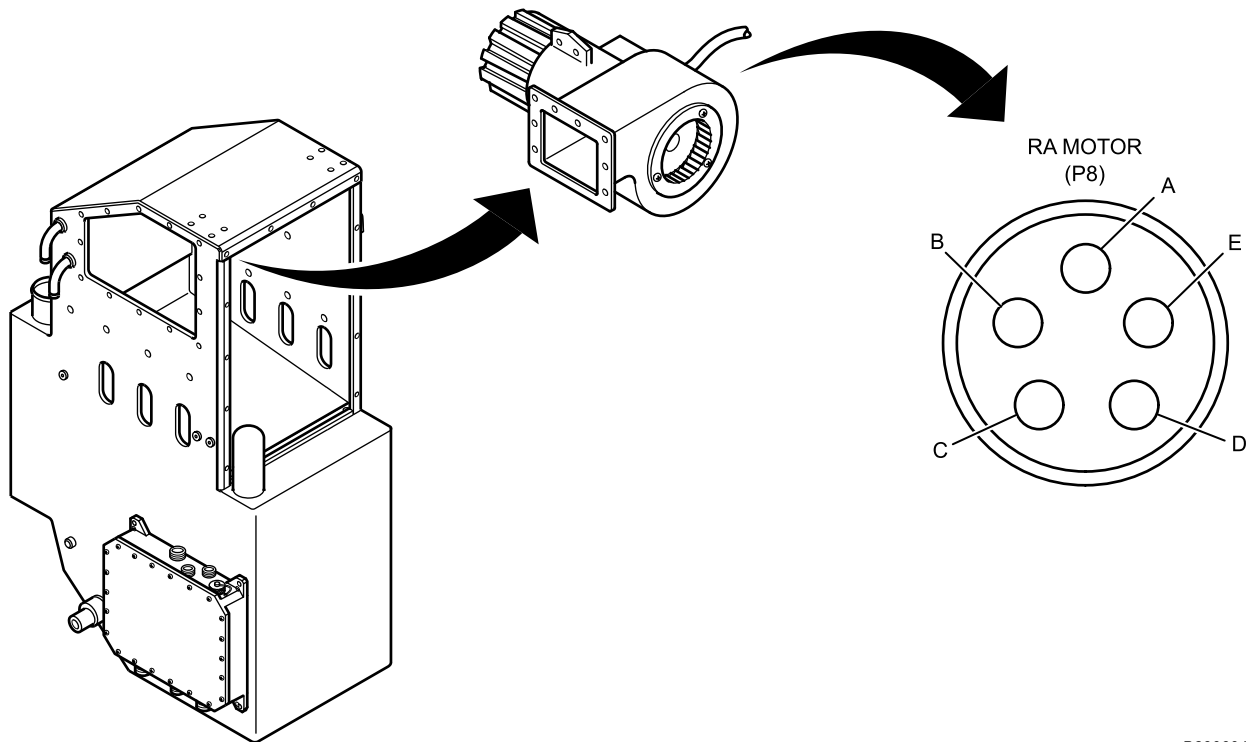
NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

1. Disconnect connector P8. Refer to Figure 1.



B230604345

Figure 1. HVAC Box Interior Area.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Turn LSS switch ON (TM 9-2355-106-10).
5. Turn R/A FAN SPEED control knob to maximum speed position (TM 9-2355-106-10).
6. Measure DC voltage between connector P8 terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to next step.
NO Go to Step 8.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

7. Measure DC voltage between connector P8 terminals B and E with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

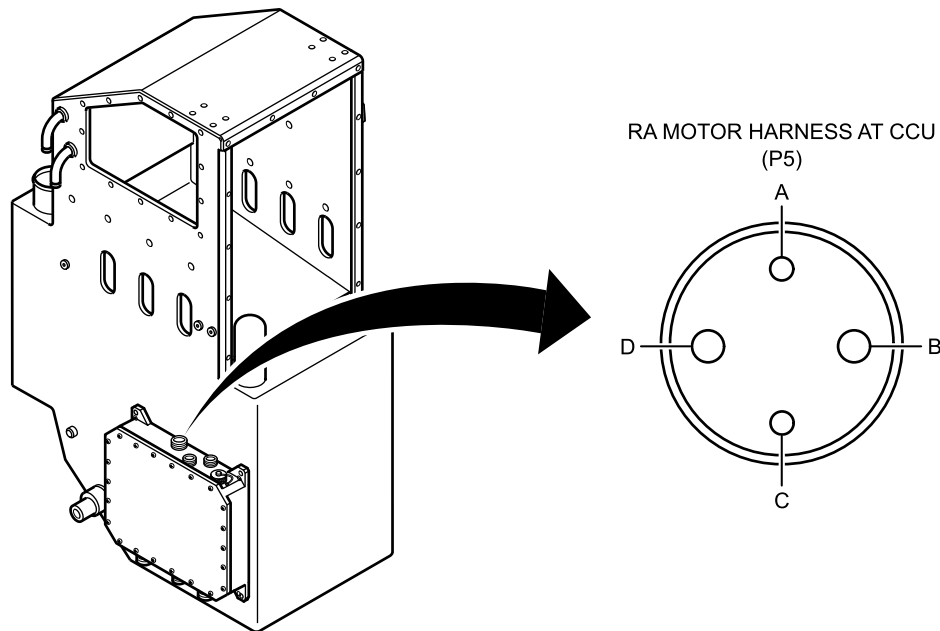
DECISION

YES Go to Step 19.

NO Go to Step 14.

STEP

8. Turn ignition switch OFF (TM 9-2355-106-10).
9. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
10. Disconnect connector P5. Refer to Figure 2.

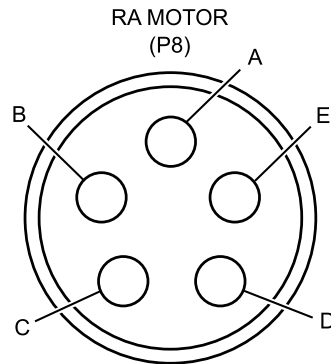


B230604346

Figure 2. HVAC/LSS Box Area.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

11. Measure resistance between connector P8 terminal B and ground with multimeter. Refer to Figure 3.



B230603939

Figure 3. Connector P8.

CONDITION/INDICATION

CAUTION

If you answer NO to the next question, perform the repair indicated and return to Step 1 of this troubleshooting procedure.

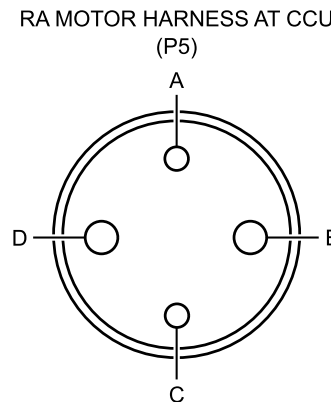
Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 18.

STEP

12. Measure resistance between connector P8 terminal B and connector P5 terminal B with multimeter. Refer to Figure 3 and Figure 4.



B230603933

Figure 4. Connector P5.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)**CONDITION/INDICATION**

Does multimeter read less than 5 ohms?

DECISION

YES Go to next step.

NO Go to Step 18.

STEP**CAUTION**

If you answer NO to the next question, perform the repair indicated and return to step 1 of this troubleshooting procedure.

13. Measure resistance between connector P5 terminals D and B with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

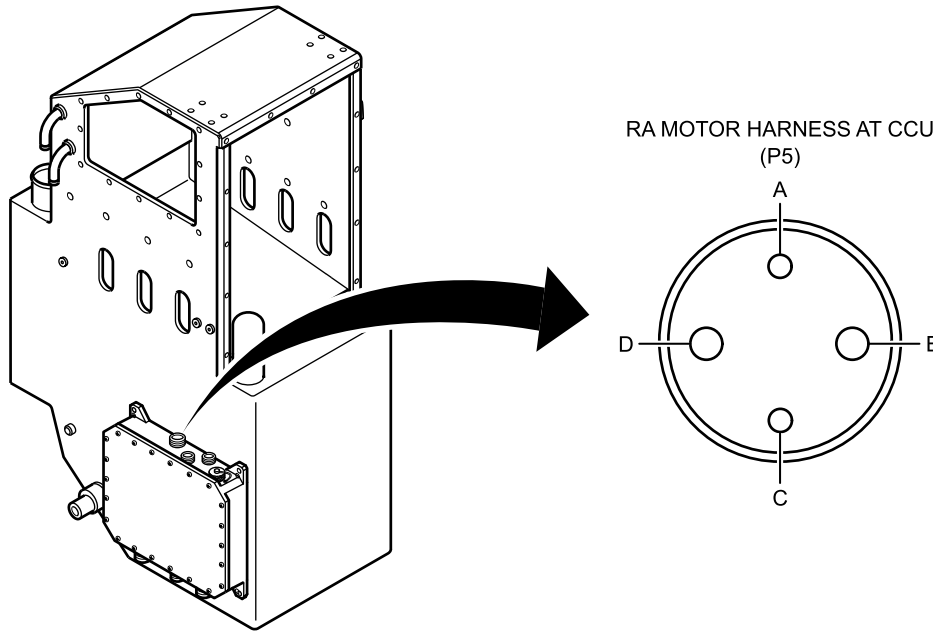
YES Go to Step 20.

NO Go to Step 18.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

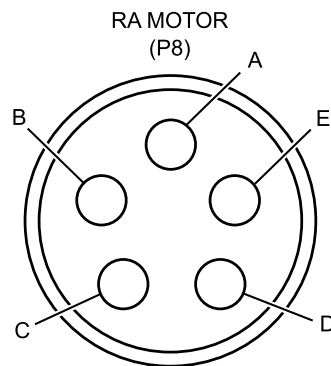
14. Turn ignition switch OFF (TM 9-2355-106-10).
15. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
16. Disconnect connector P5. Refer to Figure 5.



B230604346

Figure 5. HVAC/LSS Box Area.

17. Measure resistance between connector P8 terminal E and connector P5 terminal D with multimeter. Refer to Figure 6 and Figure 5.



B230603939

Figure 6. Connector P8.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

YES Go to Step 20.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) RECYCLED AIR (RA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

NO Go to Step 18.

MALFUNCTION

- 18. Harness is faulty.

ACTION

Replace RA blower harness. Refer to Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Upper Blower Wiring Harness Removal and Installation (WP 0779). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 19. RA blower is faulty.

ACTION

Replace RA blower. Refer to Heating Ventilating and Air Conditioning/Life Support System (HVAC/LSS) Upper Blower Removal and Installation (WP 0766). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 20. Climate Control Unit (CCU) is faulty.

ACTION

Replace CCU. Refer to Climate Control Unit (CCU) Box Removal and Installation (WP 0769). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

FIELD MAINTENANCE
**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR
(FA) BLOWER TROUBLESHOOTING PROCEDURE**

INITIAL SETUP:**Tools and Special Tools**

General Mechanic's Tool Kit (GMTK)
(WP 0795, Item 37)

References

TM 9-2355-106-10
TM 9-2355-106-23P
WP 0202
WP 0769
WP 0762
WP 0765
WP 0778
WP 0782

Equipment Condition

Parking brake set (TM 9-2355-106-10)
Transmission set in NEUTRAL (N) (TM
9-2355-106-10)
Engine off (TM 9-2355-106-10)
MAIN POWER switch off (TM 9-2355-106-10)
Wheels chocked (TM 9-2355-106-10)
NBC filter removed (WP 0762)

Drawings Required

WP 0789, Figure 75

Before Beginning This Troubleshooting Procedure

Successful diagnosis of the HVAC system depends on performing the various procedures in the correct sequence. Failure to comply will lead to misdiagnosis. Perform Heating Ventilating and Air Conditioning (HVAC)/Life Support System (LSS) Operational Checkout Procedure (WP 0202) before performing the tests in this troubleshooting procedure.

TROUBLESHOOTING PROCEDURE**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.

CAUTION

Use light contact when probing connector terminals. Do not force test probe into connector terminal. Failure to comply may result in damage to connector terminal.

NOTE

Personnel must read and understand the Troubleshooting Procedures Overview in How to Use This Manual before performing any troubleshooting procedures.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

1. Disconnect connector P17. Refer to Figure 1.

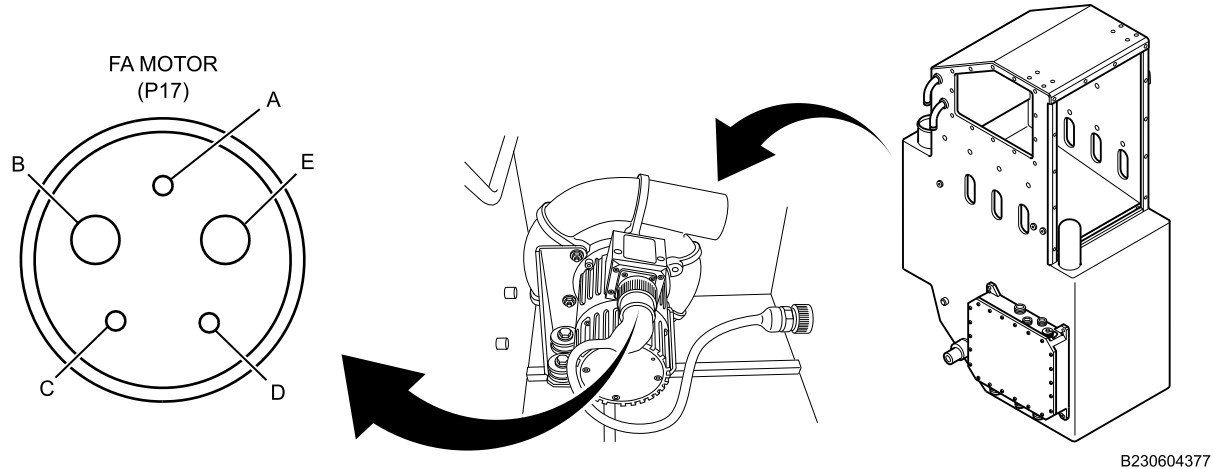


Figure 1. HVAC Box Nuclear, Biological, and Chemical (NBC) Filter Area.

2. Turn MAIN POWER switch ON (TM 9-2355-106-10).
3. Turn ignition switch ON (TM 9-2355-106-10).
4. Turn LSS switch ON (TM 9-2355-106-10).
5. Measure DC voltage between connector P17 terminal B and ground with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to next step.
NO Go to Step 7.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)**STEP**

6. Measure DC voltage between connector P17 terminals B and E with multimeter. Refer to Figure 1.

CONDITION/INDICATION

Does multimeter read more than 22.5V?

DECISION

YES Go to Step 18.

NO Go to Step 13.

STEP

7. Turn ignition switch OFF (TM 9-2355-106-10).
8. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
9. Disconnect connector P14. Refer to Figure 2.

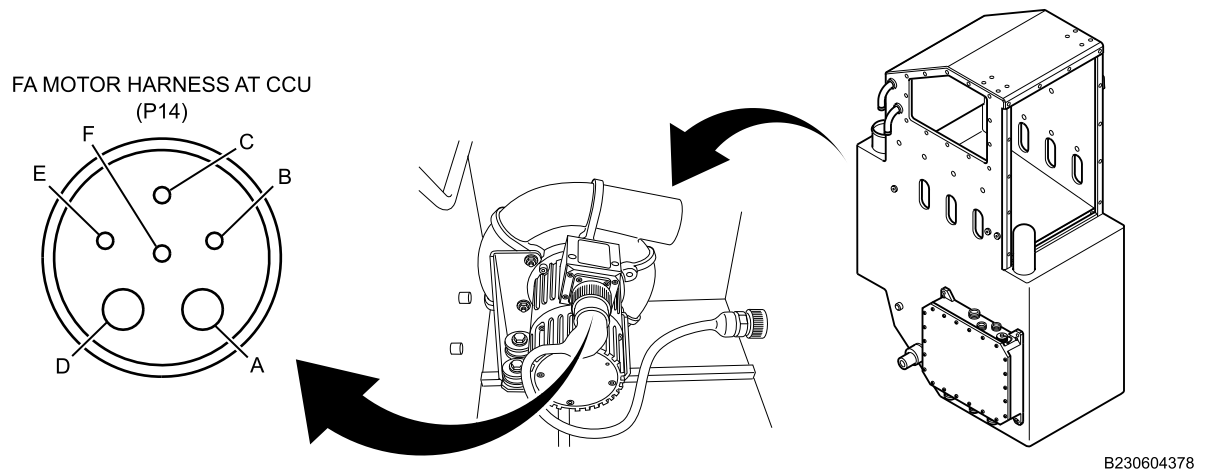


Figure 2. HVAC Box NBC Filter Area.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

10. Measure resistance between connector P17 terminal B and ground with multimeter. Refer to Figure 3.

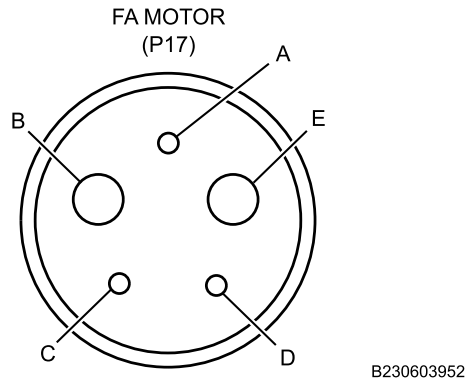


Figure 3. Connector P17.

CONDITION/INDICATION

CAUTION

If you answer NO to the next question, perform the repair indicated and return to step 1 of this troubleshooting procedure.

Does multimeter read OL?

DECISION

YES Go to next step.
NO Go to Step 17

STEP

11. Measure resistance between connector P17 terminal B and connector P14 terminal D with multimeter. Refer to Figure 3 and Figure 4.

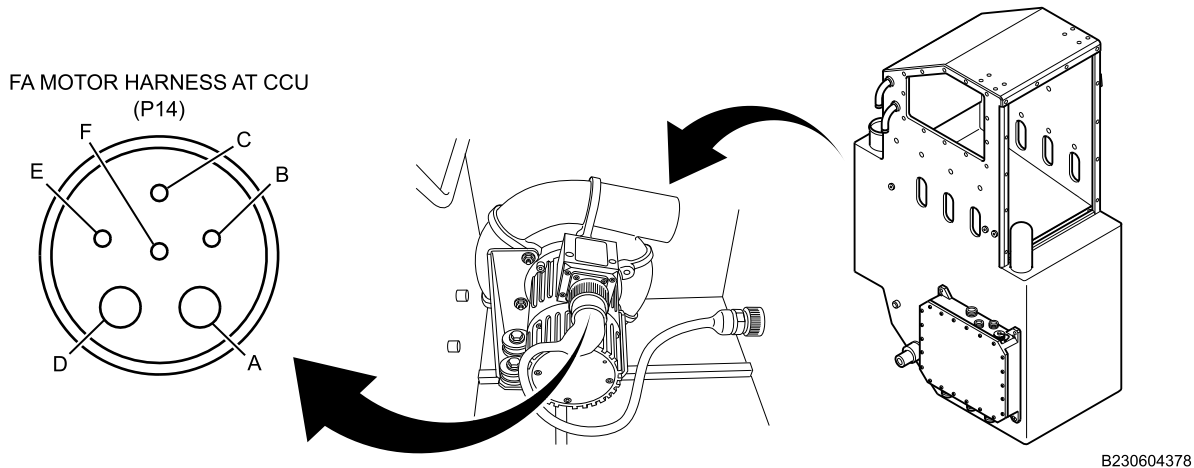


Figure 4. HVAC Box NBC Filter Area.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA)
BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)****DECISION**

YES Go to next step.
NO Go to Step 17.

STEP**CAUTION**

If you answer NO to the next question, perform the repair indicated and return to step 1 of this troubleshooting procedure.

12. Measure resistance between connector P14 terminals A and D with multimeter. Refer to Figure 4.

CONDITION/INDICATION

Does multimeter read OL?

DECISION

YES Go to Step 19.
NO Go to Step 17.

HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA) BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)

STEP

13. Turn ignition switch OFF (TM 9-2355-106-10).
14. Turn MAIN POWER switch OFF (TM 9-2355-106-10).
15. Disconnect connector P14. Refer to Figure 6.

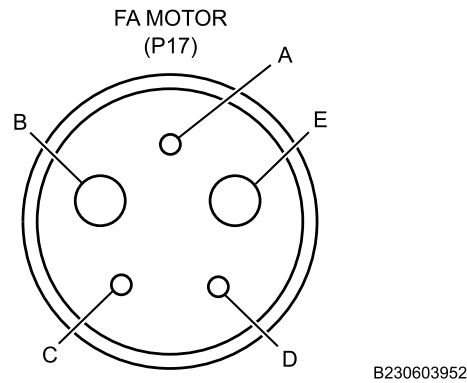


Figure 5. Connector P17.

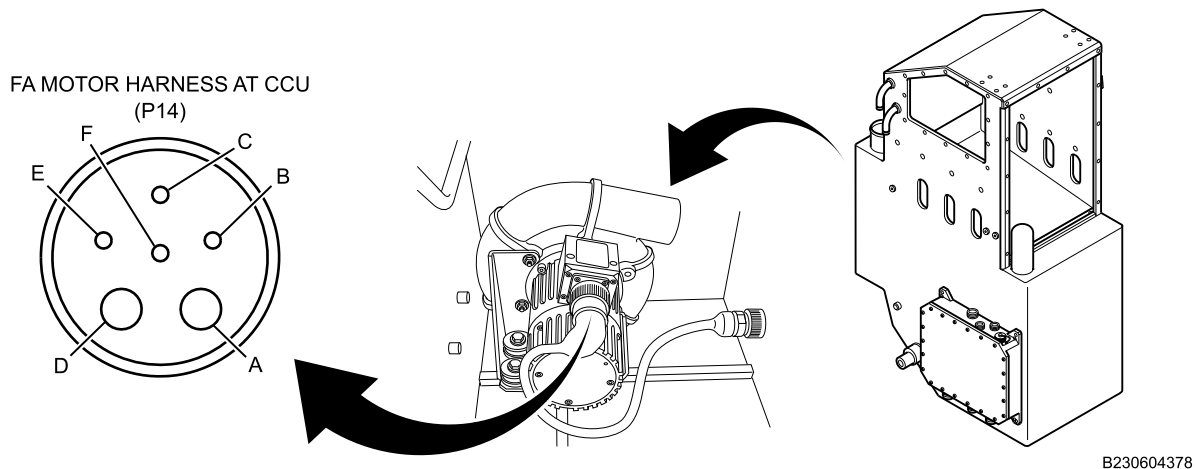


Figure 6. HVAC Box NBC Filter Area.

16. Measure resistance between connector P17 terminal E and connector P14 terminal A with multimeter. Refer to Figure 5 and Figure 6.

CONDITION/INDICATION

Does multimeter read less than 5 ohms?

DECISION

- YES Go to Step 19.
- NO Go to Step 17.

MALFUNCTION

- 17. Harness is faulty.

ACTION

Replace FA blower harness. Refer to (WP 0778). Return vehicle to service.

**HEATING VENTILATING AND AIR CONDITIONING (HVAC)/LIFE SUPPORT SYSTEM (LSS) FRESH AIR (FA)
BLOWER TROUBLESHOOTING PROCEDURE - (CONTINUED)****END OF TEST****MALFUNCTION**

- 18. FA blower is faulty.

ACTION

Replace FA blower. Refer to (WP 0765). Return vehicle to service.

END OF TEST**MALFUNCTION**

- 19. CCU is faulty.

ACTION

Replace CCU. Refer to (WP 0769). Return vehicle to service.

END OF TEST**END OF WORK PACKAGE**

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <i>Date you filled out this form.</i>	
For use of this form, see AR 25-30; the proponent agency is OAASA.								
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 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					<p><i>Figure 2, Item 9 should show a lockwasher. Currently shows a flat washer.</i></p> <p><i>Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be change to (12).</i></p>		
	0018-2							
SAMPLE								
TYPED NAME, GRADE OR TITLE						TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE
<i>Your Name</i>						<i>Your Phone Number</i>		<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 9-2355-106-23-2						DATE 19 November 2012	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO <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 9-2355-106-23-2	DATE 19 November 2012	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
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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

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.)*

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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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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 9-2355-106-23-2						DATE 19 November 2012	TITLE MAINTENANCE 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 9-2355-106-23-2	DATE 19 November 2012	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
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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

PART III – REMARKS *(Any general remark, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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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 9-2355-106-23-2						DATE 19 November 2012	TITLE MAINTENANCE 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 9-2355-106-23-2	DATE 19 November 2012	TITLE MAINTENANCE MANUAL FOR MINE RESISTANT AMBUSH PROTECTED VEHICLE
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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

PART III – REMARKS *(Any general remarks, recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW
*Administrative Assistant to the
Secretary of the Army*

1229004

RAYMOND T. ODIERNO
*General, United States Army
Chief of Staff*

By Order of the Secretary of the Air Force:

JANET C. WOLFENBARGER
*General, United States Air Force
Commander, AFMC*

MARK A. WELSH, III
*General, United States Air Force
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 381168 requirements for TM 9-2355-106-23-2.

THE METRIC SYSTEM AND EQUIVALENTS

<p>Linear Measure</p> <p>1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches 1 Kilometer = 1000 Meters = 0.621 Miles</p> <p>Weights</p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces 1 Kilogram = 1000 Grams = 2.2 Pounds 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p>Liquid Measure</p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p>Square Measure</p> <p>1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles</p> <p>Cubic Measure</p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p>Temperature</p> <p>$9/5 C^{\circ} + 32 = F^{\circ}$ $5/9 (F - 32) = C^{\circ}$ 212° Fahrenheit is equivalent to 100° Celsius 90° Fahrenheit is equivalent to 32.2° Celsius 32° Fahrenheit is equivalent to 0° Celsius</p>
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APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

PIN: 084303-000