TM 9-2320-364-20-1

THIS MANUAL SUPERSEDES TM 9-2320-364-20-1 DATED 25 FEB 1994, INCLUDING ALL CHANGES.

TECHNICAL MANUAL

UNIT MAINTENANCE
VOLUME I

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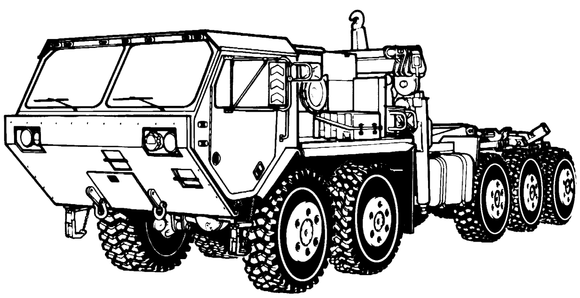
PALLETIZED LOAD SYSTEM



MODEL M1074/M1075

NSN 2320-01-304-2277
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HEADQUARTERS, DEPARTMENT OF THE ARMY

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WARNING

- Drycleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Drycleaning Solvent is 140 degrees F (60 degrees C) and Type III Drycleaning Solvent is 200 degrees F (93 degrees C). Failure to do so may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

WARNING

Radiator, radiator cap, coolant, and hoses are very hot and pressurized during truck operation. Let radiator cool before checking hoses. Failure to do so may result in serious burns to personnel.

WARNING

Use extreme care when removing the radiator pressure cap. Sudden release of pressure can cause a steam flash which could seriously injure personnel. Slowly loosen cap to the first stop to relieve pressure before removing cap completely. After opening, securely tighten cap.

WARNING

Use a clean, thick waste cloth or like material to remove radiator pressure cap. Avoid using gloves. If hot water soaks through gloves, personnel could be burned.

WARNING

Apply truck brakes and chock wheels before any maintenance tasks are performed. Otherwise serious injury to personnel could result.

WARNING

Never use fuel to clean parts. Fuel is highly flammable. Serious personal injury could result if fuel ignites during cleaning.

WARNING

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

WARNING

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

WARNING

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

WARNING

On direct contact, uncured silicone sealant irritates eyes. In case of contact, flush eyes with water and seek medical attention. In case of skin contact, wipe off and flush with water.

WARNING

Do not drain engine oil while engine is hot. Severe injury to personnel may result.

WARNING

Ensure engine is cool before performing this task or injury to personnel may result.

WARNING

Use care when removing springs. Springs are under tension and can act as projectiles when released and could cause injury to personnel.

WARNING

Use care when installing springs. Springs are under tension and can act as projectiles when released and could cause injury to personnel.

WARNING

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

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine.

WARNING

Do not remove the radiator cap when the engine is hot; steam and hot coolant can escape and burn personnel.

WARNING

After Nuclear, Biological, or Chemical (NBC) exposure of truck, all air filters shall be handled with extreme caution. Unprotected personnel may experience injury or death if residual toxic agents or radioactive material are present. If truck is exposed to chemical or biological agents, servicing personnel shall wear protective mask, hood, protective overgarments, and chemical protective gloves and boots in accordance with FM 3-4. All contaminated air filters shall be placed in double-lined plastic bags and moved swiftly to a segregation area away from the worksite. The same procedure applies for radioactive dust contamination. The Company NBC team should measure radiation prior to filter removal to determine extent of safety procedures required per the NBC Annex to the unit Standard Operating Procedures (SOP). The segregation area in which the contaminated air filters are temporarily stored shall be marked with appropriate NBC placards. Final disposal of contaminated air filters shall be in accordance with local SOP. Decontamination operation shall be in accordance with FM 3-5 and local SOP.

WARNING

Brake drum can get very hot during vehicle operation. Place hand near drum to check for excessive heat, but do not touch. Failure to comply may result in injury to personnel.

WARNING

Use extreme care when removing coolant system pressure tester. Sudden release of pressure can cause injury to personnel.

WARNING

Fuel is slippery and can cause falls. To avoid injury, wipe up spilled fuel with rags.

WARNING

Starting fluid is toxic and highly flammable. Container is pressurized. NEVER heat container and NEVER discharge starting fluid in confined areas or near open flame. Severe injury to personnel may result.

WARNING

Allow engine to cool before performing maintenance on the muffler, exhaust pipe, exhaust manifold or turbocharger. If necessary, use insulated pads and gloves.

WARNING

Muffler weighs 152 lbs (69 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Ensure this task is done only when muffler is cool. Performing this task on a warm or hot muffler may result in severe burning to personnel.

WARNING

Use extreme care when removing coolant system pressure tester. Sudden release of pressure can cause injury to personnel.

WARNING

Excess coolant may splash out upon removal of tube from hump hose. Ensure proper eye protection is worn to prevent possible injury to personnel.

WARNING

Cooling assembly weighs 925 lbs (420 kg). Attach suitable lifting device for removal and properly support cooling assembly to prevent possible injury to personnel.

WARNING

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 and cause injury or death to personnel.

WARNING

Engine cover assembly weighs 55 lbs (25 kg). Use an assistant to help remove engine cover assembly or injury to personnel may result.

WARNING

Radiator assembly weighs 575 lbs (261 kg). Do not stand directly under radiator assembly or injury to personnel may result.

WARNING

Ensure grille assembly is fully supported by lifting device prior to removal of screws. Failure to comply may result in severe injury to personnel.

WARNING

Adhesive causes immediate bonding on contact with eyes, skin, or clothing and also gives off harmful vapors. Wear protective goggles and use in well-ventilated area. If adhesive gets in eyes, try to keep eyes open; flush eyes with water for 15 minutes and get immediate medical attention.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

WARNING

Starter weighs 73 lbs. (33 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Starter weighs 73 lbs. (33 kg). Attach suitable lifting device prior to installation to prevent possible injury to personnel.

WARNING

Use care when removing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

WARNING

Use care when installing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

WARNING

Diesel fuel is flammable. Do not perform this procedure near fire, flame, or sparks. Injury or death to personnel could result.

WARNING

Do not remove screws securing fan brace. Removing screws will cause fan brace to drop and may result in severe injury or death to personnel.

WARNING

Do not start engine or move truck when anyone is working on or under vehicle. Severe injury or death to personnel could result.

WARNING

Upon removal of all wires and cables, ensure no contact is made with battery terminals or other wires and cables. Strap wires and cables away from battery terminals and other wires and cables as required to prevent damage to parts, personal injury, or death.

WARNING

Ensure that exhaust pipe and turbo charger pipe connections are free from soot or debris. Failure to comply may result in exhaust leak and injury or death to personnel.

WARNING

Battery acid (electrolyte) is extremely harmful. Always wear safety goggles and rubber gloves, and do not smoke when performing maintenance on batteries. Injury will result if acid contacts skin or eyes. Wear rubber apron to prevent clothing being damaged.

WARNING

Be careful not to short out battery terminals. Do not smoke or use open flame near batteries. Batteries may explode from a spark. Battery acid is harmful to skin and eyes.

WARNING

Wear safety goggles and acid-proof gloves when battery cover must be removed or when adding electrolyte.

WARNING

Avoid electrolyte contact with skin, eyes, or clothing. If battery electrolyte spills, take immediate action to stop burning effects:

- External: Immediately flush with cold running water to remove all acid.
- Eyes: Flush with cold water for at least 15 minutes. Seek immediate medical attention.
- Internal: Drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek immediate medical attention.
- Clothing or Vehicle: Wash at once with cold water. Neutralize with baking soda or household ammonia solution.

WARNING

Injury will result if acid contacts skin or eyes. Wear rubber apron to prevent clothing being damaged.

WARNING

Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

WARNING

Do not allow personnel to perform maintenance directly under boom or mast. Failure to follow proper procedures could cause serious injury or death.

WARNING

22 to 28 vdc are always present on wire 1431 at the ENGINE switch. Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

WARNING

22 to 28 vdc are always present on wire 1281 and DUVAC connectors. Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

WARNING

22 to 28 vdc are always present on wire 1139 at starter solenoid. Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

WARNING

Transmission oil will be extremely hot when drained. Do not come in contact with hot oil to avoid severe burns. If burned with hot oil, seek medical attention immediately.

WARNING

Ensure there are no personnel in front of truck when placing it into drive. Failure to do so may result in injury or death to personnel.

WARNING

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

WARNING

Wear safety goggles when performing tests on valves. Failure to do so may result in serious eye injury due to high pressure air.

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine.

WARNING

Do not remove the radiator cap when the engine is hot; steam and hot coolant can escape and burn personnel.

WARNING

Driveshafts can weigh up to 100 lbs (45 kg), obtain aid from an assistant to prevent possible injury to personnel.

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death keep flame away from fuel and keep fire extinguisher within easy reach.

WARNING

Use jackstands to support axle weight. Failure to comply may result in injury to personnel.

WARNING

Brake shoes may be covered with dust. Breathing this dust may be harmful to your health. Do not use compressed air to clean brake shoes. Wear a filter mask approved for use against brake dust. Failure to comply may result in injury or death to personnel.

WARNING

Use care when removing brake spring. Spring is under tension and can act as a projectile when released and could cause injury to personnel.

WARNING

Use care when installing brake spring. Spring is under tension and can act as a projectile when released and could cause injury to personnel.

WARNING

22 to 28 vdc are always present at DUVAC connectors. Care must be exercised when removing the DUVAC cover. Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuitc, a direct short may result. Damage to equipment, injury or death to personnel may occur.

WARNING

Spring in air chamber is very powerful and is under tension. Failure to cage air chamber before removal will release tension of spring abruptly and could result in injury or death to personnel.

WARNING

Air reservoir will fall when screws are removed. Support air reservoir prior to removing screws to prevent injury to personnel.

WARNING

Do not touch hot exhaust system with bare hands; injury to personnel will result.

WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

WARNING

Terminal 1 and terminal 2 at DUVAC controller are electrically hot all of the time. Ensure bracket does not contact either terminal. Damage to equipment, injury or death to personnel may occur.

WARNING

Terminal 1 and terminal 2 at DUVAC controller are electrically hot all of the time. Ensure DUVAC cover or bracket does not contact either terminal. Damage to equipment, injury or death to personnel may occur.

WARNING

Inner wheel weighs 105 lbs (48 kg). Attach suitable lifting device prior to moving rim to prevent possible injury to personnel.

WARNING

Ensure all personnel keep hands and fingers out from between tire and bead lock. Failure to comply may result in injury to personnel.

WARNING

Alternator is capable of producing over 40 vdc. Be careful when taking a voltage reading not to get shocked.

WARNING

High pressure hydraulics [oil under 3,700 psi (25,512 kPa) pressure] operate this equipment. Refer to vehicle operator and maintenance manuals for hydraulic oil pressure. Never disconnect any hydraulic line or fittings without first dropping pressure to zero. High pressure oil stream can pierce body and cause severe injury to personnel.

WARNING

Ensure all personnel wear proper eye protection. Do not stand directly in front of valve stem when draining air from tire. Tire is under extreme air pressure. Failure to comply may result in injury to personnel.

WARNING

Prolonged contact with lubricating oil (MIL-L-2104) may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well-ventilated to keep fumes to a minimum.

WARNING

Tie-rod end may unexpectedly pop-up when pressure is applied with hydraulic jack. Keep hands and face clear of tie-rod end. Failure to comply may result in severe injury to personnel.

WARNING

Skid plate weighs 130 lbs (59 kg). Attach suitable lifting device prior to removal to prevent injury to personnel.

WARNING

Skid plate structure weighs 95 lbs (43 kg). Attach suitable lifting device prior to removal to prevent injury to personnel.

WARNING

Skid plate crossmember weighs 55 lbs (25 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Right hand and left hand extension assemblies weigh 110 lb (50 kg) each. Use the aid of an assistant when lifting to prevent injury to personnel.

WARNING

Crossover tube weighs 100 lbs (45 kg). Attach a suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Each hard lift bracket weighs 67 lbs (30 kg). Attach a suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Self-guided coupler weighs 100 lbs (45 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

The exhaust pipe and muffler can become very hot during vehicle operation. Be careful not to touch these parts with bare hands, or allow body to come in contact with pipe or muffler. Exhaust system parts can become hot enough to cause serious burns.

WARNING

Support hoist extension before removing retaining pin or injury to personnel may occur.

WARNING

Tire carrier weighs 145 lbs (66 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Wire rope can become frayed or contain broken wires. Wear heavy leather-palmed work gloves when handling wire rope. Frayed or broken wires can cause injury to personnel.

WARNING

Never let moving wire rope slide through hands, even when wearing gloves. A broken wire could cut through glove and can cause injury to personnel.

WARNING

Cab door weighs 100 lbs (45 kg). Support with suitable lifting device to avoid injury to personnel.

WARNING

Do not let window fall. Broken glass may cause serious injury to personnel.

WARNING

Platform assembly weighs 62 lbs (28 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Always wear proper eye protection and protective clothing when handling glass. Failure to comply may result in injury to personnel.

WARNING

Seat assembly weighs 55 lbs (25 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Box assembly weighs 92 lbs (42 kg). Ensure box assembly is properly supported to prevent possible injury to personnel.

WARNING

Wear heavy gloves when handling crane cable. Never let cable run through hands; frayed cables can cut.

WARNING

The crane hydraulic system operates at oil pressures up to 3,100 psi (21,375 kPa). Never disconnect any hydraulic line or fitting without first dropping the pressure to zero. Failure to comply may result in serious injury or death to personnel.

WARNING

Self-recovery winch weighs 645 lbs (292 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Front tension guide weighs 60 lbs (27 kg). Use an assistant to prevent possible injury to personnel.

WARNING

Leave top front screw installed in frame to prevent spacer from falling. Failure to comply may result in injury to personnel.

WARNING

Front guide assembly weighs 75 lbs (34 kg). Use an assistant to prevent injury to personnel.

WARNING

Position top front screw in frame to hold spacer in place. Failure to comply may result in injury to personnel.

WARNING

Rear tension guide weighs 50 lbs (23 kg). Use an assistant to prevent injury to personnel.

WARNING

Rear guide assembly weighs 65 lbs (29 kg). Use an assistant to prevent possible injury to personnel.

WARNING

Rear roller assembly weighs 375 lbs (170 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Do not remove heater hoses when engine is hot; steam and hot coolant can escape and burn personnel.

WARNING

Use clean wiping rags or like material to remove heater hoses. Avoid using gloves. If hot water soaks through gloves, personnel could be burned.

WARNING

Coolant is slippery and can cause falls and injury. Clean up spilled coolant immediately.

WARNING

Allow engine to cool prior to removal of heater core to prevent burns and injury to personnel.

WARNING

Use caution when removing hoses to prevent getting antifreeze in eyes or mouth, if antifreeze does get in eyes or mouth, seek medical attention immediately.

WARNING

Extreme care should be taken when removing heater hoses if water temperature gage reads above 180 degrees F (82 degrees C). Contact by steam or hot coolant may result in injury or death to personnel.

WARNING

Allow engine to cool prior to removal of valve to prevent burns and possible injury to personnel.

WARNING

Ensure engine is cool before performing this task or severe burns from hot hydraulic fluid may result.

WARNING

The main hydraulic system operates at oil pressures up to 3,675 psi (25,339 kPa). Never disconnect any hydraulic line, fitting or component without first dropping pressure to zero. Failure to comply may result in serious injury or death to personnel.

WARNING

Use extreme care when loosening filler cap. Sudden release of pressure could seriously injure personnel. Slowly loosen cap to relieve pressure and ensure proper eye protection is worn.

WARNING

Hydraulic reservoir weighs 120 lbs (54 kg). The aid of an assistant is required to prevent possible injury to personnel.

WARNING

Battery weighs 75 lbs (34 kg). Remove battery only with the aid of an assistant to prevent possible injury to personnel.

WARNING

Battery weighs 75 lbs (34 kg). Install battery only with the aid of an assistant to prevent possible injury to personnel.

WARNING

Battery box weighs 75 lbs (34 kg). Use the aid of an assistant to prevent possible injury to personnel.

WARNING

Sharp edges of exhaust pipe could cause injury to personnel.

WARNING

Coolant may run out of water jacket when turned. Wear eye protection or injury to personnel may result.

WARNING

High pressure hydraulics [oil under 3,100 psi (21,374 kPa) pressure] operate this equipment. Refer to vehicle operator and maintenance manuals for hydraulic oil pressure. Never disconnect any hydraulic line or fittings without first dropping pressure to zero. A high pressure oil stream can pierce body and cause severe injury to personnel.

WARNING

Machine gun ring weighs 295 lbs (134 kg). Attach suitable lifting device to prevent injury to personnel.

WARNING

Machine gun ring front support weighs 55 lbs (25 kg). Attach suitable lifting device to prevent injury to personnel.

WARNING

Circuit breakers CB5, CB6, CB12, CB20, CB22, CB23 and relays R3, R13 - R19, R26, R28, R32, R33 are always electrically hot and can cause severe injury to personnel. Care must be exercised when working under the electrical circuit board cover.

WARNING

Ensure equipment will not move while repairing or inspecting it. For trailers, “red tag” the hitch, and block or chock wheels or tracks. For powered equipment, block or chock wheels or tracks, and “red tag” the starter. Prevent a “quick fix” from becoming a quick injury.

WARNING

When adjustment or service requires a running engine, two personnel will be used; one at controls and one at service point. This helps prevent accidental movement of controls.

WARNING

Wires 1866 and 1867 have 12 vdc at all times direct from batteries. Care must be exercised when working with these wires to avoid injury to personnel.

WARNING

Ensure all personnel are clear of rear of truck before shifting into R (reverse). Failure to do so might result in injury or death to personnel.

WARNING

Circuit breakers and relays are always electrically hot and can cause severe injury to personnel. Care must be exercised when working under the electrical circuit board cover.

WARNING

Ether is toxic and highly flammable. Container is pressurized. Never heat container and never discharge ether into confined areas or near open flame. Severe injury to personnel may result.

WARNING

Do not place any part of body in area of fan operation. Failure to do so will result in injury or death to personnel.

WARNING

10 to 14 vdc are always present at terminals E and F of connector MC7.

WARNING

Before inflating or deflating, stand out of the trajectory area or personal injury or death may result.

WARNING

Hot transmission oil can cause severe burns and injury to personnel. Transmission should be allowed to cool before oil is drained.

WARNING

Wear safety goggles when performing leakage tests on valves. Failure to do so may result in serious eye injury due to high pressure air.

WARNING

If air lines are under high pressure when they are disconnected, they can whip around and cause injury to personnel. Caution should be exercised when loosening or disconnecting air line fittings.

WARNING

Exercise extreme caution when working around wheels or under truck while engine is operating. Movement of truck may cause injury or death to personnel.

WARNING

Keep clear of equipment when equipment is being raised or lowered. Equipment may fall and cause serious injury or death to personnel.

WARNING

Never crawl under equipment when performing maintenance unless equipment is securely blocked. Equipment may fall and cause serious injury or death to personnel.

WARNING

Do not work on any item supported only by lift jacks or hoist. Always use blocks or proper stands to support the item prior to any work. Equipment may fall and cause injury or death to personnel.

WARNING

Ensure transmission is cool before proceeding. Failure to comply may result in injury to personnel.

WARNING

Keep hands and arms away from fan blade and drive while engine is running, or serious injury to personnel will result.

WARNING

Maintain adequate distance from moving steering parts or serious injury to personnel may result.

WARNING

Do not stand between wheels when engine is operating. Movement of vehicle can cause injury or death to personnel.

WARNING

Truck must be on level ground and wheels must be chocked before parking brake is released. Otherwise, truck may roll and cause injury to personnel.

WARNING

Do not use retread tires on vehicles equipped with a Central Tire Inflation System (CTIS). Use only the tires that are specified in the Repair Parts and Special Tools List (RPSTL). Failure to comply may result in tire failure and loss of vehicle control.

WARNING

Ensure transfer case is cool before proceeding. Failure to comply may result in injury to personnel.

WARNING

Failure to place wheel/tire assembly in safety cage prior to initial inflation could result in serious injury or death to personnel.

WARNING

When a wheel/tire is in a restraining device, do not lean any part of body or equipment on or against the restraining device, or injury or death could result.

WARNING

Stand clear of trajectory area during deflation or personal injury or death may result.

WARNING

Always completely deflate tire by removing valve core from valve stem before attempting demounting operation. After air has finished exhausting from valve stem, carefully run a piece of wire through valve stem to ensure it is not plugged and tire is completely deflated. Failure to comply may result in injury to personnel.

WARNING

Wheel/tire assembly must be deflated in a safety cage or personal injury or death may result.

WARNING

Keep hands clear of studs and outer face of wheel to prevent injury to personnel.

WARNING

Wheel/tire assembly weighs 523 lbs (237 kg). Attach suitable lifting device prior to moving to prevent possible injury to personnel.

WARNING

Stay out of the trajectory as indicated by the area shown. Under some circumstances, the trajectory may deviate from its expected path. Injury or death to personnel may result.

WARNING

Container lock could drop suddenly if not supported. Failure to comply may result in injury to personnel.

WARNING

Slider weighs 142 lbs (64 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Right front support bracket weighs 98 lbs (44 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Left front support bracket weighs 98 lbs (44 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Front support assembly weighs 660 lbs (299 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Front crossmember assembly weighs approximately 500 lbs (227 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Stow cone weldment weighs approximately 225 lbs (102 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Rear guide assembly weighs 70 lbs (32 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Slide arm weighs 65 lbs (29 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Lifting frame weighs 1600 lbs (726 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Stow weldment weighs 410 lbs (186 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Rear roller bracket weighs 150 lbs (68 kg). When removing one rear roller bracket, ensure remaining rear roller bracket is supported. Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Arm assembly weighs 240 lbs (109 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Right strut bracket assembly weighs 80 lbs (36 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Alternator weighs 75 lbs (34 kg). Use the aid of an assistant to prevent possible injury to personnel.

WARNING

Starter weighs 73 lbs (33 kg). Attach suitable lifting device prior to installation to prevent possible injury to personnel.

WARNING

Ensure brake drum is not pulled back more than approximately two inches (5 cm). Failure to comply may result in injury or death to personnel.

WARNING

Most circuit breakers are always electrically hot and can cause severe injury to personnel. Care must be exercised when working under the ECB cover.

WARNING

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

WARNING

Stand clear of tires while turning them. Failure to do so may result in injury or death to personnel

WARNING

Never inflate the wheel/tire assembly unless all ten outer wheel nuts have been properly torqued or personal injury could result.

WARNING

Brake drum weighs 132 lbs (60 kg). Attach suitable lifting device to prevent possible injury to personnel.

WARNING

Axle's No. 1 and No. 2 brake drums may swing out during removal. Use the aid of an assistant to support lifting device. Failure to comply may result in injury to personnel.

WARNING

Keep hands clear of studs and outer face of axles to prevent injury to personnel.

WARNING

Stand clear of tires while turning. Failure to do so may result in injury or death to personnel.

WARNING

Sharp edges of exhaust pipe could cause injury to personnel.

WARNING

Do not remove hoses when cooling system is hot; steam and hot coolant can escape and burn personnel.

WARNING

The hydraulic system operates at high pressures. Never disconnect any hydraulic line or fitting without first dropping pressure to zero. Failure to comply may result in serious injury or death to personnel.

WARNING

CARC paint contains isocyanate (HDI) which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning sensation in throat and nose and watering of the eyes. In extreme concentrations, HDI can cause cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:

- ALWAYS use air line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.
- DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).
- DO NOT use CARC paint without adequate ventilation.
- NEVER weld or cut CARC-coated materials.
- DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.
- BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.

WARNING

Horizontal roller weighs 75 lbs (34 kg). Attach suitable lifting device prior to removal to prevent possible injury to personnel.

WARNING

Do not put fingers in between boom sections when removing wear pads. Use a screwdriver or similar tool to remove wear pads. Failure to comply may result in injury to personnel.

WARNING

Do not put fingers in between boom sections when installing wear pads. Use a screwdriver or similar tool. Failure to comply may result in injury to personnel.

WARNING

Do not inhale fumes; could cause severe injury or death.

WARNING

Do not over-tighten clamp during installation. Accumulator is filled with compressed gas, and a change in pressure could cause crane to malfunction. Failure to complay may result in injury or death to personnel.

WARNING

Wire cable assembly can become frayed or contain broken wires. Wear heavy leather-palmed work gloves when handling wire cable assembly. Frayed or broken wires can cause injury to personnel.

WARNING

Never let moving wire cable assembly slide through hands, even when wearing gloves. A broken wire could cut through glove and cause injury to personnel.

WARNING

Air cleaner assembly can weigh up to 100 lbs (45 kg). Ensure air cleaner assembly is properly supported during removal. Failure to comply may result in injury to personnel.

WARNING

Ensure air cleaner assembly is properly supported. Failure to comply may result in injury to personnel.

WARNING

Use care when removing retaining rings. Retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

WARNING

Use care when installing retaining rings. Retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

LIST OF EFFECTIVE PAGES

Insert latest changed pages. Destroy superseded pages.

NOTE

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TECHNICAL MANUAL

No. 9-2320-364-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 01 August 1999

Unit Maintenance Manual

PALLETIZED LOAD SYSTEM

MODEL M1074/M1075
NSN 2320-01-304-2277
NSN 2320-01-304-2278

Current as of 01 August 1999

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

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HOW TO USE THIS MANUAL

This manual is designed to help maintain the Model M1074/M1075 Palletized Load System (PLS) truck. Listed below are some special features included in this manual to help locate and use the needed information:

- A front cover table of contents is provided for quick reference to chapters and sections that will be used often.
- WARNING, CAUTION, and NOTE headings, subject headings, and other essential information are printed in bold type making them easier to see.
- The maintenance tasks describe what must be done to the truck before starting the task (Equipment Condition), and what must be done to return the vehicle to operating condition after the task is finished (Follow-On Maintenance).
- The Appendixes are located at the end of the manual. They contain a reference guide to other manuals, the Maintenance Allocation Chart (MAC), a list of expendable supplies and materials, and other material for maintaining the PLS truck.
- In addition to text, there are exploded-view illustrations showing how to take a component off and put it back on. Cleaning and inspection procedures are also included as required.
- Chapter 2 of this manual covers Unit level Preventive Maintenance Checks and Services (PMCS) and basic troubleshooting, as well as general maintenance.

Follow these guidelines when using this manual:

- Read all WARNINGS and CAUTIONS before performing any procedure.
- The equipment conditions found in the maintenance procedures are of a general nature and the mechanic may be able to perform only certain steps within a procedure to accomplish the equipment condition.

CHAPTER 1

INTRODUCTION

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Section I. GENERAL INFORMATION

1-1. SCOPE.

This chapter provides general information, equipment descriptions and principles of operation for the M1074/M1075 Palletized Load System (PLS). The PLS will herein be referred to as the truck.

a. Type of Manual. Unit Maintenance Instructions, TM 9-2320-364-20.

b. Model Numbers and Equipment Names. The different truck models are listed below:

M1074	Truck with crane (Figure 1-1)
M1075	Truck without crane (Figure 1-2)
M1076	Trailer (Figure 1-3)
M1077	Flatrack (Figure 1-4)

c. Purpose of Equipment. The PLS is an ammunition-hauling tactical wheeled truck and trailer combination with integral self-load/unload capability using the PLS flatrack (FR).

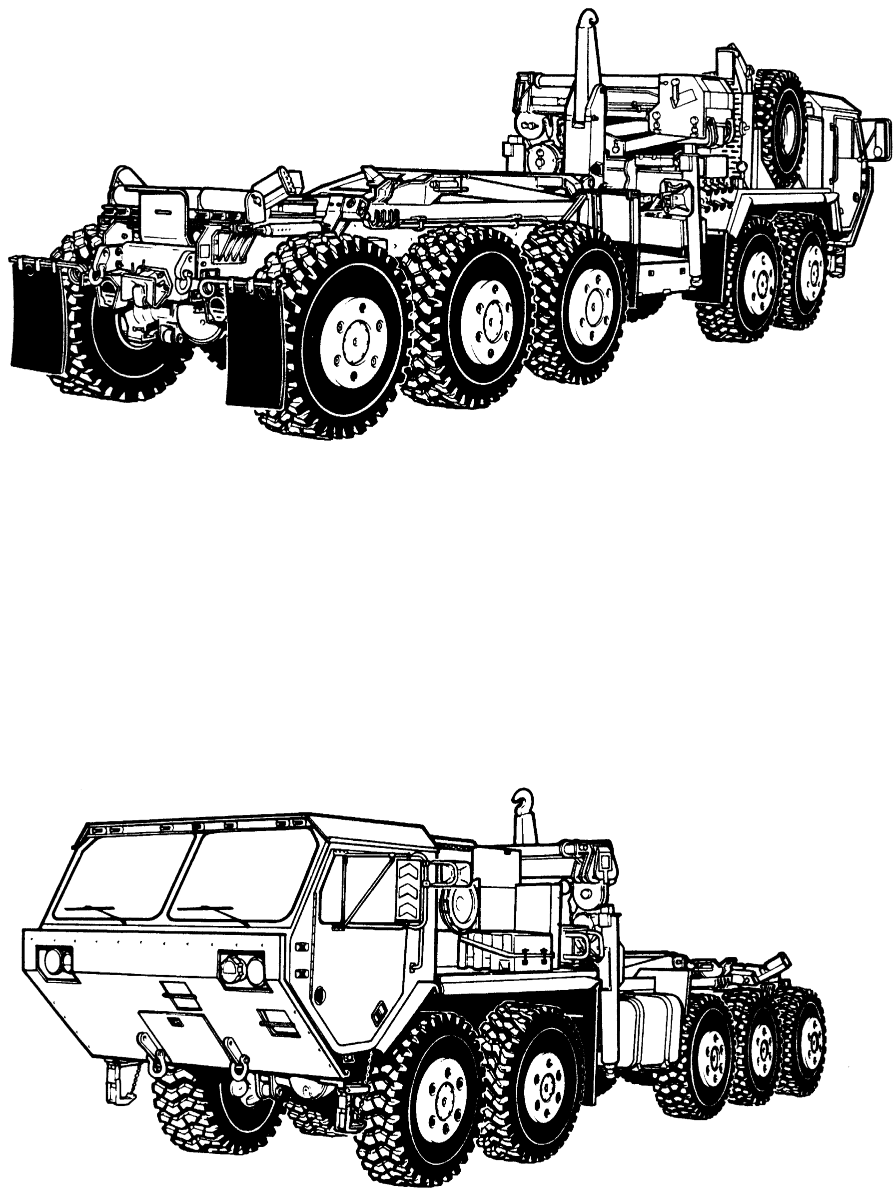

Figure 1-1. M1074 Palletized Load System Truck (With Crane)

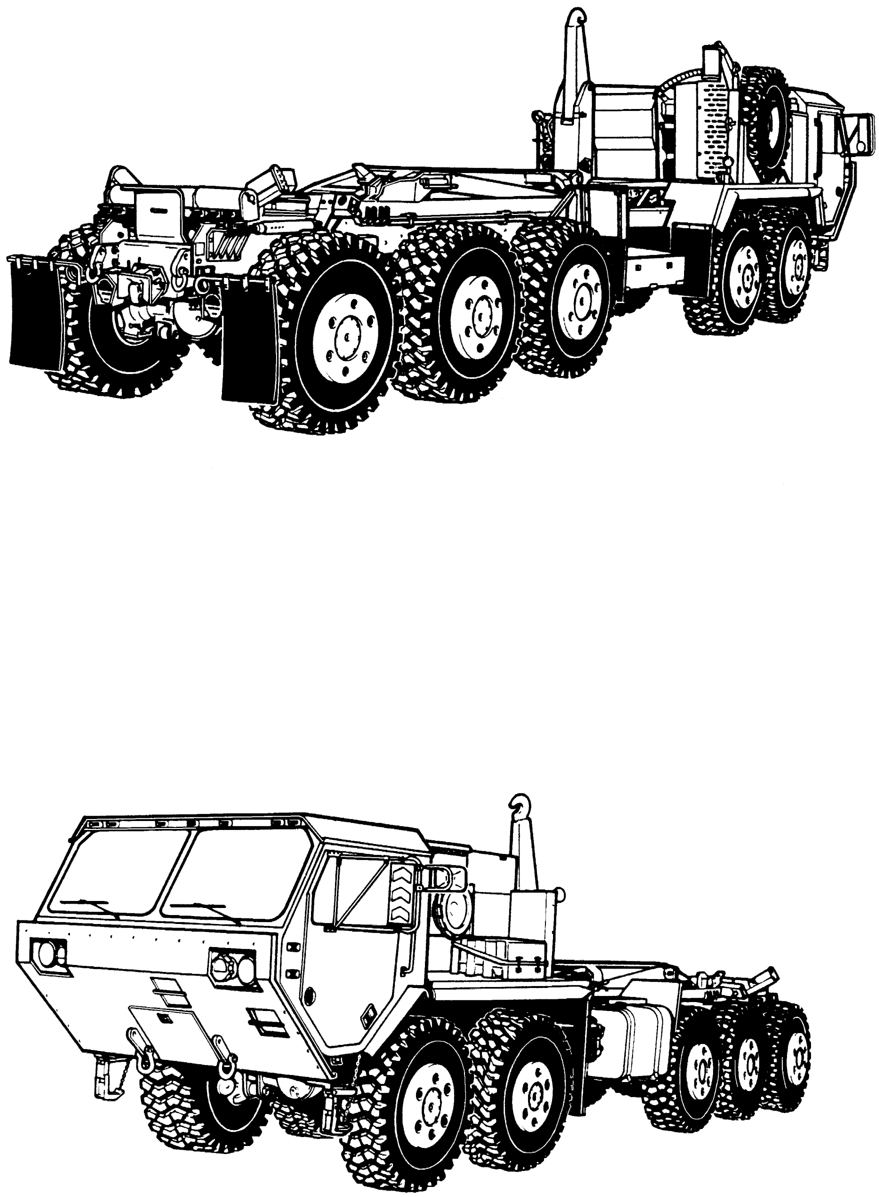

Figure 1-2. M1075 Palletized Load System Truck (Without Crane)

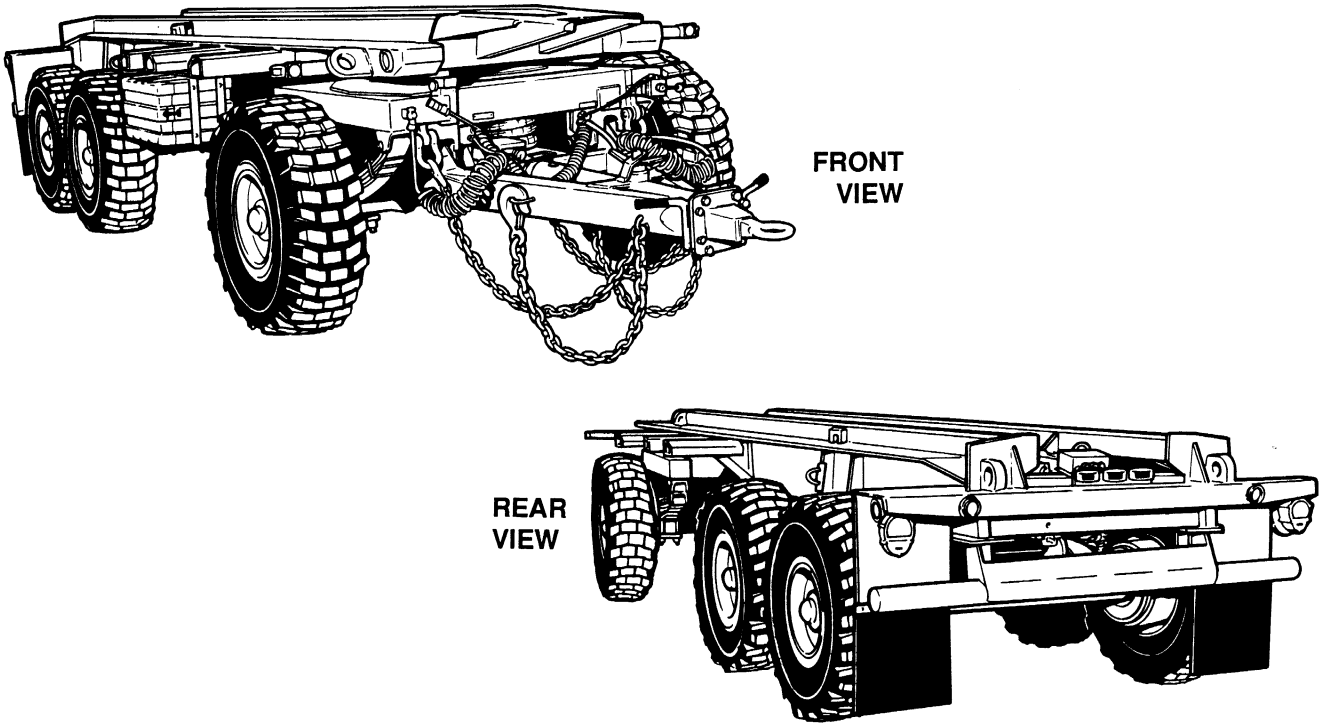

Figure 1-3. M1076 PLS Trailer

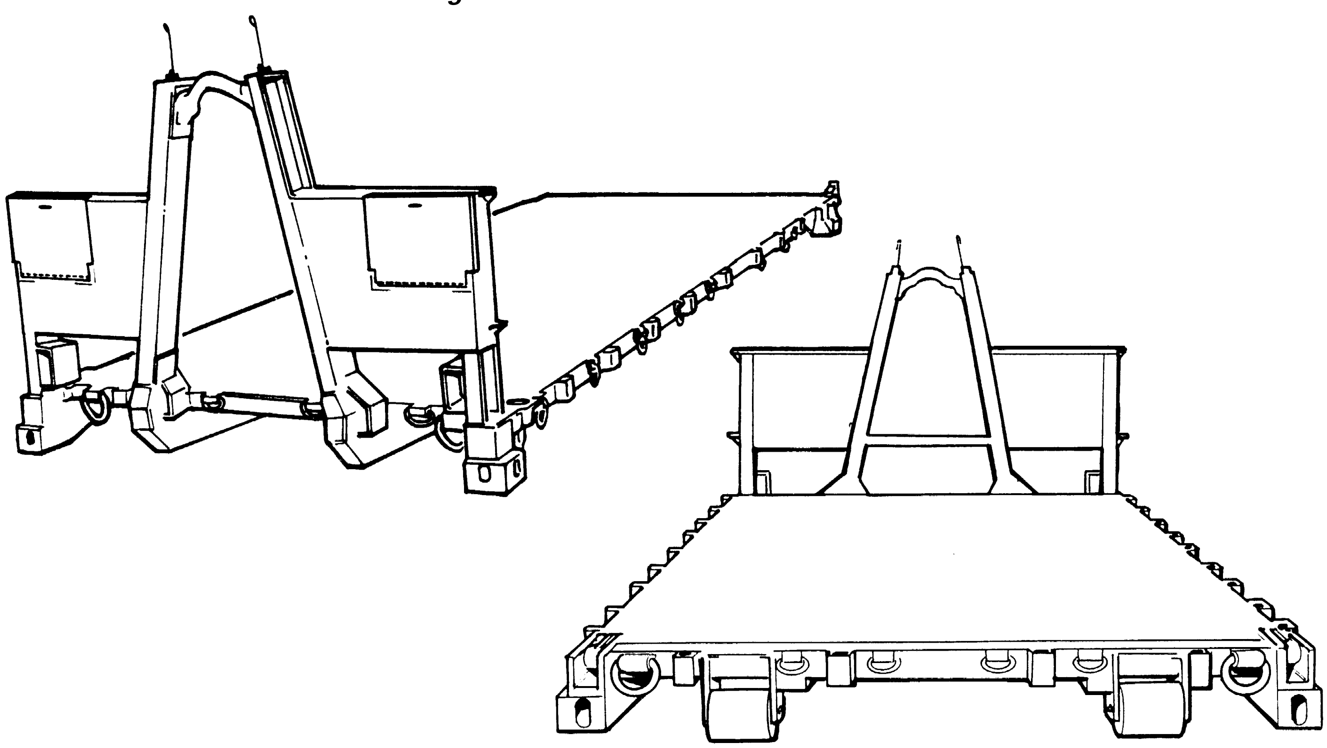

Figure 1-4. M1077 PLS Flatrack

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS) (Maintenance Management UPDATE).

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.

Command decision, according to tactical situation, will determine when the destruction of the truck will be accomplished. A destruction plan will be prepared by the using organization unless one has been prepared by a higher authority. For general destruction procedures for this truck, refer to TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (US Army Tank-Automotive Command).

1-4. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS.

Table 1-1 lists the nomenclature cross-references used in this manual.

Table 1-1. Nomenclature Cross-Reference

Common Name	Official Nomenclature
Cable	Wire rope
Cold Start System	Ether quick-start system
Engine Coolant	Antifreeze, ethylene glycol mixture
Gladhand	Quick-disconnect coupling
Truck	Palletized Load System
Jacobs Brake	Engine Retarder

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your Palletized Load System needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E-MPA; Warren, Michigan 48397-5000. We'll send you a reply.

1-6. WARRANTY INFORMATION.

Refer to PLS Warranty Technical Bulletin, TB 9-2320-364-15 for complete warranty information covering the truck. Warranty starts on the date found in block 23, DA Form 2408-9, in the logbook. Report all defects in material or workmanship to the supervisor, who will take appropriate action.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

Refer to TM 9-2320-364-10 for equipment characteristics, capabilities and features.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

Refer to TM 9-2320-364-10 for location and description of major components.

1-9. EQUIPMENT DATA.

Refer to TM 9-2320-364-10 for equipment data.

Section III. PRINCIPLES OF OPERATION

1-10. POWER TRAIN.

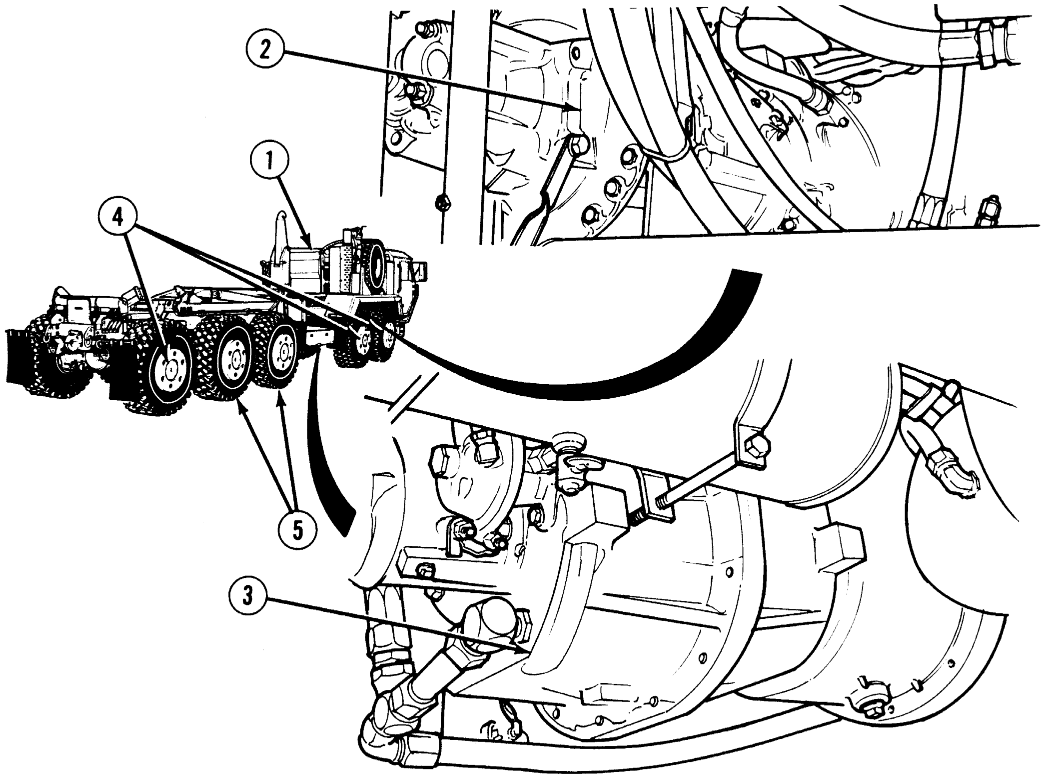

Figure 1-5. Power Train

Power for the truck is provided by a diesel engine (1, Figure 1-5) which is coupled directly to an automatic transmission (2). Power from the transmission is transferred to the transfer case (3) and on to the drive and steering axles (4) and the drive only axles (5) through a series of drive shafts and universal joints. The truck drive train is enhanced through the use of the Detroit Diesel Electronic Control II (DDEC II), or Detroit Diesel Electronic Control III (DDEC III) electronic engine controller and the Allison Transmission Electronic Control (ATEC) electronic transmission controller. The primary components of the ATEC system are an Electronic Control Unit (ECU) and shifter in the truck cab, an electrohydraulic valve module beneath the transmission gearing section that contains solenoid valves for clutch control, a throttle sensor that is activated by the accelerator pedal and an output speed sensor that relays the transmission out speed to the ECU for shifting and control functions.

a. Engine. The truck is equipped with a Detroit Diesel Corporation (DDC) Model 8V92TA engine rated at 500 HP. The drive train control system consists of the engine and transmission systems.

(1) The DDEC II and DDEC III contain a microprocessor-based electronic control module to regulate the electronic distributor unit. This distributor unit controls the individual or unit injectors that regulate both the amount and timing of fuel delivery. The DDEC II and DDEC III electronically govern engine speed and can be programmed to accommodate truck configuration changes. The DDEC II and DDEC III are electronically linked with the transmission, through the ATEC, to improve truck performance.

(2) The DDEC and ATEC systems perform self diagnostics, engine/transmission system diagnostics and truck performance diagnostics. Self diagnostics includes personnel initiated checks of main electronic components such as solenoids, wiring, sensors and control modules. System diagnostics monitor critical engine and transmission parameters such as oil temperature, oil pressure, coolant temperature, voltage and gear range attained. Truck performance diagnostic capabilities aid the mechanic in isolating problems outside of the electronic control system. Operating data is stored in the DDEC II's and DDEC III's memory for display at a later time. Stored data includes total engine hours and fuel consumed. The DDEC II and DDEC III also track intermittent problems by logging the number of occurrences and the engine hours of each occurrence.

b. Transmission. The truck uses an Allison 700 Series Transmission, Model CLT-755. This hydro-kinetic type transmission has an integral-locking torque converter, lock-up clutch, constant mesh planetary gearing, the ATEC, a speedometer and a control valve body assembly.

(1) The Electronic Control Unit (ECU), which contains the microprocessor based electronics, is located in a protected area within the truck. The ECU receives information, in the form of signals from switches and sensors, processes the information and sends electrical signals to the appropriate solenoids which control the transmission operation. The ECU features diagnostics which can sense many electronic system malfunctions and identify them with a displayed code. The ECU also protects the transmission from cold weather start-ups by inhibiting normal shifting functions until a minimum sump oil temperature of 20 degrees F (–7 degrees C) is attained.

(a) The CHECK TRANS light alerts the operator, momentarily, every time the system is activated, as a lamp check, and/or when the ECU finds a problem in the system. If the check transmission light comes on, the problem is minor. In most cases, the transmission will continue to operate in a normal manner. However, in some cases the ECU will take action to reduce the possibility of damage to the truck or the transmission. The transmission should be serviced at the next opportunity.

(b) The DO NOT SHIFT light and/or buzzer alerts the operator, momentarily, every time the system is activated as a lamp check and any time the ECU has detected a more severe problem in the system. The ECU will cause the transmission to hold-in-gear and disengage the lock-up clutch.

(2) The push button range selector is totally electronic. Range selection is achieved by means of seven snap dome switches. To select a range, touch the pad. The pad will light up, a beep will be heard and a “click” will be felt. The transmission will be ready to operate in the selected range. The range selector also has a “DO NOT SHIFT” light and a warning tone or buzzer.

(a) Select the Drive position and the truck will start in first (low range only) or second range and automatically upshift to a higher range as output speed increases. As the truck slows down, output speed decreases and the transmission automatically downshifts to the correct range. If a locked brake or a slick-surface condition should occur, the ECU will command converter operation and inhibit downshifts for a period of time or until normal wheel speed has been restored. Drive (4) should be selected for moderate loads, grades and over-the-road operation with restrictive speed limits. Drive (3) is appropriate for operating in rough terrain or in heavy traffic. Drive (2) should be selected when need for speed control requires a second gear hold condition such as descending steep grades where additional engine braking is required, for operation on rough terrain, or greater retarder action. Selecting Drive (1) permits the driver to operate the truck in areas where maximum performance in extremely rough terrain is required.

1-10. POWER TRAIN (CONT).

CAUTION

Do not allow a truck to coast in neutral. Engine braking is nullified and the transmission will not receive adequate lubrication.

(b) Select the Neutral (N) pad when checking truck accessories and for extended periods of engine idle operation. The push button range selector will automatically select neutral when the master switch is turned on.

(c) Stop the truck before shifting from Forward (F) to Reverse (R) or from Reverse (R) to Forward (F). Touch the reverse (R) pad on the selector. The light under the Reverse (R) pad will light and the reverse warning signal on rear of truck will be activated.

(d) When the ECU detects a serious problem in the system, a beeper tone is produced for 10 seconds and a “DO NOT SHIFT” light is activated to warn the driver that the transmission is held-in-gear. Selecting another pad will have no affect or change, nor will a tone sound be produced.

(3) All lubricating and clutch-applied oil is provided by an engine-driven pump (in the transmission). Because of the pump location ahead of the transmission gearing and clutches, the engine cannot be started by pushing or towing the truck. Therefore, anytime that the truck must be towed, or pushed, the drive-line must be disconnected.

c. Transfer Case. The truck transfer case has two speeds and a 30/70 differential. The transfer case 30/70 differential provides full time, all wheel drive and proportions approximately 30 percent of the torque to the front tandem and 70 percent of the torque to the rear tridem. The differential has a driver-controlled air actuated lock-up mechanism which consists of a sliding lockout collar that locks the differential housing to the output shaft. This differential lock-up provides increased mobility in adverse operating conditions.

d. Suspension. The front tandem suspension is a walking beam suspension with a special low-friction spring. The third axle suspension is an air ride suspension. The rear tandem suspension is a specially designed low-friction spring.

(1) The suspension system design maintains tire/ground contact under adverse terrain profiles and conditions. The design equalizes loads between axles and provides the necessary roll stability to operate on a 30 percent side slope. The truck uses 16.00R20 tires of a tubeless radial design.

(2) The truck uses three steering axles. The front tandem axle wheels and the last axle wheels steer. Power steering controls the steering gear at each steering axle. The power steering pump is direct driven at the engine. The cab steering wheel provides directional input to the first and second axle steering gears. A control link from the first axle master steering gear provides a mechanical link to the second axle slave steering gear. The second axle slave gear provides directional control from a rotary output shaft to the steering gear on the fifth axle. The steering gears are sized to turn the wheels when the truck is fully loaded.

e. Axles. The truck uses a three drive/steer hub reduction axle and two hub reduction axle design.

1-11. ENGINE SYSTEMS.

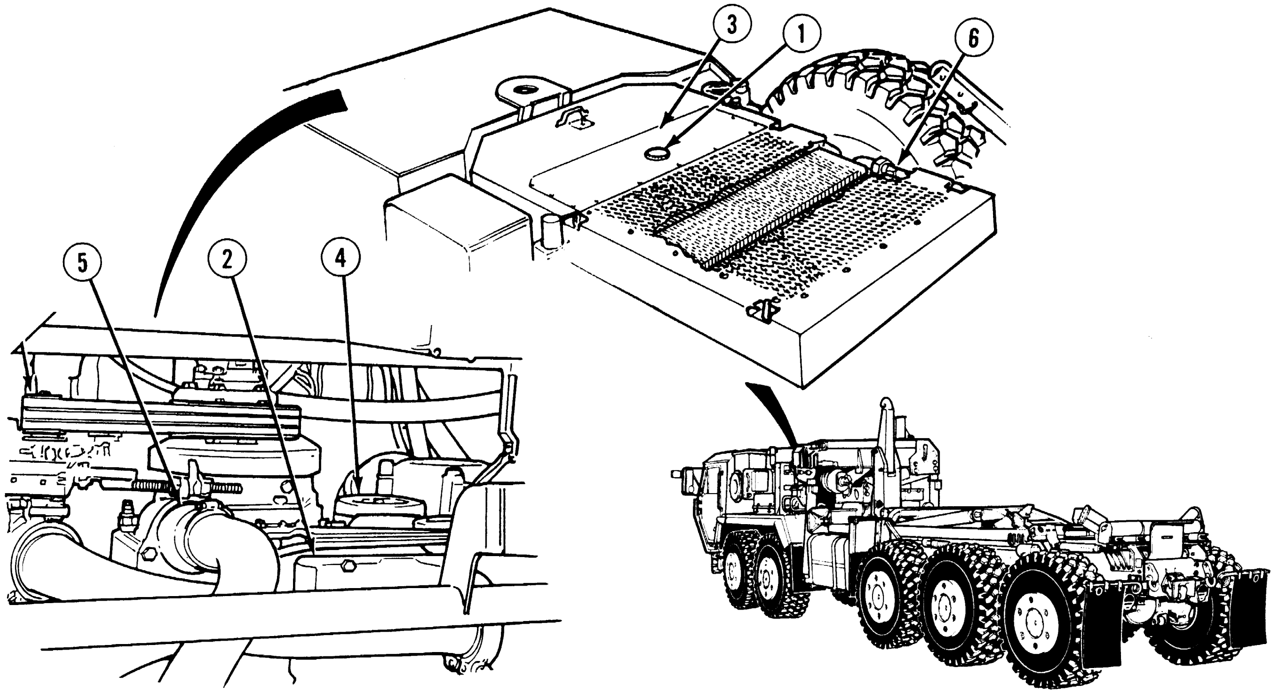

Figure 1-6. Cooling System

a. Cooling System. The pressure-type cooling system (Figure 1-6) protects the engine by removing heat generated during the combustion process. Pressure within the cooling system is regulated by a pressure release in the radiator filler cap (1). The hot coolant flows from the engine (2) to the radiator tank (3) and through the radiator core where a stream of air removes heat. This stream of air is drawn through the core by the fan. A water pump (4) draws the coolant from the radiator and pushes it through the engine repeating the cooling process. Thermostats (5) mounted in each coolant outlet elbow, remain closed until the coolant approaches a predetermined temperature at which time they open. When the coolant temperature drops below the thermostat rating, they close. An air vent line between the radiator and the water pump inlet removes air trapped in the engine when the cooling system is being filled. An oil cooler (6) is mounted in the radiator lower tank.

1-11. ENGINE SYSTEMS (CONT).

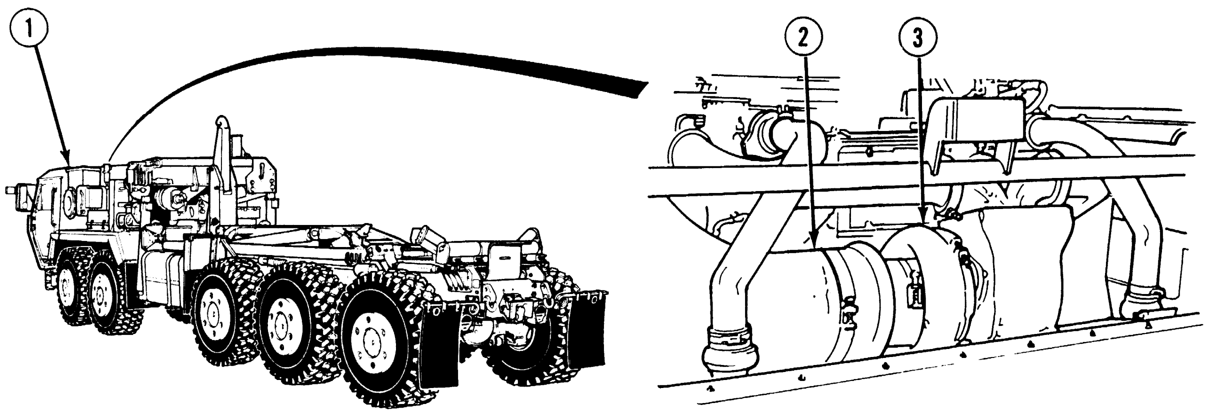

Figure 1-7. Air Intake System

b. Air Intake System. The air intake system (Figure 1-7) consists of a dry-type air cleaner (1), ducting (2), turbocharger (3) and engine blower. Engine exhaust gases flow through the turbocharger driving a turbine wheel. A compressor wheel on the opposite end of the turbine wheel shaft rotates and draws in fresh air through the air cleaner, compresses the air and delivers it to the engine blower.

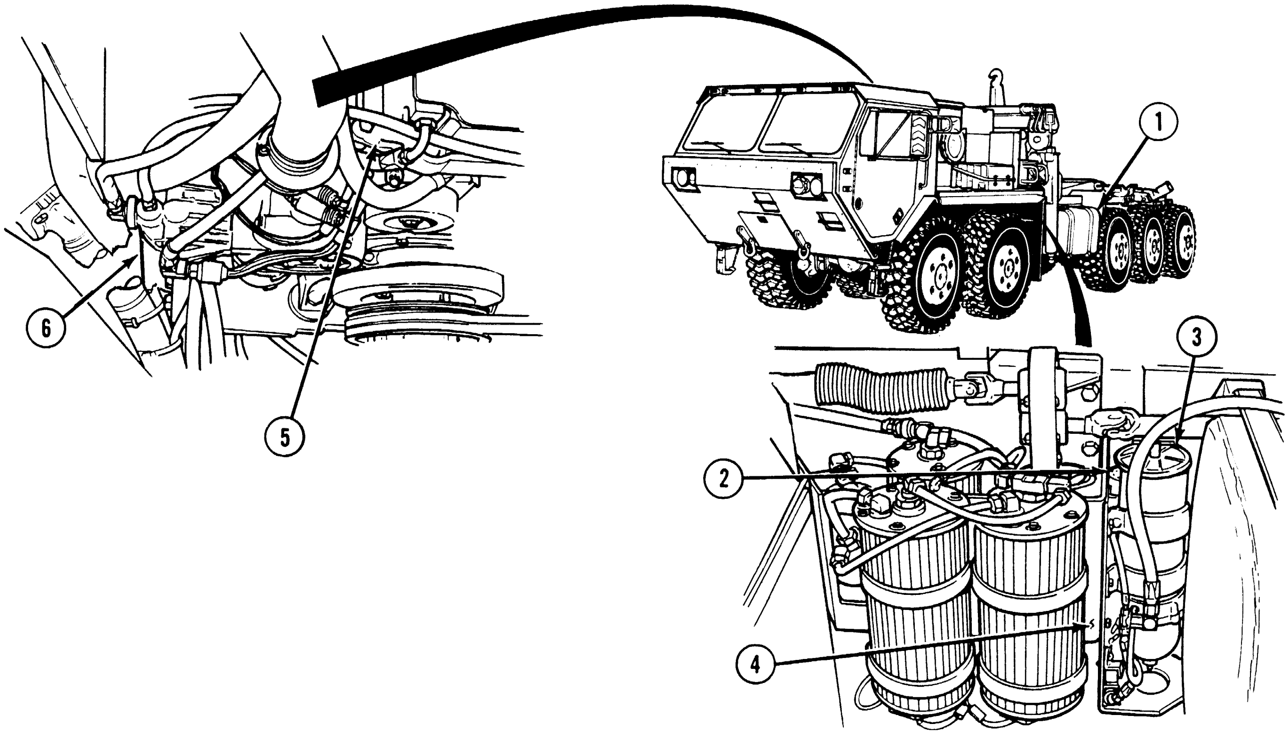

Figure 1-8. Fuel System

c. Fuel System. In the fuel system (Figure 1-8) fuel drawn from the fuel tank (1) and passes through the electrical priming fuel pump (2) and the fuel/water separator (3). A fuel shut-off valve (4) controls the flow of fuel to the engine. A mechanical fuel pump (5) draws fuel through the secondary fuel filter (6) to the engine. Surplus fuel from the injectors is returned to the fuel tank through a return line. The fuel/water separator removes water and large solid particles from the fuel. The finer particles are removed by the secondary filter before they can enter the fuel injectors.

1-12. ELECTRICAL SYSTEM.

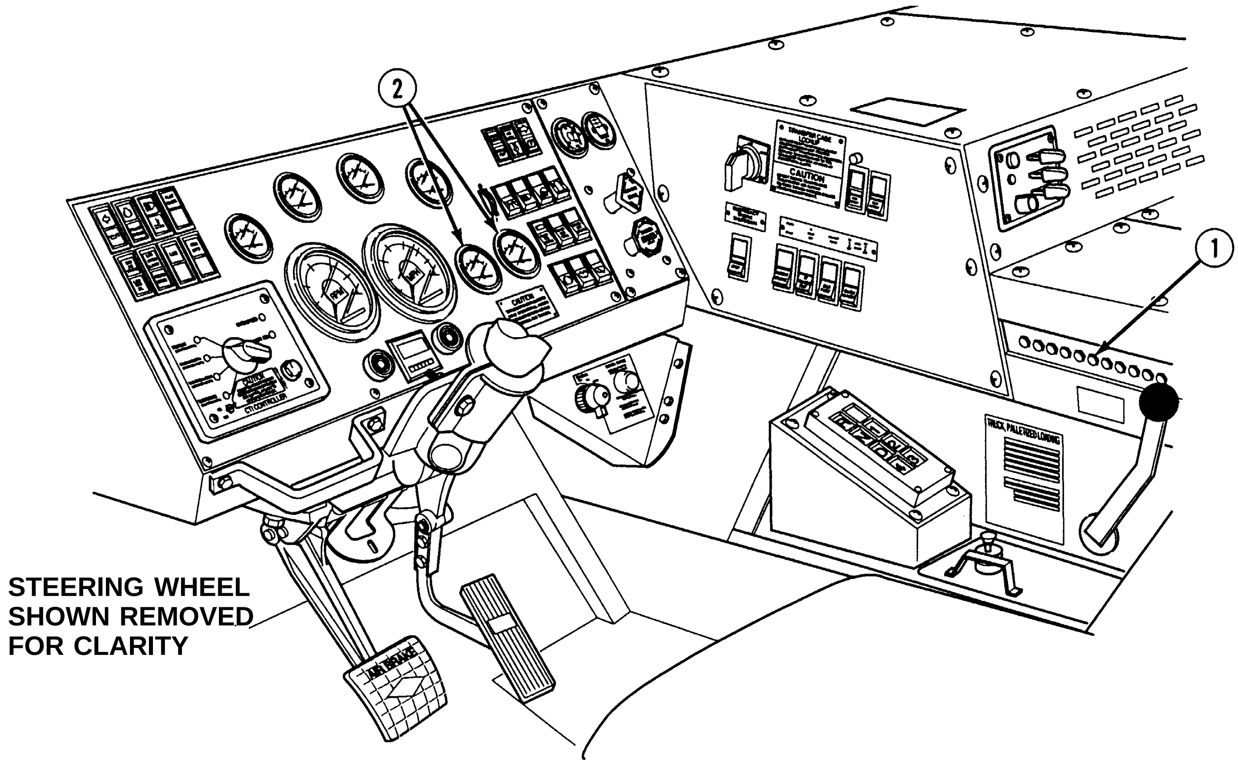

Figure 1-9. Electrical System

The 24 VDC electrical system (Figure 1-9) is waterproof, has reverse polarity protection and incorporates a 12 VDC lighting subsystem. Manual resetting circuit breakers (1) are used throughout the system and all circuits are identified. The voltages for the electrical system are indicated by two voltmeters (2) located on the dash panel inside the drivers compartment. Circuit breakers located in the cab protect the main circuits.

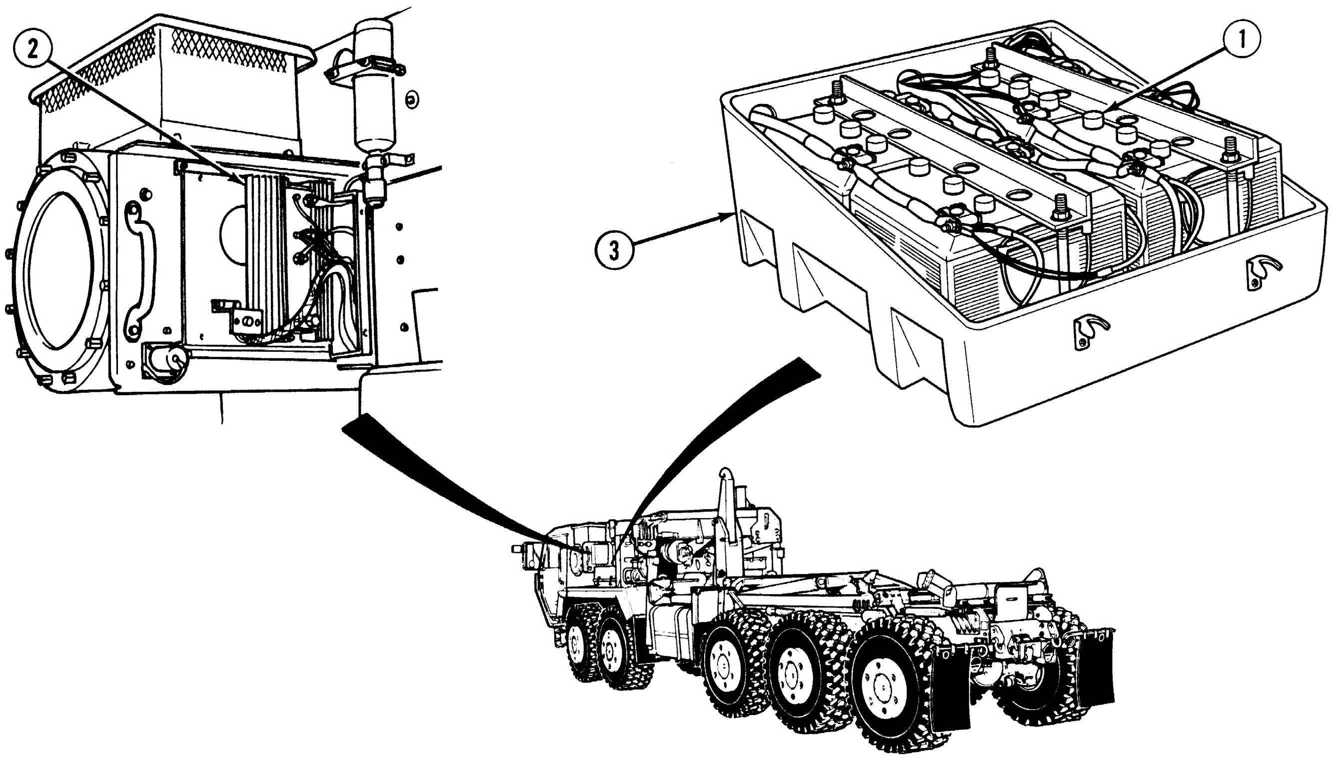

Figure 1-10. Electrical System

Electrical system (Figure 1-10) power is provided by four 12-volt series-parallel connected batteries (1). PLS trucks are either equipped with the dual voltage control system (DUVAC) and a 145 AMP alternator or the polarity protection system and a 200 AMP alternator. The DUVAC (2) delivers up to full alternator output on demand to either the 24 volt load, 12 volt load, or any combined load requirement from a single alternator. The DUVAC system can maintain battery equalization and balance even when the batteries are not matched or when they are in different charge states. Separate voltage regulation is provided for each battery bank. The battery box (3) is located on the left-hand fender and vents to the truck exterior. This location provides protection from the environment and allows ready access for service. The fiberglass battery box cover is designed to prevent short circuits during maintenance and operation. Power is distributed throughout the truck by wiring harnesses. The harnesses are interconnected by pin connectors. Connectors are provided at the rear of the truck to supply power for towed loads.

1-12. ELECTRICAL SYSTEM (CONT).

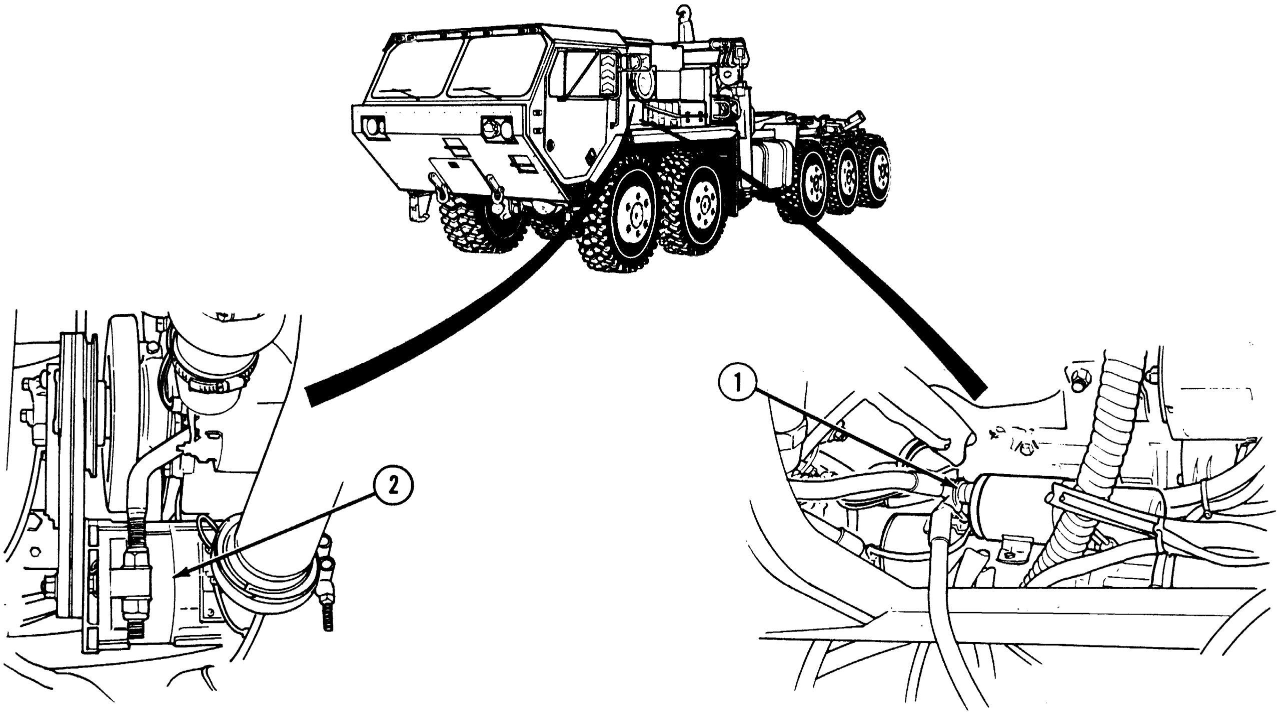

Figure 1-11. Electrical System

In the electrical system (Figure 1-11) a heavy duty starting motor (1) is mounted on the engine flywheel housing and provides the cranking power necessary for starting the engine. The DUVAC maintains both a 14- and 28-volt level for proper battery charging. The alternator (2) provides sufficient amperage to operate all electrical components and charge the batteries during engine idling. Truck exterior lights are mounted in protective locations or are protected to prevent damage. Protection is provided for lights during cross country travel. Polycarbonate lenses are provided for all lights except the sealed beam headlights and service lights. The PLS electrical system supplies all of the electrical power needed to operate the truck and trailer. The complete electrical system is made up of the following sub-systems:

- Power Storage and Generating
- Engine Starting and Stopping
- Service Lighting
- Blackout Lighting
- Accessory Lighting
- Instruments
- Warning Lights and Buzzers

a. Power Storage and Generating. Power storage for the truck consists of four 12-volt batteries. The four batteries are divided into two sets. Two batteries in each set are wired in parallel to produce higher amperage. The two sets are then wired in series to produce 24 volts. While the batteries can power all of the systems for a limited time, their primary purpose is to supply power to the engine's starting system. Once the engine is running, the generating system provides the electrical power for all of the systems. The engine driven alternator generates alternating current (AC) which is passed through a set of rectifiers that change it into direct current (DC). This direct current is used to charge the batteries and is distributed to the other systems of the PLS. The DUVAC adjusts alternator output to fit the needs of the electrical system.

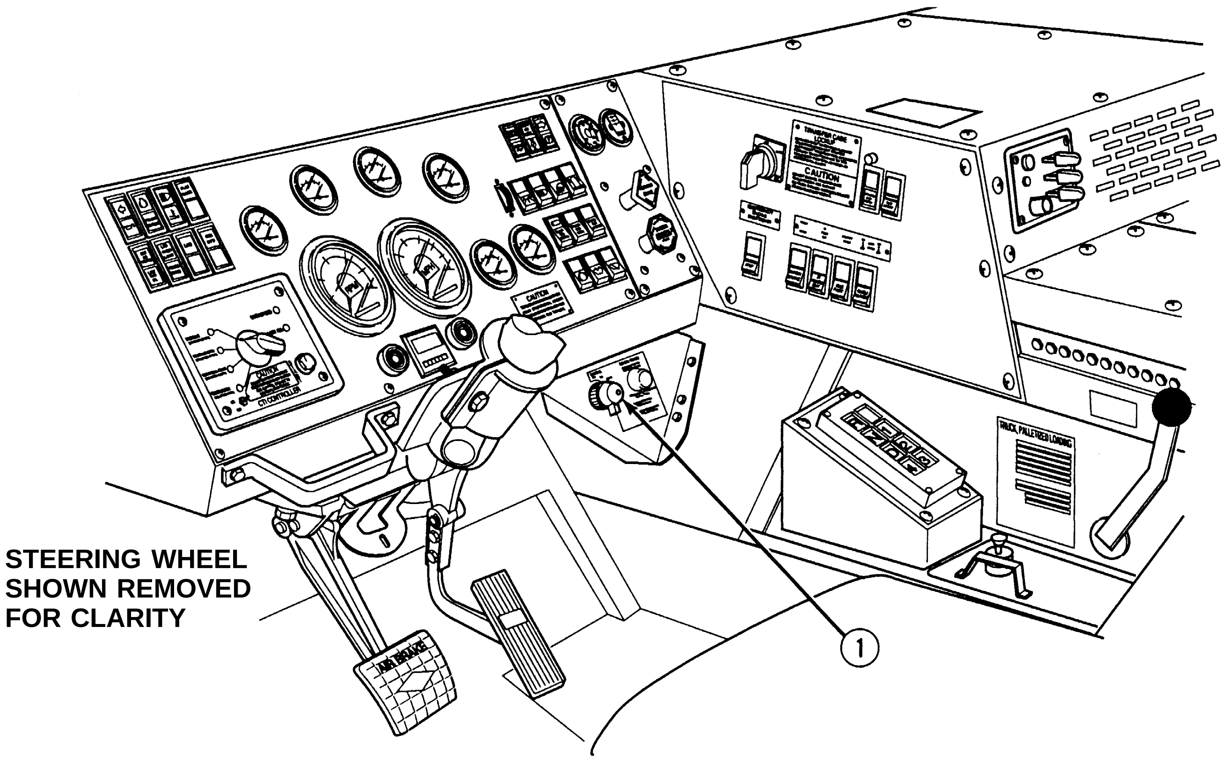

Figure 1-12. Engine Starting System

b. Engine Starting and Stopping. The engine starting system (Figure 1-12) uses the stored electrical energy of the batteries to turn the starter motor. When the ignition switch (1) is turned to the START position, electrical power is passed through the neutral safety switch to the starter relay. The starter relay, when energized, draws electrical power directly from the batteries and sends it to the starter motor solenoid. When the solenoid is energized, the starter motor draws electrical power from the batteries and turns the engine. To stop the engine, shut off ignition switch.

1-12. ELECTRICAL SYSTEM (CONT).

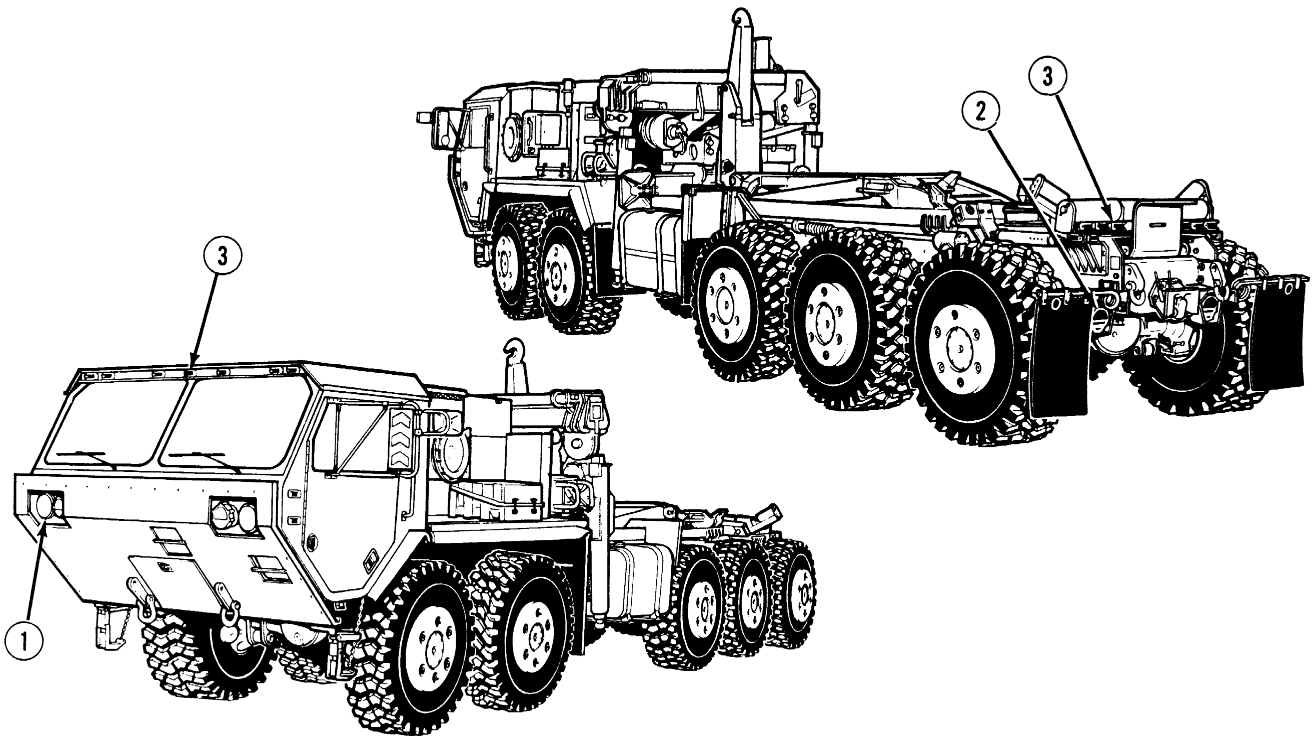

Figure 1-13. Service Lighting System

c. Service Lighting. The service lighting system (Figure 1-13) includes the headlights (1), tail lights (2) and clearance marker lights (3). They are energized by pressing the blackout light selector switch to the OFF position. The stop lights, clearance marker lights, panel lights, turn signals and emergency flashers are then controlled by separate switches located in the cab.

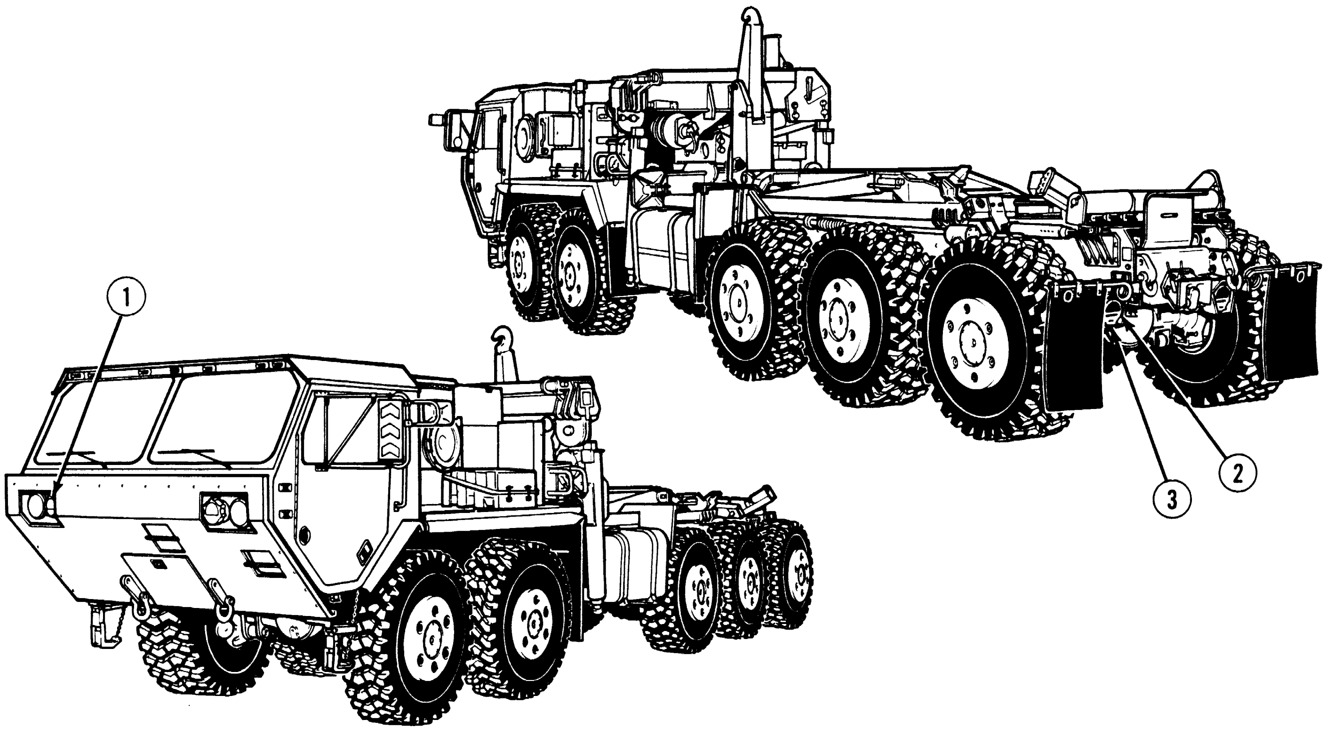

Figure 1-14. Blackout Lighting System

d. Blackout Lighting. The blackout lighting system (Figure 1-14) includes the front blackout marker lights (1), rear blackout marker lights (2), blackout stop lights (3) and panel lights. These are energized by turning on the blackout light selector switch and either the blackout marker switch or the blackout drive switch. The blackout stop lights and the panel lights are then controlled by other switches located in the cab.

e. Accessory Lighting. The accessory lighting system includes the dome light, beacon light and worklights. These are energized by turning the blackout light switch to the OFF position. The dome light, beacon light and worklights are then controlled by separate switches in the cab. The worklights also have switches built into the light assemblies themselves.

1-12. ELECTRICAL SYSTEM (CONT).

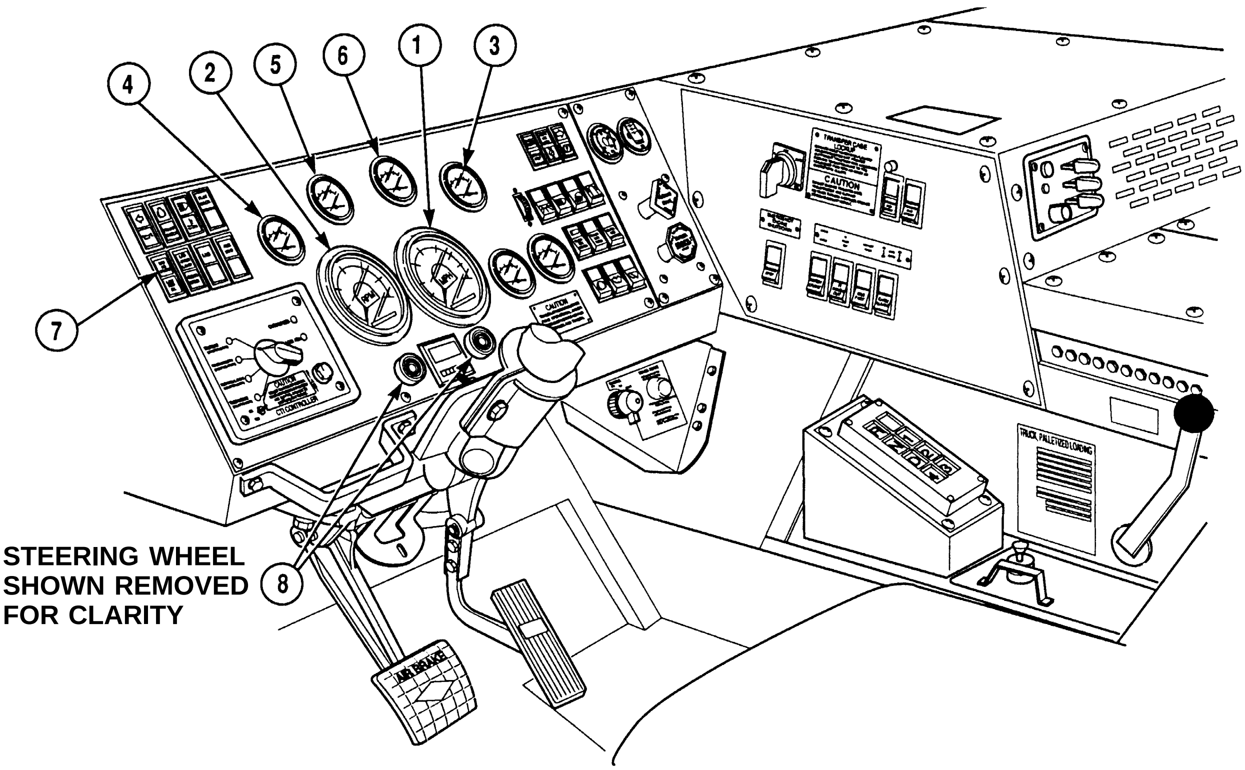

Figure 1-15. Instrument System

f. Instruments. The instrument system (Figure 1-15) includes all gages that give the operator information. The speedometer (1) receives signals from a sending unit mounted on the transfer case. Tachometer (2) input is provided from the DDEC controller. The fuel gage (3), oil pressure gage (4), water temperature gage (5) and transmission oil temperature gage (6) all receive electrical signals from sending units. These sending units monitor fluid level, pressure and temperature and send this information to the gages.

g. Warning Lights and Buzzers. The warning lights (7) and buzzers (8) in the cab are activated by sensors located in different systems. These include low air pressure, low engine oil pressure, low hydraulic oil level and high water temperature. When one or more of these sensors are activated, they energize the proper light and/or buzzer, informing the operator of a problem.

1-13. AIR SYSTEM.

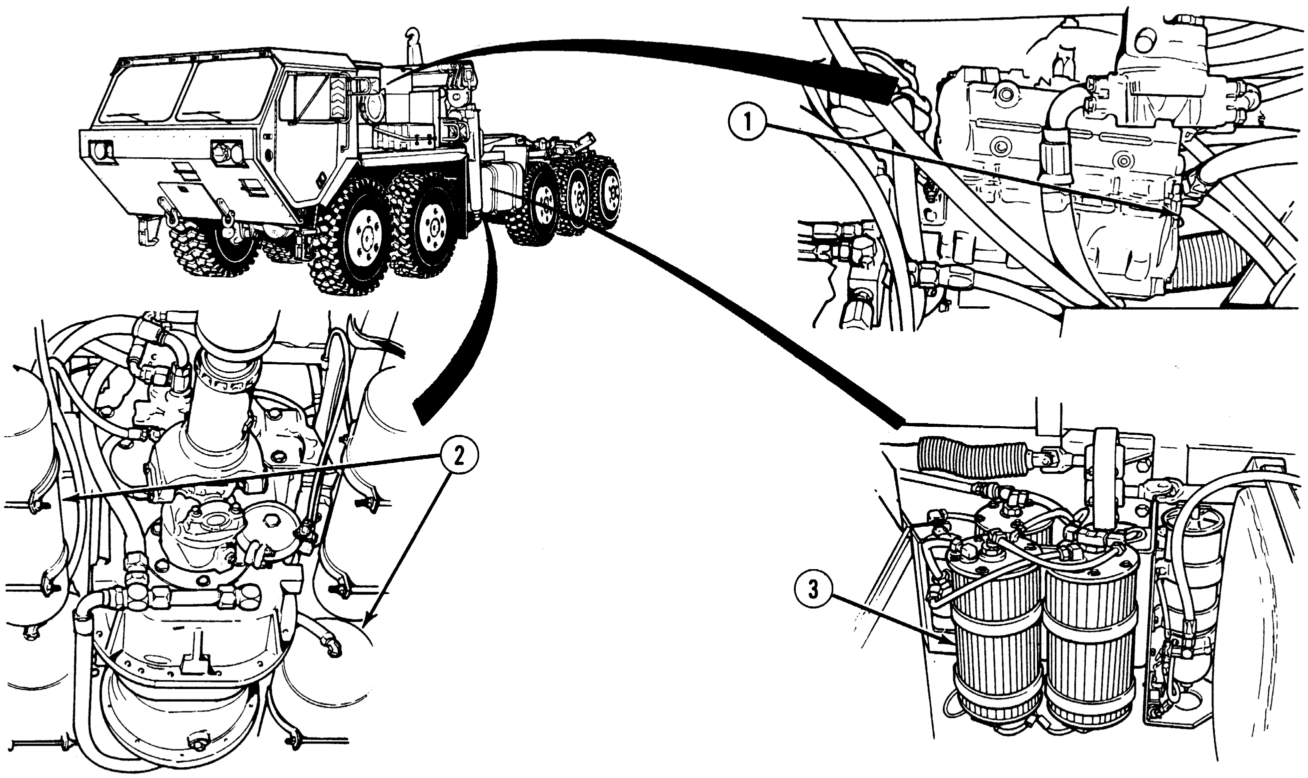

Figure 1-16. Air System

The air system (Figure 1-16) consists of an engine-driven air compressor (1) and five air reservoirs (2). The system includes the necessary valves and air lines to control the truck's air operated devices. Pressurized air from the air compressor is passed through the air dryer (3) to the reservoir. The air dryer removes dirt and moisture from the pressurized air. Air from one reservoir goes to the brake treadle valve. This air passes to the rear brake chambers, located on axles #3, #4, and #5, which control the rear axle service brakes. This air controls the rear axle service brakes. Air pressure in this system is shown by the red needle on the AIR PRESS gage. Air from another reservoir goes to the brake treadle valve. This air passes to the front brake chambers, located on axles #1 and #2, which control the front axle service brakes. Air pressure in this system is shown by the green needle on the AIR PRESS gage. The PARKING BRAKE valve applies or releases the rear axle (parking) brakes. The reservoirs are interconnected in such a way that if one reservoir fails, air will be supplied to release the rear axle (parking) brake from whichever reservoir is functioning. If air pressure falls below 60-70 psi (414-483 kPa) in either system, a buzzer will sound and the LOW AIR indicator warning light will light. If air pressure in the brake system falls below 30 psi (207 kPa), the rear brakes automatically apply.

1-14. HYDRAULIC SYSTEM.

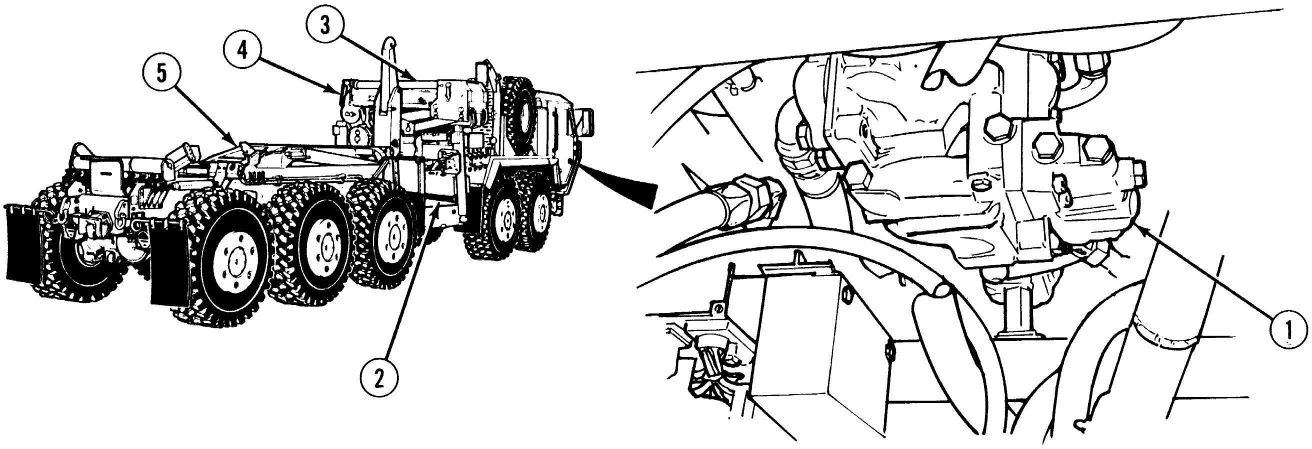

Figure 1-17. Hydraulic System

The hydraulic system (Figure 1-17) pumps (1) mounted in front of the engine provide the fluid power to operate the power steering, Self-Recovery Winch (SRW) (2), cooling fan (3), Material Handling Crane (MHC) (4) and Load Handling System (LHS) (5). A manually operated selector switch in the cab is used to select the auxiliary hydraulics.

1-15. STEERING SYSTEM.

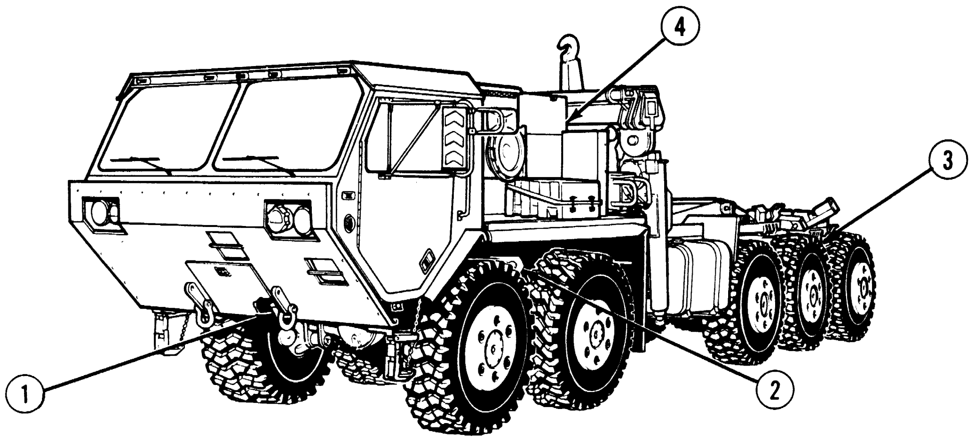

Figure 1-18. Steering System

Steering system (Figure 1-18) power is supplied to steering gears (1), (2) and (3) by an engine-driven pump. The steering fluid reservoir (4) is separate from the main hydraulic system. The steering wheel, which is mechanically linked to the steering gear, rotates a gear that positions a spool in the front steering gear (1). This motion is hydraulically transmitted to a piston in the intermediate steering gear (2) causing it to follow the pitman arm and transmit rotary motion to the rear steering gear (3). These pitman arms move the steering mechanism on the axles left or right causing the truck to steer left or right. An emergency backup hydraulic pump, driven by the transfer case middle shaft, supplies limited emergency steering.

1-16. SELF-RECOVERY WINCH (SRW).

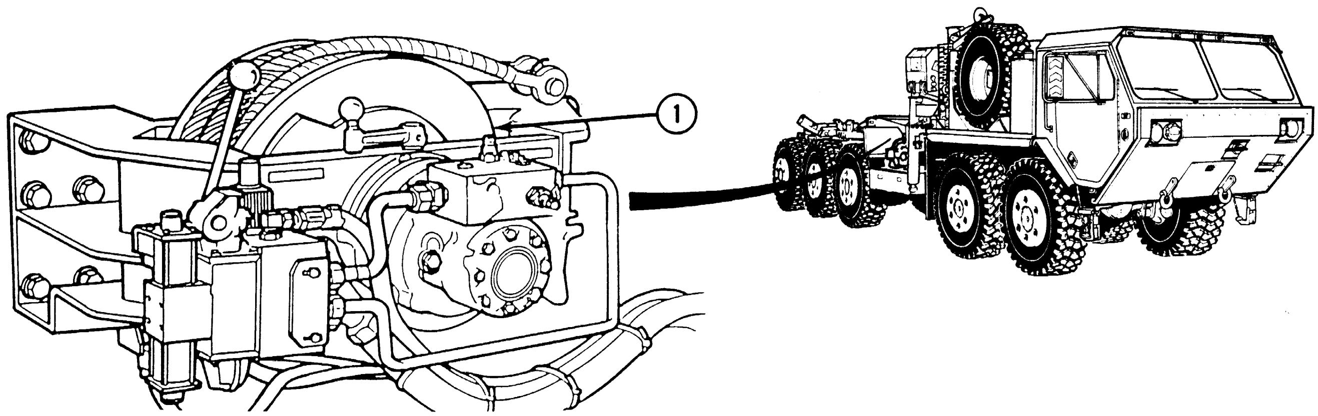

Figure 1-19. Self-Recovery Winch (SRW)

When specified, the truck is equipped with a winch (1, Figure 1-19) for self-recovery capable of forward and rearward deployment. The winch is equipped with a holding brake and hydraulic counter-balance valve to safely deploy and hold the full rated load of the winch. The winch brake is automatic and is fully engaged anytime the winch is stopped or not in use and is fully released during operation. The winch cable is equipped with a clevis end and roller assemblies are provided to guide the cable. The winch is controllable from the driver's position and at the winch itself. All controls revert to neutral when released.

1-17. MATERIAL HANDLING CRANE (MHC).

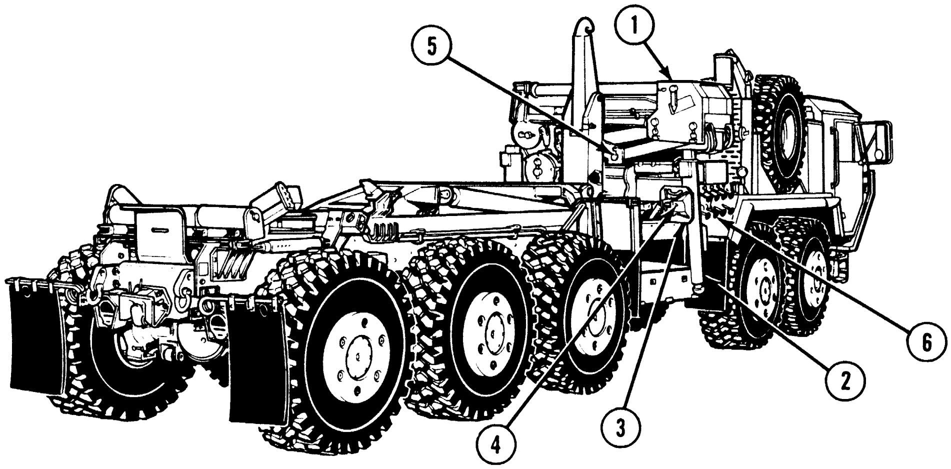

Figure 1-20. Material Handling Crane (MHC)

The truck Material Handling Crane (MHC) (Figure 1-20) is a fully hydraulic load-moment sensing crane (1), powered by the truck hydraulic system. The crane is mounted behind the cab, bolt-attached to the truck frame and is capable of lifting a 3,900 lb (1769 kg) pallet from any location on the FR. The crane can load/unload pallets to either side of the truck. Truck stability and leveling is accomplished with left- and right-side hydraulically operated stabilizers (2) that are fabricated as a part of the crane substructure. These stabilizers/outrigger jacks can be controlled from either side of the truck by individual hydraulic controls. The jacks can level the truck when it is inclined up to 7 degree side slope. Check valves are used to hold the outriggers position. Safety switches are installed in the outrigger jacks to prevent crane operation unless the outriggers are in place. The outrigger pads (3) are attached to the outrigger jacks by means of quick pins (4) and are stowed on the crane base. The pads swivel 360 degrees when installed on the jacks.

a. Hydraulic System. The hydraulic filters and strainers are located to provide direct access and to allow removal without causing damage to the truck. Bypasses are furnished, where necessary, to protect filters during cold temperature operation. All cylinder rods exposed during operations have a hard chromium plating. Integral mounted or cartridge-type holding valves prevent sudden cylinder collapse in the event of hose burst or major hydraulic failure. If a hydraulic system failure occurs, a hydraulic hand pump (5) located at the operator station permits the operator to lower any load to the ground and stow the crane. The MHC is operated by two hydraulic valve banks (6), located approximately 60 inches (152 cm) above ground on the passenger side of the truck. Four electro-proportional control valves with manual handles connected to spools are used to control crane proper function. Three additional proportional manual control valves are used for erection and outrigger control. The outrigger manual control valves are also duplicated on the driver's side of the truck.

1-17. MATERIAL HANDLING CRANE (CONT).

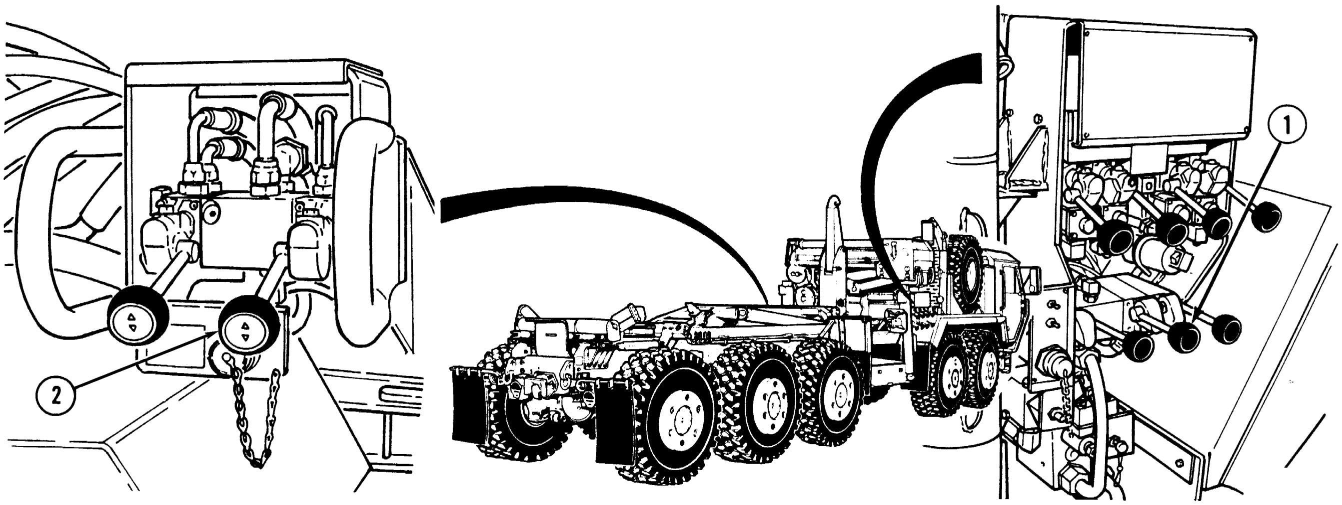

Figure 1-21. Fixed Controls

b. Fixed Controls. All crane controls and indicators (1, Figure 1-21) are located at the crane position on the passenger side of the truck. Controls (2) on the driver's side will also operate the outriggers. The controls are accessible to the operator while standing on the ground. Control valves, both crane and outrigger, automatically return to the neutral position should the operator inadvertently or intentionally release the control.

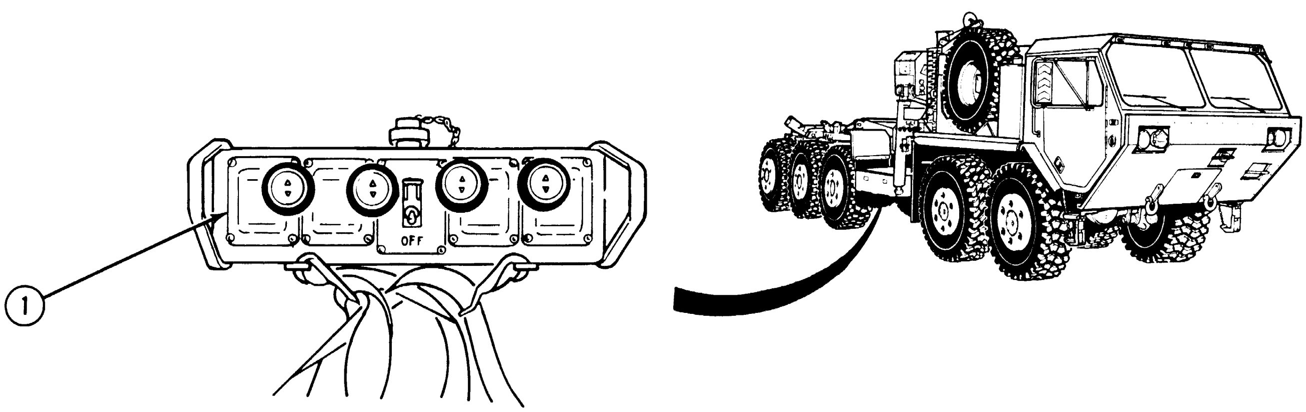

Figure 1-22. Remote Controls

c. Remote Controls. The remote control system (Figure 1-22) is designed to operate the spools of the directional control valve. Remote control is proportionally variable. Remote control (1) is provided with an emergency shutdown capability and designed so that when activated, all remote control crane functions cease and truck speed is reduced to idle. The operator can operate the remote control anywhere within 35 ft (10.7 m) of the crane base. The controller has multiple functions to match control levers on the fixed control except for the mast and outrigger controls.

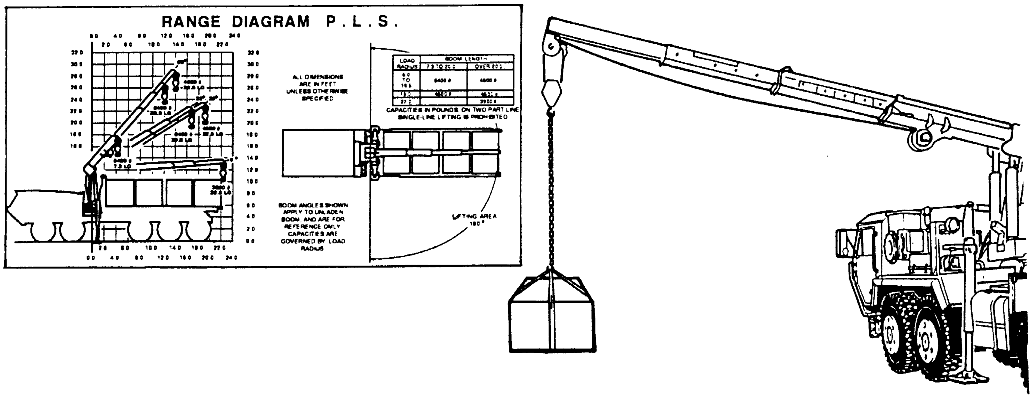

Figure 1-23. Overload Shutdown

d. Overload Shutdown. The crane is provided with an overload shutdown (Figure 1-23) which precludes structurally overloading. Two block and overload conditions are sensed through line-pull of the hoist. A preprogrammed micro-processor that is constantly comparing boom angle, boom length and hoist line pull activates solenoid valves in the telescope out, lift up, lift down and hoist up circuits when the unit is overloaded or two-blocked. During an overload condition, the crane's function cease. Hoist down, telescope in and swing in either direction can be used manually to bring the crane to a safe position.

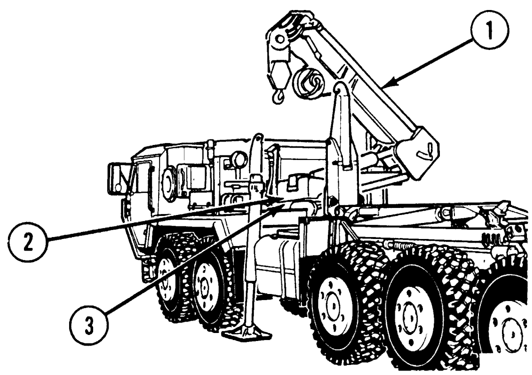

Figure 1-24. Hoist, Swing Drive and Brake

e. Hoist. The crane provides vertical lift of a 3,900 lb (1769 kg) load at 22.5 ft (6.86 m) by means of a hoist (1, Figure 1-24) with a 5.8 cu. in. (95 cu. cm.) motor. The hoist is controllable by manual control at the fixed operators station, or at the remote control. The hoist has a spring applied, hydraulically released multi-disc pack brake, hydraulically coupled to the hoist circuit, which applies automatically when the hoist control is released.

f. Swing Drive and Brakes. The swing drive (2) is a planetary gear box driven by a hydraulic motor to give a swing speed on 0.8 rpm. Mechanical stops limit the rotation to 180 degrees. The swing brake (3) is a spring applied, hydraulically released multi-disc pack, hydraulically coupled to the swing circuit, applying automatically when the swing control is released.

1-18. LOAD HANDLING SYSTEM (LHS).

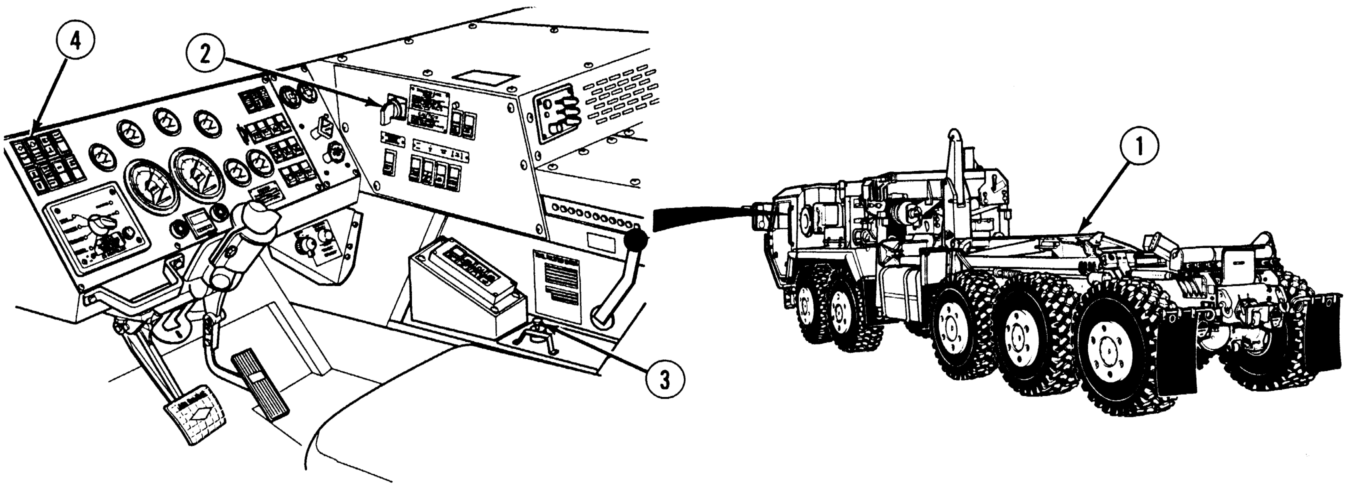

Figure 1-25. Load Handling System (LHS)

The truck is equipped with a Load Handling System (LHS) (Figure 1-25). The LHS (1) is fully hydraulic, powered by the truck hydraulic system and is operated by hydraulic selector switch (2) and joystick (3) located to the driver's right in the truck cab. The LHS control system is electrically powered from the truck electrical system. The LHS is capable of the following, with a flatrack (FR) loaded with 33,000 lb (15 metric tons) nominal payload:

- Loading/unloading the FR from the truck to 12 in. (30.5 cm) below ground level and any intermediate level,
- Loading/unloading from uneven ground slopes of 10 degrees from the trucks lateral and horizontal axis,
- Loading/unloading to/from the trailer or ramps in which the height is equal to or less than the height from the ground to the bottom of the FR (while on the truck).

a. Flatrack Locking. The LHS is designed with automatic locking features that secure the FR for all modes of transportation. The LHS can automatically guide, center and secure a FR to the truck so that even during rough trail operations, the FR remains safely secured.

b. LHS Overload. The LHS will not function when the payload exceeds 36,300 lbs (16,466 kg) maximum. A warning light (4), located in the cab in plain view of the driver, activates when a FR with a payload between 34,500 and 35,500 lbs (15,649-16,103 kg) is being loaded by the LHS while under the worst conditions.

c. Hydraulic System. Hydraulic filters are located to provide direct access and to allow removal without damage to the truck. By-passes are furnished where necessary to protect filters during cold temperature operation. All cylinder rods exposed during operation have a hard chromium plating.

d. Slave Hydraulics. Self-sealing quick disconnect hydraulic couplings and a hose with appropriate connectors are provided so that one PLS truck can readily hydraulically power the LHS of another PLS truck.

1-19. WHEELS AND TIRES.

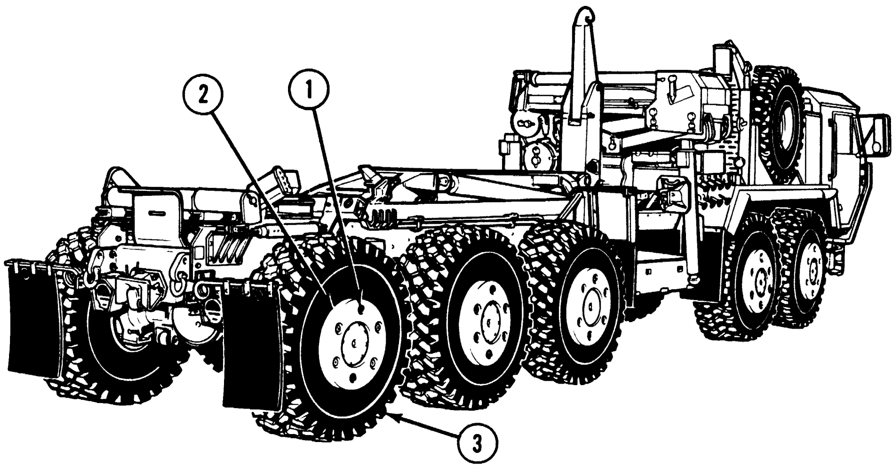

Figure 1-26. Wheels and Tires

Each truck has eleven wheel/tire assemblies (Figure 1-26); the ten installed on the truck axles plus a spare. The components of each wheel/tire assembly are the wheel, tire, valve stem, Central Tire Inflation System (CTIS), wheel valve, bead lock and wheel cover.

a. Wheel. The 20 by 10 inch wheel is manufactured in two pieces. Twelve studs (1) that protrude from the rear wheel half are used to bolt the two halves together. These studs are also used to mount the CTIS wheel valve bracket and secure the wheel cover (2).

b. Tire. The 16.00R20 tires (3) are tubeless.

c. Bead Lock. The bead lock is installed inside the assembled wheel and tire. It assures that the tire stays pressurized when tire pressure is low. It is manufactured in two halves that are bolted together.

d. CTIS Wheel Valve. The wheel valve assembly allows air flow in and out of the tire during CTIS inflation/deflation cycles. It is mounted to the wheel and secured by a bracket assembly. The input and output ports are fitted with two flexible and steel tubes in parallel.

e. Valve Stem. The valve stem connects inside the wheel and is routed to the CTIS wheel valve.

f. Wheel Cover. The entire wheel end contains a wheel cover to protect the CTIS valve and air lines from physical damage. This cover must always be in place whenever the truck is in operation. It is secured to the wheel via four of the wheel studs.

1-20. CENTRAL TIRE INFLATION SYSTEM (CTIS).

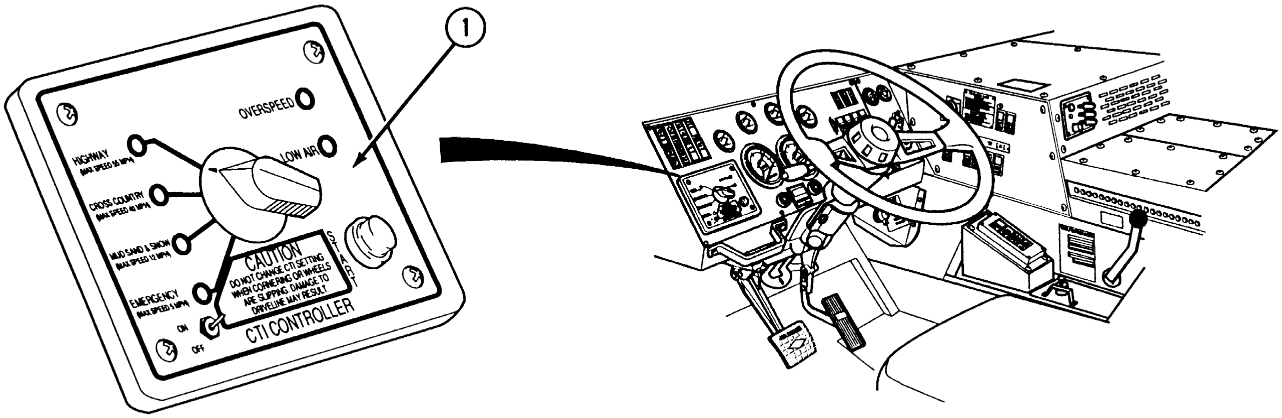

Figure 1-27. Central Tire Inflation System (CTIS)

The Central Tire Inflation System (CTIS) (Figure 1-27) is designed to adjust the pressure of all tires on the truck for different traction conditions. The CTIS controller (1) has four pressure settings which the operator selects and activates in the cab. The CTIS consists of control valves for air supply and distribution, a dash mounted electrical controller that adjusts tire pressure, along with required air tubing, electrical cables, air dryer and air compressor. The drive-line lock-up controls with the exception of the TRANSFER CASE LOCKUP are integrated with the CTIS to simplify operation of the truck. Refer to TM 9-2320-364-10 for operating controls and indicators for the CTIS.

1-21. CAB.

The truck cab features a full width configuration and is positioned forward of the first axle. The cab controls and operating mechanisms are designed to accommodate a crew of two wearing the full range of clothing. Heating, ventilation, lighting, noise, vibration and shock control is provided for personnel use. The cab contains all of the driving controls and gages and some operating controls for the mounted equipment. Refer to TM 9-2320-364-10 for information concerning operating controls and indicators.

1-22. PLS TRAILER (PLST).

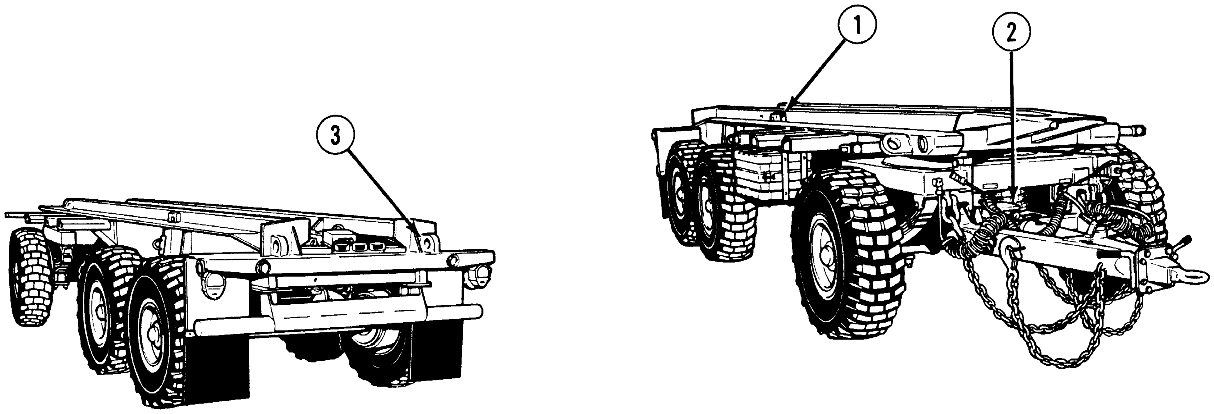

Figure 1-28. Palletized Load System Trailer (PLST)

The Palletized Load System Trailer (PLST) (Figure 1-28) is a three axle trailer designed to carry a Flatrack (FR) with a 33,000 lb (15 metric tons) nominal payload. It can accommodate both full and partial loaded flatracks. Guides laterally position the FR on the trailer rear stops and these locate the longitudinal position of the FR in relation to the PLST. These stops prevent the FR from sliding rearward. A pneumatic locking device (1), located between the frame rails just above the second axle, hooks to engage the lock points and secure the FR to the PLST. An air valve controls the position of the lock hooks. Springs retain the hooks in the locked position. The PLST has a standard 12 volt electrical system with 24 volt military adapters (2). Also provided are two intervehicular electrical connecting cables of sufficient length to reach the towing truck. Two towing eyes (3), at the rear of the PLST permit towing with a medium duty tow bar. The spare tire carrier is ahead of the second axle in the center of the frame. The spare tire is held in place with bolts through the wheel bolt pattern. The spare tire and wheel assembly can be raised and secured in the spare tire carrier by the trailer-provided hand-operated winch. The PLST uses turntable-type steering for tracking and turning and is equipped with an air braking system. All three axles use 16.5 in. diameter by 7 in. wide (420 mm by 180 mm) S-cam brakes. The PLST has a dual brake system with separate service and emergency brake system. The PLST brake system is activated and charged by the truck air supply. The brakes are self-adjusting. Refer to TM 9-2330-385-14 for Operator’s, Unit, Direct Support and General Support Maintenance for the PLS Trailer.

a. Service Brakes. The six service brakes on the PLST are powered by 24/20 inch (61/51 cm) brake chambers. Six inch automatic slack adjusters are provided with all brake chambers. The service brakes are activated when a signal from the foot-operated treadle valve or hand operated control valve is sent through a series of relay valves. The relay valves convert the proportioned service brake signal from the truck into a regulated service brake chamber pressure.

1-22. PLS TRAILER (PLST) (CONT).

b. Parking Brakes. Spring chamber parking brakes are provided on all PLST axles. The application and release of the six PLST spring brakes is controlled by a spring brake control valve. An absence of air pressure in the emergency/spring brake supply line causes the spring brake control valve to activate the spring brakes. The spring brake control valve also retains air pressure in the PLST air reservoir so the PLST spring brakes can be released by the spring release valve. The spring brake control valve also prevents compounding of pressures in the brake chambers by relieving the pressure on the spring brake side of the chambers when the spring brakes are set and the service brakes are applied. The PLST spring brake release valve is located on the right front corner of the trailer. This valve releases the PLST spring brakes without a prime mover air supply when there is sufficient air reservoir pressure. After the spring brakes have been released, they can be reapplied by actuating the release valve. When air is supplied through the emergency/spring brake supply line, the spring release valve is over-ridden and the trailer spring brakes are released. If there is insufficient air reservoir pressure to release the trailer parking brakes, a cage nut release is provided on each spring chamber to mechanically release the spring brakes.

c. Emergency Brakes. Whenever there is a loss of pressure from the truck or PLST air reservoir, the emergency brakes are activated.

1-23. PLS FLATRACK (FR).

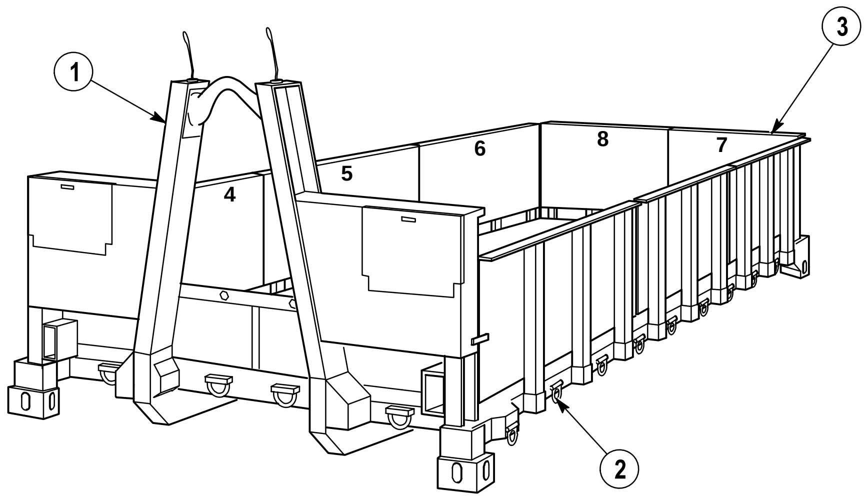

Figure 1-29. Palletized Load System Flatrack (FR)

The Flatrack (FR) (1, Figure 1-29) accommodates a 33,000 lb (15 metric tons) nominal payload during all modes of transportation and during all specified load/unload operations. The FR is designed to withstand the dynamic and static loads imposed while fully loaded during LHS load/unload operations. The FR has an empty weight of 3250 lb (1474 kg) without sideboards. The FR can accommodate palletized, break bulk and 20 ft (6.1 m) ISO container payloads. Tiedowns (2) and sideboards (3) are used to contain and hold cargo. Refer to TM 9-3990-206-14&P for Unit, Direct Support and General Support Maintenance for the PLS Flatrack.

CHAPTER 2

VEHICLE MAINTENANCE

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Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT.

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

2-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT.

For a listing of special tools, TMDE and support equipment, refer to the Maintenance Allocation Chart (MAC), Appendix B, of this manual and to the Repair Parts and Special Tools List (RPSTL), TM 9-2320-364-24P.

2-3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List (TM 9-2320-364-24P) covering Unit Maintenance for this equipment.

Section II. SERVICE UPON RECEIPT

2-4. UNPACKING AND DEPROCESSING.

a. Unpacking. Upon receipt of a new truck, the receiving organization must see if it has been properly prepared for service and is in good condition. Inspect all assemblies, subassemblies and accessories to be sure they are in proper working order (TM 9-2320-364-10). Secure, clean and correctly adjust and/or lubricate as needed (Para 2-9 and TM 9-2320-364-10). Check all tools and equipment to be sure every item is accounted for (TM 9-2320-364-10-HR), in good condition, clean and properly mounted or stowed (TM 9-2320-364-10).

b. Deprocessing. Read “Processing and Deprocessing Record of Shipping, Storage and Issue of Trucks and Spare Engines” tag, (DD Form 1397), and follow all precautions checked. This tag should be attached to the steering wheel, shifting lever or ENGINE START switch.

2-5. HAND RECEIPT MANUAL AND INVENTORY OF EQUIPMENT.

When a new truck is first received by the using organization, it is necessary to inventory the truck equipment. For detailed procedures, refer to Hand Receipt Manual, TM 9-2320-364-10-HR.

2-6. SERVICE BEFORE OPERATION.

a. General.

(1) Refer to TM 9-2320-364-10 for operating instructions for the truck.

(2) Upon receipt of a new, used or reconditioned truck, the receiving organization must see if it has been properly prepared for service and is in good condition (TM 9-2320-364-10). Inspect all assemblies, subassemblies and accessories to be sure they are in proper working order. Secure, clean and correctly adjust and/or lubricate (Para 2-9 and TM 9-2320-364-10) as needed. Check all tools and equipment to be sure every item is there (TM 9-2320-364-10-HR), in good condition, clean and properly mounted or stowed (TM 9-2320-364-10).

(3) Follow general procedures for all services and inspections given in TM 9-2320-364-10.

b. Inspection and Servicing Equipment.

NOTE

If truck has been driven to the using organization, most or all of the following work should have been done.

(1) When truck is received, inspect all items for damage that may have occurred during shipping and unloading operations. Pay close attention to any loose or missing nuts, bolts, screws, access plates, drain plugs, draincocks, oil plugs, assemblies, subassemblies, or components that may be easily lost or broken in transit. Check Basic Issue Items (BII) against checklist to make sure all items are accounted for and are in good condition (TM 9-2320-364-10-HR). Carefully list all discrepancies.

WARNING

- Drycleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Drycleaning Solvent is 140 degrees F (60 degrees C) and Type III Drycleaning Solvent is 200 degrees F (93 degrees C). Failure to do so may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

(2) Clean all exterior surfaces coated with rust-preventive compound with drycleaning solvent (Item 87, Appendix C).

(3) Perform the Semiannual (6-month or 3,000-mile) Preventive Maintenance Checks and Services (PMCS), Table 2-1.

(4) Lubricate specific points shown in Para 2-9 and TM 9-2320-364-10 regardless of interval. Do not lubricate gear cases or engine. Check processing tag for gear case and engine oil. If tag states the oil is good for 500 miles (805 km) of operation and is of the proper grade for local climatic operation, check oil level but do not change oil.

(5) Schedule a semiannual service in accordance with DA Pam 738-750. Arrange for front tandem crossmember torque check (Para 15-6) at 3,000 miles (4,828 km).

(6) Activate battery if truck is delivered with dry-charged battery (TM 9-6240-200-12).

2-6. SERVICE BEFORE OPERATION (CONT).

WARNING

- Do not remove the radiator cap when the engine is hot; steam and hot coolant can escape and burn personnel.
- Use extreme care when removing the radiator pressure cap. Sudden release of pressure can cause a steam flash which could seriously injure personnel. Slowly loosen cap to the first stop to relieve pressure before removing cap completely. After opening, securely tighten cap.
- Use a clean, thick waste cloth or like material to remove radiator pressure cap. Avoid using gloves. If hot water soaks through gloves, personnel could be burned.

(7) Check radiator coolant. Check if solution is adequate for expected climatic conditions. Refer to TB 750-651 for preparation of antifreeze solutions. Put tag near filler cap with type of antifreeze and degree of protection written on tag.

c. Special Service Instructions.

(1) Truck Body and Sheet Metal Inspection.

(a) Inspect body and sheet metal for evidence of damage during shipment.

(b) Check doors, latches and hinges on compartments for proper operation.

(c) Check mounting hardware and tighten as necessary.

(2) Truck Cab Inspection.

(a) Inspect cab for evidence of damage during shipment.

(b) Inspect windshields and window glass for cracks or other damage.

(c) Check door latches, hinges and windows for proper operation.

(d) Check seats and seat belts to ensure they are securely installed and that operator’s seat adjustments are functioning properly.

(3) Engine Inspection.

(a) Remove any seals, plugs or tape used to seal air inlets and ports on the engine during shipping.

(b) Check crankcase oil level with dipstick.

(c) Examine air cleaner element for dirty or restricted condition.

(d) Inspect engine and cooling hose connections for evidence of leakage.

(e) Clean away any obstruction of cooling air flow to radiator.

(4) Transmission Inspection.

(a) Check fluid level with dipstick.

(b) Check external hoses and tubes for evidence of leakage.

(5) Transfer Case Inspection.

(a) Check level of lubricant at fill plug.

(b) Inspect lubrication pump and external hoses and tubes for evidence of leakage.

(c) Operate driveline controls and observe power to front axle.

(d) Inspect bolts on driveline U-joints.

(6) Electrical System Inspection.

(a) Inspect battery cable connections and clean and tighten as necessary.

(b) Check light for burned out lamps, loose connections and dirty or broken lenses.

(c) Ensure alternator is charging properly.

(d) Ensure all electrical equipment functions.

(7) Air System Inspection.

(a) Drain any water from reservoirs.

(b) Inspect air lines and connections for leakage.

(8) Steering System Inspection.

(a) Check steering hydraulic reservoir for proper fluid level.

(b) Examine steering linkage and steering gears for damage incurred during shipment.

(c) Examine steering hoses and connections for evidence of leakage.

(d) Check steering system for proper operation during road test.

(9) Chassis and Running-Gear Inspection.

(a) Check all lubricant levels.

(b) Check axle housing pressure vents to ensure freedom from foreign matter.

(10) Tire Inspection.

(a) Check tire inflation.

(b) Inspect tires for serious cuts, bubbles, cracks, bruises, dry-rot, foreign objects or exposure of internal cords. Remove foreign objects lodged between treads.

(c) Check all wheel mounting nuts for proper torque, (TM 9-2320-364-10).

(d) Check front and rear suspension for broken spring leaves, damaged components or damaged air bags.

2-6. SERVICE BEFORE OPERATION (CONT).

(11) Fuel System Inspection.

(a) Check fuel level and replenish, if necessary.

(b) Inspect fuel hoses, tubes, connections and filters for evidence of leakage.

(12) Arctic Kit. If truck is equipped with an arctic kit, and is going to operate in non-arctic climates, remove arctic alternator belts and replace with standard belts.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION.

This section contains Unit Maintenance PMCS requirements for the truck. The PMCS tables contain checks and services necessary to ensure the truck is ready for operation. Using the PMCS tables, perform maintenance at the specified intervals. Perform preventive maintenance checks and services in TM 9-2320-364-10 before doing the Unit preventive maintenance.

2-8. GENERAL MAINTENANCE PROCEDURES.

WARNING

- Drycleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Drycleaning Solvent is 140 degrees F (60 degrees C) and Type III Drycleaning Solvent is 200 degrees F (93 degrees C). Failure to do so may result in injury or death to personnel.
- If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.

a. Cleanliness. Dirt, grease, oil and debris only get in the way and may cover up a serious problem. Use drycleaning solvent (Item 87, Appendix C) on metal surfaces and soapy water on rubber.

b. Bolts, Nuts and Screws. Check bolts, nuts and screws for obvious looseness, missing, bent or broken condition and tighten or replace as necessary. If they cannot be checked with a tool, look for chipped paint, bare metal or rust around bolt heads.

c. Welds. Look for loose or chipped paint, rust or gaps where parts are welded together. If a bad weld is found, notify the supervisor.

d. Electric Wires and Connectors. Look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

e. Fluid Hoses, Tubes and Fittings. Look for wear, damage, leaks and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector may indicate a leak. If connector or fitting is loose, tighten it. If something is broken or worn out, repair or replace per applicable procedure.

f. Fluid Leakage. It is necessary to know how fluid leakage affects the status of fuel, oil, coolant and the hydraulic systems. The following are definitions of the types/classes of leakage necessary to know in order to determine the status of the truck. Learn, then be familiar with them and REMEMBER - WHEN IN DOUBT, NOTIFY THE SUPERVISOR!

CAUTION

Equipment operation is allowable with minor leakage (Class I or II). Consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify the supervisor. When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS. Class III leaks should be repaired per applicable procedure.

(1) Class I. Seepage of fluid as indicated by wetness or discoloration not great enough to form drops.

(2) Class II. Leakage of fluid great enough to form drops but not enough to cause drops that fall from item being checked/inspected.

(3) Class III. Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

g. Air System Components. Look for worn, damaged or leaking components. Make sure clamps and fittings are tight. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, either repair or replace it.

h. Damage. Damage is defined as any condition that affects safety or would make the truck unserviceable for mission requirements.

i. Lubrication Fittings. Some trucks have lube for life tie-rod ends and drag link ends. These do not require lubrication and do not have a lube fitting.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES.

a. Do the SEMIANNUAL PREVENTIVE MAINTENANCE (Table 2-1) once every six months and/or every 3,000 miles (4,828 km) whichever comes first.

b. Do the ANNUAL PREVENTIVE MAINTENANCE (Table 2-1) once each year and/or every 6,000 miles (9,654 km) whichever comes first.

c. Do the BIENNIAL PREVENTIVE MAINTENANCE (Table 2-1) once every two years and/or every 12,000 miles (19,312 km) whichever comes first.

d. Refer to the specific technical manuals (Table 2-2), for preventive maintenance for special kits.

e. Always do the PREVENTIVE MAINTENANCE in the same order until it gets to be a habit. Once practiced, it will be easy to spot anything wrong in a hurry. Perform the checks and services listed in Tables 2-1 and 2-2 in the order listed.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

f. If something does not work, troubleshoot with instructions in Section IV.

g. If anything looks wrong and is not fixed, write a DA Form 2404.

h. When doing preventive maintenance, take along the tools and supplies needed to make all the checks, including a clean cloth or two.

i. The following is a breakdown of the PMCS table:

(1) "Item No." column. Checks and services are numbered in a logical order for moving around the truck. The item number column is used as a source of items numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, for recording results of the PMCS.

(2) "Interval" column. The column identifies when the PMCS should be performed. Lubrication services coincide with the vehicle's Semiannual Preventive Maintenance Service. For this purpose, a 10 percent tolerance (variation) in specified lubrication point mileage is permissible. Those vehicles not accumulating 1,000 miles (1,609 km) in a 6-month period will be lubricated at the time of Semiannual Preventive Maintenance Service.

(3) "Item To Be Inspected" column. This column identifies the item to be inspected.

(4) "Procedure" column. This column contains all the information required to do the check/inspection. Art is integrated into the column to aid the user in identifying items. Whenever replacement or repair is recommended, reference is made to the applicable maintenance instructions.

(5) "Not Mission Capable If:" column. This column contains a brief statement of the condition (e.g., malfunction, shortage) that would cause the vehicle to be less than fully ready to perform its assigned mission.

NOTE

- If the vehicle must be kept in continuous operation, do only the procedures that can be done without disturbing operation. Make complete checks and services when the vehicle is shut down.
- Oil filters must be serviced/cleaned/changed as applicable, when they are known to be contaminated or clogged and at prescribed intervals.

j. For operation of equipment in protracted cold temperatures below -15 degrees F (-26 degrees C), remove lubricants prescribed in lubrication table for temperatures above -15 degrees F (-26 degrees C). Relubricate with lubricants specified in lubrication table for temperatures below -15 degrees F (-26 degrees C). If OEA lubricant is required, see the temperature ranges prescribed in the lubrication table. OEA lubricant is to be used in place of OE/HDO 10 lubricant for all temperature ranges where OE/HDO 10 is specified in the lubrication table.

k. Perform all semiannual inspections in addition to the annual inspections at the time of the annual inspection. Perform all annual and semiannual inspections in addition to the biennial inspections at the time of the biennial inspection.

l. Engine oil/transmission/hydraulic fluids must be sampled at 100 hours of operation or at 90-day intervals, whichever comes first, as prescribed by DA Pam 738-750. Hard-time intervals will be applied in the event AOAP laboratory support is not available.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS).

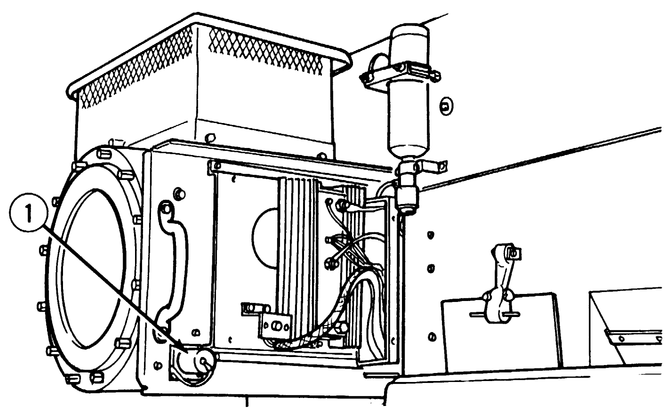
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			PRIOR TO ROAD TEST Ensure Operator/Crew has performed PMCS listed in TM 9-2320-364-10. **ROAD TEST** Maintenance personnel will be with vehicle operator to assist in performing PMCS checks and verify pre-service checks. **NOTE** • The following will be performed during the road test. These inspections must be performed before any -20 level PMCS regardless of interval. • For road test, vehicle will be driven at least five miles over different ground to give enough time to detect any malfunctions.	
1	Semi-Annual	Pre-Service Checks	***a.*** Notice if starter engages smoothly and turns the engine at normal cranking speed.	***a.*** Starter inoperative or makes excessive grinding sound.
			b. Listen for unusual engine noise at idle, at operating speeds, and under acceleration. Be alert for excessive vibration and the smell of oil, fuel, or exhaust.	***b.*** Engine knocks, rattles, or smokes excessively.
			c. Check for transmission response to shifting and for smoothness of operation in all speed ranges. Be alert for unusual noises and difficulty in shifting in any speed range.	***c.*** Transmission shifts improperly, does not shift or makes excessive noises.
			CAUTION Truck must be parked and transmission in neutral when making this check. Transfer case will be damaged if shifted while truck is moving.	
			d. Check for transfer case response to shifting and for smoothness of operation in all gear ranges (HI and LO). Be alert for unusual noises and difficulty in shifting in any gear range.	***d.*** Transfer case jumps out of gear or makes excessive noises.
			e. Test for response to accelerator feed. Observe for sticking pedal.	***e.*** Pedal sticking or binding.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Pre-Service Checks (continued)	***f.*** With vehicle speed approximately 5 mph (8 kph) turn steering wheel to left, then right, to detect steering backlash, shimmy, or free play of more than 1-1/2 inches (38 mm) in either direction. Vehicle should respond instantly. With vehicle moving on straight, level terrain, lightly hold steering wheel to check for pull and wandering.	***f.*** Steering binds, grabs, wanders or free play is more than 1-1/2 inch (38 mm) in either direction.
			g. Apply brake pedal with steady force. Vehicle should slow down and stop without pulling to one side or jerking. Release brake pedal. The brakes should release immediately and without difficulty.	***g.*** Brakes chatter, pull to one side or inoperative. Brakes will not release.
			h. Observe vehicle response to road shocks. Side sway or continuous bouncing indicates a malfunction.	***h.*** Handling is unstable.
			i. Check that Central Tire Inflation System (CTIS) controls and indicators operate properly in all modes.	***i.*** If CTIS controls or indicators do not operate properly.
			j. Set parking brake, set transmission to drive (D) and run engine to 1000 rpm. Truck should not move.	***j.*** Truck moves with parking brake on with engine at 1000 rpm.
			k. Check engine brake operation. Refer to Operator's Manual, TM 9-2320-364-10.	***k.*** If brake does not work properly, or is unoperable.
			l. Pay attention to how truck responds to road conditions. Swaying or constant bouncing indicates suspension damage.	***l.*** If excessive swaying or bouncing is noticed.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			AFTER ROAD TEST	
			a. Ensure the vehicle has been cleaned of mud, gravel, etc., from the underbody outside and crew compartment area.	***a.*** The vehicle is excessively dirty or covered with mud.
			CAUTION Do not hold steering wheel at full left or right position for longer than 10 seconds. Oil overheating and pump damage can result.	
			b. With vehicle stopped, turn steering wheel to extreme left, then to extreme right to check for hard steering.	***b.*** Hard steering is evident.
			c. Check engine operation at all speeds. Ensure that engine does not go over engine governed speed - no load (2175-2275 rpm).	***c.*** Engine governed speed - no load is below 2175 rpms or exceeds 2275.
	LEFT FRONT SIDE OF TRUCK			
2	Semi-Annual	DUVAC	Check wiring for fraying, splits and loose connections. Tighten loose connections. Repair if wiring is frayed or split. Refer to Para 7-101.	Wiring is frayed or split or any loose connections.
3	Semi-Annual	Electric Slave Receptacle	Check electric slave receptacle terminals (1) for damage. Replace terminals if damaged. Refer to Para 7-101. Coat terminals with electrical sealant (Item 68, Appendix C).	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

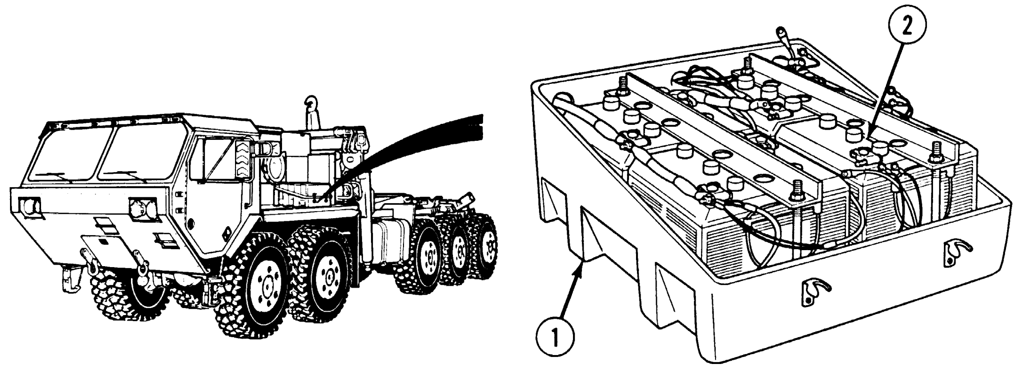
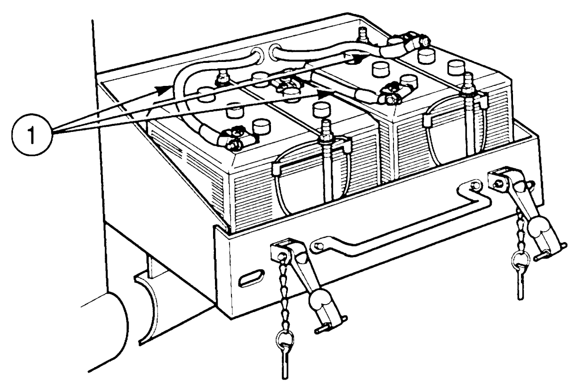
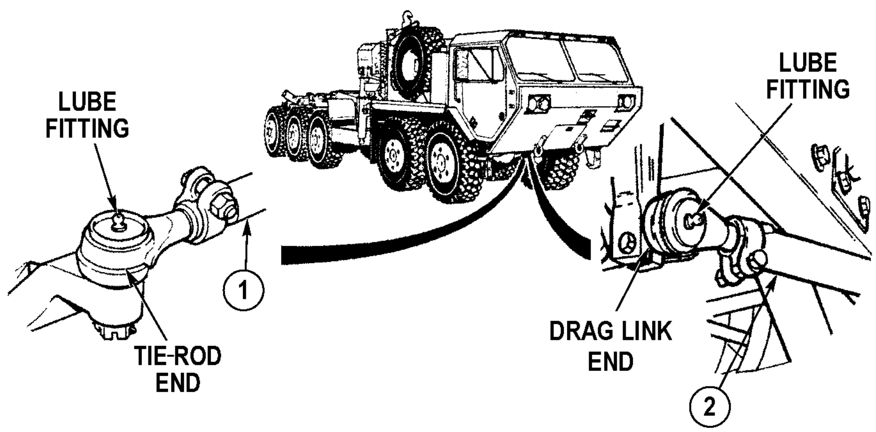
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
4	Semi-Annual	Battery Box	Check battery box (1) for acid spills and debris. If acid spills are visible, clean batteries (2) and battery box (1).	
				
			NOTE • If equipped with arctic batteries, follow same PMCS procedures for regular batteries. • Refer to TM 9-6140-200-14 for more specific details on battery maintenance.	
5	Semi-Annual	Batteries	Check and record specific gravity of each cell. Check battery cables (1) for fraying, splits and looseness. Tighten loose parts. Replace battery cables if frayed or split. Refer to Paras 7-90, 7-91 or 21-4.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
6	Semi-Annual	Sheet Metal and Frame	Inspect sheet metal and frame for evidence of corrosion damage such as surface color change, surface separation, blistered paint, rust-through, or other evidence of damage.	Sheet metal is affected to the point of damage to the parts.

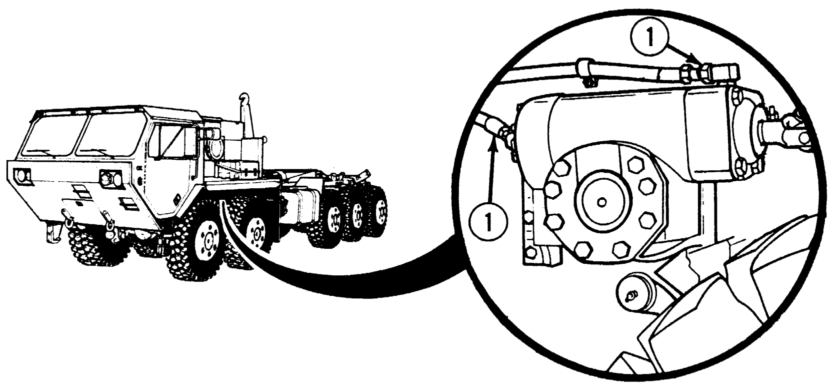


Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
7	Semi-Annual	Axle No. 1 and No. 2 Drag Links and Tie-Rods	***a.*** Check tie-rods (1) and drag links (2) for damage. Replace missing nuts or bolts. Replace damaged tie-rods and adjust misaligned linkages (Para 14-11). ***b.*** Check for excessive wear of tie-rod ends or drag link ends (Para 14-12). **NOTE** • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • Some trucks have lube for life tie-rod ends and drag link ends. These do not require lubrication and do not have a lube fitting. ***c.*** Lubricate tie-rod ends and drag links with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	***a.*** Drag links are broken, cracked, or misaligned. ***c.*** Fittings will not purge old lubricant out of component.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

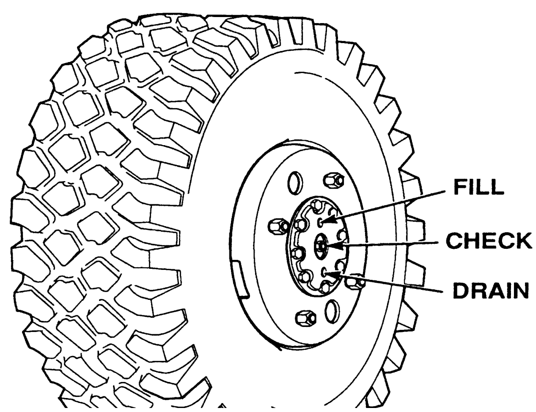
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
8	Semi-Annual	Axle No. 1 and No. 2 Drag Links and Tie-Rods	***a.*** Check steering shafts, intermediate steering gear, pitman arm, Axle No. 2 drag link, tie-rod and steering parts for looseness, breaks and cracks. Replace steering system parts if damaged or missing. Refer to Paras 14-3 through 14-17. Tighten loose parts. ***b.*** Check for excessive wear of tie-rod ends or drag link ends (Para 14-12).	***a.*** Drag link or intermediate steering gear is damaged or missing.



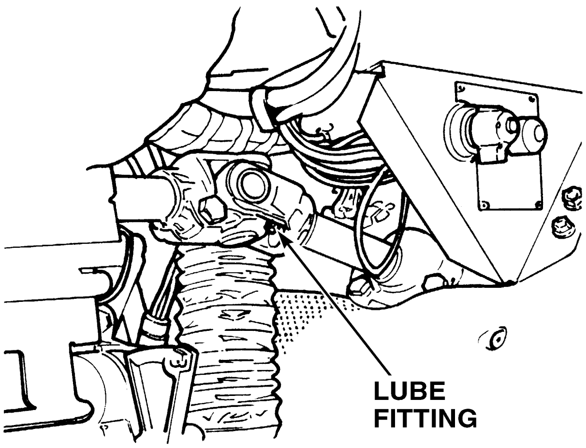
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
9	Semi-Annual	Steering Hoses and Tubes	Follow routing of all hydraulic steering hoses and tubes (1). Inspect for loose fittings, chafing, cracks and leaks.	Loose fittings, chafing, cracks or leaks.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

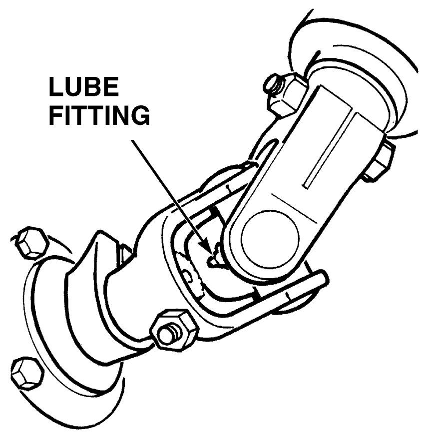
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE • Change lubricant in new or rebuilt axles at 1,000 miles (1,609 km), but no sooner than 500 mi (805 km). If truck is operated in ambient temperatures over 100 degrees F (38 degrees C) the lubricant should be drained and refilled every 3000 mi (4,828 km). During all lubricant changes, remove metal particles from magnetic drain plugs. Fill wheel ends first. • Initial fill and level checks for the axles will be made from the housing side plugs. Oil level should be at bottom of the hole. Planetary wheel end level is at the bottom of the center check plug. Fill slowly through the 3/4 in. (19 mm) fill holes until oil runs out the center check location. Scheduled oil level checks will be made at these same locations. • Axles No. 3 and 4 (non-steering axles). Scheduled oil level checks will be made only at the axle housing and not the planetary wheel ends on the rigid axles. Due to internal venting the wheel ends will seek the same level as the axle housing, and as a result, no checks should be made after the initial fill/check of the wheel end. 	
10	Semi-Annual	Planetary Hub Gears (all axles)	Remove center check plug and check lubricant level every 3,000 miles (4,828 km) or semiannually, whichever comes first. Fill as necessary with GO. Refer to Table 2-3.	Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

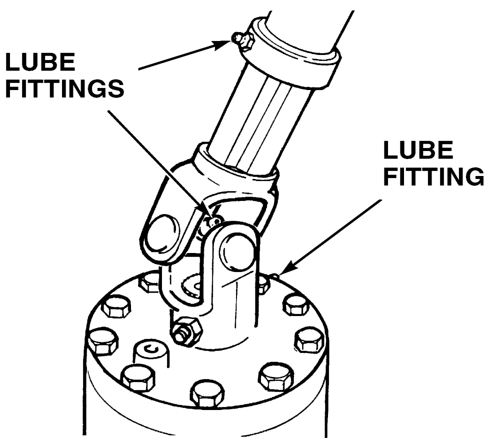
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



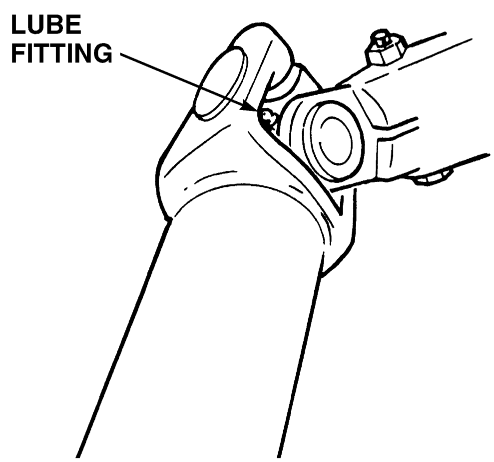
STEERING COLUMN LINKAGE (UNDER DASH)



STEERING COLUMN LINKAGE (UNDER DASH)



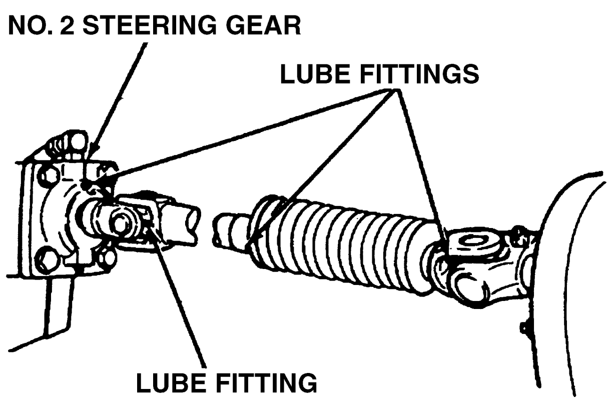
STEERING COLUMN LINKAGE AND FRONT STEERING GEAR

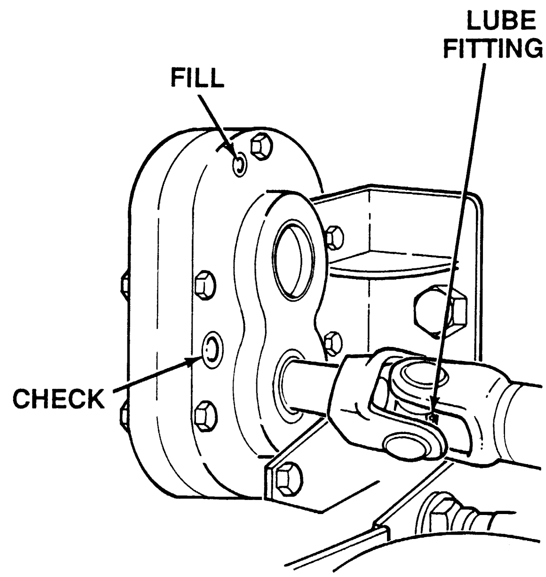


STEERING COLUMN LINKAGE (AT FRONT STEERING GEAR)

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove the fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component.	
11	Semi-Annual	Steering Column	Lubricate the steering column, steering linkage and front steering gear with GAA (6 fittings) every 1,500 miles (2,414 km) or semiannually, whichever comes first.	Fittings will not purge old lubricant out of component.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).





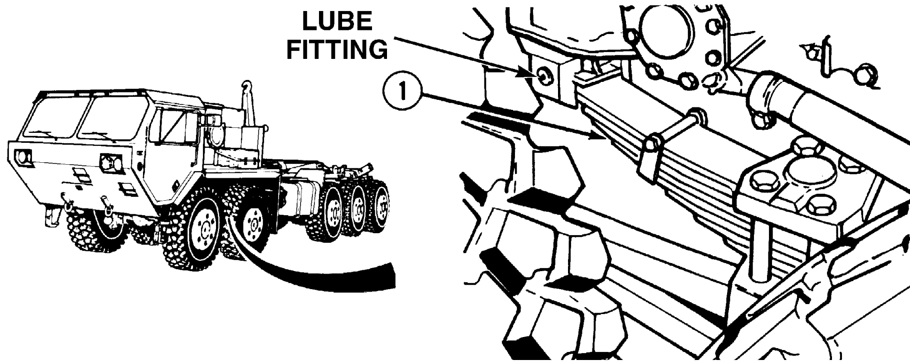
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
12	Semi-Annual	Steering Shaft and 2.21:1 Steering Gearbox	***a.*** Check shaft and gearbox for missing parts, bent parts, or misalignment. Replace missing or bent parts. Adjust misaligned parts. Refer to Para 14-9. **NOTE** • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • When greasing steering shaft slip joint lube fitting, apply two pumps from a manual grease gun or two clicks from a pneumatic grease gun. If rubber boot appears to be full of grease, remove tie strap from end of rubber boot. Push boot forward and wipe off excess grease from boot and steering shaft. Position rubber boot correctly on steering shaft and install new tie strap.	***a.*** Intergear link is broken, cracked or misaligned.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE When greasing fittings on steering gears, apply two pumps from a manual grease gun or two clicks from a pneumatic grease gun. This will prevent seal from being pushed out of bore.	
		Steering Shaft and 2.21:1 Steering Gearbox (continued)	***b.*** Lubricate the steering shaft and steering gearbox fittings with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	***b.*** Fittings will not purge old lubricant out of component.
			c. Lubricate the intergear link fittings with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	**c.** Fittings will not purge old lubricant out of component.
			NOTE Remove check plug from 2.21:1 steering gear-box and check oil level. Add oil as required until oil appears at check plug opening. Apply sealant (Item 72, Appendix C) to check plug threads prior to installing.	
			d. Check fluid level in 2.21:1 steering gearbox every 3,000 miles (4,828 km) or semiannually, whichever comes first. Fill with GO as required. Refer to Table 2-3.	***d.*** Any Class III leaks are found.
			e. Follow routing of all hydraulic steering hoses and tubes. Inspect for loose fittings, chafing, cracks and leaks. If loose fittings are found, tighten.	***e.*** Chafing, cracks or Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
13	Semi-Annual	Leaf Springs (Axles No. 1, No. 2, No. 4 and No. 5)	***a.*** Check leaf springs (1) for cracks, missing leaves, misalignment or broken parts. Check spring clips, saddles, saddle caps, spring hangers and retaining hardware for looseness, cracks or visible damage. **NOTE** • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • If spring hanger pin does not accept grease, relieve load on spring pin by jacking truck up by frame as close to spring pin as possible. If spring pin still fails to take grease, notify Direct Support Maintenance to remove spring pin and/or bushing and replace if necessary.	***a.*** Parts are broken, cracked, loose or misa-ligned.
			b. Lubricate the spring hangers with GAA every 3,000 miles (4,828 km) or semiannually, whichever comes first.	***b.*** Fittings will not purge old lubricant out of component.
14	Semi-Annual	Equalizer Beam Bushings	Check equalizer beam center and end bushings for deterioration and wear.	Deterioration or wear is present.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

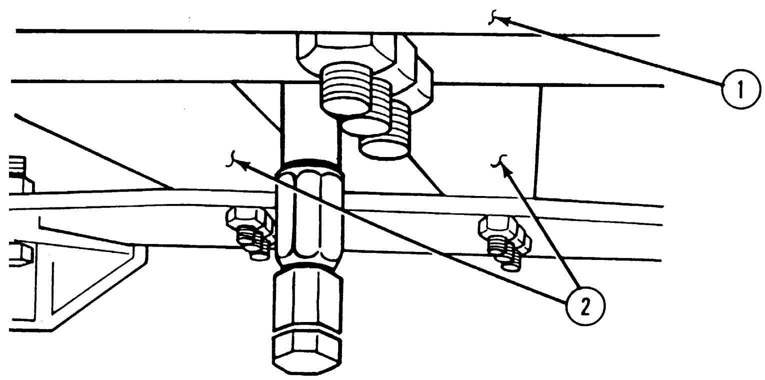
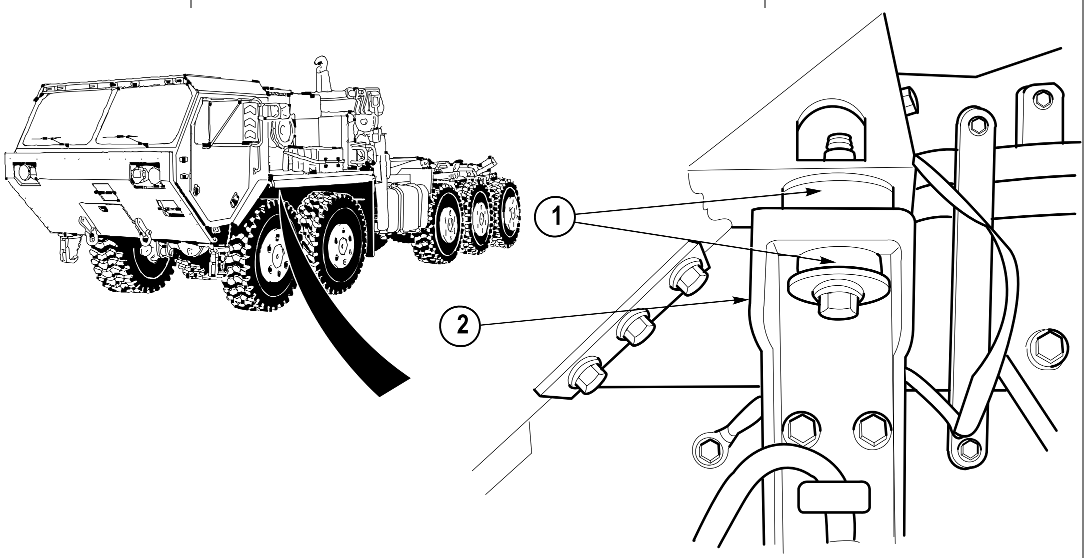
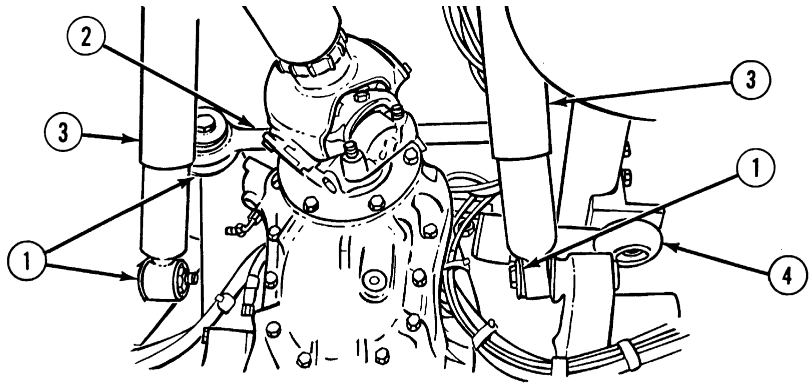
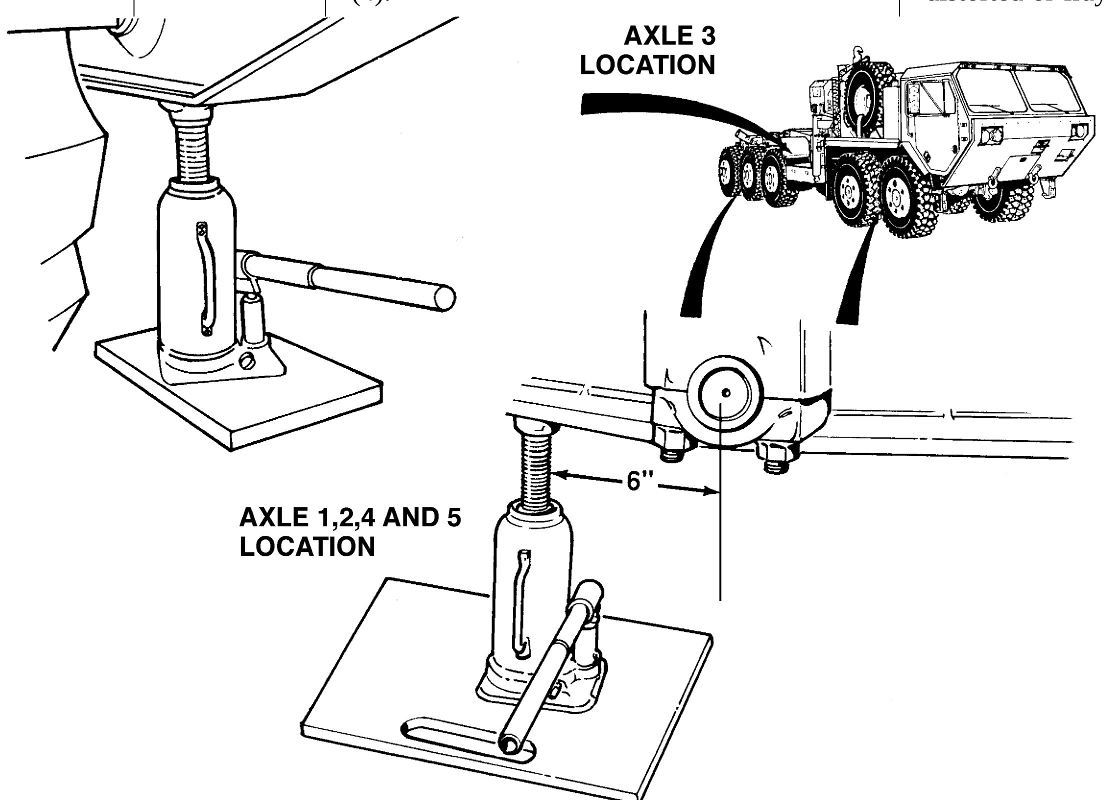
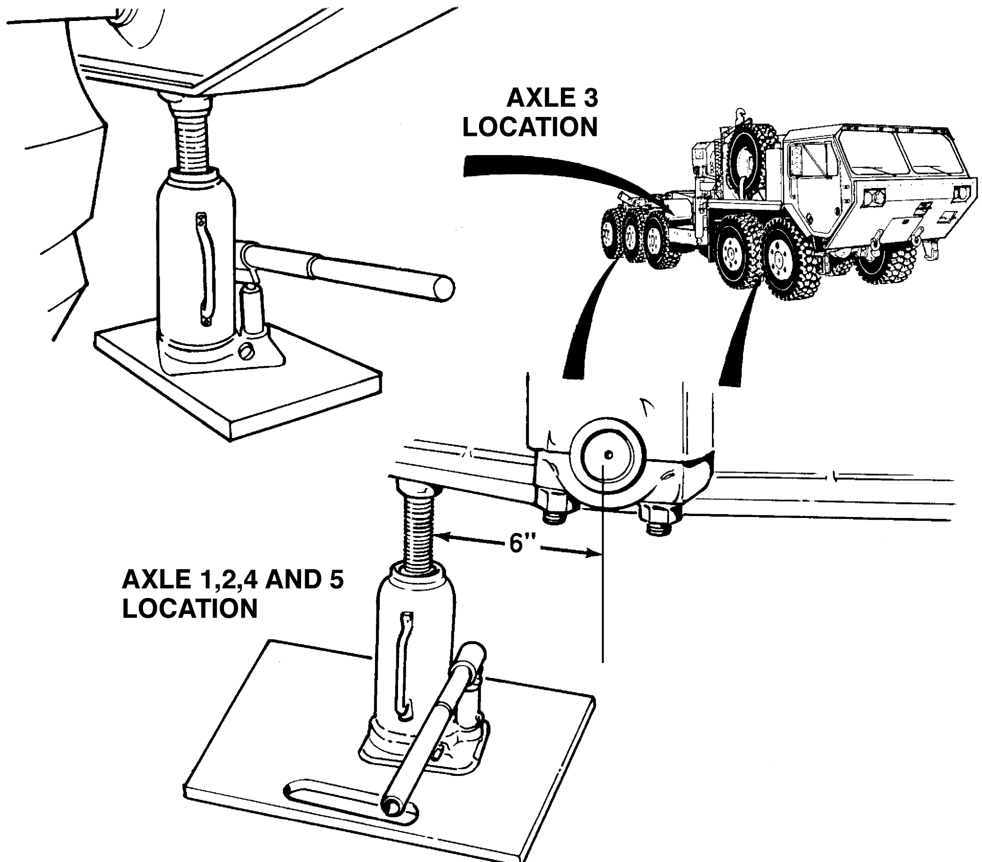
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
15	Semi-Annual	Frame	Check for broken frame side rails (1), cross-members (2) or broken welds on undercarriage.	Side rails or cross-members are damaged or welds are broken.
			LEFT SIDE CAB MOUNT	
16	Semi-Annual	Cab Mounts	Check rubber cab mount (1) on cab support (2).	Rubber cab mounts are missing or badly deteriorated.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
17	Semi-Annual	Rubber Bushings and Stops (All)	***a.*** Check rubber bushings (1) on torque rods (2) and shock absorbers (3). Check torque rods for looseness.	***a.*** Bushings are missing or badly deteriorated or torque rod is loose.
			b. Check for distorted or frayed rubber stops (4).	***b.*** Rubber stops are distorted or frayed.
				
18	Semi-Annual	Axle/Suspension	***a.*** Check wheel bearings for looseness: (1) Raise vehicle from ground with suitable lifting device far enough to position crow bar between tire and ground.	***a.*** Wheel bearings are frozen, binding, or loose.

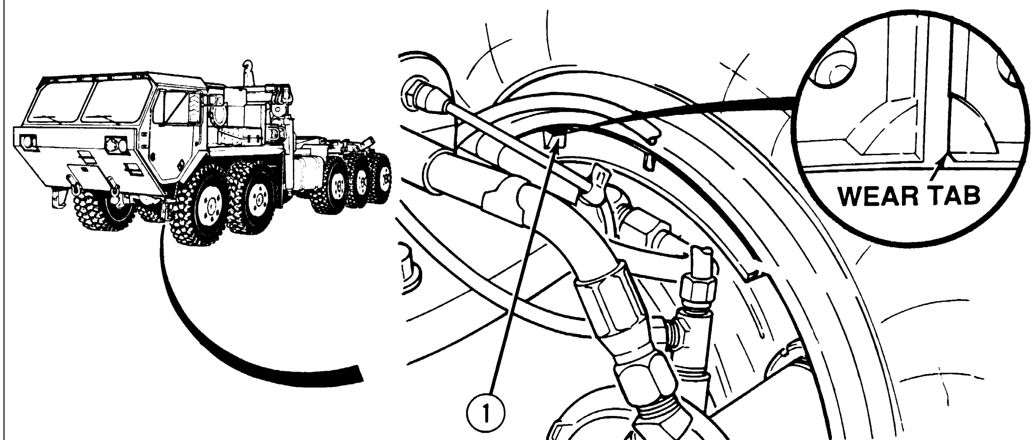
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Axle/Suspension (continued)	**NOTE** Wheel should not be loose on hub. (2) Brace crow bar on ground and push against tire. (3) If there is any wheel bearing play, notify your supervisor.	Wheel bearing play is present. Any parts are missing.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			WARNING • Brake drum can get very hot during vehicle operation. Place hand near drum to check for excessive heat, but do not touch. Failure to comply may result in injury to personnel. • Apply truck brakes and chock wheels before any maintenance tasks are performed. Otherwise serious injury to personnel could result.	
19	Semi-Annual	Brakes (all axles)	***a.*** Carefully check and compare each brake drum for overheating which can indicate a dragging brake. Cool brake drum could mean improper adjustment, defective, or inoperative brakes.	***a.*** Brake drums are overheated or excessively cool.
			NOTE Brake assembly must be cleaned of dirt, mud and debris before starting inspection.	
			b. Check brake shoe linings for grooves, uneven wear, signs of overheating and thickness. If step on center edge wear tab (1) of brake shoe lining is not visible or 1/4 in. (6 mm) thick or less on any part of brake shoe, or there are signs of overheating, replace brake shoes. Refer to Para 12-2.	***b.*** Brake shoes show signs of wear, overheating or distortion.
			c. Check brake supply lines and brake vent lines for cracks, bends, breaks or looseness. Tighten loose parts if leaking. Replace lines or hoses if damaged. Refer to Para 12-36.	***c.*** Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

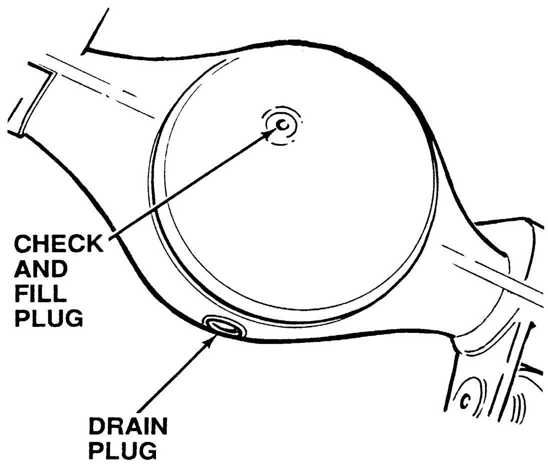
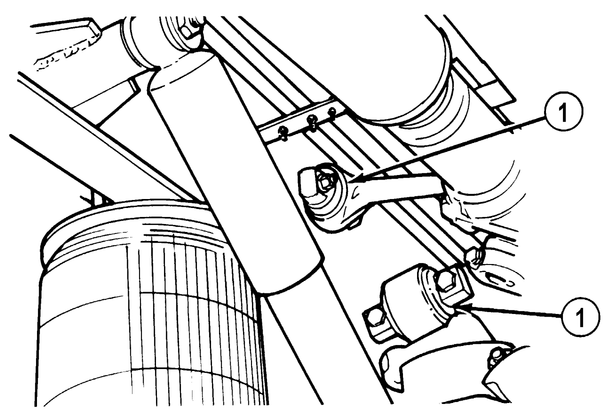
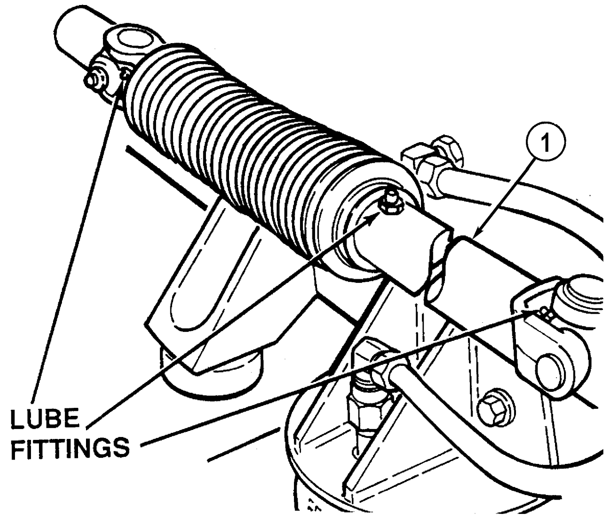
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 **NOTE** All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed.	
20	Semi-Annual	Differential (Axles No. 1, and No. 5)	Check fluid level in Axles No. 1 and No. 5 differentials every 3,000 miles (4,828 km) or semiannually, whichever comes first. Fill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.
				
21	Semi-Annual	Torque Rods (All)	Check torque rods (1) for looseness and bent or broken parts. Tighten loose parts.	Torque rods are damaged.

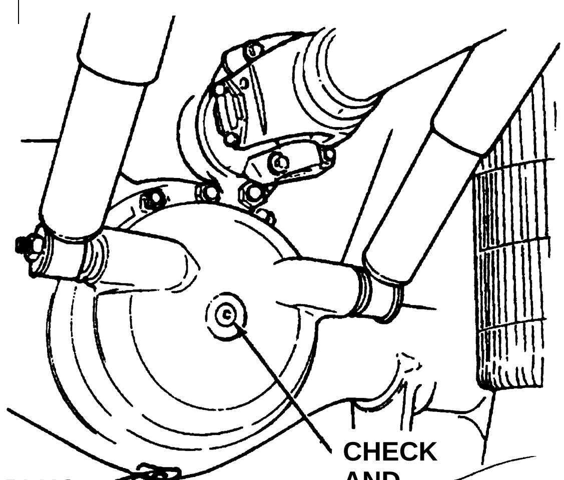
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
22	Semi-Annual	Rear Steering Shaft	***a.*** Check steering shaft (1) for damaged or bent parts. Replace shaft if bent. Adjust misaligned shaft. Refer to Para 14-10. **NOTE** • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • When greasing steering shaft slip joint lube fitting, apply two pumps from a manual grease gun or two clicks from a pneumatic grease gun. If rubber boot appears to be full of grease, remove tie strap from end of rubber boot. Push boot forward and wipe off excess grease from boot and steering shaft. Position rubber boot correctly on steering shaft and install new tie strap. ***b.*** Lubricate the steering shaft and U-joints with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	***a.*** Shaft is damaged, bent, or misaligned. ***b.*** Fittings will not purge old lubricant out of component.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
23	Semi-Annual	Axles No.1 and No. 2 Shaft Seals and Yoke Nuts	Check shaft seals for cuts, nicks, gouges and leaks. Check input and output yoke nuts for proper staking. Both staked points on nuts should be in slots of pinion shafts.	Leaks or damage are found. Yoke nuts are loose, missing or not staked.
24	Semi-Annual	Axles No. 1 and No. 2 Constant Velocity Joints	Check constant velocity joints for wear, play and damage.	Joints are worn, damaged or have play.

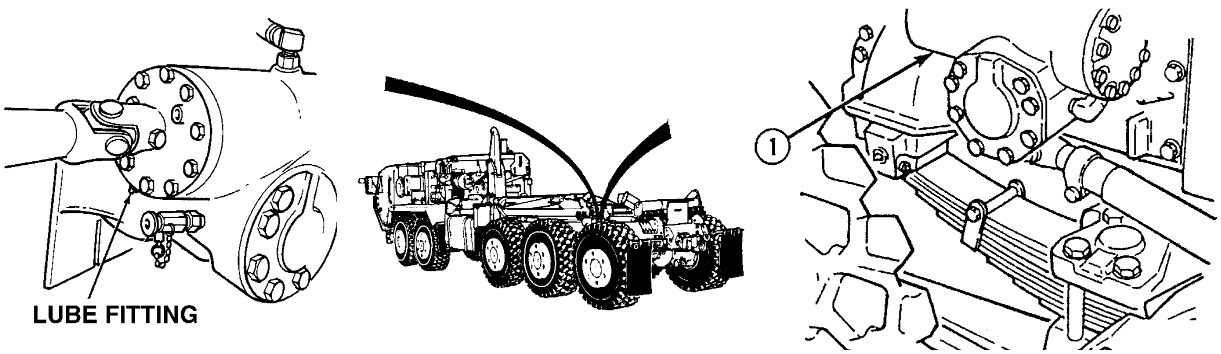


NOTE

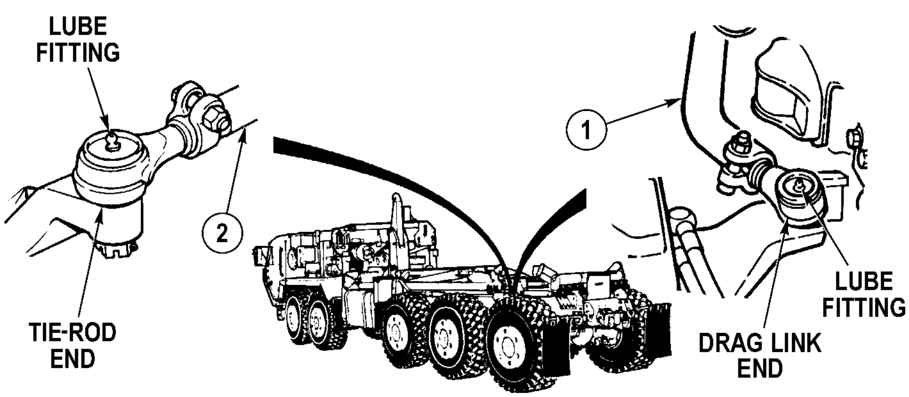
- Some oil will transfer from the wheel end to the axle housing and a slight overfill condition at the axle housing may be noticed during checking of the axles. This is considered normal and should not be a reason for concern.
- All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed.

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
25	Semi-Annual	Differential and Output Shaft (Axle No. 3)	Check fluid level in the axle No. 3 differential every 3,000 miles (4,828 km) or semiannually, whichever comes first. Fill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



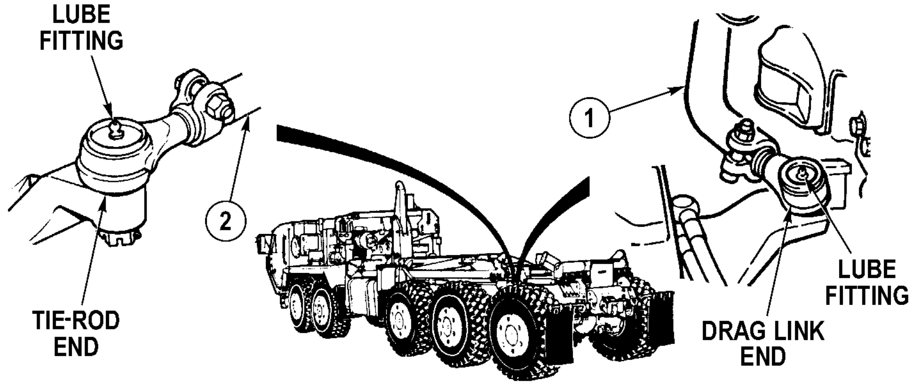
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
26	Semi-Annual	Rear Steering Gear	***a.*** Check rear steering gear (1) for any gouges, damage or leaks. Replace nuts or bolts if missing. Check adjustment holes for dirt and rust. If dirty, clean holes and fill with grease. **NOTE** When greasing fittings on steering gears, apply two pumps from a manual grease gun or two clicks from a pneumatic grease gun. This will prevent seal from being pushed out of bore. ***b.*** Lubricate the rear steering gear with GAA every 1,500 miles (2414 km) or semiannually, whichever comes first.	***a.*** Any Class III leaks are found. ***b.*** Fittings will not purge old lubricant out of component.



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
27	Semi-Annual	Axle No. 5 Drag Link and Tie-Rods	***a.*** Check drag link (1) and tie-rods (2) for damage. Replace nuts or bolts if missing. Replace damaged tie-rods and adjust misaligned linkages.	***a.*** Drag link is broken, cracked or misaligned.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Axle No. 5 Drag Link and Tie-Rods (continued)	***b.*** Check for excessive wear of tie-rod ends or drag link ends (Para 14-12). **NOTE** • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • Some trucks have lube for life tie-rod ends and drag link ends. These do not require lubrication and do not have a lube fitting. ***c.*** Lubricate drag links (1) and tie-rod ends (2) with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	***c.*** Fittings will not purge old lubricant out of component.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

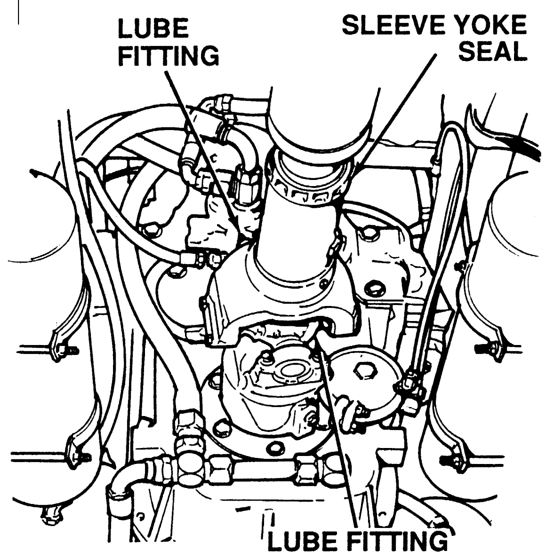
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 **NOTE** • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.	
28	Semi-Annual	Double Cardon Joints (Axles No. 1, No. 2 and No. 5)	Lubricate the double cardon joints with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first. **WARNING**	Fittings will not purge old lubricant out of component.
29	Semi-Annual	Driveshaft and Universal Joints (all axles)	Do not start engine or move truck when anyone is working on or under vehicle. Severe injury or death to personnel could result. **NOTE** If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Driveshaft and Universal Joints (all axles) (continued)	**NOTE** • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated. • Universal joint may have one or two grease fittings. If there are two fittings, grease either fitting. It is not necessary to grease both fittings. • Use the proper lubricant to purge all seals on each universal joint. Purging flushes abrasive contaminates from each bearing and ensures all bearings are filled properly. Pop the seals; these seals are made to be popped. If any seal fails to purge, move driveshaft from side-to-side while applying grease gun pressure. This allows greater clearance on thrust end of bearing that is not purging. If seals still do not purge, rock truck by starting engine, releasing parking brakes, putting transmission in Drive (D) or Reverse (R), and allowing truck to roll. This removes the wind up in the drive line and allows for a greater clearance on the thrust end of the universal joint. • Because of the design of the universal joint seal, there will occasionally be one or more bearing seals that may not purge. Seal tension then has to be released. The procedure for releasing seal tension is as follows: (1) Loosen bolts holding bearing assembly that does not purge to release seal tension. It may be necessary to loosen bearing assembly approximately 1/16 in. (1.6 mm) minimum. (2) If loosening does not result in purging, remove bearing assembly to determine cause of blockage.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Driveshaft and Universal Joints (all axles) (continued)	**NOTE** • When lubricating spline end of driveshafts, apply grease to spline fitting until lubricant appears at pressure relief hole. Cover hole with finger and continue adding grease until it appears at sleeve yoke seal. ***a.*** Lubricate the U-joints and driveshafts with GAA every 3,000 miles (4,828 km) or semiannually, whichever comes first.  ***b.*** Check transfer case and axle driveshafts for bends, dents and cracks. Replace driveshafts if bent, broken or missing. Refer to Para 10-2. ***c.*** Check U-joints for wear and play and broken or missing lubrication fittings. There should be no play at U-joints. Replace U-joints if damaged, show visible wear, or have play. Replace lubrication fittings if damaged. Refer to Para 10-2.	***a.*** Fittings will not purge old lubricant out of component.
30	Semi-Annual	No. 3, No. 4 and No. 5 Shaft Seals and Yoke Nuts	Check input and output shaft seals for cuts, nicks, gouges and leaks. Check input and output yoke nuts for proper staking. Both staked points or nuts should be in slots of pinion shafts.	Seals are damaged, leaking or missing.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

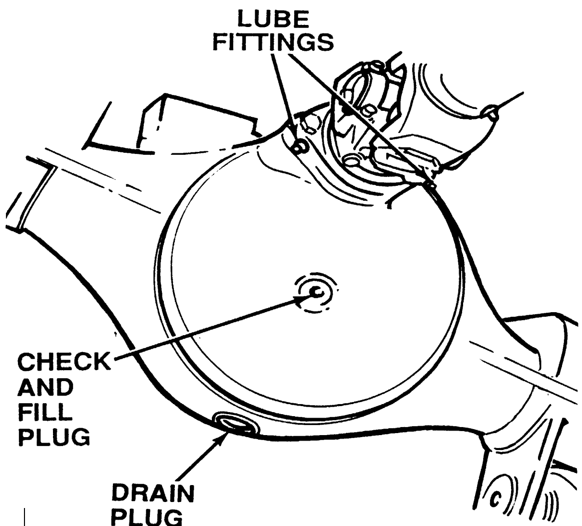
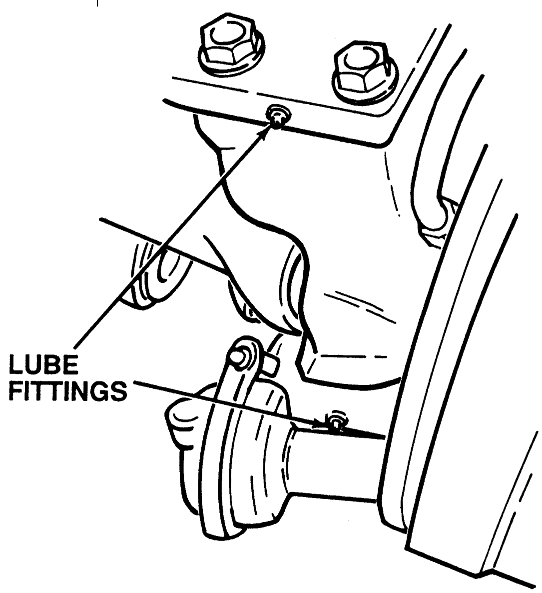
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 **NOTE** • Axle No. 4. Some oil will transfer from the wheel end to the axle housing and a slight overfill condition at the axle housing may be noticed during checking of the axles. This is considered normal and should not be a reason for concern. • All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed. • Lubricant will not purge from axle output shaft seal. When using a hand-operated grease gun, apply only two pumps of lubricant to the fitting. When using an air-operated grease gun, apply only a small amount of lubricant to the fitting.	
31	Semi-Annual	Differential and Output Shaft (Axles No. 2 and No. 4)	***a.*** Check fluid level in the axle No. 2 and No. 4 differentials every 3,000 miles (4,828 km) or semiannually, whichever comes first. Fill with GO as required. Refer to Table 2-3.	***a.*** Any Class III leaks are found.
			b. Lubricate the No. 2 and No. 4 axle output shafts with GAA every 3,000 miles (4,828 km) or semiannually, whichever comes first.	***b.*** Fittings will not purge old lubricant out of component.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
32	Semi-Annual	Suspension System	Check suspension system for missing parts and broken bolts.	Suspension system has broken or missing parts or bolts.
33	Semi-Annual	Equalizer Beam Bushings	Check equalizer beam center and end bushings for deterioration and wear.	Deterioration or wear is present.



NOTE

- If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component.
- When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
34	Semi-Annual	Trunnions (Axles No. 1, No. 2 and No. 5)	Lubricate trunnion fittings with GAA every 1,500 miles (2,414 km) or semiannually, whichever comes first.	Fittings will not purge old lubricant out of component.
35	Semi-Annual	Wheels	Check wheels for bends, cracks or damage. Replace wheels if bent or damaged. Refer to Para 13-2.	Wheels are bent or damaged.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

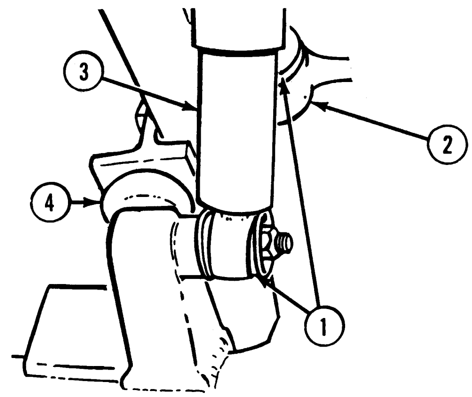
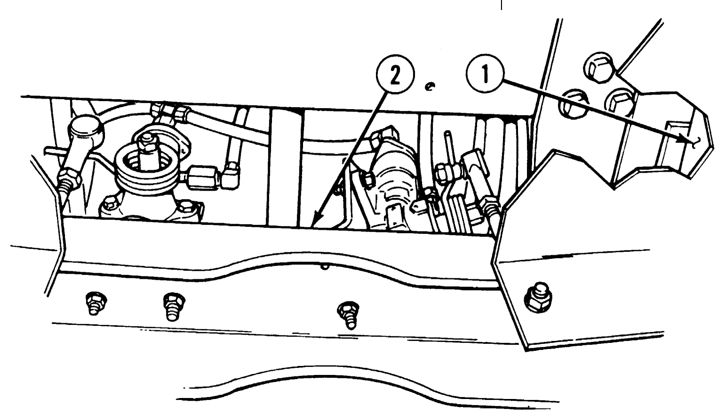
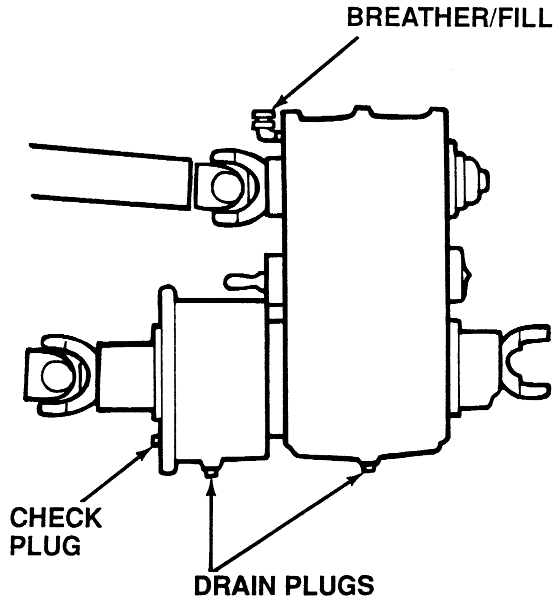
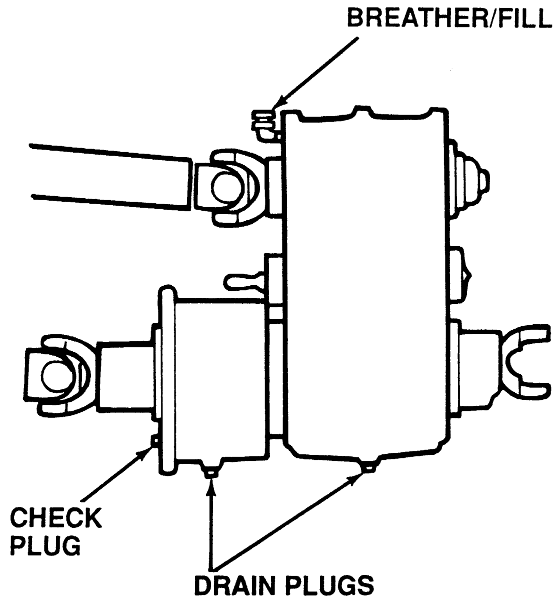
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
36	Semi-Annual	Tires	Check tires for nicks, gouges and wear on tread and sidewall. If nicks and gouges are severe or tire tread shows signs of excessive wear, replace tire. Refer to Para 13-2. 	Nicks and gouges are severe or tire tread shows signs of excessive wear.
37	Semi-Annual	Rubber Bushings and Stops (typical)	***a.*** Check rubber bushings (1) on torque rods (2) and shock absorbers (3). ***b.*** Check rubber stops (4) for distortion or fraying. 	***a.*** Bushings are missing or badly deteriorated. ***b.*** Rubber stops are distorted, frayed or missing.
38	Semi-Annual	Frame	Check for broken frame side rails (1), crossmembers (2) or broken welds on undercarriage.	Damaged side rails, crossmembers or broken welds are found.
39	Semi-Annual	Mounting Brackets	Check for cracks, breaks, rust or looseness.	Mounting brackets are damaged or missing.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
40	Semi-Annual	Transfer Case Oil Seals	***a.*** Check transfer case oil seals for cuts, nicks, gouges and leaks. ***b.*** Check transfer case for leaks, cracks, dents, damage and loose bolts. **WARNING** • Drycleaning Solvent (P-D-680) is TOXIC and flammable. Wear protective goggles, face shield, and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes, and do not breathe vapors. Keep away from heat or flame. Never smoke when using solvent. The flashpoint for Type II Drycleaning Solvent is 140 degrees F (60 degrees C) and Type III Drycleaning Solvent is 200 degrees F (93 degrees C). Failure to do so may result in injury or death to personnel. • If personnel become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush eyes with water and get immediate medical attention.	***a.*** Damage or leaks are found. ***b.*** Damage or leaks are found.

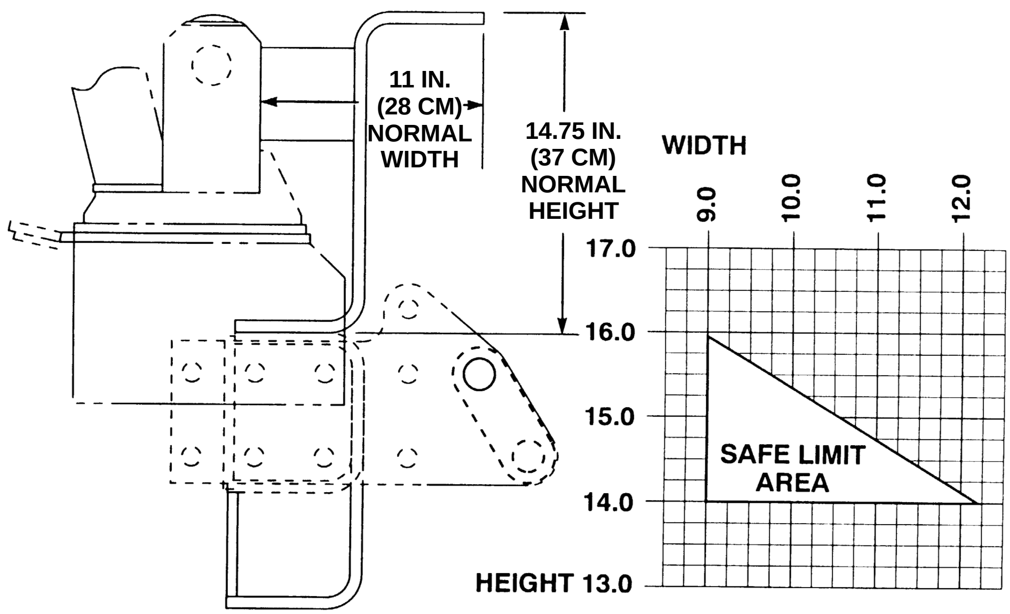
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



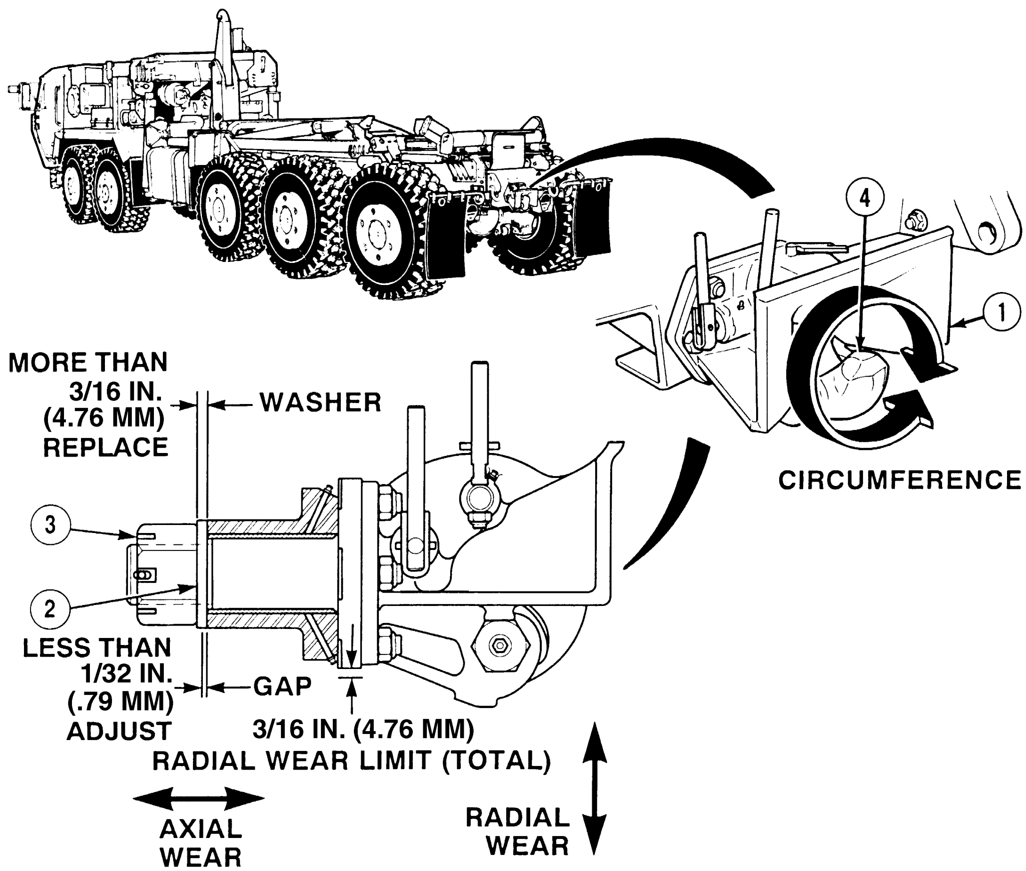
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Transfer Case Oil Seals (Continued)	***c.*** Check transfer case breather for dirt. If dirty, remove breather and wash in dry cleaning solvent. Allow to air dry. Install breather. Refer to Para 9-8.	***c.*** Breather is damaged or missing.
			d. Check fluid level in transfer case every 1,500 miles (2,414 km) or semiannually, whichever comes first. Fill with OE/HDO as required. Refer to Table 2-3.	***d.*** Any Class III leaks are found.
41	Semi-Annual	Axle No. 5 Constant Velocity Joints	Check constant velocity joints for wear, play or damage.	Joints are damaged, worn, damaged or have play.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
	REAR OF TRUCK			
				
42	Semi-Annual	Bumper Stop Bracket	Check bumper stop bracket for cracks and/or broken parts. Gouges and scrapes are acceptable as long as they do not wear through the face plate. Measure height and width of bumper stop bracket. If both measurements are within safe limit area on graph, the bumper stop bracket is good. Refer to Para 15-18.	Either the height or width measurement is outside the safe limit area on graph.

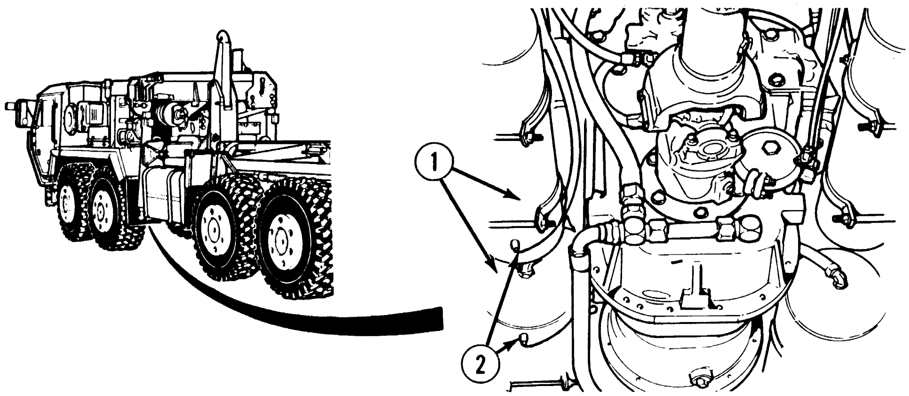
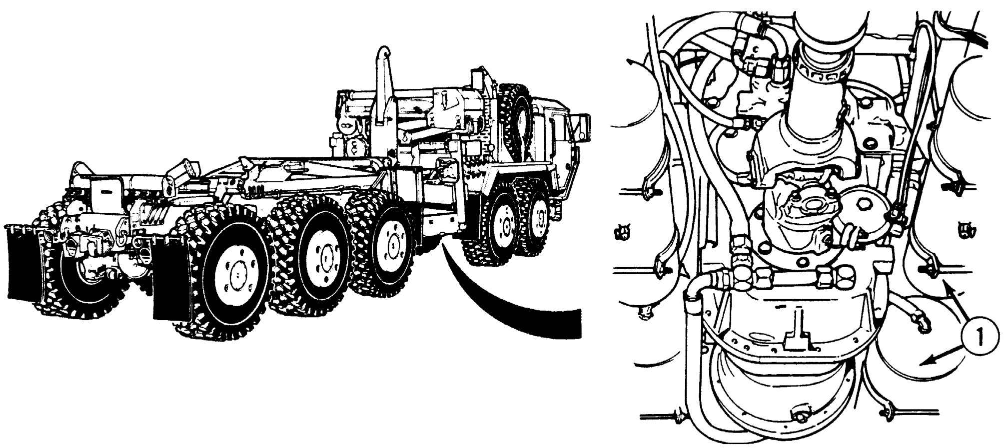
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
43	Semi-Annual	Self-Guided Coupler	Check self-guided coupler (1) for cracks, damage, or excessive wear. Replace coupler if cracked or damaged. If radial wear exceeds 3/16 in. (4.76 mm) total, replace coupler before next mission. If axial clearance exceeds 1/32 in. (.79 mm), measure thickness of washer (2). If washer (2) thickness is under 3/16 in. (4.76 mm), replace washer. If washer thickness is larger than 3/16 in. (4.76 mm), adjust nut (3). Refer to Para 15-20.	Radial wear exceeds 3/16 in. (4.76 mm). Washer thickness is less than 3/16 in. (4.76 mm).
			If circumference at worn area of coupler jaw (4) is less than 8-1/2 in. (215.9 mm), replace coupler at next scheduled service. If circumference is less than 8-1/4 in. (209.6 mm), replace coupler before next mission. Refer to Para 15-20.	Circumference at worn area is less than 8-1/4 in. (209.6 mm).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
44	Semi-Annual	Air Reservoirs No. 3 and No. 5	Check air reservoirs (1) attaching valves (2), lines and connections for mounting looseness, leaks, bends, dents and cracks. Replace air reservoir or attaching parts if leaking, or have bends, dents or cracks that could leak. Tighten loose parts. Refer to Paras 12-29, 12-31 and 12-36.	
				
45	Semi-Annual	Air Reservoirs No. 2 and No. 4	Check air reservoirs (1) attaching valves, lines and connections for mounting looseness, leaks, bends, dents and cracks. Replace air reservoir or attaching parts if leaking, or have bends, dents, or cracks that could leak. Tighten loose parts. Refer to Paras 12-28, 12-30 and 12-36.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

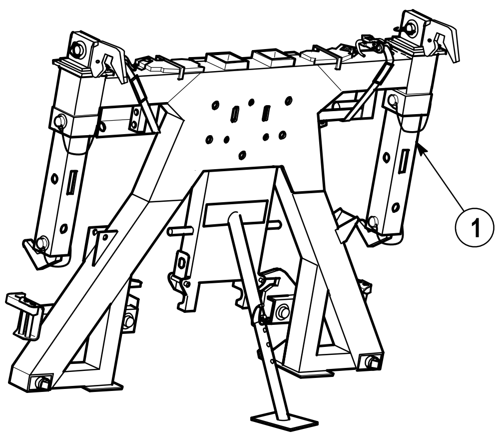
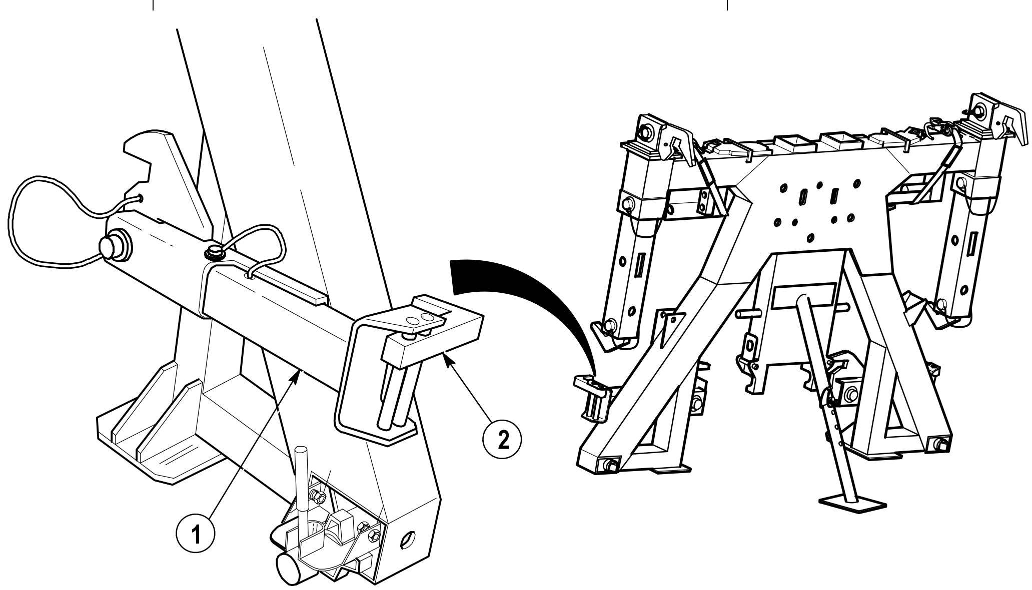
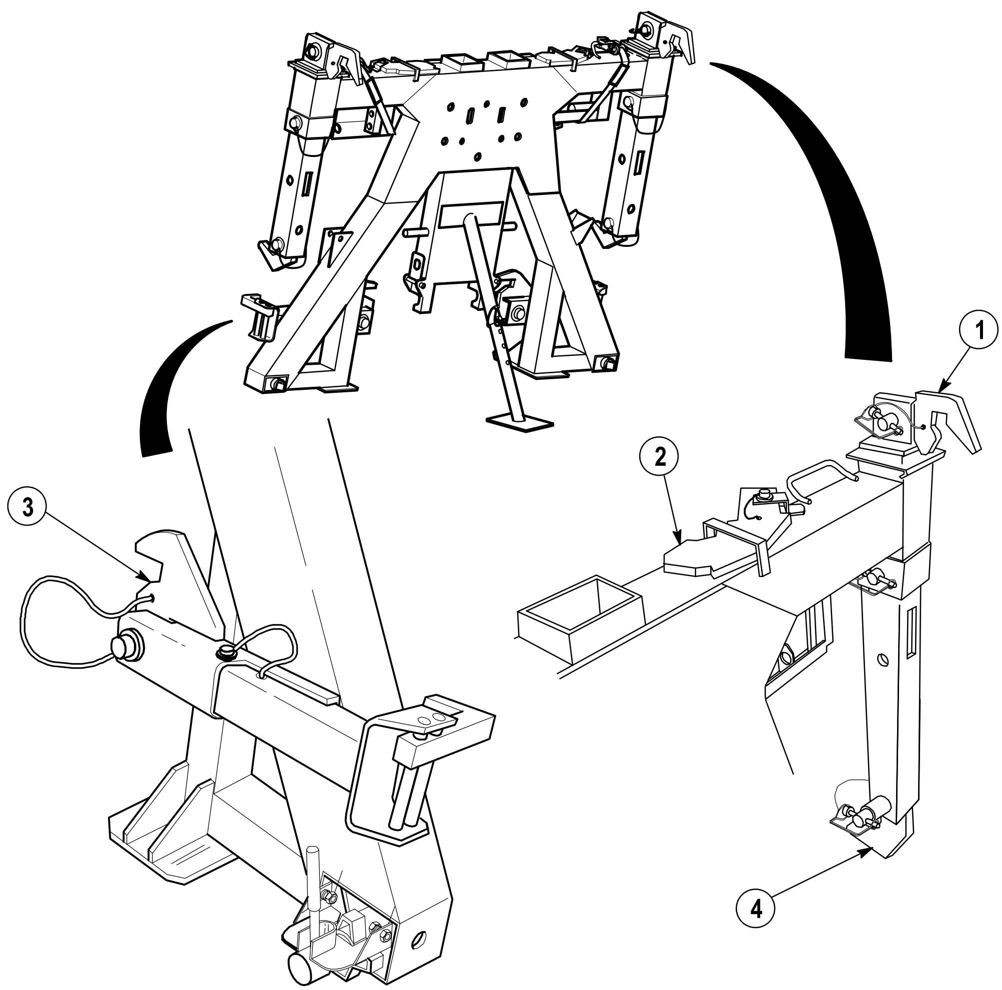
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
46	Semi-Annual	Lifting Frame (LF)	If truck is equipped with Container Handling Unit (CHU), check lifting frame (1) for cracks or broken welds.	Cracks or broken welds are found.
				
47	Semi-Annual	Rear Container Locks	***a.*** If truck is equipped with Container Handling Unit (CHU), check rear container locks (1) for cracks or broken welds. ***b.*** Check for cracked, bent or missing hooks (2).	***a.*** Cracks or broken welds are found. ***b.*** Cracked, broken or missing hooks.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
48	Semi-Annual	Hooks	If truck is equipped with Container Handling Unit (CHU), check standard hooks (1), six foot hooks (2), half height hooks (3) and hooks (4) for cracks or bends.	Cracked or bent hooks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

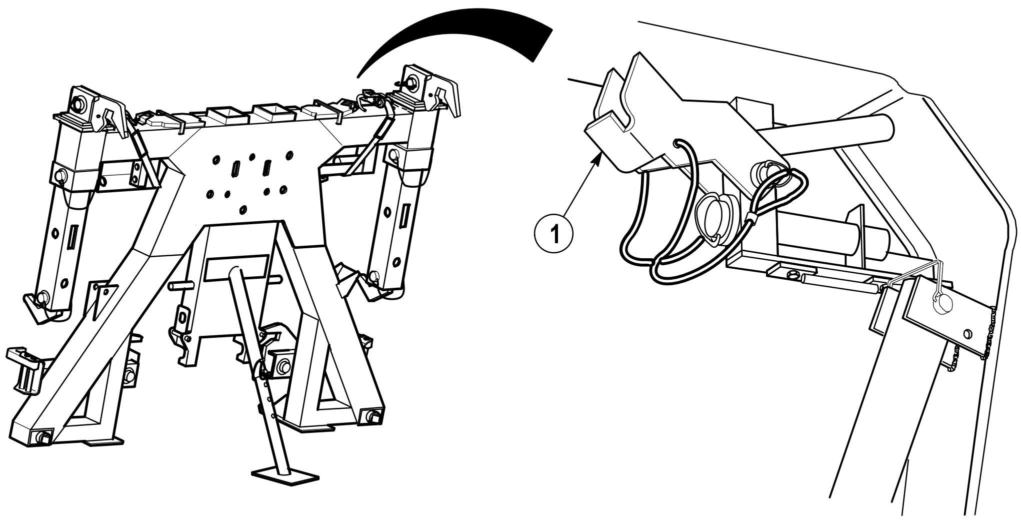
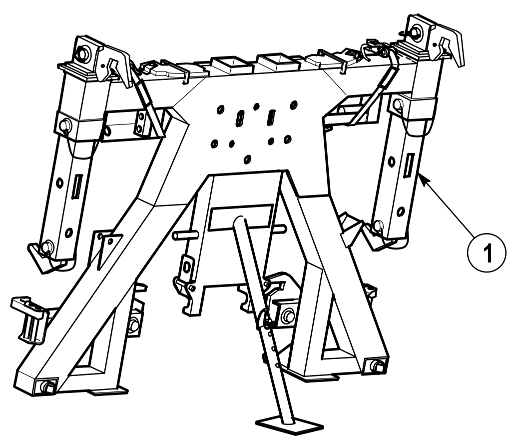
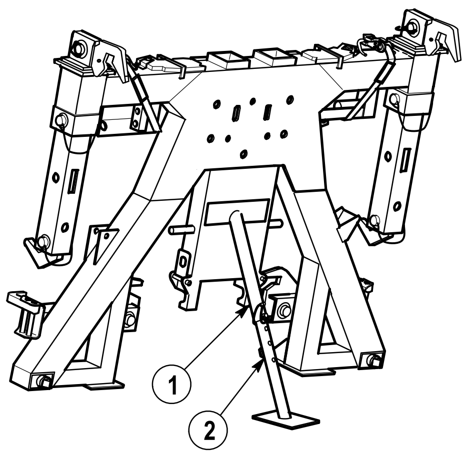
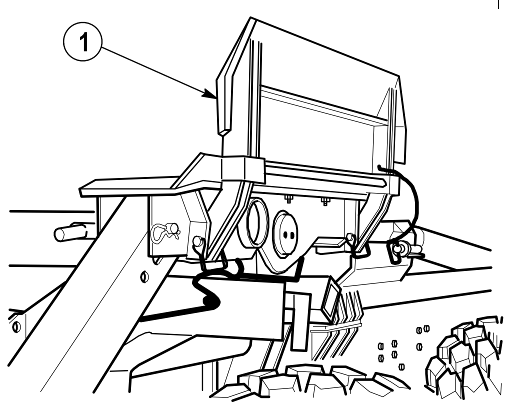
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
49	Semi-Annual	Bail Bar Lock	If truck is equipped with Container Handling Unit (CHU), check bail bar lock (1) for cracks or broken welds.	Cracks or broken welds are found.
				
50	Semi-Annual	Slide Arm Weldments	If truck is equipped with Container Handling Unit (CHU), check slide arm weldments (1) for cracks or broken welds.	Cracks or broken welds are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
51	Semi-Annual	Upper and Lower Support Leg	If truck is equipped with Container Handling Unit (CHU), check upper support leg (1) and lower support leg (2) for cracks or broken welds.	Cracks or broken welds are found.
				
52	Semi-Annual	Rear Sliders	If truck is equipped with Container Handling Unit (CHU), check rear sliders (1) for cracks or broken welds.	Cracks or broken welds are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

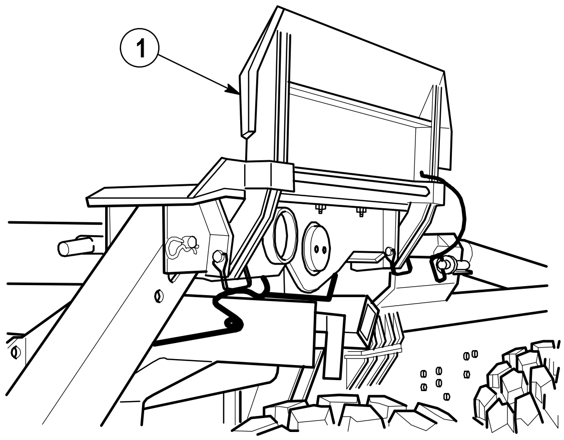
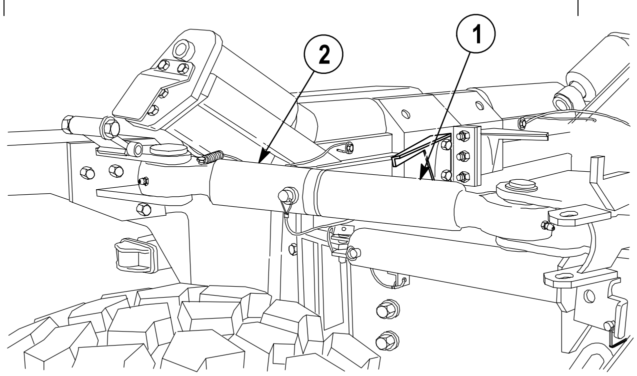
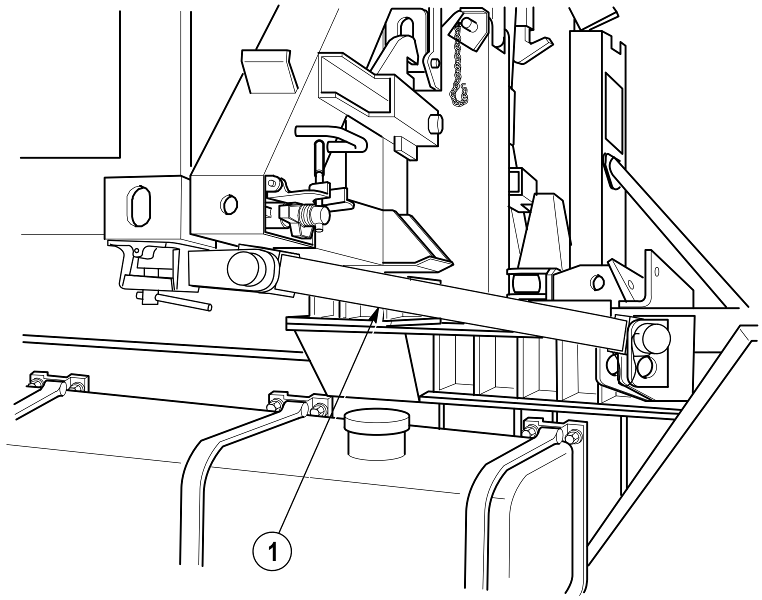
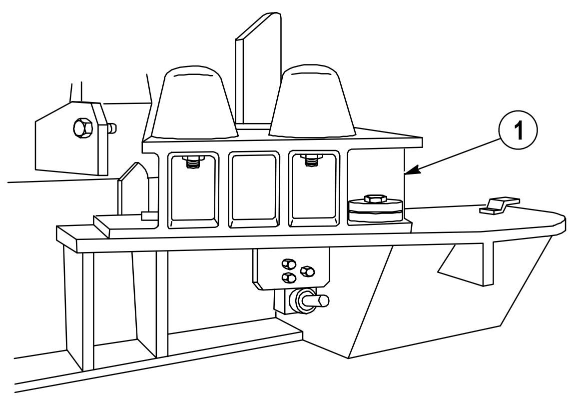
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
53	Semi-Annual	Container Guides	If truck is equipped with Container Handling Unit (CHU), check container guides (1) for cracks or broken welds.	Cracks or broken welds are found.
				
54	Semi-Annual	Long and Short Struts	If truck is equipped with Container Handling Unit (CHU), check long strut (1) and short strut (2) for cracks or broken welds.	Cracks or broken welds are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
55	Semi-Annual	Rail Supports	If truck is equipped with Container Handling Unit (CHU), check rail supports (1) for cracks or broken welds.	Cracks or broken welds are found.
				
56	Semi-Annual	Bumper Support	If truck is equipped with Container Handling Unit (CHU), check bumper support (1) for cracks or broken welds.	Cracks or broken welds are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

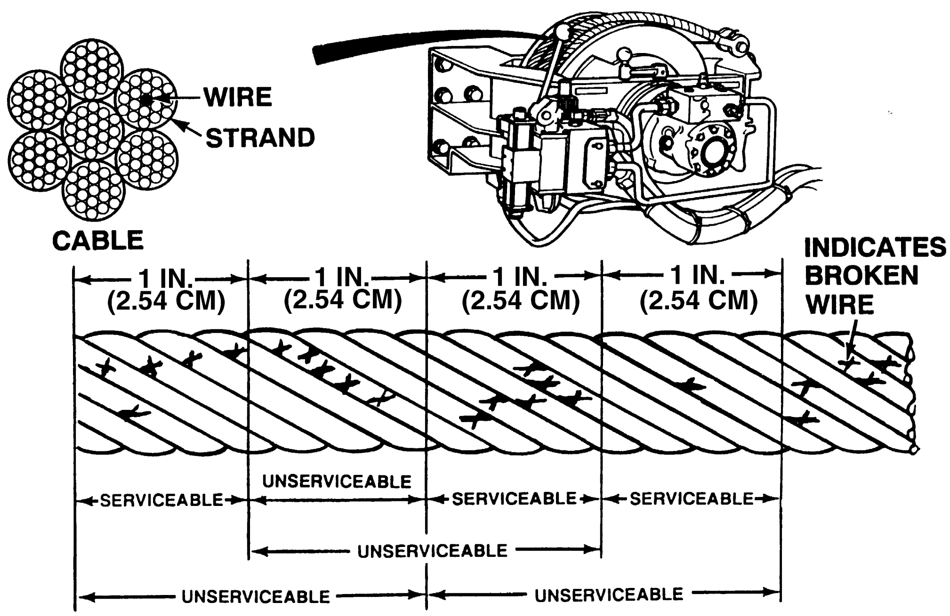
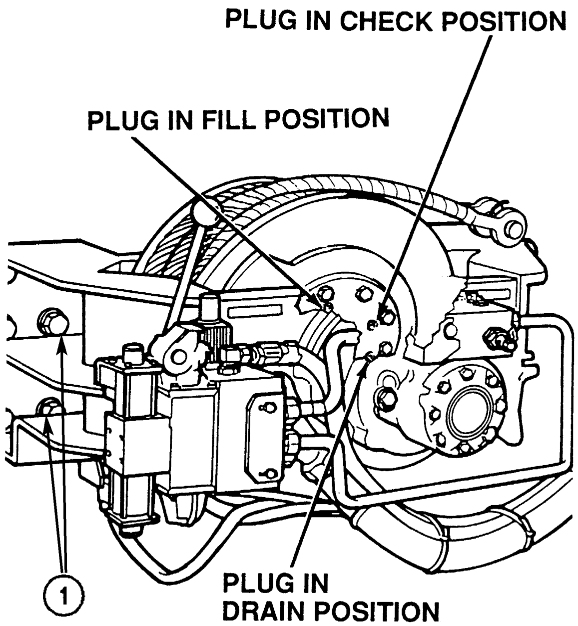
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
	RIGHT FRONT SIDE OF TRUCK			
				
57	Semi-Annual	Self-Recovery Winch Cable	If truck is equipped with self-recovery winch (SRW) inspect SRW cable. Weak points in cable and points where greatest stress occurs must be inspected carefully.	
			a. Inspect for worn spots. Worn spots will show up as shiny flattened spots on cable strands.	***a.*** Outer wires are reduced in diameter by one-fourth.
			b. Strands must be inspected to determine if one or more wires are broken.	***b.*** Cable is frayed, kinked, worn or corroded.
			c. Inspect strands. If individual wires are broken next to one another, count broken wires. If six randomly distributed broken wires in one lay (distance in which strands make one complete turn around the cable) or three broken wires in one strand in one lay are found, replace cable. Refer to Para 18-17.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			NOTE Self-recovery winch (SRW) has two plugs. To check and fill SRW, one plug must be in upper position and second plug must be at side position. To drain SRW, one plug must be in side position and one plug must be at bottom position.	
58	Semi-Annual	Self-Recovery Winch	***a.*** Check fluid level in SRW gearbox every 6,000 miles (9,656 km) or semiannually, whichever comes first. Fill with GO as required. Refer to Table 2-3.	***a.*** Any Class III leaks are found.
			b. Check torque of SRW mounting screws (1). Tighten SRW mounting screws to 210 lb-ft (285 N·m). Replace mounting screws if broken or missing. Refer to Para 18-12.	***b.*** Mounting screws are loose, broken or missing.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

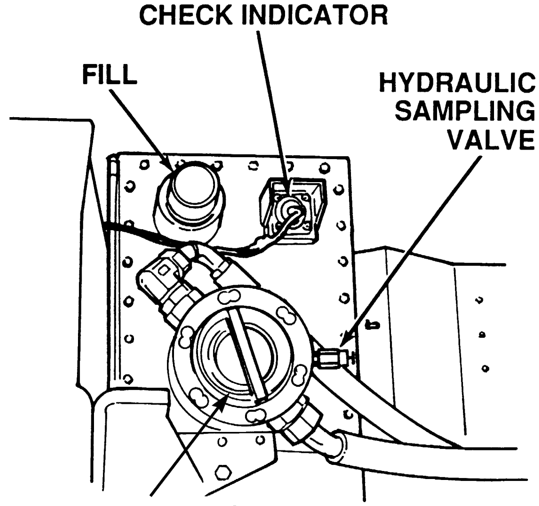
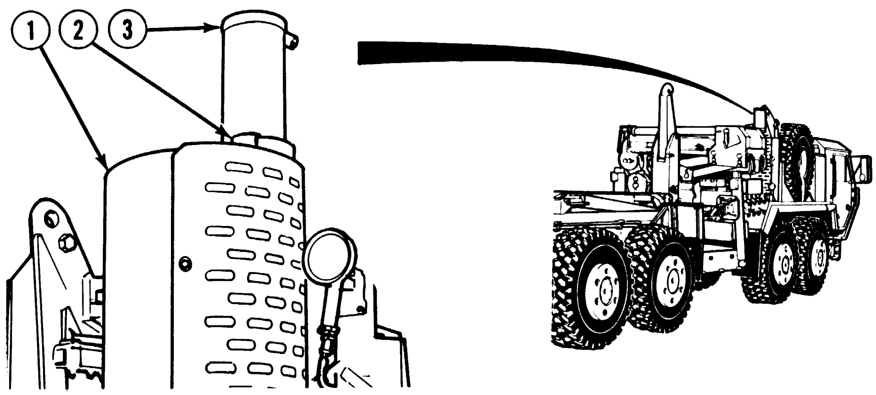
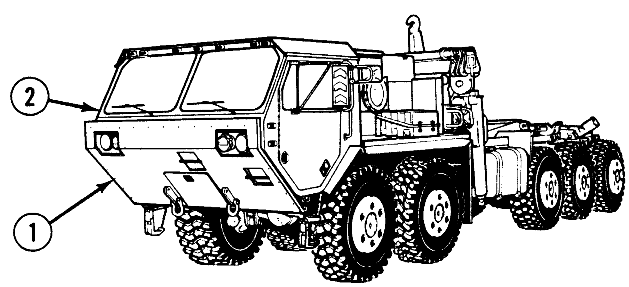
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			NOTE • OE/HDO-30 must be used when temperatures are consistently above 60 degrees F (16 degrees C). • When oil is cold, do not add or fill beyond the word "FULL" on the fluid level indicator.	
59	Semi-Annual	Main Hydraulic Reservoir	***a.*** Check hydraulic reservoir for cracks, leaks or obvious damage. Refer to Para 20-11 and 20-12. ***b.*** Check hydraulic fluid level and fill with OE/HDO as required. Refer to Table 2-3. ***c.*** Take sampling of hydraulic fluid for AOAP analysis. ***d.*** Replace main hydraulic return line filter every 400 hours of operation or semiannually, whichever comes first. Refer to Para 20-9.	***a.*** Any Class III leaks are found. ***c.*** Faulty oil results received from AOAP lab "Do not operate".

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
60	Semi-Annual	Exhaust System	Check muffler (1) for looseness or leaks. Check for damaged pipes and loose clamps. Tighten loose parts. Replace exhaust system parts if damaged or missing. Refer to Paras 5-2 and 5-3.	
61	Semi-Annual	Exhaust System	Check all exhaust mounting clamps (2) for looseness. Tighten loose parts. Refer to Paras 5-2 and 5-3.	
62	Semi-Annual	Exhaust System	Check rain cap (3) to ensure it operates freely and that it closes off the tail pipe when the engine is not running. Replace rain cap if missing or damaged. Refer to Paras 5-2 and 5-3.	
	FRONT OF CAB			
63	Semi-Annual	Skid Plate and Cab Metal	Inspect skid plate (1) and cab metal (2) for evidence of corrosion damage such as surface color change, surface separation, blistered paint, rust-through or other evidence of damage.	Skid plate or cab metal is affected to the point of damage to parts.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

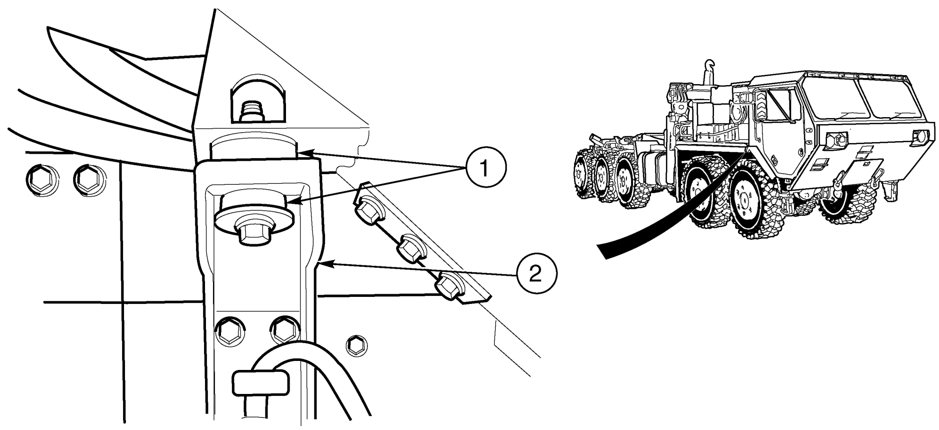
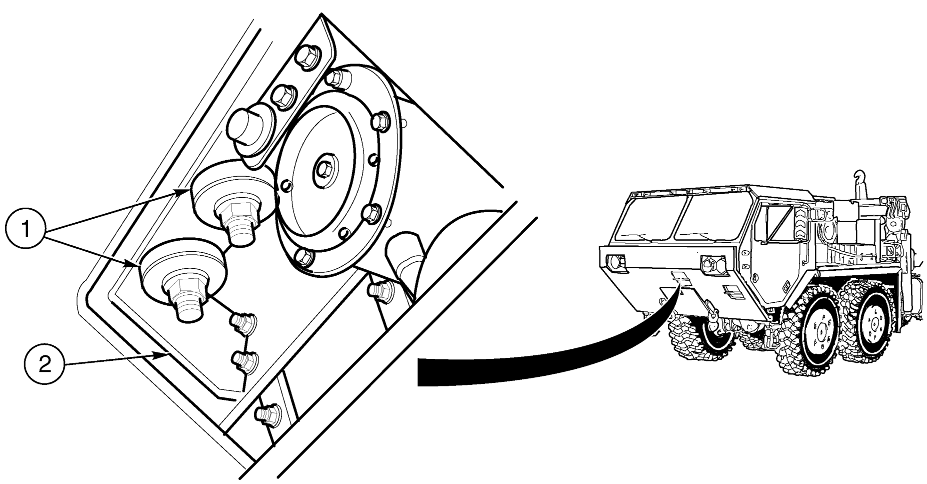
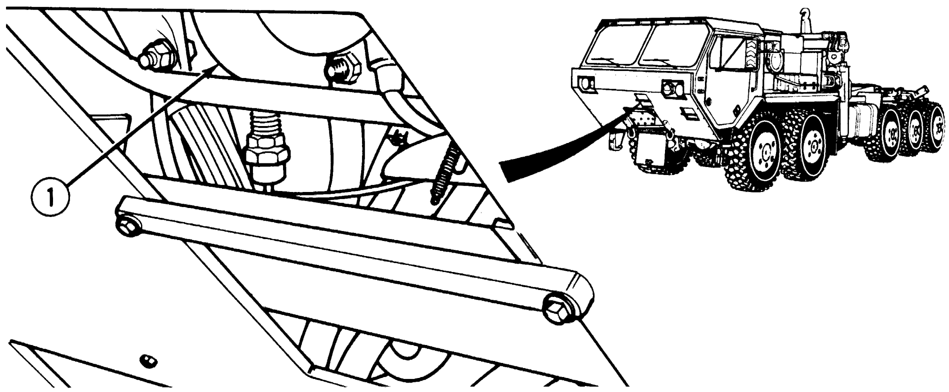
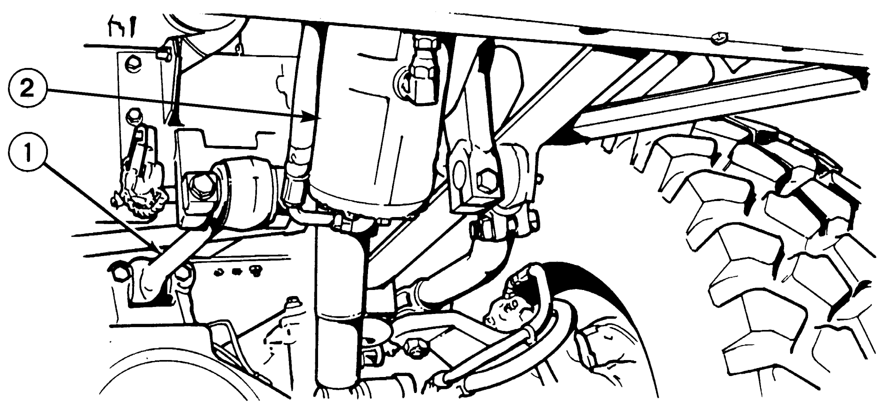
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
64	Semi-Annual	Cab Mounts	Check rubber cab mount (1) on cab support (2).	Rubber cab mounts are missing or badly deteriorated.
				
65	Semi-Annual	Cab Mounts	Check two rubber cab mounts (1) on front cab support (2).	Rubber cab mounts are missing or badly deteriorated.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
66	Semi-Annual	Air Reservoir No. 1	Check air reservoir (1), attaching valves, lines and connections for mounting looseness, leaks, bends, dents and cracks. Tighten loose parts. Replace reservoir or attaching parts if leaking, or have bends, dents or cracks that could leak. Refer to Paras 12-27 and 12-36.	Broken, missing or loose parts are found.
				
67	Semi-Annual	Torque Rods (All)	Check torque rods (1) for looseness and bent or broken parts.	Torque rods are bent or damaged.
68	Semi-Annual	Front Steering Gear	Check front steering gear (2) adjustment holes for dirt and rust. If dirty, clean holes and fill with grease. Check front steering gear (2), pitman arm, steering column U-joint, hydraulic pump driveshaft, Axle No. 1 drag link, intergear link and steering parts for looseness, breaks and cracks.	Parts are broken, cracked or missing.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

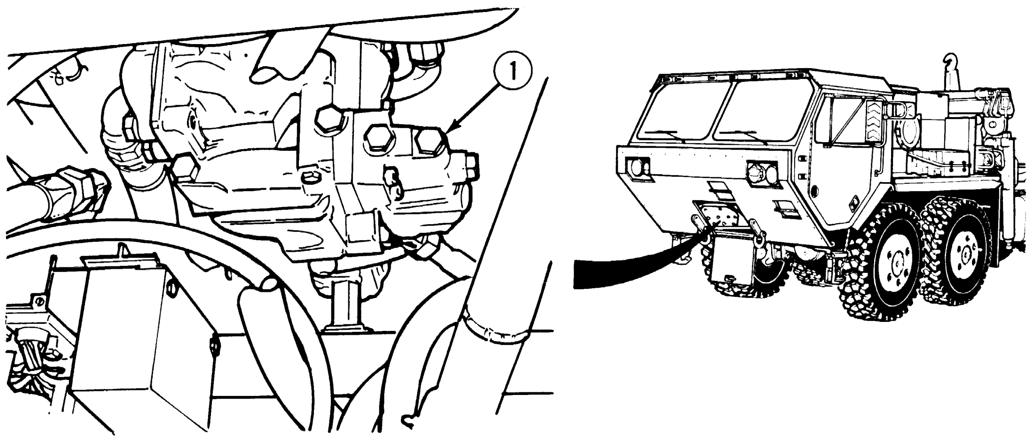
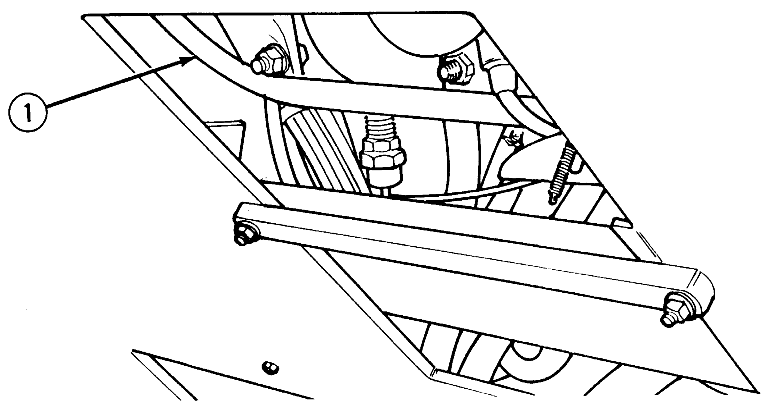
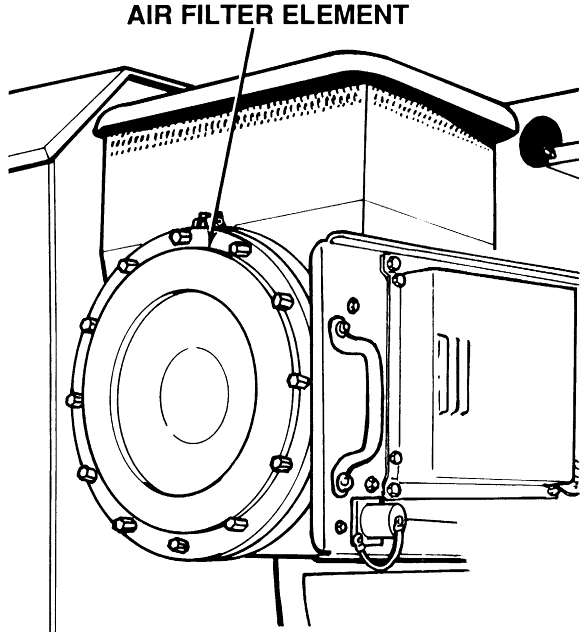
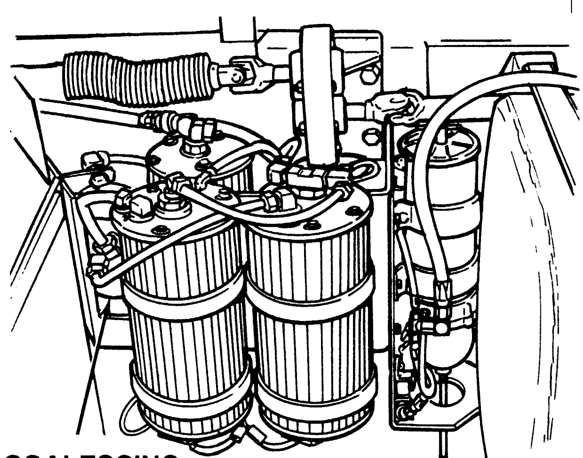
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
69	Semi-Annual	Hydraulic Pump	Inspect hydraulic pump (1) for leaks or loose parts.	Any Class III leaks, loose parts, or damage are found.
				
70	Semi-Annual	Hydraulic Hoses and Tubes	Follow routing of all hydraulic hoses and tubes (1). Inspect for loose fittings, chafing, cracks and leaks.	Loose fittings, cracks, leaks or chafing are found.
71	Semi-Annual	CTIS Manifolds (Front and Rear)	Check manifold and fittings for looseness and leaks. Replace manifold or fittings if damaged. Tighten loose parts if leaking. Replace hoses if damaged or missing. Refer to Paras 13-6 and 13-8 through 13-10.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 	
			NOTE When air restriction indicator (located on dash panel) reads 20 in., replace air filter element.	
72	Semi-Annual	Air Filter	Replace air filter as required. Refer to Para 4-5.	
			 	
73	Semi-Annual	Coalescing Filter	Replace coalescing filter every 1,000 hours of operation or semiannually, whichever comes first. Refer to Para 12-24.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

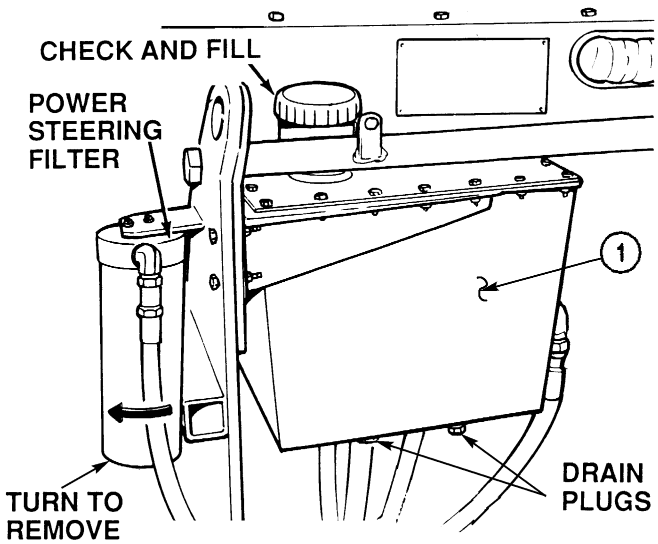
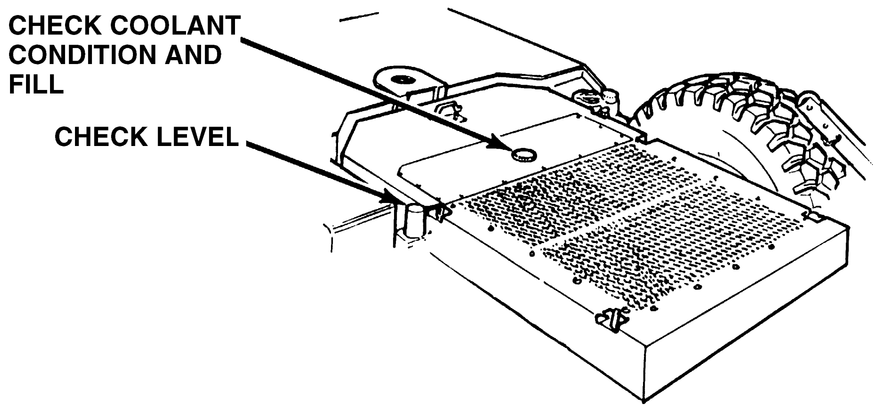
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		 		
74	Semi-Annual	Power Steering Filter and Reservoir	***a.*** Change power steering filter every 400 hours of operation or semiannually, whichever comes first. Refer to Para 14-16.	
			b. Check and fill power steering reservoir as required with OE/HDO. Remove rear noise panel. Check power steering reservoir (1) for cracks, leaks or obvious damage. Refer to Table 2-3.	***b.*** Any Class III leaks are found or reservoir is damaged.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
75	Semi-Annual	Cooling System	***a.*** Check coolant level and fill as necessary. Refer to Table 2-4. ***b.*** Check condition of coolant. Add or change coolant as necessary. Refer to Table 2-4. ***c.*** Check cooling system hoses and piping for looseness, splits, wear, cracks and leaks. Check hose clamps for wear or looseness. Tighten loose parts. Replace damaged parts (Para 6-8).	***c.*** Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

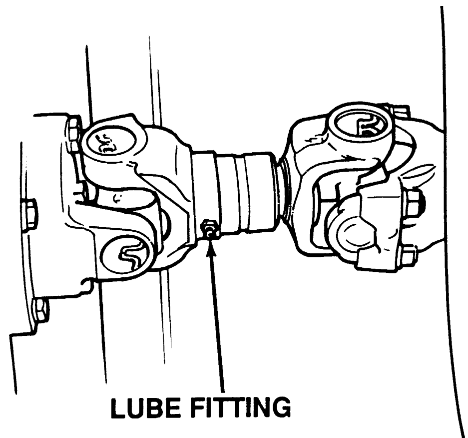
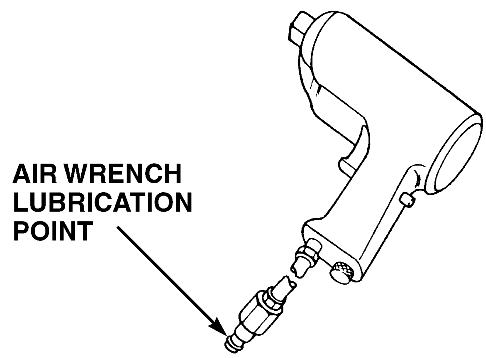
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 **NOTE** • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.	
76	Semi-Annual	Hydraulic Pump Drive-shaft	Lubricate the hydraulic pump driveshaft with GAA every 3,000 miles (4,828 km) or semiannually, whichever comes first.	Fittings will not purge old lubricant out of component.
77	Semi-Annual	Transmission	Check transmission for cracks, leaks or obvious damage.	Obvious cracks, damage or leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
78	Semi-Annual	Air Wrench	**NOTE** Pour 1/2 oz. (15 ml) of oil in the short hose installed on the air wrench. Connect air hose to air supply and operate air wrench for 10 to 15 seconds. Use oil can to lubricate air wrench with OE/HDO.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

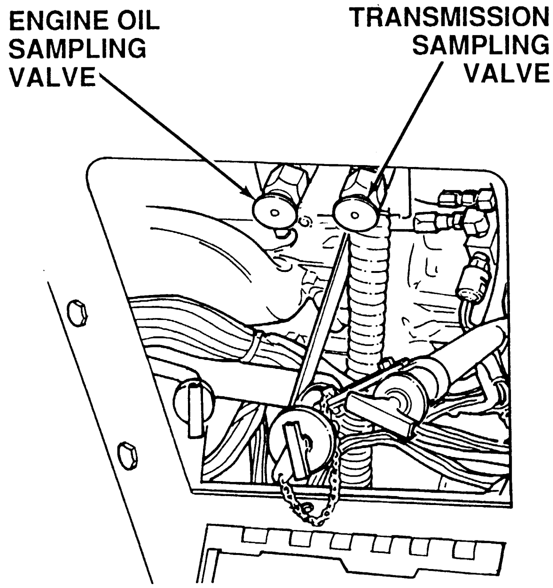
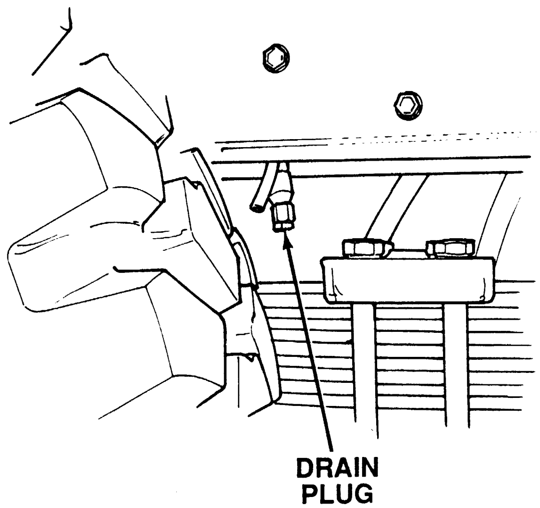
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			NOTE • Refer to DA Pam 738-750 for sampling requirements. • After expiration of warranty, active Army units will send an oil sample to an AOAP laboratory for analysis every 90 days. Reserve and National Guard activities will send an oil sample to an AOAP Laboratory for analysis every 180 days. • Intervals for sampling as well as draining and refilling lubricants may be changed by an AOAP laboratory. • If AOAP laboratory support is not available, drain and refill crankcase oil every 3,000 mi (4,828 km) or semiannually, whichever comes first. Drain and refill transmission oil every 6,000 mi (9,656 km) or annually, whichever comes first.	
79	Semi-Annual	Engine and Transmission Oil Samples	***a.*** Take engine oil sample for AOAP analysis.	***a.*** Faulty oil results received from AOAP lab "Do not operate".
			b. Take transmission oil sample for AOAP analysis.	***b.*** Faulty oil results received from AOAP lab "Do not operate".

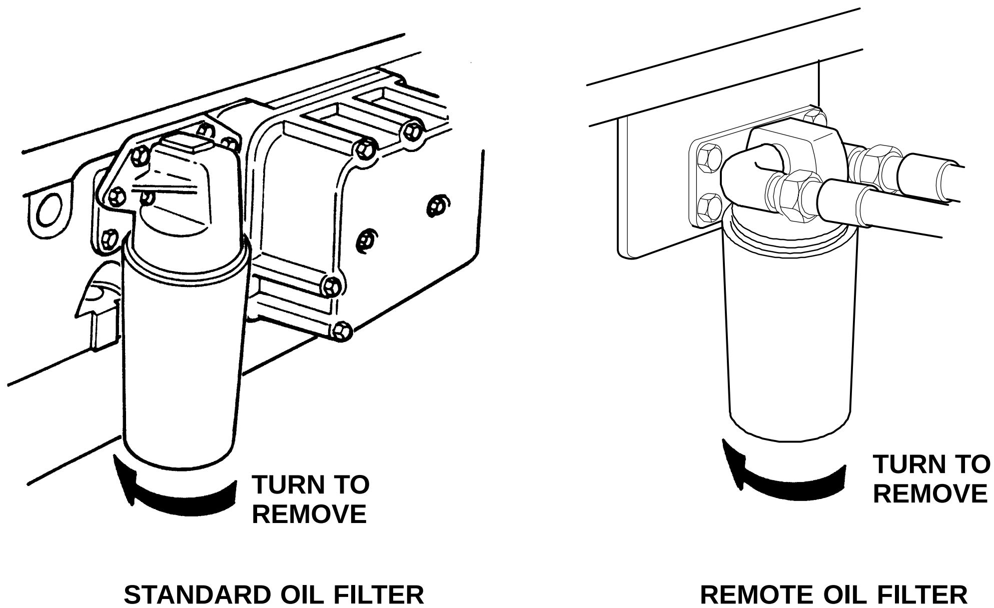
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
80	Semi-Annual	Engine Oil	**NOTE** • Check oil level with truck parked on level ground and the engine off and cool. Do not overfill crankcase. Drain crankcase when hot. • OE/HDO 40 must be used in temperatures consistently above 100 degrees F (38 degrees C). Drain engine oil from crankcase every 3,000 miles (4,828 km) or semiannually, whichever comes first. Refill with OE/HDO as required. Refer to Para 3-2.	Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

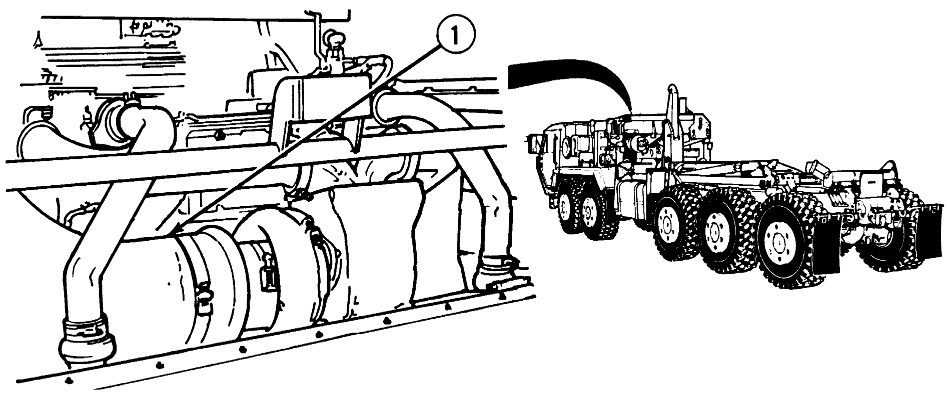
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
81	Semi-Annual	Engine Oil Filter	**NOTE** After installing new filter, fill crankcase, operate engine five minutes and check filter for leaks. Shut down engine, check crankcase level and bring to FULL mark. Replace engine oil filter every 3,000 miles (4,828 km) or semiannually, whichever comes first.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
82	Semi-Annual	Fan Motor	Check fan motor for leaks or damage.	Any Class III leaks or damage are found.
83	Semi-Annual	Fan Blades	Check fan blades for damage or cracks. Replace fan blades if cracked or damaged. Refer to Para 6-3.	
84	Semi-Annual	Fluid Tubes	Check all fluid tubes for cracks, fraying, wear and leaks.	Tubes are cracked, frayed, show wear or leak.



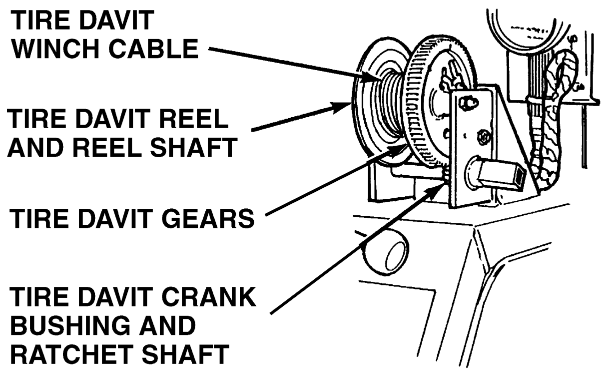
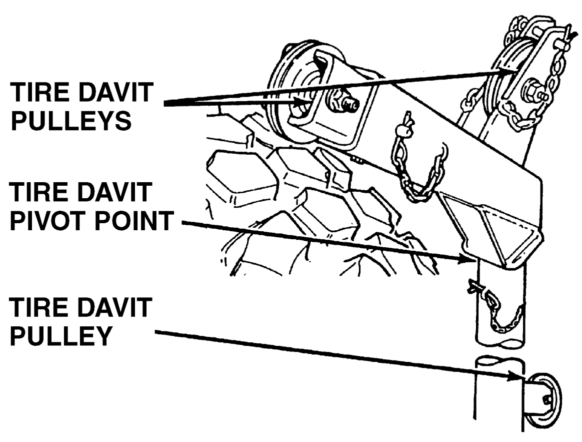
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
85	Semi-Annual	Air Intake	Check air intake hoses and tubing (1) for proper installation, cracks, breaks or loose connections that could let unfiltered air into air intake system. Replace air cleaner, hoses or tubing if cracked or broken. Tighten loose parts. Refer to Para 4-4.	
86	Semi-Annual	Engine Compartment	Check rocker housing covers for evidence of leaks. If leak exists, replace rocker cover gasket. Refer to Para 3-4 and Para 3-5.	
87	Semi-Annual	Engine Compartment	Check alternator wiring for fraying, splits, missing insulation and loose terminal connections. Repair wiring if damaged. Tighten loose parts. Refer to Para 7-101.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
88	Semi-Annual	Engine Compartment	Check engine compartment wiring for fraying, splits, missing insulation or poor connections. Repair if wiring is frayed or split. Refer to Para 7-101.	
89	Semi-Annual	Engine Compartment	Remove cab engine access panel and check alternator mounting and attaching hardware for looseness and cracks or damage. Replace alternator mounting or attaching hardware if damaged or missing. Tighten loose parts. Refer to Para 7-2 or Para 7-3.	
90	Semi-Annual	Engine Compartment	Check alternator belts for cracks and frays. Check for correct belt tension. Replace belts if damaged or missing. Tighten belts to correct tension 55 to 65 lbs (245 to 289 N) for 145 amp and 60 to 65 lbs (260 to 289 N) for 200 amp. Refer to Para 7-4 or Para 7-5.	
91	Semi-Annual	Fuel System	Check fuel tubes and fittings for leaks. If tubes or fittings are leaking, tighten loose parts. Refer to Para 4-12.	Any Class III leaks are found.
92	Semi-Annual	Oil Tubes and Hoses	Check oil tubes and hoses for cracks, fraying, wear or leaks.	Tubes or hoses are damaged.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
93	Semi-Annual	Spare Tire Davit Reel	***a.*** Clean and use oil can to lubricate tire davit winch cable with OE/HDO. ***b.*** Use oil can to lubricate tire davit reel and reel shaft with OE/HDO. ***c.*** Clean and lubricate tire davit gears and ratchet with GAA. ***d.*** Use oil can to lubricate the tire davit crank bushing and ratchet shaft with OE/HDO.	
				
94	Semi-Annual	Spare Tire Davit	***a.*** Use oil can to lubricate tire davit pulleys with OE/HDO. ***b.*** Clean and lubricate tire davit pivot point with GAA.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

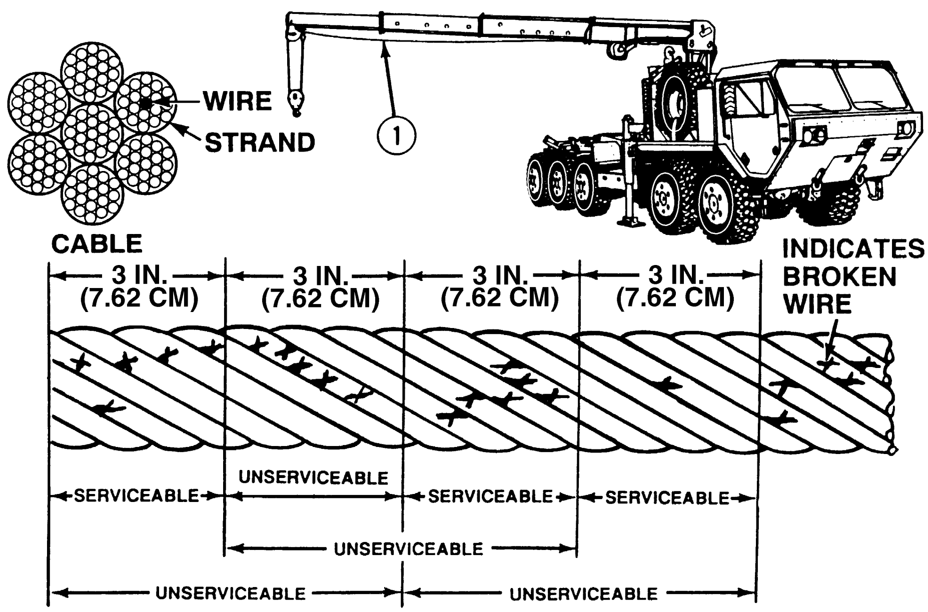
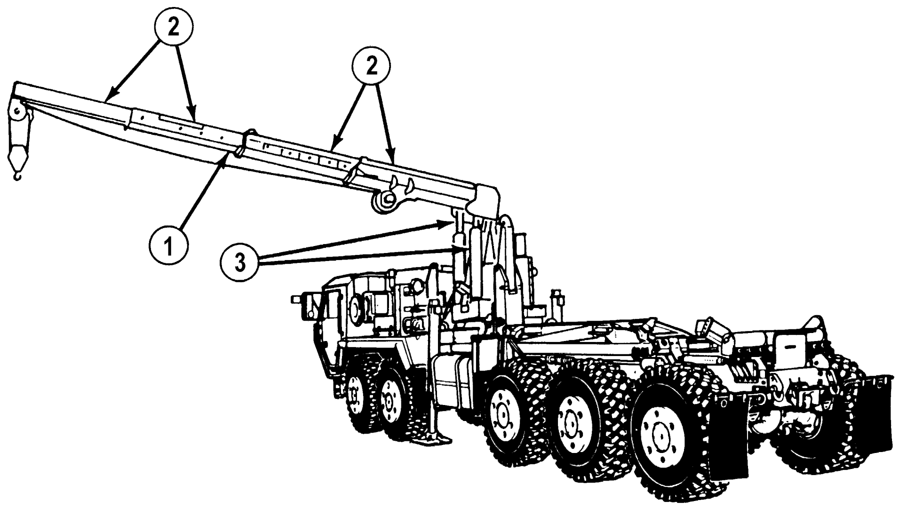
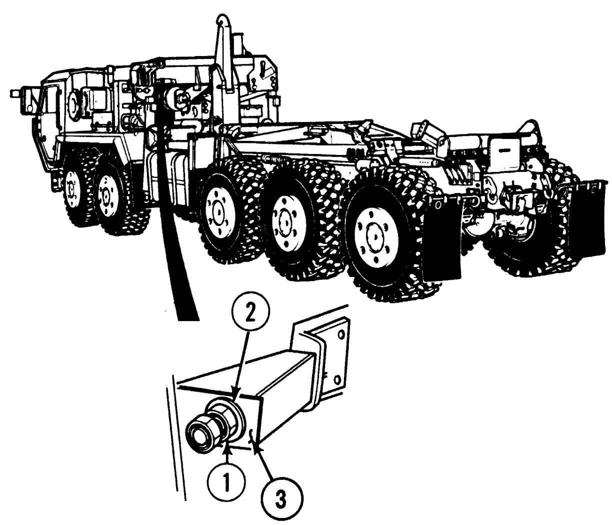
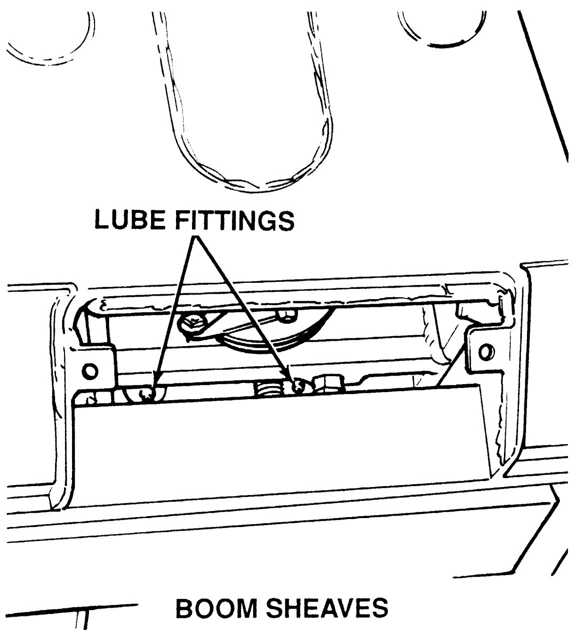
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
95	Semi-Annual	Crane Hoist Cable	Inspect crane hoist cable for weak points in cable and points where greatest stress occurs. ***a.*** Inspect for worn spots. Worn spots will show up as shiny flattened spots on cable strands. ***b.*** Strands must be inspected to determine if one or more wires are broken. ***c.*** Inspect strands. If individual wires are broken next to one another, count broken wires. If six randomly distributed broken wires in one lay (distance in which strands make one complete turn around the cable) or three broken wires in one strand in one lay are found, replace cable. Refer to Para 18-5.	 ***a.*** Outer wires are reduced in diameter by one-fourth. ***b.*** Cable is frayed, kinked, worn or corroded.

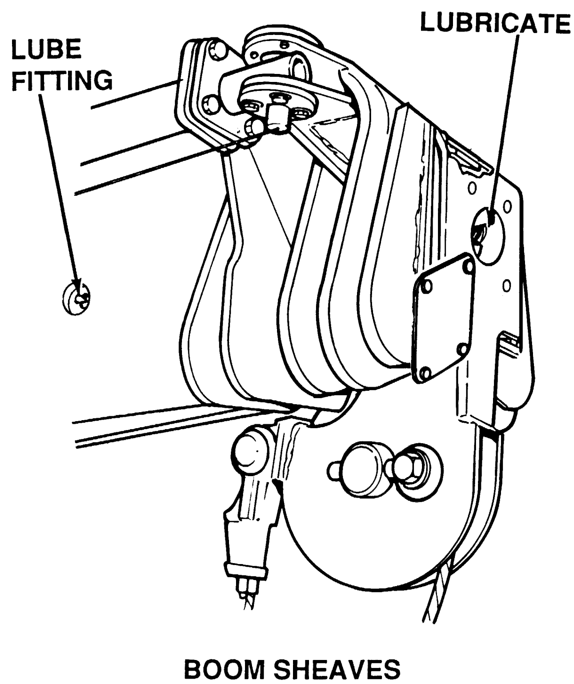
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
96	Semi-Annual	Material Handling Crane	***a.*** Raise crane boom (1) and extend stages (2) (TM 9-2320-364-10). Check cylinder piston rods (3) for bends and scoring. ***b.*** Check crane boom (1) for deformation, cracks or broken welds.	***a.*** Piston rods are scored or bent. ***b.*** Crane boom is deformed, cracked or has broken welds.
				
97	Semi-Annual	Boom Chain/Cable Adjustment	Inspect boom chain/cable adjustment. Retract boom and manually push in end of boom completely back to stops. Pull out on adjusting nut (1) and check for clearance between washer (2) and stop plate (3).	Clearance is more than 1/32 in. (0.79 mm).

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

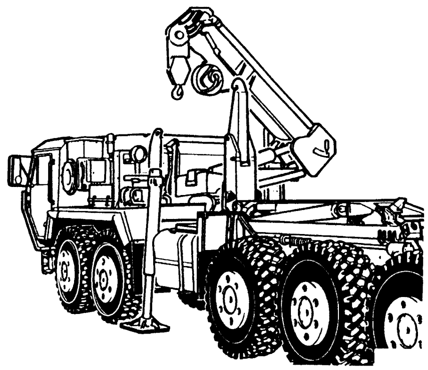
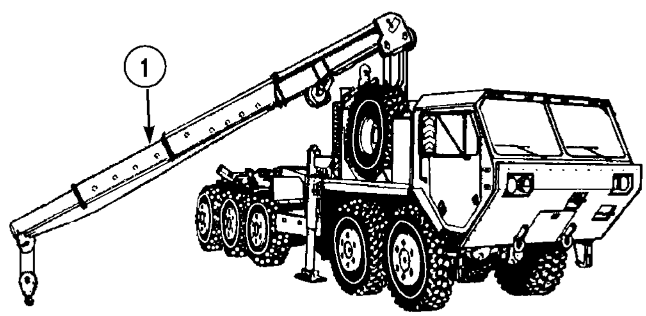
Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).





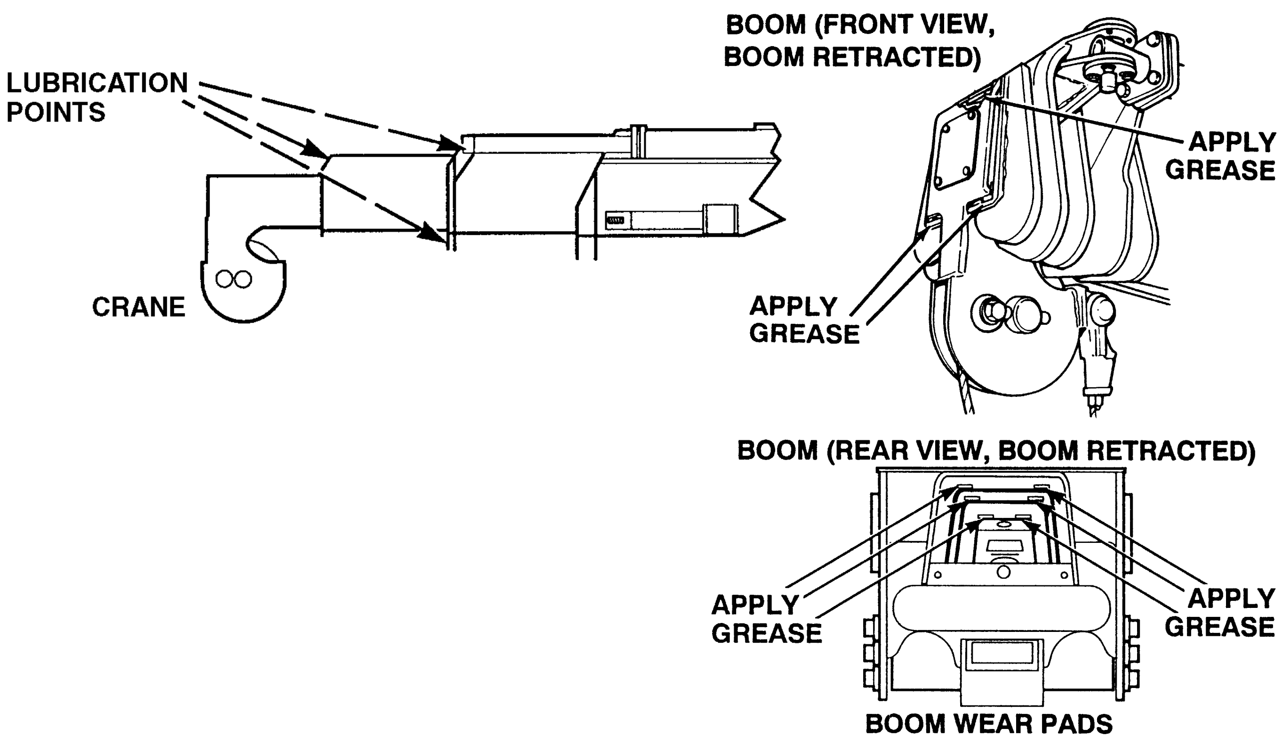
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE • If an air-operated grease gun does not purge the fitting, use a hand-operated grease gun. If the part does not purge, remove fitting and clean, install fitting and grease again. If part still does not purge, refer to maintenance task for that component. • When using a grease gun, apply lubricant to the fitting until clean lubricant squeezes out of the part being lubricated.	
98	Semi-Annual	Boom Sheaves	Remove front and rear covers on boom and lubricate boom sheaves with GAA semiannually.	Fittings will not purge.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
99	Semi-Annual	Material Handling Crane	While operating Material Handling Crane (MHC), check that engine maintains 1250 ± 50 rpm during hoisting operation. If engine surges erratically refer to troubleshooting, Section IV.	
100	Semi-Annual	Material Handling Crane	Check torque of inner turntable bearing screws. Tighten screws to 370 lb-ft (502 N·m).	Screws are missing.
101	Semi-Annual	Material Handling Crane	Check hydraulic tubes and hoses for splits, cracks, leaks or signs of wear.	Crane tubes or hoses are damaged.
				
102	Semi-Annual	Boom Wear Pads	***a.*** Inspect boom wear pads on crane boom (1) for wear. Replace worn pads. Refer to Para 18-3.	***a.*** Boom wear pads are worn.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Boom Wear Pads (continued)	***b.*** Lubricate boom wearpads with GAA, perform the following procedures: (1) Refer to TM 9-2320-364-10 and shut off truck. (2) Remove cover at rear of boom. (3) Inject grease in front of each rear (upper) wear pad.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
		Boom Wear Pads (continued)	**WARNING** Do not allow personnel to perform maintenance directly under the boom or mast. Failure to follow proper procedures could cause serious injury or death. (4) Refer to TM 9-2320-364-10 and erect crane and extend boom. (5) Apply grease to front (lower) wear pads. (6) Extend and retract boom. If boom chatters or does not smoothly extend/ retract, refer to TM 9-2320-364-10, return crane to stowed position and shut off truck. Repeat Steps (3) through (5). (7) With boom extended, visually inspect that the boom sections undersides are evenly greased along the boom wear pad riding surfaces. If bare spots are present, refer to TM 9-2320-364-10, return crane to stowed position and shut off truck. Repeat Steps (3) through (6). (8) Refer to TM 9-2320-364-10 and return crane to stowed position. (9) Refer to TM 9-2320-364-10 and shut off truck. (10) Install cover plate at rear of boom.	
103	Semi-Annual	Cab Compartment	Lubricate doors, side panels, engine cover hinges, locks and pivot points every 1,500 mi (2,414 km) or semiannually. Lubricate more often if usage is high. Lubricate door rotary locks and latches with lubricant cleaner. Refer to Table 2-3.	

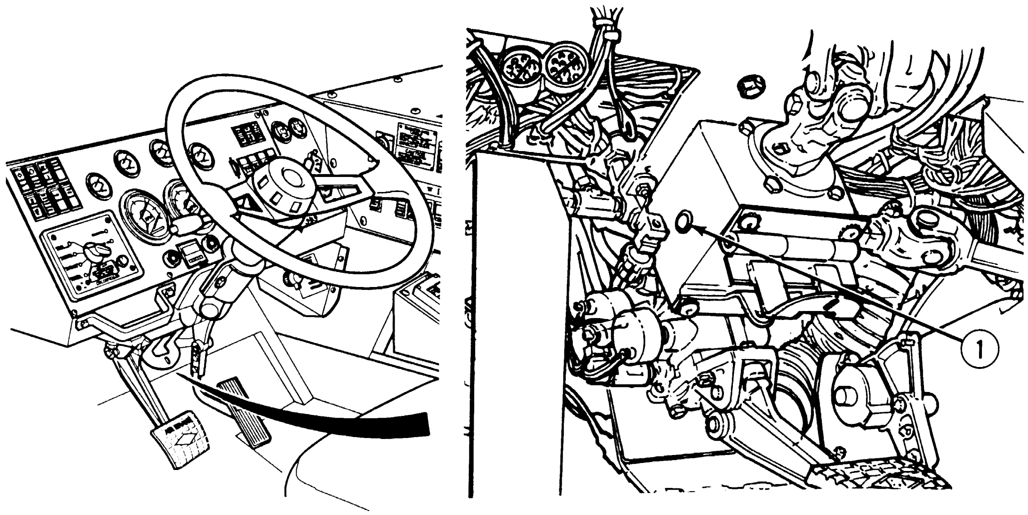
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
	INSIDE CAB			
104	Semi-Annual	Cab Compartment	Check hose clamps and GPFU mounts for looseness or damage. Replace clamps or mounts if damaged or missing. Tighten loose parts. Refer to Para 24-2.	
105	Semi-Annual	Cab Compartment	Check operator and crew seats and seat belts for loose mountings and damage. Replace operator or crew seat or seat belt mountings if damaged or missing. Tighten loose parts. Refer to Paras 17-40, 17-42 or 17-44.	Replace seat/seat mounts if damaged. Replace seat belts if any seat belt system shows cuts, fraying, extreme wear, abrasions to seat belt webbing or damage to the buckle, latch plate retractor hardware.
106	Semi-Annual	Cab Compartment	Check air filter restriction indicator operation. See Operator's Manual (TM 9-2320-364-10). If indicated, replace air filter element. Refer to Para 4-5. **NOTE** After all services and inspections have been completed, take the truck on a short road test to make sure all corrections have been accomplished. Correct any defects or malfunctions that occur during this test.	
107	Semi-Annual	Cab Compartment	During road test: ***a.*** Listen for any abnormal noise. ***b.*** Check steering operation. ***c.*** Check operation of brakes. ***d.*** Check transmission operation; all ranges. ***e.*** Check engine brake operation (TM 9-2320-364-10). ***f.*** Note any loss of power or rough running engine.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
	FRONT LEFT SIDE OF VEHICLE			
108	Annual	90 Degree Gearbox	Check 90 degree gearbox (1) for cracks, dents, damage or loose bolts.	Damage or loose bolts are found.
109	Annual	Exterior	Check that the following items on the exterior are in place and in serviceable condition. ***a.*** Fasteners ***b.*** Hinges ***c.*** Panels ***d.*** Stowage compartments	
110	Annual	Exterior	Check all data plates to ensure legibility. Replace data plates if damaged or missing.	



2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

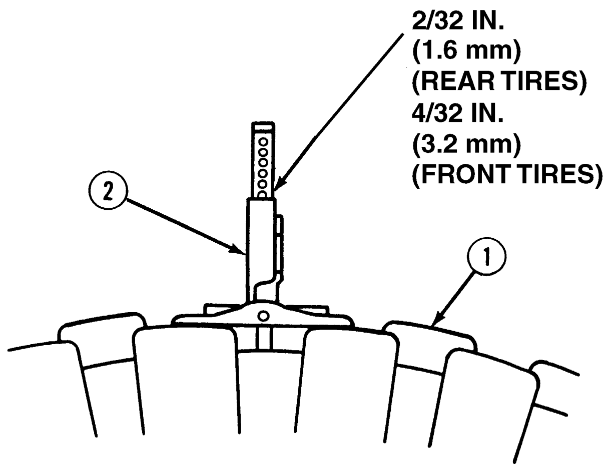
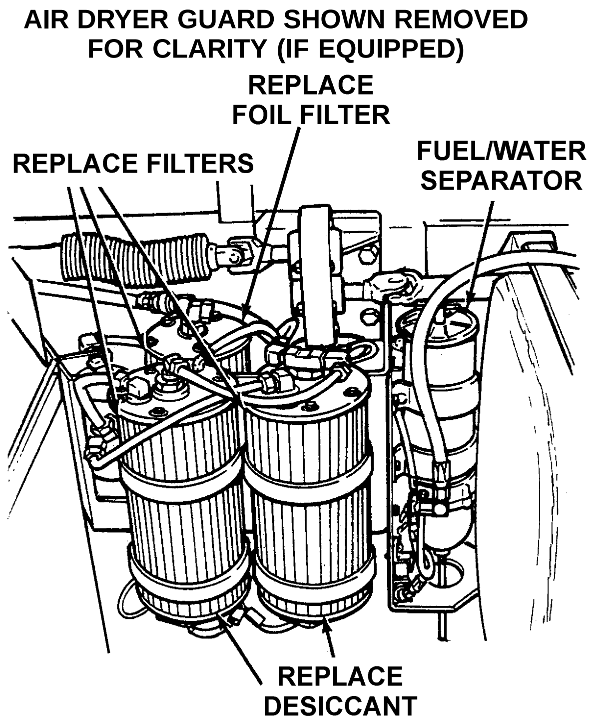
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
111	Annual	Tires (All)	Check each tire (1) for wear using depth gauge (2). Nine separate measurements must be taken. Measure depth across tread at outside edge, center and inside edge of tire at 12 o'clock, 8 o'clock and 4 o'clock positions around outside of tire. If tread depth is less than 2/32 in. (1.6 mm) on rear tires or 4/32 in. (3.2 mm) on front tires, replace tire. Refer to Para 13-2.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
112	Annual	Air and Fuel Filters	***a.*** Replace air dryer/after cooler filters every 2,000 hours of operation or annually, whichever comes first. Refer to Para 12-21 and Para 12-22. ***b.*** Replace air dryer desiccant every 2,000 hours of operation or annually, whichever comes first. Refer to Para 12-21. ***c.*** Replace fuel/water separator filter every 6,000 miles (9,656 km) or annually, whichever comes first. Refer to Para 4-17. ***d.*** Replace after cooler foil filter every 2,000 hours of operation or annually, whichever comes first. Refer to Para 12-22. ***e.*** Clean fuel priming pump filter every 6,000 miles (9,656 km), annually or more frequently if fuel is dirty. Refer to Para 4-3.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

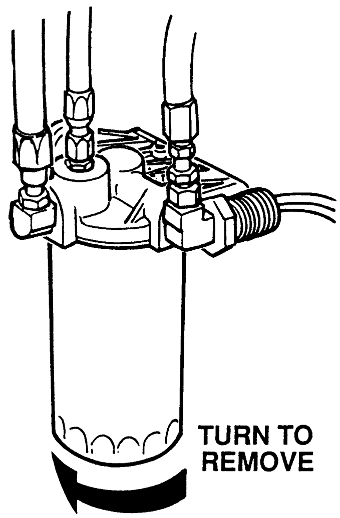
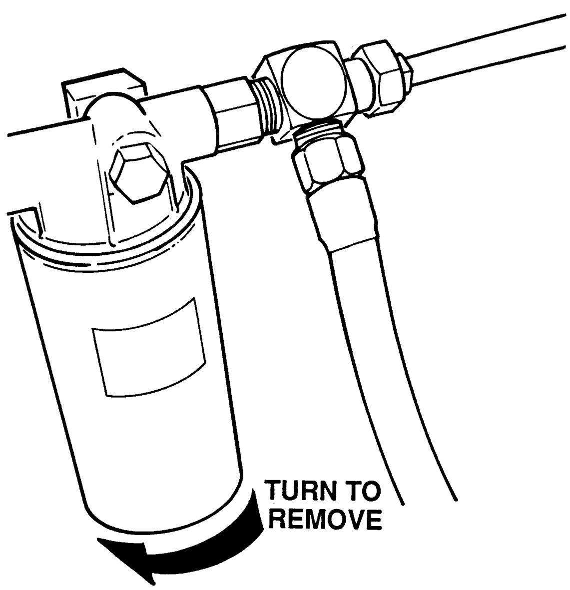
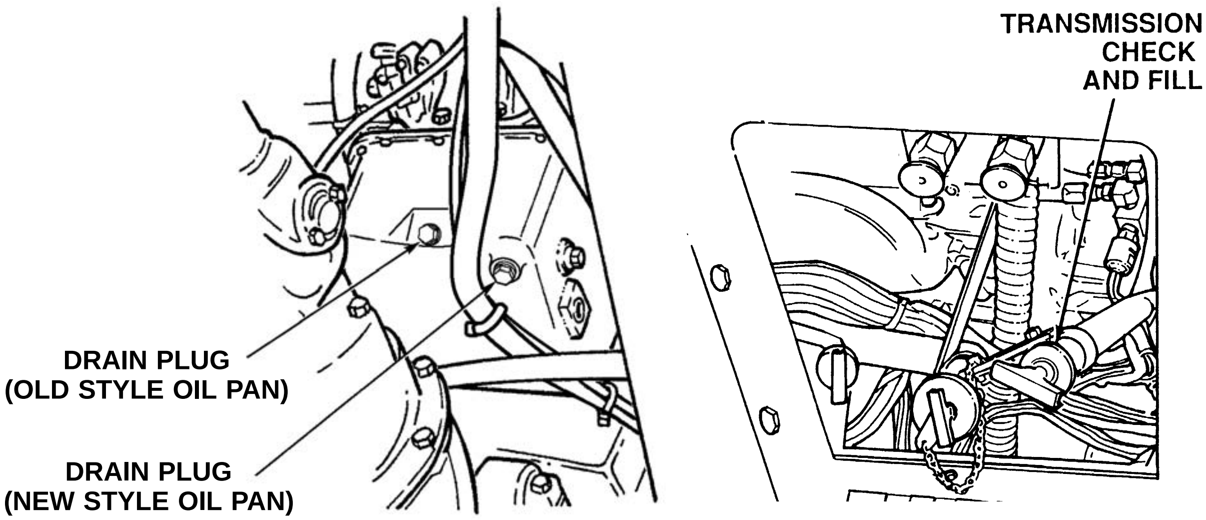
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 	
113	Annual	Secondary Fuel Filter	Replace secondary fuel filter every 6,000 miles (9,656 km) or annually, whichever comes first. Refer to Para 4-13.	Any Class III leaks are found.
			 	
114	Annual	Transmission Oil Filter	Replace transmission oil filter every 6,000 miles (9,656 km) or annually, whichever comes first. Refer to Para 8-4.	Any Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE • When initially filling or changing the transmission fluid, use the COLD band on dipstick. At an initial operating temperature of 60 to 120 degrees F (16 to 49 degrees C) fill the transmission so the fluid is in COLD range. • Loosen T-handle on transmission dipstick approximately one full turn then dipstick can be removed from check and fill tube with slight resistance. • Operate engine one minute at 1000 RPM, idle until transmission temperature reaches 180 to 220 degrees F (82 to 104 degrees C). With engine idling, transmission in neutral, and truck on level ground, check transmission dipstick. If oil level is within the HOT/RUN band the quantity of oil in the transmission is safe for operation. If oil level is on or below bottom line of HOT/RUN band, add oil.	
115	Annual	Transmission Fluid and Breather	Drain fluid from transmission and service transmission breather every 6,000 miles (9,656 km) or annually, whichever comes first. Refer to Para 8-3 and Para 8-5. Refill with OE/HDO as required. Refer to Table 2-3.	Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

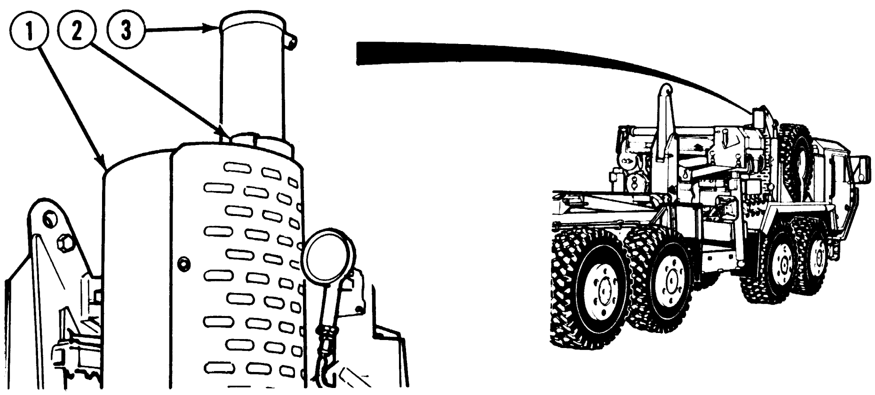
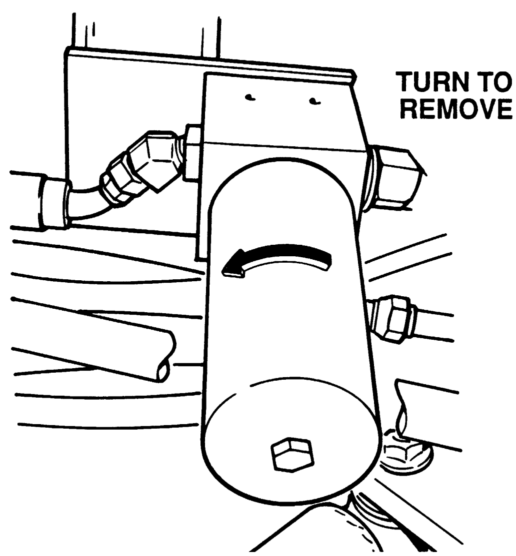
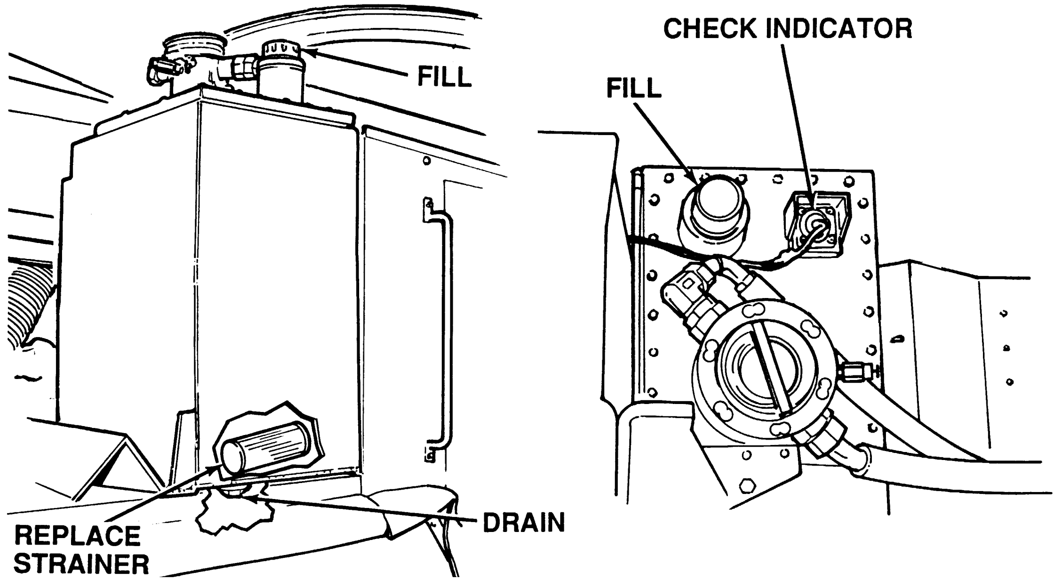
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
116	Annual	Exhaust System	Check muffler (1), guard (2) and raincap (3) for looseness or leaks. Tighten loose parts. Refer to Paras 5-2 and 5-3.	Muffler, guard or raincap is missing.
				
117	Annual	Main Hydraulic High Pressure Filter	Replace main hydraulic high pressure filter every 6,000 miles (9,656 km) or annually, whichever comes first. Refer to Para 20-6.	Any Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			NOTE • OE/HDO-30 must be used when temperatures are consistently above 60 degrees F (16 degrees C). • When oil is cold, do not add or fill beyond the word “FULL” on the fluid level indicator.	
118	Annual	Main Hydraulic Reservoir	***a.*** Drain main hydraulic reservoir every 800 hours of operation or annually, whichever comes first. Refer to Para 20-11. Refill with OE/HDO as required. Refer to Table 2-3. ***b.*** Replace strainers in the main hydraulic reservoir every 800 hours of operation or annually, whichever comes first. Refer to Para 20-13.	***a.*** Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

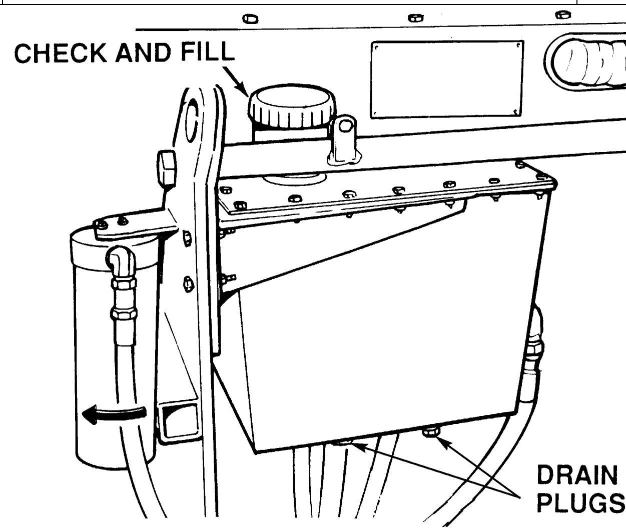
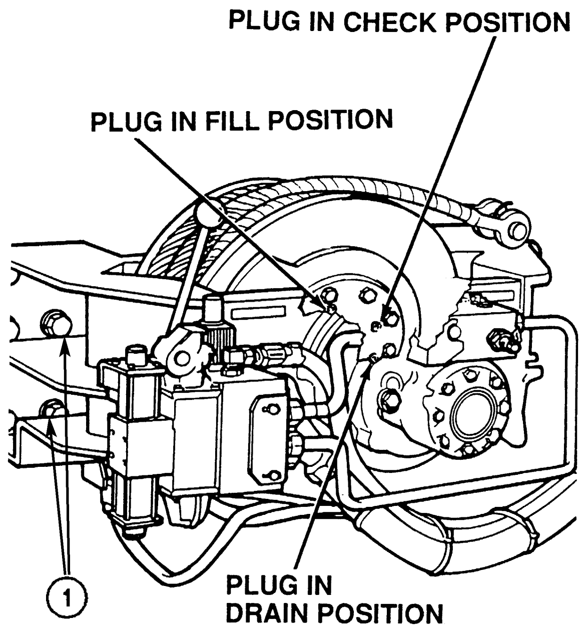
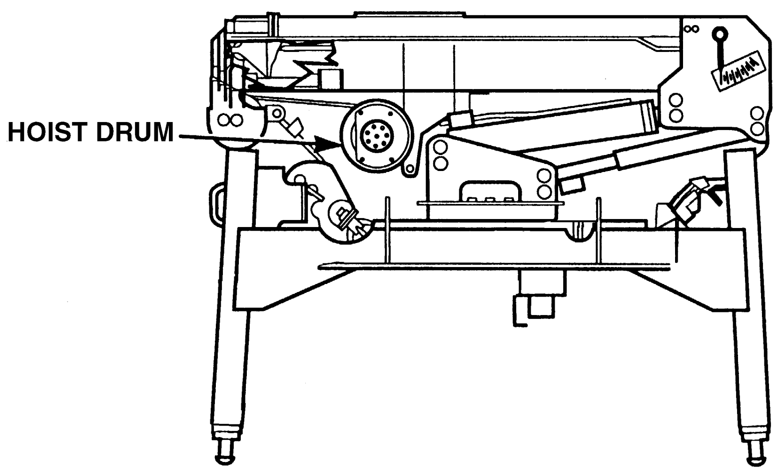
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			 **NOTE** • OE/HDO-30 must be used when temperatures are consistently above 60 degrees F (16 degrees C). • Both drain plugs must be removed to completely drain the steering reservoir.	
119	Annual	Power Steering Reservoir	Drain fluid from power steering reservoir every 800 hours of operation or annually, whichever comes first. Refer to Para 14-2. Refill with OE/HDO as required. Refer to Table 2-3.	Any Class III leaks are found.
120	Annual	U-Joint Mounting Screws	Make sure all U-joint mounting screws are tight. Tighten all parts. Replace screws if damaged or missing. Refer to Para 10-2. **NOTE** Per TB 43-0142, material handling cranes must be load tested after extensive repair, modification or if crane has remained idle for one or more years.	
121	Annual	Material Handling Crane	Notify Direct Support Maintenance if vehicle crane meets requirements for load testing.	
122	Annual	Air Governor	Check air governor operation and adjust as required. Refer to Para 12-41.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
			NOTE • The 50 hour interval is based on actual self-recovery winch operating hours. The hours can be tracked by the operator and recorded in the logbook. The self-recovery winch should be lubricated on a monthly or 50 actual operating hour interval, whichever comes first. • Change oil in self-recovery winch (SRW) gearbox after the first 10 hours of winch operation. • SRW has two plugs. To check and fill SRW, one plug must be in upper position and second plug must be at side position. To drain SRW, one plug must be in side position and one plug must be at bottom position.	
123	Annual	Self-Recovery Winch	Drain fluid from SRW every 12,000 miles (19,312 km) or annually, whichever comes first. Refill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

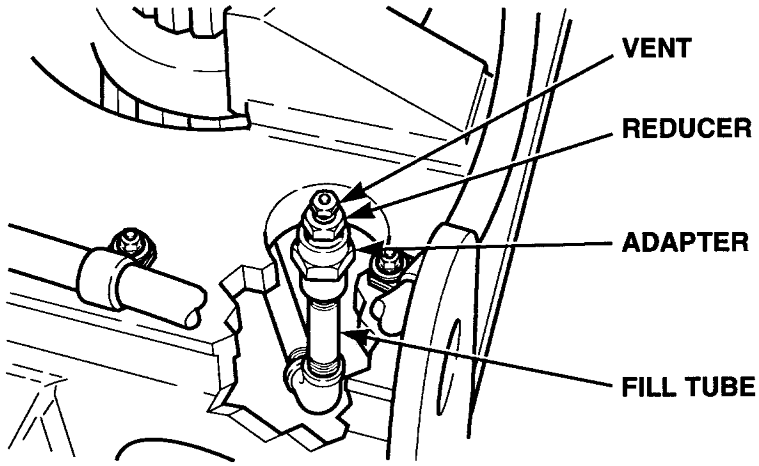
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



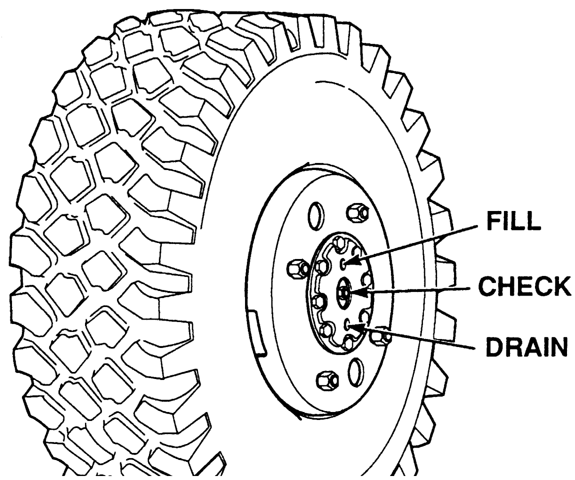
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
124	Biennial	Crane Hoist Drum	Check fluid level in hoist drum every 250 hours of operation or biennially, whichever comes first. Fill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
				
125	Biennial	Crane Swing Drive Gear Box	To check and fill the swing drive gearbox, perform the following procedures: (1) Remove vent cap at top of filler tube. (2) Check that lubricant is visible at bottom of tube. (3) If required, fill gearbox with lubricant. (4) Replace vent cap. Check fluid level in swing drive gearbox every 250 hours of operation or biennially, whichever comes first. Fill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



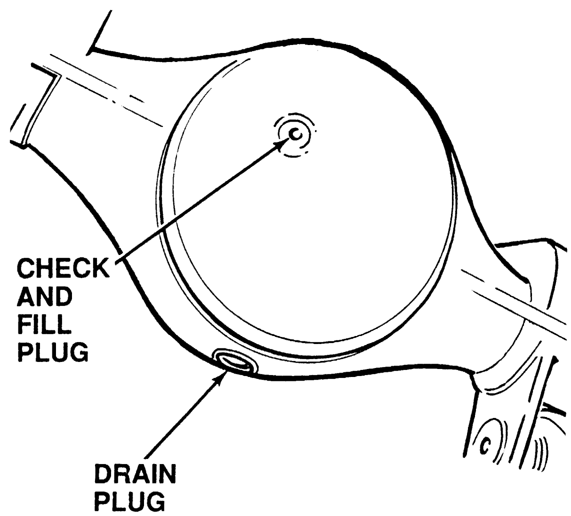
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
126	Biennial	Planetary Hub Gears (all axles)	**NOTE** • Following initial drain, change lubricant every 12,000 mi (19,312 km) or each two years of service, whichever comes first. If truck is operated in ambient temperatures over 100 degrees F (38 degrees C) the lubricant should be drained and refilled every 3,000 mi (4,828 km). During all lubricant changes, remove metal particles from magnetic drain plugs. Fill wheel ends first. • Axles No. 1, 2 and 5 (steering axles). Planetary wheel end level is at the bottom of the center check plug. Fill slowly through the 3/4 in. (19 mm) fill holes until oil runs out the center check location. Scheduled oil level checks will be made at these same locations.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			• Axles No.3 and 4 (non-steering axles). Planetary wheel end level on the rigid axles will initially be set at bottom of the center check plug. Filling will be through the 3/4 in. (19 mm) fill holes until oil runs out the center check location. Scheduled oil level checks will be made only at the axle housing and not the planetary wheel ends on the rigid axles. Due to internal venting the wheel ends will seek the same level as the axle housing, and as a result, no checks should be made after the initial fill/check of the wheel end. • Axles No. 3 and 4 (non-steering axles). Some oil will transfer from the wheel end to the axle housing and a slight overfill condition at the axle housing may be noticed during checking of the axles. This is considered normal and should not be a reason for concern.	
		Planetary Hub Gears (all axles) (continued)	Drain fluid from planetary hub gears. Refer to Para 11-2. Refill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

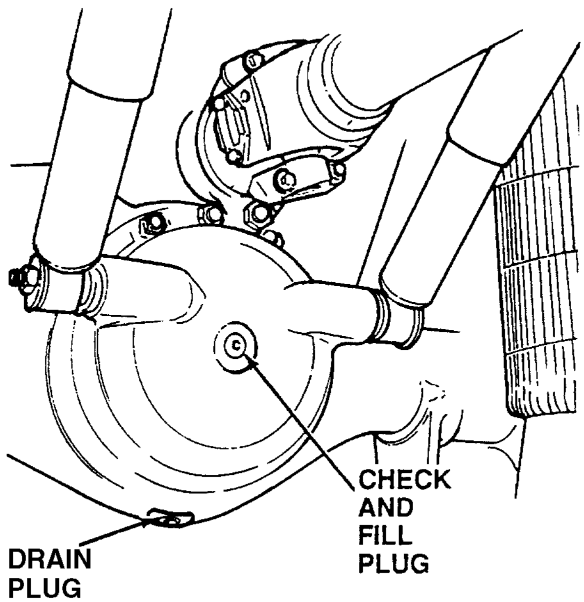
2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE • Following initial drain, change lubricant every 12,000 mi (19,312 km) or each two years of service, whichever comes first. If truck is operated in ambient temperatures over 100 degrees F (38 degrees C) the lubricant should be drained and refilled every 3,000 mi (4,828 km). During all lubricant changes, remove metal particles from magnetic drain plugs. Fill wheel ends first. • Initial fill and level checks for the axles will be made from the housing side plugs. Oil level should be at bottom of the hole. Scheduled oil level checks will be made at these same locations. • All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed.	
127	Biennial	Differential (Axles No. 1 and No. 5)	Drain fluid from Axles No. 1 and No. 5 differentials. Refer to Para 11-2. Refill with GO as required. Refer to Table 2-3.	Any Class III leaks are found.

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

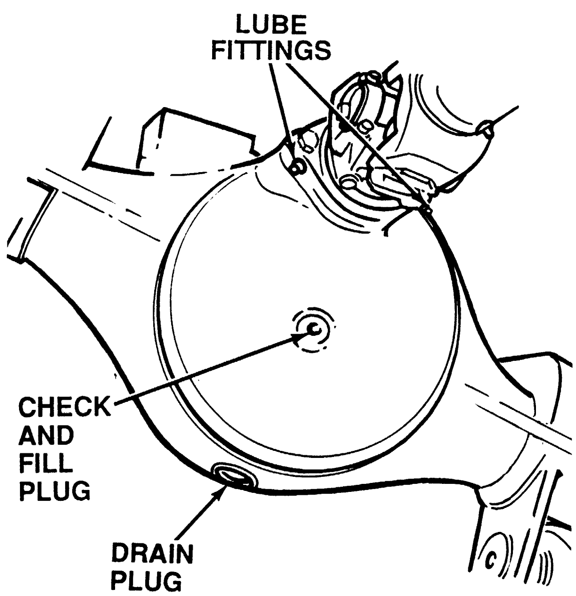


Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
128	Biennial	Differential (Axle No. 3)	**NOTE** • Following initial drain, change lubricant every 12,000 mi (19,312 km) or each two years of service, whichever comes first. If truck is operated in ambient temperatures over 100 degrees F (38 degrees C) the lubricant should be drained and refilled every 3,000 mi (4,828 km). During all lubricant changes, remove metal particles from magnetic drain plugs. Fill wheel ends first. • Initial fill and level checks for the axles will be made from the housing side plugs. Level should be set at the bottom of the hole. • Some oil will transfer from the wheel end to the axle housing and a slight overfill condition at the axle housing may be noticed during checking of the axles. This is considered normal and should not be a reason for concern.	

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

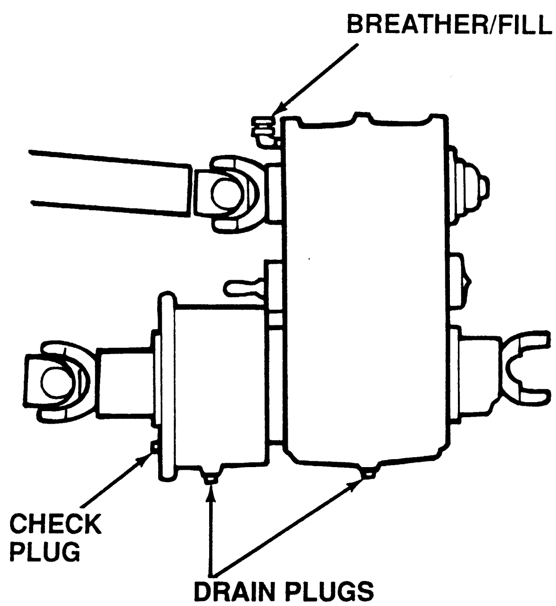
Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			• All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed.	
		Differential (Axle No. 3) (continued)	Drain fluid from the Axle No. 3 differential. Refer to Para 11-2. Refill with GO as required. Refer to Table 2-3.	Class III leaks are found.



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
129	Biennial	Differential (Axles No. 2 and No. 4)	**NOTE** • Following initial drain, change lubricant every 12,000 mi (19,312 km) or each two years of service, whichever comes first. If truck is operated in ambient temperatures over 100 degrees F (38 degrees C) the lubricant should be drained and refilled every 3,000 mi (4,828 km). During all lubricant changes, remove metal particles from magnetic drain plugs. Fill wheel ends first.	

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			• All axles are drained/filled the same way. After draining, fill through the axle bowl to a level even with the check and fill hole. Allow the oil level to stabilize and recheck. Add lubricant as needed. • Initial fill and level checks for the axles will be made from the housing side plugs. Level should be set at the bottom of the hole. • Axle No. 4. Some oil will transfer from the wheel end to the axle housing and a slight overfill condition at the axle housing may be noticed during checking of the axles. This is considered normal and should not be a reason for concern.	
		Differential (Axles No. 2 and No. 4) (continued)	Drain fluid from the No. 2 and No. 4 axle differentials. Refer to Para 11-2. Refill with OE/HDO as required. Refer to Table 2-3.	Class III leaks are found.



Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
130	Biennial	Transfer Case	Drain fluid from the transfer case every 12,000 miles (19,308 km) or biennially, whichever comes first. Refer to Para 9-2. Refill with OE/HDO as required. Refer to Table 2-3.	Class III leaks are found.

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-1. Unit Level Preventive Maintenance Checks and Services (PMCS) (CONT).

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
			NOTE Tires should only be rotated on the same side within same tandem.	
131	Biennial	Tires	Rotate tires. On same side of truck, rotate tire with most wear with the tire with least wear (TM 9-2320-364-10).	
132	Biennial	Wheel Bearings	Check wheel bearings for looseness or damage.	Wheel bearings are loose or damaged.

Table 2-2. Unit Level Preventive Maintenance Checks and Services - Auxiliary Equipment

Item No.	Interval	Item to Be Inspected	Procedure	Not Mission Capable If:
	INSIDE CAB			
1		Machine Gun Mount	Refer to TM 9-1005-245-14 for preventive maintenance checks and services.	
2		M-8 Chemical Alarm	Refer to TM 9-6665-225-12 for preventive maintenance checks and services.	
3		M-13 Decontamination Unit	Refer to TM 3-4230-214-12&P for preventive maintenance checks and services.	
4		Radio	Refer to TM 11-5820-498-12 for preventive maintenance checks and services.	

Table 2-3. Lubricants

Lubricant	Component	Approximate Capacity	Expected Temperature	Intervals	
Luricating Oil, Internal Combustion Engine (ICE Tactical OE/HDO (MIL-L-2104) or Lubricating Oil, ICE, Artic,OEA (MIL-L-46167)	Engine	32 qt (30 l) w/std oil filter 37 qt (35 l) w/re-mote oil filter	See CHART A.	OC - ON - CONDITION D - DAILY W - WEEKLY M - MONTHLY AR - AS REQUIRED HRS - HOURS S - SEMIANNUALLY (6 MONTHS) A - ANNUALLY BI - BIANNUALLY 1.5 - 1,500 MILES 3 - 3,000 MILES 6 - 6,000 MILES 9 - 9,000 MILES 12 - 12,000 MILES 24 - 24,000 MILES	For arctic operation, refer to FM 9-207.
	Transmission	39.5 qt (37.4 l)	See CHART B.		
	Transfer Case	10.5 qt (9.9l)	See CHART C.		
	Power Steering Reservoir	34 qt (32 l)	See CHART D.		
	Hydraulic Reservoir	234 qt (22 l)	See CHART D.		
	Oil Can Points	As Required	See CHART G.		
Lubricating, Oil, Gear, Multipurpose, GO (MIL-L-2105)	Axle No 1	33 pt (16 l)	See CHART H.		
	Axle No 2	36 pt (17 l)	See CHART H.		
	Axle No 3	41 pt (19 l)	See CHART H.		
	Axle No 4	40 pt (19 l)	See CHART H.		
	Axle No 5	32 pt (15 l)	See CHART H.		
	Planetary Hub Gears	3.0 pt (1.4 l)	See CHART H.		
	Steering Gear Box 2.21:1	0.5 pt (0.237 l)	See CHART F.		
	Self Recovery Winch Gearbox	2 qt (2 l)	See CHART E.		
	Hoist Gearbox	1 pt (0.47 l)	See CHART E.		
	Swing Drive Gearbox	1 pt (0.47 l)	See CHART E.		

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-4. Other Fluids

Fluid	Capacity	Temperature	For arctic operation, refer to FM 9-207.
Drycleaning Solvent, SD-ll, (P-D-680)	As Required	All Temperatures	
Antifreeze, Ethylene Glycol (MIL-A-46153)	100 qt (95 l)*	Above –50 degrees F (–46 degrees C)	
Antifreeze, Arctic-Type (MIL-A-11755)	103 qt (97 l)*	Use when extended periods of –40 degrees F (–40 degrees C) or below are encountered.	

* Cooling System Capacity

Table 2-5. Grease, Automotive and Artillery (GAA) (MIL-L-10924)

The following components are lubricated with GAA as required at all temperatures

Drive Train/Suspension Driveshafts, U-Joints, Double Cardon Joints, Spring Hangers, Trunnions (Fittings)	For arctic operation, refer to FM 9-207.
SRW Tensioning Guides and Rollers (Fittings)	
Self-Guided Coupler (Fittings)	
Steering System Pitman Arms, Steering Gears, Drag Links Steering Shafts, Steering Column Linkage Tie-Rod Ends, Intergear Link (Fittings)	
Tire Davit (Fittings)	
Hydraulic Pump Driveshaft (Fittings)	
Load Handling System (Fittings)	
Crane (Fittings)	

Table 2-6. Antiseize Compound (MIL-A-907)

The following components are lubricated with antiseize compound as required at all temperatures.

Crane Jack Cylinder Barrels
Crane Tension Link

Table 2-7. Total Work Hours Required for Service

TRUCK, M1074	
OC	1.04
D	0.03
W	0.03
M/50 HRS	0.43
S,Q	0.04
A	TBD
BI	TBD
1.51/Q	1.71
3/S	0.72
S/400 HRS	1.08
6A	0.41
12A	0.40
20/A	0.33
50/A	1.38
12/BI	5.93
8000 HRS/12	0.10

* The work-hours shown above have been established on an individual basis and, accordingly, are not applicable at maintenance facilities where production line methods are employed.

Table 2-8. Sealant (NSN 8030-01-166-0675)

The following components have sealant applied.

Steering Gearbox 2.21 to 1

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Chart A. Engine

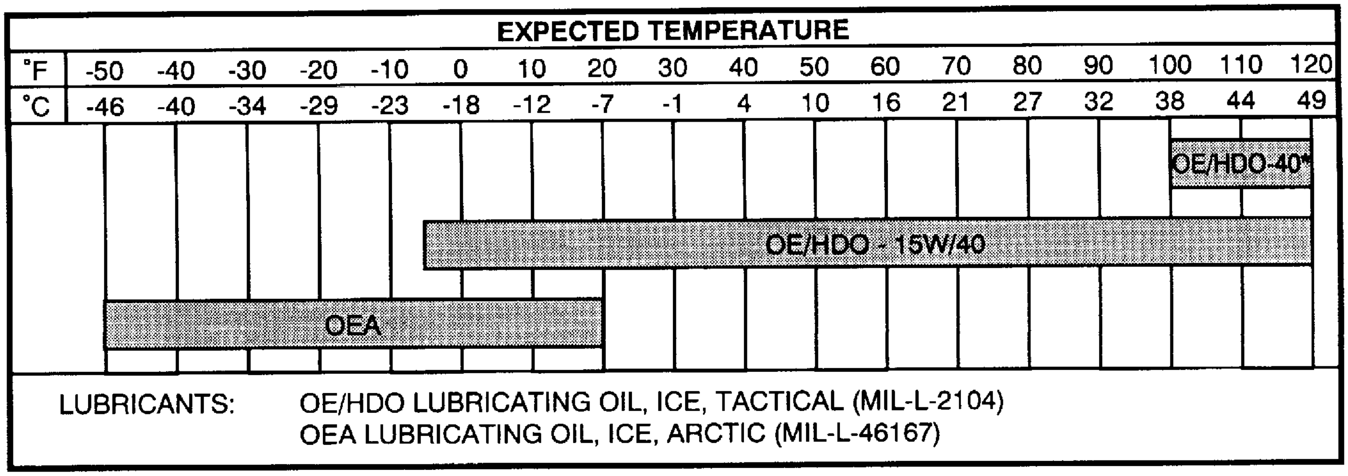


Chart B. Transmission

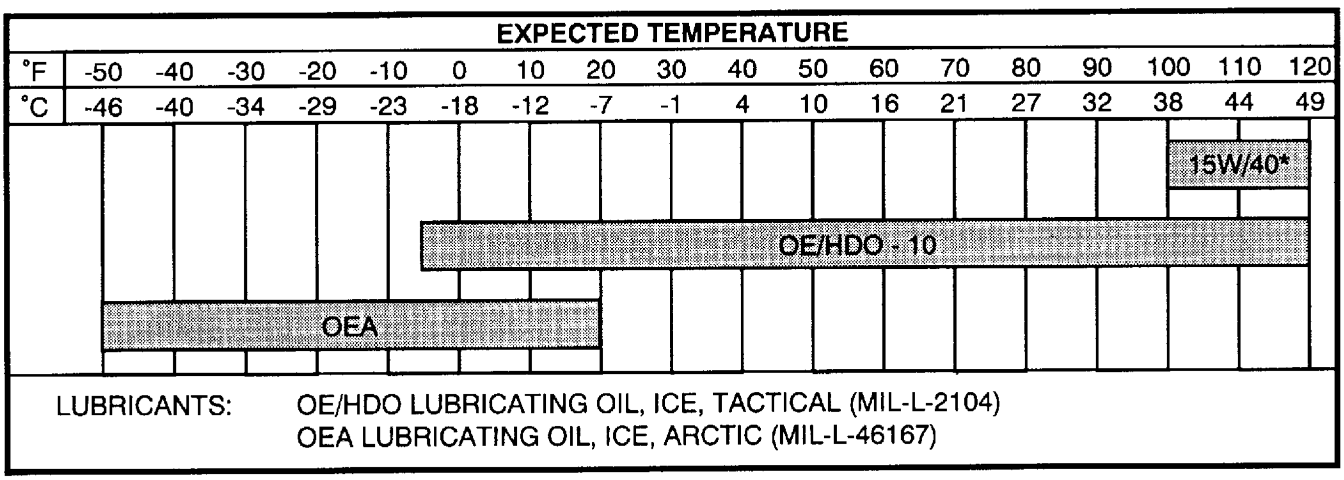


Chart C. Transfer Case

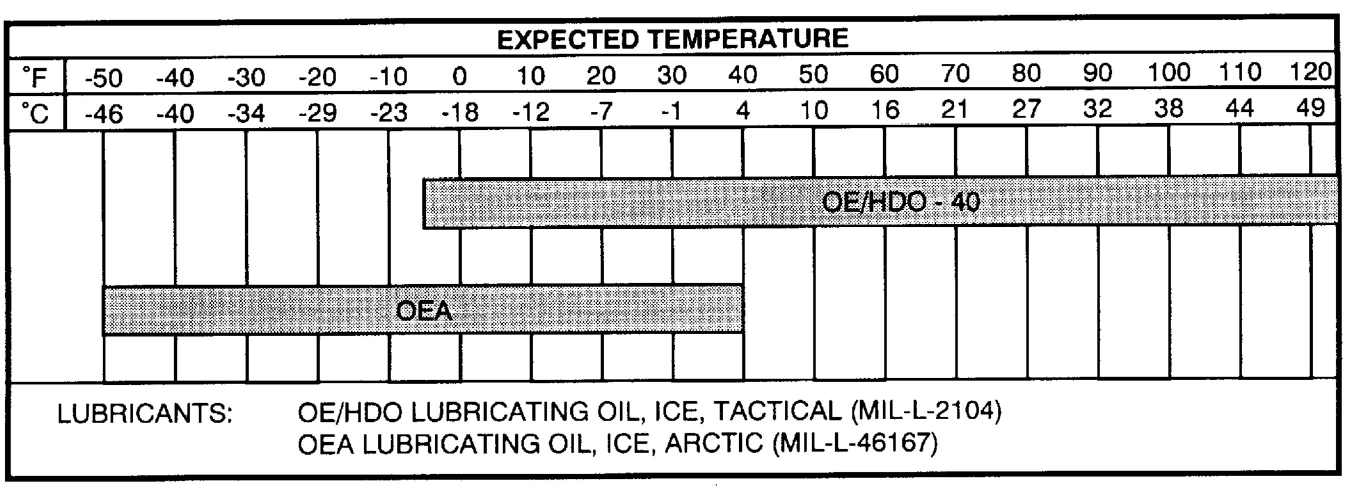


Chart D. Hydraulic Reservoir / Steering Reservoir

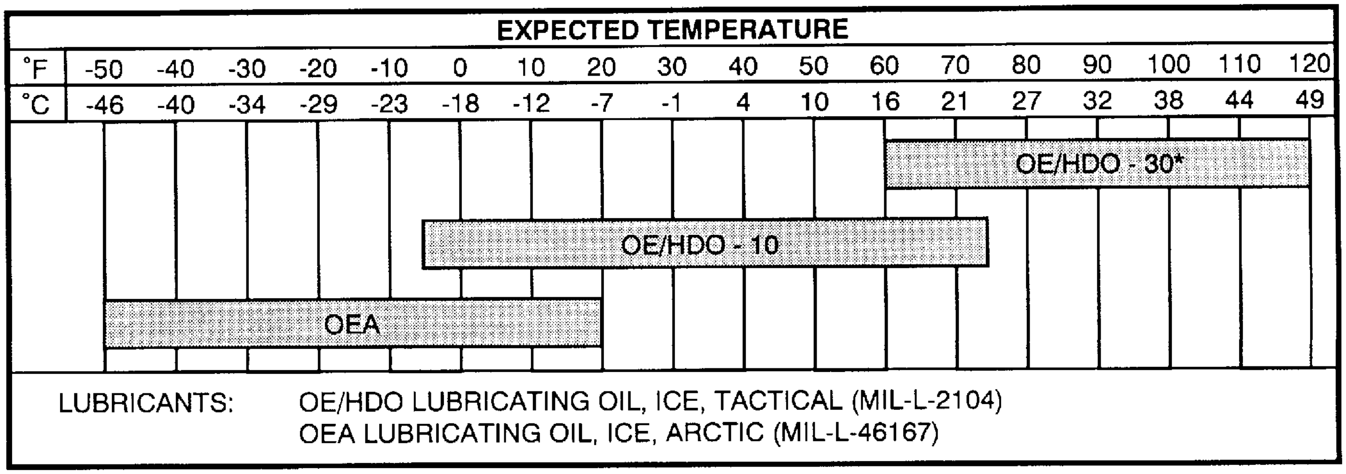


Chart E. SRW Gearbox, Hoist Gearbox, Swing Drive Gearbox

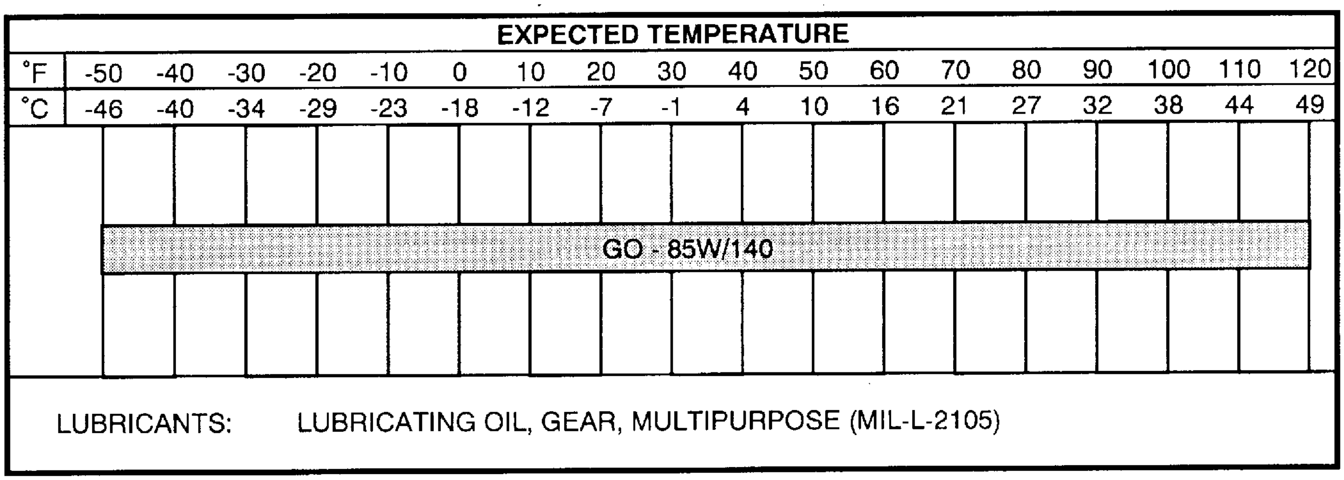
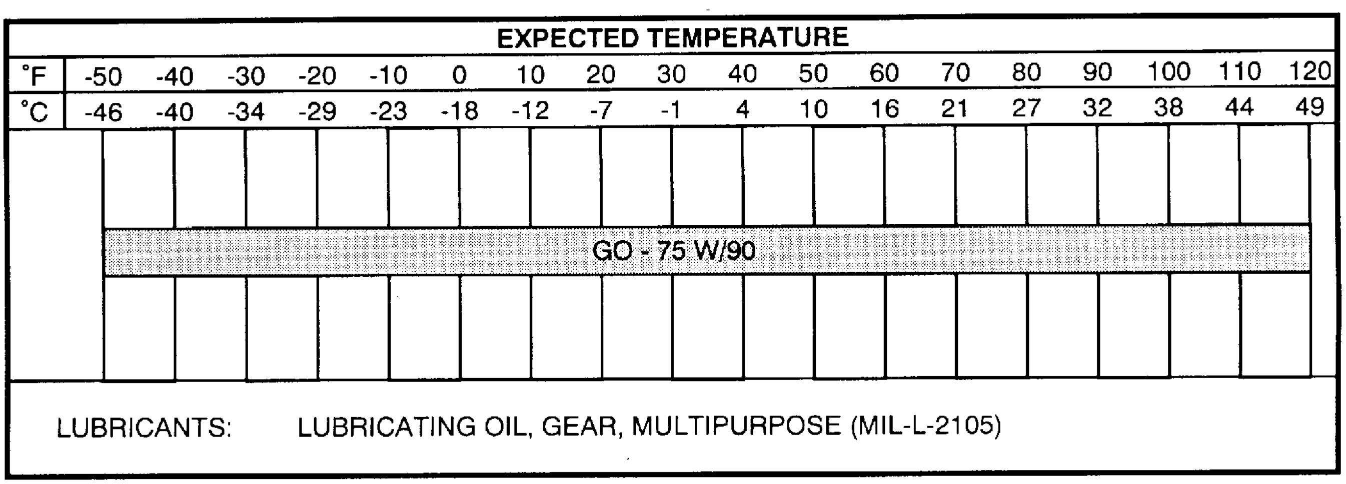


Chart F. Gearbox (Steering 2.21:1)



2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Chart G. Oil Can Points

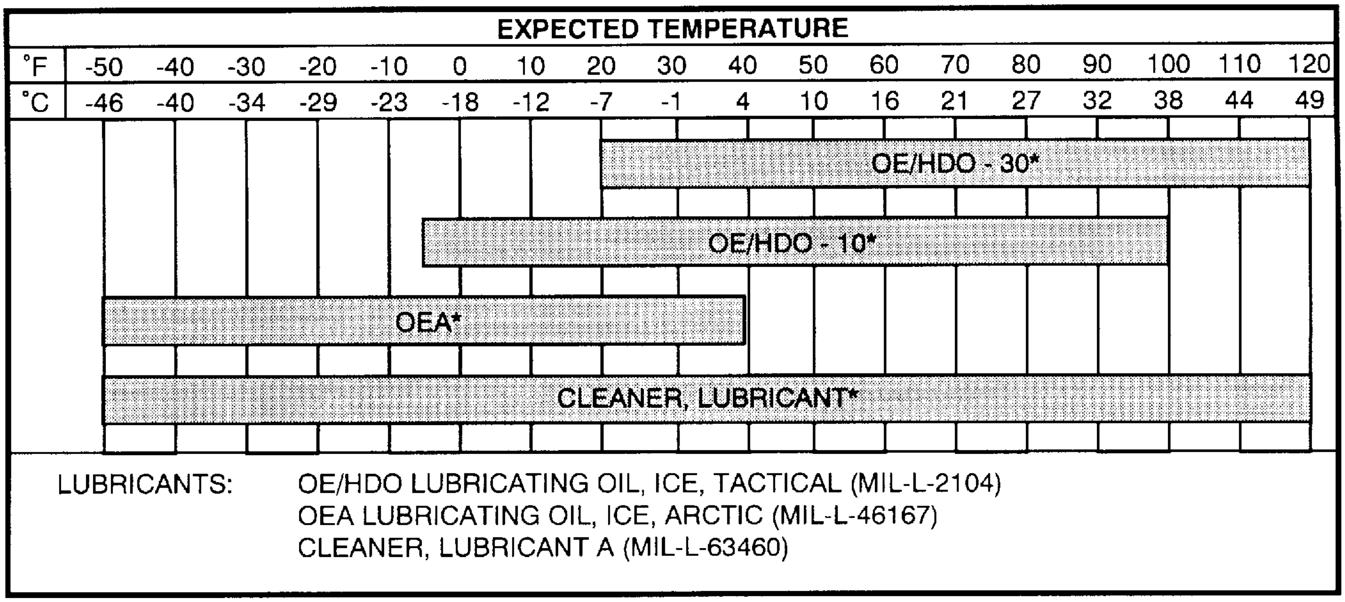


Chart H. Axles and Planetary Wheel Ends

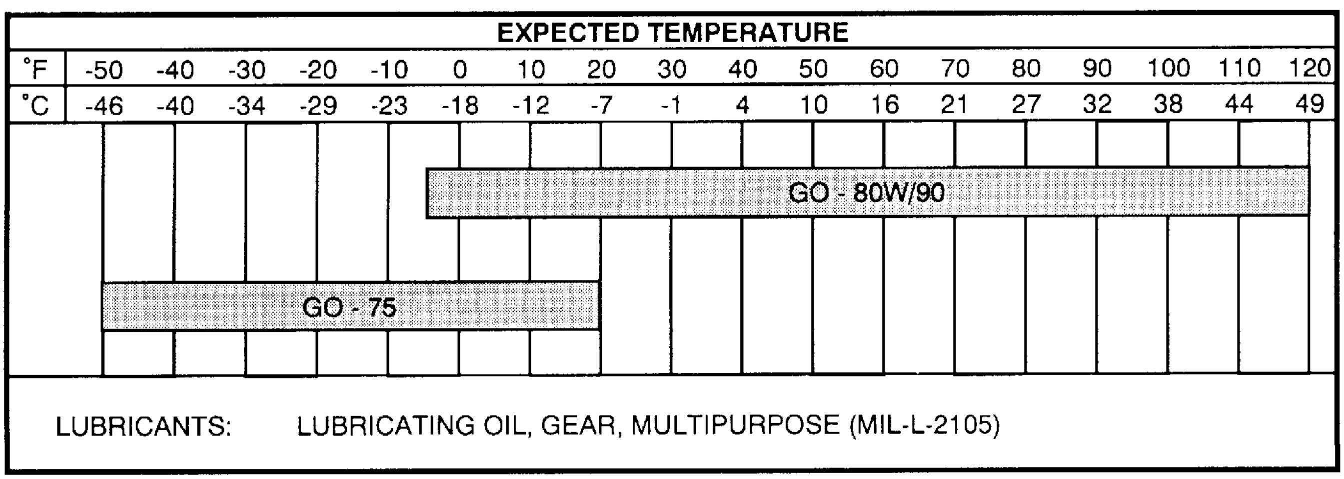


Table 2-9. **SEMI-ANNUAL (3,000 MILE) PMCS PARTS LIST**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	V75500858	5330-01-350-6007	Preformed Packing (Planetary Drain)	11
2	V75503675	5310-01-389-2364	Washer (Planetary Center Screws)	6
3	23518524	2940-01-314-1345	Filter Element (Engine Oil)	1
4	1314130	4330-01-232-8305	Filter Element (Main Hydraulic Return Line)	1
5	1198559	5330-01-358-8219	Gasket (Main Hydraulic Return Line)	1
6	G-1399	2940-01-394-6172	Filter Element (Steering)	1
7	MTP-95-551	4330-01-026-6371	Kit (Filter, Coalising)	1

Table 2-10. **ANNUAL (6,000 MILE) PMCS PARTS LIST**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	25010643	4330-01-132-4842	Filter Element (Transmission)	1
2	14079550	5330-00-107-3925	Nylon Washer (Transmission Drain Plug)	1
3	23518481	2910-01-423-2859	Filter Element (Secondary Fuel)	1
4	2020PMOR	2910-01-344-5791	Filter Element (Fuel/Water Separator)	1
5	11007B	5330-01-344-0539	Gasket (Fuel/Water Separator)	1
6	11350	5330-01-147-6003	Preformed Packing (Fuel/Water Separator)	1
7	CCS3	2940-01-359-8346	Filter Element (Main Hydraulic High Pressure)	1
8	2-238N674-70	5330-00-172-7223	Preformed Packing (High Pressure Filter)	1
9	8-238N300-90	5330-01-065-5959	Packing Retainer (High Pressure Filter)	1
10	22617-6	5330-01-198-8439	Preformed Packing (Main Hydraulic Drain Plug)	1

2-9. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) TABLES (CONT).

Table 2-10. **ANNUAL (6,000 MILE) PMCS PARTS LIST - (CONT)**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
11	FB-7	5330-01-406-8221	Gasket (Main Hydraulic Fill/Breather Cap)	1
12	SS-2-100	4730-01-113-1458	Suction Strainer (Main Hydraulic Reservoir)	1
13	1958330	5330-01-358-5561	Reservoir Gasket (Main Hydraulic)	1
14	93613642	5310-01-068-8446	Lockwasher (Main Hydraulic Reservoir Cover)	27
15	22617-8	5330-01-244-2273	Preformed Packings (Steering Reservoir Drain Plug)	2
16	RN60V	5330-01-377-2460	Kit (Repair, After Cooler)	1
17	RN60A	4440-01-337-7324	Kit (Repair, Air Dryer)	2
18	2-X-5731	5310-01-447-4251	Locknut (Air Dryer, After Cooler)	18
19	92-158	5330-01-058-7118	Gasket (Electric Fuel Pump)	1
20	96-212	5305-01-205-0041	Screws, Lock (Electric Fuel Pump)	3

Table 2-11. **BIENNIALLY (12,000 MILE) PMCS PARTS LIST**

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	V75500858	5330-00-350-6007	Preformed Packing (Planetary Drain)	20
2	V75503675	5310-01-389-2364	Washer (Planetary Center Screw)	10

Section IV. TROUBLESHOOTING

2-10. TROUBLESHOOTING INTRODUCTION.

This section contains step-by-step procedures for identifying, locating, isolating and repairing equipment malfunctions.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify the supervisor.

2-11. TROUBLESHOOTING INSTRUCTIONS.

The first part of this section explains the use of the Troubleshooting Logic Tree. These procedures make use of Simplified Test Equipment for Internal Combustion Engines-Reprogrammable (STE/ICE-R), Detroit Diesel Electronic Control II (DDEC II) and Allison Transmission Electronic Control (ATEC) for testing and fault isolation. DDEC III troubleshooting is located in Para 2-14.

a. Simplified Test Equipment for Internal Combustion Engines - Reprogrammable (STE/ICE-R). The PLS truck is equipped with several STE/ICE-R sensors that are used to support troubleshooting procedures. STE/ICE-R tests, employing these sensors, are incorporated into the standard troubleshooting tests to aid in fault isolation. The STE/ICE-R acts as a conventional digital multimeter to measure voltage, current and resistance. It can also measure pressure, speed, compression unbalance, engine power and some specialized battery and starter evaluations. The STE/ICE-R is powered by the truck batteries using an electrical harness called the Diagnostic Connector Assembly (DCA). The complete system includes a truck test meter (VTM), a transducer kit (TK), cables, transit case and technical publications. The STE/ICE-R can make TK measurements while connected to the DCA. STE/ICE tests are referenced. VIN number for PLS truck is “38”.

b. Diagnostic Data Reader (DDR) Description.

(1) DDR cartridge replacement.

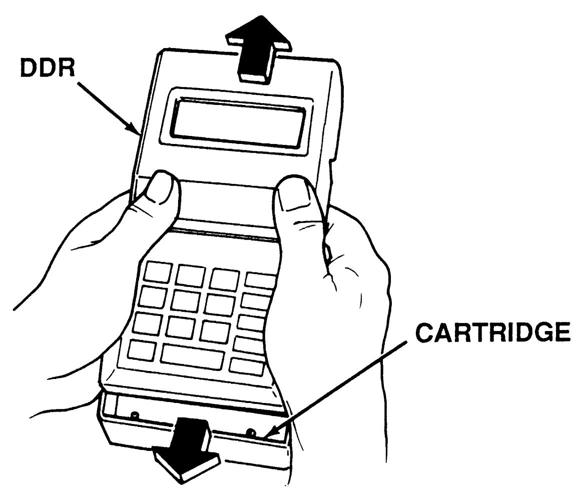
(a) Disconnect DDR cable from DDL connector MC13.

(b) Hold DDR with thumbs placed against slanted surface and grasp cartridge with fingers.

(c) Squeeze DDR, push thumbs forward against slanted surface, and slide cartridge back at the same time.

(d) Slide cartridge from DDR.

(e) Seat cartridge on back of DDR.



2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

CAUTION

Damage will occur to the cartridge if it is held at an angle during installation. The cartridge must be held flat before sliding into place.

(f) Slide cartridge forward until the cartridge clicks into place.

(2) Cable connections to truck.

(a) The data/power cable must be connected to the truck before the DDR can function.

(b) The DDR will energize as soon as it is connected to the truck's electrical system and the ENGINE switch is turned ON. If it does not, there are several things to check.

(3) Troubleshooting.

(a) If the unit does not power up, check that the cartridge is plugged in correctly. Slide the cartridge out and plug it in again. If there is grease, oil or other grime on the edgeboard, carefully remove it with a soft cloth. DO NOT use solvents and DO NOT attempt to clean the terminals in the DDR unit itself.

(b) Check the 2-amp fuse located inside the cartridge. Remove the screws to disassemble the cartridge. Always use a 2-amp fuse for replacement.

(4) Readout window. The readout window contains a liquid crystal display (LCD). It has four lines, each with 20 characters. This provides a great deal of information at one time. A built-in backlight ensures that you will be able to read the display regardless of the lighting conditions in the truck. The readout uses letters, numbers and special symbols.

(5) Keypad.

(a) The keypad features 16 keys. They are totally sealed against contamination, including grease and fluids. You can clean them with a damp cloth or mild cleaner. DO NOT immerse the DDR in fluids; the edgeboard connector is NOT sealed.

(b) The keys operate with a soft touch, but unlike membrane keys, they ”give” to indicate that your entry has been made.

(c) Ten NUMERIC KEYS arranged calculator-style for quick operation. Each key is imprinted with a single digit.

1 To the right side of the keypad, there are four arrow keys, each imprinted with a direction arrow. The UP and DOWN arrow keys are used to scroll through the lines of the display. Each touch of a key causes the display to move one line, up or down. The LEFT and RIGHT arrow keys are used to toggle back and forth between choices given by the display; they may have other purposes, depending on which cartridge is used.

2 The FUNC key, below the arrow keys, lets you choose various DDR modes, or functions, depending on the cartridge in use. These include several operating modes and a printing mode.

3 The ENTER key lets you tell the DDR when to do something. Depending on what's showing in the readout window display, the ENTER key can make a selection, confirm an answer, or instruct the DDR to continue to the next step.

(6) RS232 port. On the right side of the DDR case is an RS232 port. Using the proper cables, you can connect to a printer or terminal.

(7) DDL connector. The DDR receives information from the truck's on-board computer, the DDEC electronic control module (ECM) ATEC electronic control unit (ECU), through a connector called the Display Data Line (DDL). The DDL has 12 terminal cavities. The DDL adapter plug is located on the left side of the cab at left door hinge area under the edge of the instrument panel.

c. DDEC II Operation.

(1) General instructions.

(a) The Check Engine Light (CEL) and Check Gages Light (CGL) will light for five seconds when the ENGINE switch is first turned ON as a bulb and system check. If the Check Engine Light remains on, the self-diagnostic system has detected a fault.

(b) The first step in diagnosis is identifying the symptom or problem condition. Always refer to DDEC II Troubleshooting (All Conditions) to begin troubleshooting.

Symptom A	CEL comes on and stays on
Symptom B	CEL is always off
Symptom C	CEL operates normally (comes on for up to 5 seconds, then goes off) and a fault is present
Symptom D	CEL and fault are intermittent
Symptom E	Engine cranks but will not start
Symptom F	CGL is always on or always off

(c) Once the key symptom is identified, refer to the fault index to find the page number of the flowchart for that symptom. Symptoms A, C, D and F's starting flowcharts will list secondary symptoms (Symptoms B and E have no secondary symptoms). Look to the right of the secondary symptom to find the page on which to begin troubleshooting. Go to that page.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(d) Diagnosis is built on codes that are displayed on the Diagnostic Data Reader (DDR) (Table 2-12). Since the self-diagnostics do not detect all possible faults, the absence of a code does not mean there are no problems in the system. If a DDEC problem is suspected (even in the absence of a code), go to the DDEC II Troubleshooting (All Conditions) flowchart, (Para 2-13) or DDEC III Troubleshooting (All Conditions) flow chart Para 2-14. This chart can lead you to other charts which can aid in the troubleshooting process.

(e) If, after DDEC II or DDEC III troubleshooting is completed and other symptoms remain, go to Engine Troubleshooting.

(2) Using the Diagnostic Data Reader (DDR).

(a) Plug reader into truck connector and turn ENGINE switch ON.

Table 2-12. DDEC II System Code Index

Code Number	Affected Sensor	Description
11	Vernier Control	System on for 2 seconds with too low a voltage at the Vernier Control input to the DDEC ECM.
12	Vernier Control	System on for 2 seconds with too high a voltage at the Vernier Control input to the DDEC ECM.
14	Oil Temperature (OTS)	Engine running for 8 minutes with too high a voltage at the OTS input to the DDEC ECM.
15	Oil Temperature (OTS)	Engine running for 2 seconds with too low a voltage at the OTS input to the DDEC ECM.
21	Throttle Position (TPS)	System running for 2 seconds with too high a voltage at the TPS input to the DDEC ECM.
22	Throttle Position (TPS)	System running for 2 seconds with too low a voltage at the TPS input to the DDEC ECM.
23	Fuel Temperature (FTS)	Engine running for 8 minutes with too high a voltage at the FTS input to the DDEC ECM.
24	Fuel Temperature (FTS)	Engine running for 2 seconds with too low a voltage at the FTS input to the DDEC ECM.
25		NO CODES - No faults have been detected by DDEC since the last time the codes were cleared.
32		ECM FAILURE - The backup system inside the DDEC ECM has failed.
33	Turbo Boost (TBS)	Engine running (at less than 800 RPM or less than 30% of maximum torque) for 5 seconds with too high a voltage at the TBS input to the DDEC ECM.
34	Turbo Boost (TBS)	Engine running for 2 seconds with too low a voltage at the TBS input to the DDEC ECM.
35	Oil Pressure (OPS)	Engine running for 2 seconds at less than 800 RPM with too high a voltage at the OPS input to the DDEC ECM. Oil temperature must be greater than 60 degrees C to log this code.
36	Oil Pressure (OPS)	Engine running for 2 seconds with too low a voltage at the OPS input to the DDEC ECM.

Table 2-12. DDEC II System Code Index (CONT).

Code Number	Effected Sensor	Description
41	Timing Reference (TRS)	The number TRS pulses received per revolution was incorrect or completely missing. One pulse per cylinder per revolution is required.
42	Synchronous Reference (SRS)	Did not receive an SRS pulse on every firing of the #1 cylinder.
44		HIGH OIL TEMPERATURE - System running for 2 seconds with the oil temperature greater than a calibrated limit.
45		LOW OIL PRESSURE - Engine running with the oil pressure less than the limit (different limits at different RPM's) for 7 seconds.
46		LOW BATTERY VOLTAGE - Engine running with low battery voltage (less than 10 volts) for more than 30 seconds.
51		EEPROM ERROR - An error has been detected in the EEPROM (Electrically Erasable, Programmable, Read Only Memory) inside the DDEC ECM.
52		ECM FAILURE - The DDEC ECM was unable to correctly convert sensor voltages into numbers for computer usage.
53		EEPROM ERROR - An error has been detected in the EEPROM inside the DDEC ECM which affects the logging of trouble codes.
56		ECM FAILURE - The DDEC ECM was unable to correctly convert sensor voltages into numbers for computer usage.
61 thru 68		RESPONSE TIME TOO LONG - The response time of the injector was longer than the maximum limit or the injector never responded at all. Oil temperature must be greater than 30 degrees C and battery voltage must be between 11 volts and 16 volts to log this code. The code is only logged at less than 2000 RPM.
71 thru 78		RESPONSE TIME TOO SHORT - The response time of the injector was shorter than the minimum limit. Oil temperature must be greater than 30 degrees C and battery voltage must be between 11 volts and 16 volts to log this code. The code is only logged at less than 2000 RPM.

(b) When the reader powers up, observe the data readout window. It will remain on for several seconds. If the reader does not power up, check connections and be sure the ENGINE switch is ON.

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Data Readout Window

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(c) Observe the data readout window displaying a second message indicating communication with the DDEC Electronic Control Module (ECM). If needed, press ENTER on the DDR to display the screen.

(d) After a few seconds, the first four lines in a data list will appear on the screen.

(e) Use the UP and DOWN arrow keys to move through the list. The first four lines appear as follows:

01	ACTIVE CODES	YES
02	HISTORIC CODE	YES
04	ENGINE RPM	xxxx
05	ECM VOLTAGE	xxx

Data Readout Window

(f) If, at any time, you observe a NO DATA message on the screen, check the cable connector and ensure the ENGINE switch is ON. Lastly, troubleshoot the DDEC ECM (Para 2-13).

(g) Press the FUNC key to display the following screen:

FUNCTION SELECTIONS
SELECT DESIRED
MENU

[ENGINE] <– – –> PRO LINK

Data Readout Window

(h) Use the LEFT arrow key to toggle to the ENGINE choice, then press ENTER.

(i) Observe the Engine menu with a list of choices. You can move up and down on the list using the UP and DOWN arrow keys.

ENG MENU SELECTIONS
DIAGNOSTIC CODES

Data Readout Window

(j) Select DIAGNOSTIC CODES and press ENTER to display the next menu screen:

DIAGNOSTIC CODE MENU
MODE 01
ACTIVE CODES

Data Readout Window

(k) Use the UP and DOWN arrow keys to select MODE 1 ACTIVE codes, MODE 2 HISTORIC CODES and MODE 40 CLEAR CODES. Press ENTER for desired selections.

(l) Generally, you will select ACTIVE CODES. Refer to the specific malfunction or condition and referenced instructions for more information. An ACTIVE CODE display resembles:

DDEC II S60 12.7 PTO HIGH VOLTAGE ACTIVE CODE 12

Data Readout Window

(m) Clear DDEC codes.

CODES LAST CLEARED AT XXXXXXX.X ENG HRS DO YOU WANT TO CLEAR CODES YES <– – –> [NO]

Data Readout Window

1 Select Mode 40 on the DDR.

2 Use arrow keys on the DDR to select YES.

3 Press ENTER.

NOTE

When ENTER has been pressed, the DDR will clear all stored codes and check the DDEC ECM to ensure all codes are cleared. The DDR will then display the results of the clearing function.

CODES NOT CLEARED ENTER TO RETRY FUNC TO EXIT

Data Readout Window

4 Press ENTER to retry the clearing function or FUNC to exit Mode 40.

(3) Tools needed for DDEC diagnosis. The following tools and equipment are required to properly diagnose a complete system:

(a) Voltmeter and Ohmmeter: Use a digital volt-ohmmeter J-34029, or equivalent digital multimeter to measure voltage and resistance when required. A digital multimeter must be used when specified in the procedure.

(b) Test Light 6V: Use when specified in the procedure.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(c) Jumper Wires: Use to bypass a circuit and to insert between special connectors. This will permit access to the connector terminals for circuit checking.

(d) Diagnostic Data Reader (DDR) PRO LINK 9000: J38500-203.

(4) Reading diagnostic codes. If you have turned to this instruction to begin diagnosis of a problem and already know how to read, as well as understand Active and Historical codes, go to DDEC II Troubleshooting (All Conditions) and begin DDEC Troubleshooting.

(5) DDEC mode descriptions. Table 2-13 lists and describes each DDR mode.

(6) Flashing DDEC codes. DDEC troubleshooting procedures are designed to be performed with the DDR. In situations where a DDR is not available, DDEC codes can be read by flashing them on the CEL. For example, codes 13 and 23 will be flashed as follows:

(a) Turn OFF ENGINE switch (TM 9-2320-364-10).

(b) Place a jumper wire between wires 435 and 451 on DDL connector MC13, terminals A and M.

(c) Turn ON ENGINE switch, observe the CEL and record the codes being flashed.

(d) The CEL will flash once for the one in the number 13 and pause for about a half a second.

(e) Then the CEL will flash three times for the three in the number 13 and pause for about three seconds.

(f) After the three second pause, the CEL will flash two times for the two in the number 23 and pause for about a half of a second.

(g) After the half second pause, the CEL will flash three times for the three in the number 23.

(h) The CEL will continue to flash in this manner until all of the DDEC codes in the DDEC ECM memory are displayed.

(i) Turn OFF the ENGINE switch when all of the DDEC codes are flashed.

(j) Remove the jumper wire.

(k) Proceed to DDEC Troubleshooting (Para 2-13) and the first code flashed by the CEL.

Table 2-13. DDR Mode Index

Mode Number	Name	Description
01	ACTIVE CODES	If there is a condition present that causes the CEL to be ON, the condition is said to be active. An Active Code is set in DDEC ECM memory. The readout is YES if any active codes are present, and NO if there are none.
02	HISTORIC CODES	If a condition existed in the past to cause an active code, but the condition is no longer present, the condition is called historic. A Historic Code is set in DDEC ECM memory. The readout is YES if any historic codes are present, and NO if there are none. Engine protection codes (22,44, and 45) will also store additional information, which will tell the engine hours when the code was set, the duration the code existed, and the number of times the code was logged.
04	ENGINE RPM	This displays the engine crankshaft revolutions per minute as determined from the timing reference sensor (TRS).
05	ECM VOLTAGE	This is the battery voltage available to the DDEC ECM.
07	TPS COUNTS	This is a digital value for the throttle position sensor (TPS). Range is 0 to 225 counts.
07	TPS IN %	This value is the percent opening of the throttle as determined from the throttle position sensor.
10	INJ RESP TIMES	This value is the fuel injector response time.
15	FUEL TEMP	This readout indicates the temperature of the fuel entering the engine in degrees Fahrenheit or Celsius, depending on which mode (English or Metric) you have chosen.
17	OIL PRS PSI (kPa)	Engine oil pressure is indicated in psi or kPa, depending on which mode (ENGLISH or METRIC) you have chosen.
18	OIL TEMP	This readout indicates the temperature of the engine oil in degrees Fahrenheit or Celsius, depending on which mode you have chosen.
19	BOOST PSI (kPa)	Turbo boost pressure is indicated in psi or kPa, depending on which mode you have chosen.
20	IDLE SPEED RPM	This is the engine idle RPM value.
21	PTO COUNTS	Power take-off counts is a digital representation of the PTO sensor voltage. Range 0 - 225 counts.
22	PTO SET RPM	This is an indication of the set RPM for the power take-off.
30	CHECK ENG LHT	This is an indication of the output command to the CEL. Readout is ON or OFF.
30	ENG BRK ENBLE	This is an indication of the status of the engine brake. Readout is ON or OFF.
30	STOP ENG LHT	This is an indication of the output command to the CGL. Readout is ON or OFF.
31	SRS RECEIVED	This is an indication of the signal from the synchronous reference sensor is being received. Readout is YES or NO.
40	CLEAR CODES	This mode is used to clear all stored codes in the DDEC ECM.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

d. ATEC Operation.

(1) The “CHECK TRANS” and “DO NOT SHIFT” lights will come ON when the ENGINE switch is first turned ON as a bulb and system check. If lights remain ON when truck is started and/or placed into gear, a failure has been detected. The ATEC ECU for the transmission will place a code into memory.

(2) System selection procedure.

(a) Copyright screen. When the DDR powers up, the readout displays the copyright screen for several seconds.

MPSI PRO-LINK 9000 SOFTWARE COPYRIGHT 1989 VERSION 1.00 ATEC I

Data Readout Window

(b) System selection process. In the ATEC I system, you must select the transmission type from the Transmission Type menu.

ATEC I SYSTEM SELECT TRANS TYPE MT(B) 600 OR V. HT (B) OR C(L)(B)T 700

Data Readout Window

(c) Note the arrow symbols in the DDR display. They remind you to use the UP and DOWN arrow keys to scroll to the desired transmission type. Each touch will move the display up or down by one item. If you hold an arrow key down, the display will scroll quickly. The list is circular; it will return to the beginning after the last one is viewed.

(d) When you see the C(L)(B)T 700 on the bottom line, press the ENTER key. The DDR now begins to display data. Refer to Step (4) (Data display).

(3) Non-volatile memory. The ATEC cartridge has a non-volatile memory. This means that stored data are not lost when the DDR is disconnected from the truck power source.

NOTE

When the DDR establishes communication with the ATEC ECU in a truck, the DDR memory buffers are all cleared. You cannot use a truck’s DDL connector to power your DDR to review recorded data. The recorded data will be lost.

(a) When the DDR is connected to an external power source, for instance, at your workbench, the DDR recognizes that it is not communicating with an ATEC ECU. Under these conditions, the FUNC key is active. You can access stored data for review and printing. These include ATEC ECU operating data, diagnostic codes and snapshot data. For example, suppose you have used the DDR to store snapshot data during a road test. Later, using your workbench power supply, you can review the recorded data.

(4) Data display.

(a) Data readout. The main function of the DDR is to provide you with data from the truck's on-board computer, called the ATEC electronic control unit (ECU). This is what the DDR automatically does after the system type has been determined.

1 If the DDR is unable to established communication with the ATEC ECU in the truck, you will see a NO DATA display. Press ENTER to command the DDR to try again.

```
NO ATEC DATA
  RECEIVED

ENTER TO RETRY
```

Data Readout Window

2 If communication cannot be establish and the NO DATA display reappears, see Step (4)(b).

3 When communication is established and the correct transmission type input, you will see the system configuration screen.

```
ATEC I SYSTEM
DATA LIST
MT(B) 600 OR V. VH (B)
OR C(L)(B)T 700
```

Data Readout Window

4 This display will appear for about three seconds.

```
ECU A/N   16035879
DIAG CODES    21  32
TPS   128  CNTS  50  2%
RANGE SEL  N ATT  N
```

Data Readout Window

5 Use the UP and DOWN arrow keys to scroll through the entire data list. Pressing a key causes the display to move one line. Holding a key causes the display to scroll quickly. Pressing the LEFT arrow key causes the display to advance four lines. Pressing the RIGHT arrow key causes the display to move backward four lines. When you reach the end of the list, you will see the display that tells you which system you are testing.

NOTE

Parameters in the data list that do not pertain to the system you are testing will be designated by NA, meaning not available.

6 For an explanation of each of the items in the data list, refer to Steps (11) through (30) of this section.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(b) What to do with NO DATA Readout. If you get the NO DATA message, there are several things to check:

1 Bad connection - Check the truck cable at each terminal for a good connection. In an extreme case, a wire may be broken in the truck cable or in the ATEC ECU wiring.

2 Engine ON OFF switch - Be sure the ENGINE switch is ON.

3 Bad ATEC ECU, or blown ATEC ECU fuse - If the ATEC ECU is incapable of transmitting data, the DDR will not receive any.

(c) Data freeze operation.

1 There are times when you want to be able to quickly view several operating parameters at the same time, even though they are not normally together in the data list. One way to do this is to create a custom data list using the Custom Data List function. Another way is to use the Data Freeze function.

NOTE

There are two differences between Custom Data List and Data Freeze. In Custom Data, you can scroll the entire reorganized data list exactly like the normal data list. In Data Freeze, the items you “freeze” cannot be scrolled. The rest of the list scrolls normally. Also, you can use a custom list, but not a data freeze, when using Snapshot.

2 To freeze a line of data, follow Steps 3 through 5.

NOTE

You must be viewing the data list before you can freeze an item.

3 For the purposes of freezing data, the four lines in the readout display are numbered 1 through 4 from the top. Use the UP and DOWN arrow keys to scroll the data list. When an item you want to freeze is visible (on any readout line), press the numerical key that corresponds to the readout line of that item. A solid black square appears next to the item. In the following example, suppose you want to freeze OIL TEMP. To do so, press numerical key 3 because OIL TEMP is displayed on line 3.

LOCKUP RPM	1234
OUTPUT RPM	1234
OIL TEMP 123F	1234
FWD PRESS SW	OFF

Data Readout Window

4 Now, when you use the UP and DOWN arrows to scroll the data list, OIL TEMP remains frozen in position on the third line of the display. Although the item is frozen, its value is able to change, according to system operation.

RETARD REQUEST YES
RETARD COMMAND YES
OIL TEMP 123F 123C
SPECIAL INPUT OFF

Data Readout Window

5 Now, suppose you also want to watch SPECIAL INPUT. Use the UP and DOWN arrow keys to scroll the list. As you can see above, the third line remains frozen. Eventually, your item appears on line 4. Press numerical key 4. The square will appear to indicate that line 4 is also frozen. You can continue doing this until you have frozen data on all four lines.

(d) Unfreezing data. There are two ways to unfreeze data. To unfreeze just one line, press the numerical key corresponding to the line you want to unfreeze. The solid square disappears and the line can now be scrolled. To unfreeze the entire display at once, press the numerical key 0 (zero). All solid squares disappear and all lines are unfrozen.

(e) Functions. The DDR's main purpose is to display data and it does this automatically. The DDR can also perform several other jobs, called functions. These functions are of two types. Some of them relate to the way DDR communicates with the ATEC ECU in the truck, such as diagnostic codes and ranges. Other functions relate to the way the DDR itself operates, such as Snapshot, RS-232 Serial Port and Contrast Adjustment.

(f) Use of the FUNC key. For access to the functions, press the FUNC key. The DDR is programmed to provide access to only those functions that apply. If you see a function displayed, it is available to use. If you do not see a function displayed, it does not apply.

(5) Diagnostic codes. When the ENTER key is pressed on the DIAGNOSTIC CODES selection, the DDR will display the code number, along with a description of the code(s) stored in the ATEC ECU.

(a) When viewing DIAG CODES in the normal data list, the number on the left is usually a more severe code than the code on the right side of the display. If both memory locations have a code stored in the ATEC ECU, the arrows will appear on the bottom line of the code display screen.

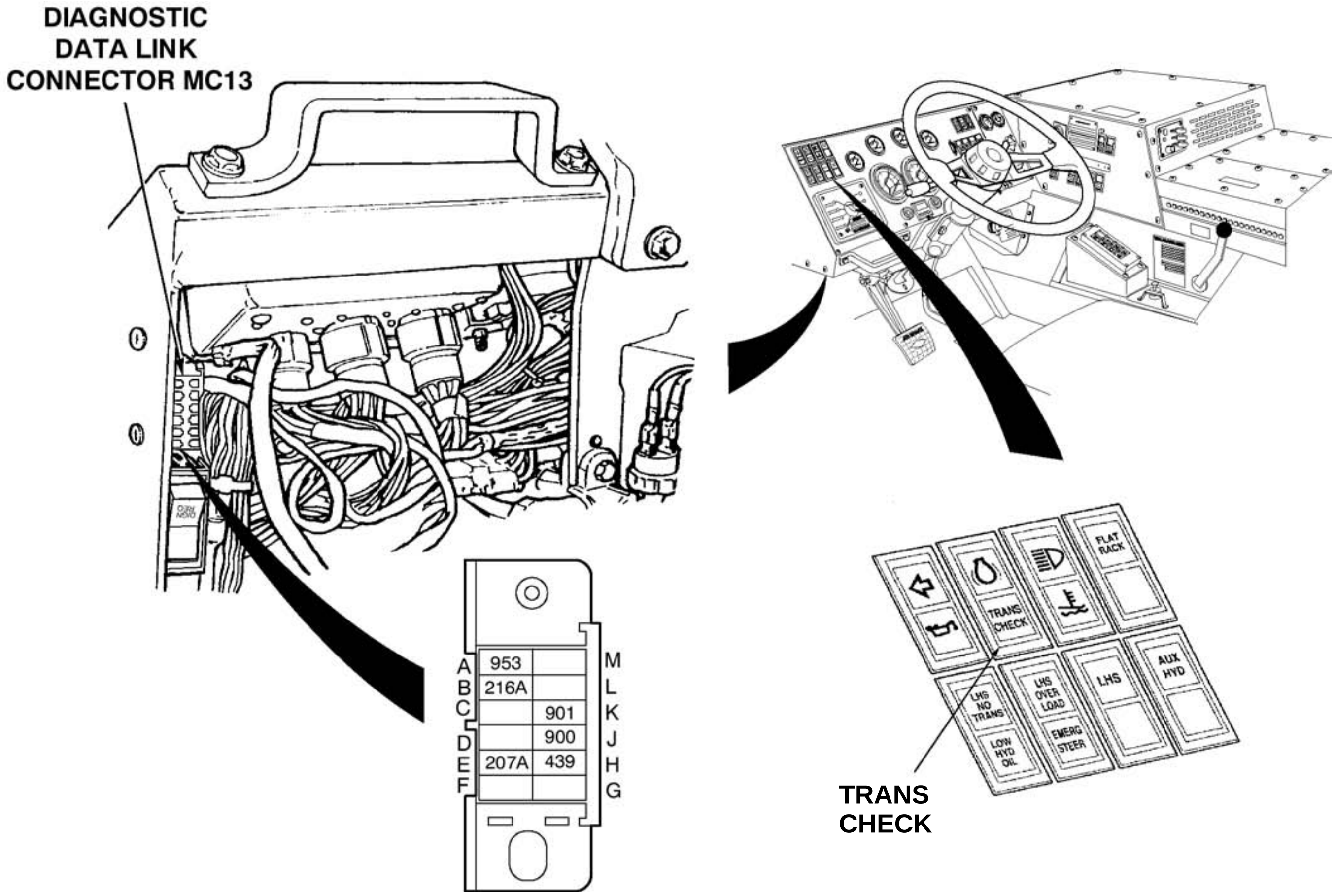
(b) The readout contains the name of the system or component that caused the code to be set.

ATEC I DIAG CODES
SPEED SENSOR
CODE 22

Data Readout Window

(c) Press the FUNC key to exit.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).



(6) Flashing ATEC codes. ATEC troubleshooting procedures are designed to be performed with the DDR. In situations where a DDR is not available, ATEC codes can be read by flashing them on the "TRANS CHECK" light. If "TRANS CHECK" light does not flash, no faults have been detected by ATEC since the last time the codes were cleared. For example, codes 13 and 23 will be flashed as follows:

(a) Turn OFF ENGINE switch (TM 9-2320-364-10).

(b) Place a jumperwire between terminals A and B on DDL connector MC13.

(c) Start engine, observe the "TRANS CHECK" light and record the codes being flashed.

(d) The "TRANS CHECK" light will flash once for the one in the number 13 and pause for about a half of a second.

(e) Then the "TRANS CHECK" light will flash three times for the three in the number 13 and pause for about three seconds.

(f) After the three second pause, the "TRANS CHECK" light will flash two times for the two in the number 23 and pause for about a half of a second.

(g) After the half second pause, the "TRANS CHECK" light will flash three times for the three in the number 23.

(h) The “TRANS CHECK” light will continue to flash in this manner until all of the ATEC codes in the ATEC ECM memory are displayed.

(i) Turn OFF the ENGINE switch when all of the ATEC codes are flashed.

(j) Remove the jumperwire.

(k) Proceed to ATEC Troubleshooting (Para 2-15) and the first code flashed by the “TRANS CHECK” light.

(7) Clear ATEC codes.

(a) Turn OFF ENGINE switch (TM 9-2320-364-10).

(b) Place a jumperwire between terminals A and B on DDL connector MC13.

(c) Start engine (TM 9-2320-364-10).

(d) Observe “TRANS CHECK” light for codes being flashed.

(e) Apply brake and shift the transmission in the following sequence:

1 N (Neutral).

2 D (Drive).

3 R (Reverse). (Leave in reverse until “TRANS CHECK” light stops flashing, approximately five seconds).

4 N (Neutral).

(f) If “TRANS CHECK” light stops flashing, codes have been cleared and fault corrected.

(g) If “TRANS CHECK” light continues flashing, fault has not been corrected.

(h) Turn OFF ENGINE switch.

(i) Remove jumperwire.

(8) Range selected/range attained. When the driver selects a specific range for the transmission, the ATEC ECU begins shifting the transmission through the various ranges, depending on operating conditions, until the selected range is attained. Under some conditions, the range selected and the range attained will be the same. In other cases, the transmission will not attain the range selected. This information is of diagnostic value.

(a) When you select this function, the DDR reads out the range selected and the range attained.

RANGE SELECTED	RANGE ATTAINED
N	N

Data Readout Window

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

NOTE

In the diagnostic mode, the ATEC ECU update rate is approximately 1½ seconds. If the transmission is shifting rapidly, it is possible that the transmission may pass through several “attained” ranges more quickly than the readout can display them. This is not a fault of either the ATEC ECU or the DDR.

(b) In this mode, the update rate is about ¼ of a second, so the values received will be more accurate than in the normal data list mode.

(c) Range selected readout:

R - Reverse
N - Neutral
F5 - 1st through 5th (Drive)
F4 - 1st through 4th (Drive)
F3 - 1st through 3rd (Drive)
F2 - 1st through 2nd
F1 - 1st

(d) Range attained readout:

R2 - Second reverse
R - Reverse
N - Neutral
1C - 1st converter
1L - 1st lockup
2C - 2nd converter
2L - 2nd lockup
3C - 3rd converter
3L - 3rd lockup
4C - 4th converter
4L - 4th lockup
5C - 5th converter
5L - 5th lockup

(9) Custom data list. When you use your DDR to read data for an ATEC I system, it will be displayed in the same order each time because the list is fixed in the DDR’s memory.

(a) There may be some instances when the programmed order of the data list is not convenient. For example, in order to solve a particular driveability problem, you need to look at TPS, Range SEL/ATT and Lockup RPM, all at the same time. But these three pieces of information are not together in the data list. The following text describes a method to watch all three items at the same time.

(b) Locate Custom Data List in the DDR Main Function menu and press ENTER.

(c) Once you enter the Custom Data List mode, you will be given a choice between continuing to use the standard list or creating a custom list. The default is STANDARD.

SELECT DATA LIST DESIRED (STANDARD)   CUSTOM

Data Readout Window

(d) Use the LEFT and RIGHT arrows to toggle to your choice and press ENTER. Refer to Steps 1 and 2 for STANDARD instructions; or Step (e) for creating a custom list.

1 If you choose STANDARD, one of two things happens. If there was no custom list already in memory, you will be returned to the menu. If a custom list is still in DDR memory, you will see:

RESET CUSTOM LIST ARE YOU SURE? YES   [NO]

Data Readout Window

2 This display gives you the choice of continuing to use the existing custom list (choose NO) or creating a new custom list (choose YES). If you choose NO, you will return to the menu. If you choose YES, refer to Step (e) below. Press ENTER to confirm your choice.

(e) Creating a custom list. You are now ready to actually create a new custom list. The available diagnostic parameter list is displayed on the bottom line, one item at a time. Use the UP and DOWN arrow keys to scroll the list.

SELECT PARAMETER PRESS ENTER Current line = 2 RANGE SEL/ATT

Data Readout Window

1 Line 4 now automatically indexes to the next item in the data list. Notice that the number on line 3 indicates that you are ready to select the parameter you want to place on the second line of your custom list. Use the UP and DOWN arrow keys to locate RANGE SEL/ATT in the list on line 4 and press ENTER. SEL/ATT in the list on line 4 and press ENTER. RANGE SEL/ATT is now entered on the second line of your customized list. Continue this process until you have located and entered each item you want on your customized list.

2 Press FUNC to exit. You can now use your customized list to read data. It is also available in Snapshot.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

NOTE

If you change your mind while creating a custom list, you can use the LEFT arrow key to back up through the list. When the item you wish to change appears, simply scroll the parameter list to locate the new item and ENTER it. Also note that backing up through the list erases each item you pass through. You will have to recreate the list from the point of the change item.

(10) Snapshot. The Snapshot function permits the DDR to record data while the truck is being driven. Then the data can be played back when you return to the shop. You can use this feature to locate operating problems that would be difficult to locate by any other method. Depending on truck type and the data rate, the DDR will record over 50 minutes of data.

NOTE

The amount of information that can be recorded is determined by the data update rate selected. Refer to Step (11)(f) (Data update rate).

(a) When you are using Snapshot, the DDR is continuously recording data. When the memory is filled, the oldest data is dropped and the new data is continuously added. When an operating condition occurs, the DDR puts a marker in the data recording so you can find the exact spot later during play back. We call this ability to mark data for play back a “trigger”. Because driveability problems are often related to diagnostic codes, one of your choices is to use a diagnostic code as the trigger. You can choose any code, or a specific code to be the trigger. Or you can trigger the recorder yourself manually if a suspicious driveability condition occurs.

(b) It is sometimes helpful to look at data that occurred before the operating condition happened, for instance, looking for an unnatural trend. It is also sometimes helpful to look at data that occurred after the operating condition happened. DDR allows you to decide ahead of time how much data will be retained before, as well as after, the trigger point.

(c) When you select the Snapshot function, you will see the Snapshot menu selection readout. Choices include Quick Trigger, Trigger Set-Up, Data Update Rate and Review Snapshot.

SNAPSHOT MODE
XXX FRAMES FREE
SELECTIONS
QUICK TRIGGER

Data Readout Window

NOTE

The second line indicates the amount of frames of memory available to record data. Although there is no simple way to relate frames to the amount of driving time that will be recorded, generally a larger number translates into more minutes of recording time than a smaller number.

(d) Quick trigger. You will use Quick Trigger to start the snapshot process. If you are using Snapshot for the first time, selecting Quick Trigger automatically chooses the default operation. This is the manual Any Numeric Key trigger.

(e) If you are ready to take a second or third snapshot, using Quick Trigger permits you to use the operating parameters you used before. This means you do not have to constantly reset parameters.

(f) Trigger setup. When you choose this menu entry, you can specify what will be used as the trigger.

SELECT SNAPSHOT
TRIGGER SOURCE
SELECTIONS
ANY NUMERIC KEY

Data Readout Window

(g) Any numeric key. When you specify Any Numeric Key as the trigger, the DDR will place a marker in the recording at the time you press any of the numeric keys. You will probably use this trigger when you want to find the cause of a driveability problem that you can feel or hear when driving the truck. When the condition occurs, trigger the DDR by pressing any numeric key.

(h) After entering Any Numeric Key, you will be given the opportunity to adjust the memory trigger point. Refer to Step (n) (Adjust memory trigger point).

(i) If you choose diagnostic code as trigger source. If you decide to use a code as the trigger, you will be given two additional choices: Any Code or Specific Code.

SELECT SNAPSHOT
TRIGGER SOURCE
SELECTIONS
ANY CODE

Data Readout Window

(j) If you use the ENTER key to choose Any Code, the DDR will recognize any diagnostic code as the trigger. You will now be given the opportunity to adjust the memory trigger point. Refer to Step (n) (Adjust memory trigger point).

(k) If you use the ENTER key to choose Specific Code, the DDR will give you the opportunity to specify which code you want as the trigger.

SELECT CODE
CURRENT CODE [21]
CODE 21

Data Readout Window

(l) The code presently chosen is enclosed in the brackets on line 2. There are two ways to choose another diagnostic code. You can input your choice with the numerical keys and press ENTER. Or you can use the UP and DOWN arrow keys to scroll the list. The code number choices appear on line 4. When you see the code you desire, press ENTER.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(m) You will now be given the opportunity to adjust the memory trigger point. Refer to Step (n) (Adjust memory trigger point).

(n) Adjust memory trigger point. You will get to this point, regardless of which trigger method you chose. Now you have the opportunity to determine where in memory you want the trigger.

DO YOU WISH
TO ADJUST THE MEMORY
TRIGGER POINT?
YES [NO]

Data Readout Window

(o) If you do not wish to adjust the memory trigger point, press ENTER. The Snapshot function now begins. The readout displays the message: WAITING FOR TRIGGER.

ECU A/N 16035879
DIAG CODES 21 32
TPS 128 CNTS 50 2%
WAITING FOR TRIGGER

Data Readout Window

NOTE

To find out what happens when the trigger occurs, refer to Step (11) (Processing trigger).

(p) If you do wish to adjust the memory trigger point, use the LEFT arrow key to toggle the indicator to YES and press ENTER. The display will now permit you to choose how much data you want retained in memory before and after the trigger point.

T INDICATES LOCATION		
OF TRIGGER IN MEMORY		
BEG	MID	END
[	T	]

Data Readout Window

(q) Use the LEFT and RIGHT arrows to move the T to the place you want the trigger to be. If you do not move the T, the DDR will continue recording data after the trigger occurs, placing the trigger in the middle of the data recorded. If you place the T at the right, the DDR will quit recording data as soon as the trigger occurs. All of the data recorded will be before the trigger point. If you place the T at the left, the DDR will continue recording data after the trigger occurs, placing the trigger at the beginning of the data recorded.

NOTE

- The DDR begins recording data as soon as you see WAITING FOR TRIGGER on the bottom line of the readout. The DDR has no way of knowing when an operating condition is going to occur. So, when memory is full, the oldest data is dropped to make room for new data, in a continuing circular process. The trigger point you select actually determines how long the recording continues after the trigger occurs.
- To find out what happens when the trigger occurs, refer to Step (11) (Processing trigger).

(11) Processing trigger. While the DDR is waiting for the trigger to occur, the bottom line reads WAITING FOR TRIGGER. As soon as the trigger occurs (numeric key, any code, or specific code), the bottom line reads PROCESSING TRIGGER. This notice remains until the DDR has taken sufficient data to satisfy the trigger point location you selected.

(a) When the recording is completed, the display will change to permit you to play back the data recorded.

ECU A/N 16035879
DIAG CODES 21 32
TPS 128 CNTS 50 2%
T=27 C=14 GO TO...

Data Readout Window

NOTE

- Refer to Step (b) (Review snapshot) to learn how to interpret this display.
- Regardless of which trigger you have chosen, when PROCESSING TRIGGER is visible on the readout, you can terminate the recording process at any time by pressing a numeric key.

(b) Review snapshot.

NOTE

The Review Snapshot mode choice does NOT appear in the Snapshot menu until you have actually triggered a recording.

(c) Choose this mode to play back the data recorded.

ECU A/N 16035879
DIAG CODES 21 32
TPS 128 CNTS 50 2%
T=27 C-14 GO TO...

Data Readout Window

(d) The top three lines contain data. Use the UP and DOWN arrow keys to scroll through the list.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(e) The bottom line contains the Snapshot operating information. The letter T indicates the number of the frame that contains the trigger. The letter C indicates the number of the frame you are CURRENTLY looking at. Use the LEFT and RIGHT arrow keys to increase or decrease the number of CURRENT frame. Observe the data as you move from one frame to the next. The display will show you the changes that took place. If you want to jump immediately to a specific frame, use the numeric keys to input the desired frame number. The numbers you input will replace the dashes after the GOTO. When you press ENTER, you will jump directly to the specified frame.

NOTE

- If you tell the DDR to GOTO a stream number larger than the highest one stored, the dashes will reappear.
- If you plan to print out the data just recorded, write down the frame numbers of the data streams you want to print. You will need to know these frame numbers when you enter the Print function.

(f) Data update rate. The data displayed by your DDR is updated at specified intervals. You can specify how often you want this to happen using Data Update Rate.

DATA UPDATE RATE
SELECT DELAY
THEN PRESS ENTER
CURRENT=0.0   NEW=0.0

Data Readout Window

(g) The amount of time that elapses between updates is called the delay. This can be varied from 0.0 to 9.9 seconds. Use the numerical keys to input a NEW delay rate. When this rate is displayed, press ENTER. The DDR will return to the Snapshot menu.

(12) Contrast adjust. Contrast refers to the darkness of the readout letters and numbers when compared with the background. Under some viewing angles and at various air temperatures, you will be able to see the readout better if you adjust contrast.

NOTE

If you are using the DDR in direct sunlight, the heat of the sun may affect contrast. As temperature goes up, the display may darken. If so, adjust contrast.

(a) To adjust contrast, select the Contrast Adjust function.

DISPLAY CONTRAST
TO CHANGE CONTRAST
DEPRESS   OR

Data Readout Window

(b) You can change contrast by holding down either the UP or DOWN arrow key. Both keys cause the contrast to move through its entire range. You must hold the key down for several seconds. After the contrast reaches minimum, the readout will seem to disappear. This is normal. Simply keep holding the key down and the readout will return.

(c) To exit Contrast Adjust, press the FUNC key.

NOTE

Each time the DDR is powered up, the contrast is automatically set at an average value.

(13) Restart. When you select Restart and press ENTER, the DDR system restarts from the beginning (Step [2]). The copyright screen will not appear. The display will read: REQUESTING ATEC DATA. Refer to Step (2)(b) (System selection procedure) earlier in this manual.

(14) ECU/A/N. The ATEC ECU and the calibration PROM together are identified by an 8-digit assembly number.

(15) Diagnostic codes. When certain conditions occur, a diagnostic code will be set in one of two memory locations of the ATEC ECU. Both memory locations are displayed and the code in the left position is usually more severe to transmission operation.

(16) TPS counts and percent (%). Throttle position sensor (TPS) monitors the position of the fuel control lever on the engine. The resulting voltage signal is converted to digital counts by the ATEC ECU. It is possible for the readout to range from 255 counts at idle to nearly 0 counts at open throttle. The throttle position count is converted by the ATEC ECU to percentage of throttle applied. It is possible for the readout to range from 0% (closed) to 100% (fully open).

(17) Range SEL. When the truck driver operates the shift selector in the truck cab, the readout indicates the range selected. Note that this is the range selected, not necessarily the range the transmission actually attains. Also refer to Step (18) (Range ATT). The readouts include:

R - Reverse	F4 - 1st through 4th (Drive)
N - Neutral	F3 - 1st through 3rd (Drive)
F2 - 1st through 2nd	F5 - 1st through 5th (Drive)
F1 - 1st	

(18) Range ATT. In response to the driver’s request for a particular range, the ATEC ECU issues commands for the transmission to shift. Due to operating conditions, the range actually attained may or may not match the range selected. Also refer to Step (17) (Range SEL). The readouts include:

R2 - Second reverse	3C - 3rd converter
R - Reverse	3L - 3rd lockup
N - Neutral	4C - 4th converter
1C - 1st converter	4L - 4th lockup
1L - 1st lockup	5C - 5th converter
2C - 2nd converter	5L - 5th lockup
2L - 2nd lockup	

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

NOTE

In the diagnostic mode, the ATEC ECU update rate is approximately 1½ seconds. If the transmission is shifting rapidly, it is possible that the transmission may pass through several “attained” ranges more quickly than the readout can display them. This is not a fault of either the ATEC ECU or the DDR.

(19) The readout displays the transmission output shaft speed (rpm) when the transmission made its last range upshift or downshift. Converter lockups are excluded. Due to the slow update rate of the ATEC ECU, be careful to match the displayed value with the proper shift. If you are not certain, use the transmission HOLD feature to inhibit unwanted shifts.

(20) A speed sensor is located on the rear cover of the transmission to detect output shaft rpm. The readout shows actual transmission output shaft speed in revolutions per minute; the readout lower limit is 60 rpm.

(21) The readout indicates the transmission output shaft speed (rpm) when the last converter lock-up (engage or disengage) occurred. When the converter is locked up (engaged), it provides a direct mechanical link from the engine through the converter. When the converter is not locked (disengaged), the converter pump and turbine are connected by hydraulic fluid only. Lockup rpm is generally different at closed and open throttle positions.

(22) Oil temperature. A temperature sensor is located in the transmission sump on CLT755 transmission. It is located in the lock-up valve body assembly. High oil temperature may result from overfilling or cooling system problems. Low oil temperature may result from cold weather conditions. The readout provides both Fahrenheit (–60°F to 350°F) and Celsius (–51°C to 177°C).

(23) FWD PRESS SW. A pressure switch in the transmission detects if the transmission has attained a forward range. The readout is ON when there is forward pressure and OFF when there is no forward pressure. Because the ATEC ECU needs input from both forward and reverse switches to determine neutral range, refer to Step (24) (REV PRESS SW). Neutral is indicated when both readings are OFF.

(24) REV PRESS SW. A pressure switch in the transmission detects if the transmission has attained a reverse range. The readout is ON when there is reverse pressure and OFF when there is no reverse pressure. Because the ATEC ECU needs input from both forward and reverse switches to determine neutral range, refer to Step (23) (FWD PRESS SW). Neutral is indicated when both readings are OFF.

(25) When the transmission has been placed in reverse range, the readout indicates ON as a reverse warning signal. When the transmission is shifted from reverse range, the readout displays OFF.

NOTE

Oil level and fluidic sensor systems are used to detect low oil level conditions. The readout is OFF when a low oil level condition is detected. The readout is ON when the oil level is above the low oil level detection point.

(26) Oil lube/LVL SW. This type of oil condition indicator is fluidic. The switch is used in the PLS truck.

(27) Retard request. On the PLS truck, an instrument panel-mounted control is used to request operation of the engine brake. The readout indicates ON when the engine brake is requested and OFF when the engine brake is not requested. Refer to Step (28) (Retard command) for further information.

(28) Retard command. When the retard control is operated (see Step (27) Retard request) the ATEC ECU gives a command to operate the engine brake. The readout indicates YES when the retard command is given and NO when the command is not given.

(29) Special input. This readout indicates the position of a special input switch used for certain options, ON or OFF.

(30) Range commanded. This is the output signal to indicate that a specific gear range has been attained. The readout is YES or NO.

(31) Input voltage. The readout indicates the voltage available to the ATEC ECU.

e. Measurements Required for Troubleshooting.

CAUTION

Use proper sized test leads and ensure care is used when checking for resistance, continuity or voltage at connectors or damage to equipment may result.

(1) Resistance measurements.

(a) Connect red test lead to Volt-Ohm input connector and black lead to COM input connector on meter.

(b) Set the function/range switch to the desired ohm position. If the magnitude of the resistance is not known, set the switch to the highest range, then reduce until a satisfactory reading is obtained.

(c) If the resistance being measured is connected to a circuit, turn ENGINE switch OFF.

(d) Connect test leads to the circuit being measured. When measuring high resistance, be careful not to contact adjacent points, even if they are insulated. Some insulators have a relatively low insulation resistance which can affect the resulting measurement.

(e) Read the resistance value on the digital display.

(2) Continuity checks.

(a) Place the function/range switch in any ohm range.

NOTE

Some meters show “1+m”, or simply “1” when function/range switch is in any ohm position.

(b) Connect the red test lead to the volt-ohm connector and black lead to COM input connector on the meter. When the test leads are separated or measuring an out-of-range resistance, the digital display will indicate “OL” (Over Limit).

(c) Put one test probe at one end of the wire or circuit to be tested. Use the other test lead to trace the circuit. When continuity is established, an ohm symbol will appear in the upper left corner of the digital display. If contact in the wire is maintained long enough (about ¼ of a second), the OL will disappear and the resistance value of the wire or circuit will appear next to the symbol.

(d) If your multimeter does not work in this manner, learn how it operates before performing troubleshooting.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(3) Voltage measurements. The PLS truck is equipped with both 12 vdc and 24 vdc circuits. Troubleshooting procedures will reference 12 vdc and 24 vdc measurements, however these values can vary. When the batteries are fully charged, 12.6 vdc can be measured on an open 12 volt circuit and 14.5 vdc can be measured when the engine is running at 1000 rpm. When the batteries are fully charged, 25.2 vdc can be measured on an open 24 volt circuit and 29 vdc can be measured when the engine is running at 1000 rpm.

(a) Connect the red test lead to the volt-ohm input connector and the black lead to the COM input on the meter. If a DC-AC switch is present, make sure it is set to the DC position.

(b) Set the function/range switch to the desired volts position. If the magnitude of the voltage is not known, set the switch to a range which will be able to read most voltages seen on the truck (typically, a 200V range will do). Then reduce the range until a satisfactory reading is obtained.

(c) Connect the test leads to the circuit being measured. In the DDEC II diagnostic procedures, voltage measurements are always given as being taken at pins, sockets, battery (+) or ground. Following the voltage measurement point, the color test lead tube used is given in parenthesis (red is volt-ohm connection and black is the COM connection).

f. General Relay Troubleshooting Procedures. The following general relay troubleshooting procedures apply to all PLS relays.

NOTE

Configuration data covering each relay is listed in Table 2-14.

(1) Pull relay out of socket just enough for the relay terminals to make contact with receptacle terminals. Leave about 1/4 to 3/8 in. (6.35 to 9.53 mm) space between the relay and relay socket to insert a multimeter lead and make contact with the terminal listed in the troubleshooting test.

(2) Perform truck operation that will actuate the relay in question.

g. General Wire Test Procedures. PLS troubleshooting isolates problems down to the components that could cause a specific failure. When all of the components in a circuit are tested without isolating a fault, the wires are the only other components that could be suspected of being damaged. Each wire that must be tested may pass through two or more connectors. The following procedures provide general instructions for testing electrical wires. These procedures will either attempt to measure a voltage at the working end of a circuit or continuity from the power end of a specific wire to the working end. Before either of these tests are performed, all connectors in the circuit must be checked for looseness.

CAUTION

Use proper sized test leads and ensure care is used when checking for resistance, continuity or voltage at connectors or damage to equipment may result.

(1) Wire voltage drop test.

(a) Disconnect connector from the component (light, relay, motor, etc.) at the working end of the circuit.

(b) Check connector terminal(s) for damage; repair or replace connector as necessary.

(c) Setup truck conditions that will create voltage at the working end of the wire.

Table 2-14. Relay Configuation Data

Voltage	Relay No.	Nomenclature	Terminal No./Wire No.					Coil Resistance	12 vdc into Relay at Terminal	24 vdc into Relay at Terminal	Contact Position 30 to 87A and 30 to 87 at Position
			30	85	86	87	87A				
12 volt	R1	Head Lts	1927	1049	1435	1017/ 1017	--	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R2	Cl. Lts	1835	1920	1435/ 1435	1012/ 1017	--	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R3	Horn	1026	1031	1016	1168	--	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R4	Work Lt	1040	1040A	1435/ 1435	1040B	--	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R5	Dimmer	1017	1017A	1435/ 1435	1007	1006	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R6	Beacon	1413	1184	1435/ 1435	1029	--	Position 85-86/ 85 ± 15 ohms	85 30		Closed Open
12 volt	R7	Trans	1713	508/ white	1711/ white	1839	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R8	Retarder	1839/ 211	213	1871/ 1871	1716/ 1714	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R9	Ck. Trans	1409	215	1517	--	1435	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R10	Reverse	1891	214	1871/ 1871	1149	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R11	Neutral	1021/ 1021	231	1871/ 1871	1021A	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
24 volt	R12	24 Volt	1189	1435/ 1435	1872	1189	--		30	86	Closed Open

Table 2-14. Relay Configuration Data – CONT.

			Terminal No./Wire No.								
Voltage	Relay No.	Nomenclature	30	85	86	87	87A	Coil Resistance	12 vdc into Relay at Terminal	24 vdc into Relay at Terminal	Contact Position 30 to 87A and 30 to 87 at Position
12 volt	R13	Trailer B.O. Stop	1676/ 1676	1435/ 1435	1678	1678C	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R14	Trailer Serv Tail	1676/ 1676	1435/ 1435	1017	1008C	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R15	L.H. Turn	1676/ 1676	1435/ 1435	1003	1003C	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R16	R.H. Turn	1676/ 1676	1435/ 1435	1004	1004C	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
12 volt	R17	Trailer B.O. Tail	1676	1435/ 1435	1680	1680C	--	Position 85-86/ 85 ± 15 ohms	86 30		Closed Open
24 volt	R18	DDEC	1075B	1435	1872	1871	--			86 30	Closed Open
24 volt	R19	Trans DDEC	1867	1435/ 1435	1872/ 1872	1875	--			86 30	Closed Open
24 volt	R20	Interaxle	1882/ 1882	1884	1888/ 1888	1889	--			86 30	Closed Open
24 volt	R21	Diff Lock	1882	1885	1888	1890	--			86 30	Closed Open
24 volt	R22	Crane Hi Idle	510	231	1737	510	--			86 30	Closed Open
24 volt	R23	Hi Range Lockout	1885	1435/ 1435	1095	1885	--			86 30	Closed Open
24 volt	R24	T.C. Dual Mode	309	1435/ 1435	1095	315/ 313	--			86 30	Closed Open

NOTE

PLS is equipped with 12 vdc and 24 vdc circuits. The troubleshooting fault that referenced these general wire tests will provide voltage information for testing wires.

(d) Check for the required voltage at the working end of the wire.

1 If the required voltage is not measured at the working end of the wire, go to Step (e).

2 If the required voltage is measured at the working end of the wire, the fault has not been isolated. Continue with the fault isolation tests or notify supervisor.

(e) Disconnect the first connector in line from the working end of the wire to the power source.

(f) Check for the required voltage at the working end of the wire.

1 If the required voltage is not measured at the working end of the wire, go to Step (g).

2 If the required voltage is measured at the working end of the wire, a fault is in the section of wire most recently disconnected. Repair the wire and perform the voltage test again.

(g) Repeat Steps (d) and (e) until all sections of the suspect wire are tested.

(2) Wire continuity test.

(a) Disconnect wire from the component (light, relay, motor, etc.) at the working end of the circuit and from the power end.

(b) Setup truck conditions that will create the desired circuit.

(c) Check continuity from power end of the wire to the working end of the wire.

1 If continuity is not measured go to Step (d).

2 If continuity is measured, the fault has not been isolated. Continue with the fault isolation tests or notify supervisor.

(d) Disconnect the first connector from the working end of the wire in line to the power source.

(e) Check continuity.

1 If continuity is not measured, go to Step (f).

2 If continuity is measured, a fault is in the section of the wire most recently disconnected. Repair the wire and perform the continuity test again.

(f) Repeat Steps (d) and (e) until all sections of the suspect wire are tested.

(3) Wire harness shorting wires test.

(a) Disconnect wire harness connector with wire suspected of damage.

(b) Set multimeter select switch to ohms.

2-11. TROUBLESHOOTING INSTRUCTIONS (CONT).

(c) Connect positive (+) multimeter lead to harness connector terminal of the suspected wire.

(d) Connect negative (–) multimeter lead to each of the other terminals in the harness connector.

1 If there is continuity, the suspected wire and the wire where continuity is measured are shorting together; repair wire.

2 If there is no continuity, all wires are OK.

(4) Wire repair. Refer to Para 7-101 for the repair of wire harness connectors. Refer to TM 43-0158 for detailed instructions concerning electrical wiring repairs. Wire harness repair is limited to splicing and taping of wires at Unit Maintenance. If a wire harness cannot be repaired, notify DS Maintenance.

2-12. INTRODUCTION TO LOGIC TREE TROUBLESHOOTING.

a. Page Layout. Troubleshooting procedures are divided into logic tree pages and test pages.

(1) A logic tree page is always a left-hand page, facing the test page on the right. The logic tree page provides the sequence of steps required to isolate a fault to a failed component. All critical information for decision making is on the left-hand page. Each logic tree page contains the following information:

(a) **INITIAL SETUP** - This box is located only on the first logic tree page of a fault. INITIAL SETUP lists tools, materials, references, personnel and equipment needed to troubleshoot the fault.

(b) **KNOWN INFO** - This box is located in the top left-hand column. KNOWN INFO lists conditions and information that will eliminate specific components as the cause of the fault.

(c) **POSSIBLE PROBLEMS** - This box is located directly below KNOWN INFO. All of the system components that could cause a fault are listed in the POSSIBLE PROBLEMS box. The first component listed in the POSSIBLE PROBLEMS box is the one that will be tested at that step in the logic sequence. When one of the components is tested and found to be operational, it is entered at the bottom of the KNOWN INFO box as OK.

(d) **QUESTION** - Each question, located in the middle column, refers to the first possible problem listed in POSSIBLE PROBLEMS. If the answer to the question is YES, proceed to the next step. If the answer is NO, follow the NO arrow to obtain directions for correcting the problem. If the step contains a WARNING or CAUTION message, a small shadow box is printed above the question. Text for WARNINGs or CAUTIONs is on the following right-hand page.

(e) **TEST OPTIONS** - This box is located in the top right-hand column. TEST OPTIONS lists tests available for testing parts suspected of failing.

(f) **REASON FOR QUESTION** - This box is located directly below TEST OPTIONS. It explains the purpose for the question in the middle column.

(2) A test page is always a right-hand page, facing the logic tree page on the left. The test provides detailed instructions for testing the first component listed in the POSSIBLE PROBLEMS box. This test will also provide an answer for the question in the middle column. Note the arrow connecting the test on the right-hand page to the REASON FOR QUESTION. When possible, illustrations are included to provide visual details. Warnings, cautions, and notes contain additional information for testing.

b. How to Begin Troubleshooting.

(1) Determine the symptom or condition that indicates a problem or failure. Troubleshooting is divided into symptoms peculiar to a truck system or component, for example: air system or engine. Refer to the Troubleshooting Fault Index (Table 2-15). Follow DDEC II and DDEC III Troubleshooting BEFORE going to Engine Troubleshooting.

(2) Go to the referenced page to begin troubleshooting. Open the manual flat so both the left-hand and right-hand pages are displayed before you. The information on both pages is important to resolve the problem or failure. However, the experienced technician can follow the left-hand page instructions and refer to the right-hand page when necessary.

(3) Follow the Diagnostic Procedure. Answer question no. 1 on the left-hand page and follow the YES or NO path to either the remedy or the next question. If necessary, look on the right-hand page for test instructions and illustrations.

(4) Observe warnings, cautions and notes. The formatting and symbols used in this manual for warnings, cautions and notes are as follows:

WARNING

This is the symbol for a warning statement. If you see the word WARNING above a question on the left-hand page, look on the right-hand page for the text of the message. WARNINGs describe a situation which could cause severe injury or death to personnel.

CAUTION

This is the symbol for a caution statement. If you see the word CAUTION above a question on the left-hand page, look on the right-hand page for the text of the message. CAUTIONs describe a situation which could cause damage to equipment.

NOTE

This is the symbol for a note. Notes are located directly above the test to which they refer. Notes provide additional information for performing a test.

c. Abbreviations and Commonly Used Terms.

(1) A/D - Analog to Digital: The computer inside the DDEC ECM uses an A/D converter to convert a sensor voltage into a number with which the computer can work.

(2) Active Codes - These are the codes that currently keep the Check Engine Light on. They can only be read using the Diagnostic Data Reader.

(3) BAT - Battery.

2-12. INTRODUCTION TO LOGIC TREE TROUBLESHOOTING (CONT).

(4) CEL - Check Engine Light: Mounted on the dash panel. Has two functions:

(a) Serves as a warning lamp to tell the driver that a problem has occurred and that the truck should be taken in for service as soon as possible.

(b) Serves as a light bulb check and system check. The Check Engine Light (CEL) will come on for about 5 seconds when the ENGINE switch is turned ON. If the CEL remains on, the self-diagnostics system has detected a problem. If the problem goes away, the light will go out, but the HISTORICAL trouble code will be stored in the DDEC ECM memory.

(5) CGL - Check Gages Light: Mounted on the dash, it lights to warn the driver when a potential engine damaging condition has been detected (low oil pressure, low coolant, or engine over temperature). As a light bulb check, the CGL will come on for about 5 seconds when ignition switch is placed in the ON position.

(6) CKT - Circuit.

(7) COM - Common.

(8) DCA - Diagnostic Connector Assembly: An electrical harness on the truck which allows the STE/ICE-R to be powered and to make measurements of key truck signals from a single connection. In addition to many basic electrical signals such as starter voltage and current, it includes engine speed and fuel return pressure. The STE/ICE-R can make TK measurements while connected to the DCA.

(9) DDEC II - The Detroit Diesel Electronic Controls, second generation.

(10) DDEC III - The Detroit Diesel Electronic Controls, third generation.

(11) DDL - Diagnostic Data Link: The lines (wires) over which the DDEC ECM communicates information to be read by a Diagnostic Data Reader.

(12) DDR - Diagnostic Data Reader: The hand-held tool used for troubleshooting with the DDEC (DDR or PRO-LINK 9000).

(13) Diagnostics - Troubleshooting by following an exact procedure.

(14) DL+ - Data Link, positive side. Used for communications to the Diagnostic Data Reader, as well as other applications.

(15) DL– - Data Link, negative side. Used for communications to the Diagnostic Data Reader, as well as other applications.

(16) DREQ - Diagnostic Request Terminal: The pin on the DDL connector which must be grounded to obtain diagnostic codes (pin M).

(17) ECM - Electric Control Module: The brains of DDEC II and DDEC III. It receives input from the DDEC II and DDEC III sensors and switches, calculates injector firing times and duration (using a built-in computer) and fires the injectors at the appropriate times. System operates on 12 vdc with 5 vdc input to sensors and switches back to ECM.

(18) EEPROM - Electronically Erasable Programmable Read Only Memory: Contains the engine calibration.

(19) EFPA - Electronic Foot Pedal Assembly.

(20) Erratic - Intermittent.

(21) EUI - Electronic Unit Injector.

(22) Historical Codes - All codes kept in DDEC ECM memory (may not trip the CEL). These codes can be cleared by using the Diagnostic Data Reader.

(23) OPS - Oil Pressure Sensor: Monitors oil pressure at the main oil gallery.

(24) OTS - Oil Temperature Sensor: Monitors oil temperature in the turbo oil supply line.

(25) PW - Pulsewidth: The amount of time in crank degrees that the DDEC ECM is requesting the injectors to be turned on.

(26) SRS - Synchronous Reference Sensor: Detects when the first cylinder in the firing order is about to be fired.

(27) STE/ICE-R - Simplified Test Equipment for Internal Combustion Engines - Reprogrammable: A testing system used for performing tests and measurements on the truck. In addition to acting as a conventional digital multimeter to measure voltage, current and resistance, it is also capable of measuring pressure, speed, compression, unbalance, engine power and some specialized battery and starter evaluations. It is powered by the truck batteries. The complete system includes a truck test meter (VTM), a transducer kit (TK), cables, transit case and technical publications. STE/ICE tests are referenced.

(28) System - A collection of devices which all are related to each other because they depend on each other to do some function or job. For example, the function of the fuel system is to inject fuel into the cylinders at the correct time in the correct amount and with the correct quantity. The collection of devices that are required to do this include the fuel pump, fuel lines, lift pump, fuel filter and injectors.

(29) TBS - Turbo Boost Sensor: Used to monitor turbo boost pressure. The sensor generates a voltage (from 0 to 5 volts) which is proportional to pressure.

(30) Test Chain: A series of tests to be followed in a particular order or sequence (numbered).

(31) TPS - Throttle Position Sensor: Used to detect throttle position (percent of throttle).

(32) Troubleshooting - The process of making measurements and observing the operation of the truck to find out if and where any problems exist.

(33) TRS - Timing Reference Sensor: Detects whenever any cylinder is about to be fired.

(34) VIN - Vehicle Identification Number.

(35) VTM - Truck Test Meter: A box which performs the measurement and analysis functions of the STE/ICE-R system.

Table 2-15. Troubleshooting Fault Index

Fault Number	Troubleshooting Procedure		Page Number
DDEC II TROUBLESHOOTING (ALL CONDITIONS)			
A	Check Engine Light (CEL) Comes ON And Stays ON		2-148
A1	Check Engine Light (CEL) ON No Historical Or Active Codes Displayed On DDR		2-150
A2	DDR Display Reads “No DDEC Data Received”		2-156
A3	DDR Display Is Blank Or Random		2-164
A4	DDR reads active codes and does not read any historic codes:		
	CODE 11	Vernier Control Signal Voltage Low	2-172
	CODE 12	Vernier Control Signal Voltage High	2-192
	CODE 14	Oil Temperature Sensor (OTS) Signal Voltage High	2-202
	CODE 15	Oil Temperature Sensor (OTS) Signal Voltage Low	2-210
	CODE 21	Throttle Position Sensor (TPS) Signal Voltage High	2-218
	CODE 22	Throttle Position Sensor (TPS) Signal Voltage Low	2-230
	CODE 23	Fuel Temperature Sensor (FTS) Signal Voltage High	2-244
	CODE 24	Fuel Temperature Sensor (FTS) Signal Voltage Low	2-252
	CODE 32	DDEC ECM Backup System Failure	2-260
	CODE 33	Turbo Boost Sensor (TBS) Signal Voltage High	2-264
	CODE 34	Turbo Boost Sensor (TBS) Signal Voltage Low	2-274
	CODE 35	Oil Pressure Sensor (OPS) Signal Voltage High	2-286
	CODE 36	Oil Pressure Sensor (OPS) Signal Voltage Low	2-296
	CODE 41	Timing Reference Sensor (TRS)	2-312
	CODE 42	Synchronous Reference Sensor (SRS)	2-322
	CODE 44	High Oil Temperature	2-332
	CODE 45	Low Oil Pressure	2-334

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure		Page Number
DDEC II TROUBLESHOOTING (ALL CONDITIONS) (CONT).			
A4 (CONT)			
	CODE 46	Low Battery Voltage	2-336
	CODE 51	Electrically Erasable Programmable Read-Only Memory (EEPROM) Failure (Historical Code 51 On DDR)	2-348
	CODE 52/56	DDEC ECM - Analog To Digital Failure	2-350
	CODE 53	Electrically Erasable Programmable Read-Only Memory (EEPROM) Failure Affecting Code Memory	2-352
	CODES 61-68	Injector Response Time Too Long	2-354
	CODES 71-78	Injector Response Time Too Short	2-376
A5A	Vehicle Harness +5 Volt Supply		2-382
A5B	Engine Harness +5 Volt Supply		2-400
B	Check Engine Light (CEL) Always OFF		2-414
C	Normal Operation of Check Engine Light (CEL) And Fault Present		2-426
C1	CEL Normal and Historical Codes Displayed On DDR		2-428
C2	No Data Link and Lamp Check OK		2-432
D	Check Engine Light (CEL) And Fault Are Intermittent		2-442
D1	CEL Erratic and Historical Codes Displayed On DDR		2-444
D2	CEL and Fault are Intermittent		2-448
D3	CEL Flashes A Valid Active Code		2-452
D4	Crane High Idle Not Working		2-458
D5	Engine Brake Inoperative		2-472
E1	Engine Cranks But Will Not Start		2-476
E2	Check Gages Light (CGL) Always ON Or Always OFF		2-494
E3	Check Gages Light (CGL) Always ON		2-496
E4	Check Gages Light (CGL) Always OFF		2-502

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
ATEC SYSTEM FAULT INDEX		
1.	CODE 12 Low Oil Level	2-818
2.	CODE 13 Low Battery Voltage	2-828
3.	CODE 14 Forward Pressure Switch Inoperative	2-834
4.	CODE 15 Reverse Pressure Switch Inoperative	2-842
5.	CODE 21 Throttle Sensor Inoperative	2-850
6.	CODE 22 Speed Sensor Inoperative	2-862
7.	CODE 23 Shift Selector	2-870
8.	CODE 24 Oil Temperature (High Limit Exceeded)	2-884
9.	CODE 32 Transmission Direction Signal	2-886
10.	CODE 33 Oil Temperature Sensor Inoperative	2-896
11.	CODE 34 Prom Check	2-904
12.	CODES 41 Through 45 And 51 Through 53: Solenoids J, F, D, C, B, A, G, E, Or H Inoperative	2-908
13.	CODE 46 Solenoid A Inoperative	2-914
14.	CODE 54 A, B, C, D, F, And J Solenoid Off Test	2-920
15.	CODE 69 Electronic Control Unit (ECU) Failure	2-930
ENGINE SYSTEM FAULT INDEX		
1.	Engine Fails To Crank	2-936
2.	Low Engine Oil Pressure (Oil Press Gage Continuously Reads Less Than 35 To 40 psi [241 To 276 kPa] At 1800 To 2100 rpm)	2-968
3.	Excessive Engine Oil Consumption	2-974
4.	Excessive Black Or Gray Exhaust Smoke (Water Temp Gage Reads Over 180°F [82°C])	2-986
5.	Blue Exhaust Smoke (Water Temp Gage Reads Over 180°F [82°C])	2-990
6.	White Exhaust Smoke (Water Temp Gage Reads Over 180°F [82°C])	2-994
7.	Engine Does Not Develop Full Power	2-998
8.	Engine Has No Throttle Response With No Codes or Code 22	2-1000

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
FUEL SYSTEM FAULT INDEX		
1.	Engine Cranks But Fails To Start Or Stalls After Starting	2-1014
2.	Engine Starts But Misfires, Runs Rough, Or Lacks Power	2-1044
3.	Engine Does Not Start When Ether Starting Aid Is Used In Cold Weather	2-1058
COOLING SYSTEM FAULT INDEX		
1.	Engine Overheats (Water Temp Gage Continuously Reads Over 230°F [110°C])	2-1072
2.	Engine Runs Too Cool	2-1090
EXHAUST SYSTEM FAULT INDEX		
1.	Exhaust System Unusually Noisy or Vibrates Excessively During Engine Operation	2-1098
ELECTRICAL SYSTEM FAULT INDEX		
1.	All 12 And 24 VDC Circuits Do Not Operate	2-1132
2.	Headlights, Clearance Lights, Horn, Work Lights, Dimmer Or Beacon Light Do Not Operate	2-1140
3.	CTIS, LHS, Crane And Heater Do Not Operate	2-1168
4.	Windshield Wipers, Engine Brakes And Gages Do Not Operate	2-1172
5.	Gage(s) Giving No Or Incorrect Readings	2-1178
6.	Work Light(s) Will Not Operate	2-1188
7.	Instrument Lights Do Not Operate	2-1204
8.	Dome Light Does Not Operate	2-1208
9.	Beacon Light Does Not Operate	2-1216
10.	Headlight(s) Do Not Operate (Low Beam)	2-1228
11.	Headlight(s) Do Not Operate (High Beam)	2-1246
12.	Taillight(s) Do Not Operate	2-1256
13.	All Turn Signals Do Not Operate	2-1266
14.	Right Rear Turn Signal Does Not Operate	2-1272

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
ELECTRICAL SYSTEM FAULT INDEX (CONT).		
15.	Left Rear Turn Signal Does Not Operate	2-1282
16.	Left Front Turn Signal Does Not Operate	2-1292
17.	Right Front Turn Signal Does Not Operate	2-1300
18.	Parking Light(s) Do Not Operate	2-1310
19.	Stoplight Does Not Operate	2-1316
20.	Reverse Light Does Not Operate	2-1326
21.	Reverse Alarm Does Not Operate	2-1338
22.	Clearance, Side Marker And Id Light(s) Do Not Operate	2-1342
23.	All Blackout Lights Do Not Operate	2-1358
24.	Blackout Drive Light Does Not Operate	2-1362
25.	Blackout Stoplights Do Not Operate	2-1370
26.	Rear Blackout Clearance Or Taillight(s) Does Not Operate	2-1380
27.	Front Blackout Clearance Or Marker Light Does Not Operate	2-1390
28.	Blackout Tail, Marker And Clearance Lights Do Not Operate	2-1400
29.	Horn Does Not Operate	2-1404
30.	Windshield Washers Do Not Operate	2-1420
31.	Windshield Wipers Do Not Operate At High Or Low Speed	2-1432
32.	Windshield Wipers Do Not Operate (Low Speed)	2-1442
33.	Windshield Wipers Do Not Operate (High Speed)	2-1448
34.	Engine Brake Does Not Operate In Low	2-1452
35.	Engine Brake Does Not Operate In High	2-1482
36.	Shift Controller Panel Lamps Do Not Operate	2-1490
37.	Shift Controller Range LED(s) Do Not Operate	2-1500

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
ELECTRICAL SYSTEM FAULT INDEX (CONT).		
38.	Trans Check Light Will Not Operate	2-1504
39.	Trans Check Light Will Not Go Out	2-1512
40.	Emerg Steer Light Will No Go Out	2-1522
41.	Trailer Marker Lights Do Not Operate	2-1528
42.	Trailer R.H. Turn Signal/Stoplight Does Not Operate	2-1536
43.	Trailer L.H. Turn Signal/Stoplight Does Not Operate	2-1544
44.	Trailer Blackout Taillights Do Not Operate	2-1552
45.	Trailer Blackout Stoplights Do Not Operate	2-1560
46.	Low Air/Hydraulic Oil Alarm Does Not Operate	2-1568
47.	Low Air Warning Light Does Not Operate	2-1576
48.	Low Air Light And Low Air/Hydraulic Oil Alarm Does Not Operate	2-1582
49.	Heater Does Not Operate Or Will Not Change Speed	2-1586
50.	12 And 24 Volt Systems Not Charging Or Under Charging (145 AMP)	2-1600
51.	12 Volt System Over Or Under Charging (145 AMP)	2-1628
52.	24 Volt System Not Charging Or Under Charging (145 AMP)	2-1632
53.	24 Volt System Over Charging (145 AMP)	2-1642
54.	12 And 24 Volt Systems Not Charging Or Under Charging (200 AMP)	2-1648
55.	12 Volt System Over Or Under Charging (200 AMP)	2-1666
56.	24 Volt System Over Or Under Charging (200 AMP)	2-1670
TRANSMISSION SYSTEM FAULT INDEX		
1.	Transmission Overheats (Trans Temp Gage Continuously Reads Over 220°F (104°C))	2-1676
2.	Transmission Will Not Shift Into Gear, Slips Into And Out Of Gear, Or Does Not Respond To Shift Selector Key Pad	2-1682
3.	Transmission Shifts Roughly	2-1688
4.	Automatic Shifts Occur At Too High Or Low Of A Speed	2-1694

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
TRANSFER CASE SYSTEM FAULT INDEX		
1.	Transfer Case Unusually Noisy When Operating	2-1702
2.	Transfer Case Does Not Shift Into High Or Low Or Slips Out Of Gear	2-1712
3.	Transfer Case Will Not Lockup	2-1718
DRIVESHAFT FAULT INDEX		
1.	Driveshafts or Universal Joints Unusually Noisy When Operating	2-1728
BRAKES SYSTEM FAULT INDEX		
1.	Parking Brakes On Axles No. 3 Through No. 5 Do Not Release	2-1742
2.	Parking Brakes On Axle No. 3 Do Not Release	2-1750
3.	Parking Brakes On Axles No. 4 And No. 5 Do Not Release	2-1762
4.	Parking Brakes On Axles No. 3 Through No. 5 Do Not Apply	2-1772
5.	Parking Brakes On Axle No. 3 Do Not Apply	2-1778
6.	Parking Brakes On Axles No. 4 And No. 5 Do Not Apply	2-1786
7.	Trailer Service Brakes Do Not Apply When Hand Control Valve Is Operated	2-1796
8.	Service Brakes On Axles No. 3 Through No. 5 Do Not Apply	2-1804
9.	Service Brakes On Axles No. 3 Through No. 5 Do Not Release	2-1812
10.	Service Brakes On Axle No. 3 Do Not Apply	2-1818
11.	Service Brakes On Axle No. 3 Do Not Release	2-1828
12.	Service Brakes On Axles No. 4 And No. 5 Do Not Apply	2-1838
13.	Service Brakes On Axles No. 4 And No. 5 Do Not Release	2-1848
14.	Service Brakes On Axles No. 1 And No. 2 Do Not Apply	2-1858
15.	Service Brakes On Axles No. 1 And No. 2 Do Not Release	2-1868
16.	Truck Brakes Unevenly; Pull To One Side	2-1878
17.	Excessive Braking Distance	2-1884
18.	Brake Drums Overheat	2-1890

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
AXLE NO. 3 AIR BAG SYSTEM FAULT INDEX		
1.	Axle No. 3 Air Bag(s) Will Not Inflate	2-1896
2.	One Axle No. 3 Air Bag Will Not Deflate	2-1908
CENTRAL TIRE INFLATION SYSTEM (CTIS) FAULT INDEX		
1.	One Tire Will Not Inflate or Deflate	2-1916
2.	CTIS Inoperative	2-1924
3.	All Tires On Axles No. 3 Through No. 5 Will Not Deflate	2-1938
4.	All Tires On Axles No. 1 And No. 2 Will Not Deflate	2-1952
5.	Excess Inflation Time Axles No. 1 And No. 2, CTIS Green Indicator Flashes Too Long Or Continually	2-1964
6.	Excess Inflation Time Axles No. 3 Through No. 5, CTIS Green Indicator Flashes Too Long Or Continually	2-1988
7.	Axles No. 1 And No. 2 Tire Pressures Do Not Agree With CTIS Settings	2-2012
8.	Axles No. 3 Through No. 5 Tire Pressures Do Not Agree With CTIS Settings	2-2026
9.	CTIS Does Not Automatically Inflate To The Next Higher Setting	2-2040
10.	Front Manifold Clicks Continually/Low Air Light Flashing	2-2046
11.	Rear Manifold Clicks Continually/Low Air Light Flashing	2-2102
12.	Tires On No. 1 Through No. 5 Axles Deflate Upon Completion Of Adjustment Cycle	2-2158
13.	CTIS Low Air Indicator Stays On Over 110 psi	2-2168
AIR SYSTEM FAULT INDEX		
1.	Air Pressure Buildup Is Slow	2-2184
2.	Air Dryer(s) And/Or Aftercooler Continually Purge	2-2198
3.	Compressor Fails To Unload (Air System Pressure Builds Up To More Than 129 psi (889 kPa))	2-2204
4.	Noisy Air Compressor Operation	2-2208
5.	Air Pressure Drops Rapidly After Engine Shutdown	2-2214
6.	Air Horn Will Not Operate	2-2222

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
LOAD HANDLING SYSTEM (LHS) FAULT INDEX		
1.	LHS Light Does Not Operate	2-2236
2.	LHS No Trans Light Does Not Operate	2-2258
3.	LHS Overload Light Does Not Operate	2-2282
4.	LHS Overload Light Does Not Go Out	2-2300
5.	Loss Of Supply Voltage To Main Junction Box	2-2304
6.	Loss Of Middle Frame Safe Lowering Function	2-2308
7.	Loss Of Hook Arm Safe Lowering Function	2-2324
8.	LHS Does Not Operate	2-2340
9.	Hook Arm Does Not Unload In Manual Mode	2-2362
10.	Hook Arm Does Not Load In Manual Mode	2-2382
11.	Middle Frame Does Not Unload In Manual Mode	2-2402
12.	Middle Frame Does Not Load In Manual Mode	2-2422
13.	LHS Does Not Load In Auto Mode	2-2440
14.	LHS Does Not Unload In Auto Mode	2-2458
15.	LHS Inoperative With Interface Kit Installed	2-2474
CRANE SYSTEM FAULT INDEX		
1.	No Crane Functions Work Using Remote Control	2-2518
2.	Hoist Will Not Lower Using Remote Control Unit	2-2528
3.	Hoist Will Not Raise Using Remote Control Unit	2-2546
4.	Boom Will Not Lower Using Remote Control Unit	2-2564
5.	Boom Will Not Raise Using Remote Control Unit	2-2582
6.	Boom Will Not Telescope In Using Remote Control Unit	2-2600
7.	Boom Will Not Telescope Out Using Remote Control Unit	2-2618
8.	Crane Will Not Swing CW Using Remote Control Unit	2-2636
9.	Crane Will Not Swing CCW Using Remote Control Unit	2-2654
10.	Outriggers Do Not Operate	2-2672
11.	Loss Of Crane Functions (Swing, Telescope, Boom, And Hoist)	2-2720
12.	Boom Does Not Operate	2-2750

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
CRANE SYSTEM FAULT INDEX (CRANE)		
13.	Telescope Does Not Operate	2-2754
14.	Hoist Does Not Operate	2-2758
15.	Crane Does Not Swing	2-2762
16.	Mast Does Not Operate	2-2766
17.	Lift And Hoist Do Not Operate Or Operate Slowly	2-2770
18.	Swing And Telescope Do Not Operate Or Operate Slowly	2-2772
19.	Crane High Idle Not Working	2-2774
SELF RECOVERY WINCH (SRW) SYSTEM FAULT INDEX		
1.	Self Recovery Winch (SRW) Will Not Pay In Or Out Using Control Lever	2-2816
2.	Self Recovery Winch (SRW) Will Not Pay In Or Out Using Cab Winch In/Out Switch	2-2824
3.	Self Recovery Winch (SRW) Will Not Pay In Using Cab Winch In/Out Switch	2-2828
4.	Self Recovery Winch (SRW) Will Not Pay Out Using Cab Winch In/Out Switch	2-2834
5.	Cable Cannot Be Free-Spooled Out From Front Or Rear Of Truck	2-2840
HYDRAULIC SYSTEM FAULT INDEX		
1.	Auxiliary Hydraulics (Aux Hyd) Light Does Not Operate	2-2852
2.	Crane And Winch (SRW) Do Not Operate	2-2874
3.	LHS, Winch And Crane Do Not Operate	2-2884
4.	Fan, LHS, Winch And Crane Do Not Operate	2-2894
5.	Fan Does Not Operate	2-2904
6.	Fan Speed Does Not Lower From High Speed To Low Speed	2-2908
STEERING SYSTEM FAULT INDEX		
1.	Truck Is Hard To Steer	2-2940
2.	Truck Wanders, Pulls To One Side, Or Shimmies	2-2952
3.	Excessive Play When Turning Steering Wheel	2-2962

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
STEERING SYSTEM FAULT INDEX		
4.	No Response When Turning Steering Wheel	2-2966
5.	No Response At Axle No. 5 When Turning Steering Wheel	2-2970
AXLES SYSTEM FAULT INDEX		
1.	Axle Differential(s) Unusually Noisy When Operating	2-2978
2.	Differential Side To Side Lockup Will Not Engage With CTIS In Emergency With Transfer Case In Low	2-2982
3.	Interaxle Front To Rear Lockup Will Not Engage With CTIS In Mud, Sand And Snow	2-3004
SUSPENSION SYSTEM FAULT INDEX		
1.	Ride Is Rough	2-3020
WHEELS AND TIRES FAULT INDEX		
1.	Tires Wear Unevenly Or Excessively	2-3026
2.	Wheel Wobbles Or Shimmies	2-3032
ARCTIC KIT FAULT INDEX		
1.	Arctic Kit Coolant Pump Does Not Operate	2-3040
INTERFACE SYSTEM FAULT INDEX		
1.	Loss Of Interface Air Supply	2-3060
2.	Interface Kit Hydraulics Inoperative	2-3066
3.	Loss Of Interface Power 12 VDC	2-3108
4.	Loss Of Interface Power 24 VDC	2-3122

Table 2-15. Troubleshooting Fault Index (CONT).

Fault Number	Troubleshooting Procedure	Page Number
CONTAINER HANDLING UNIT (CHU) FAULT INDEX		
1.	Main Frame Does Not Unload	2-3140
2.	Rotary Paddle Cylinders Do Not Operate	2-3142
3.	LHS Does Not Unload In CHU Mode	2-3150
4.	CHU Mode Switch Inoperative (Lifting Frame Contacts Rear Rollers)	2-3164
5.	Hook Arm Extends Too Far In CHU Mode (AUTO)	2-3176

2-13. DDEC II TROUBLESHOOTING.

NOTE

Ensure that wire connections 150/150 on battery A1 ground terminal, and wire connections 240/241 on battery A1 positive terminal are tight and free of corrosion before starting to troubleshoot DDEC II system. Refer to Para 7-90 and 7-91 and tighten/clean any loose or corroded wire connections.

This paragraph covers DDEC II System Troubleshooting. The DDEC II System Fault Index, Table 2-16, lists faults for the DDEC II system of the PLS truck. Refer to schematic Figure 2-1 through 2-4 when performing tests and corrective actions.

Table 2-16. DDEC II System Fault Index

Fault No.		Troubleshooting Fault	Page
A		**CHECK ENGINE LIGHT (CEL) COMES ON AND STAYS ON**	2-148
A1		Check Engine Light (CEL) ON And No Historical Or Active Codes Displayed On DDR	2-150
A2		DDR Display Reads “No DDEC Data Received”	2-156
A3		DDR Display Is Blank Or Random	2-164
A4		DDR Reads Active Codes And Does Not Read Any Historic Codes	
FLASH CODES:	SAE CODES:		
CODE 11	P187 4	Vernier Control Signal Voltage Low	2-172
CODE 12	P187 3	Vernier Control Signal Voltage High	2-192
CODE 14	P175 3/P110 3	Oil Temperature Sensor (OTS) Signal Voltage High	2-202
CODE 15	P175 4/P110 4	Oil Temperature Sensor (OTS) Signal Voltage Low	2-210
CODE 21	P091 3	Throttle Position Sensor (TPS) Signal Voltage High	2-218
CODE 22	P091 4	Throttle Position Sensor (TPS) Signal Voltage Low	2-230
CODE 23	P174 3	Fuel Temperature Sensor (FTS) Signal Voltage High	2-244
CODE 24	P174 4	Fuel Temperature Sensor (FTS) Signal Voltage Low	2-252
CODE 32		DDEC ECM Backup System Failure	2-260
CODE 33	P102 3	Turbo Boost Sensor (TBS) Signal Voltage High	2-264
CODE 34	P102 4	Turbo Boost Sensor (TBS) Signal Voltage Low	2-274
CODE 35	P100 3	Oil Pressure Sensor (OPS) Signal Voltage High	2-286
CODE 36	P100 4	Oil Pressure Sensor (OPS) Signal Voltage Low	2-296
CODE 41	S021 0	Timing Reference Sensor (TRS)	2-312
CODE 42	S021 1	Synchronous Reference Sensor (SRS)	2-322
CODE 44	P175 0/P110 0	High Oil Temperature	2-332
CODE 45	P100 1	Low Oil Pressure	2-334
CODE 46	P168 1	Low Battery Voltage	2-336
CODE 51		Electrically Erasable Programmable Read-Only Memory (EEPROM) Failure (Historical Code 51 On DDR)	2-348
CODE 52/56	S254 12/S250 12	DDEC ECM - Analog to Digital Failure	2-350
CODE 53	S253 12	Electrically Erasable Programmable Read-Only Memory (EEPROM) Failure Affecting Code Memory	2-352
CODES 61-68	SXXX 0	Injector Response Time Too Long	2-354
CODES 71-78	SXXX 1	Injector Response Time Too Short	2-376
A5A		Vehicle Harness +5 Volt Supply	2-382
A5B		Engine Harness +5 Volt Supply	2-400

Table 2-16. DDEC II System Fault Index (CONT).

Fault No.	Troubleshooting Fault		Page
B	**CHECK ENGINE LIGHT (CEL) ALWAYS OFF**		2-414
C	**NORMAL OPERATION OF CHECK ENGINE LIGHT (CEL) AND FAULT PRESENT**		2-426
	C1	CEL Normal And Historical Codes Displayed On DDR	2-428
	C2	No Data Link And Lamp Check OK	2-432
D	**CHECK ENGINE LIGHT (CEL) AND FAULT ARE INTERMITTENT**		2-442
	D1	CEL Erratic And Historical Codes Displayed On DDR	2-444
	D2	CEL And Fault are Intermittent	2-448
	D3	CEL Flashes A Valid Active Code	2-452
	D4	Crane High Idle Not Working	2-458
	D5	Engine Brake Not Working	2-472
E	**NO CODES DISPLAYED ON DDR**		2-476
	E1	Engine Cranks But Will Not Start	2-476
	E2	Check Gages Light (CGL) Always ON Or Always OFF	2-494
	E3	Check Gages Light (CGL) Always ON	2-496
	E4	Check Gages Light (CGL) Always OFF	2-502

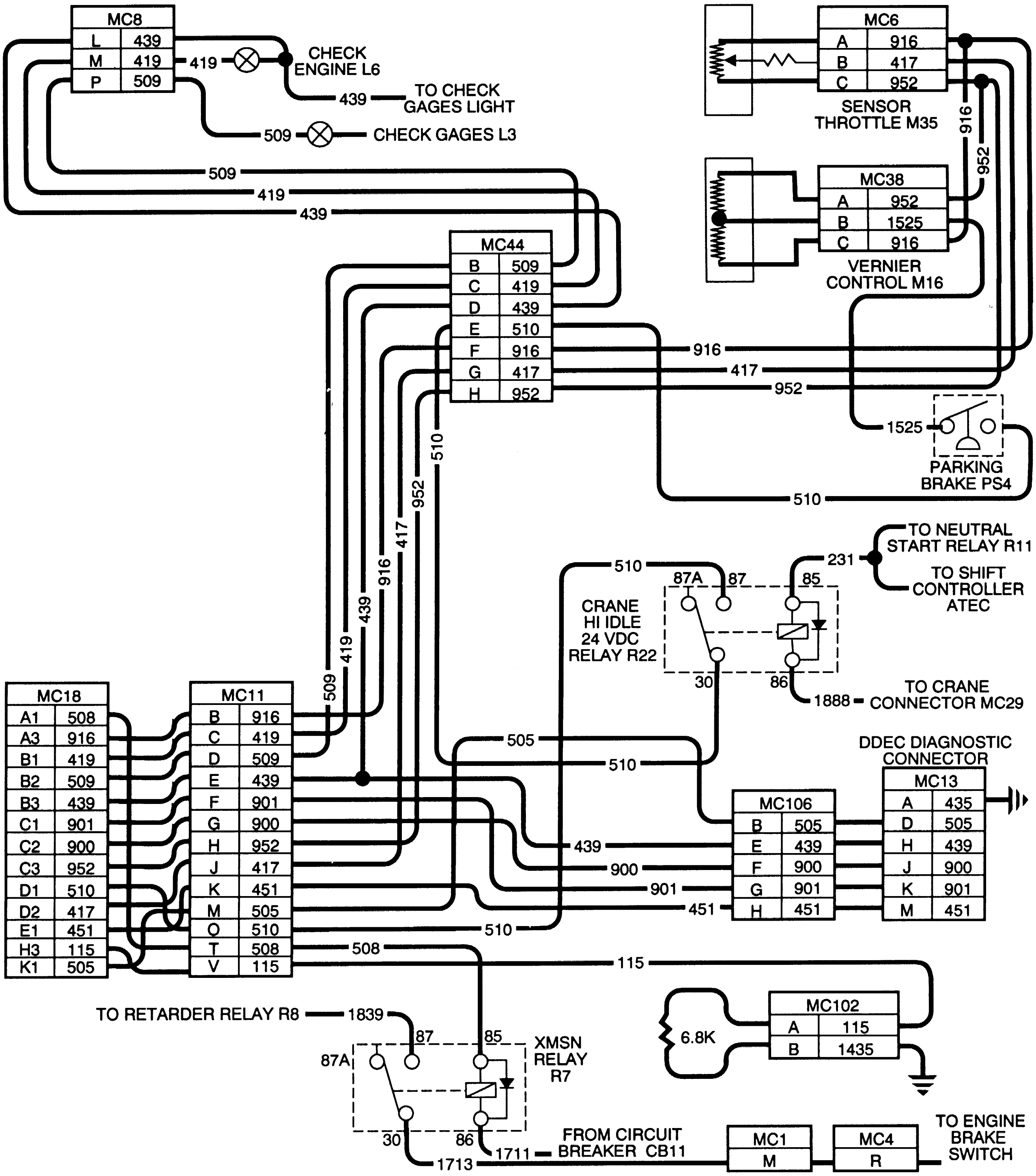


Figure 2-1. DDEC II Vehicle Harness Wiring Schematic

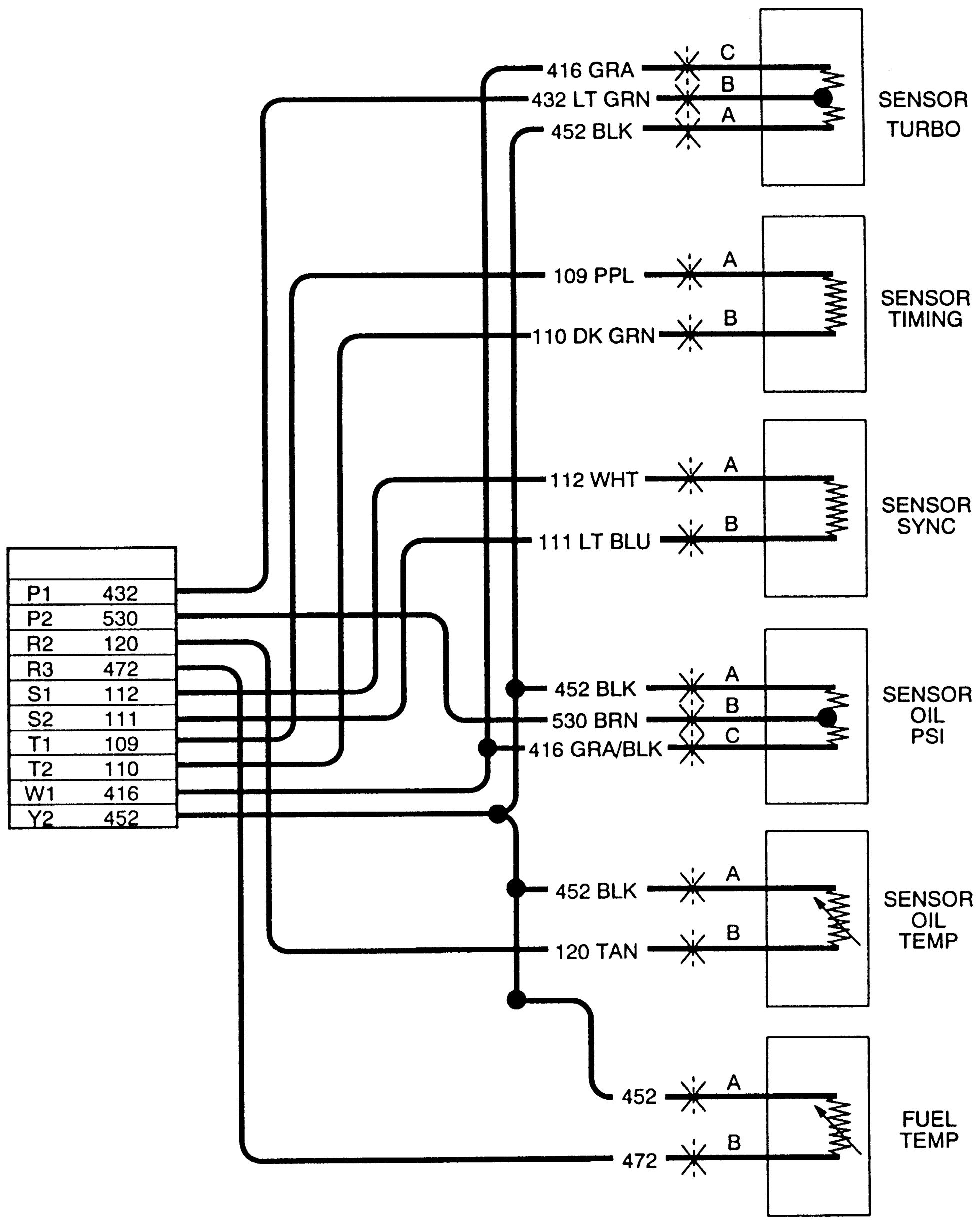


Figure 2-2. DDEC II Engine Harness Wiring Schematic

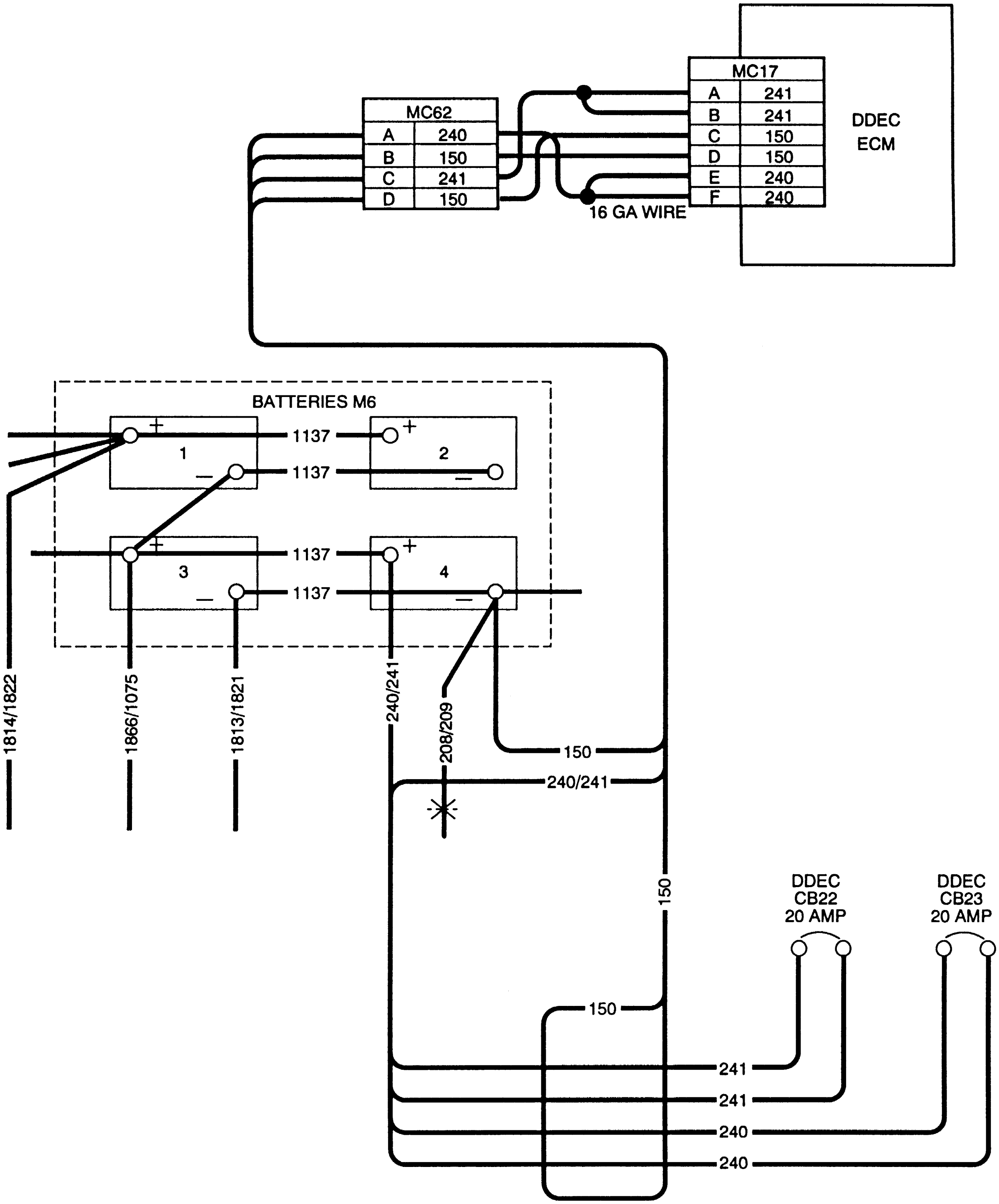


Figure 2-3. DDEC II Power Harness Wiring Schematic

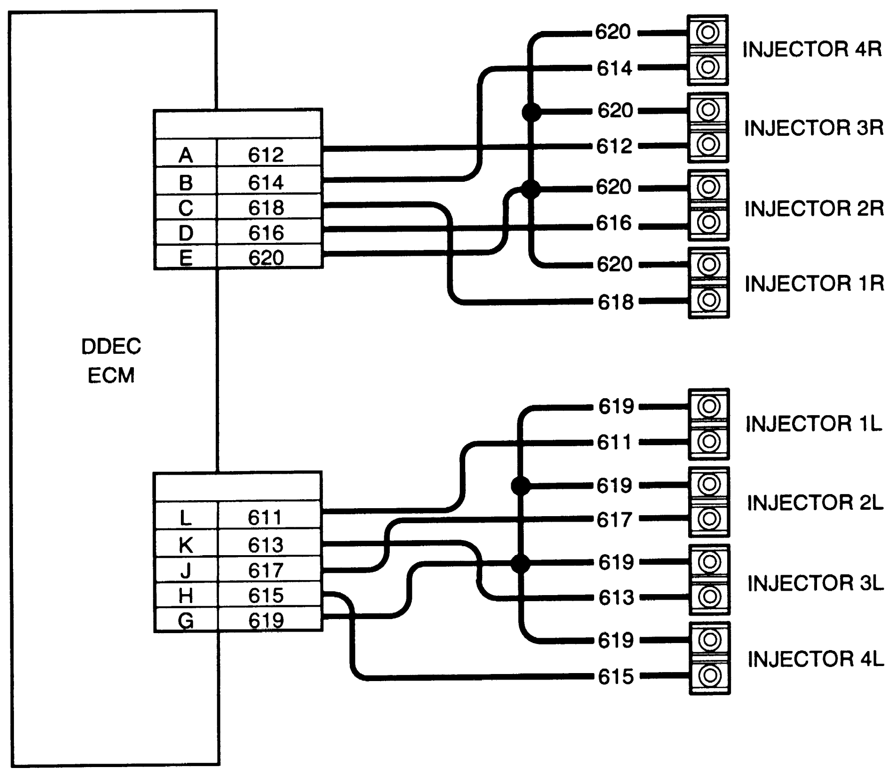


Figure 2-4. DDEC II Injector Harness Wiring Schematic

2-13. DDEC II TROUBLESHOOTING (CONT).

A CHECK ENGINE LIGHT (CEL) COMES ON AND STAYS ON.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
DDEC has detected a fault.
POSSIBLE PROBLEMS

1.

Are active and/or historical codes displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

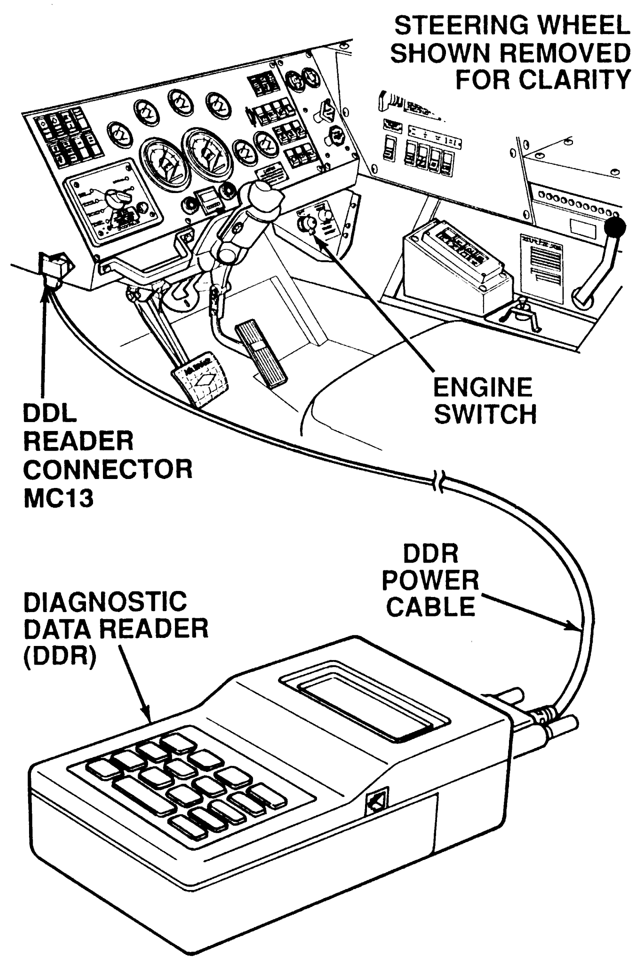
YES

- If CEL is ON and stays ON, go to Fault A1 (Table 2-16).
- If DDR display reads “NO DDEC DATA RECEIVED”, go to Fault A2 (Table 2-16).
- If DDR display is blank or random, go to Fault A3 (Table 2-16).
- If Active Codes are displayed, go to Fault Index (Table 2-16).
- If no Active Code and Historical Code 51 are displayed, go to Fault A4 Code 51 (Table 2-16).

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Turn OFF ENGINE switch (TM 9-2320-364-10). (2) Connect DDR to DDL connector MC13. (3) Turn ON ENGINE switch. (4) Select MODE 01 (ACTIVE CODES) on DDR and read codes. (5) Select Mode 02 (HISTORICAL CODES) on DDR and read codes.



2-13. DDEC II TROUBLESHOOTING (CONT).

A1 CHECK ENGINE LIGHT (CEL) ON AND NO HISTORICAL OR ACTIVE CODES DISPLAYED ON DDR.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO
Suspected DDEC Fault.
POSSIBLE PROBLEMS
Short in CEL diagnostic request line wire 451. Short in CEL driver line wire 419. Damaged harness connectors.

1.

Is CEL erratic or intermittent when engine is running at 2100 rpm?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
Erratic or intermittent CEL (with erratic engine operation) indicates short to ground on diagnostic request line wire 451.

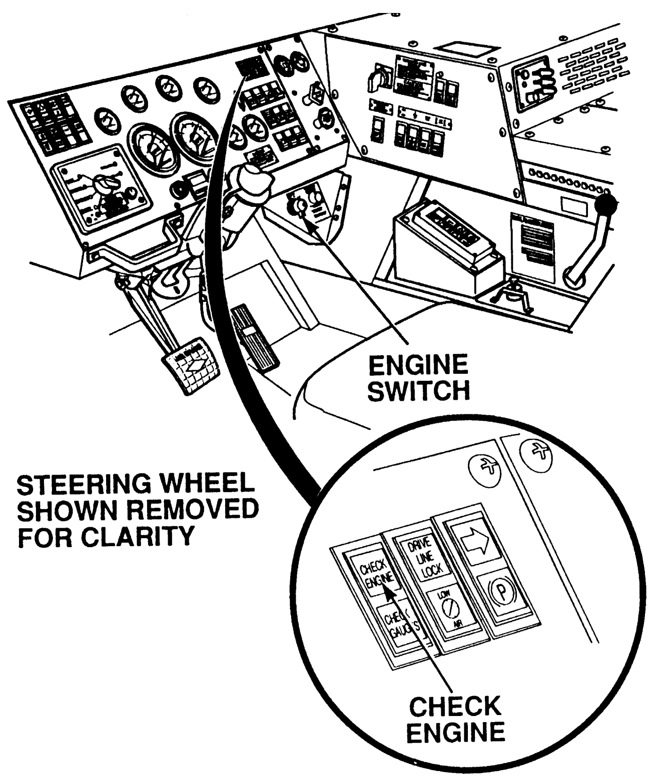
NO → Repair wire 451 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 4 of this Fault.

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Turn ON ENGINE switch (TM 9-2320-364-10) and observe CEL. (a) If CEL lights erratically or intermittently, turn OFF ENGINE switch and repair wire 451 (see schematic Fig 2-1) or notify DS Maintenance. (b) If CEL lights for five seconds and goes off, go to Step (2) below. (2) Start engine. (3) Increase engine speed to 2100 rpm and observe CEL. (a) If CEL lights erratically or intermittently, turn OFF ENGINE switch and repair wire 451 (see schematic Fig 2-1) or notify DS Maintenance. (b) If CEL goes off after five seconds and stays off after engine warms up, wire 451 is OK. (4) Turn OFF ENGINE switch.



A1 CHECK ENGINE LIGHT (CEL) ON AND NO HISTORICAL OR ACTIVE CODES DISPLAYED ON DDR (CONT).

KNOWN INFO

CEL diagnostic request line wire 451 OK.

POSSIBLE PROBLEMS

Short in CEL driver line wire 419.
Damaged harness connectors.

2.

WARNING
READ WARNING on Page 2-153

Does CEL go OUT with vehicle harness connector MC18 disconnected at DDEC ECM and ENGINE switch ON (engine not running)?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Wire 419 is shorted if CEL stays ON with vehicle harness disconnected.

NO → Repair wire 419 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 4 of this Fault.

YES ↓

KNOWN INFO

CEL diagnostic request line wire 451 OK.
CEL driver line wire 419 OK.

POSSIBLE PROBLEMS

Damaged harness connectors.

3.

CAUTION
READ CAUTION on Page 2-153

Are DDEC ECM connector MC18 terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

CEL will not operate properly if harness connectors are damaged.

NO → Repair connectors (Para 7-101). Verify repair, go to Step 4 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 4 of this Fault.

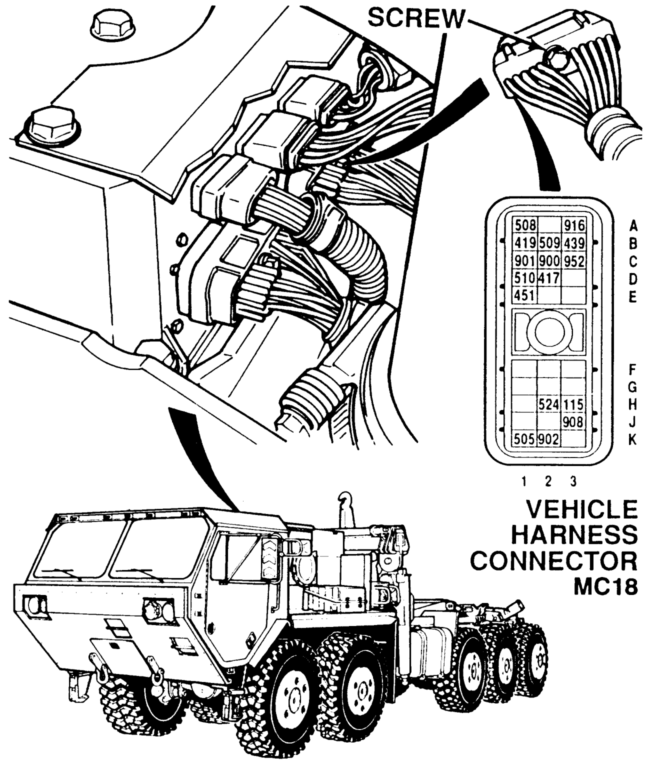
WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

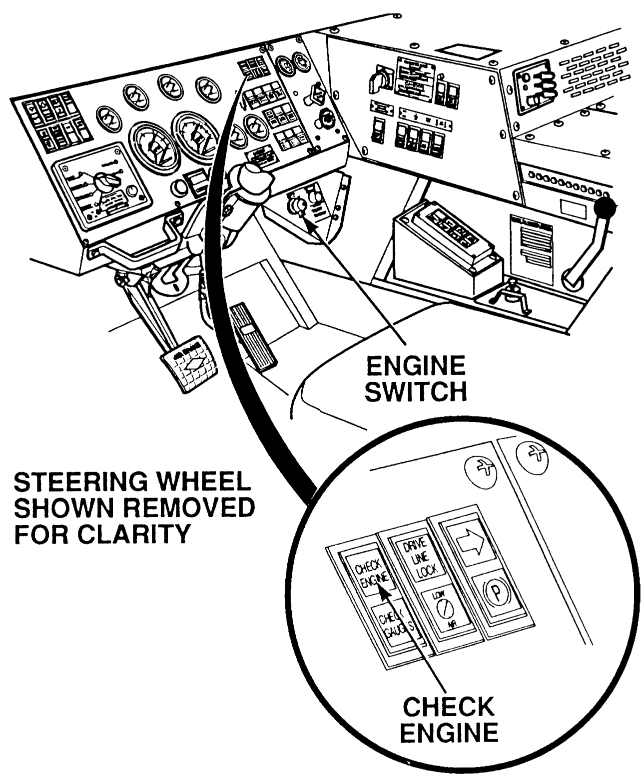
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM. (2) Turn ON ENGINE switch (TM 9-2320-364-10) and observe CEL. (a) If CEL stays on, turn OFF ENGINE switch, and repair wire 419 (see schematic Fig 2-1) or notify DS Maintenance. (b) If CEL goes off after five seconds, wire 419 is OK. (3) Turn OFF ENGINE switch.



VISUAL INSPECTION
(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector MC18 is damaged, repair connector (Para 7-101). (b) If harness connector MC18 is OK, replace DDEC ECM (Para 7-56). (c) If DDEC ECM connector MC18 is damaged, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector to DDEC ECM and tighten screw. (3) Close top engine cover.



A1 CHECK ENGINE LIGHT (CEL) ON AND NO HISTORICAL OR ACTIVE CODES DISPLAYED ON DDR (CONT).

KNOWN INFO

CEL diagnostic request line wire 451 OK.
CEL driver line wire 419 OK.
Harness connectors OK.

POSSIBLE PROBLEMS

4.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

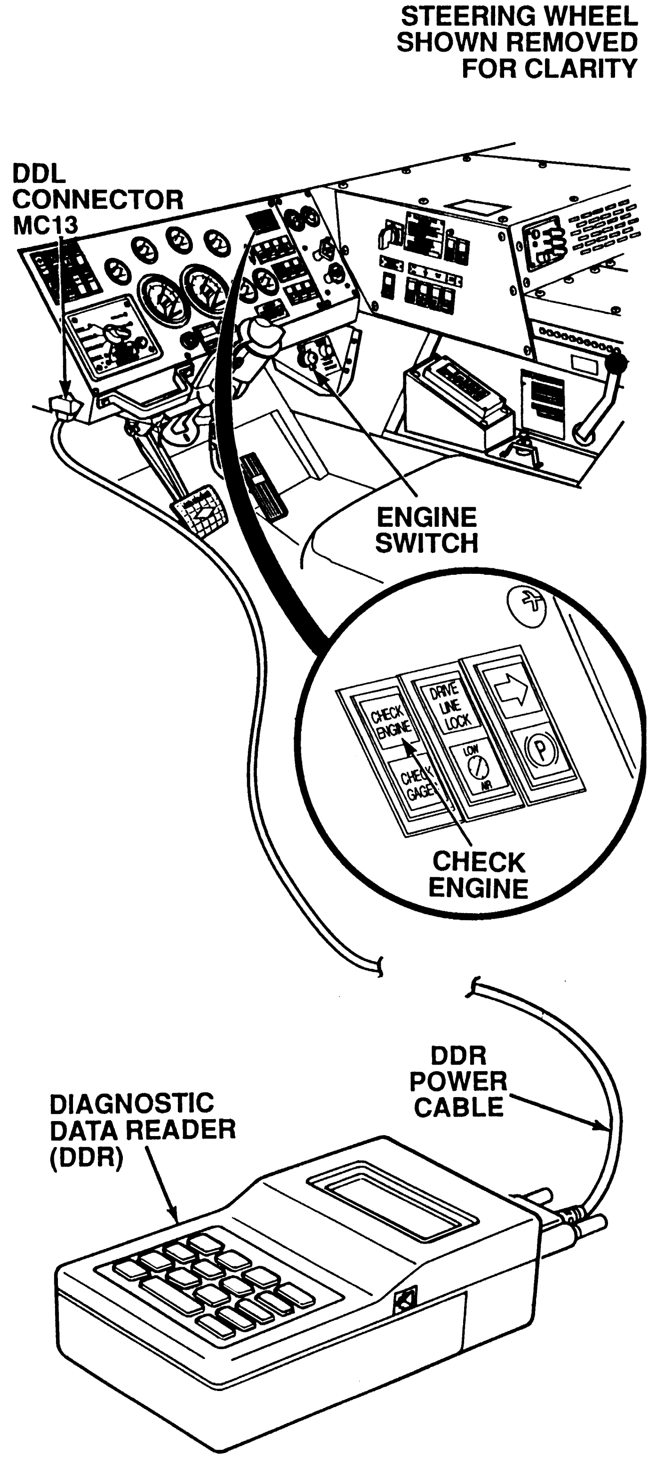
REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR
(1) Connect DDR cable to DDL connector. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Clear codes on DDR (Para 2-24). (4) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (5) and (6) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (5) and (6) below and go to Fault Index (Table 2-16). (5) Turn OFF ENGINE switch. (6) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A2 DDR DISPLAY READS “NO DDEC DATA RECEIVED”.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic’s: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Tripped circuit breakers.
Open in DDL connector.
Short in CEL driver line wire 419.
Damaged DDEC ECM connectors.

1.

Are DDEC circuit breakers, CB11, CB13, CB22 and CB23, set?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

DDEC will not operate properly if breakers are tripped or defective. If breakers continue to trip, a short or ground exists in wire 240 or 241.

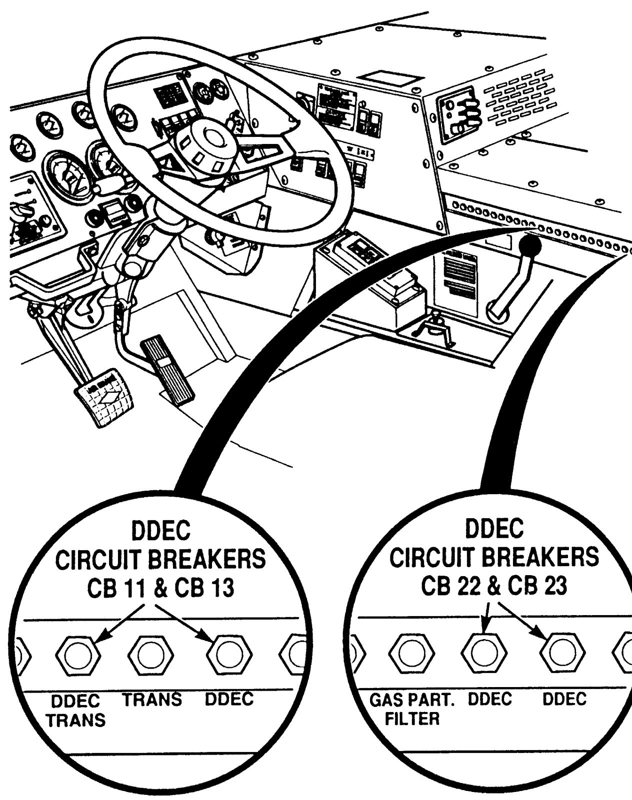
NO → Reset circuit breakers. Verify repair, go to Step 5 of this Fault.

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
Check DDEC circuit breakers CB11, CB13, CB22 and CB23. (1) If any one of these circuit breakers are tripped, reset circuit breaker. (2) If none of these circuit breakers are tripped, go to Step 2 of this Fault.



A2 DDR DISPLAY READS "NO DDEC DATA RECEIVED" (CONT).

KNOWN INFO

DDEC circuit breakers OK.

POSSIBLE PROBLEMS

Open in DDL connector.
Short in CEL driver line wire 419.
Damaged DDEC ECM connectors.

2.

WARNING

READ WARNING on Page 2-159

Are 3,000 ohms or less measured on wires 435, 451, 900 and 901 between DDL connector MC13 and a known good ground or vehicle harness connector MC18?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance greater than 3,000 ohms indicates open in that circuit.

NO → Repair wires 435, 451, 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 5 of this Fault.

YES ↓

WARNING

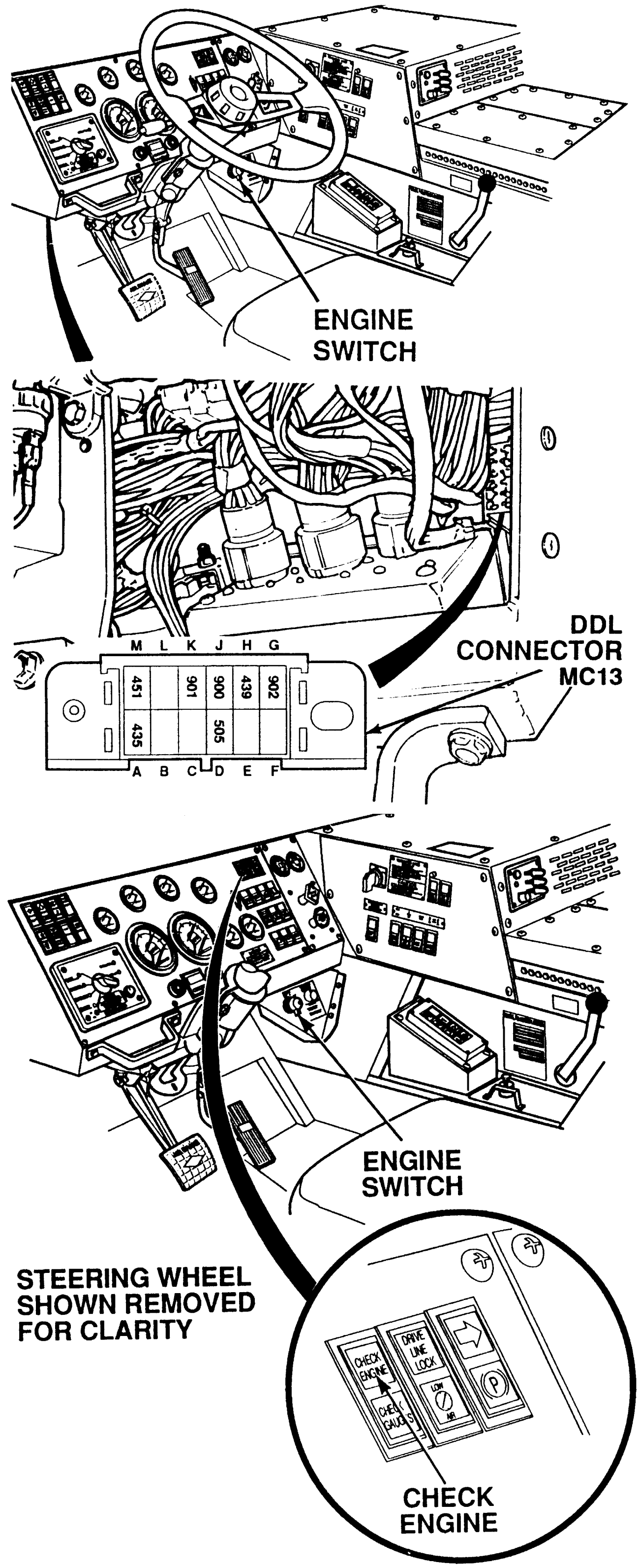
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST

(1) Disconnect DDR cable from DDL connector.
(2) Read resistance between wire 435 at DDL connector MC13, terminal A and a known good ground?
    (a) If more than 3,000 ohms are present, repair wire 435 (see schematic Fig 2-1) or notify DS Maintenance.
    (b) If less than 3,000 ohms are present, go to Step (3) below.
(3) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM.
(4) Are there more than 3,000 ohms present on the following wires:
    wire 451 between DDL connector MC13, terminal M and vehicle harness connector MC18, terminal E1.
    wire 900 between DDL connector MC13, terminal J and vehicle harness connector MC18, terminal C2.
    wire 901 between DDL connector MC13, terminal K and vehicle harness connector MC18, terminal C1.
    (a) If more than 3,000 ohms are present, repair wires (see schematic Fig 2-1) or notify DS Maintenance.
    (b) If less than 3,000 ohms are present, wires 451, 900 and/or 901 are OK.
(5) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.



A2 DDR DISPLAY READS “NO DDEC DATA RECEIVED” (CONT).

KNOWN INFO

Circuit breakers OK.
No open/short in DDL connector.

POSSIBLE PROBLEMS

Short in CEL driver line wire 419.
Damaged DDEC ECM connectors.

3.

Does CEL stay ON with vehicle harness connector disconnected?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

CEL driver line wire 419 is shorted to ground if CEL comes ON and stays ON.

NO → Go to Step 4 of this Fault.

YES → Repair wire 419 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 5 of this Fault.

KNOWN INFO

Circuit breakers OK.
No open/short in DDL connector.
No short in CEL driver line wire 419.

POSSIBLE PROBLEMS

Damaged DDEC ECM connectors.

4.

WARNING

READ WARNING on Page 2-161

Are DDEC ECM connector and vehicle harness connector MC18 free of damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connectors can affect signal to DDEC ECM.

NO → Repair DDL connector and vehicle harness connector and/or terminals (Para 7-101). Verify repair, go to Step 5 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 5 of this Fault.

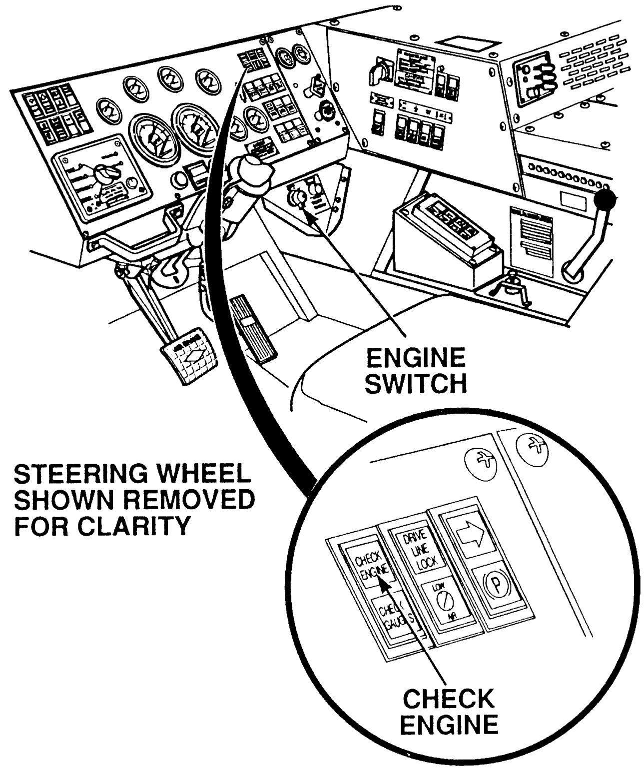
WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

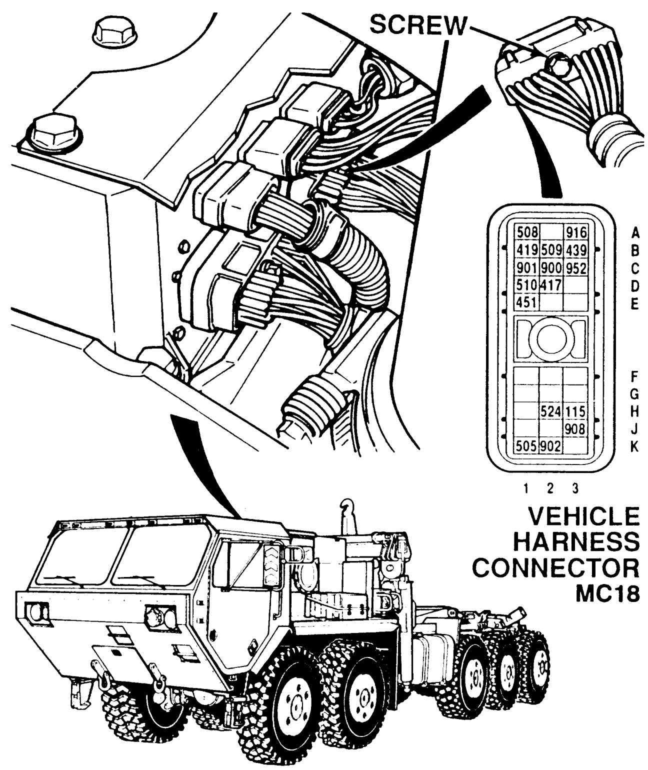
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
Turn ON ENGINE switch (TM 9-2320-364-10). (1) If CEL comes on and stays on, turn OFF ENGINE switch and repair wire 419 (see schematic Fig 2-1) or notify DS Maintenance. (2) If CEL does not come on, turn OFF ENGINE switch and go to Step 4 of this Fault.



VISUAL INSPECTION
(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector MC18 and tighten screw. (3) Close top engine access cover.



A2 DDR DISPLAY READS “NO DDEC DATA RECEIVED” (CONT).

KNOWN INFO

Circuit breakers OK.
No open/short in DDL connector.
No short in CEL driver line wire 419.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

5.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

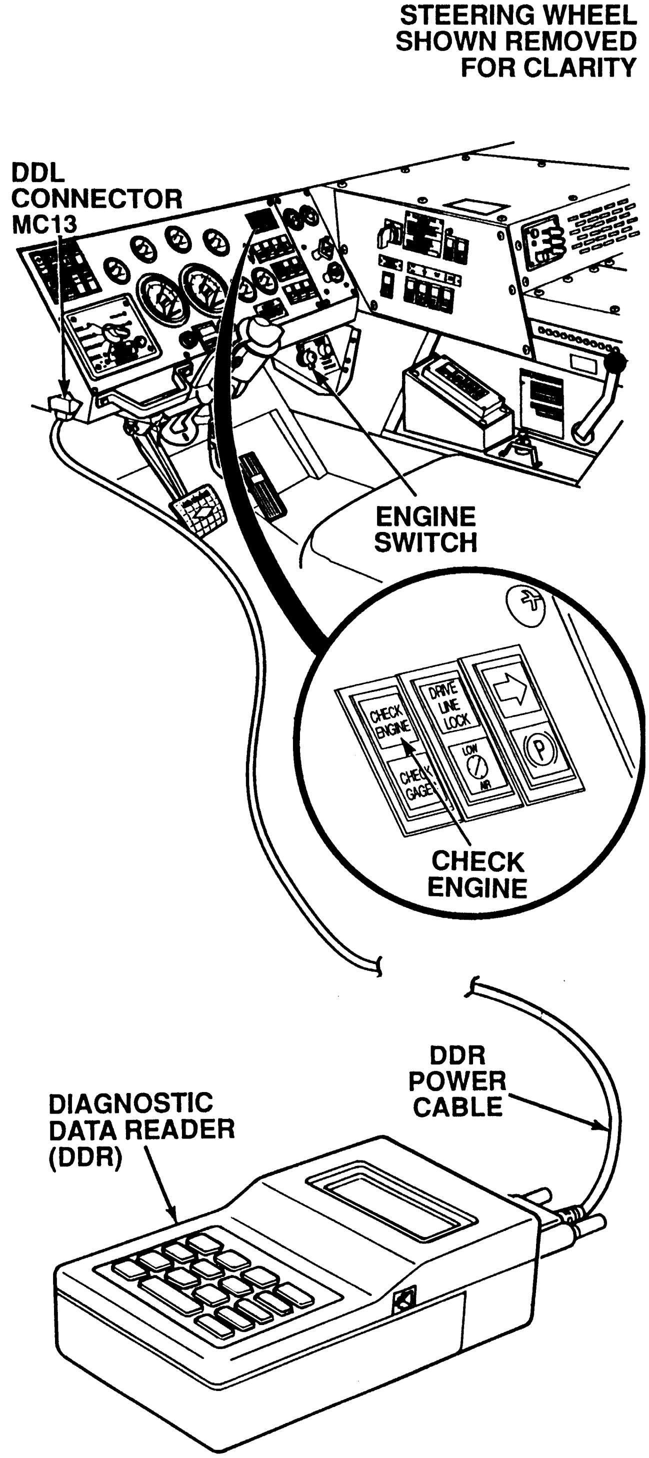
YES → Go to Fault Index (Table 2-16).

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A3 DDR DISPLAY IS BLANK OR RANDOM.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Jumperwire

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)
DDR disconnected from DDL connector MC13, (Para 2-11)

References

TM 9-2320-364-10
TM 9-4910-571-12&P

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDR Faulty.
Open in +12 volt line.
Open in DDR or data link lines.
Short in DDR or data link lines.
Short in +12 volt line.
DDEC ECM connector damaged.

1.

Is DDR fuse free of damage?

TEST OPTIONS

DDR test.

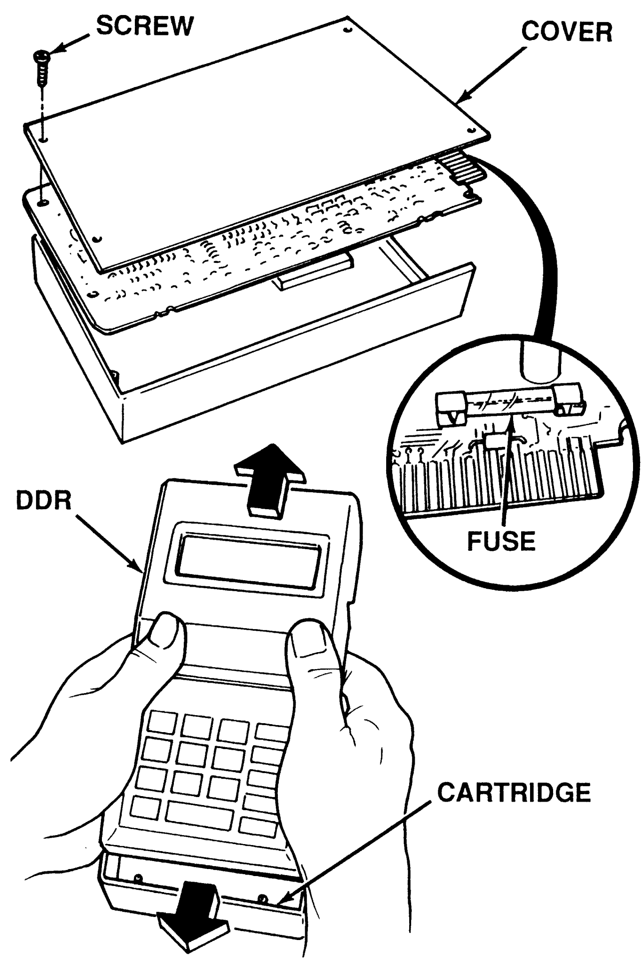
REASON FOR QUESTION

Defective DDR could be problem.

NO → Replace DDR fuse. Verify repair, go to Step 7 of this Fault.

YES ↓

DDR TEST
(1) Hold DDR with thumbs placed against slanted surface and grasp cartridge with fingers. (2) Squeeze DDR, push thumbs forward against slanted surface and slide cartridge back at the same time. (3) Slide cartridge from DDR. (4) Remove four screws, cover and circuit board. (5) Remove fuse. (6) Visually inspect fuse. (a) If fuse is damaged, replace fuse and perform Steps 8 through 11. (b) If fuse is OK, go to Step 8 below. (7) Install fuse. (8) Install circuit board, cover and four screws. (9) Seat cartridge flat on back of DDR. (10) Slide cartridge forward until it clicks into place.



A3 DDR DISPLAY IS BLANK OR RANDOM (CONT).

KNOWN INFO

DDR OK.

POSSIBLE PROBLEMS

Open in +12 volt line.
Open in DDR or data link lines.
Short in DDR or data link lines.
Short in +12 volt line.
DDEC ECM connector damaged.

2.

WARNING

READ WARNING on Page 2-167

Are 10 to 14 vdc measured on wire 439 at DDL connector MC13, terminal H?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Reading less than 10.0 volts at DDL connector indicates open in either +12 volt line wire 439 or open in ground line to DDL connector.

NO → Repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

KNOWN INFO

DDR OK.
No open in +12 volt line.
No open in DDR or data link lines.

POSSIBLE PROBLEMS

Short in DDR or data link lines.
Short in +12 volt line.
DDEC ECM connector damaged.

3.

WARNING

READ WARNING on Page 2-167

Are more than 5 ohms measured on wires 900 and 901 at vehicle harness connector MC18, terminal C2 and C1?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 5 ohms at vehicle harness connector MC18 indicates two data lines wires 900 and 901 are shorted together.

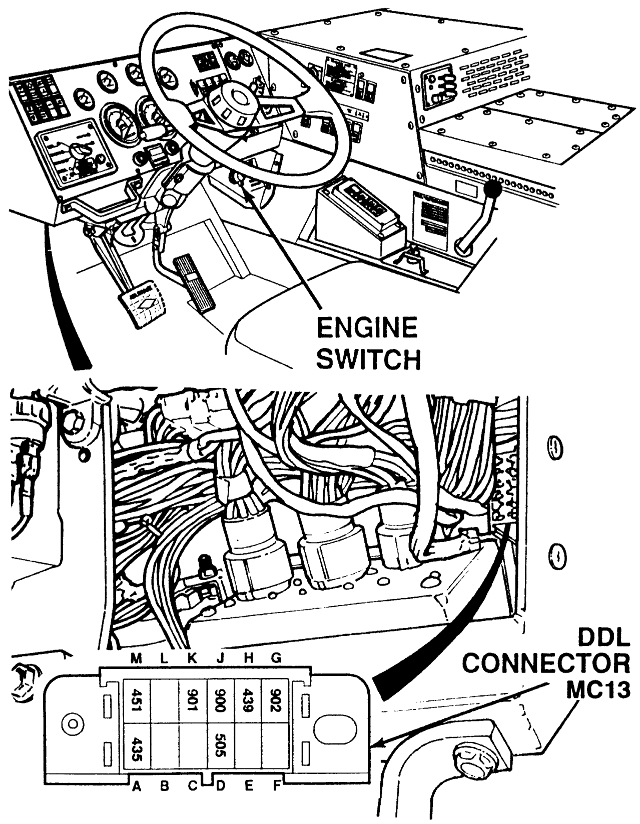
NO → Repair wires 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

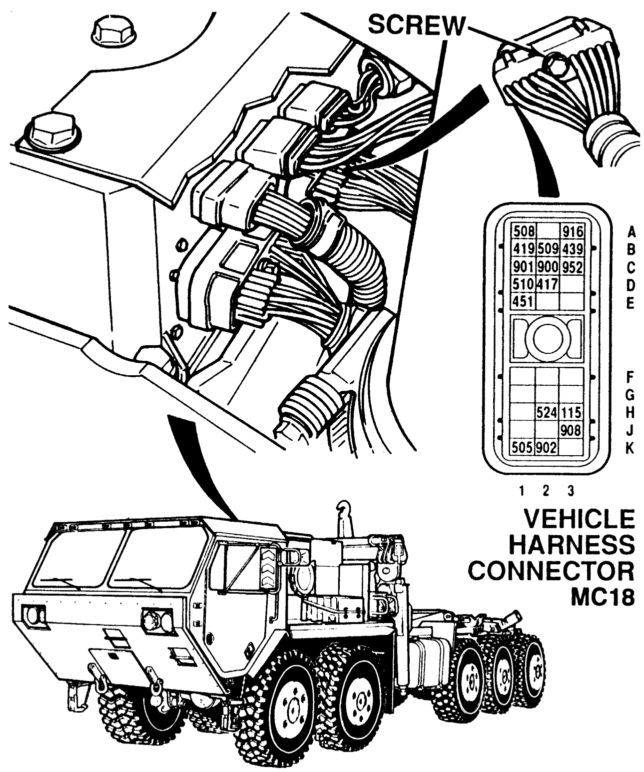
WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur

VOLTAGE TEST
(1) Connect positive (+) multimeter lead to wire 439 on DDL connector MC13, terminal H. (2) Connect negative (–) multimeter lead to a known good ground. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. (b) If 10 to 14 vdc are present, wire 439 is OK. (4) Turn OFF ENGINE switch.



RESISTANCE TEST
(1) Place jumperwire between terminals J and K on DDL connector MC13. (2) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (3) Read resistance between terminals C1 and C2 of vehicle harness connector MC18. (a) If more than 5 ohms, repair wires 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. (b) If less than 5 ohms are present, wires 900 and 901 are OK.



A3 DDR DISPLAY IS BLANK OR RANDOM (CONT).

KNOWN INFO

DDR OK.
No open in +12 volt line.
No open in DDR or data link lines.

POSSIBLE PROBLEMS

Short in +12 volt line.
Short in DDR or data link lines.
Short in +12 volt line.
DDEC ECM connector damaged.

4.

WARNING

READ WARNING on Page 2-169

Are there more than 5 ohms measured between terminals J and A, J and H, K and A and K and H on DDL connector MC13?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 5 ohms at DDL connector indicates short between data line and +12 volt line wire 439 or ground wire 435.

NO → Repair wires 439, 435 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

KNOWN INFO

DDR OK.
No open in +12 volt line.
No open in DDR or data link lines.
No short in +12 volt line.

POSSIBLE PROBLEMS

Short in DDR or data link lines.
DDEC ECM connector damaged.

5.

WARNING

READ WARNING on Page 2-169

Are there less than 5 ohms measured between wires 900 and 901 with jumperwire between terminals J and K on DDL connector?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Reading greater than 5 ohms at vehicle harness connector indicates one or both data lines wires 900 or 901 are open.

NO → Repair wires 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

WARNING

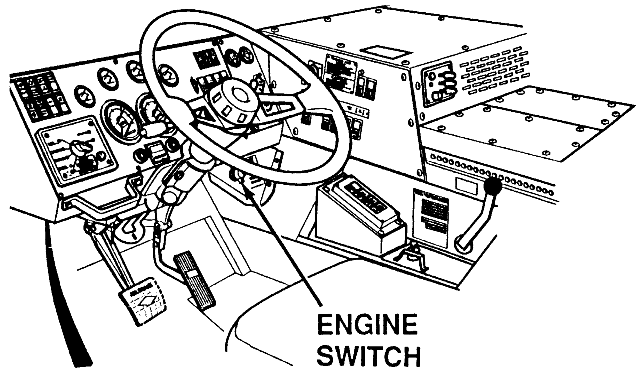
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

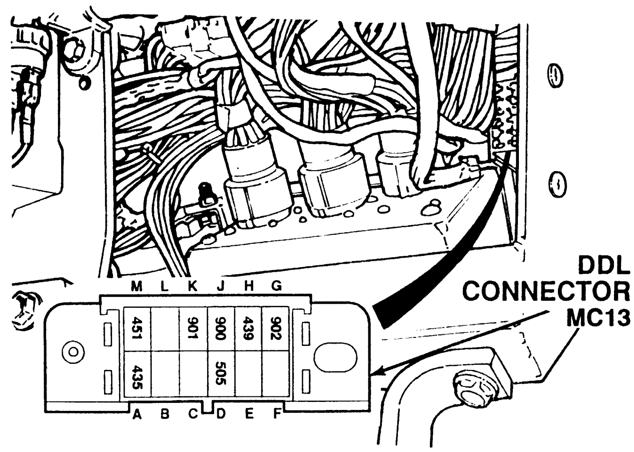
CAUTION

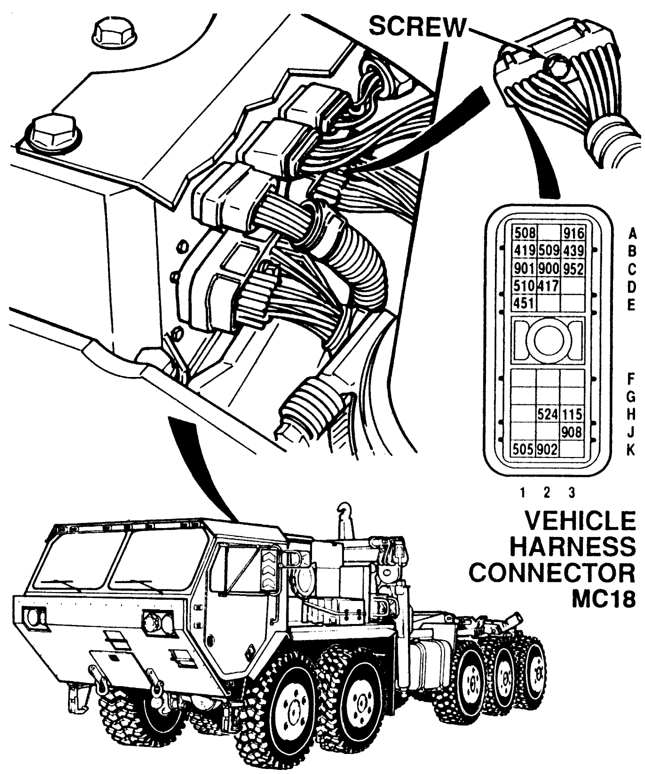
Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

RESISTANCE TEST
(1) Read resistance between terminals J and A and J and H on DDL connector MC13. (a) If there are less than 5 ohms present, repair wires 435, 439 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are more than 5 ohms present, go to Step (2) below. (2) Read resistance between terminals K and A and K and H on DDL connector MC13. (a) If there are less than 5 ohms present, repair wires 435, 439 and/or 901 (see schematic is 2-1) or notify DS Maintenance. (b) If there are more than 5 ohms present, wires 435, 439, 900 and 901 are OK.

RESISTANCE TEST
(1) Read resistance between terminals C2 and C1 on vehicle harness connector MC18. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 900 and/or 901 (see schematic Fig 2-3). (b) If there are less than 5 ohms present, wires 900 and 901 are OK. (2) Remove jumperwire.







A3 DDR DISPLAY IS BLANK OR RANDOM (CONT).

KNOWN INFO

DDR OK.
No open in +12 volt line.
No open in DDR or data link lines.
No short in DDR or data link lines.
No short in +12 volt line.

POSSIBLE PROBLEMS

DDEC ECM connectors damaged.

6.

WARNING

READ WARNING on Page 2-171

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connector can affect signal to DDEC ECM.

NO → Repair DDEC ECM terminals (Para 7-56). Verify repair, go to Step 7 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

KNOWN INFO

DDR OK.
No open in +12 volt line.
No open in DDR or data link lines.
No short in DDR or data link lines.
DDEC ECM connectors OK.

POSSIBLE PROBLEMS

7.

Is DDR display still blank or random?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting terminals.

VISUAL INSPECTION

(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
- (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below.
- (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
- (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56).

(2) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.

(3) Close top engine access cover.

VERIFY REPAIR

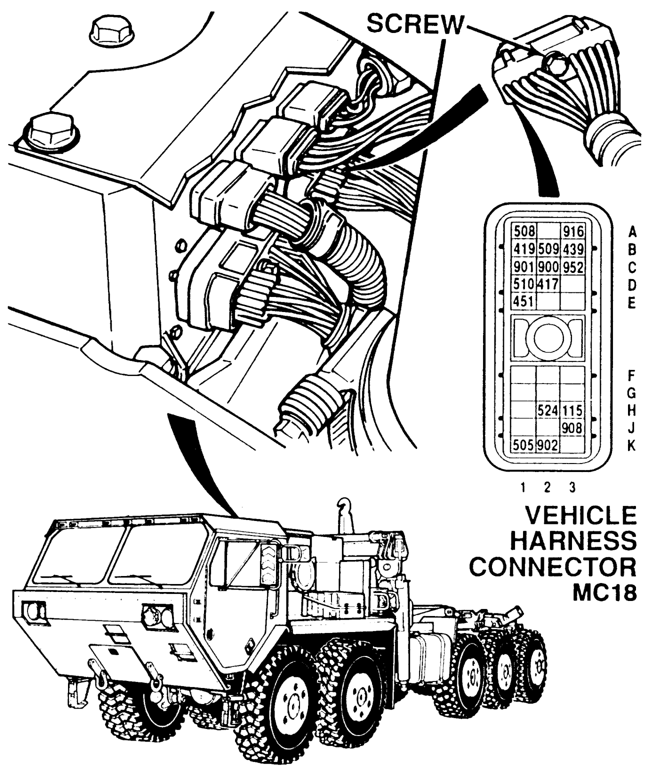
(1) Turn ON ENGINE switch (TM 9-2320-364-10).

(2) Clear codes on DDR (Para 2-11).

(3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
- (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
- (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).

(4) Turn OFF ENGINE switch.

(5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Remover, Connector (Item 55, Appendix G)
- Wrench, Torque (0 to 175 lb-ft [0-237 N·m]) (Item 95, Appendix G)
- Jumperwire

Materials/Parts
- Compound, Corrosion Preventive (Item 34, Appendix C)
- Lockwasher (Item 168, Appendix F)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS
More than Code 11 displayed on DDR. Vehicle harness connector MC18 faulty. ECM faulty. Wires 916 and/or 952 shorted. Wire 916 faulty. Wires 1525 and/or 952 shorted. Wires 1525 and/or 916 faulty. Vernier control terminals damaged. Vernier control faulty. Wires 240 and/or 241 shorted. Wire 150 faulty. Wire 240 faulty.

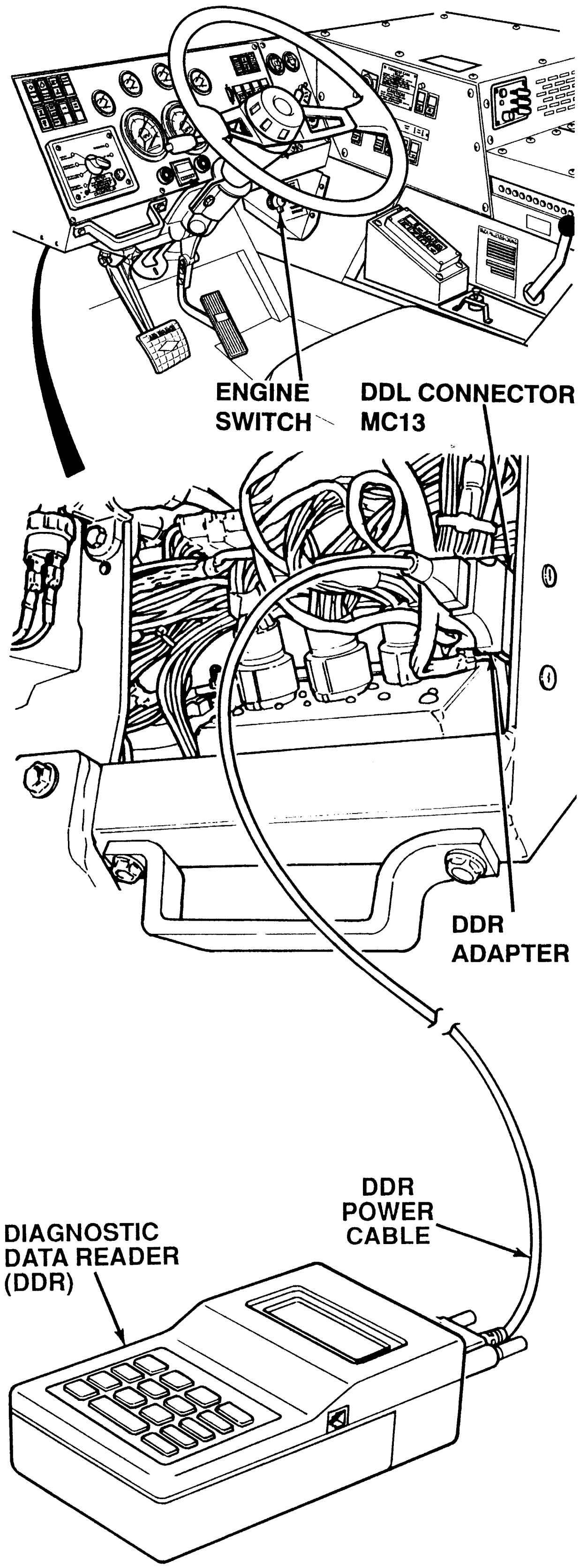
1.

Is Code 11 the only code displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

NO → Go to Fault A5A (Table 2-16).

YES ↓



NOTE

The code 11 troubleshooting procedures should only be used if DDEC Troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select Mode 01 (ACTIVE CODES) on DDR. (a) If Code 11 and/or 12, 21 or 22 are displayed, go to Fault A5A (Table 2-16). (b) If only Code 11 or no Codes are displayed, go to Step 2 of this Fault.

A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes On and stays ON.
Code 11 only code displayed on DDR.

POSSIBLE PROBLEMS

Vehicle harness connector MC18 faulty.
ECM faulty.
Wires 916 and/or 952 shorted.
Wire 916 faulty.
Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

2.

WARNING

READ WARNING on Page 2-175

Are 4 to 6 vdc measured on wire 916 on vernier control connector MC38, terminal C?

NO → If less than 4 volts, go to Step 5 of this Fault. If greater than 6 volts, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

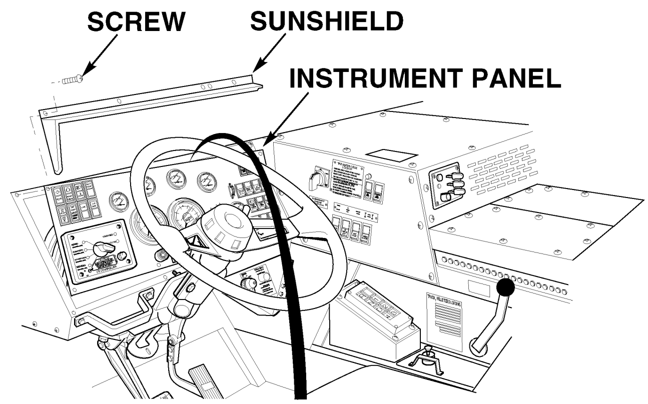
Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

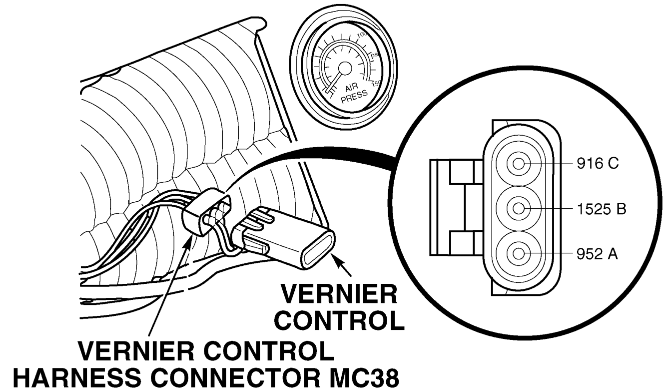
If 4 to 6 vdc are not present, vernier signal voltage will be incorrect.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.



VOLTAGE TEST
(1) Remove ten screws and sunshield from instrument panel. (2) Pull top of instrument panel towards steering wheel. (3) Disconnect vernier control connector MC38. (4) Set multimeter select switch to volts dc. (5) Connect positive (+) multimeter lead to wire 916 on vernier control connector MC38, terminal C. (6) Connect negative (–) multimeter lead to a known good ground. (7) Turn ON ENGINE switch. (a) If less than 4 vdc are present, turn OFF ENGINE switch, and go to Step 5 of this Fault. (b) If greater than 6 vdc are present, go to Step 6 of this Fault. (c) If there are 4 to 6 vdc present, turn OFF ENGINE switch, and go to Step 3 of this fault.



A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.

POSSIBLE PROBLEMS

Vehicle harness connector MC18 faulty.
DDEC ECM faulty.
Wires 916 and/or 952 shorted.
Wire 916 faulty.
Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

3.

WARNING

READ WARNING on Page 2-177

Are 8,700 to 9,100 ohms measured between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3?

NO → Go to Step 7 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 8,700 ohms or greater than 9,100 ohms at vehicle harness connector MC18, indicates wires 952, 916 and/or vernier control are faulty.

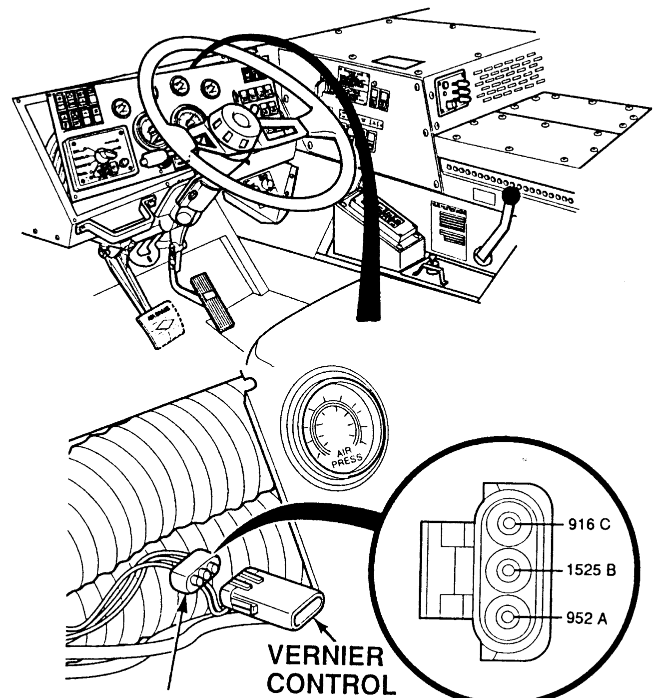
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

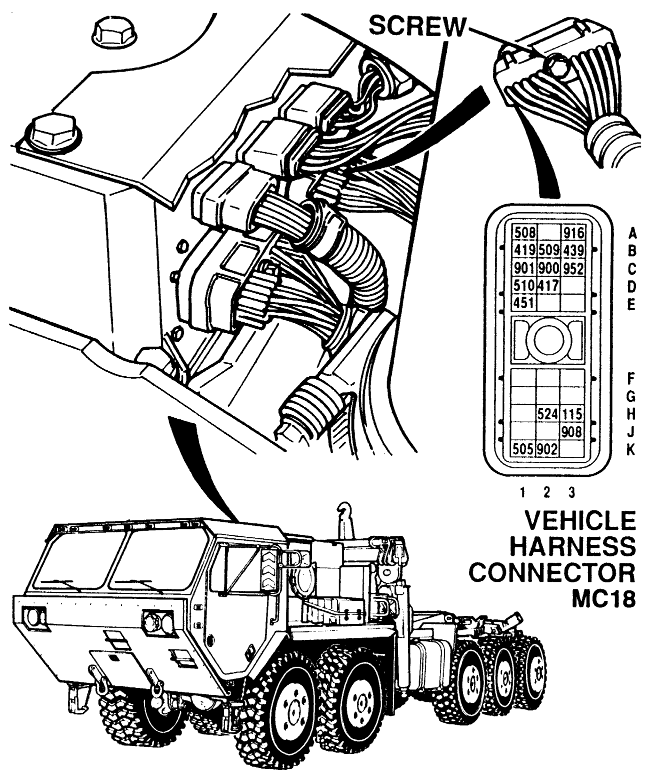
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Connect vernier harness connector to the vernier control. (2) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (3) Read resistance between terminals A3 and C3 on vehicle harness connector MC18. (a) If 8,700 to 9,100 ohms are not present, go to Step 7 of this Fault. (b) If 8,700 to 9,100 ohms are present, go to Step 4 of this Fault.



VERNIER CONTROL HARNESS CONNECTOR MC38



VEHICLE HARNESS CONNECTOR MC18

A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.

POSSIBLE PROBLEMS

Vehicle harness connector MC18 faulty.
DDEC ECM faulty.
Wires 916 and/or 952 shorted.
Wire 916 faulty.
Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

4.

WARNING

READ WARNING on Page 2-179

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free of damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals or connectors can affect signal to DDEC ECM.

NO → Repair vehicle harness connector MC18 (Para 7-101). Verify repair, go to Step 12 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 12 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wires 916 and/or 952 shorted.
Wire 916 faulty.
Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

5.

WARNING

READ WARNING on Page 2-179

Are there more than 10,000 ohms or an open circuit measured on wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms indicates vehicle +5 volt line wire 916 is shorted to the return line wire 952.

NO → Repair wires 916 and/or 952 (see schematic 2-1) or notify DS Maintenance. Verify repair go to Step 12 of this Fault.

YES ↓

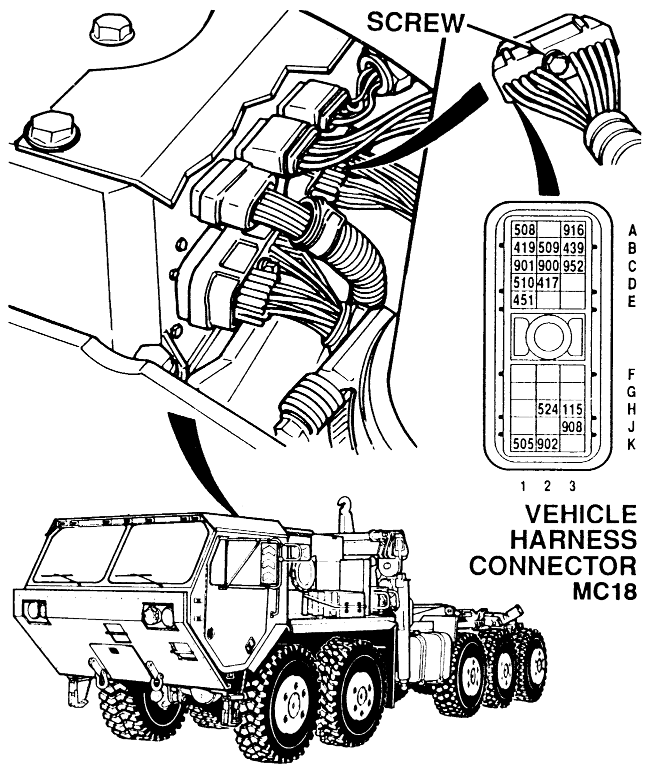
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Step (2) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.



RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM. (2) Read resistance between terminals A3 and C3 on vehicle harness connector MC18. (a) If there are less than 10,000 ohms, present, repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step 6 of this Fault.

A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.

POSSIBLE PROBLEMS

Wire 916 faulty.
Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

6.

WARNING

READ WARNING on Page 2-181

Are there less than or equal to 5 ohms measured at wire 916 on vehicle harness connector MC18, terminals A3 and C3?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms indicates vehicle wire 916 (+5 volt line) is open.

NO → Repair wire 916 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES → Go to Step 4 of this Fault.

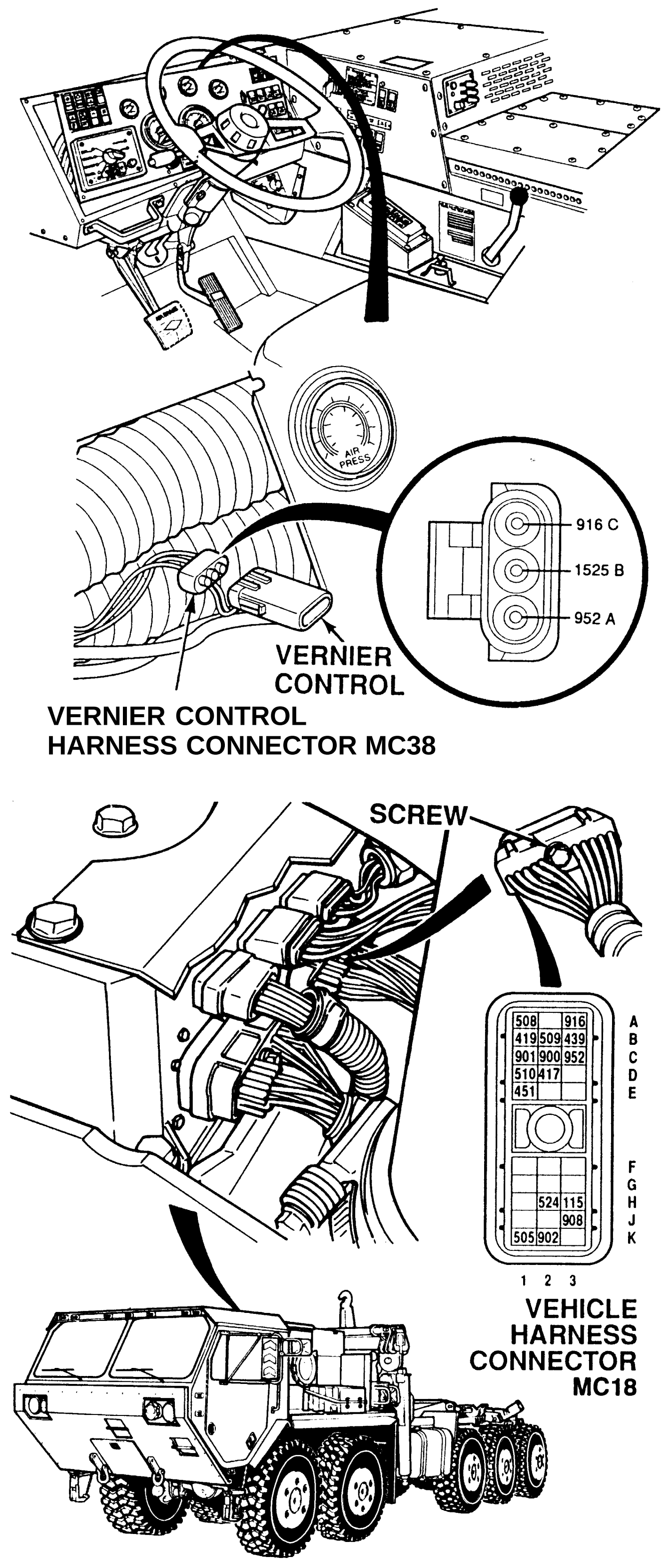
WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Place jumperwire between terminals A and C vernier control connector MC38. (2) Read resistance between terminals A3 and C3 on vehicle harness connector MC18. (a) If there are more than 5 ohms, remove jumperwire and repair wire 916 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are less than 5 ohms, wire 916 is OK. (3) Remove jumperwire.



A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.

POSSIBLE PROBLEMS

Wires 1525 and/or 952 shorted.
Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

7.

WARNING

READ WARNING on Page 2-183

Are there more than 10,000 ohms or an open circuit between signal line wires 1525 and 952 at vernier control harness connector MC38, terminals A and B?

NO → Repair wires 1525 and/or 952, (see schematic 2-1) or notify DS Maintenance. Verify repair go to Step 12 of this fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms indicates signal line wire 1525 is shorted to return line wire 952.

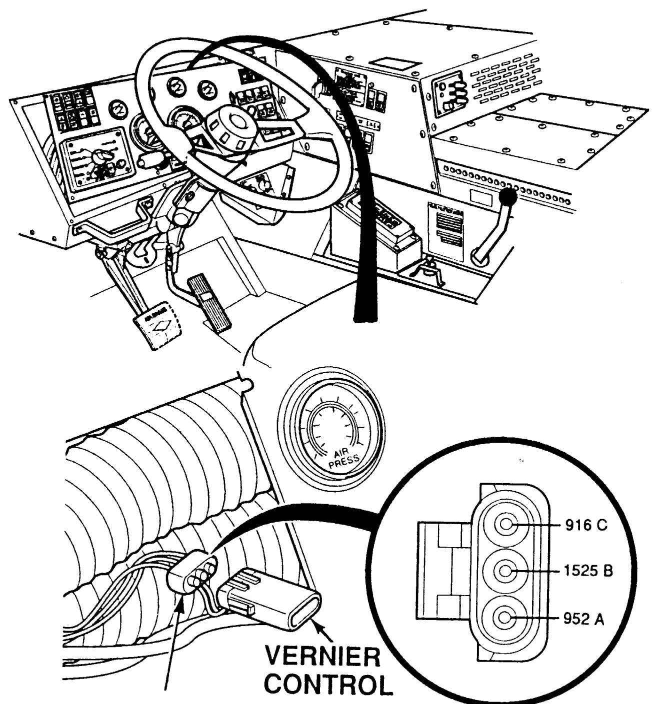
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
Read resistance between terminals A and B at the vernier control harness connector MC38. (1) If there are less than 10,000 ohms, present repair wires 1525 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (2) If there are more than 10,000 ohms present, go to Step 8 of this Fault.



VERNIER CONTROL HARNESS CONNECTOR MC38

A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.
Wires 1525 and 952 not shorted.

POSSIBLE PROBLEMS

Wires 1525 and/or 916 faulty.
Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

8.

WARNING

READ WARNING on Page 2-185

Are 5 ohms or less measured between wires 1525 and 952 at vehicle harness connector MC18, terminals D1 and C3?

NO → Repair wires 1525 and/or 916 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector indicates signal line wire 1525 and/or return line wire 952 are open.

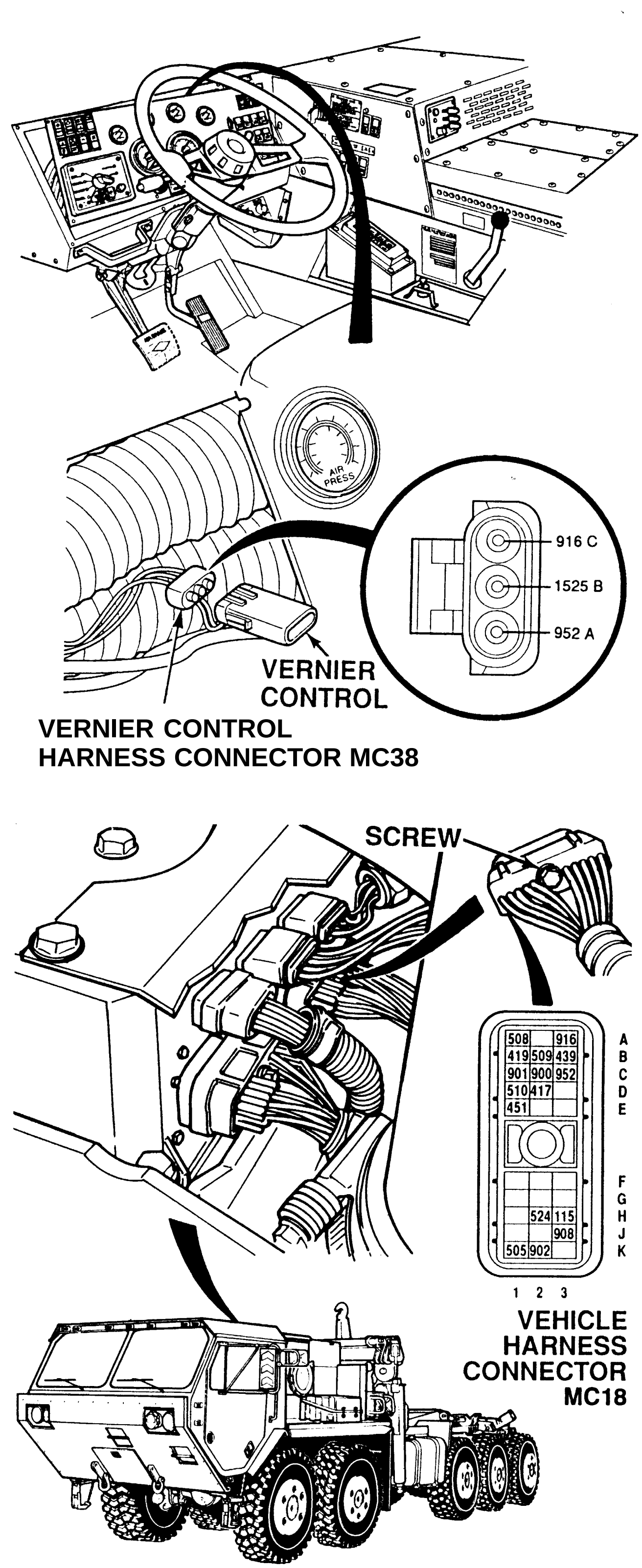
WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Place jumperwire between terminals A and B of vernier control harness connector MC38. (2) Read resistance between terminals D1 and C3 on vehicle harness connector MC18. (a) If there are more than 5 ohms, remove jumperwire and repair wires 1525 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are less than 5 ohms, wires 1525 and 952 are OK. (3) Remove jumperwire.



A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.
Wires 1525 and 952 not shorted.
Wires 1525 and 916 not shorted.

POSSIBLE PROBLEMS

Vernier control terminals damaged.
Vernier control faulty.
Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

9.

WARNING
READ WARNING on Page 2-187

Are vernier control terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged connectors or terminals can affect signal to DDEC ECM.

NO → Repair vernier terminals (Para 7-101). Verify repair, go to Step 12 of this Fault.

YES → Replace vernier control (Para 7-100). Go to Step 10 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.
Wires 1525 and 952 not shorted.
Wires 1525 and 916 not shorted.
Vernier control terminals OK.
Vernier control OK.

POSSIBLE PROBLEMS

Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

10.

WARNING
READ WARNING on Page 2-187

Is code 11 displayed on DDR after replacement of vernier control MC38?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate fault.

NO → Verify repair, go to Step 12 of this Fault.

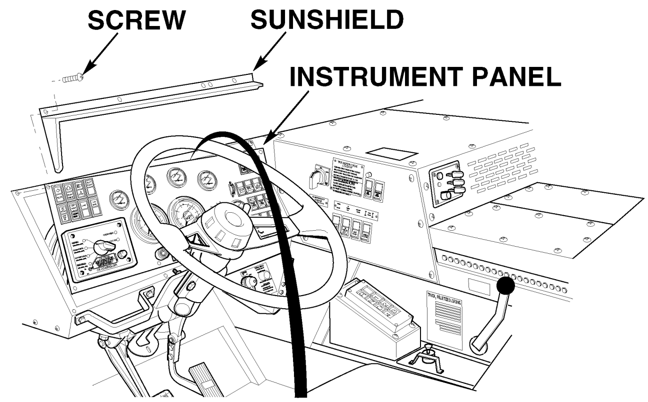
YES ↓

WARNING

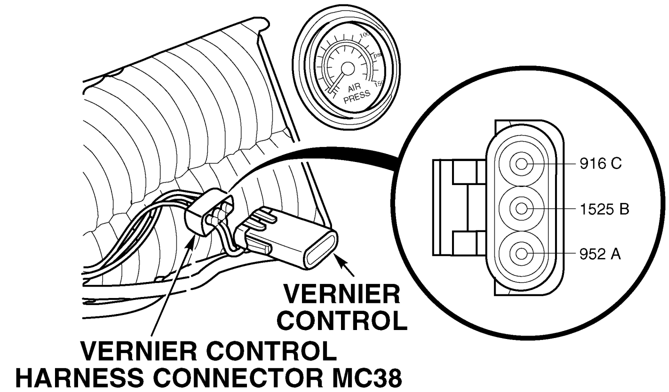
Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

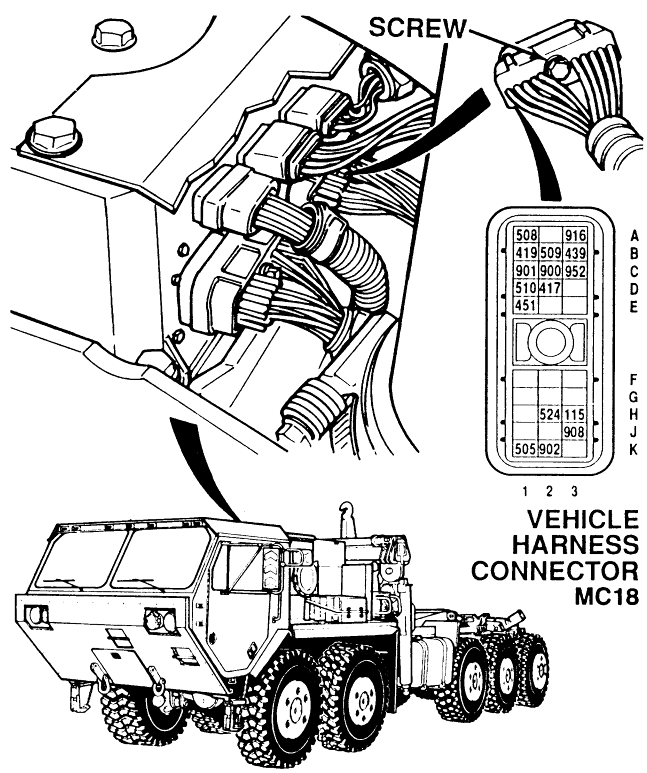
DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



VISUAL INSPECTION
(1) Check terminals at vernier control terminals and connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If terminals are damaged, repair connector (Para 7-101) and perform Step (2) below. (b) If terminals are not damaged, replace vernier control (Para 7-100). (2) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw. (3) Install instrument panel and sunshield with ten screws.



DDR TEST
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear all codes on DDR (Para 2-11). (3) Select MODE 01 (ACTIVE CODES) on DDR and read codes. (a) If no codes appear on DDR, turn OFF ENGINE switch, and go to Step 12 of this Fault. (b) If code 11 appears on DDR, turn OFF ENGINE switch, and go to Step 11 of This Fault. (4) Turn OFF ENGINE switch.



A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.
Wires 1525 and 952 not shorted.
Wires 1525 and 916 not shorted.
Vernier control terminals OK.
Vernier control OK.

POSSIBLE PROBLEMS

Wires 240 and/or 241 shorted.
Wire 150 faulty.
Wire 240 faulty.

11.

WARNING

READ WARNING on Page 2-189

Are there more than 10,000 ohms or an open circuit in battery positive wire 240/241?

NO → Repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES → Fault not corrected. Notify DS Maintenance.

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at vehicle harness connector or 6-way power connector indicates short.

WARNING

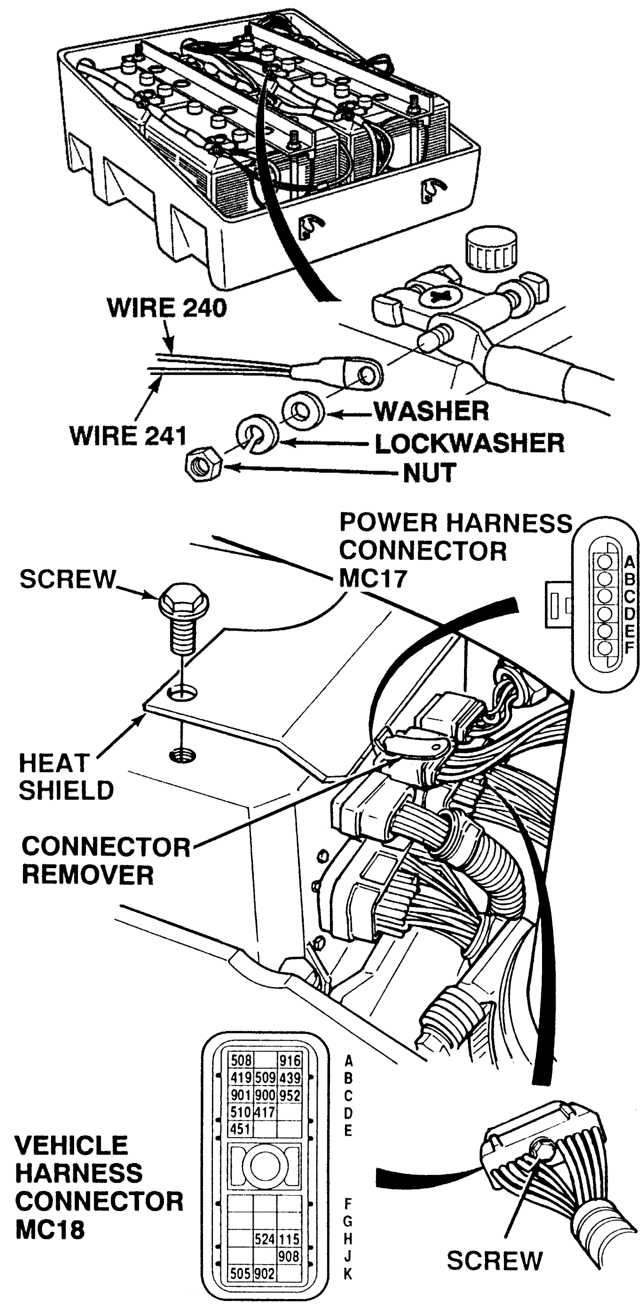
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

CAUTION

- While applying torque to nut, hold screw with wrench or damage to battery may occur.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting terminals.

RESISTANCE TEST

(1) Remove battery box cover.
(2) Remove nut, washer, lockwasher, wires 240 and 241 from battery. Discard lockwasher.
(3) Remove two screws and heatshield from DDEC ECM.
(4) Disconnect power harness connector MC17 from DDEC ECM with connector remover.
(5) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.
(6) Are there more than 10,000 ohms present between terminals D1 and B3 at vehicle harness connector MC18.
  (a) If less than 10,000 ohms are present, repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (8) through (15) below.
  (b) If more than 10,000 ohms are present, go to Step (6) below.
(7) Are there less than 10,000 ohms present on the following wires:
  wire 150 between power connector MC17, terminal C and vehicle harness connector MC18, terminal D1
  wire 150 between power connector MC17, terminal D and vehicle harness connector MC18, terminal D1
  wire 240 between power connector MC17, terminal E and vehicle harness connector MC18, terminal D1
  wire 240 between power connector MC17, terminal F and vehicle harness connector MC18, terminal D1
  (a) If less than 10,000 ohms are present, repair wires (see schematic Fig 2-3) or notify DS Maintenance.
  (b) If more than 10,000 ohms are present, perform Steps (8) through (15) below.
(8) Connect power harness connector C17 to DDEC ECM.
(9) Connect vehicle harness connector MC18 to DDEC ECM.
(10) Install heatshield with two screws.
(11) Connect wires 240 and 241 to battery with washer, lockwasher and nut.
(12) Tighten nut to 23 lb-ft (31 N·m).
(13) Apply corrosion preventive compound on nut.
(14) Install battery box cover.
(15) Close top engine access cover.



A4 CODE 11 VERNIER CONTROL SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 11 only code displayed on DDR.
Vehicle harness connector MC18 OK.
DDEC ECM OK.
Wires 916 and 952 not shorted.
Wire 916 OK.
Wires 1525 and 952 not shorted.
Wires 1525 and 916 not shorted.
Vernier control terminals OK.
Vernier control OK.
Wires 240 and 241 not shorted.
Wire 150 OK.
Wire 240 OK.

POSSIBLE PROBLEMS

12.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

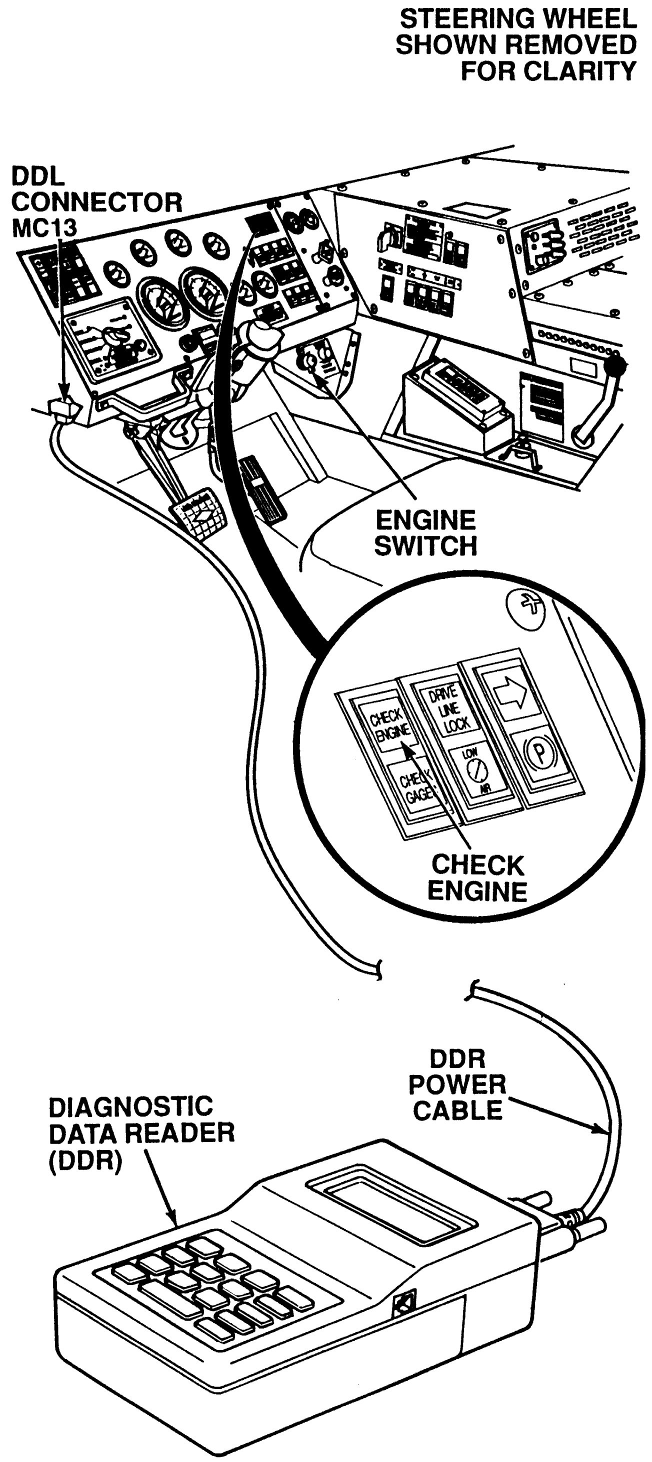
REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (3) and (4) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (3) and (4) below and go to Fault Index (Table 2-16). (3) Turn OFF ENGINE switch. (4) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 12 VERNIER CONTROL SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)
- Hydraulic selector switch in CRANE/SRW position, (TM 9-2320-364-10)
- CRANE/SRW switch in CRANE position, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
More Codes than Code 12 displayed on DDR. Wire 952 faulty. Vernier control connector faulty. Vernier control faulty. Wires 1525 and/or 510 shorted. Wire 952 shorted. DDL connector and/or vehicle harness connector MC18 faulty. DDEC ECM faulty.

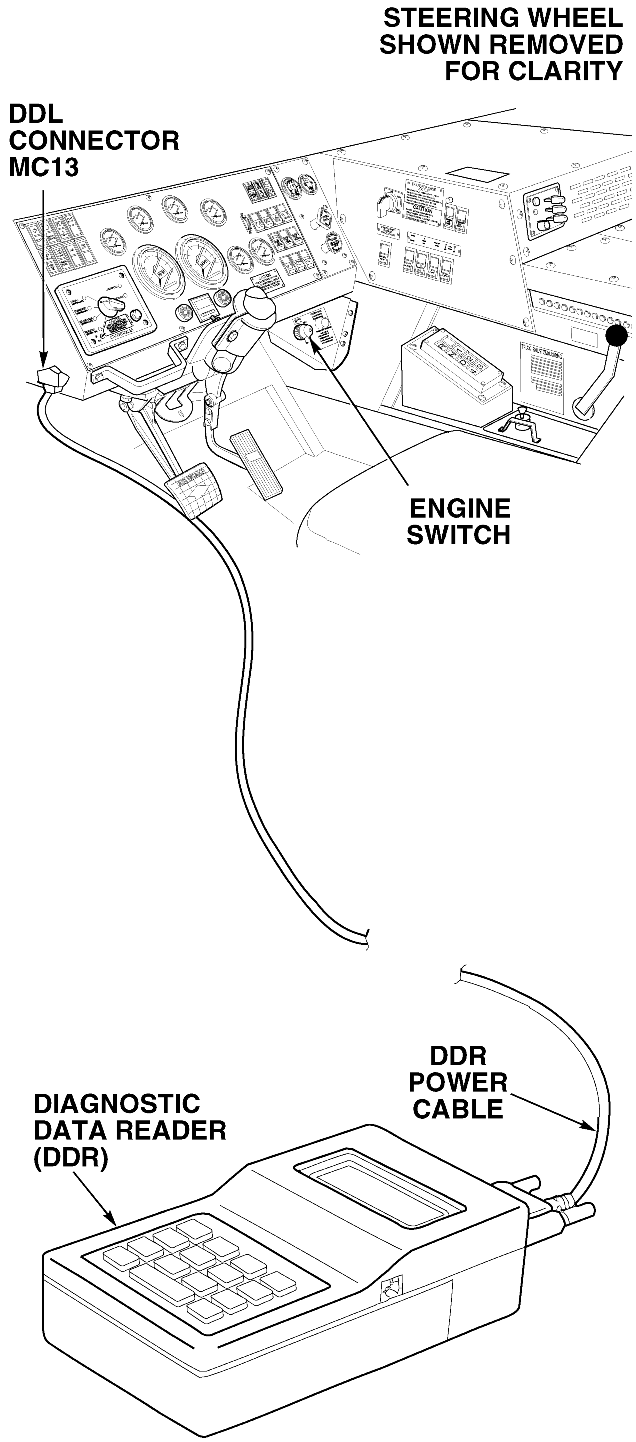
1.

Is Code 12 the only code displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate fault.

NO → Go to Fault A5A (Table 2-16).

YES ↓



NOTE

The following steps should only be used if Troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If there are more than Code 12 on DDR display, turn OFF ENGINE switch and go to Fault A5A (Table 2-16). (b) If there are not more codes than Code 12, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 12 VERNIER CONTROL SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.

POSSIBLE PROBLEMS

Wire 952 faulty.
Vernier control connector faulty.
Vernier control faulty.
Wires 1525 and/or 510 shorted.
Wire 952 shorted.
DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

2.

WARNING

READ WARNING on Page 2-195

Are any codes besides code 12 displayed on DDR with vernier control connector MC38 disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

A short in wire 916 (+5 volt line) may cause other faults to appear.

NO → Go to Step 5 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.

POSSIBLE PROBLEMS

Wire 952 faulty.
Vernier control connector faulty.
Vernier control faulty.
Wires 1525 and/or 510 shorted.
Wire 952 shorted.
DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

3.

WARNING

READ WARNING on Page 2-195

Are 5 ohms or less measured on the return line wire 952 between vehicle harness connector MC18, terminals C3 and D1?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector indicates open in return line wire 952.

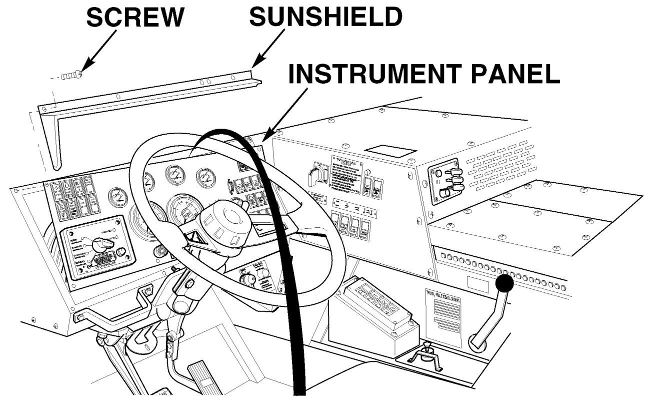
NO → Repair wire 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8.

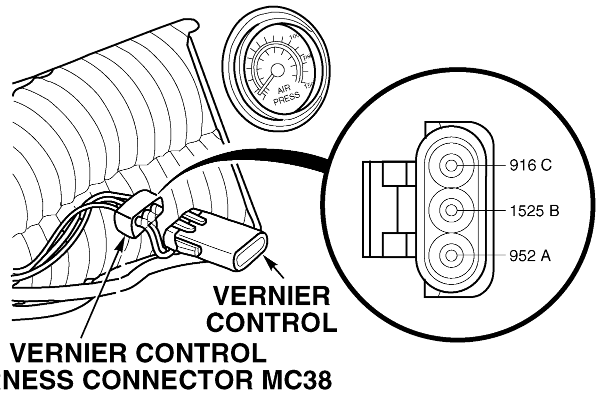
YES ↓

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury, or death to personnel may occur.

DDR TEST
(1) Remove ten screws, sunshield and tilt instrument panel. (2) Disconnect vernier control harness connector MC38. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Select MODE 01 (ACTIVE CODES) on DDR and read codes. (a) If code 12 is only code displayed, turn OFF ENGINE switch and go to Step 5 of this Fault. (b) If other codes are displayed, turn OFF ENGINE switch and go to Step 3 of this Fault.

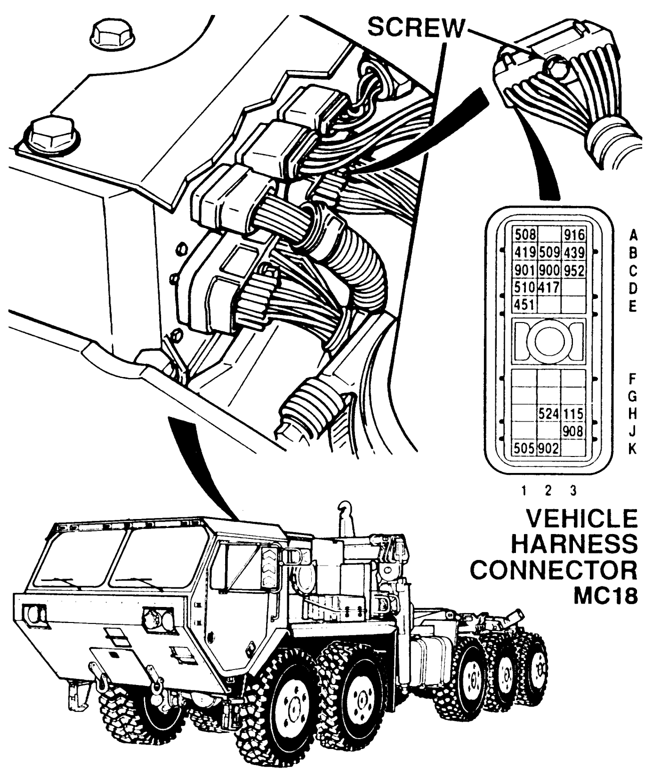




CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Place jumperwire across terminals A and B of vernier control harness connector MC38. (2) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Turn on crane power switch and latch high idle. (5) Read resistance between terminals C3 and D1 on the vehicle harness connector MC18. (a) If more than 5 ohms are present, perform Steps (6) and (7) below and remove jumperwire and repair wire 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If less than 5 ohms are present, wire 952 is OK, remove jumperwire and perform Steps (6) and (7) below. (6) Turn OFF ENGINE switch and crane power switch. (7) Connect vehicle harness connector MC18 and tighten screw.



A4 CODE 12 VERNIER CONTROL SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.
Wire 952 OK.

POSSIBLE PROBLEMS

Vernier control connector faulty.
Vernier control faulty.
Wires 1525 and/or 510 shorted.
Wire 952 shorted.
DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

4.

Are vernier control connectors and/or terminals OK?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged connectors can affect signal to vernier control.

NO → Repair vernier control connectors (Para 7-101). Verify repair, go to Step 8 of this Fault.

YES → Replace vernier control (Para 7-100). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.
Wire 952 OK.
Vernier control connector OK.
Vernier control OK.

POSSIBLE PROBLEMS

Wire 952 shorted.
Wires 1525 and/or 510 shorted.
DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

5.

WARNING

READ WARNING on Page 2-197

Is there less than 1.0 vdc between vernier control harness connector MC38, terminals B and A?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Greater than 1.0 vdc at harness connector indicates signal line wires 1525 or 510 are shorted to vehicle wire 916 (+5 volt line) or another voltage source.

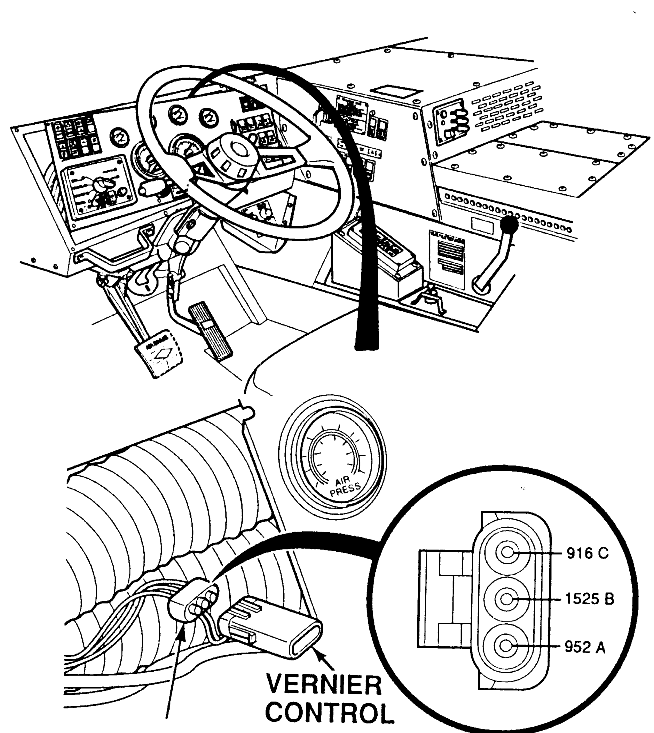
NO → Repair wires 1525 and/or 510 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step of 8 of this Fault.

YES ↓

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

VISUAL INSPECTION
Check terminals at vernier control harness connectors (connector and harness side) for damage; bent, corroded and unseated pins or terminals. (1) If harness connectors are damaged, repair connectors (Para 7-101). (2) If harness connectors are OK, replace vernier control (Para 7-100).



VERNIER CONTROL HARNESS CONNECTOR MC38

VOLTAGE TEST
(1) Set multimeter select switch to volts dc. (2) Connect positive (+) multimeter lead to vernier control harness connector MC38, terminal A. (3) Connect negative (–) multimeter lead to vernier control harness connector MC38, terminal B. (4) Turn ON ENGINE switch (TM 9-2320-364-10). (5) Turn on crane power switch and latch high idle. (a) If there is 1.0 vdc or more present, turn OFF ENGINE switch and repair wires 916, 1525 and/or 510 (see schematic Fig 2-1) or notify DS Maintenance. (b) If less than 1.0 vdc is present, wires 916, 1525 and 510 are OK. (6) Turn OFF ENGINE switch and crane power switch.

A4 CODE 12 VERNIER CONTROL SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.
Wire 952 OK.
Vernier control connector OK.
Vernier control OK.
Wires 1525 and 510 not shorted.

POSSIBLE PROBLEMS

Wire 952 shorted.
DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

6.

WARNING
READ WARNING on Page 2-199

Are there less than 4.5 vdc at vernier control harness connector MC38, terminals C and A?

NO → Repair wire 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault

YES → Step 7.

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Greater than 4.5 vdc indicates open in wire 952 between vernier control and DDEC ECM.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.
Wire 952 OK.
Vernier control connector OK.
Vernier control OK.
Wires 1525 and/or 510 not shorted.
Wire 952 not shorted.

POSSIBLE PROBLEMS

DDL connector and/or vehicle harness connector MC18 faulty.
DDEC ECM faulty.

7.

WARNING
READ WARNING on Page 2-199

Are DDEC ECM connector and vehicle harness MC18 free of damage?

NO → Repair vehicle harness connector MC18 (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

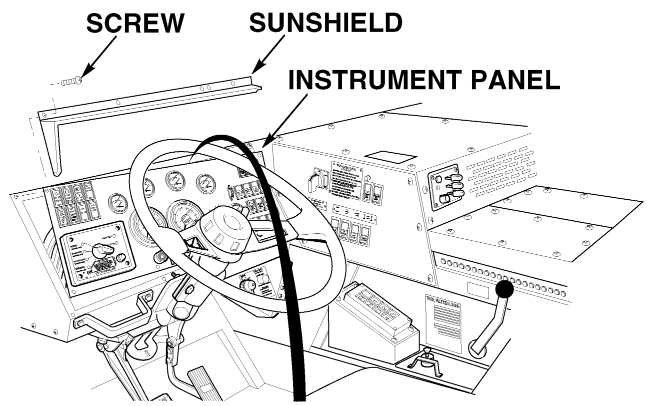
Damaged connectors will cause a code 12 to be displayed.

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

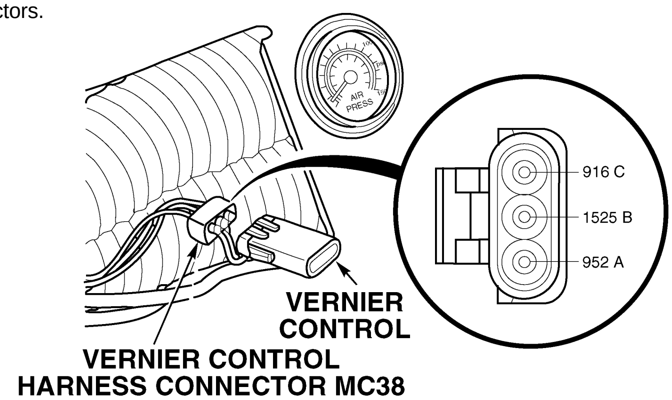
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



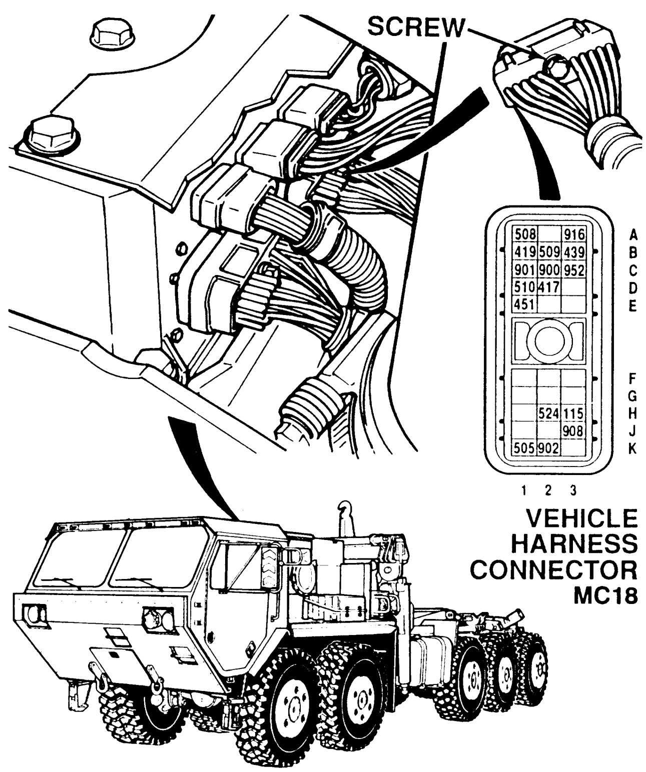
VOLTAGE TEST

(1) Connect positive (+) multimeter lead to vernier control harness connector MC38, terminal A.
(2) Connect negative (–) multimeter lead to vernier control harness connector MC38, terminal C.
(3) Turn ON ENGINE switch (TM 9-2320-364-10).
  (a) If there are 4.5 vdc or more present, turn OFF ENGINE switch and repair wire 952 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If there are less than 4.5 vdc present, wire 952 is OK.
(4) Connect vernier control harness connector MC38.
(5) Install instrument panel and sunshield with ten screws.
(6) Turn OFF ENGINE switch.



VISUAL INSPECTION

(1) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM.
(2) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (3) through (5) below.
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56).
(3) Connect vehicle harness connector MC18 and tighten screw.
(4) Install instrument panel and sunshield with ten screws.
(5) Close top engine access cover.



A4 CODE 12 VERNIER CONTROL SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 12 only displayed on DDR.
Wire 952 OK.
Vernier control connector OK.
Vernier control OK.
Wires 1525 and/or 510 not shorted.
Wire 952 not shorted.
DDL connector and/or vehicle harness connector MC18 OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

8.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

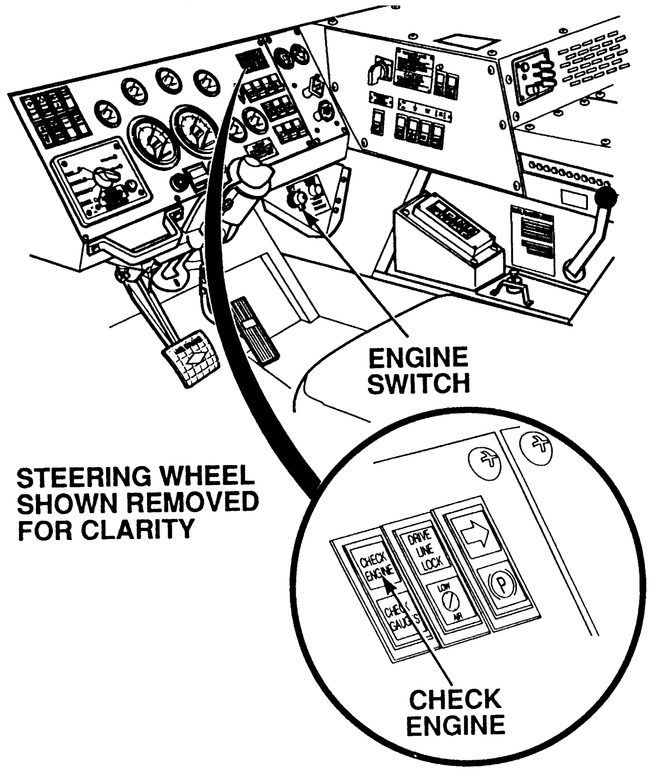
YES → Go to Fault Index (Table 2-16).

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.



VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear codes on DDR (Para 2-11).
(3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
 (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
 (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 14 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Jumperwire

Materials/Parts
Lockwasher (22) (Item 195, Appendix F)

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Short in wire 120.
Damaged OTS terminals and connectors.
Open in wire 120.
Damaged terminals at DDEC ECM engine harness connector.

1.

WARNING
READ WARNING on Page 2-203

Does Code 15 appear on DDR or any other active codes with jumperwire installed between wires 452 and 120 at OTS connector, terminals A and B?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For any code except Code 15, go to Step 4 of this Fault.

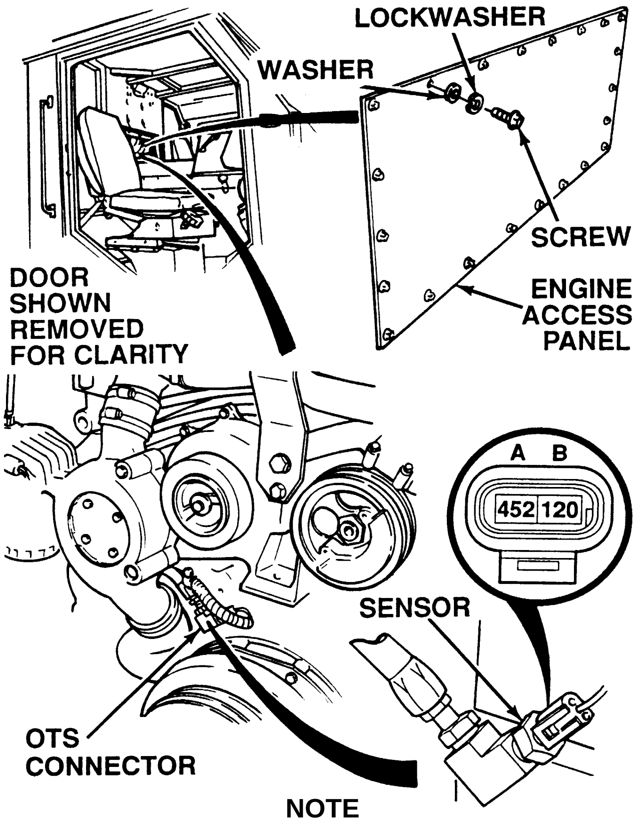
YES ↓

WARNING

Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

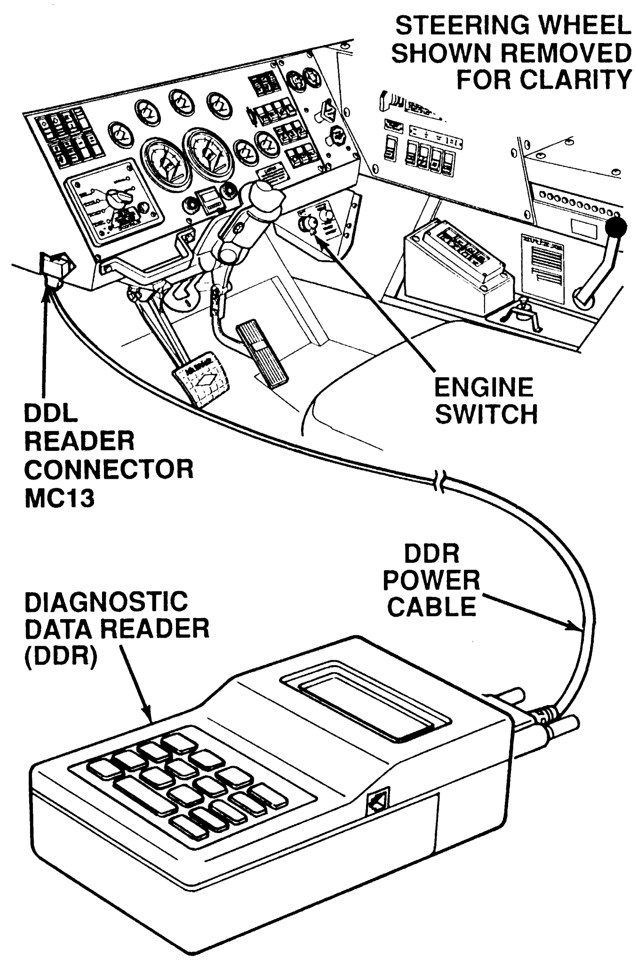
Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Remove 22 screws, lockwashers, washers and cab engine access panel. Discard lockwashers. (3) Disconnect oil temperature sensor (OTS) harness connector. (4) Place jumperwire between OTS harness connector, terminals A and B. (5) Turn ON ENGINE switch. (6) Select MODE 01 (ACTIVE CODES) on DDR. (a) If code 15 or any other code does not appear, turn OFF ENGINE switch and go to Step 4 of this fault. (b) If code 15 or any other active code does appear, turn OFF ENGINE switch and go to Step 2 of this Fault.



A4 CODE 14 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

DDR displays Code 14 and 15.

POSSIBLE PROBLEMS

Short in wire 120.
Damaged OTS terminals and connectors.
Open in wire 120.
Damaged terminals at DDEC ECM engine harness connector.

2.

WARNING

READ WARNING on Page 2-205

Are there more than 10,000 ohms or an open circuit measured between wires 120, 416 and/or 452?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 120 is shorted to engine wire 416 (+5 volt line) and/or return line wire 452.

NO → Repair wires 120, 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES ↓

KNOWN INFO

DDR displays Code 14 and 15.
No short in wire 120.

POSSIBLE PROBLEMS

Damaged OTS terminals and connectors.
Open in wire 120.
Damaged terminals at DDEC ECM engine harness connector.

3.

Are OTS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged connectors could affect signal to OTS.

NO → Repair OTS terminals or connectors (Para 7-101). Verify repair, go to Step 6 of this Fault.

YES → Replace OTS (Para 7-66). Verify repair, go to Step 6 of this Fault.

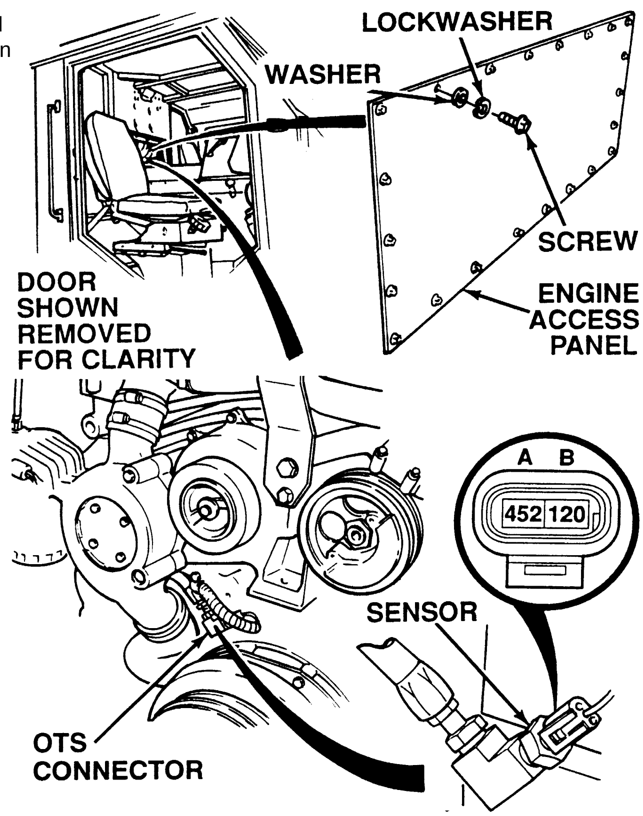
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

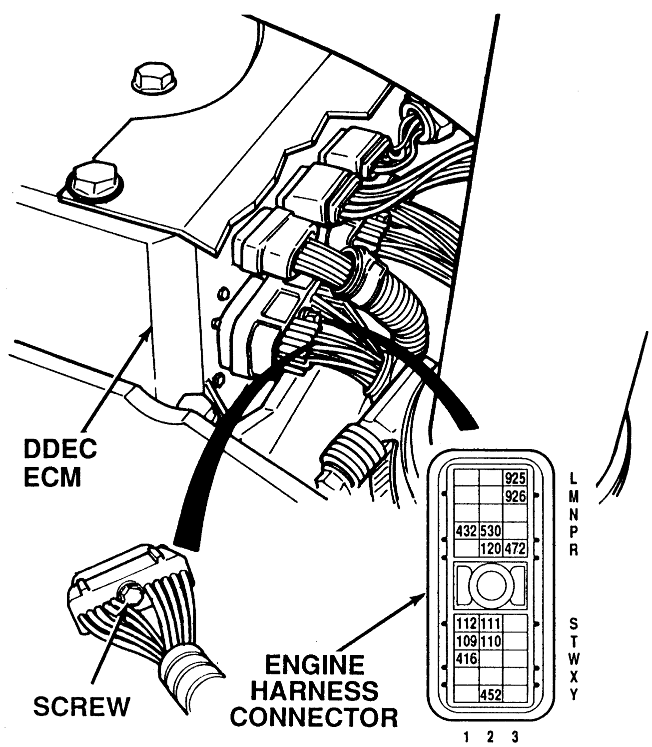
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Remove jumperwire from OTS connector. (2) Loosen screw and disconnect engine harness connector at DDEC ECM. (3) Read resistance between terminals R2 and W1 on engine harness connector. (a) If there are less than 10,000 ohms present, repair wires 120, 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step 3 of this Fault.



VISUAL INSPECTION
(1) Check OTS and terminals at OTS connector (Both sensor and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If connectors or terminals are damaged, repair connectors or terminals (Para 7-101). (b) If connectors and terminals are free of damage, replace OTS (Para 7-66). (2) Connect engine harness connector to DDEC ECM and tighten screw. (3) Install engine access panel with 22 screws, washers and lockwashers.



A4 CODE 14 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

Code 15 not displayed on DDR with jumperwire installed at OTS harness connector.

POSSIBLE PROBLEMS

Short in wire 120.
Damaged OTS terminals and connectors.
Open in wire 120.
Damaged terminals at DDEC ECM engine harness connector.

4.

WARNING

READ WARNING on Page 2-207

Are there 5 ohms or less measured between wires 120 and 452 at engine harness connector, terminals R2 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at engine harness connector indicates signal line wire 120 or return line wire 452 are open.

NO → Repair wires 120 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES → Step 5.

KNOWN INFO

No open in wire 120.

POSSIBLE PROBLEMS

Short in wire 120.
Damaged OTS terminals and connectors.
Damaged terminals at DDEC ECM engine harness connector.

5.

Are DDEC ECM terminals and connectors (DDEC ECM and vehicle harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connectors can affect signal to DDEC ECM.

NO → Repair vehicle harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

WARNING

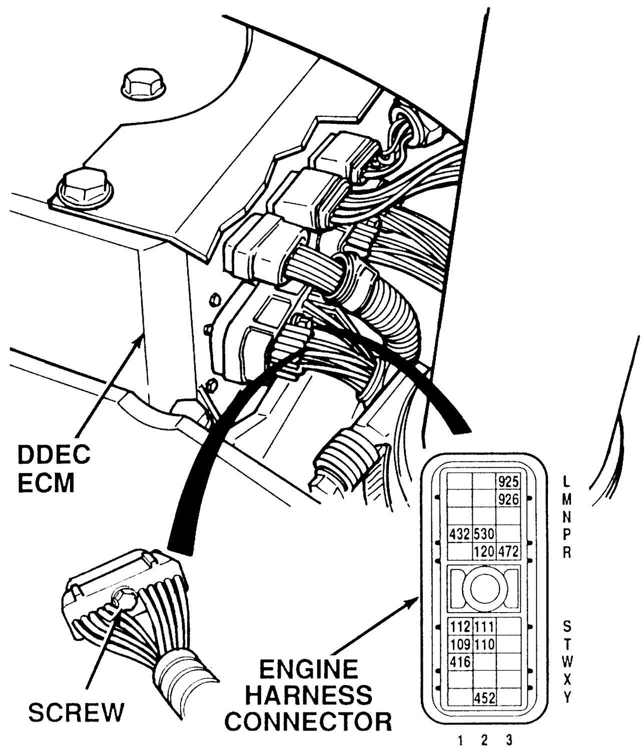
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

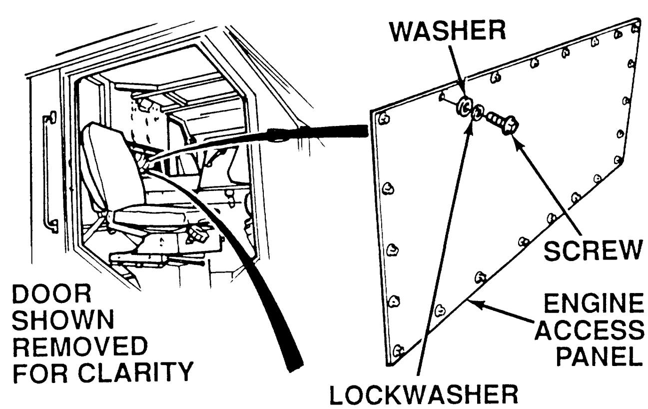
RESISTANCE TEST

(1) Loosen screw and disconnect engine harness connector from DDEC ECM.
(2) Read resistance between wires 120 and 452 at engine harness connector terminals R2 and Y2.
  (a) If 5 ohms or more are present, remove jumperwire and repair wires 120 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance.
  (b) If 5 ohms or less are present, connect OTS harness connector and go to Step 5 of this Fault.



VISUAL INSPECTION

(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) through (4) below.
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56).
(2) Connect engine harness connector to DDEC ECM and tighten screw.
(3) Install engine access panel with 22 washers, lockwashers and screws.
(4) Close top engine access cover.



A4 CODE 14 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

No short in wire 120.
OTS terminals and connectors OK.
No open in wire 120.
Terminals at DDEC ECM engine harness connector OK.

POSSIBLE PROBLEMS

6.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

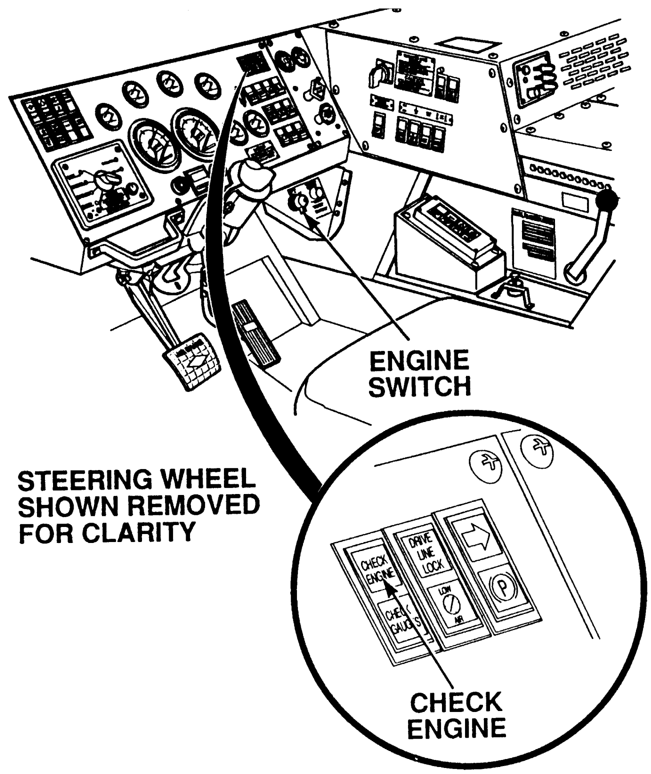
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 15 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)

Materials/Parts
- Lockwasher (22) (Item 195, Appendix F)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

OTS connector or terminals faulty.
OTS faulty.
Wires 120 and/or 452 faulty.
DDEC ECM connector or terminals faulty.
DDEC ECM faulty.

1.

Is Code 15 the only code displayed on DDR?

TEST OPTIONS

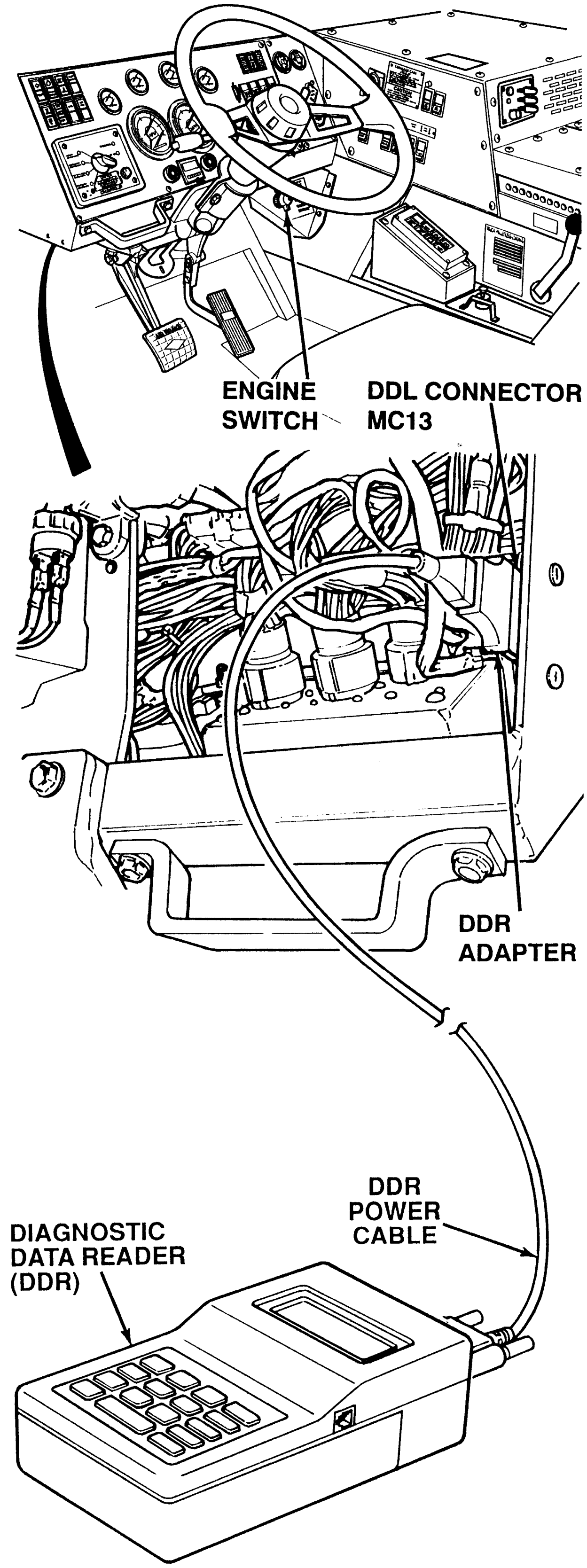
DDR test.

REASON FOR QUESTION

To determine if engine harness is faulty.

NO → For Codes 14, 23, 24 or 33, go to Fault A5B (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 15 is not the only code and Codes 14, 23, 24 or 33 appear, turn OFF ENGINE switch and go to Fault A5B (Table 2-16). (b) If Code 15 or any other codes except 14, 23, 24 or 33 appear, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 15 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

OTS connector or terminals faulty.
OTS faulty.
Wires 120 and/or 452 faulty.
DDEC ECM connector or terminals faulty.
DDEC ECM faulty.

2.

WARNING

READ WARNING on Page 2-213

Are any codes (except 15) displayed on DDR with OTS disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → Go to Step 4 of this Fault.

YES → Step 3.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

OTS connector or terminals faulty.
OTS faulty.
Wires 120 and/or 452 faulty.
DDEC ECM connector or terminals faulty.
DDEC ECM faulty.

3.

Are OTS terminals and connector free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connector can affect signal to OTS.

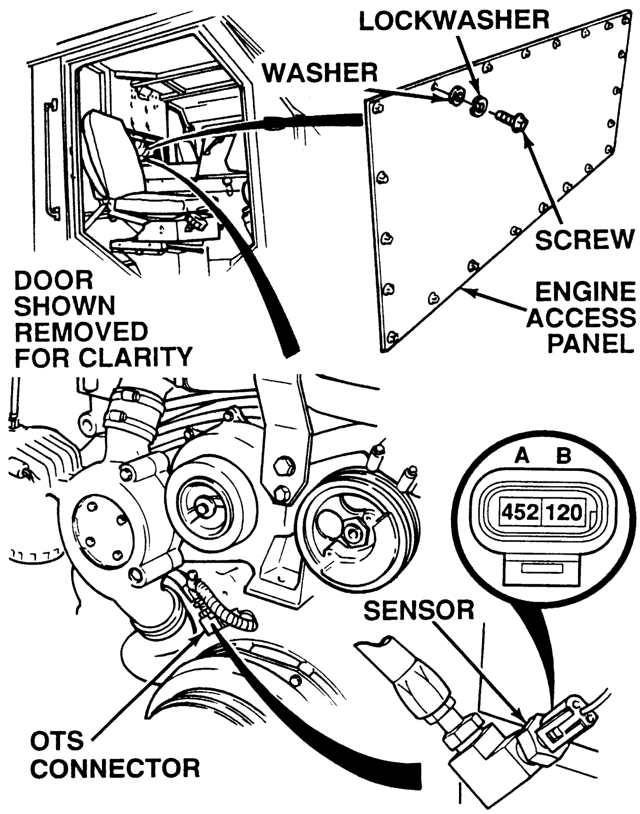
NO → Repair OTS connectors or terminals (Para 7-101). Verify repair, go to Step 6 of this Fault.

YES → Replace OTS (Para 7-66). Verify repair, go to Step 6 of this Fault.

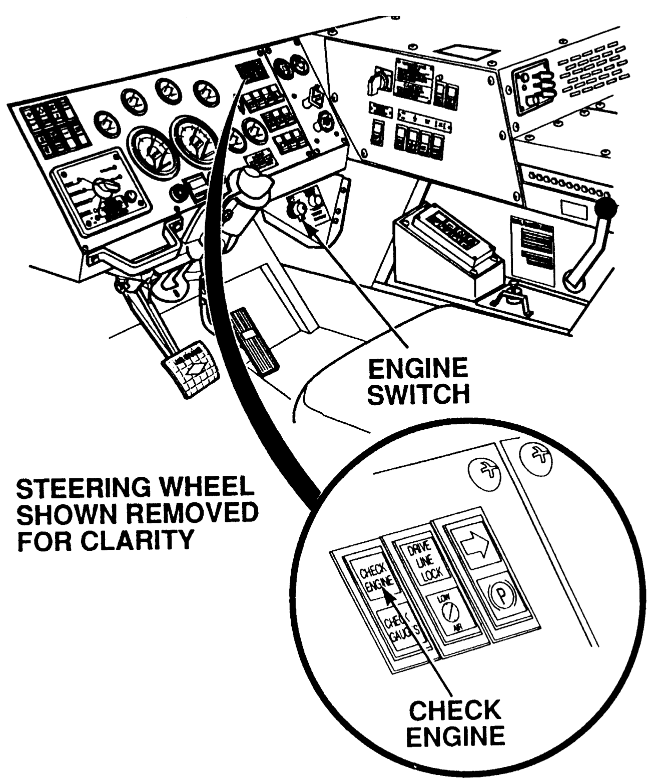
WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

DDR TEST
(1) Remove 22 screws, lockwashers, washers and cab engine access panel. Discard lockwashers. (2) Disconnect OTS connector. (3) Start engine and run until CEL comes ON, eight minutes maximum. (4) Select MODE 01 (ACTIVE CODES) and read codes with engine still running. (a) If code 15 appears, turn OFF ENGINE switch and go to Step 4 of this Fault. (b) If any codes other than 15 appear, turn OFF ENGINE switch and go to Step 3 of this Fault.



VISUAL INSPECTION
(1) Check OTS terminals at OTS connector (OTS and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If connectors are damaged, repair connectors (Para 7-101). (b) If connectors are free of damage, replace OTS (Para 7-66). (2) Connect OTS connector. (3) Install cab engine access panel and 22 washers, lockwashers and screws.



A4 CODE 15 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OTS connector or terminals OK.
OTS OK.

POSSIBLE PROBLEMS

Wires 120 and/or 452 faulty.
DDEC ECM connector or terminals faulty.
DDEC ECM faulty.

4.

WARNING

READ WARNING on Page 2-215

Are there more than 10,000 ohms measured between wires 120 and 452 at engine harness connector terminals R2 and Y2?

NO

Repair wires 120 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms at engine harness connector indicates signal line wire 120 is shorted to return line wire 452 or ground.

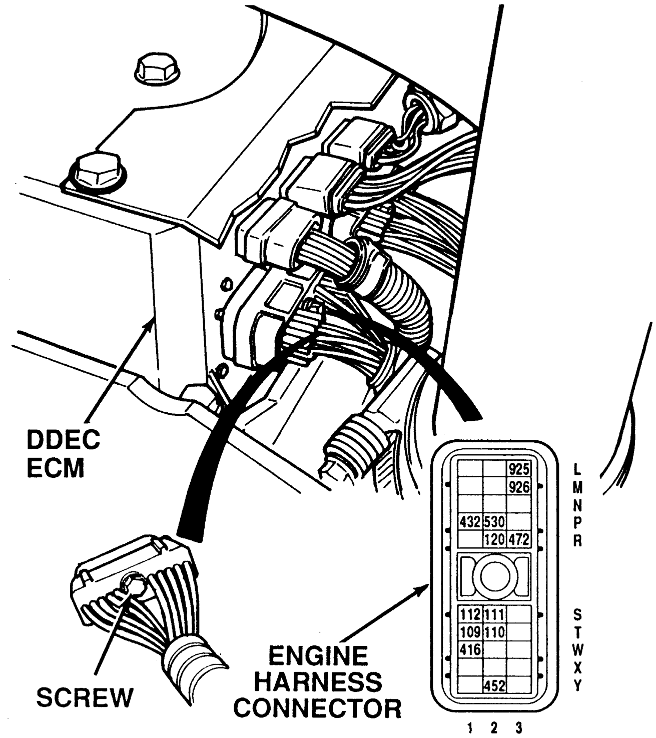
WARNING

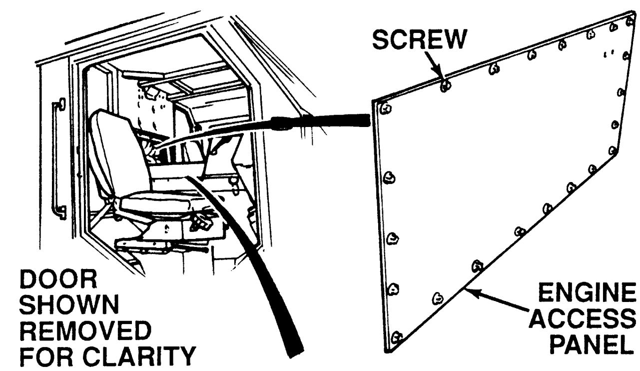
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

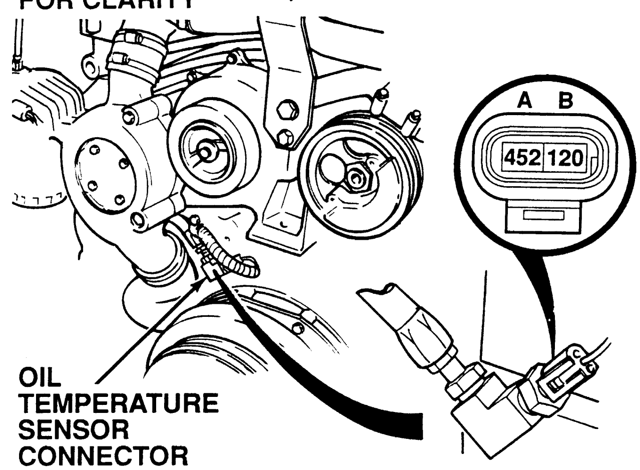
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Read resistance between wires 120 and 452 at engine harness connector, terminals R2 and Y2. (a) If there are less than 10,000 ohms present, repair wires 120 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, wires 120 and 452 are OK. (3) Connect OTS connector. (4) Install cab engine access panel and 22 washers, lockwashers and screws.







A4 CODE 15 OIL TEMPERATURE SENSOR (OTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OTS connector or terminals OK.
OTS OK.
Wires 120 and/or 452 OK.

POSSIBLE PROBLEMS

DDEC ECM connector or terminals faulty.
DDEC ECM faulty.

5.

CAUTION

READ CAUTION on Page 2-217

Are engine DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connector can affect signal to DDEC ECM.

NO → Repair harness connector (Para 7-101). Verify repair, go to Step 6 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OTS connector or terminals OK.
OTS OK.
Wires 120 and/or 452 OK.
DDEC ECM connector and terminals OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

6.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

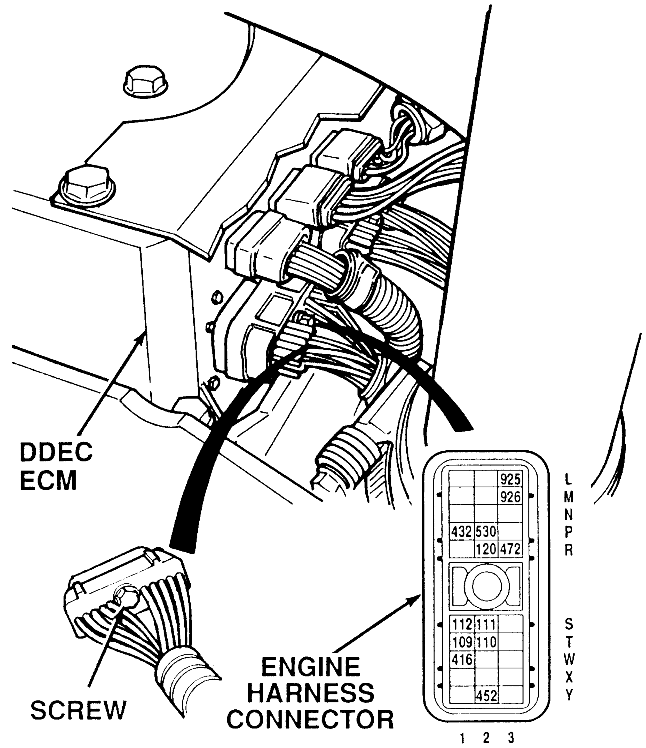
NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

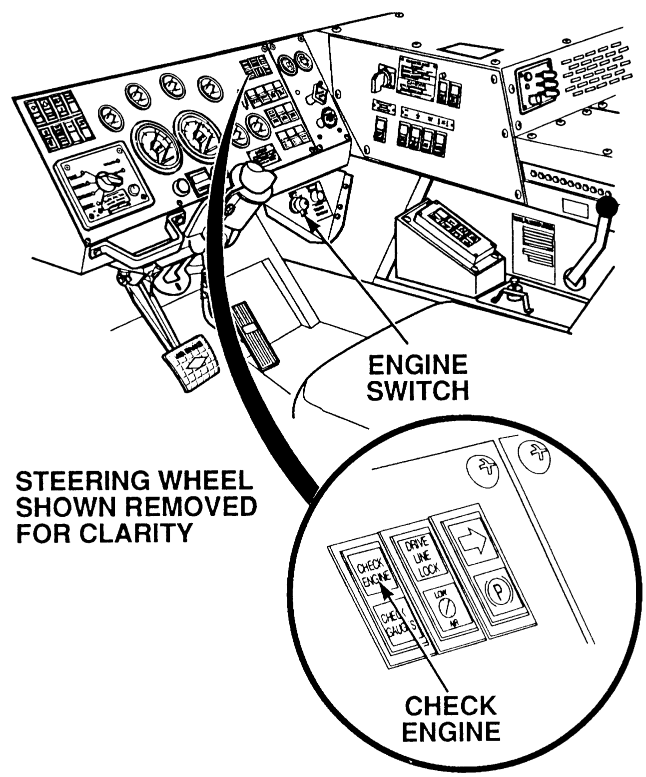
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting terminals.

VISUAL INSPECTION
(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect engine harness connector to DDEC ECM and tighten screw. (3) Close top engine access cover.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-24). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Remover, Connector (Item 55, Appendix G)
- Wrench, Torque (0 to 175 lb-ft [0-237 N·m]) (Item 95, Appendix G)
- Jumperwire

Materials/Parts
- Compound, Corrosion Preventive (Item 34, Appendix C)
- Lockwasher (Item 168, Appendix F)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wires 952 and/or 419 are open.
TPS is faulty.
TPS terminals and/or connector are faulty.
Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

1.

Is Code 21 the only code displayed on DDR?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

If Code 12 or 22 are displayed on DDR, vehicle harness may be faulty.

NO

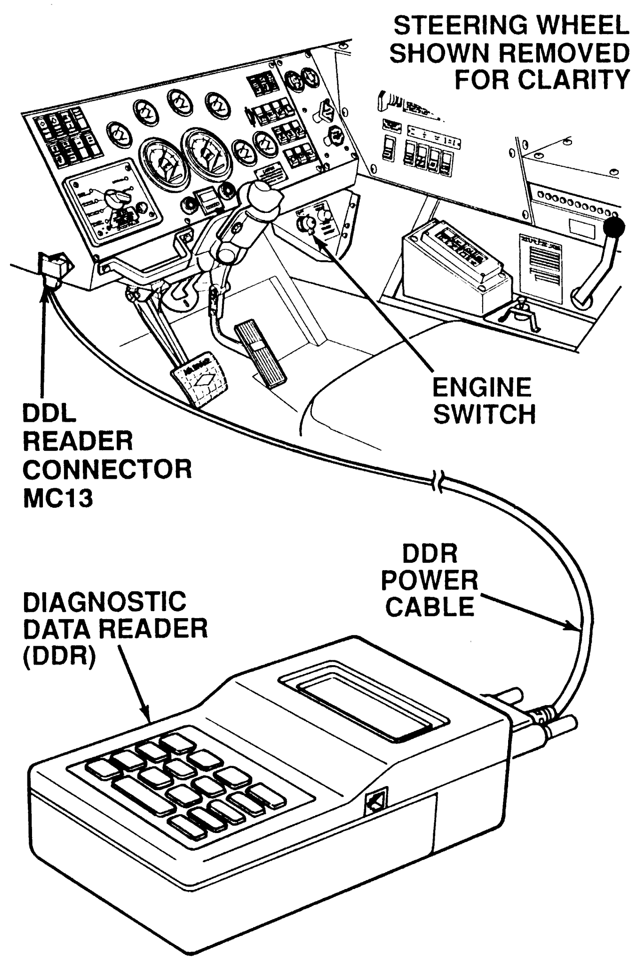
For Code 12 or 22, go to Fault A5A (Table 2-16).

YES

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If other codes are displayed (12 or 22), turn OFF ENGINE switch and go to Fault A5A (Table 2-16). (b) If only Code 21 is displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.



A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wires 952 and/or 419 are open.
TPS is faulty.
TPS terminals and/or connector are faulty.
Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

2.

WARNING
READ WARNING on Page 2-221

Are any codes (except 21) displayed on DDR with TPS MC6 disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For Code 21, go to Step 6 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wires 952 and/or 419 are open.
TPS is faulty.
TPS terminals and/or connector are faulty.
Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

3.

WARNING
READ WARNING on Page 2-221

Are there 5 ohms or less measured between wires 952 and 417 at vehicle harness connector MC18, terminals D2 and C3?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector indicates open in return line wire 952 and/or signal line wire 417.

NO → Repair wires 952 and/or 417 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

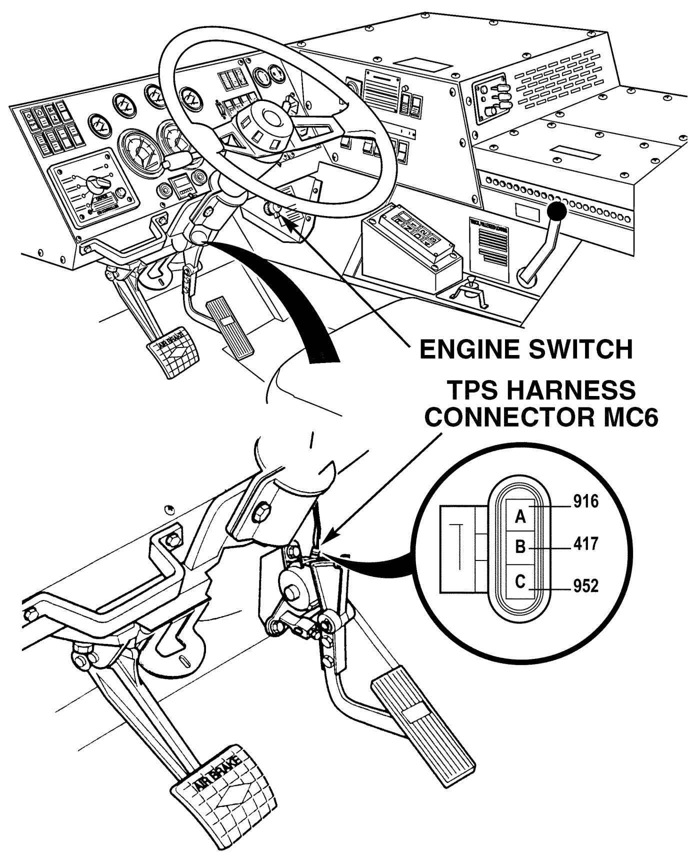
YES ↓

WARNING

Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

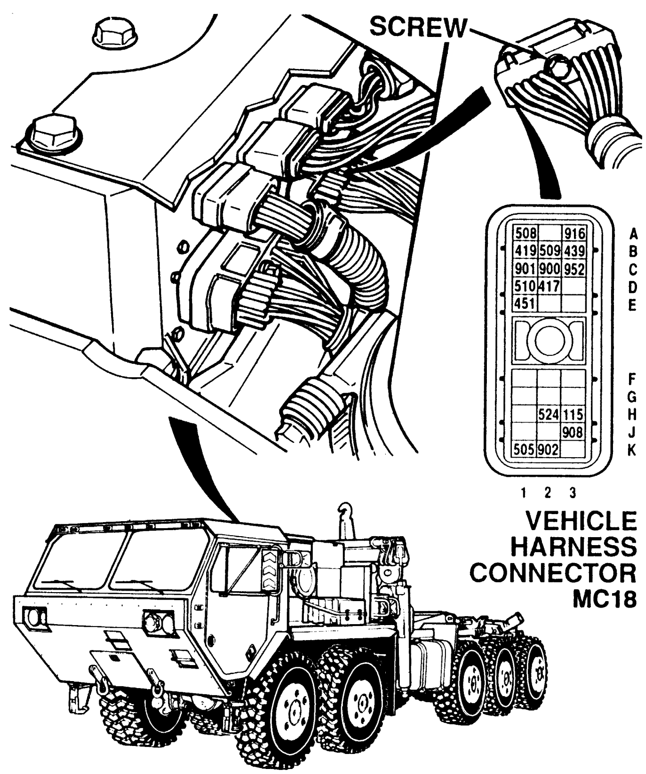
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting terminals.



DDR TEST
(1) Disconnect TPS connector. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (4) Are there any codes displayed on DDR. (a) If code 21 and any other codes are present, turn OFF ENGINE switch and go to Step 6 of this Fault. (b) If any codes other than 21 are present on DDR, turn OFF ENGINE switch and go to Step 3 of this Fault.

RESISTANCE TEST
(1) Place jumperwire between terminals C and B at TPS harness connector MC6. (2) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (3) Read resistance between wires 952 and 417 at vehicle harness connector MC18, terminals D2 and C3. (a) If there are 5 ohms or more present, remove jumperwire and repair wires 952 and/or 417 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are 5 ohms or less, go to Step 4 of this Fault. (4) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.



A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.

POSSIBLE PROBLEMS

TPS is faulty.
TPS terminals and/or connector are faulty.
Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

4.

WARNING

READ WARNING on Page 2-223

Are the TPS counts 20 to 30 at idle and 200 to 235 counts at full throttle?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

TPS is faulty if counts are not 20 to 30 at idle and 200 to 235 at full throttle.

NO → Replace TPS (Para 7-58). Verify repair, go to Step 9 of this Fault.

YES → go to Step 5.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.

POSSIBLE PROBLEMS

TPS is faulty.
TPS terminals and/or connector are faulty.
Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

5.

Are TPS terminals and connector free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals can affect signal to TPS.

NO → Repair TPS terminals (Para 7-101). Verify repair, go to Step 9 of this Fault.

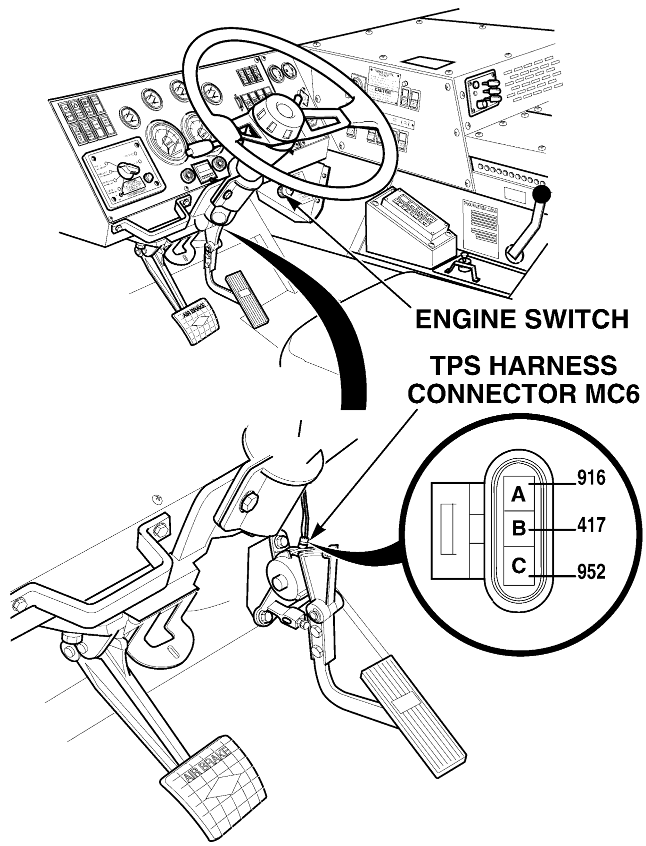
YES → Replace TPS (Para 7-58). Verify repair, go to Step 9 of this Fault.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

DDR TEST

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Select MODE 07 (TPS COUNTS) on DDR.
(3) Read throttle counts at idle and at full throttle (engine not running).
 (a) If throttle count is not 20 to 30 at idle and 200 to 235 at full throttle, turn OFF ENGINE switch and replace TPS (Para 7-58).
 (b) If throttle count is 20 to 30 at idle and 200 to 235 at full throttle, turn OFF ENGINE switch and go to Step 5 of this Fault.



VISUAL INSPECTION

(1) Disconnect TPS connector MC6.
(2) Inspect TPS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals.
 (a) If connectors are damaged, repair connectors (Para 7-101).
 (b) If connectors are free of damage, replace TPS (Para 7-58).

A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.
TPS OK.
TPS terminals and connector OK.

POSSIBLE PROBLEMS

Wires 417 and/or 916 shorted.
Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

6.

WARNING

READ WARNING on Page 2-225

Are there more than 10,000 ohms measured between wires 417 and 916 at vehicle harness connector MC18, terminals D2 and A3?

NO — Repair wires 417 and/or 916 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at vehicle harness connector indicates signal line wire 417 is shorted to vehicle wire 916 (+5 volt line).

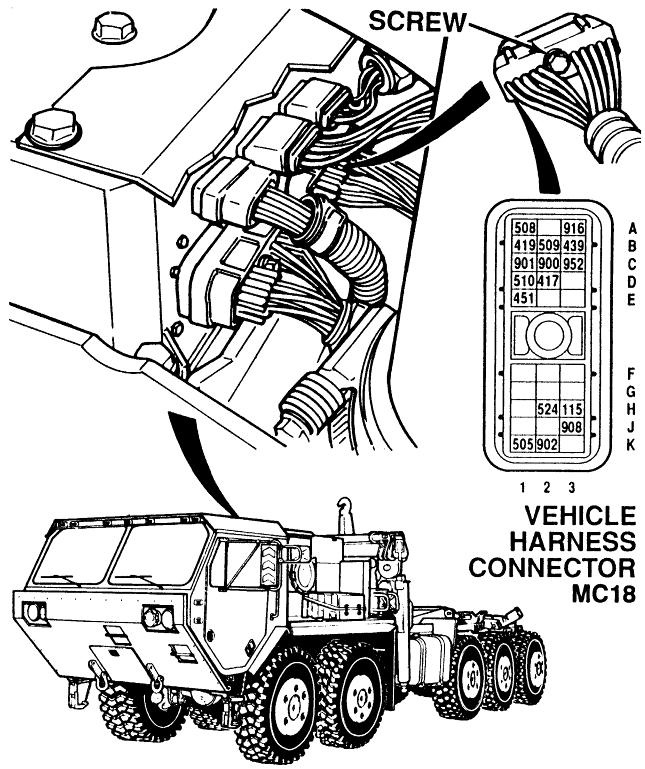
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM. (2) Read resistance between wires 417 and 916 at vehicle harness connector MC18, terminals D2 and A3. (a) If 10,000 ohms or less are present, repair wires 417 and/or 916 (see schematic Fig 2-1) or notify DS Maintenance. (b) If more than 10,000 ohms are present, go to Step 7 of this Fault.



A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.
TPS OK.
TPS terminals and connector OK.
Wires 417 and 916 not shorted.

POSSIBLE PROBLEMS

Vehicle harness connector and/or power harness connector shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.

7.

WARNING

READ WARNING on Page 2-227

Are there less than 10,000 ohms measured at vehicle harness connector MC18 and/or the power harness connector MC17?

NO → Repair connector and/or wires (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Any reading less than or equal to 10,000 ohms at power harness connector or vehicle harness connector indicates a short.

WARNING

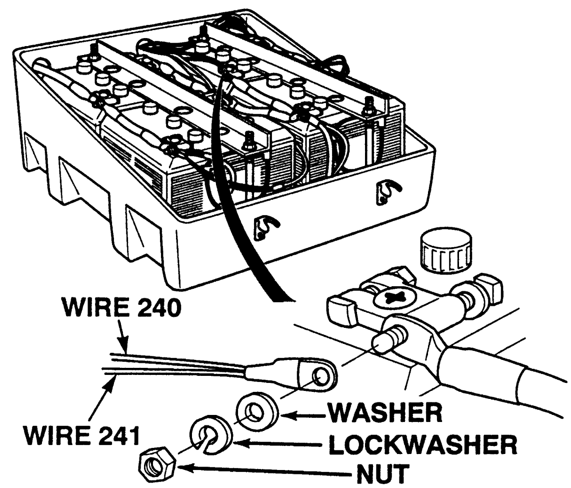
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

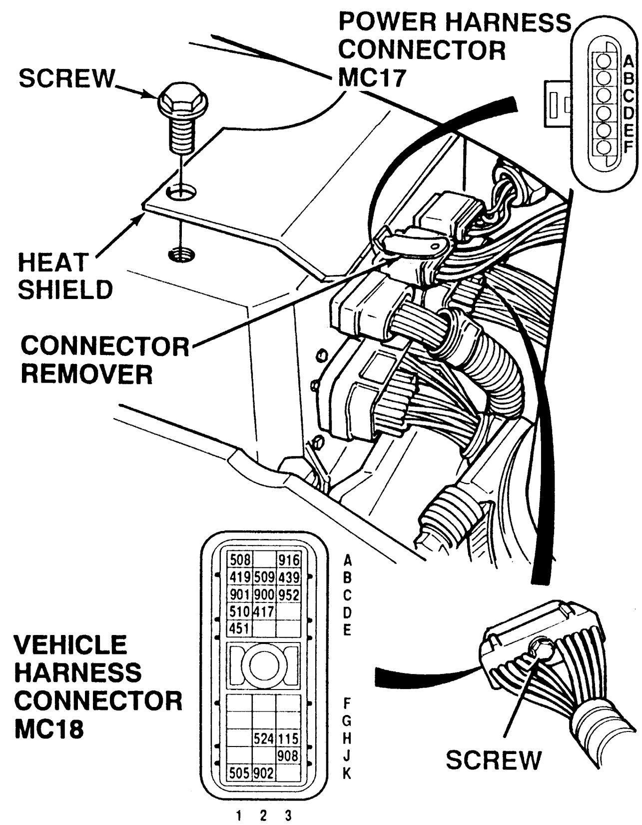
CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2320-364-10).
(2) Remove nut, washer, lockwasher, wire 240 and 241 from battery. Discard lockwasher.
(3) Remove two mounting screws and heat shield from DDEC ECM.
(4) Disconnect power harness connector MC17 from DDEC ECM with connector remover.
(5) Read resistance between wires 417 and 439 at vehicle harness connector MC18, terminals D2 and B3.
  (a) If 10,000 ohms or less are present, repair wires 417 and 439. (See schematic Fig 2-3) or notify DS Maintenance and perform Steps (7) through (12) below.
  (b) If more than 10,000 ohms are present, perform Step (6) below.
(6) Read resistance between wire 417 on vehicle harness connector MC18, terminal D2 and wires 241, 150 and 240, terminals A, B, D, E or F.
  (a) If more than 10,000 ohms are present, repair wires 241, 150 and/or 240 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (7) through (12) below.
  (b) If 10,000 ohms or less are present, wires 241, 150 and 240 are OK.
(7) Connect power harness connector MC17.
(8) Install heat shield with two mounting screws to DDEC ECM.
(9) Connect wires 240/241 to battery with lockwasher, washer and nut.
(10) Tighten nut to 23 lb-ft (31 N·m).
(11) Apply corrosion preventive compound on nut.
(12) Install battery box cover.





A4 CODE 21 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.
TPS OK.
TPS terminals and connector OK.
Wires 417 and 916 not shorted.
Vehicle harness connector and power harness connector not shorted.

POSSIBLE PROBLEMS

DDEC ECM terminals faulty.
DDEC ECM faulty.

8.

WARNING

READ WARNING on Page 2-229

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

NO → Repair harness connector terminals (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to DDEC ECM.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 952 and 419 not open.
TPS OK.
TPS terminals and connector OK.
Wires 417 and 916 not shorted.
Vehicle harness connector and power harness connector not shorted.
DDEC ECM terminals OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

9.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

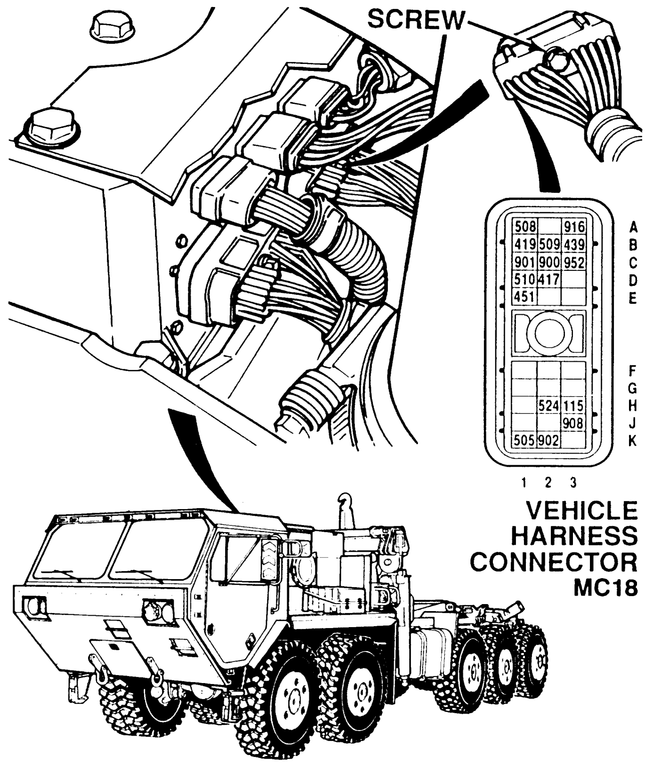
If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

WARNING

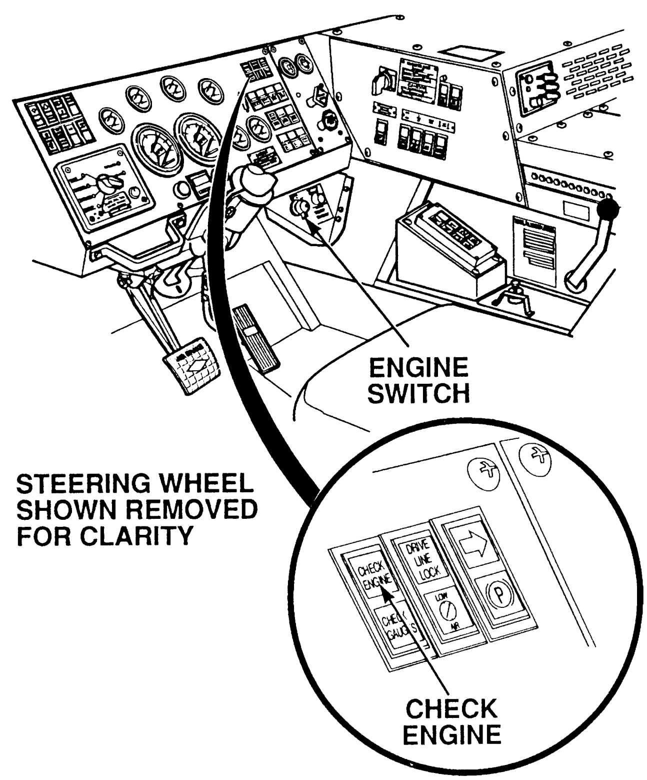
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



VISUAL INSPECTION
(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are damaged, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw. (3) Close top engine access cover.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-24). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Jumperwire

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

TPS faulty.
TPS harness connector MC6 faulty.
Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

1.

Is Code 22 the only code displayed on DDR.

TEST OPTIONS

DDR test.

REASON FOR QUESTION

To determine if vehicle harness is faulty.

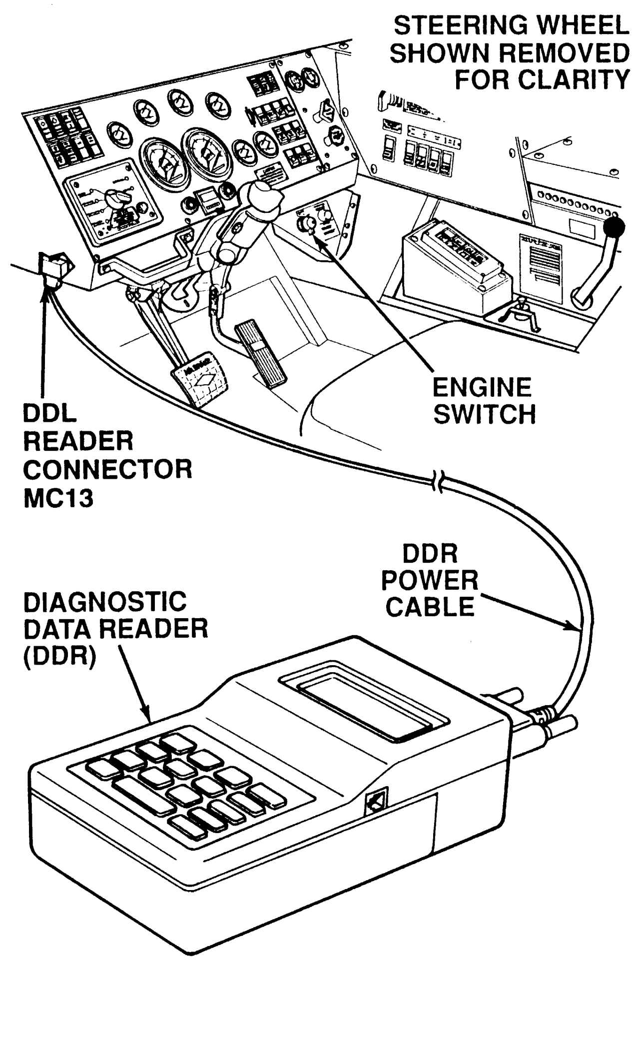
NO → For Codes 12 or 21, go to Fault A5A (Table 2-16).

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If other codes are displayed (12 or 21), turn OFF ENGINE switch and go to Fault A5A (Table 2-16). (b) If only Code 22 is displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.



A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

TPS faulty.
TPS harness connector MC6 faulty.
Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

2.

CAUTION

READ CAUTION on Page 2-233

Are any other codes besides Code 21 displayed on DDR with jumperwire installed at wires 417 and 916 at TPS harness connector, between terminals A and B?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → Go to Step 5 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

TPS faulty.
TPS harness connector MC6 faulty.
Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

3.

Are the TPS counts 20 to 30 at idle and 200 to 235 counts at full throttle?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

TPS is faulty if counts are not 20-30 at idle and 200-235 at full throttle.

NO → Replace TPS (Para 7-58). Verify repair, go to Step 10 of this Fault.

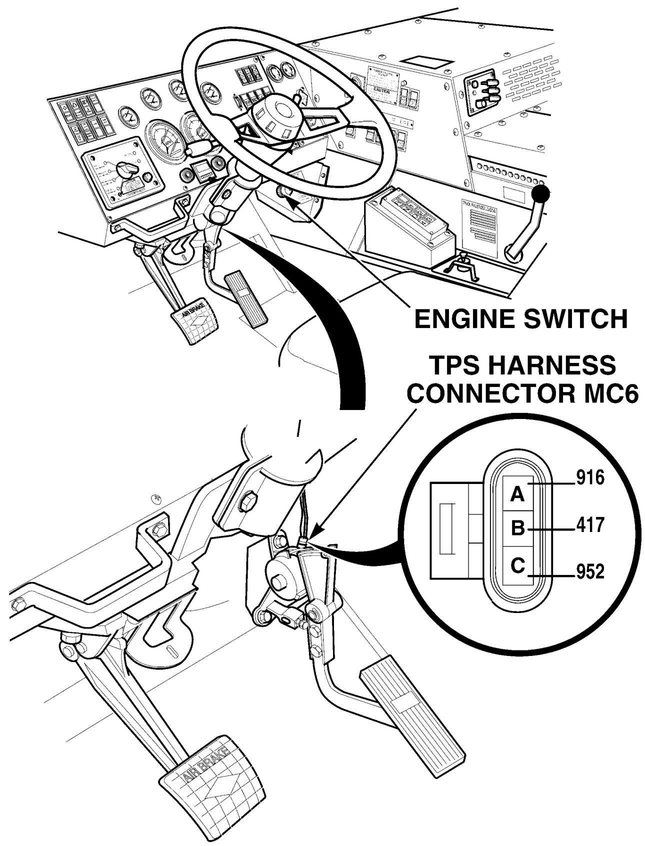
YES ↓

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

DDR TEST

(1) Disconnect TPS harness connector MC6.
(2) Place jumperwire between terminals A and B at TPS harness connector MC6.
(3) Turn ON ENGINE switch (TM 9-2320-364-10).
(4) Select MODE 01 (ACTIVE CODES) on DDR.
(5) Is code 21 or any other codes displayed on DDR.
   (a) If code 21 or any other code is not present on DDR, go to Step 5 of this Fault.
   (b) If code 21 or any other code is present on DDR, go to Step 3 of this Fault.



NOTE

Ensure throttle control is fully depressed to the floor when checking full throttle counts.

DDR TEST

(1) Remove jumperwire.
(2) Connect TPS connector.
(3) Select MODE 07 (TPS COUNTS) on DDR.
(4) Read throttle counts at idle and at full throttle (engine not running).
   (a) If throttle count is not 20 to 30 at idle and 200 to 235 at full throttle, replace TPS (Para 7-58).
   (b) If throttle count is 20 to 30 at idle and 200 to 235 at full throttle, go to Step 4 of this Fault.

A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

TPS faulty.
TPS harness connector MC6 faulty.
Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

4.

WARNING
READ WARNING on Page 2-235

Are TPS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to connectors can affect signal to TPS.

NO → Repair TPS connector (Para 7-101). Verify repair, go to Step 10 of this Fault.

YES → Replace TPS (Para 7-58). Verify repair, go to Step 10 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.

POSSIBLE PROBLEMS

Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

5.

WARNING
READ WARNING on Page 2-235

Are 4 to 6 volts measured between wires 916 and 952 at TPS harness connector, terminals A and C?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Incorrect source voltage possible.

NO → If less than 4 volts, go to Step 9 of this Fault.

YES ↓

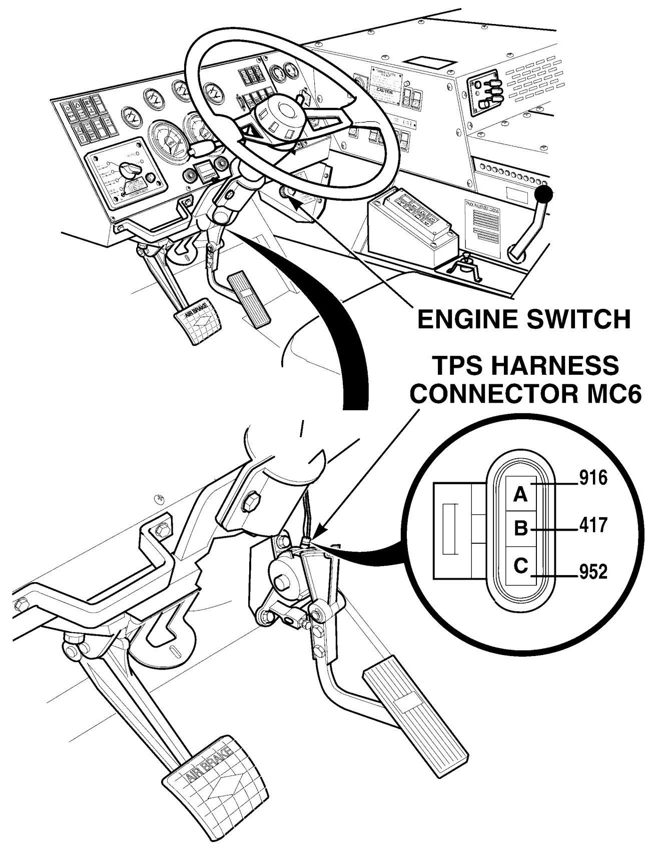
WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

VISUAL INSPECTION
(1) Disconnect TPS harness connector from TPS. (2) Inspect TPS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If connectors are damaged, repair connectors (Para 7-101). (b) If connectors are free of damage, replace TPS (Para 7-58).



VOLTAGE TEST
(1) Remove jumperwire. (2) Set multimeter select switch to volts dc. (3) Connect positive (+) multimeter lead to wire 952 on TPS harness connector, terminal C. (4) Connect negative (–) multimeter lead to wire 916 at TPS harness connector, terminal A. (5) Turn ON ENGINE switch (TM 9-2320-364-10). (a) If less than 4 vdc are present, turn OFF ENGINE switch and go to Step 9 of this Fault. (b) If 4 to 6 vdc are present, turn OFF ENGINE switch and go to Step 6 of this Fault.

A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.

POSSIBLE PROBLEMS

Wires 417 and/or 952 shorted.
Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

6.

WARNING

READ WARNING on Page 2-237

Are there more than 10,000 ohms measured between wires 417 and 952 at TPS harness connector MC6, terminals C and B?

NO → Repair wire 417 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 10 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at TPS harness connector MC6 indicates signal line wire 417 is shorted to return line wire 952 or ground.

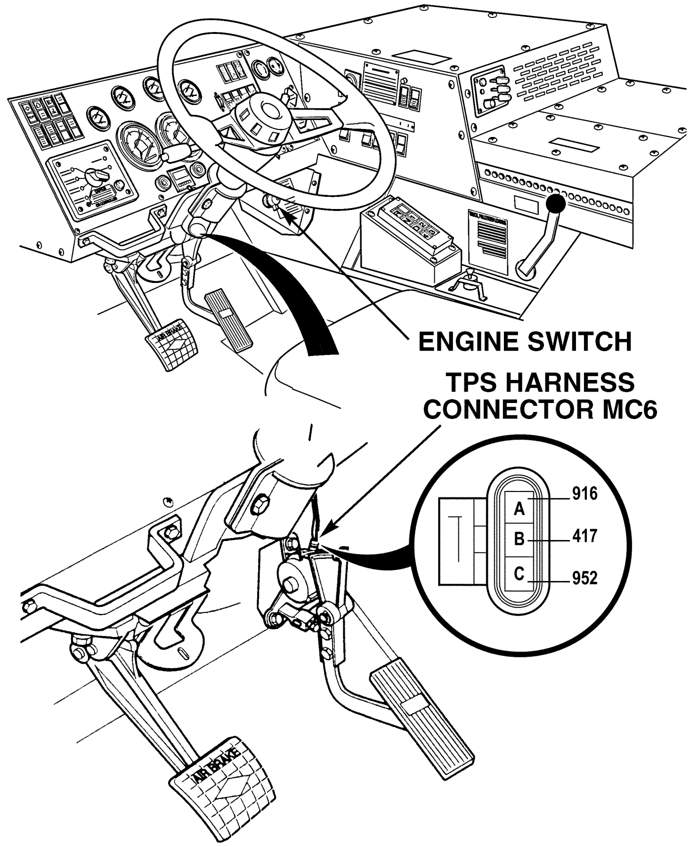
WARNING

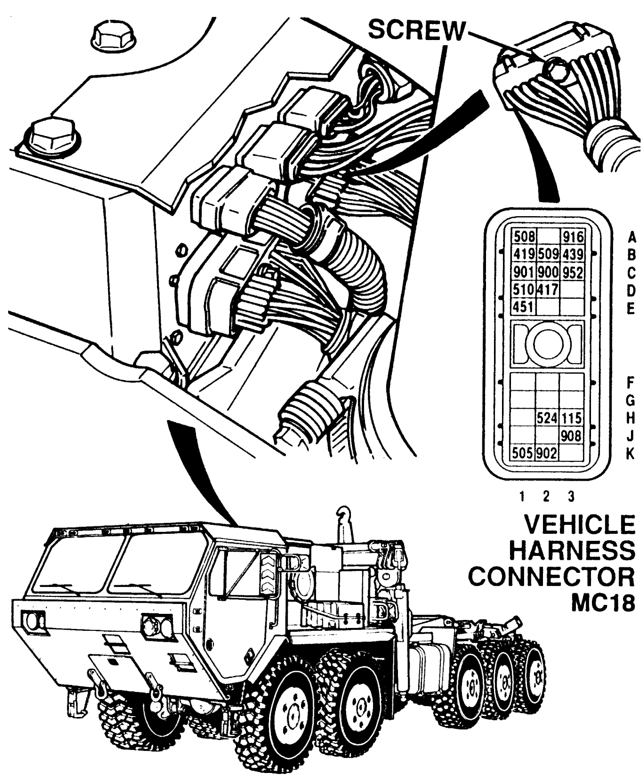
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (2) Read resistance between wires 417 and 952 at TPS harness connector MC6, terminals C and B. (a) If there are more than 10,000 ohms present, repair wires 417 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are 10,000 ohms or less, go to Step (3) below. (3) Read resistance between wire 417 and a known good ground at TPS harness connector, terminal B. (a) If there are more than 10,000 ohms present, repair wire 417 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are 10,000 ohms or less, go to Step 7 of this Fault.





A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.
Wires 417 and 952 not shorted.

POSSIBLE PROBLEMS

Wires 417, 916 and/or 952 shorted.
DDEC ECM terminals faulty.
DDEC ECM faulty.
Wires 916 and/or 952 open.

7.

WARNING

READ WARNING on Page 2-239

Are there less than 5 ohms measured between wires 417, 916 and 952 at vehicle harness connector MC18, terminals D2, A3 and C3?

NO → Repair wires 417, 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 10 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector indicates open in signal line wire 417 and/or return line wire 952.

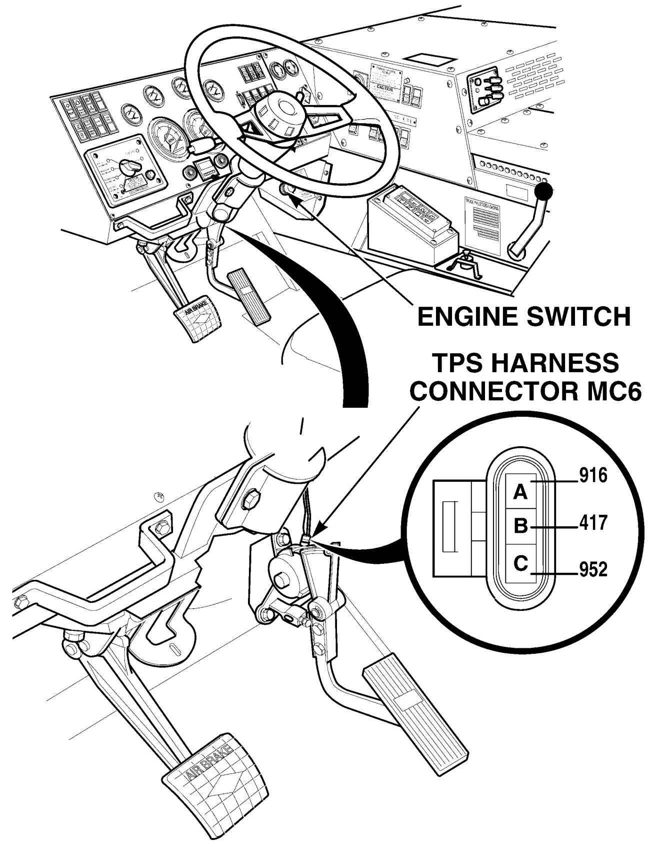
WARNING

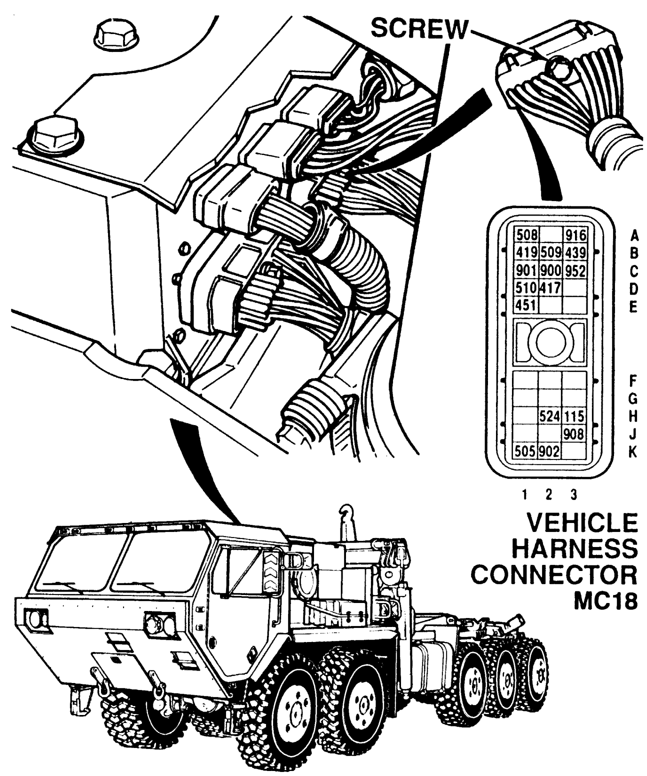
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Place jumperwire between TPS harness connector MC6, terminals A and B. (2) Set multimeter select switch to ohms. (3) Read resistance between wires 417 and 952 at vehicle harness connector MC18, terminals C3 and D2. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 417 and/or 952 (See schematic Fig 2-1) or notify DS Maintenance. (b) If there are 5 ohms or less, go to Step (4) below. (4) Read resistance between wires 417, 916 and 952 at vehicle harness connector MC18, terminals D2, A3 and C3. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 417, 916 and/or 952 (See schematic Fig 2-1) or notify DS Maintenance. (b) If there are 5 ohms or less, wires 417, 916 and 952 are OK. (5) Remove jumperwire.





A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.
Wires 417 and 952 not shorted.
Wires 417, 916 and 952 not open.

POSSIBLE PROBLEMS

DDEC ECM terminals faulty.
DDEC ECM faulty.

8.

WARNING

READ WARNING on Page 2-241

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals and connectors can affect signal to DDEC ECM.

NO → Repair harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 10 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 10 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.
Wires 417 and 952 not shorted.
Wires 417, 916 and 952 not open.
DDEC ECM terminals OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wires 916 and/or 952 open.

9.

CAUTION

READ CAUTION on Page 2-241

Are there 5 ohms or less measured between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector MC18 indicates wire 916 (+5 volt line) is open.

NO → Repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 10 of this Fault.

YES → Fault not corrected. Notify DS Maintenance.

WARNING

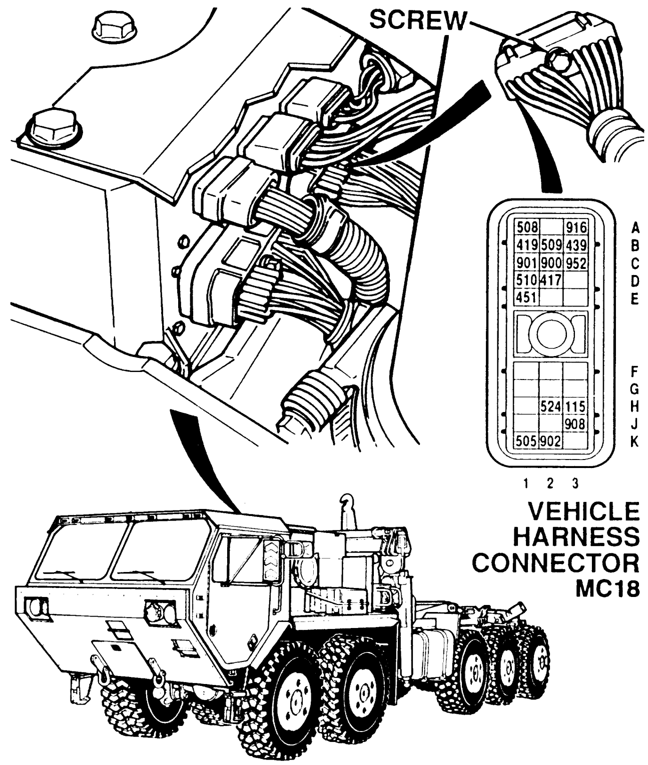
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

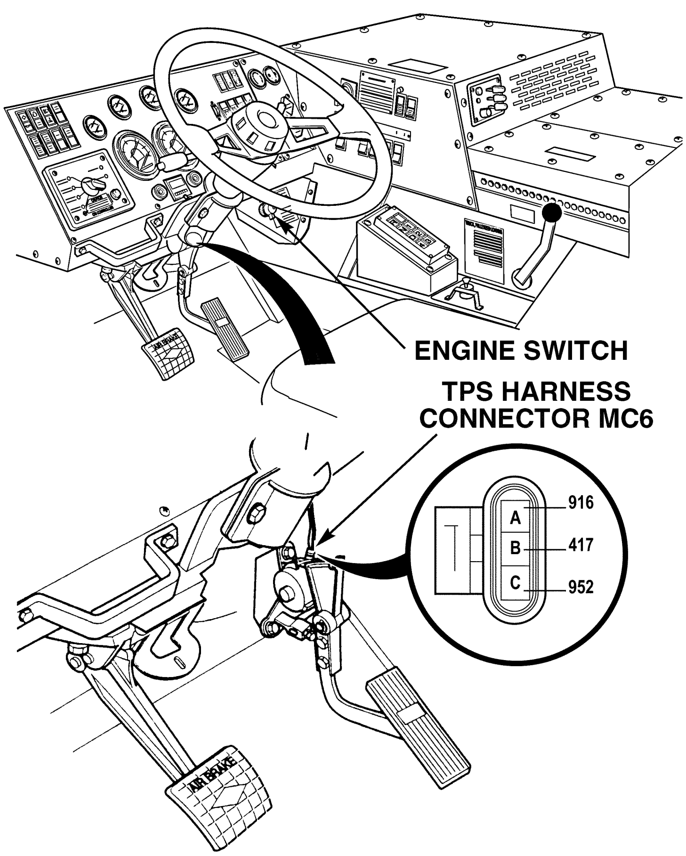
CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

VISUAL INSPECTION
(1) Check terminals at vehicle harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector to DDEC ECM and tighten screw. (3) Close top engine access cover.

RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18. (2) Place a jumperwire between terminals A and C on TPS harness connector. (3) Read resistance between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3. (a) If there are more than 5 ohms present, repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (4) through (7). (b) If there are 5 ohms or less present, wires 916 and 952 are OK. (4) Remove jumperwire. (5) Connect TPS connector. (6) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw. (7) Close top engine access cover.





A4 CODE 22 THROTTLE POSITION SENSOR (TPS) SIGNAL LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
TPS OK.
TPS harness connector MC6 OK.
Wires 417 and 952 not shorted.
Wires 417, 916 and 952 not open.
DDEC ECM terminals OK.
DDEC ECM OK.
Wires 916 and 952 not open.

POSSIBLE PROBLEMS

10.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

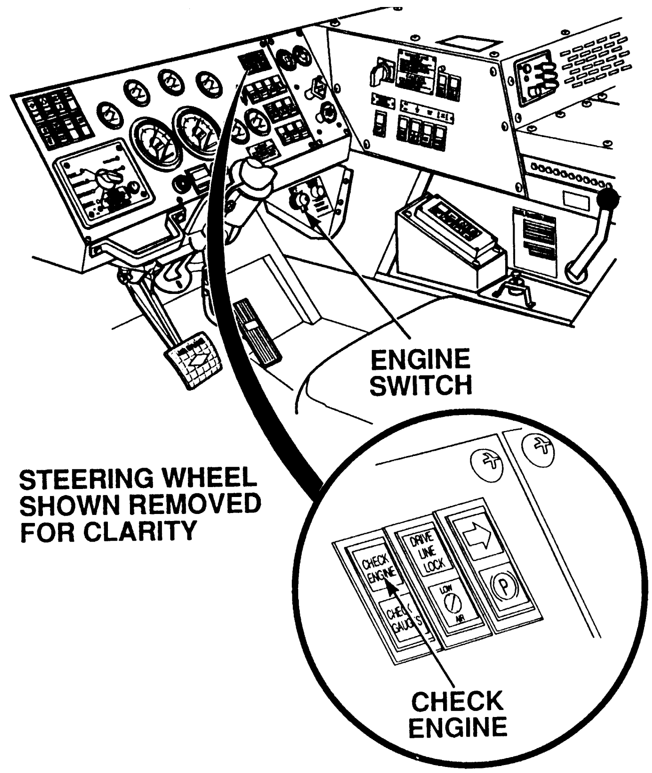
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) Select MODE 01 (ACTIVE CODES) on DDR. (4) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (5) and (6) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (5) and (6) below and go to Fault Index (Table 2-16). (5) Turn OFF ENGINE switch. (6) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 23 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
Wires 472, 416 and/or 452 shorted. FTS connector faulty. FTS faulty. Wires 472 and/or 452 open. Engine harness connector faulty. DDEC ECM faulty.

1.

WARNING

Read WARNING on Page 2-245

Is Code 24 or any other codes displayed on DDR with jumperwire installed between wires 452 and 472 at FTS harness connector, terminals A and B?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

NO → For any code except Code 24, go to Step 4 of this Fault.

YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

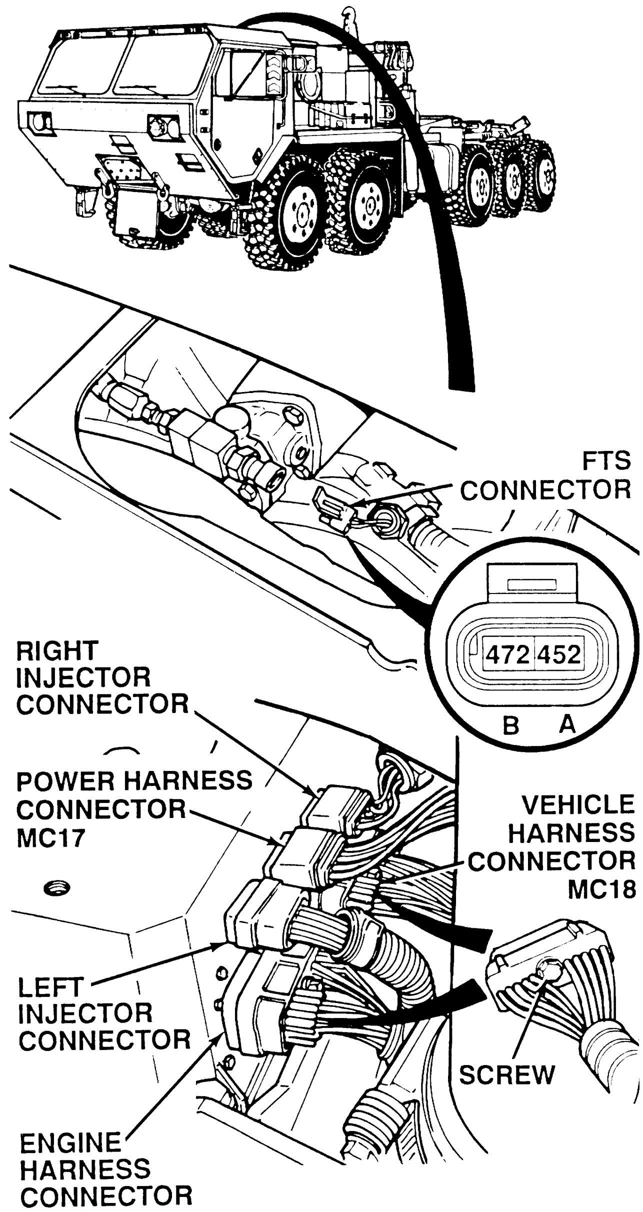
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Remove DDEC ECM (Para 7-56). (2) Disconnect FTS. (3) Place jumperwire between terminals A and B at FTS harness connector. (4) Set ECM on mounting bracket. (5) Connect vehicle and engine harness connectors to DDEC ECM and tighten two screws. (6) Connect power harness connector and right and left injector harness connectors to DDEC ECM. (7) Connect DDR to DDL connector MC13. (8) Turn ON ENGINE switch (TM 9-2320-364-10). (9) Select MODE 01 (ACTIVE CODES) on DDR. (10) Is code 24 or any other codes displayed on DDR? (a) If any code except Code 24 is displayed on DDR, turn OFF ENGINE switch and go to Step 4 of this Fault. (b) If code 24 or any other code is displayed on DDR, go to Step 2 of this Fault.



A4 CODE 23 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wires 472, 416 and/or 452 shorted.
FTS connector faulty.
FTS faulty.
Wires 472 and/or 452 open.
Engine harness connector faulty.
DDEC ECM faulty.

2.

WARNING
Read WARNING on Page 2-247

Are there more than 10,000 ohms or an open circuit measured between wires 472 and 416 at engine harness connector, terminals R3 and W1?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 472 is shorted to engine wire 416 (+5 volt line) and/or return line wire 452.

NO → Repair wires 472, 416, and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES → Go to Step 3.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 472, 416 and 452 not shorted.

POSSIBLE PROBLEMS

FTS connector faulty.
FTS faulty.
Wires 472 and/or 452 open.
Engine harness connector faulty.
DDEC ECM faulty.

3.

WARNING
Read WARNING on Page 2-247

Are FTS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to connectors can affect signal to FTS.

NO → Repair FTS connector (Para 7-101). Verify repair, go to Step 6 of this Fault.

YES → Replace FTS (Para 7-62). Verify repair, go to Step 6 of this Fault.

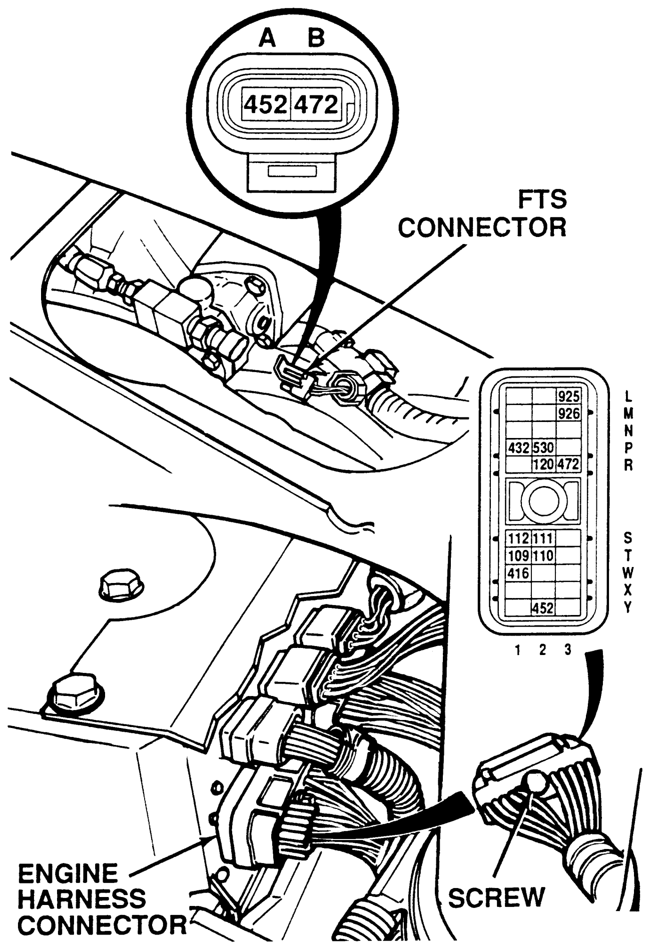
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector from DDEC ECM. (2) Remove jumperwire. (3) Read resistance between wires 472 and 416 at engine harness connector, terminals R3 and W1. (a) If there are less than 10,000 ohms present, repair wires 472, 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, wires are OK, go to Step 3 of this Fault.



VISUAL INSPECTION
(1) Check terminals at FTS harness connector (sensor and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If terminals are damaged, repair connector (Para 7-101) or notify DS Maintenance. (b) If terminals are not damaged, replace FTS (Para 7-62) and perform Steps (2) and (3) below. (2) Connect FTS harness connector. (3) Connect engine harness connector to DDEC ECM and tighten screw.

A4 CODE 23 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 472, 416 and 452 not shorted.
FTS connector OK.
FTS OK.

POSSIBLE PROBLEMS

Wires 472 and/or 452 open.
Engine harness connector faulty.
DDEC ECM faulty.

4.

WARNING
Read WARNING on Page 2-249

Are there 5 ohms or less measured between wires 472 and 452 at engine harness connector, terminals R3 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at engine harness connector indicates signal line wire 472 or return line wire 452 are open.

NO → Repair wires 472 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES → Go to Step 5.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 472, 416 and 452 not shorted.
FTS connector OK.
FTS OK.
Wires 472 and 452 not open.

POSSIBLE PROBLEMS

Engine harness connector faulty.
DDEC ECM faulty.

5.

CAUTION
Read CAUTION on Page 2-249

Are DDEC ECM terminals and connectors (DDEC ECM and vehicle harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connectors can affect signal to DDEC ECM.

NO → Repair engine harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

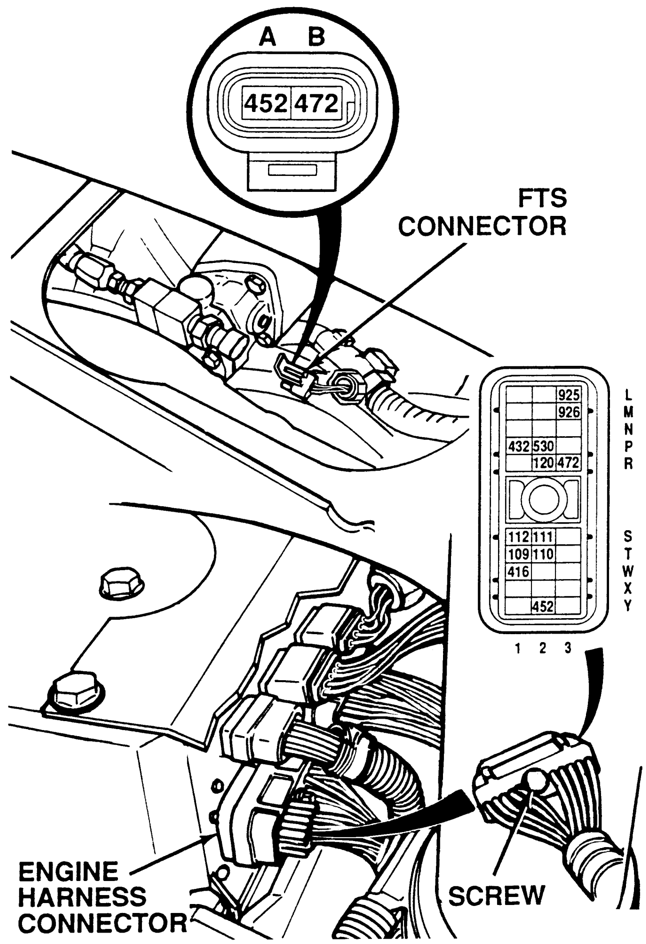
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector from DDEC ECM. (2) Read resistance between wires 472 and 452 at engine harness connector, terminals R3 and Y2. (a) If there are more than 5 ohms present, repair wires 472 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are 5 ohms or less present, wires 472 and 452 are OK. (3) Connect engine harness connector to DDEC ECM and tighten screw. (4) Remove jumperwire and connect FTS connector.



VISUAL INSPECTION
(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If engine harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If engine harness connector and DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Install DDEC ECM (Para 7-56). (3) Close top engine access cover.

A4 CODE 23 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 472, 416 and 452 not shorted.
FTS connector OK.
FTS OK.
Wires 472 and 452 not open.
Engine harness connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

6.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

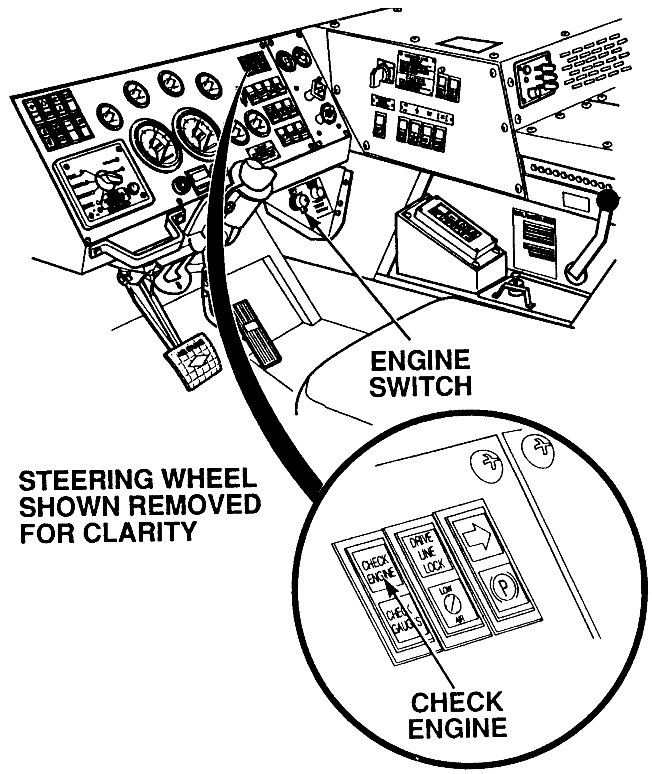
If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear codes on DDR (Para 2-11).
(3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
   (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
   (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 24 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

FTS connector faulty.
FTS faulty.
Wires 472, 150 and/or 452 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

1.

Is Code 24 the only code displayed on DDR?

TEST OPTIONS

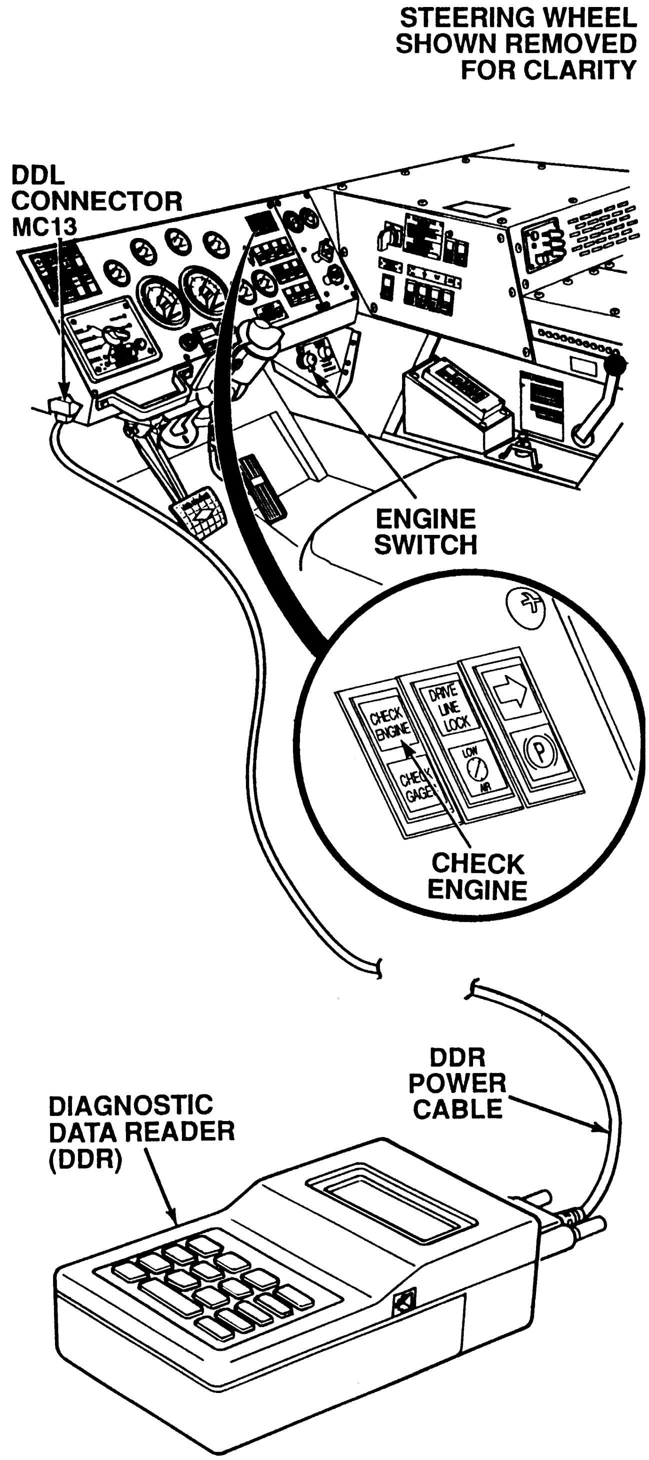
DDR test.

REASON FOR QUESTION

There may be a problem with the engine harness if Codes 14, 23 and/or 33 are displayed along with Code 24.

NO → For Codes 14, 23 or 33, go to Fault A5B (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If there are other codes (14, 23 and/or 33), turn OFF ENGINE switch and go to Fault A5B (Table 2-16). (b) If Code 24 is the only active code, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 24 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

FTS connector faulty.
FTS faulty.
Wires 472, 150 and/or 452 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

2.

WARNING
Read WARNING on Page 2-255

Are any codes (except 24) displayed on DDR with FTS disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For Code 24, go to Step 4 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

FTS connector faulty.
FTS faulty.
Wires 472, 150 and/or 452 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

3.

CAUTION
Read CAUTION on Page 2-255

Are FTS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to connectors can affect signal to FTS.

NO → Repair FTS connector (Para 7-101). Verify repair, go to Step 6 of this Fault.

YES → Replace FTS (Para 7-62). Verify repair, go to Step 6 of this Fault.

WARNING

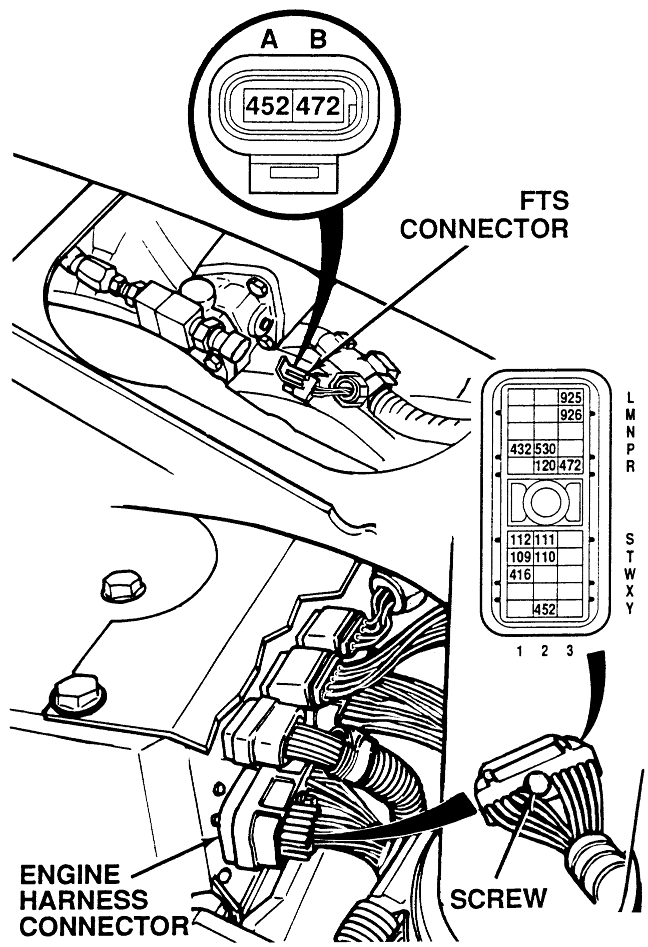
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

DDR TEST
(1) Remove DDEC ECM (Para 7-56). (2) Disconnect FTS. (3) Set DDEC ECM on mounting bracket. (4) Connect vehicle and engine harness connectors to DDEC ECM and tighten two screws. (5) Connect power harness connector and right and left injector connectors to DDEC ECM. (6) Start engine and run until CHECK ENGINE LIGHT (CEL) comes ON or for eight minutes. (7) Select MODE 01 (ACTIVE CODES) on DDR. (a) If code 24 is the only code that appears on DDR, turn OFF ENGINE switch and go to Step 4 of this Fault. (b) If any other codes except code 24 appear on DDR, turn OFF ENGINE switch and go to Step 3 of this Fault.

VISUAL INSPECTION
(1) Disconnect FTS harness connector. (2) Inspect FTS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If connectors are damaged, repair connectors (Para 7-101). (b) If connectors are free of damage, replace FTS (Para 7-62). (3) Connect FTS harness connector.



A4 CODE 24 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
FTS connector OK.
FTS OK.

POSSIBLE PROBLEMS

Wires 472, 150 and/or 452 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

4.

WARNING

Read WARNING on Page 2-257

Are there more than 10,000 ohms or an open circuit measured between wires 472 and 452 at engine harness connector, terminals R3 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness connector or FTS connector indicates signal line wire 472 is shorted to return line wire 452 or ground.

NO → Repair wires 472 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 6 of this Fault.

YES → Step 5.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
FTS connector OK.
FTS OK.
Wires 472, 150 and 452 not shorted.

POSSIBLE PROBLEMS

DDEC ECM connector faulty.
DDEC ECM faulty.

5.

CAUTION

Read CAUTION on Page 2-257

Are DDEC ECM terminals and connectors (DDEC ECM and vehicle harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals and connectors can affect signal to DDEC ECM.

NO → Repair DDEC ECM connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 6 of this Fault.

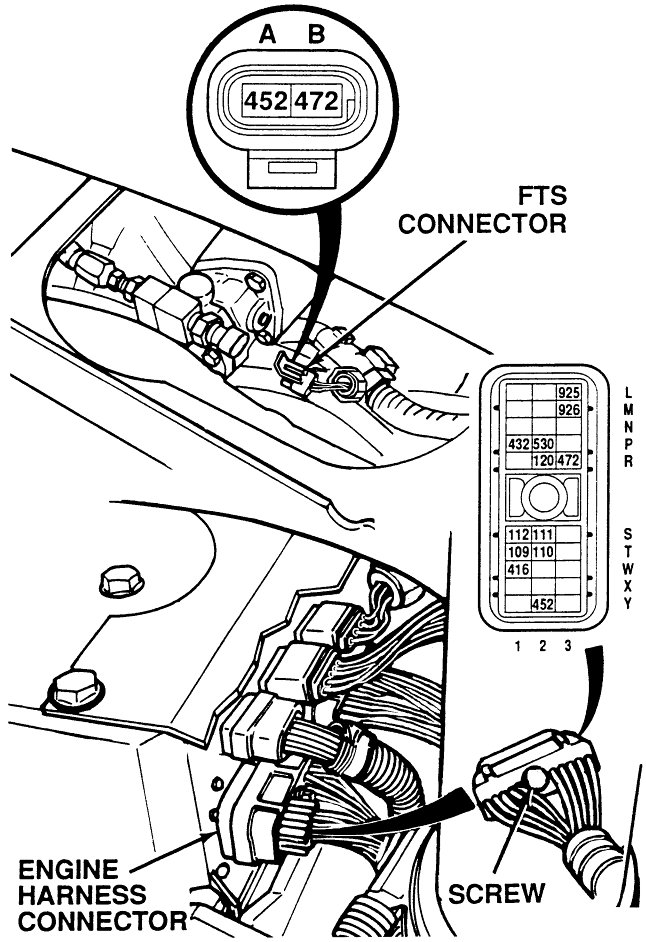
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector from DDEC ECM. (2) Read resistance between wires 472 and 452 at engine harness connector, terminals R3 and Y2. (a) If there are less than 10,000 ohms present, repair wires 472 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, wires 472 and 452, go to Step (3) below. (3) Read resistance between wire 472 on FTS connector terminal B and a known good ground. (a) If there are less than 10,000 ohms present, repair wire 472 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present wire 472 is OK.



VISUAL INSPECTION
(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) through (4) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If engine harness and DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect engine harness connector to DDEC ECM and tighten screw. (3) Install DDEC ECM (Para 7-56). (4) Close top engine access cover.

A4 CODE 24 FUEL TEMPERATURE SENSOR (FTS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL)
comes ON and stays ON.
FTS connector OK.
FTS OK.
Wires 472, 150 and 452
not shorted.
DDEC ECM connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

6.

Does CEL stay ON less than five seconds?

TEST OPTIONS

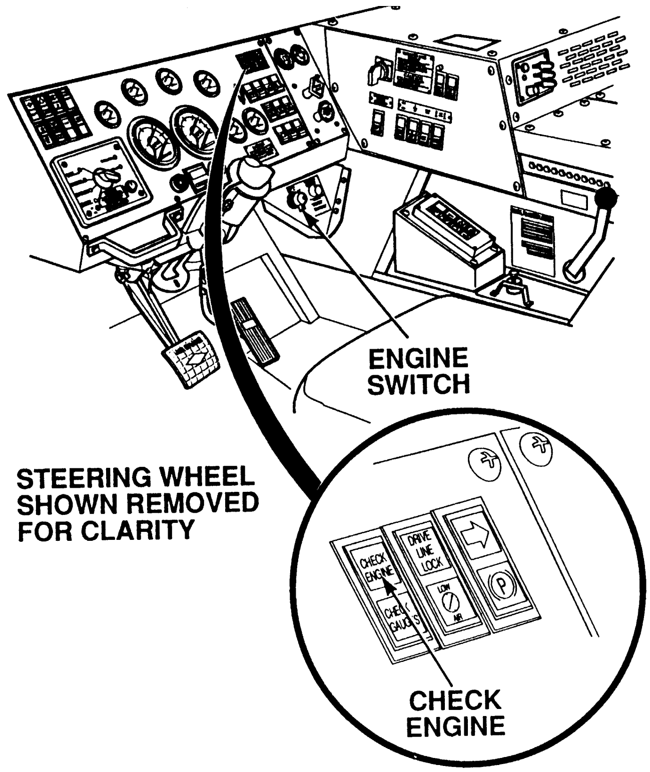
Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).



VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear codes on DDR (Para 2-11).
(3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
  (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
  (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 32 DDEC ECM BACKUP SYSTEM FAILURE.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
DDEC ECM Fault.

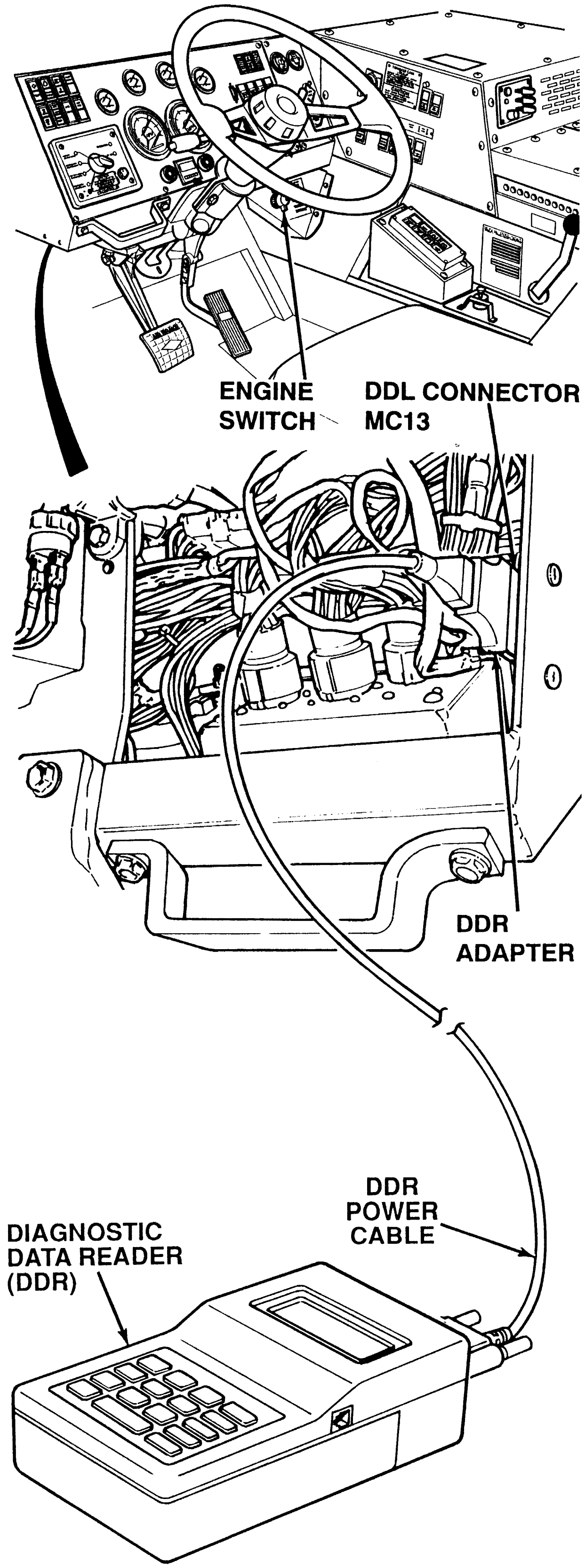
1.

Is Code 32 the only active code displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

NO → Service other codes first. Go to Fault Index (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 32 is not the only active code displayed, turn OFF ENGINE switch and go to Fault Index (Table 2-16). (b) If Code 32 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 32 DDEC ECM BACKUP SYSTEM FAILURE (CONT).

KNOWN INFO
Code 32 only code displayed on DDR.
POSSIBLE PROBLEMS
DDEC ECM Fault.

2.

Is Code 32 displayed on DDR after clearing codes?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Constant code 32 indicates backup computer inside DDEC ECM has failed.

NO → Verify repair, go to Step 3 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

KNOWN INFO
Code 32 displayed on DDR after clearing. DDEC ECM OK.
POSSIBLE PROBLEMS

3.

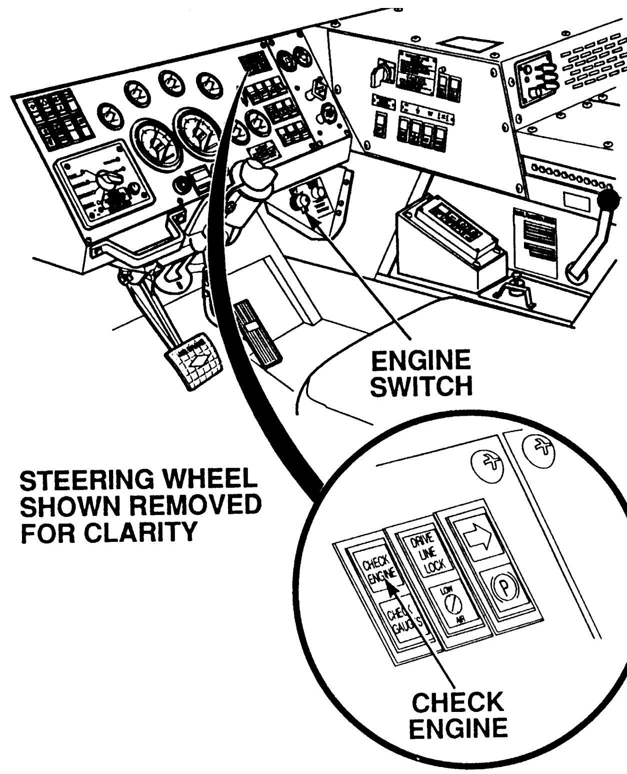
Does CEL stay ON less than 5 seconds?

TEST OPTIONS
Verify repair.
REASON FOR QUESTION
If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Go to Fault Index (Table 2-16).

YES → Fault corrected.

DDR TEST
(1) Clear codes on DDR (Para 2-11). (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 32 does not appear, turn OFF ENGINE switch and go to Step 3 of this Fault. (b) If Code 32 does appear, turn OFF ENGINE switch and replace DDEC ECM (Para 7-56). (4) Disconnect DDR from DDL connector MC13. (5) Turn OFF ENGINE switch.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (b) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 33 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Remover, Connector (Item 55, Appendix G)
- Wrench, Torque (0 to 175 lb-ft [0 to 237 N·m]) (Item 95, Appendix G)
- Jumperwire

Materials/Parts
- Compound, Corrosion Preventive (Item 34, Appendix C)
- Lockwasher (Item 168, Appendix F)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
Wire 452 open. TBS connector faulty. TBS sensor faulty. Wires 416 and/or 432 shorted. Wires 439, 432, 241 and/or 240 shorted. DDEC ECM connector faulty. DDEC ECM faulty.

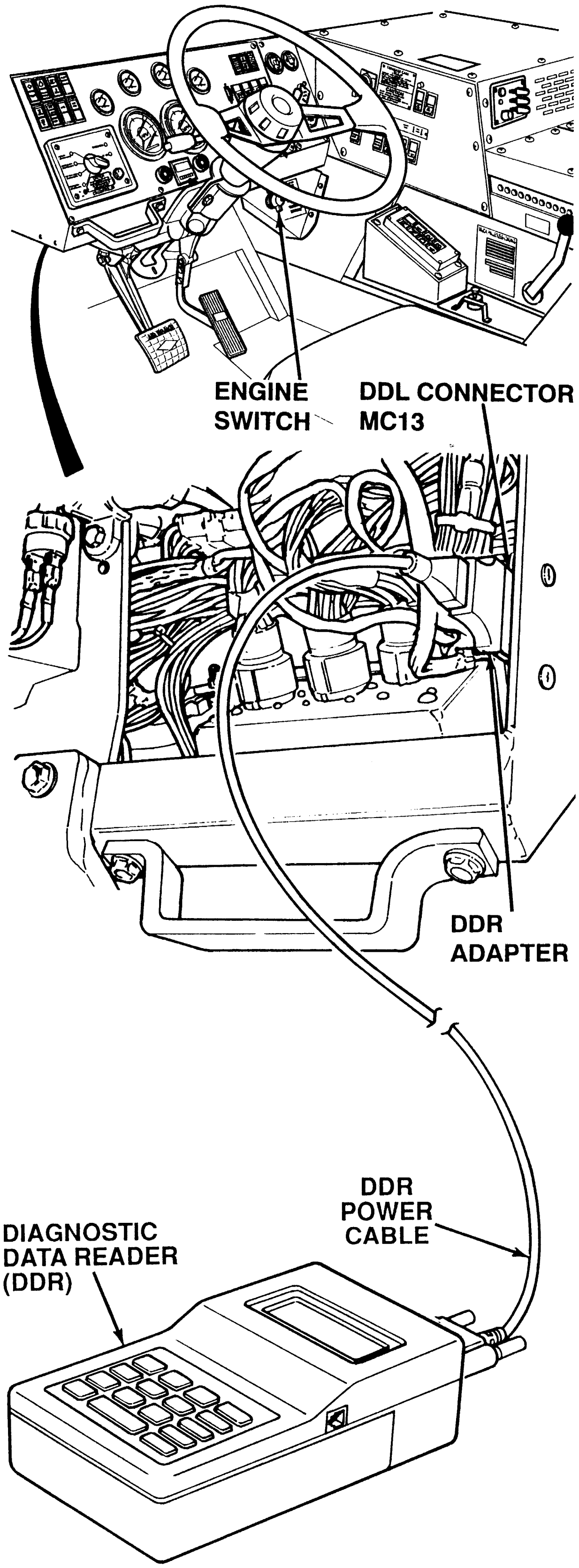
1.

Do DDR codes displayed not include codes 14, 15, 23, 24, or 34-36?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
To check engine harness for fault.

NO → For Codes 14, 15, 23, 24 or 34-36, go to Fault A5B (Table 2-16).

YES



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 33 is not the only active code displayed and Codes 14, 15, 23, 24 and/or 34 through 36 appear, turn OFF ENGINE switch and go to Fault Index A5B (Table 2-16). (b) If Code 33 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 33 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wire 452 open.
TBS connector faulty.
TBS sensor faulty.
Wires 416 and/or 432 shorted.
Wires 439, 432, 241 and/or 240 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

2.

WARNING

Read WARNING on Page 2-267

Is Code 34 (and any codes except 33) displayed on DDR with TBS disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For Code 33 (and any other codes), go to Step 5 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wire 452 open.
TBS connector faulty.
TBS sensor faulty.
Wires 416 and/or 432 shorted.
Wires 439, 432, 241 and/or 240 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

3.

CAUTION

Read CAUTION on Page 2-267

Are there 5 ohms or less measured between wires 452 and 432 at engine harness connector, terminals P1 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at engine harness connector indicates open in return line wire 452.

NO → Repair wire 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

WARNING

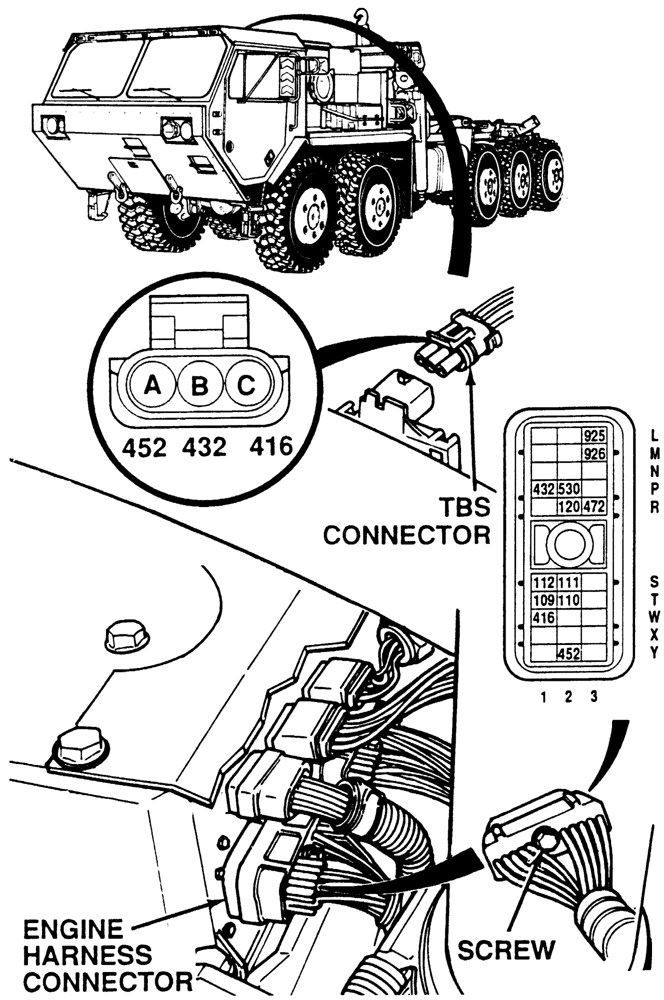
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

DDR TEST
(1) Disconnect TBS harness connector. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Start engine and run at idle. (4) Read active codes on DDR. (a) If code 33 and any other codes appears on DDR, turn OFF ENGINE switch and go to Step 5 of this Fault. (b) If code 34 or any other code except code 33 appear on DDR, turn OFF ENGINE switch and go to Step 3 of this Fault.

RESISTANCE TEST
(1) Place jumperwire between terminals A and B at TBS harness connector. (2) Loosen screw and disconnect engine harness connector at DDEC ECM. (3) Read resistance between wires 432 and 452 at engine harness connector, terminals P1 and Y2. (a) If there are more than 5 ohms present, remove jumperwire and repair wire 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are 5 ohms or less present, wire 452 is OK. (4) Remove jumperwire.



A4 CODE 33 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wire 452 not open.

POSSIBLE PROBLEMS

TBS connector faulty.
TBS sensor faulty.
Wires 416 and/or 432 shorted.
Wires 439, 432, 241 and/or 240 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

4.

WARNING

Read WARNING on Page 2-269

Are TBS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to TBS terminals can affect signal to TBS.

NO → Repair TBS connector (Para 7-101). Verify repair, go to Step 8 of this Fault.

YES → Replace TBS sensor (Para 7-63). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wire 452 not open.
TBS connector OK.
TBS sensor OK.

POSSIBLE PROBLEMS

Wires 416 and/or 432 shorted.
Wires 439, 432, 241 and/or 240 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

5.

WARNING

Read WARNING on Page 2-269

Are there more than 10,000 ohms or an open circuit measured between wires 416 and 432 at engine harness connector, terminals W1 and P1?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 432 is shorted to engine Wire 416 (+5 volt line).

NO → Repair wires 432 and/or 416 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

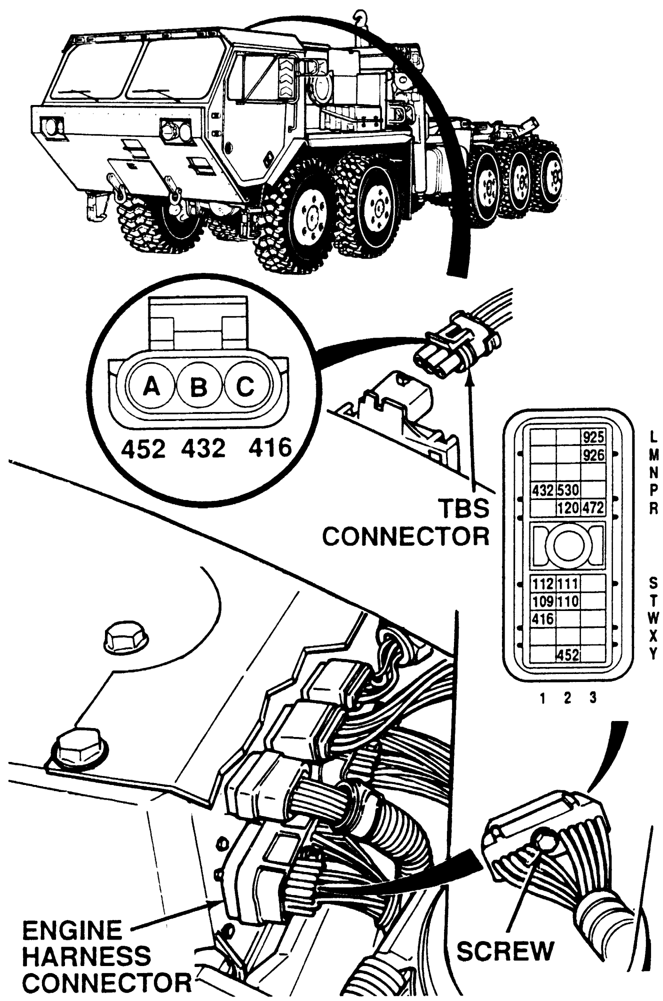
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
Check terminals at TBS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals. (1) If connectors are damaged, repair connectors (Para 7-101) and connect TBS harness connector to sensor connector. (2) If connectors are free of damage, replace TBS (Para 7-63) and connect TBS harness connector to sensor connector.



RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector from DDEC ECM. (2) Read resistance between wires 416 and 432 at engine harness connector, terminals W1 and P1. (a) If 10,000 ohms or less are present, repair wires 416 and/or 432 (see schematic Fig 2-2) or notify DS Maintenance. (b) If more than 10,000 ohms are present, go to Step 6 of this Fault.

A4 CODE 33 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wire 452 not open.
TBS connector OK.
TBS sensor OK.
Wires 416 and 432 not shorted.

POSSIBLE PROBLEMS

Wires 439, 432, 241 and/or 240 shorted.
DDEC ECM connector faulty.
DDEC ECM faulty.

6.

WARNING

Read WARNING on Page 2-271

Are there 10,000 ohms measured between vehicle harness connector, terminals W1 and P1 and between terminals P1 and power connector terminals A, B, E and F?

NO → Repair wires 432, 439, 241 and/or 240 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at vehicle harness, engine harness or power harness connectors indicates a short between terminals where measured.

WARNING

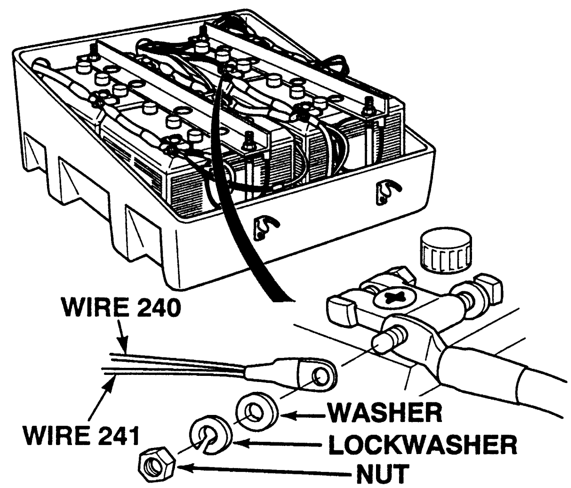
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

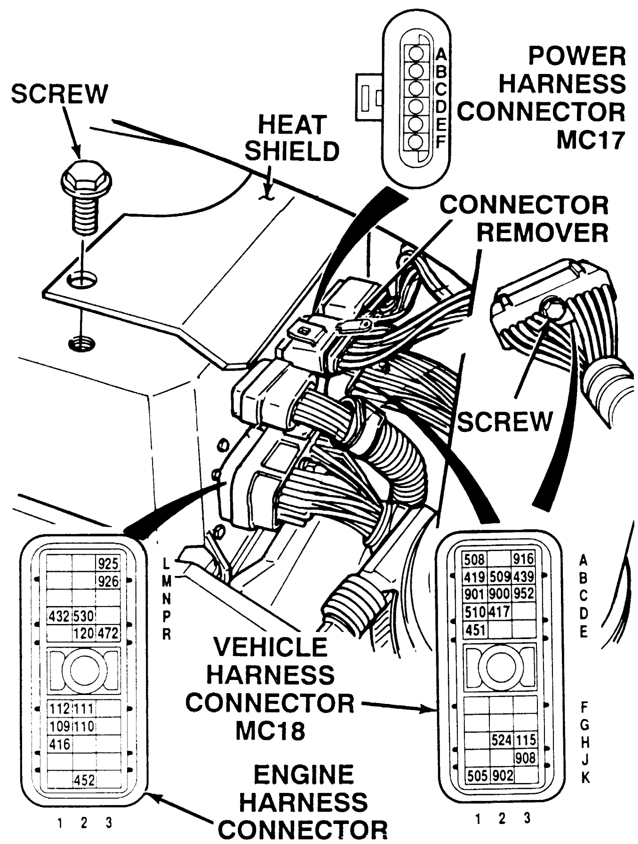
CAUTION

While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2320-364-10).
(2) Remove nut, washer, lockwasher, wires 240 and 241 from battery. Discard lockwasher.
(3) Remove two mounting screws and heat shield from DDEC ECM.
(4) Disconnect power harness connector at DDEC ECM with connector remover.
(5) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM.
(6) Read resistance between wire 432 at engine harness connector, terminal P1 and wire 439 at vehicle harness connector MC18, terminal B3.
  (a) If there are 10,000 ohms or less present, repair wires 432 and/or 439 (see schematic Fig 2-2 and/or 2-3) or notify DS Maintenance and perform Steps (8) through (14) below.
  (b) If there are more than 10,000 ohms present, go to Step (7) below.
(7) Read resistance between wire 432 at engine harness connector, terminal P1 and wires 241 and 240 at power harness connector MC17, terminals A, B, E and F.
  (a) If there are 10,000 ohms or less present, repair wires 432, 241 and/or 240 (see schematic Fig 2-2 and/or 2-3) or notify DS Maintenance and perform Steps (8) through (14) below.
  (b) If there are more than 10,000 ohms present, wires 432, 241 and 240 are OK.
(8) Connect wires 240/241 to battery with lockwasher, washer and nut.
(9) Tighten nut to 23 lb-ft (31 N·m).
(10) Apply corrosion preventive compound on nut.
(11) Install battery box cover.
(12) Connect power harness connector to DDEC ECM.
(13) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.
(14) Install heat shield with two mounting screws to DDEC ECM.





A4 CODE 33 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wire 452 not open.
TBS connector OK.
TBS sensor OK.
Wires 416 and 432 not shorted.
Wires 439, 432, 241 and 240 not shorted.

POSSIBLE PROBLEMS

DDEC ECM connector faulty.
DDEC ECM faulty.

7.

WARNING

Read WARNING on Page 2-273

Are DDEC ECM terminals and harness connectors (DDEC ECM and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals or connectors can affect signal to DDEC ECM.

NO → Repair vehicle harness connector MC18 (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wire 452 not open.
TBS connector OK.
TBS sensor OK.
Wires 416 and 432 not shorted.
Wires 439, 432, 241 and 240 not shorted.
DDEC ECM connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

8.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

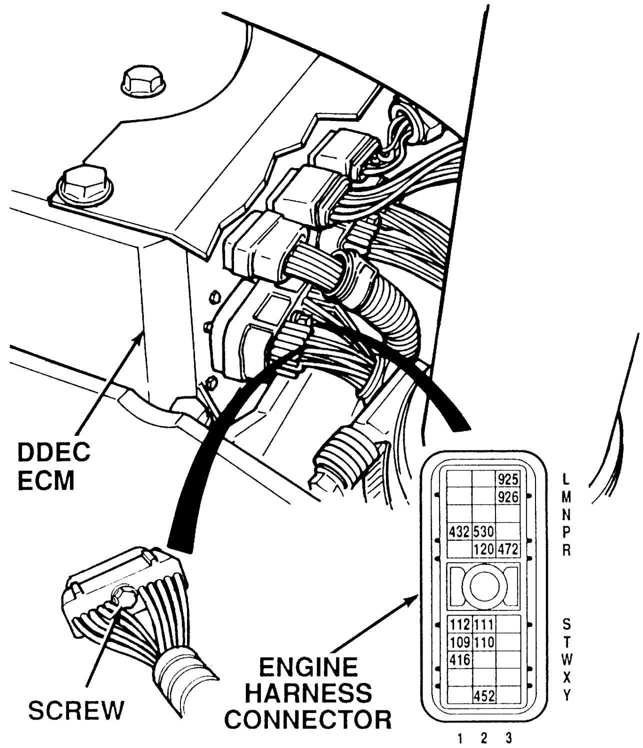
YES → Go to Fault Index (Table 2-16).

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

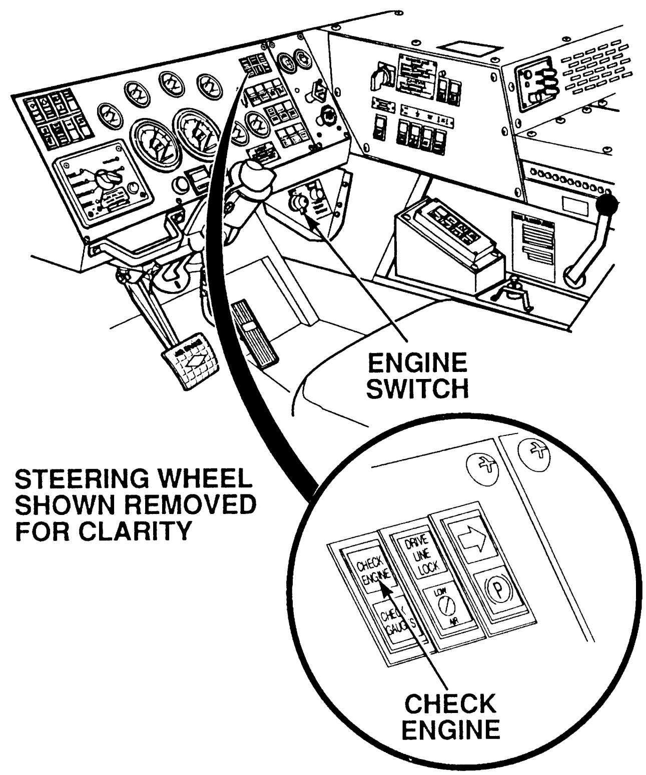
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



VISUAL INSPECTION
(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect engine harness connector to DDEC ECM and tighten screw. (3) Close top engine access cover.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-24). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

TBS connector faulty.
TBS sensor faulty.
Wires 432 and/or 452 are open.
Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

1.

Is Code 34 the only code displayed on DDR?

TEST OPTIONS

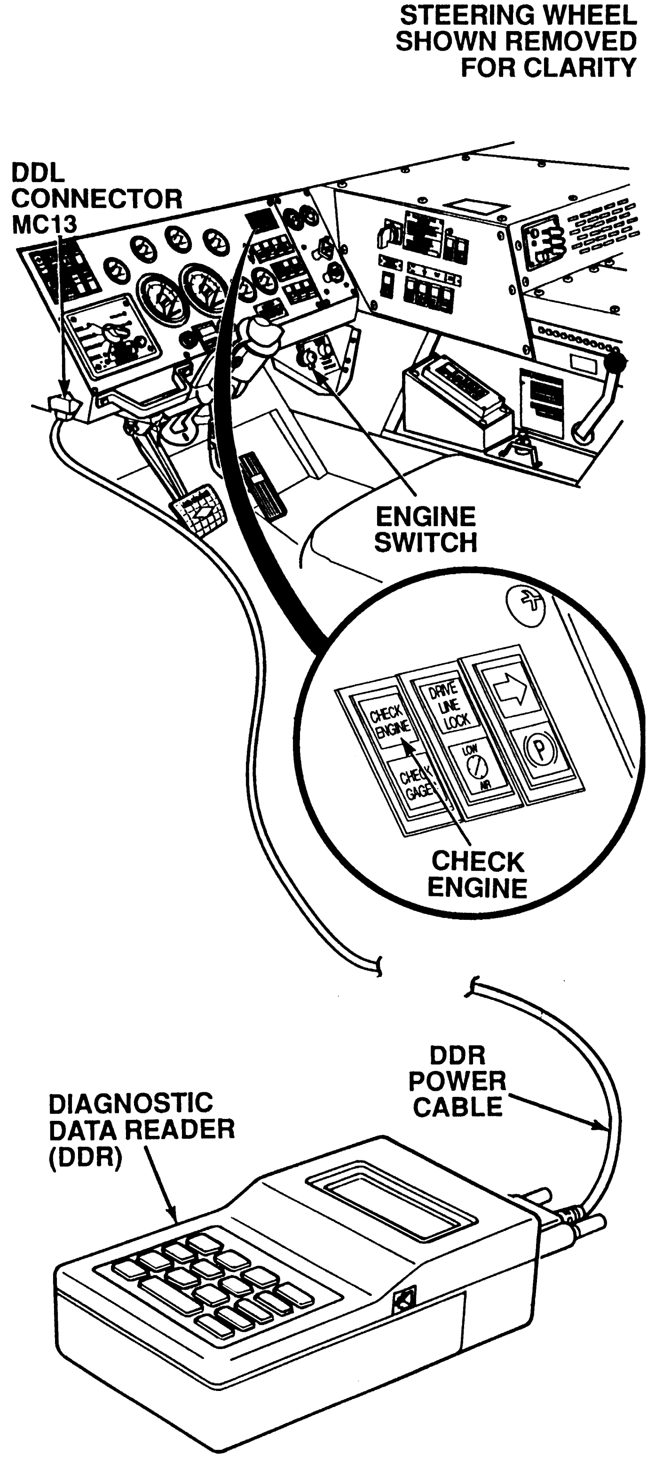
DDR test.

REASON FOR QUESTION

Determine if engine harness is faulty.

NO → For Codes 14, 15, 23, 24 or 34 through 36, go to Fault A5B (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 34 is not the only active code displayed and Codes 14, 15, 23 or 34 through 36 are displayed, turn OFF ENGINE switch and go to Fault A5B (Table 2-16). (b) If Code 34 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

Code 34 only code displayed on DDR.

POSSIBLE PROBLEMS

TBS connector faulty.
TBS sensor faulty.
Wires 432 and/or 452 are open.
Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

2.

WARNING

Read WARNING on Page 2-277

Is Code 33 or any other code displayed on DDR except Code 34 with jumperwire installed between wires 416 and 432 at TBS harness connector, terminals B and C?

NO — For Code 34, go to Step 4 of this Fault.

YES

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Sensor Fault is suspect.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

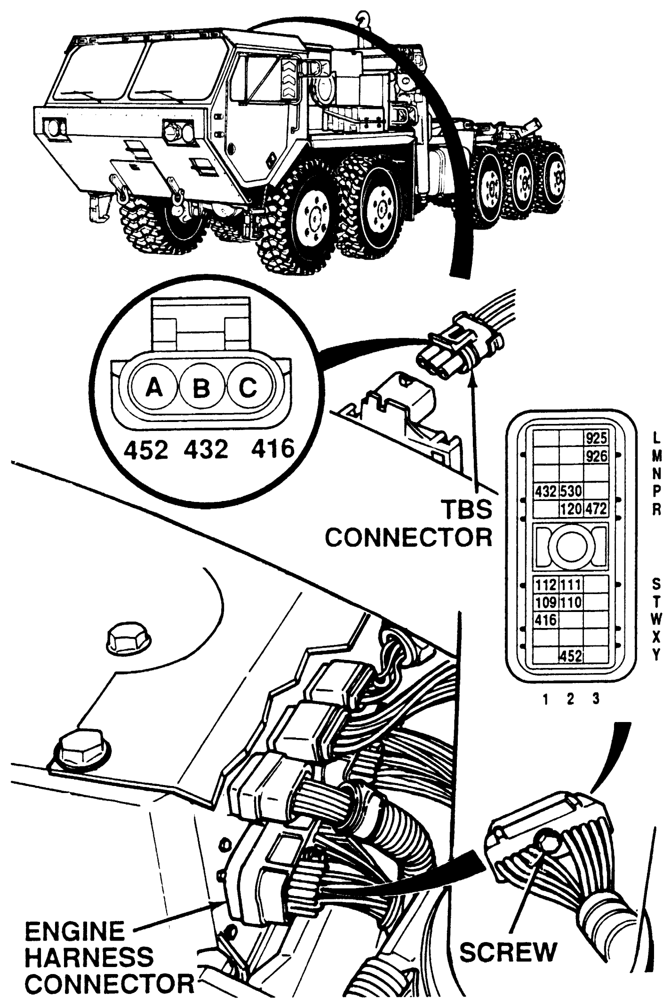
CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

NOTE

If no codes appear on DDR, start engine and run until either the CEL comes ON or the engine has been running at 120 to 160°F (49 to 71°C) for at least one minute at greater than 1,000 RPM.

DDR TEST
(1) Disconnect TBS harness connector. (2) Place jumperwire between terminals B and C at TBS harness connector. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Select MODE 01 (ACTIVE CODES) on DDR. (5) Are codes 33 and/or 34 displayed on DDR. (a) If code 34 and any other is displayed on DDR, turn OFF ENGINE switch and go to Step 4 of this Fault. (b) If code 33 and any other code except code 34 is displayed on DDR, turn OFF ENGINE switch and go to Step 3 of this Fault. (6) Remove jumperwire from TBS harness connector.



A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

Code 34 only code displayed on DDR.

POSSIBLE PROBLEMS

TBS connector faulty.
TBS sensor faulty.
Wires 432 and/or 452 are open.
Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

3.

CAUTION

Read CAUTION on Page 2-279

Are TBS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to TBS.

NO → Repair TBS connectors (Para 7-101). Verify repair, go to Step 9 of this Fault.

YES → Replace TBS sensor (Para 7-63). Verify repair, go to Step 9 of this Fault.

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.

POSSIBLE PROBLEMS

Wires 432 and/or 452 are open.
Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

4.

WARNING

Read WARNING on Page 2-279

Is there 4 to 6 vdc measured at wires 416 to 452 at TBS harness connector, terminals C and A?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Incorrect voltage possible.

NO → If less than 4 volts, go to Step 8 of this Fault.

YES ↓

WARNING

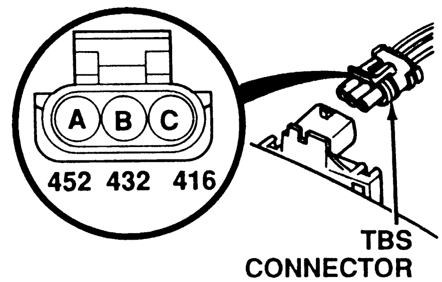
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

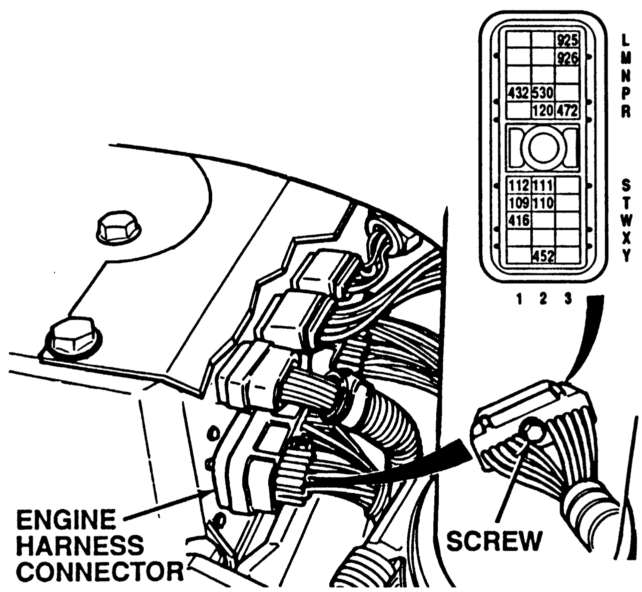
VISUAL INSPECTION

(1) Remove jumperwire.
(2) Check terminals at TBS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If connectors are damaged, repair connectors (Para 7-101).
  (b) If connectors are free of damage, replace TBS (Para 7-63).



VOLTAGE TEST

(1) Remove jumperwire.
(2) Set multimeter select switch to volts dc.
(3) Connect positive (+) multimeter lead to TBS harness connector, terminal A.
(4) Connect negative (–) multimeter lead to TBS harness connector, terminal C.
(5) Turn ON ENGINE switch (TM 9-2320-364-10).
  (a) If there are less than 4 to 6 vdc present, turn OFF ENGINE switch go Step 8 of this Fault.
  (b) If there are 4 to 6 vdc present, turn OFF ENGINE switch and go to Step 5 of this Fault.



A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.

POSSIBLE PROBLEMS

Wires 432 and/or 452 are open.
Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

5.

WARNING

Read WARNING on Page 2-281

Are there 5 ohms or less measured between wires 432 and 452 at engine harness connector, terminals P1 and Y2?

NO

Repair wires 432 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms between terminals P1 and Y2 on the engine harness connector indicates open in signal line wire 432 or return line wire 452.

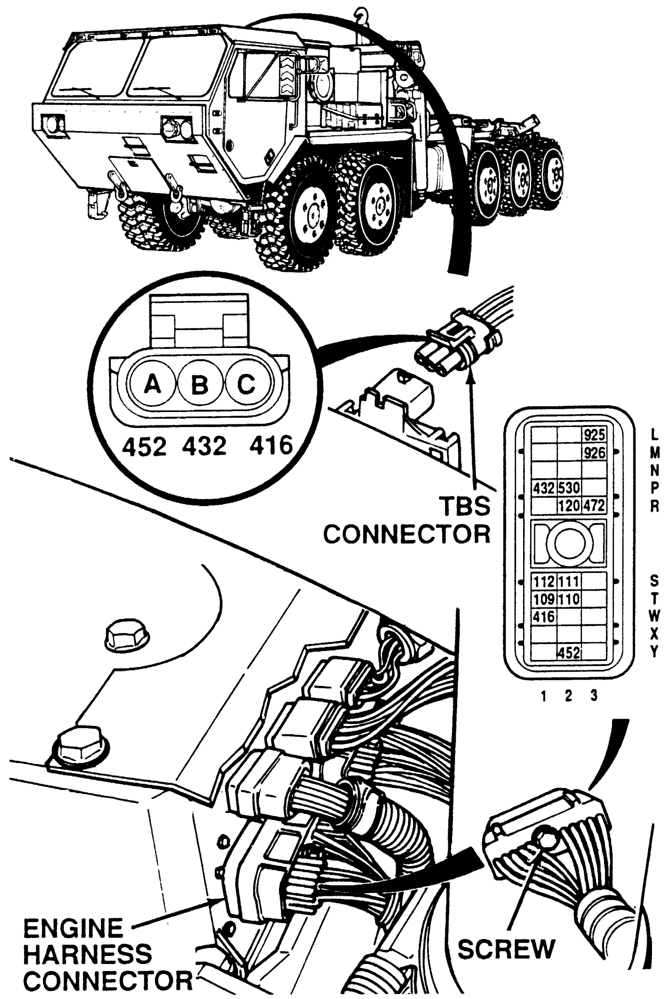
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Place jumperwire between terminals B and A at TBS harness connector. (3) Read resistance between wires 432 and 452 at engine harness connector, terminals P1 and Y2. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 432 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are 5 ohms or less present, remove jumperwire and go to Step 6 of this Fault.



A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.
Wires 432 and 452 are not open.

POSSIBLE PROBLEMS

Wires 432 and/or 452 are shorted.
DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

6.

WARNING

Read WARNING on Page 2-283

Are there more than 10,000 ohms measured between wires 432 and 452 at TBS harness connector, terminals A and B?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Less than or equal to 10,000 ohms at TBS harness connector indicates signal line wire 432 is shorted to return line wire 452.

NO → Repair wires 432 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES → Step 7.

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.
Wires 432 and 452 are not open.
Wires 432 and 452 are not shorted.

POSSIBLE PROBLEMS

DDEC ECM connectors faulty.
DDEC ECM faulty.
Wires 416 and/or 452 are open.

7.

CAUTION

Read CAUTION on Page 2-283

Are DDEC ECM terminals and connectors (DDEC ECM and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to DDEC ECM.

NO → Repair engine harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

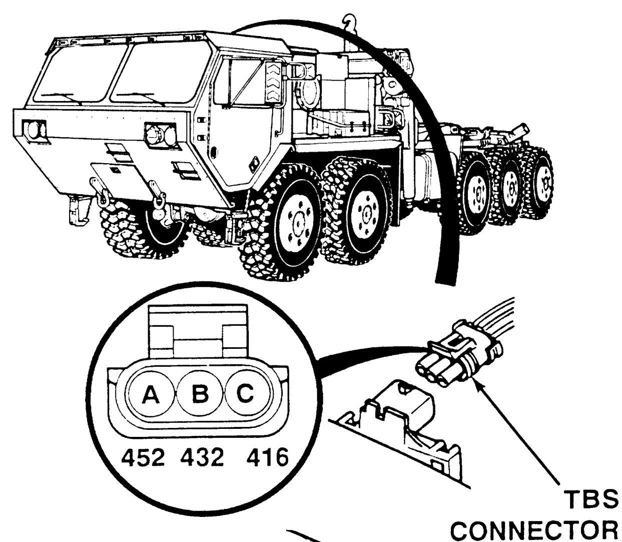
WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

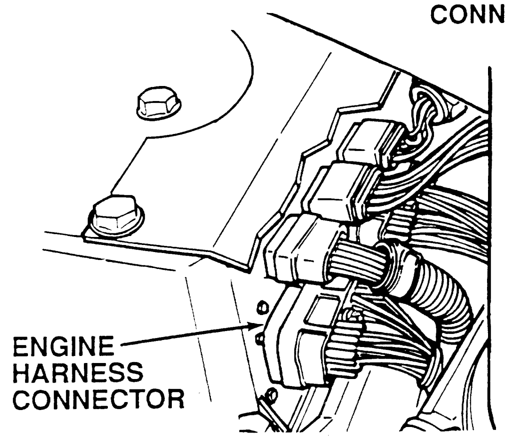
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Remove jumperwire. (2) Read resistance between terminals A and B at TBS harness connector. (a) If there are 10,000 ohms or less present, repair wires 432 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step (3) below. (3) Read resistance between terminal B at TBS harness connector and a known good ground. (a) If there are less than 10,000 ohms present, repair wire 432 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, wires 432 and 452 are OK.



VISUAL INSPECTION
(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connectors are damaged, repair connectors (Para 7-101) and perform Step (2) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If engine harness and DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Close top engine access cover.



A4 CODE 34 TURBO BOOST SENSOR (TBS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.
Wires 432 and 452 are not open.
Wires 432 and 452 are not shorted.
DDEC ECM connectors OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wires 416 and/or 452 are open.

8.

WARNING

Read WARNING on Page 2-285

Are there 5 ohms or less measured between wires 416 and 452 at engine harness connector, terminals W1 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at engine harness connector indicates engine wire 416 (+5 volt line) is open.

NO → Repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

KNOWN INFO

Code 34 only code displayed on DDR.
TBS connector OK.
TBS sensor OK.
Wires 432 and 452 are not open.
Wires 432 and 452 are not shorted.
DDEC ECM connectors OK.
DDEC ECM OK.
Wires 416 and 452 are not open.

POSSIBLE PROBLEMS

9.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

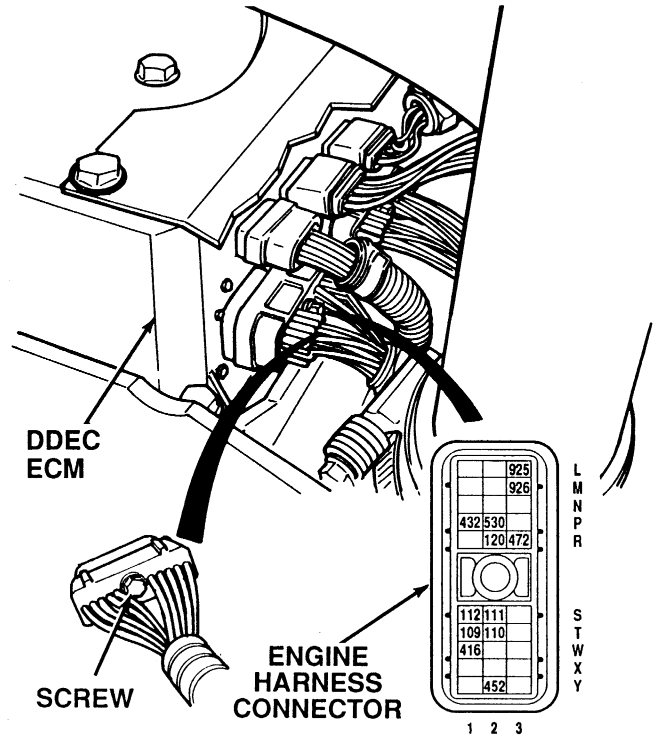
WARNING

Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

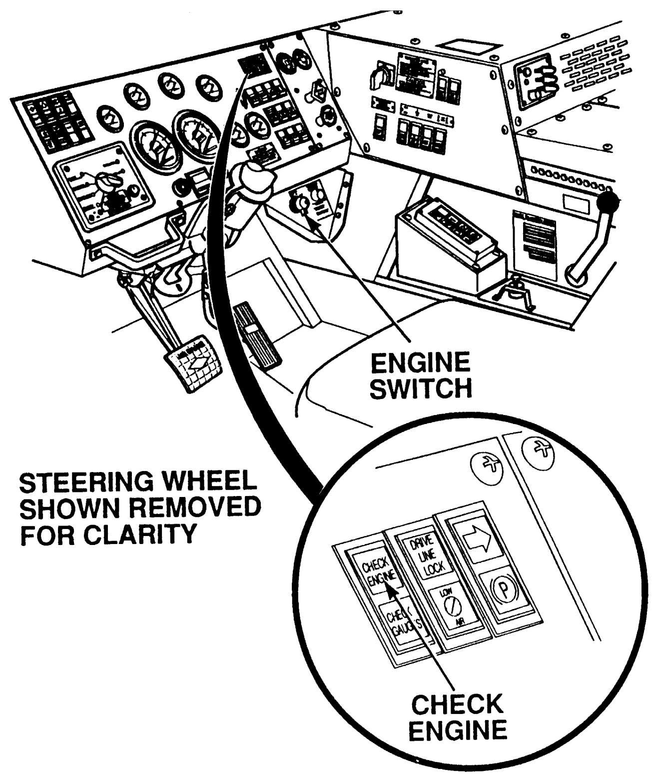
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector from DDEC ECM. (2) Place jumperwire between terminals A and C at TBS harness connector. (3) Read resistance between wires 416 and 452 at engine harness connector, terminals W1 and Y2. (a) If there are more than 5 ohms present, repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance and perform Steps (4) through (7) below. (b) If there are 5 ohms or less present, wires 416 and 452 are OK, perform Steps (4) through (7) below and go to Step 9 of this Fault. (4) Remove jumperwire from TBS harness connector. (5) Connect TBS harness connector. (6) Connect engine harness connector to DDEC ECM and tighten screw. (7) Close top engine access cover.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-24). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 35 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE HIGH.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Wrench, Torque (0 to 175 lb-ft [0 to 237 N·m]) (Item 95, Appendix G)
Jumperwire

Materials/Parts

Compound, Corrosion Preventive (Item 34, Appendix C)
Lockwasher (Item 168, Appendix F)

References

TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)
Right front fender skirt removed, (Para 17-33)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
Wires 530 and/or 452 are open. OPS connector faulty. OPS faulty. Wires 416, 530, 439, 241 and/or 240 shorted. DDEC ECM faulty.

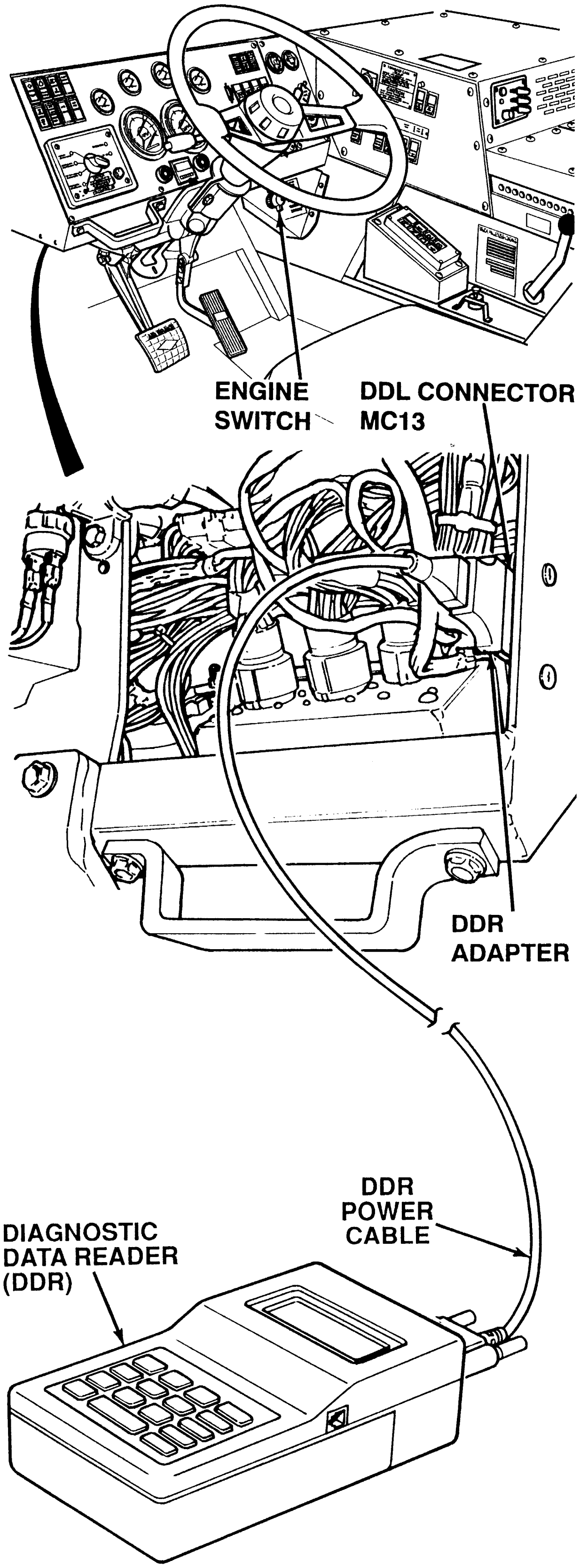
1.

Is Code 35 the only code displayed on DDR?

TEST OPTIONS
DDR TEST.
REASON FOR QUESTION
Determine if engine harness is faulty.

NO → For Codes 14, 15, 23, 24, 33, 34 or 36, go to Fault A5B (Table 2-16).

YES



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 35 is not the only active code displayed and Codes 14, 15, 23, 24, 33, 34 or 36 are displayed, turn OFF ENGINE switch and go to Fault A5B (Table 2-16). (b) If Code 35 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 35 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Code 35 the only code displayed on DDR.

POSSIBLE PROBLEMS

Wires 530 and/or 452 are open.
OPS connector faulty.
OPS faulty.
Wires 416, 530, 439, 241 and/or 240 shorted.
DDEC ECM faulty.

2.

WARNING
Read WARNING on Page 2-289

Is Code 36 or any other codes (except Code 35) displayed on DDR with OPS connector disconnected?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For Code 35, go to Step 5 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Wires 530 and/or 452 are open.
OPS connector faulty.
OPS faulty.
Wires 416, 530, 439, 241 and/or 240 shorted.
DDEC ECM faulty.

3.

CAUTION
Read CAUTION on Page 2-289

Are there 5 ohms or less measured between wires 530 and 452 at engine harness connector, terminals P2 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at engine harness connector indicates open in return line wire 452.

NO → Repair wires 530 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

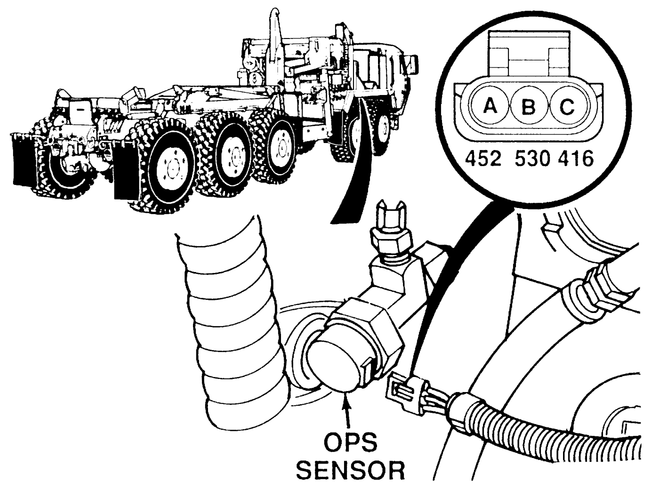
WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

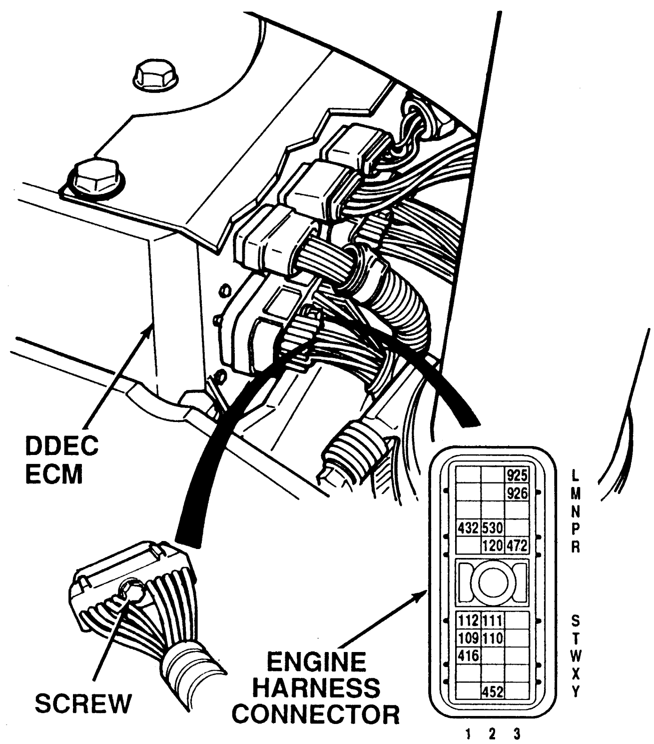
CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

DDR TEST
(1) Disconnect OPS harness connector. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 18 (OIL TEMP) on DDR. (4) Run engine until oil temperature reading is greater than 140°F (60°C). (5) Is Code 36 or any other codes except Code 35 displayed on DDR with OPS connector disconnected. (a) If Code 35 or any other code is displayed, turn OFF ENGINE switch and go to Step 5 of this Fault. (b) If Code 36 and any other code except Code 35 is displayed, turn OFF ENGINE switch and go to Step 3 of this Fault.



RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Place jumperwire between terminals A and B at OPS harness connector. (3) Read resistance between wires 452 and 530 at engine harness connector, terminals P2 and Y2. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 452 and/or 530 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are 5 ohms or less present, wires 452 and 530 are OK. (4) Remove jumperwire.



A4 CODE 35 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 530 and 452 are not open.

POSSIBLE PROBLEMS

OPS connector faulty.
OPS faulty.
Wires 416, 530, 439, 241 and/or 240 shorted.
DDEC ECM faulty.

4.

WARNING
Read WARNING on Page 2-291

Are OPS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to connectors can affect signal to OPS.

NO → Repair OPS connectors (Para 7-101). Verify repair, go to Step 8 of this Fault.

YES → Replace OPS (Para 7-67). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 530 and 452 are not open.
OPS connector OK.
OPS OK.

POSSIBLE PROBLEMS

Wires 416, 530, 439, 241 and/or 240 shorted.
DDEC ECM faulty.

5.

WARNING
Read WARNING on Page 2-291

Are there more than 10,000 ohms measured between wires 416 and 530 on engine harness connector, terminals W1 and P2?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 530 is shorted to engine wire 416 (+5 volt line).

NO → Repair wire 530 or 416 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

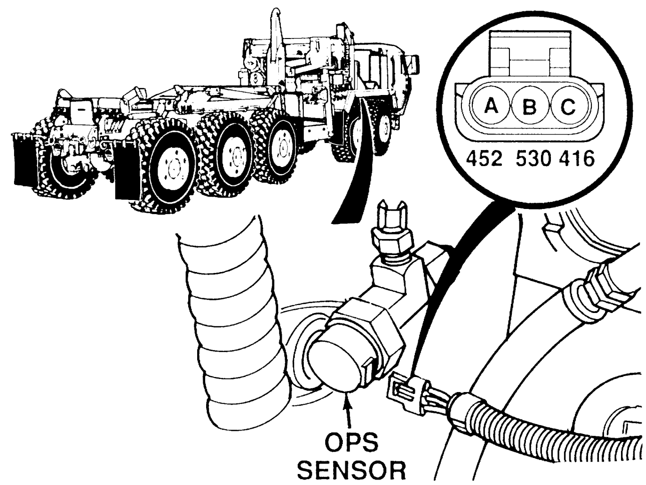
YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

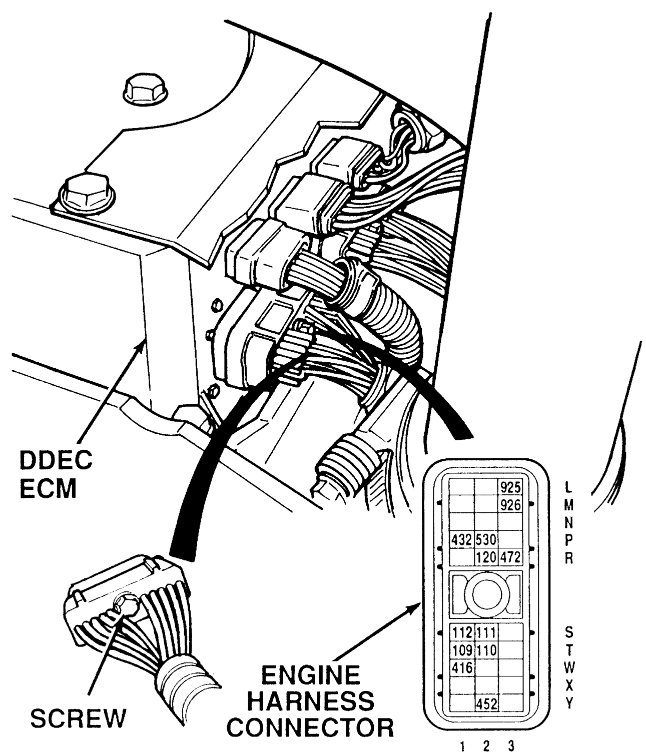


VISUAL INSPECTION

(1) Check terminals at OPS connector (sensor and harness side) for damage; bent, corroded and unseated pins or terminals.
   (a) If connectors are damaged, repair connectors (Para 7-101), perform Steps (2) through (4) below and go to Step 8 of this Fault.
   (b) If connectors are free of damage, replace OPS (Para 7-67), perform Steps (2) through (4) below, and go to Step 8 of this Fault.
(2) Connect OPS harness connector.
(3) Close top engine access cover.
(4) Install right front fender skirt (Para 17-33).

RESISTANCE TEST

(1) Loosen screw and disconnect engine harness connector.
(2) Read resistance between wires 416 and 530 on engine harness connector, terminals W1 and P2.
   (a) If there are less than 10,000 ohms present, repair wires 416 and/or 530 (see schematic Fig 2-2) or notify DS Maintenance.
   (b) If there are more than 10,000 ohms present, wires are OK.



A4 CODE 35 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 530 and 452 are not open.
OPS connector OK.
OPS OK.
Wires 416 and 530 OK.

POSSIBLE PROBLEMS

Wires 439, 241 and/or 240 shorted.
DDEC ECM faulty.

6.

WARNING

Read WARNING on Page 2-293

Are more than 10,000 ohms measured between engine harness connector, terminal P2 and vehicle harness connector, terminal B3 and power harness connector, terminals A, B, E and F?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms or an open circuit at vehicle harness, engine harness or power connectors indicates a short between terminals where measured.

NO → Repair wires 439, 241 and/or 240 (see schematic Fig 2-1, 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2302-364-10).

(2) Remove nut, washer, lockwasher and wires 240/241 from battery. Discard lockwasher.

(3) Remove two mounting screws and heat shield from DDEC ECM.

(4) Disconnect power harness connector MC17 with connector remover.

(5) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.

(6) Read resistance between engine harness connector, terminal P2 and wire 439 at vehicle harness connector MC18, terminal B3.

- (a) If less than 10,000 ohms are present, repair wire 439 (see schematic Fig 2-1 and/or Fig 2-2) or notify DS Maintenance and perform Steps (8) through (17) below.
- (b) If there are more than 10,000 ohms present, wire 439 is OK. Perform Step (7) below.

(7) Read resistance between engine harness connector, terminal P2 and wires 241 and 240 at power harness connector MC17, terminals A, B, E and F.

- (a) If less than 10,000 ohms are present, repair wires 241 and/or 240 (see schematic Fig 2-1 and/or Fig 2-2) or notify DS Maintenance. Perform Steps (8) through (17) below.
- (b) If more than 10,000 ohms are present, wires are OK. Go to Step 7 of this Fault.

(8) Connect engine harness connector to DDEC ECM and tighten screw.

(9) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.

(10) Connect power harness connector MC17 to DDEC ECM.

(11) Install heat shield with two mounting screws on DDEC ECM.

(12) Connect wires 240/241 to battery with lockwasher, washer and nut.

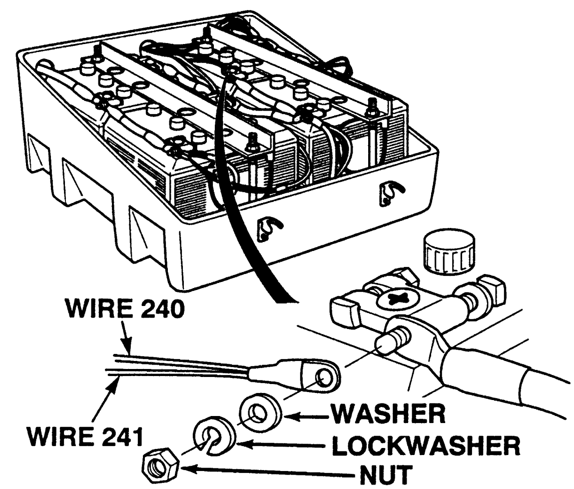
(13) Tighten nut to 23 lb-ft (31 N·m).

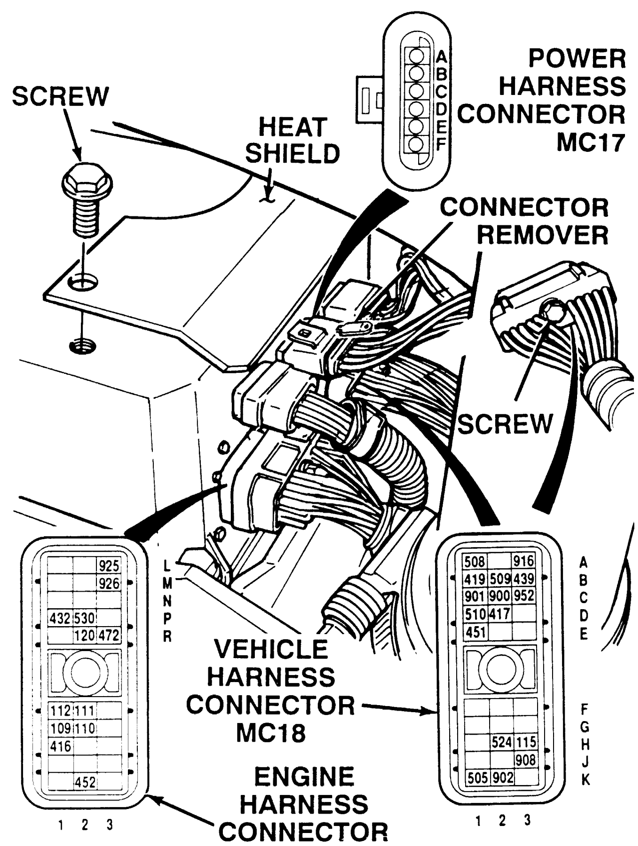
(14) Apply corrosion preventive compound on nut.

(15) Install battery box cover.

(16) Close top engine access cover.

(17) Install right front fender skirt (Para 17-33).





A4 CODE 35 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE HIGH (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 530 and 452 are not open.
OPS connector OK.
OPS OK.
Wires 416, 530, 439, 241 and 240 not shorted.

POSSIBLE PROBLEMS

DDEC ECM faulty.

7.

WARNING

Read WARNING on Page 2-295

Is Code 35 displayed on DDR with all connectors reconnected?

NO → If other codes are displayed, go to Fault Index (Table 2-16). If no codes are displayed, go to Step 8 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

TEST OPTIONS

DDR test.

REASON FOR QUESTION

DDEC ECM is suspect.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Wires 530 and 452 are not open.
OPS connector OK.
OPS OK.
Wires 416, 530, 439, 241 and 240 not shorted.
DDEC ECM OK.

POSSIBLE PROBLEMS

8.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

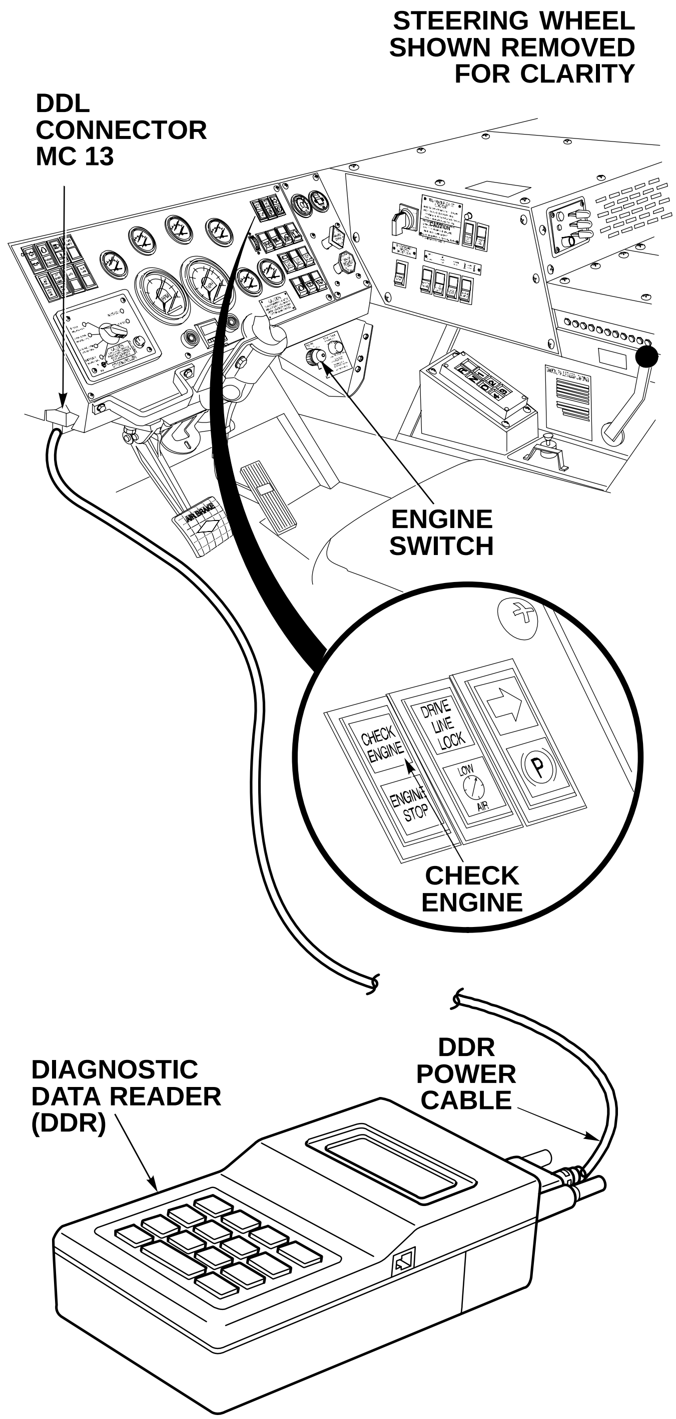
If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

DDR TEST
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Select MODE 40 (CLEAR CODES) on DDR (Para 2-11). (3) Start engine (TM 9-2320-364-10). (4) Run engine for one minute or until CHECK ENGINE light (CEL) comes ON. (5) Select MODE 01 (ACTIVE CODES) on DDR. (6) Is Code 35 or any other codes displayed on DDR. (a) If any other code (except Code 35) appears on DDR, turn OFF ENGINE switch, and go to Fault Index (Table 2-16). (b) If Code 35 is displayed on DDR, turn OFF ENGINE switch, and replace DDEC ECM (Para 7-56).

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Wrench, Torque (0 to 175 lb-ft [0 to 237 N·m]) (Item 95, Appendix G)
Jumperwire

Materials/Parts
Compound, Corrosion Preventive (Item 34, Appendix C)
Lockwasher (Item 168, Appendix F)

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)
Right front fender skirt removed, (Para 17-33)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

OPS connector faulty.
OPS faulty.
Wire 530 is open.
Wires 530 and/or 452 are shorted.
DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

1.

Is Code 36 the only code displayed on DDR?

TEST OPTIONS

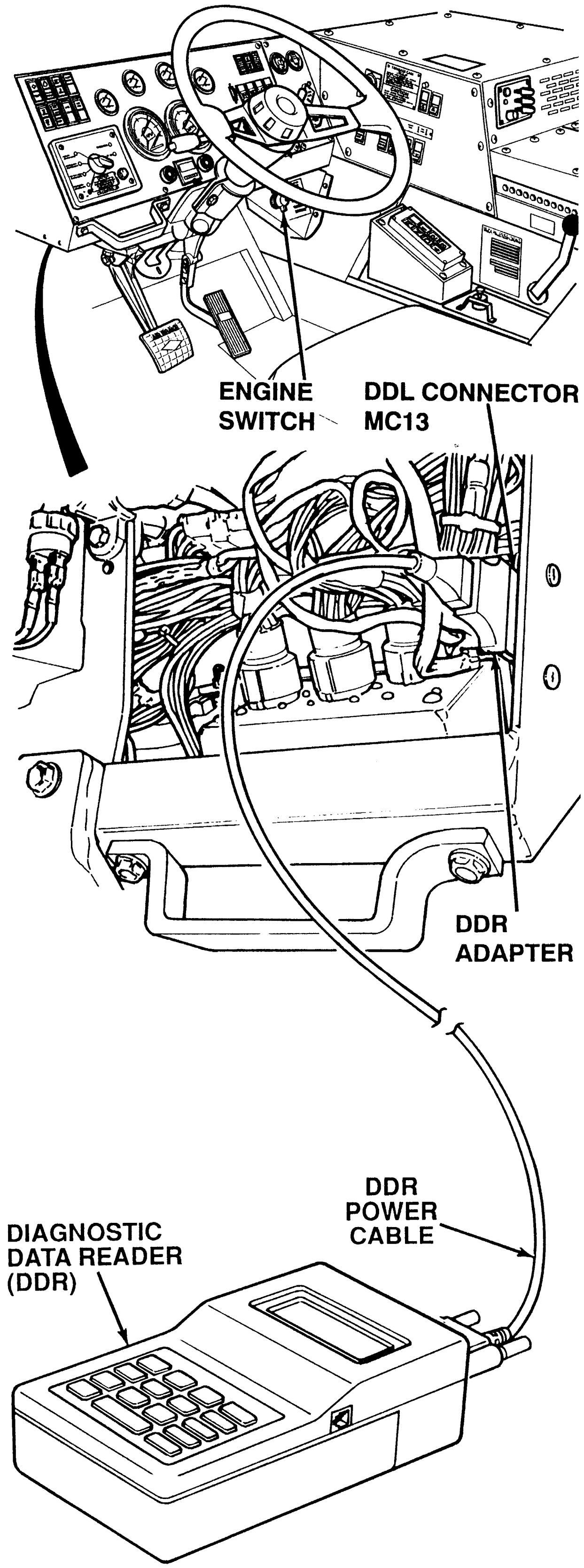
DDR TEST.

REASON FOR QUESTION

Determine if engine harness is faulty.

NO → For Codes 14, 15, 23, 24 or 33-35, go to Fault A5B (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If there are codes other than Code 36 displayed, turn OFF ENGINE switch go to Fault A5B (Table 2-16). (b) If there are no other codes displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
OPS connector faulty. OPS faulty. Wire 530 is open. Wires 530 and/or 452 are shorted. DDEC ECM harness connector faulty. Wires 416 and/or 452 are open. Wires 416 and/or 452 are shorted. Wires 530, 439, 241 and/or 240 are shorted.

2.

WARNING

Read WARNING on Page 2-299

Is Code 35 (and any other code except Code 36) displayed on DDR with jumperwire installed between wires 530 and 416 at OPS harness connector, terminals B and C?

NO → Go to Step 4 of this Fault.

YES ↓

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

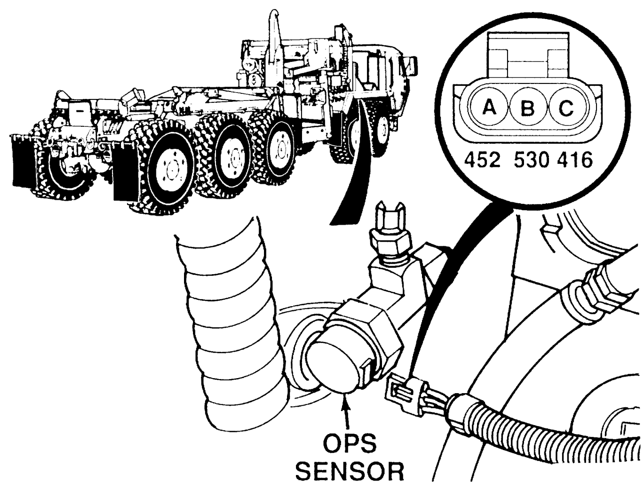
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

DDR TEST
(1) Disconnect OPS harness connector. (2) Place jumperwire between terminals B and C at OPS harness connector. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Select MODE 01 (ACTIVE CODES) on DDR. (5) Is Code 35 or any other codes displayed on DDR. (a) If Code 36 or any other code is displayed on DDR, turn OFF ENGINE switch, remove jumperwire and go to Step 4 of this Fault. (b) If Code 35 or any other code except Code 36 is displayed on DDR, turn OFF ENGINE switch, remove jumperwire and go to Step 3 of this Fault.



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

OPS connector faulty.
OPS faulty.
Wire 530 is open.
Wires 530 and/or 452 are shorted.
DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

3.

WARNING

Read WARNING on Page 2-301

Are OPS terminals and connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to OPS.

NO → Repair OPS connectors (Para 7-101). Verify repair, go to Step 12 of this Fault.

YES → Replace OPS (Para 7-67). Verify repair, go to Step 12 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.

POSSIBLE PROBLEMS

Wire 530 is open.
Wires 530 and/or 452 are shorted.
DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

4.

WARNING

Read WARNING on Page 2-301

Is there 4 to 6 vdc measured from wire 416 to 452 at OPS harness connector, terminals C to A?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Incorrect voltage possible.

NO → If less than 4 volts, go to Step 8 of this Fault. If more than 6 volts, go to Step 10 of this Fault.

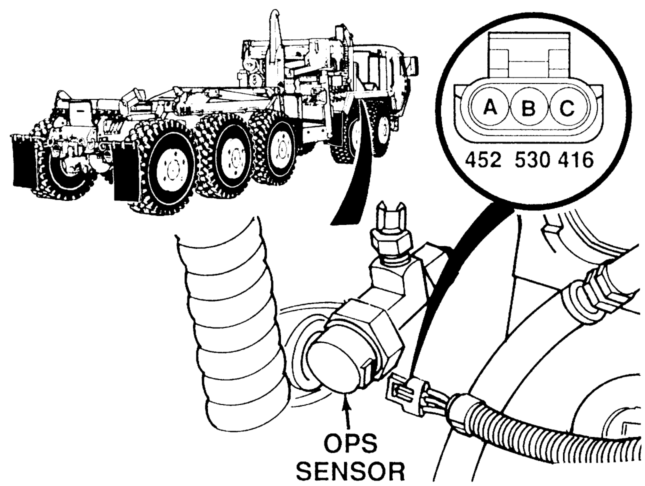
YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

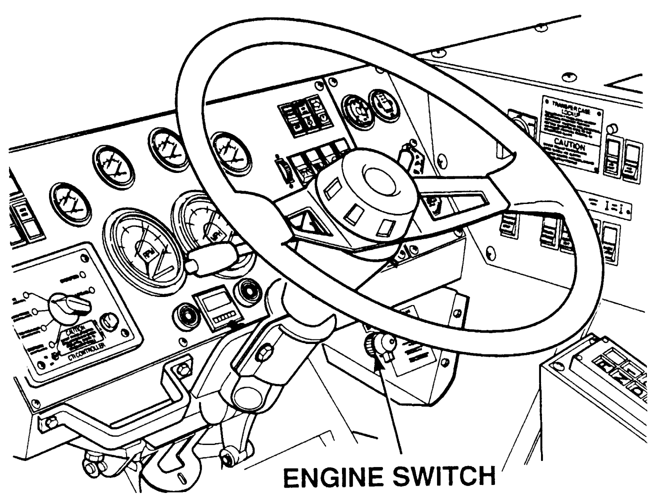
VISUAL INSPECTION

(1) Check terminals at OPS connector sensor and harness side for damage; bent, corroded and unseated pins or terminals.
   (a) If connectors are damaged, repair connectors (Para 7-101).
   (b) If connectors are free of damage, replace OPS (Para 7-67).
(2) Close top engine access cover.
(3) Install right front fender skirt (Para 17-33).



VOLTAGE TEST

(1) Set multimeter select switch to volts dc.
(2) Connect positive (+) multimeter lead to OPS harness connector, terminal A.
(3) Connect negative (–) multimeter lead to OPS harness connector, terminal C.
(4) Turn ON ENGINE switch (TM 9-2320-364-10).
   (a) If there are less than 4 vdc present, turn OFF ENGINE switch and go to Step 8 of this Fault.
   (b) If there are more than 6 vdc present, go to Step 10 of this Fault.
   (c) If there are 4 to 6 vdc present, turn OFF ENGINE switch and go to Step 5 of this Fault.



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.

POSSIBLE PROBLEMS

Wire 530 is open.
Wires 530 and/or 452 are shorted.
DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

5.

CAUTION
Read CAUTION on Page 2-303

Are there 5 ohms or less measured between wires 530 and 452 at engine harness connector, terminals P2 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at OPS harness connector indicates open signal line wire 530.

NO → Repair wire 530 or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.

POSSIBLE PROBLEMS

Wires 530 and/or 452 are shorted.
DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

6.

WARNING
Read WARNING on Page 2-303

Are there more than 10,000 ohms or an open circuit measured between wires 452 and 530 at OPS harness connector, terminals A and B?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at OPS harness connector indicates signal line wire 530 is shorted to return line wire 452 or ground.

NO → Repair wires 452 and/or 530 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

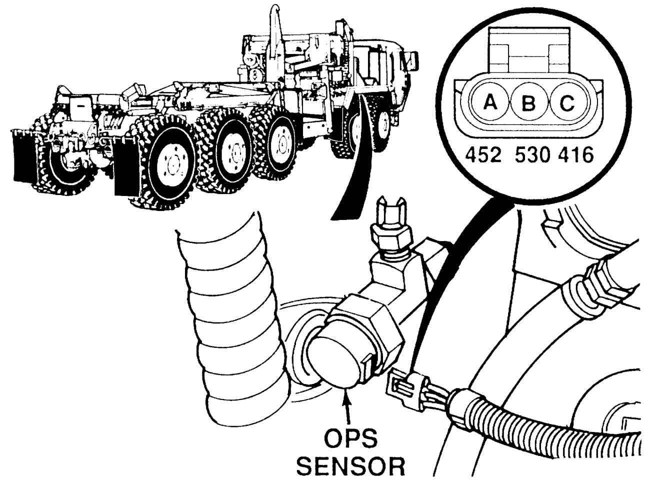
YES ↓

WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

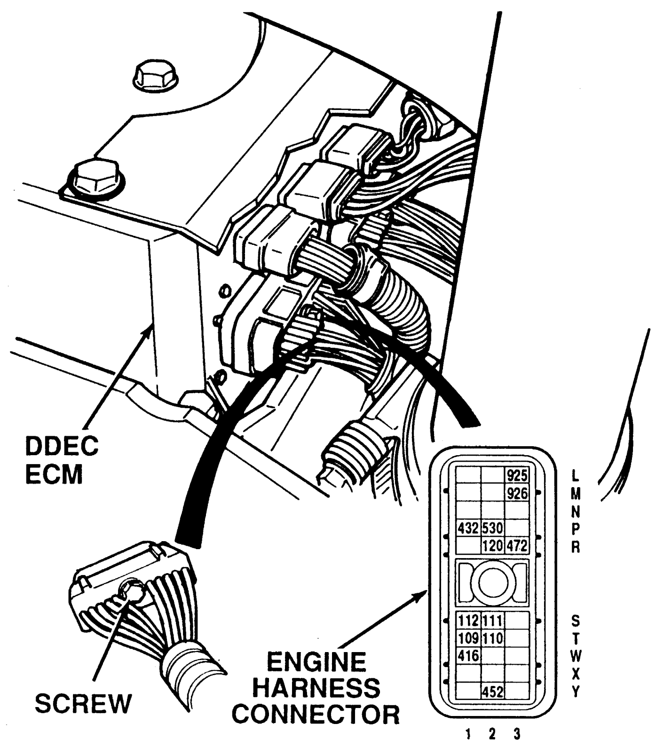
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Place jumperwire between terminals A and B at OPS harness connector. (3) Set multimeter select switch to ohms. (4) Read resistance between wires 452 and 530 at engine harness connector, terminals P2 and Y2. (a) If there are more than 5 ohms present, perform Step (5) below and repair wires 452 and/or 530 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are 5 ohms or less present, wires 452 and 530 are OK. (5) Remove jumperwire.

RESISTANCE TEST
(1) Read resistance between wires 452 and 530 at OPS harness connector, terminals A and B. (a) If there are less than 10,000 ohms present, repair wires 452 and/or 530 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step (2) below. (2) Read resistance between wires 530 and 452 at OPS harness connector, terminal B and A and a known good ground. (a) If there are less than 10,000 ohms present, repair wire 530 or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, wires 530 and 452 are OK.



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
Wire 530 and 452 not shorted.

POSSIBLE PROBLEMS

DDEC ECM harness connector faulty.
Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.

7.

CAUTION
Read CAUTION on Page 2-305

Are DDEC ECM terminals and connectors (DDEC ECM and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals can affect signal to DDEC ECM.

NO → Repair DDEC ECM harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 12 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 12 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
DDEC ECM harness connector is OK.

POSSIBLE PROBLEMS

Wires 416 and/or 452 are open.
Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.
Wires 530 and/or 452 are shorted.

8.

CAUTION
Read CAUTION on Page 2-305

Are there 5 ohms or less measured between wires 416 and 452 at engine harness connector, terminals W1 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at engine harness connector indicates wire 416 (+5 volt line) is open.

NO → Repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

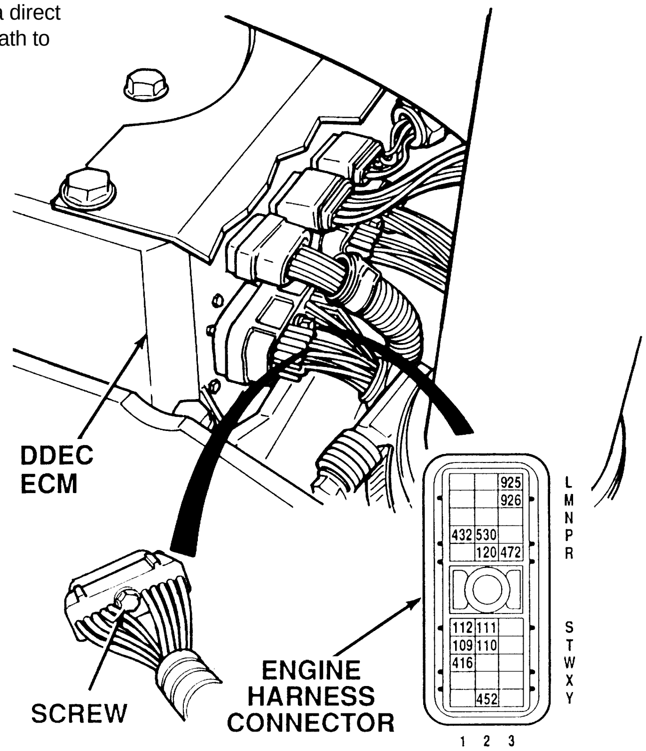
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

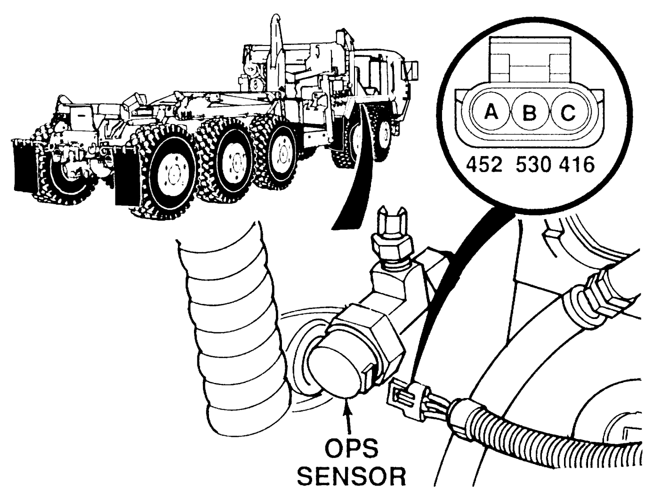
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Check terminal at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If engine harness connector is damaged, repair connector (Para 7-101), and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If engine harness and DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Close top engine access cover. (3) Install right front fender skirt (Para 17-33).



RESISTANCE TEST
(1) Place jumperwire between terminals A and C at OPS harness connector. (2) Read resistance at wires 416 and 452 at engine harness connector, terminals W1 and Y2. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are less than 5 ohms present, wires 416 and 452 are OK. (3) Remove jumperwire.



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
DDEC ECM harness connector OK.
Wires 416 and 452 are not open.

POSSIBLE PROBLEMS

Wires 416 and/or 452 are shorted.
Wires 530, 439, 241 and/or 240 are shorted.
Wires 530 and/or 452 are shorted.

9.

WARNING

Read WARNING on Page 2-307

Are there more than 10,000 ohms or an open circuit measured between wires 452 and 416 at OPS harness connector, terminals A and C?

NO → Repair wires 452 and/or 416 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

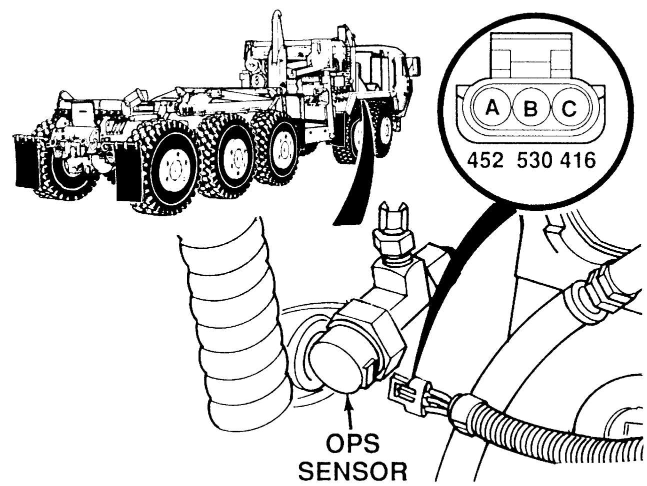
REASON FOR QUESTION

Less than 10,000 ohms at OPS harness connector indicates wire 416 (+5 volt line) is shorted to return line wire 452.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST
(1) Read resistance between wires 452 and 416 at OPS harness connector, terminals A and C. (a) If there are less than 10,000 ohms present, repair wires 452 and/or 416 (see schematic Fig 2-2) or notify DS Maintenance and perform Step (2) below. (b) If there are more than 10,000 ohms present, wires are OK. (2) Connect OPS harness connector.



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
DDEC ECM harness connector OK.
Wires 416 and 452 are not open.
Wires 416 and 452 are not shorted.

POSSIBLE PROBLEMS

Wires 530, 439, 241 and/or 240 are shorted.
Wires 530 and/or 452 are shorted.

10.

WARNING

Read WARNING on Page 2-309

Are less than 10,000 ohms measured between engine harness connector, terminal P2 and vehicle harness connector, terminals B3 and power harness connector, terminals A, B, E and F?

NO → Repair wires 530, 439, 241 and/or 240 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or 10,000 ohms at vehicle harness, engine harness or power connectors indicates a short between terminals where measured.

WARNING

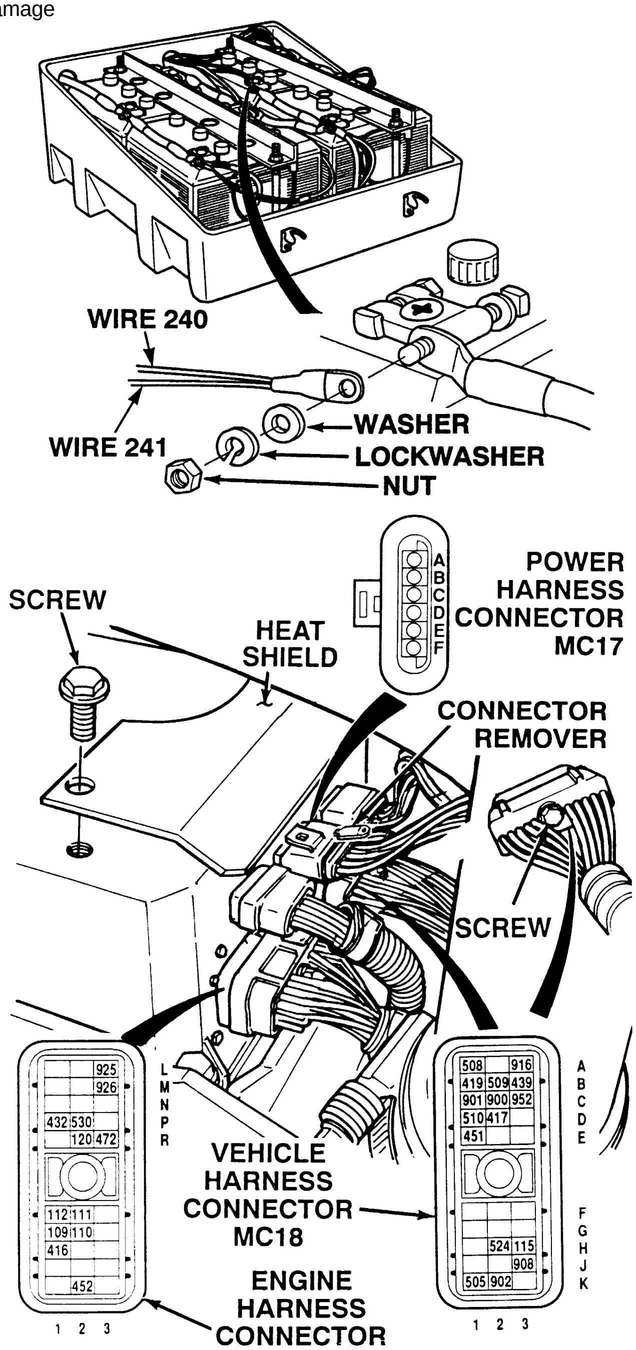
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2320-364-10).
(2) Remove nut, washer, lockwasher and wires 240/241 from battery. Discard lockwasher.
(3) Remove two mounting screws and heat shield from DDEC ECM.
(4) Disconnect power harness connector MC17 with connector remover.
(5) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.
(6) Read resistance between wire 530 at engine harness connector, terminal P2 and wire 439 at vehicle harness connector MC18, terminal B3.
  (a) If there are less than 10,000 ohms present, repair wires 530 and/or 439 (see schematic Fig 2-1, Fig 2-2) or notify DS Maintenance and perform Steps (8) through (15) below.
  (b) If there are more than 10,000 ohms present, go to Step (7) below.
(7) Read resistance between wire 530 at engine harness connector, terminal P2 and wires 241 and 240 at power harness connector MC17, terminals A, B, E and F.
  (a) If there are less than 10,000 ohms present, repair wires 530, 241 and/or 240 (see schematic Fig 2-1, Fig 2-2) or notify DS Maintenance and perform Steps (8) through (15) below.
  (b) If there are more than 10,000 ohms present, wires are OK.
(8) Connect vehicle harness connector MC18 and tighten screw.
(9) Connect power harness connector MC17.
(10) Install heat shield with two mounting screws to DDEC ECM.
(11) Connect wires 240/241 to battery with lockwasher, washer and nut.
(12) Tighten nut to 23 lb-ft (31 N·m).
(13) Apply corrosion preventive compound on nut.
(14) Install battery box cover.
(15) Install right front fender skirt (Para 17-33).



A4 CODE 36 OIL PRESSURE SENSOR (OPS) SIGNAL VOLTAGE LOW (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
DDEC ECM harness connector OK.
Wires 416 and 452 are not open.
Wires 416 and 452 are not shorted.
Wires 530, 439, 241 and 240 are not shorted.

POSSIBLE PROBLEMS

Wires 530 and/or 452 are shorted.

11.

WARNING

Read WARNING on Page 2-311

Are there more than 10,000 ohms or an open circuit measured between wires 530 and 452 at engine harness connector, terminals P2 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at engine harness indicates signal line wire 530 and return line wire 452 are shorted together.

NO → Repair wires 530 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES → Step 12.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
OPS connector OK.
OPS OK.
Wire 530 is not open.
DDEC ECM harness connector OK.
Wires 416 and 452 are not open.
Wires 416 and 452 are not shorted.
Wires 530, 439, 241 and 240 are not shorted.
Wires 530 and 452 are not shorted.

POSSIBLE PROBLEMS

12.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

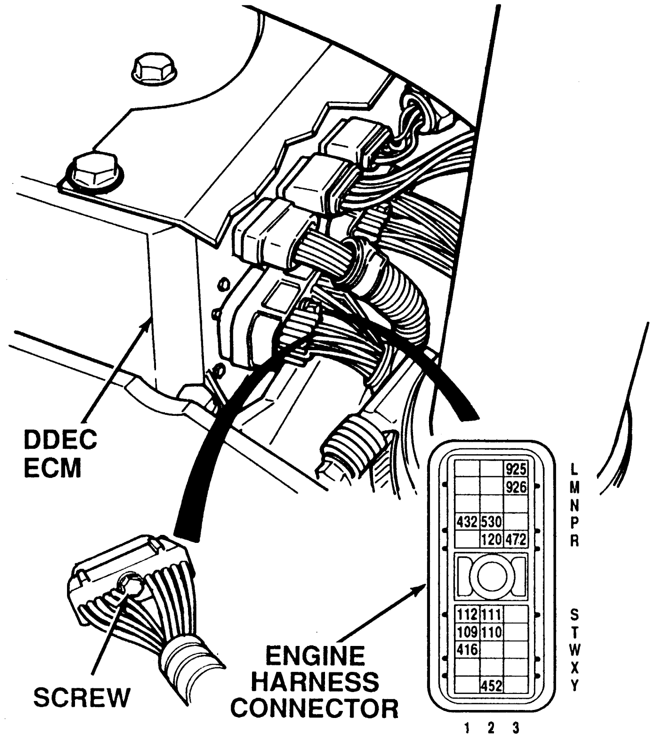
NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

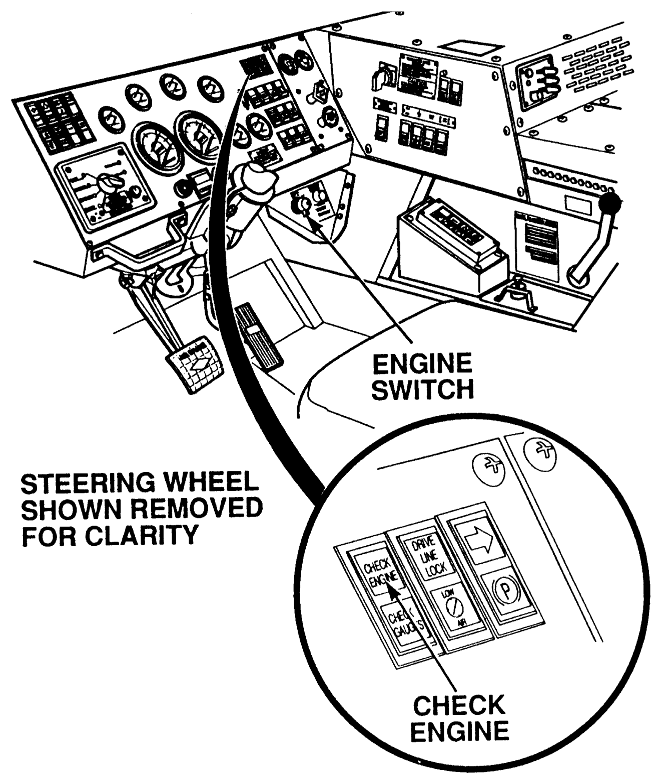
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST
(1) Read resistance between wires 530 and 452 at engine harness connector, terminals P2 and Y2. (a) If there are less than 10,000 ohms present, repair wires 530 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance and perform Step (2) below. (b) If there are more than 10,000 ohms present, wires are OK. (2) Connect engine harness connector and tighten screw. (3) Close top engine access cover.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 41 TIMING REFERENCE SENSOR (TRS).

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
DDEC ECM connector faulty. DDEC ECM faulty. Wires 109 and/or 110 are shorted. Wires 109 and/or 110 are open. TRS connector faulty. TRS faulty.

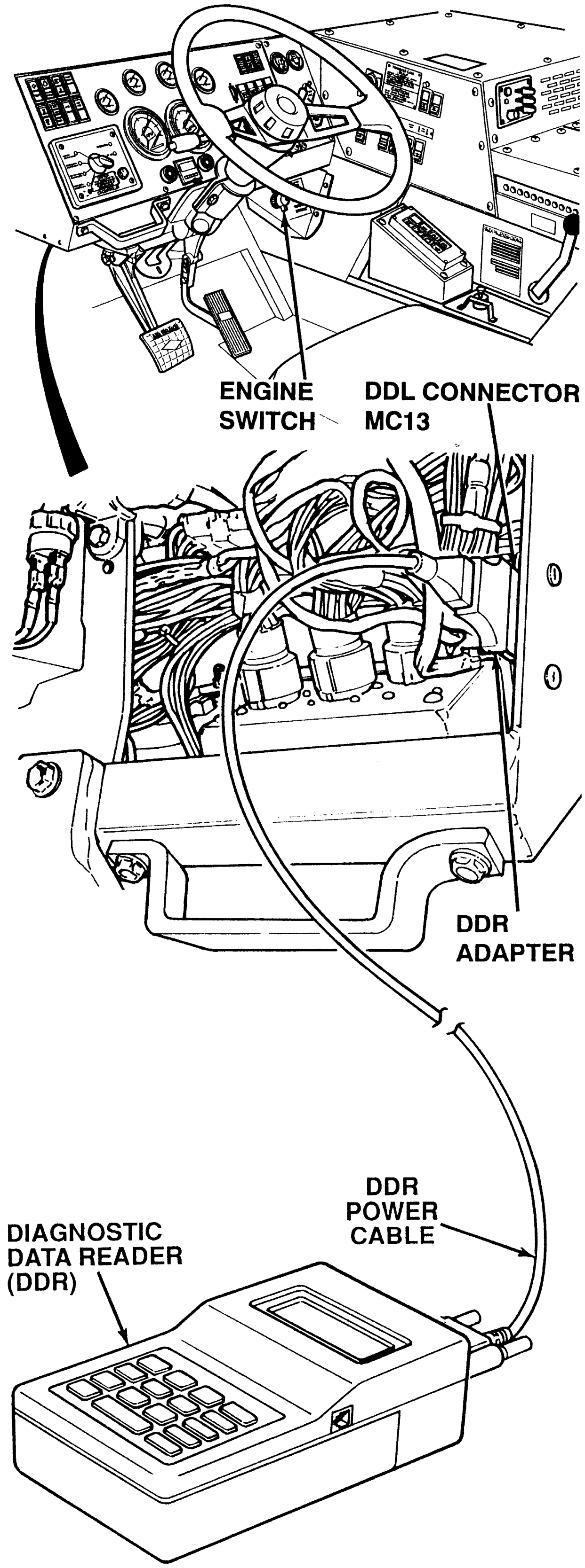
1.

Is Code 41 the only code displayed on DDR?

TEST OPTIONS
DDR TEST.
REASON FOR QUESTION
Isolate Fault.

NO → For both Codes 41 and 42, go to Step 3 of this Fault. Other codes, go to Fault Index (Table 2-16).

YES



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 41 is not the only active code displayed and Codes 41 and/or 42 is displayed, turn OFF ENGINE switch and go to Step 3 of this Fault. For any other codes displayed, go to Fault Index (Table 2-16). (b) If Code 41 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 41 TIMING REFERENCE SENSOR (TRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM connector faulty.
DDEC ECM faulty.
Wires 109 and/or 110 are shorted.
Wires 109 and/or 110 are open.
TRS connector faulty.
TRS faulty.

2.

WARNING
Read WARNING on Page 2-315

Are 200 ohms or less measured between wires 109 and 110 at engine harness connector, terminals T1 and T2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 100 ohms or greater than 200 ohms at DDEC ECM engine harness connector indicates TRS sensor or wiring faulty.

NO → More than 200 ohms, go to Step 5 of this Fault.

YES → Less than 200 ohms, go to Step 4 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM connector faulty.
DDEC ECM faulty.
Wires 109 and/or 110 are shorted.
Wires 109 and/or 110 are open.
TRS connector faulty.
TRS faulty.

3.

CAUTION
Read CAUTION on Page 2-315

Are DDEC ECM terminals and connectors (DDEC ECM and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to DDEC ECM.

NO → Repair engine harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

WARNING

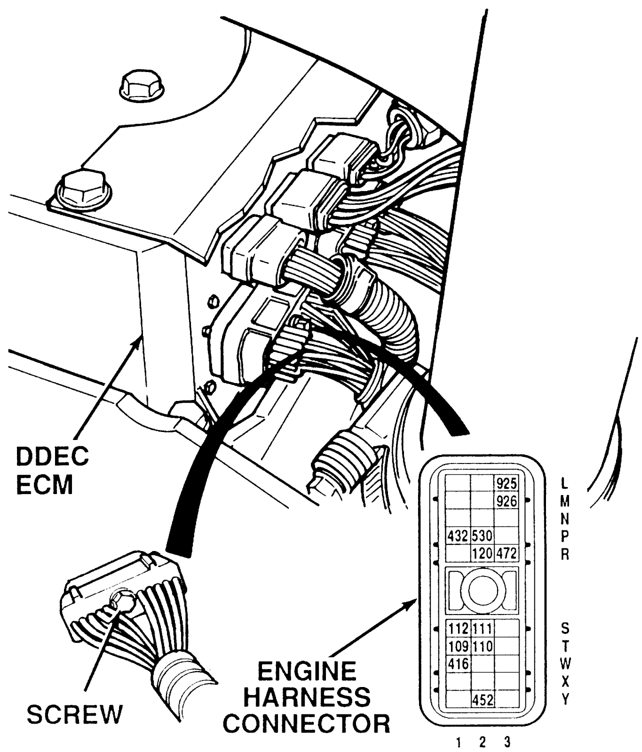
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST

(1) Loosen screw and disconnect engine harness connector at DDEC ECM.
(2) Read resistance between wires 109 and 110 at engine harness connector, terminals T1 and T2.
  (a) If there are 200 ohms or less present, go to Step 4 of this Fault.
  (b) If there are more than 200 ohms present, go to Step 5 of this Fault.



VISUAL INSPECTION

(1) Check terminals at engine harness connector (DDEC ECM and engine harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If engine harness connector is damaged, repair connector (Para 7-101).
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) If engine harness connector and DDEC ECM connector are OK, replace DDEC ECM (Para 7-56).
(2) Close top engine access cover.

A4 CODE 41 TIMING REFERENCE SENSOR (TRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wires 109 and/or 110 are shorted.
Wires 109 and/or 110 are open.
TRS connector faulty.
TRS faulty.

4.

WARNING

Read WARNING on Page 2-317

Are there more than 10,000 ohms measured between wires 109 and 110 at engine harness connector, terminals T1 and T2?

NO → Repair wires 109 and/or 110 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

TEST OPTIONS

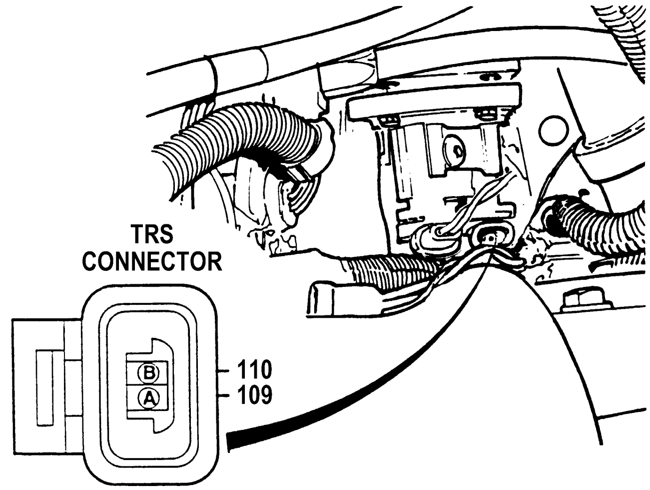
Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

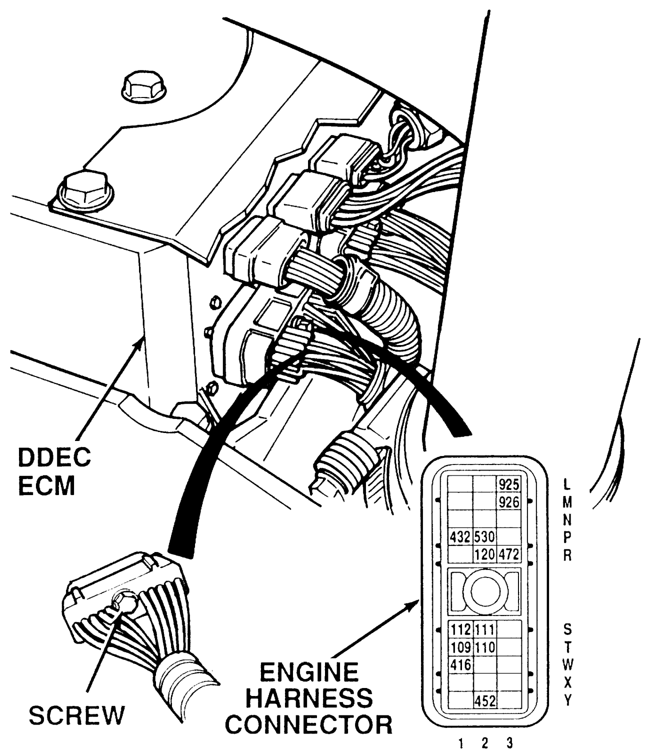
Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 110 and return line wire 109 are shorted together.

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.



RESISTANCE TEST
(1) Remove DDEC ECM (Para 7-56). (2) Disconnect TRS harness connector. (3) Read resistance between wires 109 and 110 at engine harness connector, terminals T1 and T2. (a) If there are less than 10,000 ohms present, repair wires 109 and/or 110 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step (4) below. (4) Read resistance between wires 109 and 110 between engine harness connector, terminals T1 and T2 and a known good ground. (a) If there are less than 10,000 ohms present, repair wires 109 and/or 110 (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms present, go to Step 5 of this Fault.



A4 CODE 41 TIMING REFERENCE SENSOR (TRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM connector OK.
DDEC ECM OK.
Wires 109 and/or 110 are not shorted.

POSSIBLE PROBLEMS

Wires 109 and 110 are open.
TRS connector faulty.
TRS faulty.

5.

CAUTION
Read CAUTION on Page 2-319

Are there 5 ohms or less measured between wires 109 and 110 at engine harness connector, terminals T1 and T2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at engine harness connector indicates signal line wire 110 or return line wire 109 are open.

NO → Repair wires 110 and/or 109 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES → Go to Step 6.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM connector OK.
DDEC ECM OK.
Wires 109 and 110 are not shorted.
Wires 109 and 110 are not open.

POSSIBLE PROBLEMS

TRS connector faulty.
TRS faulty.

6.

WARNING
Read WARNING on Page 2-319

Are TRS terminals and connectors (TRS and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to TRS.

NO → Repair TRS connectors (Para 7-101). Verify repair, go to Step 7 of this Fault.

YES → Replace TRS. Notify DS Maintenance.

WARNING

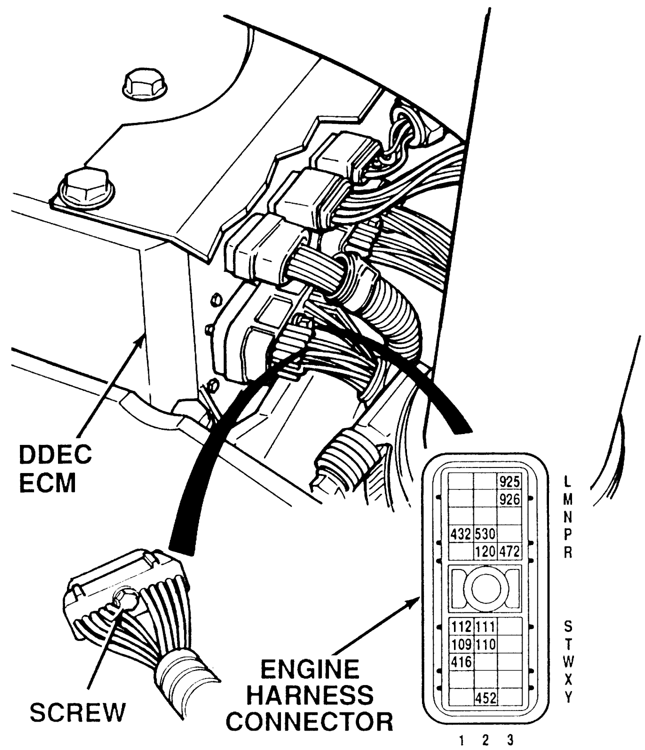
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

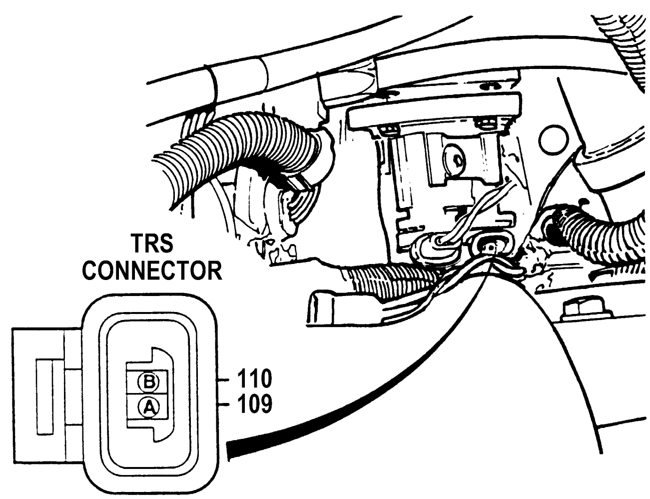
RESISTANCE TEST

(1) Place jumperwire between terminals A and B at the TRS harness connector.
(2) Read resistance between wires 109 and 110 at engine harness connector, terminals T1 and T2.
  (a) If there are more than 5 ohms present, remove jumperwire and repair wires 109 and/or 110 (see schematic Fig 2-2) or perform Step (3) below and notify DS Maintenance.
  (b) If there are less than 5 ohms present, wires are OK, remove jumperwire and perform Step (3) below.
(3) Connect engine harness connector and tighten screw.



VISUAL INSPECTION

(1) Check TRS terminals and connectors (harness and TRS side) for damage; bent, corroded or unseated pins or terminals.
  (a) If connectors and/or terminals are damaged, repair connector (Para 7-101).
  (b) If connectors and/or terminals are free from damage, notify DS Maintenance.
(2) Connect TRS harness connector.
(3) Install DDEC ECM (Para 7-56).
(4) Close engine access cover.



A4 CODE 41 TIMING REFERENCE SENSOR (TRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM connector OK.
DDEC ECM OK.
Wires 109 and 110 are not shorted.
Wires 109 and 110 are not open.
TRS connector OK.
TRS OK.

POSSIBLE PROBLEMS

7.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

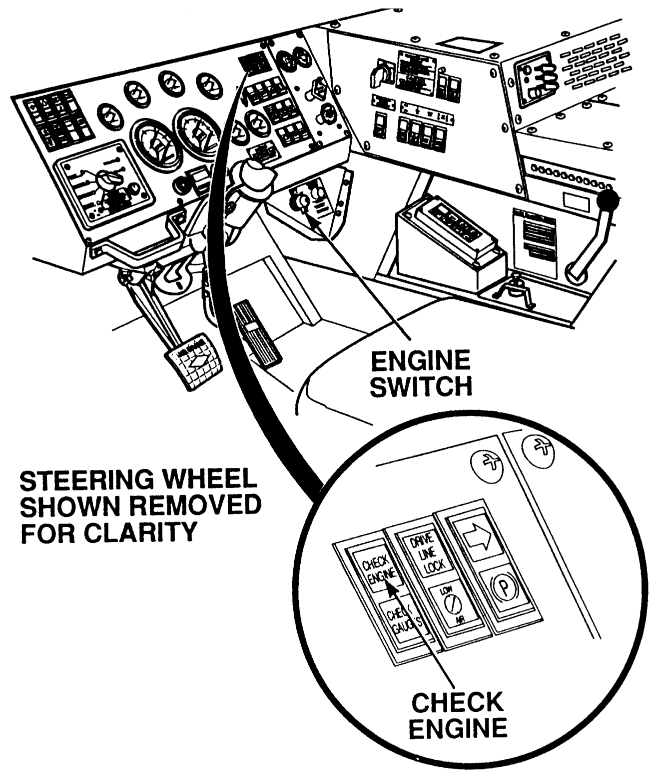
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-24). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 42 SYNCHRONOUS REFERENCE SENSOR (SRS).

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM and/or engine harness connector faulty.
DDEC ECM faulty.
Wires 112 and/or 111 are shorted.
Wires 112 and/or 111 are open.
SRS and/or engine harness connector faulty.
SRS faulty.

1.

Is Code 42 the only code displayed on DDR?

TEST OPTIONS

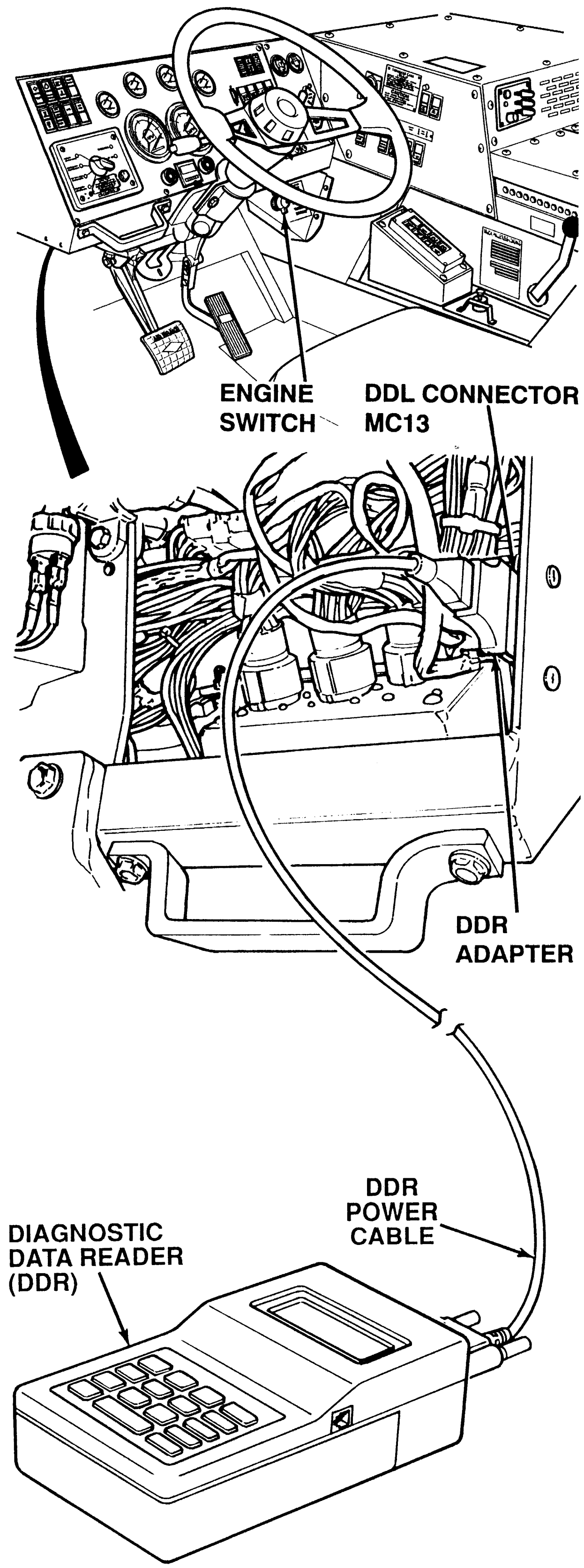
DDR test.

REASON FOR QUESTION

Isolate Fault.

NO → For both Codes 42 and 41, go to Step 3 of this Fault. Other codes, go to Fault Index (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 42 is not the only active code displayed and Codes 41 and/or 42 is displayed, turn OFF ENGINE switch and go to Step 3 of this Fault. If other codes are displayed, go to Fault Index (Table 2-16). (b) If Code 42 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this Fault.

A4 CODE 42 SYNCHRONOUS REFERENCE SENSOR (SRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM and/or engine harness connector faulty.
DDEC ECM faulty.
Wires 112 and/or 111 are shorted.
Wires 112 and/or 111 are open.
SRS and/or engine harness connector faulty.
SRS faulty.

2.

WARNING

Read WARNING on Page 2-325

Are there between 100 and 200 ohms measured between wires 112 and 111 at engine harness connector, terminals S1 and S2?

TEST OPTIONS

Resistance test
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 100 ohms or more than 200 ohms at DDEC ECM engine harness connector indicates SRS sensor or wiring faulty.

NO → For 100 ohms or less, go to Step 4 of this Fault. For more than 200 ohms, go to Step 5 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM and/or engine harness connector faulty.
DDEC ECM faulty.
Wires 112 and/or 111 are shorted.
Wires 112 and/or 111 are open.
SRS and/or engine harness connector faulty.
SRS faulty.

3.

CAUTION

Read CAUTION on Page 2-325

Are DDEC ECM terminals and connectors (DDEC ECM and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to DDEC ECM.

NO → Repair engine harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

WARNING

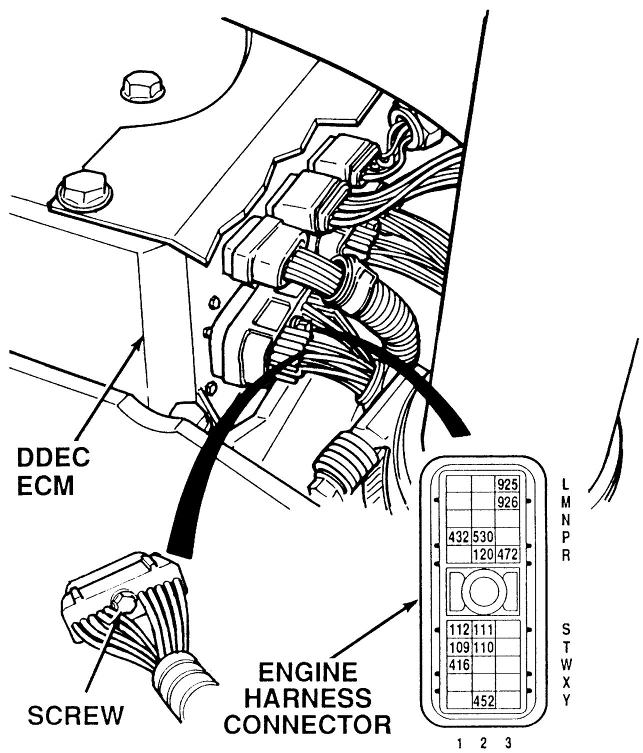
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST

(1) Loosen screw and disconnect engine harness connector at DDEC ECM.
(2) Are there 100 to 200 ohms present between wires 112 and 111 at engine harness connector, terminals S1 and S2?
  (a) If there are less than 100 ohms present, go to Step 4 of this Fault.
  (b) If there are more than 200 ohms present, go to Step 5 of this Fault.
  (c) If there are between 100 and 200 ohms present, go to Step 3 of this Fault.



VISUAL INSPECTION

(1) Check terminals at engine harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If engine harness connector is damaged, repair connector (Para 7-101).
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) If DDEC ECM connector and engine harness connector are OK, replace DDEC ECM (Para 7-56).
(2) Close top engine access cover.

A4 CODE 42 SYNCHRONOUS REFERENCE SENSOR (SRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM and engine harness connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wires 112 and/or 111 are shorted.
Wires 112 and/or 111 are open.
SRS and/or engine harness connector faulty.
SRS faulty.

4.

WARNING

Read WARNING on Page 2-327

Are there more than 10,000 ohms or an open circuit between wires 112 and 111 at engine harness connector, terminals S1 and S2?

NO → Repair wires 112 and/or 111 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

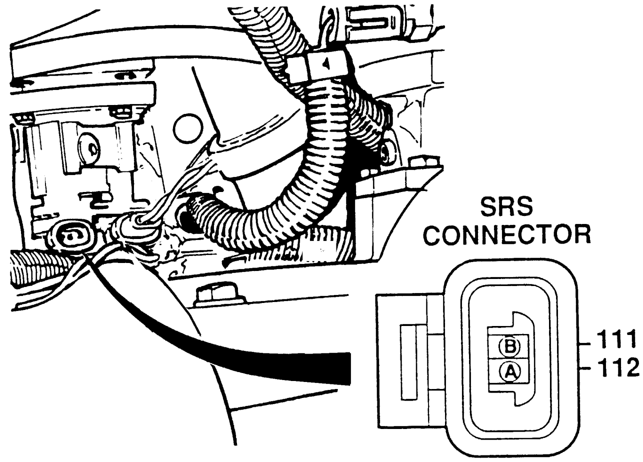
Resistance less than or equal to 10,000 ohms at engine harness connector indicates signal line wire 111 and return line wire 112 are shorted together.

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

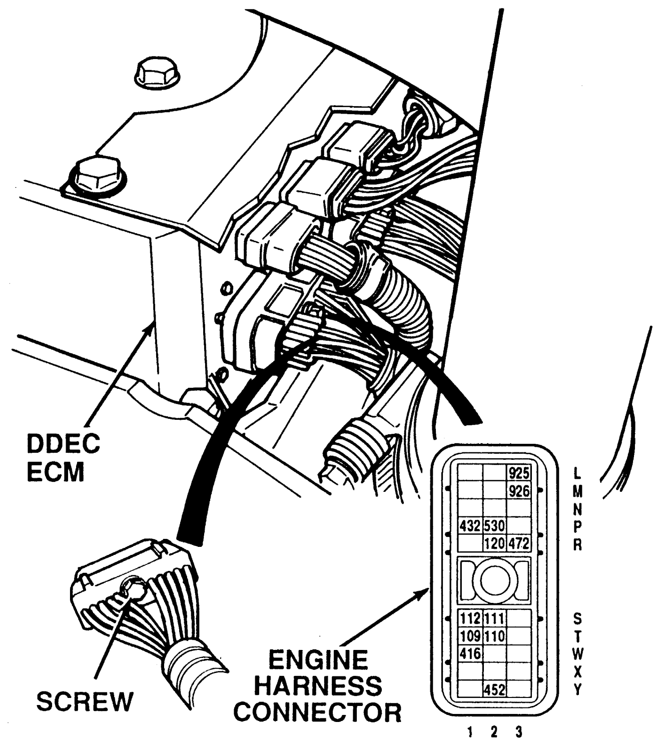
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



RESISTANCE TEST

(1) Disconnect SRS harness connector.
(2) Read resistance between wires 112 and 111 at engine harness connector, terminals S1 and S2.
   (a) If there are less than 10,000 ohms present, repair wires 112 and 111 (see schematic Fig 2-2) or notify DS Maintenance.
   (b) If there are more than 10,000 ohms present, go to Step (3) below.
(3) Read resistance between wire 112 at engine harness connector, terminal S1 and a known good ground.
   (a) If there are less than 10,000 ohms present, repair wire 112 (see schematic Fig 2-2) or notify DS Maintenance.
   (b) If there are more than 10,000 ohms present, go to Step (4) below.
(4) Read resistance between wire 111 at engine harness connector, terminal S2 and a known good ground.
   (a) If there are less than 10,000 ohms present, repair wire 111 (see schematic Fig 2-2) or notify DS Maintenance.
   (b) If there are more than 10,000 ohms present, wire 111 is OK.



A4 CODE 42 SYNCHRONOUS REFERENCE SENSOR (SRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM and engine harness connector OK.
DDEC ECM OK.
Wires 112 and 111 are not shorted.

POSSIBLE PROBLEMS

Wires 112 and/or 111 are open.
SRS and/or engine harness connector faulty.
SRS faulty.

5.

CAUTION
Read CAUTION on Page 2-329

Are there 5 ohms or less measured between wires 112 and 111 at engine harness connector, terminals S1 and S2 with jumperwire installed between terminals A and B at SRS harness connector?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at engine harness connector indicates signal line wire 111 or return line wire 112 are open.

NO → Repair wires 112 and/or 111 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES → Step 6.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM and engine harness connector OK.
DDEC ECM OK.
Wires 112 and 111 are not shorted.
Wires 112 and 111 are not open.

POSSIBLE PROBLEMS

SRS and/or engine harness connector faulty.
SRS faulty.

6.

WARNING
Read WARNING on Page 2-329

Are SRS terminals and connectors (SRS and engine harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

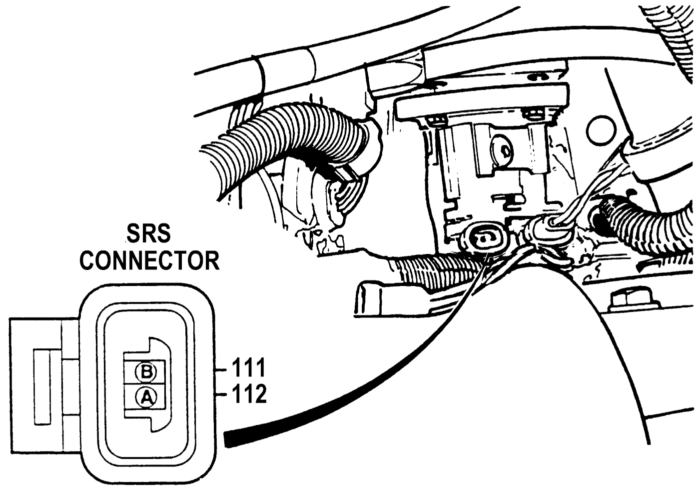
Damage to terminals or connectors can affect signal to SRS.

NO → Repair SRS and/or engine harness connectors (Para 7-101). Verify repair, go to Step 7 of this Fault.

YES → SRS faulty. Notify DS Maintenance.

WARNING

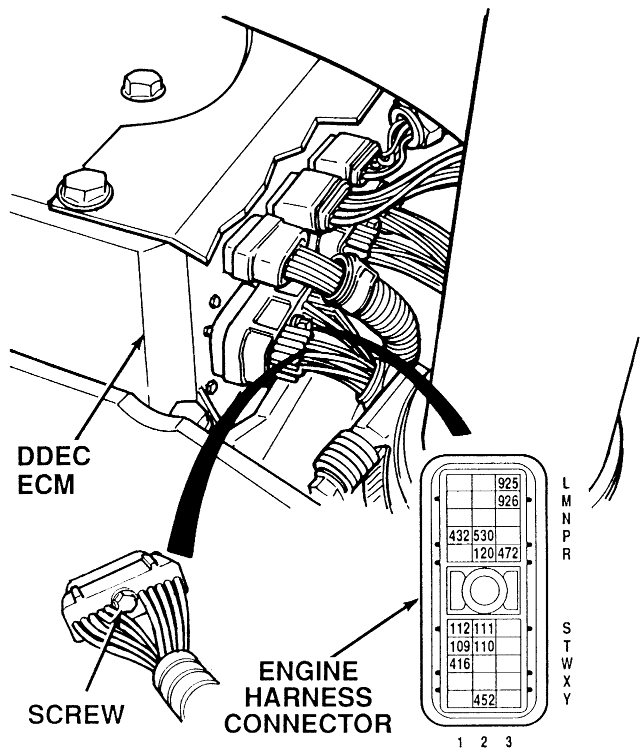
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.



CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Place jumperwire between terminals A and B at SRS harness connector. (2) Read resistance between wires 112 and 111 at engine harness connector, terminals S1 and S2. (a) If there are more than 5 ohms are present, remove jumperwire and repair wires 112 and/or 111 (see schematic Fig 2-2) or notify DS Maintenance and perform Step (3) below. (b) If there are 5 ohms or less present, remove jumperwire, perform Step (3) below and go to Step 6 of this Fault. (3) Connect engine harness connector tighten screw.



VISUAL INSPECTION
(1) Check terminals at SRS connector (sensor and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If connectors and/or terminals are damaged, repair connectors (Para 7-101). (b) If connectors and/or terminals are free of damage, notify DS Maintenance. (2) Connect SRS connector. (3) Install DDEC ECM (Para 7-56). (4) Close top engine access cover.

A4 CODE 42 SYNCHRONOUS REFERENCE SENSOR (SRS) (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
DDEC ECM and engine harness connector OK.
DDEC ECM OK.
Wires 112 and 111 are not shorted.
Wires 112 and 111 are not open.
SRS and engine harness connector OK.
SRS OK.

POSSIBLE PROBLEMS

7.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

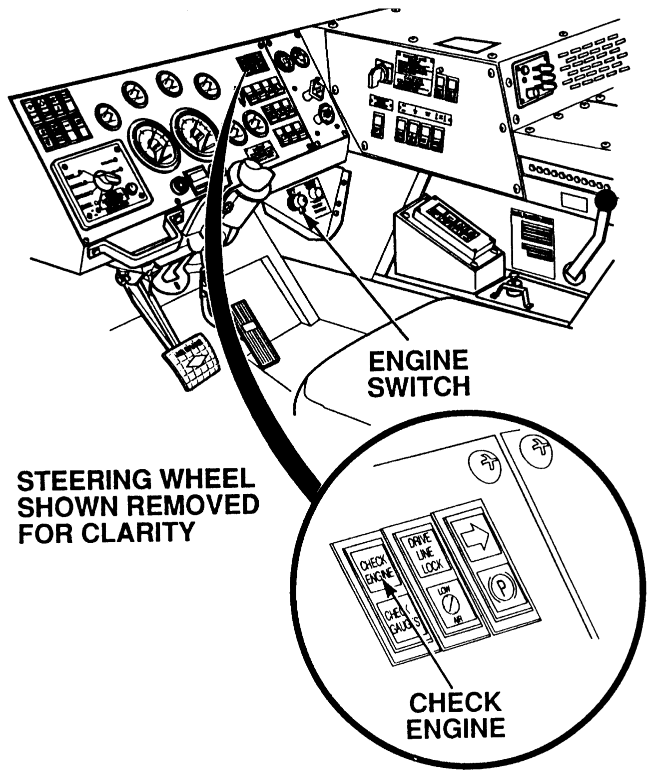
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 44 HIGH OIL TEMPERATURE.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
Oil loss or pump output problem.

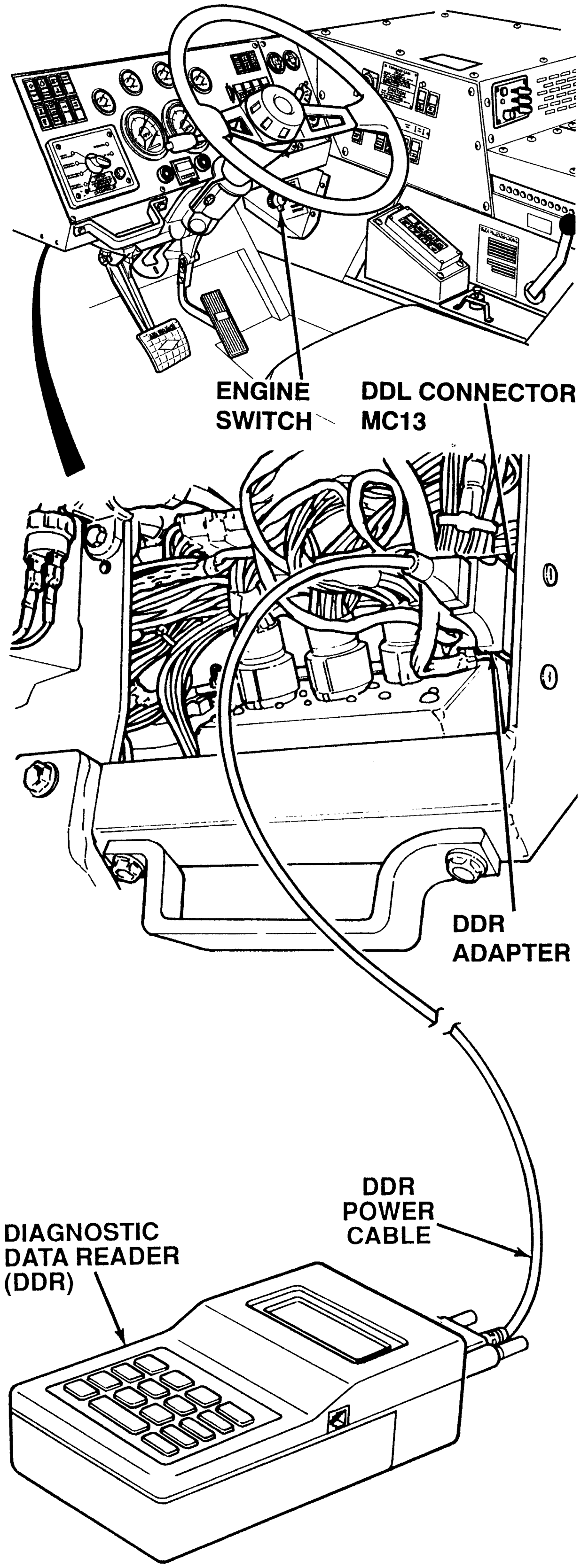
1.

Is Code 44 the only active code displayed on DDR?

TEST OPTIONS
DDR TEST.
REASON FOR QUESTION
Other potential causes for high oil temperature may exist. Code 44 indicates there was an engine running condition at which the oil temperature was higher than it should have been.

NO → Service other codes first. Go to Fault Index (Table 2-16).

YES → Go to Cooling System Troubleshooting (Para 2-18, Fault 1).



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 44 is not the only active code displayed, turn OFF ENGINE switch and perform Step (4) below and go to Fault Index (Table 2-16). (b) If Code 44 is the only active code displayed, turn OFF ENGINE switch, perform Step (4) below and go to Cooling System Troubleshooting (Para 2-18, Fault 1). (4) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 45 LOW OIL PRESSURE.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
Oil loss or pump output problem.

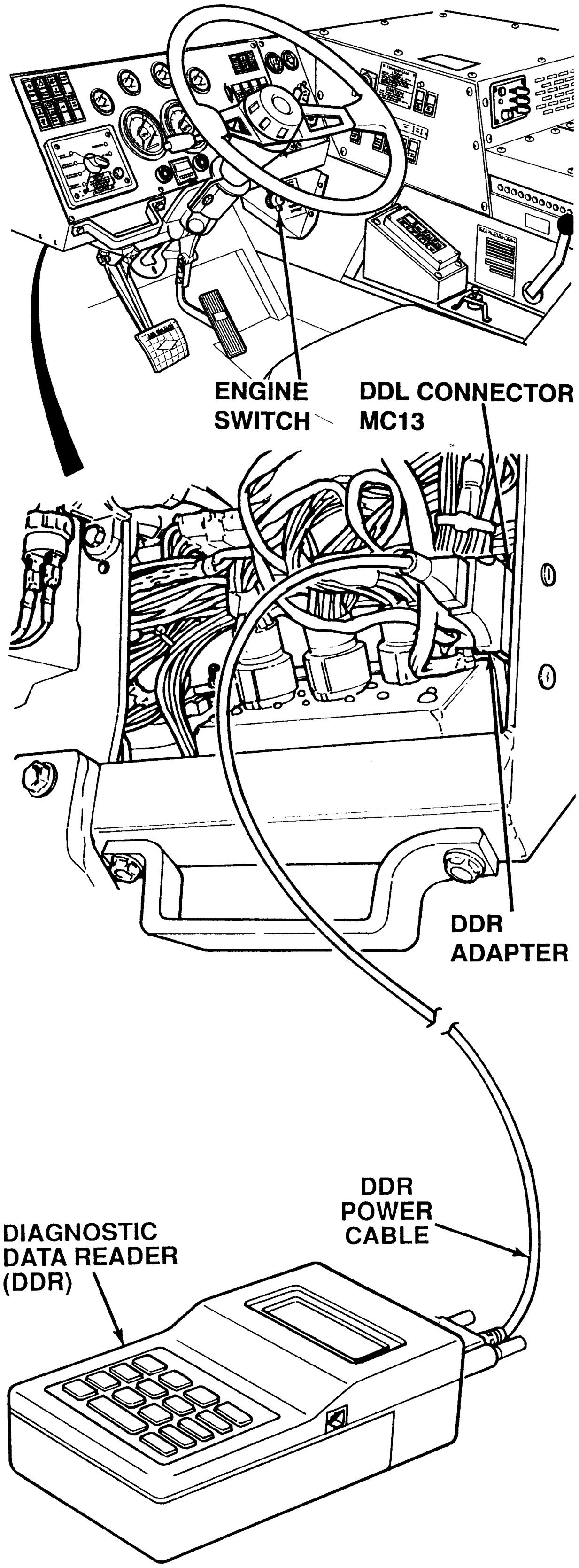
1.

Is Code 45 the only active code displayed on DDR?

TEST OPTIONS
DDR TEST.
REASON FOR QUESTION
Other potential causes for low oil pressure may exist. Code 45 indicates there was an engine running condition at which the oil pressure was lower than it should have been.

NO → Service other codes first. Go to Fault Index (Table 2-16).

YES → Go to Engine troubleshooting (Para 2-16, Fault 1)).



NOTE

- The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.
- Oil Pressure can be monitored by selecting Mode 17 (OIL PRS PSI) on DDR.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 45 is not the only active code displayed, turn OFF ENGINE switch and perform Step (4) below and go to Fault Index (Table 2-16). (b) If Code 45 is the only active code displayed, turn OFF ENGINE switch, perform Step (4) below and go to Engine Troubleshooting (Para 2-16, Fault 1). (4) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 46 LOW BATTERY VOLTAGE.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)

References

TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CEL comes ON and stay ON.

POSSIBLE PROBLEMS

DDEC ECM power harness connector faulty.
DDEC ECM faulty.
CB22 and/or CB23 power input wires 240/241 faulty.
Circuit breaker CB22 and/or CB23 faulty.
CB22 and/or CB23 output wires 240/241 faulty.

1.

Does the engine crank?

TEST OPTIONS

Engine start test.

REASON FOR QUESTION

Engine not cranking indicates a starting/charging system Fault has occurred.

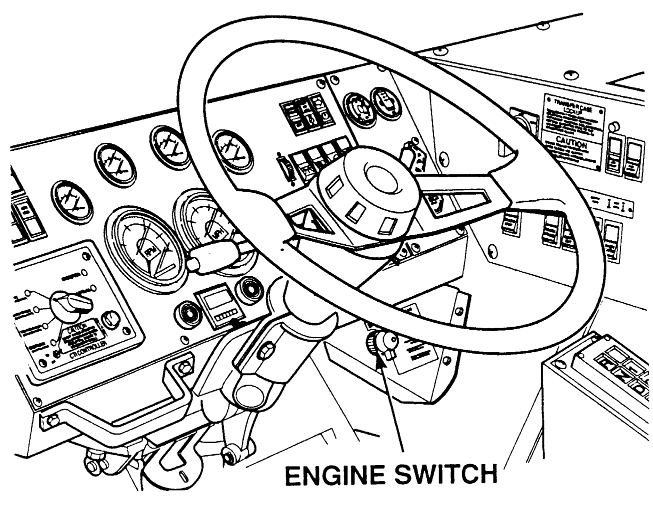
NO → Go to Engine Troubleshooting (Para 2-16, Fault 1).

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

ENGINE START TEST
Attempt to start engine (TM 9-2320-364-10). (1) If engine does not start, turn OFF ENGINE switch and go to Engine Troubleshooting Procedures (Para 2-16, Fault 1). (2) If engine starts, allow engine to run and go to Step 2 of this Fault.



A4 CODE 46 LOW BATTERY VOLTAGE (CONT).

KNOWN INFO

CEL comes on and stays on.

POSSIBLE PROBLEMS

- DDEC ECM power harness connector faulty.
- DDEC ECM faulty.
- CB22 and/or CB23 power input wires 240/241 faulty.
- Circuit breaker CB22 and/or CB23 faulty.
- CB22 and/or CB23 output wires 240/241 faulty.

2.

WARNING

Read WARNING on Page 2-339

Is 10 vdc or less measured at DDEC ECM input?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Less than +10 volts on DDR indicates battery supplied +12 volts are faulty.

NO → Go to Step 4 of this Fault.

YES ↓

KNOWN INFO

CEL comes on and stays on.

POSSIBLE PROBLEMS

- DDEC ECM power harness connector faulty.
- DDEC ECM faulty.
- CB22 and/or CB23 power input wires 240/241 faulty.
- Circuit breaker CB22 and/or CB23 faulty.
- CB22 and/or CB23 output wires 240/241 faulty.

3.

CAUTION

Read CAUTION on Page 2-339

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged DDEC ECM or power terminals or connectors can affect signal or voltage to DDEC ECM.

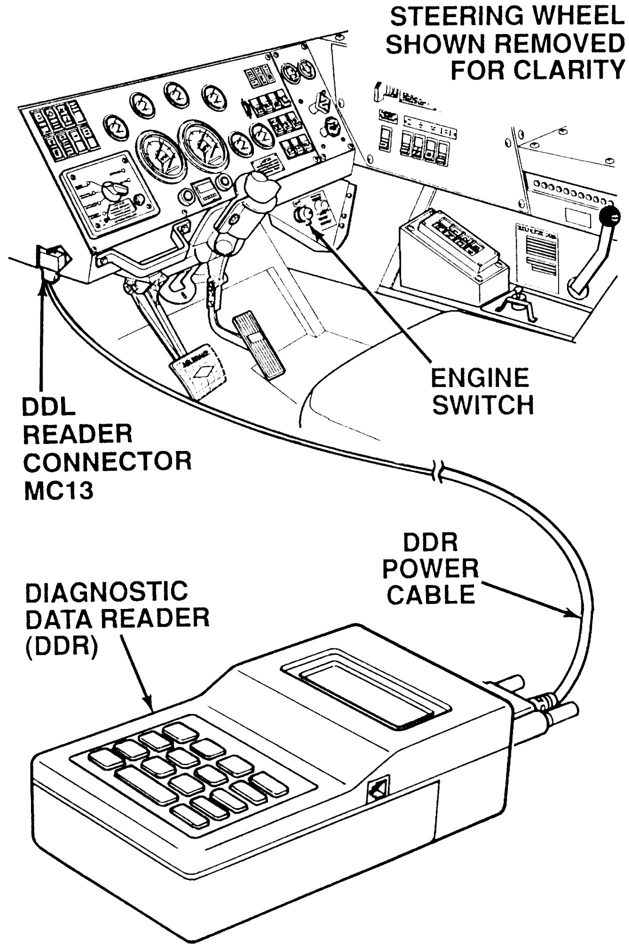
NO → Repair power harness connector terminals (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 7 of this Fault.

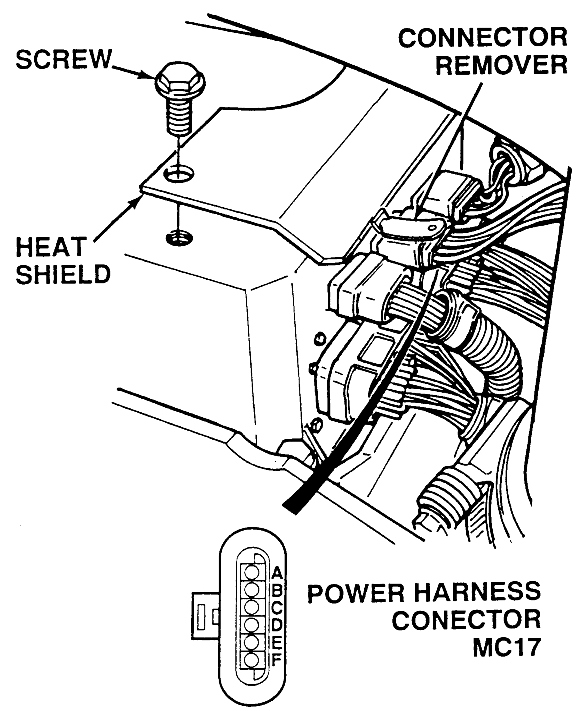
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

DDR TEST
(1) If referred here from Step 1, keep engine running. (2) Connect DDR to DDL connector MC13. (3) Select MODE 05 (DDEC ECM VOLTAGE) on DDR. (4) Observe DDEC ECM voltage reading on DDR. (a) If there are more than 10 vdc present, turn OFF ENGINE switch (TM 9-2320-364-10) and go to Step 4 of this Fault. (b) If there are less than 10 vdc present, turn OFF ENGINE switch and go to Step 3 of this Fault.



VISUAL INSPECTION
(1) Remove two screws and heat shield from DDEC ECM. (2) Disconnect power harness connector MC17 from DDEC ECM with connector remover. (3) Check terminals at the DDEC ECM power harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If power harness connector MC17 is damaged, repair connector (Para 7-101) and perform Steps (4) and (5) below. (b) If DDEC ECM power harness connector is damaged, replace DDEC ECM (Para 7-56). (c) If DDEC harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (4) Connect power harness connector MC17. (5) Install heat shield and two screws on DDEC ECM.



A4 CODE 46 LOW BATTERY VOLTAGE (CONT).

KNOWN INFO

CEL comes on and stays on.
DDEC ECM power harness connector OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

CB22 and/or CB23 power input wires 240/241 faulty.
Circuit breaker CB22 and/or CB23 faulty.
CB22 and/or CB23 output wires 240/241 faulty.

4.

WARNING

Read WARNING on Page 2-341

Are 10 to 14 vdc measured on wires 240 and 241 at input terminals of circuit breakers CB23 and CB22?

NO → Repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

YES ↓

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

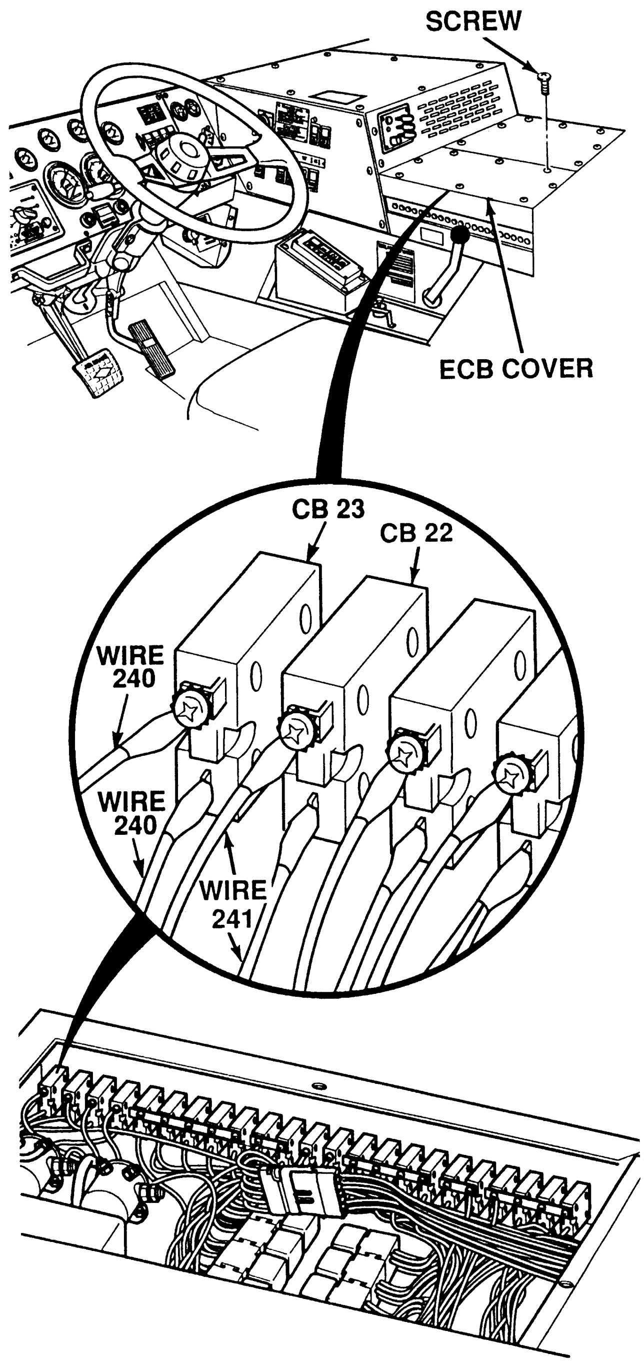
REASON FOR QUESTION

If 10 to 14 vdc are not present on wire 241 or 240 at circuit breaker CB23 or CB22, a Code 46 will be displayed on the DDR.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury, or death to personnel may occur.
- Circuit breakers CB5, CB6, CB12, CB20, CB22, CB23 and relays R3, R13 - R19, R26, R28, R32, R33 are always electrically hot and can cause severe injury to personnel. Care must be exercised when working under the electrical circuit board cover.

VOLTAGE TEST
(1) Remove 15 screws and two ECB covers. (2) Set multimeter select switch to volts dc. (3) Connect positive (+) multimeter lead to circuit breaker CB22 input (upper) terminal. (4) Connect negative (–) multimeter lead to a known good ground. (5) Turn ON ENGINE switch (TM 9-2320-364-10). (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and repair wire 241 (see schematic Fig 2-3) or notify DS Maintenance. (b) If 10 to 14 VDC are present, turn OFF ENGINE switch and go to Step (6) below. (6) Connect positive (+) multimeter lead to circuit breaker CB23 input (upper) terminal. (7) Connect negative (–) multimeter lead to a known good ground. (8) Turn ON ENGINE switch. (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and repair wire 240 (see schematic Fig 2-3) or notify DS Maintenance. (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and go to Step 5 of this Fault.



A4 CODE 46 LOW BATTERY VOLTAGE (CONT).

KNOWN INFO

CEL comes on and stays on.
DDEC ECM power harness connector OK.
DDEC ECM OK.
CB22 and CB23 input wires 240/241 OK.

POSSIBLE PROBLEMS

Circuit breaker CB22 and/or CB23 faulty.
CB22 and/or CB23 output wires 240/241 faulty.

5.

WARNING

Read WARNING on Page 2-343

Are 10 to 14 vdc measured on wires 240 and 241 at output terminals of circuit breakers CB23 and CB22?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

If 10 to 14 vdc are not present, circuit breakers are faulty.

NO

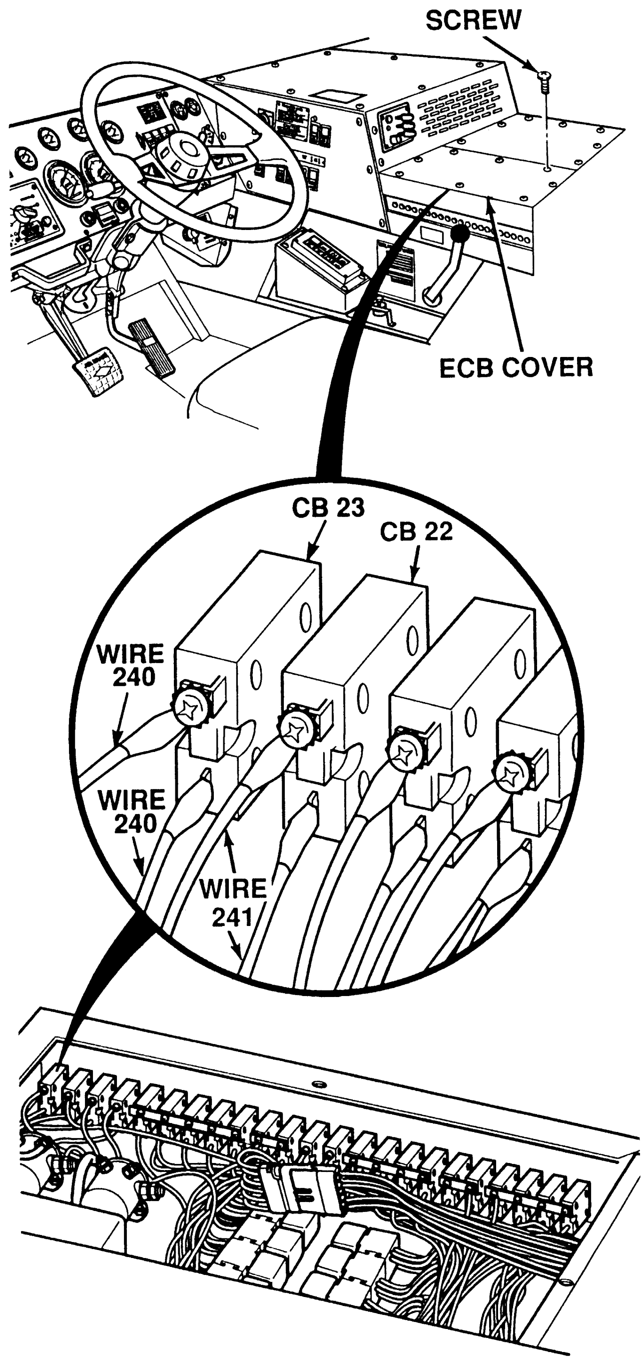
Replace circuit breaker CB 23 or CB22 (Para 7-16). Verify repair, go to Step 7 of this Fault.

YES

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury, or death to personnel may occur.
- Circuit breakers CB5, CB6, CB12, CB20, CB22, CB23 and relays R3, R13 - R19, R26, R28, R32, R33 are always electrically hot and can cause severe injury to personnel. Care must be exercised when working under the electrical circuit board cover.

VOLTAGE TEST
(1) Connect positive (+) multimeter lead to circuit breaker CB22 output (lower) terminal. (2) Connect negative (–) multimeter lead to a known good ground. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and replace circuit breaker CB22 (Para 7-16) and perform Step (7) below. (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and go to Step (4) below. (4) Connect positive (+) multimeter lead to circuit breaker CB23 output (lower) terminal. (5) Connect negative (–) multimeter lead to a known good ground. (6) Turn ON ENGINE switch. (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and replace circuit breaker CB23 (Para 7-16) and perform Step (7) below. (b) If 10 to 14 vdc are present, turn OFF ENGINE switch, perform Step (7) below and go to Step 6 of this Fault. (7) Install ECB cover and 15 screws.



A4 CODE 46 LOW BATTERY VOLTAGE (CONT).

KNOWN INFO

CEL comes on and stays on.
DDEC ECM power harness connector OK.
DDEC ECM OK.
CB22 and CB23 input wires 240/241 OK.
Circuit breaker CB22 and CB23 OK.

POSSIBLE PROBLEMS

CB22 and/or CB23 output wires 240/241 faulty.

6.

WARNING

Read WARNING on Page 2-345

Are 10 to 14 vdc measured on wires 240 and 241 at DDEC ECM power harness connector MC17, terminals A, B, E and F?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

If less than 10 vdc are present, either wire 240 or 241 will cause the engine to run rough.

NO → Repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 7 of this Fault.

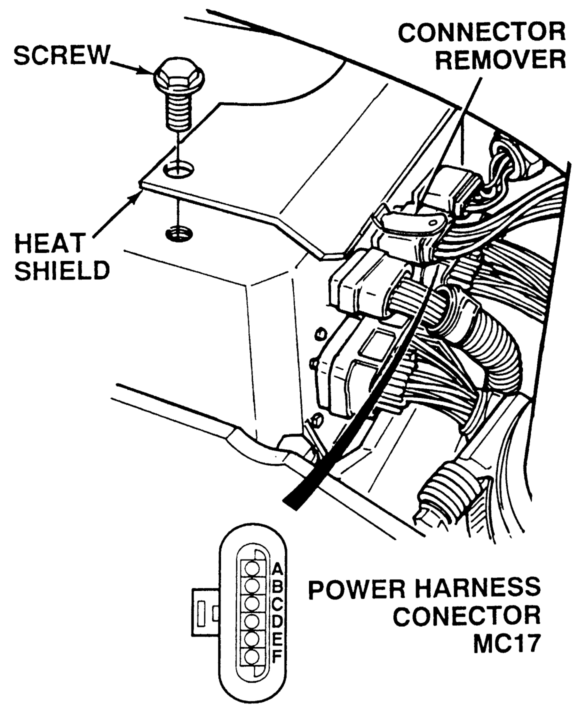
YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VOLTAGE TEST

(1) Remove two screws and heat shield from DDEC ECM.
(2) Disconnect power harness connector MC17 from DDEC ECM with connector remover.
(3) Connect positive (+) multimeter lead to wire 241 at DDEC ECM power connector MC17, terminals E and F one at a time.
(4) Connect negative (–) multimeter lead to a known good ground.
(5) Turn ON ENGINE switch (TM 9-2320-364-10).
    (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and repair wire 241 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (7) through (9) below.
    (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and go to Step (6) below.
(6) Connect positive (+) multimeter lead to wire 240, terminals A and B one at a time.
    (a) If 10 to 14 vdc are not present, turn OFF ENGINE switch and repair wire 240 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (7) through (9) below.
    (b) If 10 to 14 vdc are present, wire 240 is OK. Turn OFF ENGINE switch and perform Steps (7) through (9) below.
(7) Connect power harness connector MC17 to DDEC ECM.
(8) Install heat shield and two screws.
(9) Close top engine access cover.



A4 CODE 46 LOW BATTERY VOLTAGE (CONT).

KNOWN INFO

CEL comes on and stays on.
DDEC ECM power harness connector OK.
DDEC ECM OK.
CB22 and CB23 input wires 240/241 OK.
Circuit breaker CB22 and CB23 OK.
CB22 and CB23 output wires 240/241 OK.

POSSIBLE PROBLEMS

7.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

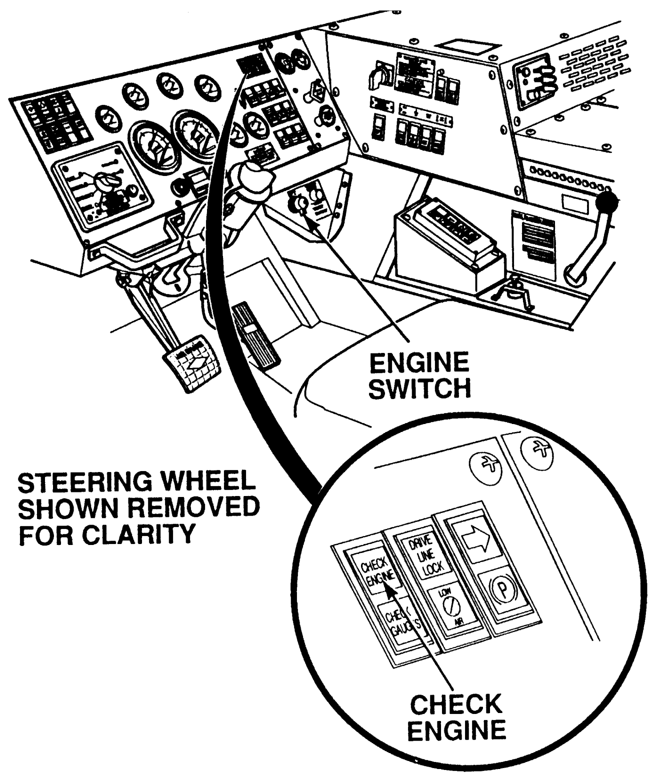
REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not come ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 51 ELECTRICALLY ERASABLE PROGRAMMABLE READ-ONLY MEMORY (EEPROM) FAILURE (HISTORICAL CODE 51 ON DDR).

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM faulty.

1.

Is historical Code 51 displayed on DDR after clearing?

TEST OPTIONS

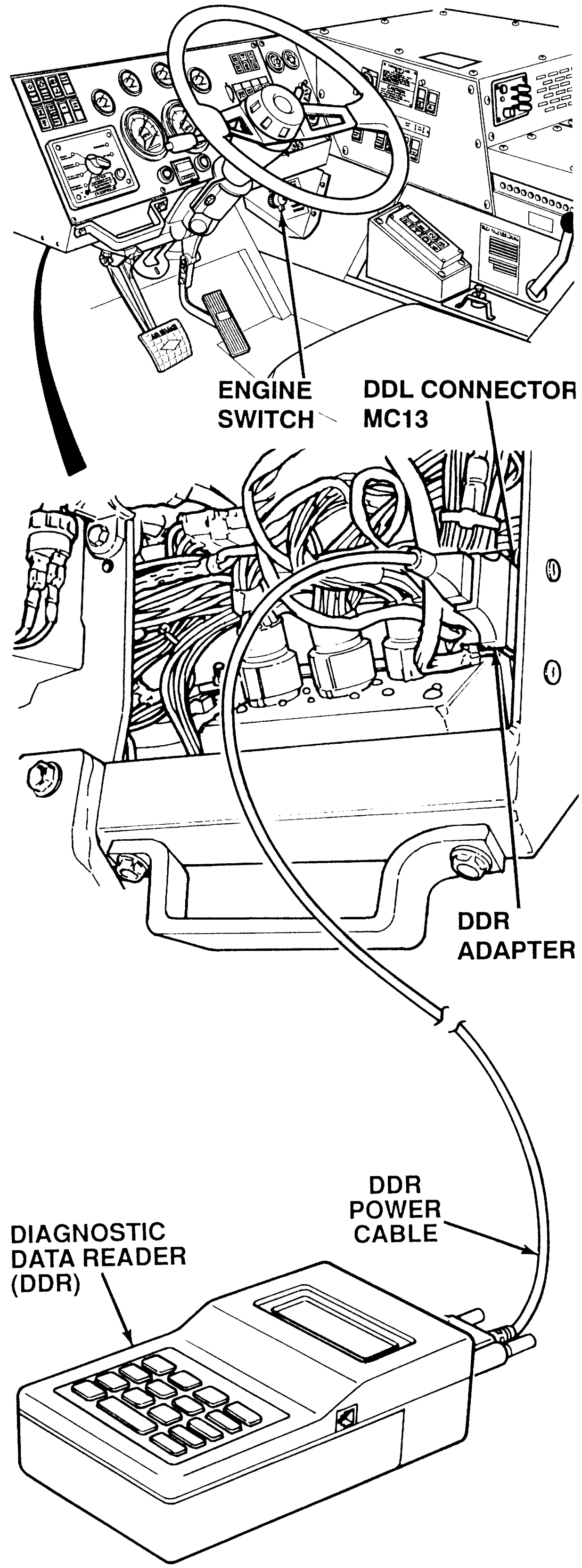
DDR test.

REASON FOR QUESTION

Code 51 indicates a memory problem exists in DDEC ECM. DDEC ECM is using backup memory for operation.

NO → Fault corrected.

YES → Replace DDEC ECM (Para 7-56).



DDR TEST

(1) Connect DDR to DDL connector MC13.
(2) Turn ON ENGINE switch (TM 9-2320-364-10).
(3) Clear codes on DDR (Para 2-11).
(4) Select MODE 02 (HISTORICAL CODES) on DDR.
  (a) If historical Code 51 is not displayed, turn OFF ENGINE switch and perform Step (5) below.
  (b) If historical Code 51 is displayed, turn OFF ENGINE switch, replace DDEC ECM (Para 7-56) and perform Step (5) below.
(5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODES 52 OR 56 DDEC ECM - ANALOG TO DIGITAL FAILURE.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

DDEC ECM faulty.

1.

Are Codes 52 or 56 the only active codes displayed on DDR?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

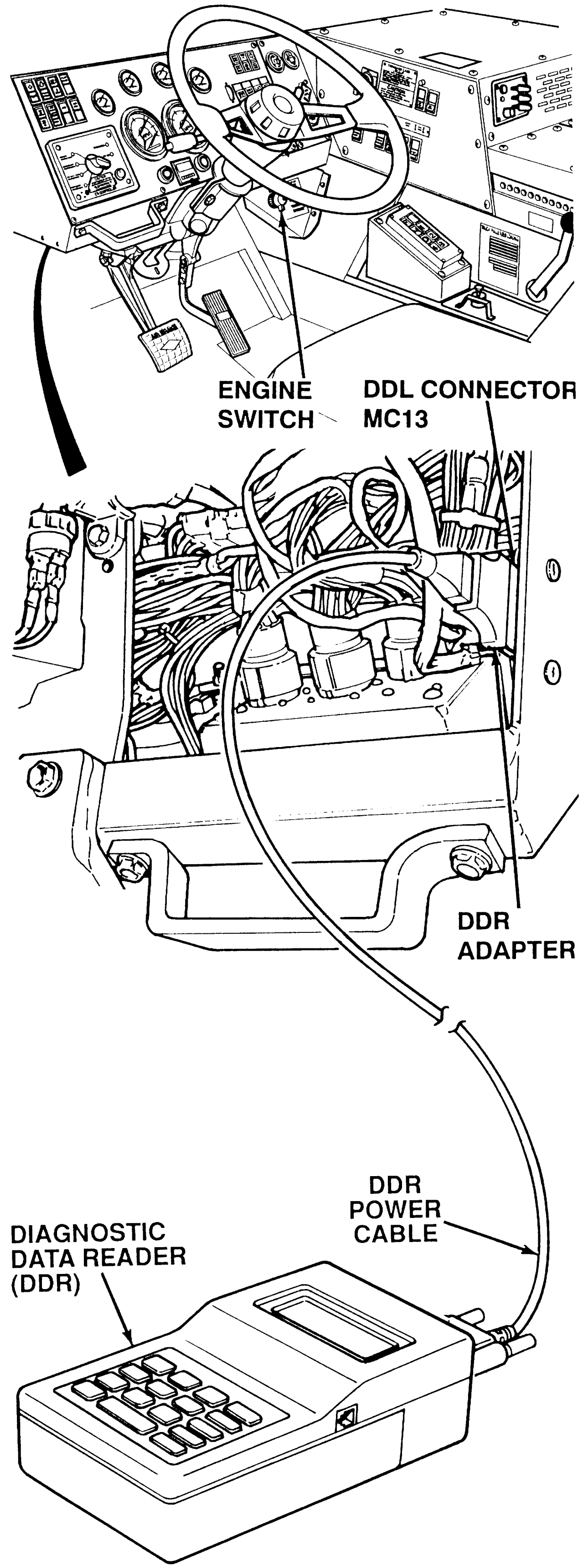
Code 52 and Code 56 indicates the DDEC ECM is unable to correctly convert sensor voltages into numbers for computer usage.

NO

Service other codes first. Go to Fault Index (Table 2-16).

YES

Replace DDEC ECM (Para 7-56).



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Codes 52 or 56 are not the only active codes displayed, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (b) If Codes 52 and 56 are the only active codes displayed, perform Steps (4) and (5) below and replace DDEC ECM (Para 7-56). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODE 53 ELECTRICALLY ERASABLE PROGRAMMABLE READ-ONLY MEMORY (EEPROM) FAILURE AFFECTING CODE MEMORY.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.
POSSIBLE PROBLEMS
DDEC ECM faulty.

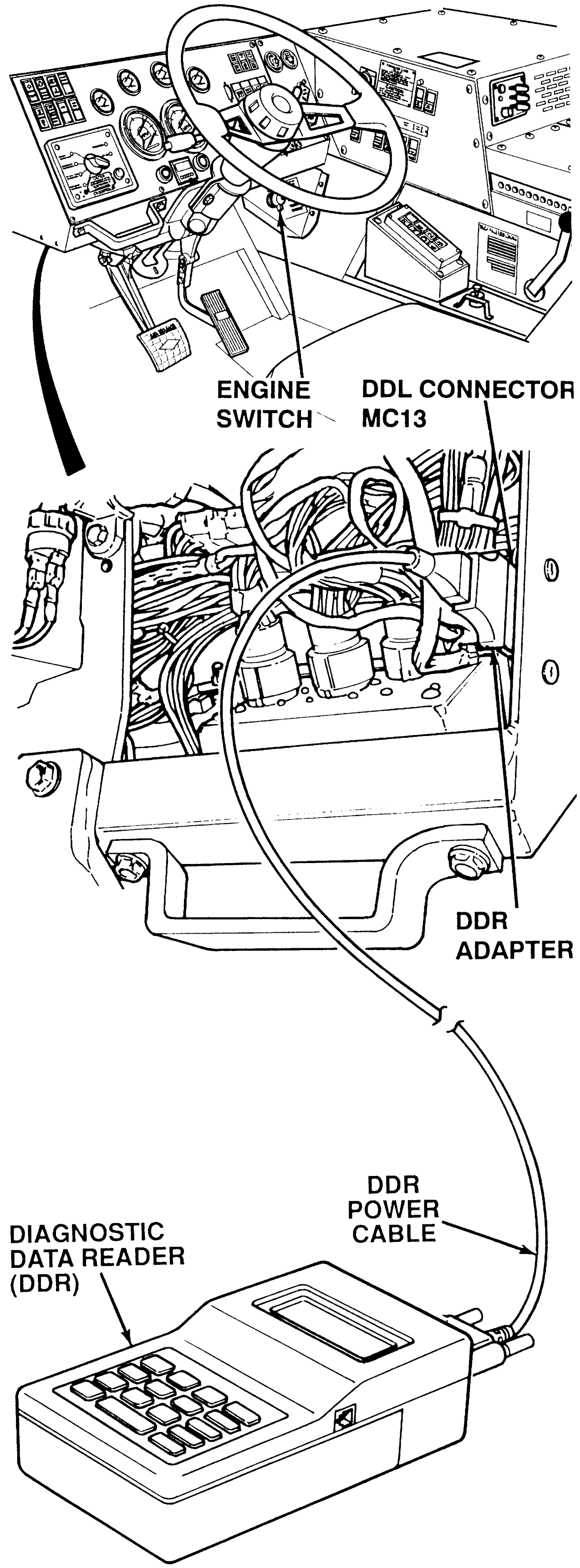
1.

Is Code 53 displayed on DDR after clearing?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Code 53 indicates an error has been detected in the EEPROM inside the DDEC ECM which affects the logging of trouble codes.

NO → Fault corrected.

YES → Replace DDEC ECM (Para 7-56).



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Clear codes on DDR (Para 2-11). (4) Select MODE 01 (ACTIVE CODES) on DDR. (5) Select MODE 02 (HISTORICAL CODES) on DDR and read codes. (a) If Code 53 is not displayed on DDR, perform Steps (6) and (7) below. (b) If Code 53 is displayed, perform Steps (6) and (7) below and replace DDEC ECM (Para 7-56). (6) Turn OFF ENGINE switch. (7) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

Personnel Required
Two

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS
Injector response times incorrect. Open in wires 619 and/or 620. Short in wires 619 and/or 620. Short in wires 611 through 618. Faulty injectors. Damaged terminals. DDEC ECM faulty. Tripped DDEC circuit breakers. Short in bank A or bank B wires 240 and/or 241. Open in bank A or bank B wires 240 and/or 241. Open in ground line wire 150. Open in injector return lines wires 619 and/or 620.

1.

Are Codes 61 through 68 the only codes displayed on DDR?

TEST OPTIONS
DDR TEST.

REASON FOR QUESTION
Isolate Fault.

NO → Service other codes first. Go to Fault Index (Table 2-16).

YES ↓

NOTE

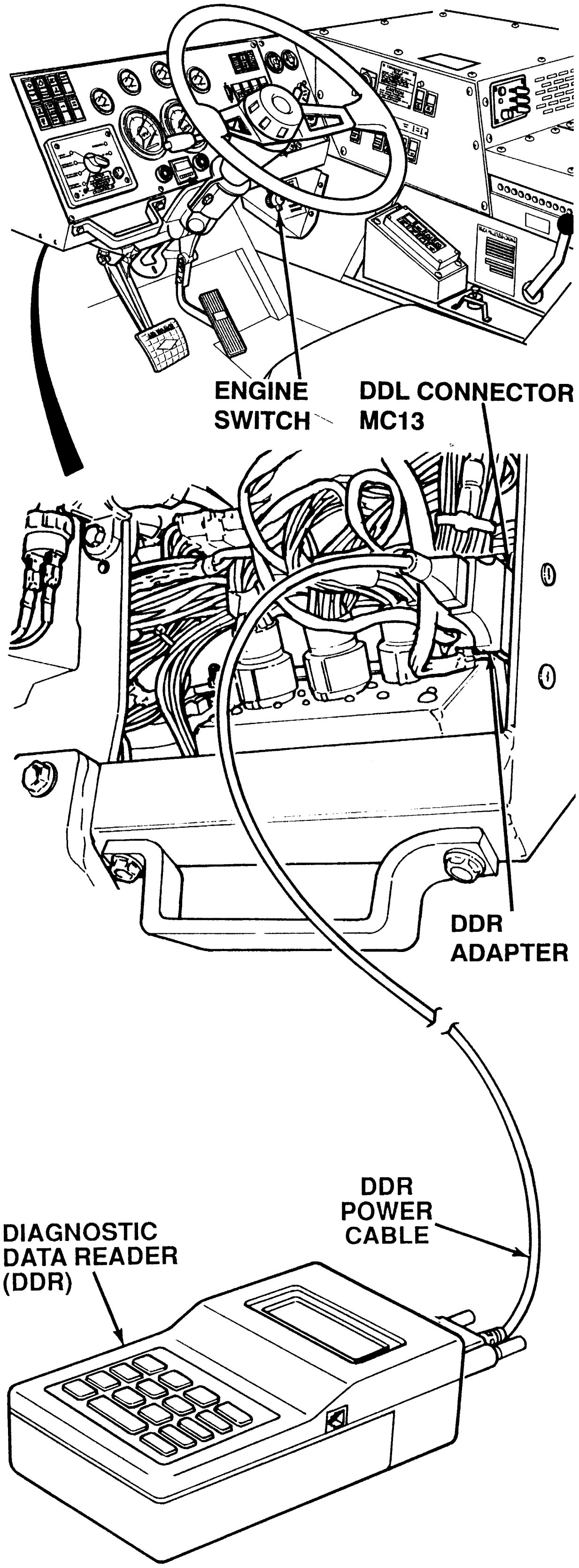
- The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.
- Table 2-17 shows which injector is associated with each of the failure codes.
- Troubleshooting procedures for codes 71 through 78 are the same for codes 61 through 68.

Table 2-17. Injector Identification

Code	Firing Order	Cylinder
61	1	1 Left
62	2	3 Right
63	3	3 Left
64	4	4 Right
65	5	4 Left
66	6	2 Right
67	7	2 Left
68	8	1 Right

DDR TEST

(1) Connect DDR to DDL connector MC13.
(2) Turn ON ENGINE switch (TM 9-2320-364-10).
(3) Select MODE 01 (ACTIVE CODES) on DDR.
  (a) If Code(s) 61 through 68 are not the only codes displayed, turn OFF ENGINE switch and go to Fault Index (Table 2-16).
  (b) If Code(s) 61 through 68 are the only code(s) displayed, turn OFF ENGINE switch and go to Step 2 of this fault.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Injector response times incorrect.
Open in wires 619 and/or 620.
Short in wires 619 and/or 620.
Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

2.

Are injector response times for code(s) received 0.80?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

DDR will deisplay a response time of 0.80 if injector electrical system is faulty.

NO → Fault is intermittent. See note on following page for possible problems.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.

POSSIBLE PROBLEMS

Open in wires 619 and/or 620.
Short in wires 619 and/or 620.
Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

3.

Is only one of the Codes (61 through 68) displayed by DDR?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Isolate problem to injector harness wiring or other electrical wiring.

NO → All codes, go to Step 9 of this Fault. All left bank or all right bank codes, go to Step 11 of this Fault.

YES ↓

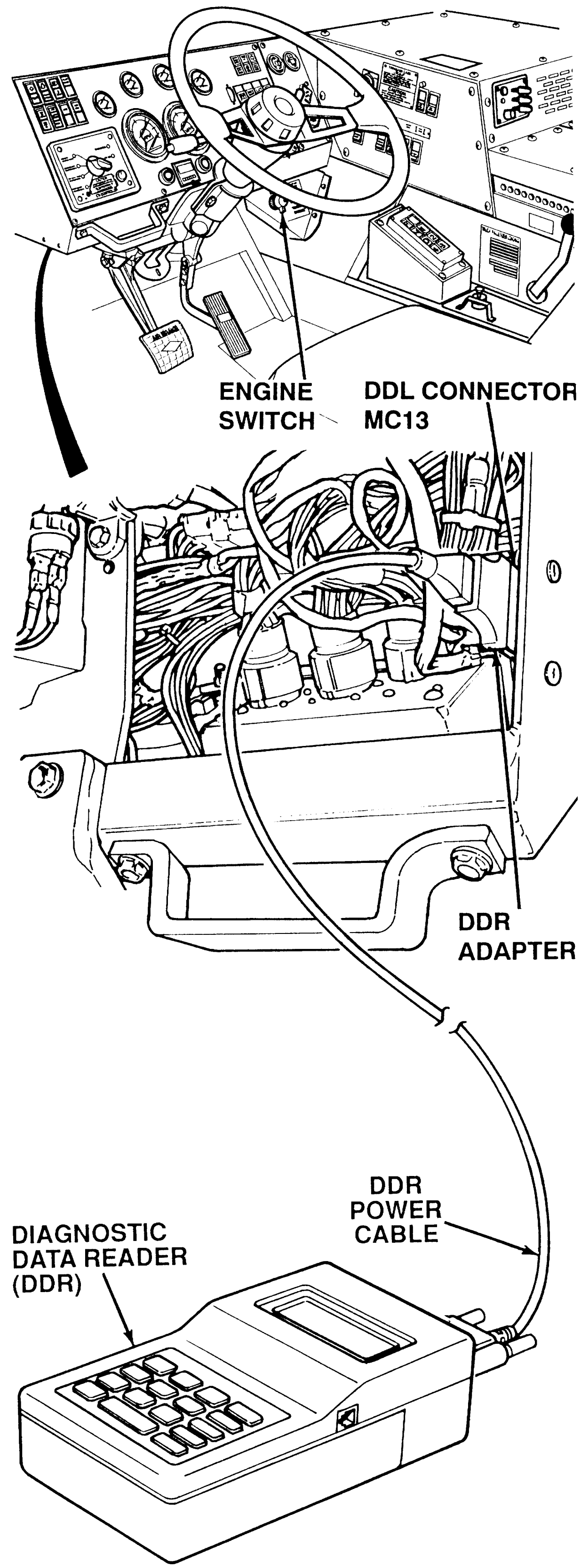
NOTE

If response time(s) received is not 0.80 the following may be causing intermittent failures:

a. Air in fuel (Refer to Fuel System Troubleshooting - Para 2-17).
b. Low battery charge (Refer to Electrical System Troubleshooting Para 2-20).
c. Problems in the charging system (Loose alternator belt, bad grounds, etc.). (Refer to Electrical System Troubleshooting Para 2-20).
d. Signs of insulation wear on injector harness (Remove Rocker Arm Cover Para 3-4 or 3-5).
e. If problem has not been corrected notify DS Maintenance

DDR TEST
(1) Start engine (TM 9-2320-364-10) and warm to operating temperature 180°F to 190°F (82°C to 88°C). (2) Select MODE 10 (INJ RESP TIMES) on DDR. (3) Read DDR display of injector response time (in firing order) through several cycles. Note response time(s) of cylinder by number in Fault code. (4) Refer to Table 2-17 for the firing sequence in relation to the code received. (5) Turn OFF ENGINE switch.

DDR TEST
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Select MODE 40 (CLEAR CODES) on DDR and clear codes. (3) Select MODE 01 (ACTIVE CODES) on DDR. (4) Read displayed codes. (a) All Codes (61 through 68), perform Steps (5) and (6) below and go to Step 9 of this Fault. (b) For all left bank codes or right bank codes, perform Steps (5) and (6) below and go to Step 11 of this Fault. (c) If only one Code (61 through 68) is displayed, perform Steps (5) and (6) below and go to Step 4 of this Fault. (5) Turn OFF ENGINE switch. (6) Disconnect DDR from DDL connector MC13.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.

POSSIBLE PROBLEMS

Open in wires 619 and/or 620.
Short in wires 619 and/or 620.
Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

4.

WARNING

Read WARNING on Page 2-359

Is injector resistance (at connectors) more than 1 ohm?

NO → For less than or equal to 1 ohm, go to Step 6 of this Fault.

YES

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 1 ohm indicates open to return line wires 619 or 620.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

RESISTANCE TEST

(1) Remove two screws and heat shield from DDEC ECM.
(2) Disconnect both injector harness connectors at the DDEC ECM with connector remover.
(3) Is there more than 1 ohm present between injector harness connector terminals when Codes 61-68 are received. (Example: read resistance between terminal G and L for Code 61).
(4) Refer to Table 2-18 for injector harness connector identification.
    (a) If there is more than 1 ohm present, go to Step 5 of this Fault.
    (b) If there is 1 ohm or less present, go to Step 6 of this Fault.

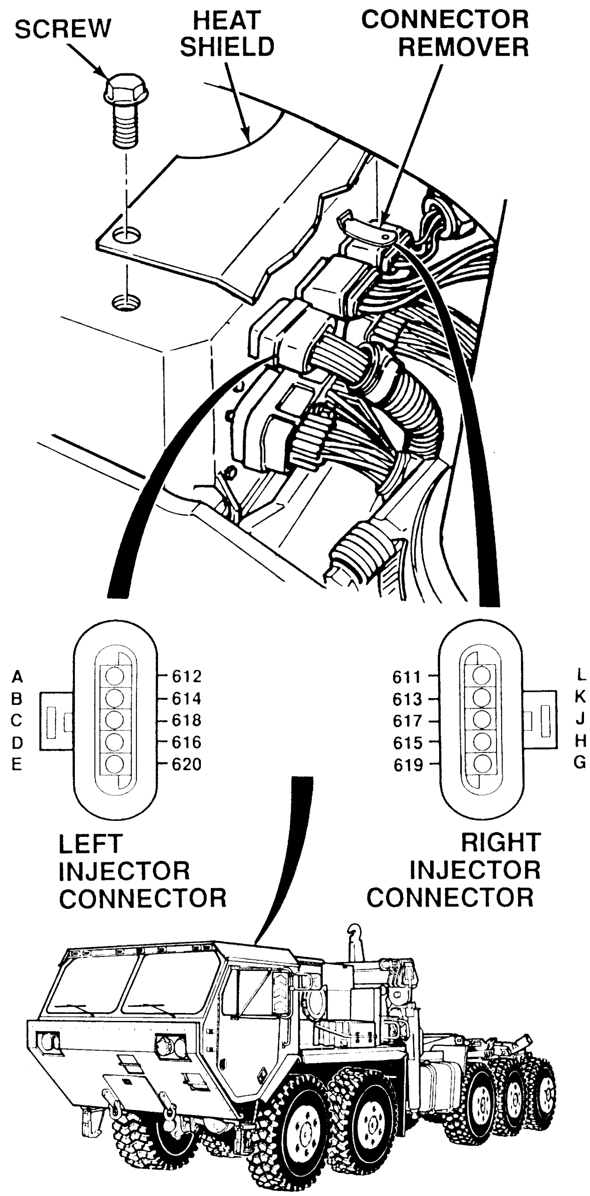


Table 2-18. Injector Harness Connector Terminal Identification

DDEC CODE No.	Injector Harness Connector Terminal No.	Injector Harness Connector Terminal No.
61	L	G
62	A	E
63	K	G
64	B	E
65	H	G
66	D	E
67	J	G
68	C	E

A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.

POSSIBLE PROBLEMS

Open in wires 619 and/or 620.
Short in wires 619 and/or 620.
Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

5.

WARNING
Read WARNING on Page 2-361

Is there 1 ohm or less measured at the injector harness connector?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than or equal to 1 ohm indicates faulty injector. More than 1 ohm, open exists in wires where resistance was read.

NO → Repair connector (see schematic Fig 2-4) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES → Notify DS Maintenance, injector is faulty. See note on following page.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.

POSSIBLE PROBLEMS

Short in wires 619 and/or 620.
Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

6.

WARNING
Read WARNING on Page 2-361

Are there more than or equal to 10,000 ohms or an open circuit measured at the injector harness connector?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms indicates short in return lines.

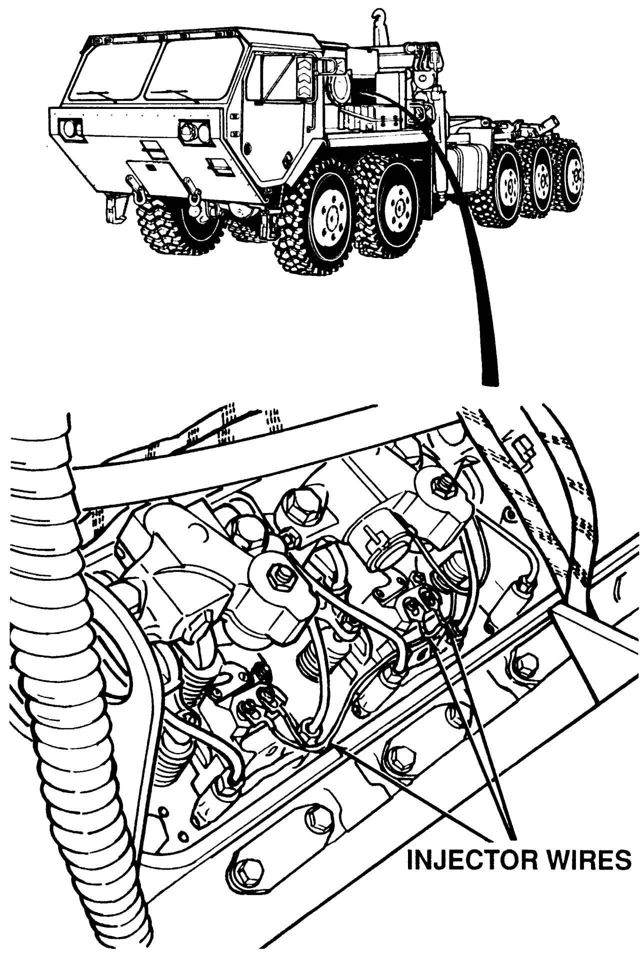
NO → Repair wire (see schematic Fig 2-4) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

RESISTANCE TEST
(1) Remove rocker arm cover (Para 3-4 or 3-5) corresponding to injector identified by Table 2-17. (2) Disconnect the two wires of the injector identified. (3) Short these two wires together. (4) Referring to Table 2-18, measure the resistance between the injector harness connector terminals associated with the faulty injector. (a) If 1 ohm or less is present, install rocker arm cover and notify DS Maintenance. Injector is faulty. (b) If more than 1 ohm is present, repair wires tested, (see schematic Fig 2-4) or notify DS Maintenance and install rocker arm cover.



RESISTANCE TEST
(1) Remove rocker arm cover (Para 3-4 or 3-5) corresponding to injector identified by Table 2-17. (2) Disconnect two wires of injector indicated. (3) Measure resistance at the injector harness connector terminals associated with faulty injector. (b) If there are less than 10,000 ohms present, repair wires tested (see schematic Fig 2-4) or notify DS Maintenance. (a) If there are more than 10,000 ohms present, go to Step 7 of this Fault.

A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.

POSSIBLE PROBLEMS

Short in wires 611 through 618.
Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

7.

WARNING

Read WARNING on Page 2-363

Are there more than or equal to 10,000 ohms or an open circuit measured between injector drive wire and a known good ground?

NO → Repair drive wire and/or ground (see schematic Fig 2-4) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms between injector drive wire and ground indicates injector drive wire is shorted to ground. Resistance less than 10,000 ohms from injector to ground indicates short to faulty injector.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

NOTE

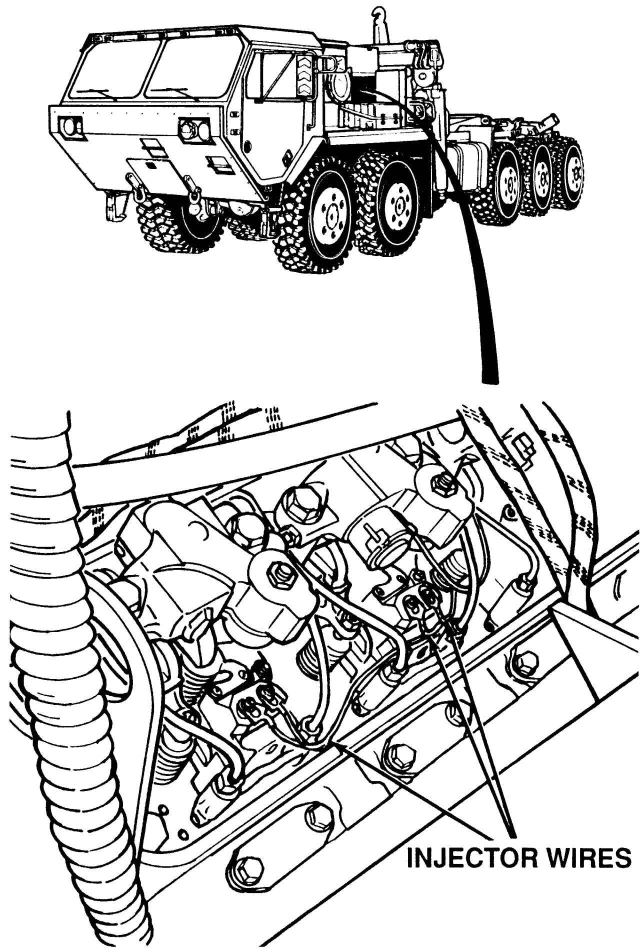
Injector drive wires are numbered 611 through 618 and injector return wires are numbered 619 and 624 on the DDEC Injector Harness Wiring Schematic (Fig 2-4).

RESISTANCE TEST

(1) Check for short to ground, working with injector that has its two wires disconnected.

(2) Measure resistance between injector drive wire and a known good ground.
   - (a) If there are less than 10,000 ohms present, repair wires tested (see schematic Fig 2-4) or notify DS Maintenance.
   - (b) If there are more than 10,000 ohms present, perform Step (3) below.

(3) Measure resistance between one of the terminals of the injector (injector with disconnected wires) and a known good ground.
   - (a) If there are less than 10,000 ohms present, repair wires tested (see schematic Fig 2-4) or notify DS Maintenance.
   - (b) If there are more than 10,000 ohms present, go to Step 8 of this Fault.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

8.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.

POSSIBLE PROBLEMS

Faulty injectors.
Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

WARNING
Read WARNING on Page 2-365

Does test light fail to illuminate while engine is being cranked?

NO → Notify DS Maintenance. Injector faulty.

YES ↓

TEST OPTIONS

Signal test.

REASON FOR QUESTION

Injector may be faulty if test light illuminates while engine is being cranked.

9.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.

POSSIBLE PROBLEMS

Damaged terminals.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

WARNING
Read WARNING on Page 2-365

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

NO → Repair connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 16 of this Fault.

YES ↓

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals or connectors can affect signal to DDEC ECM.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

NOTE

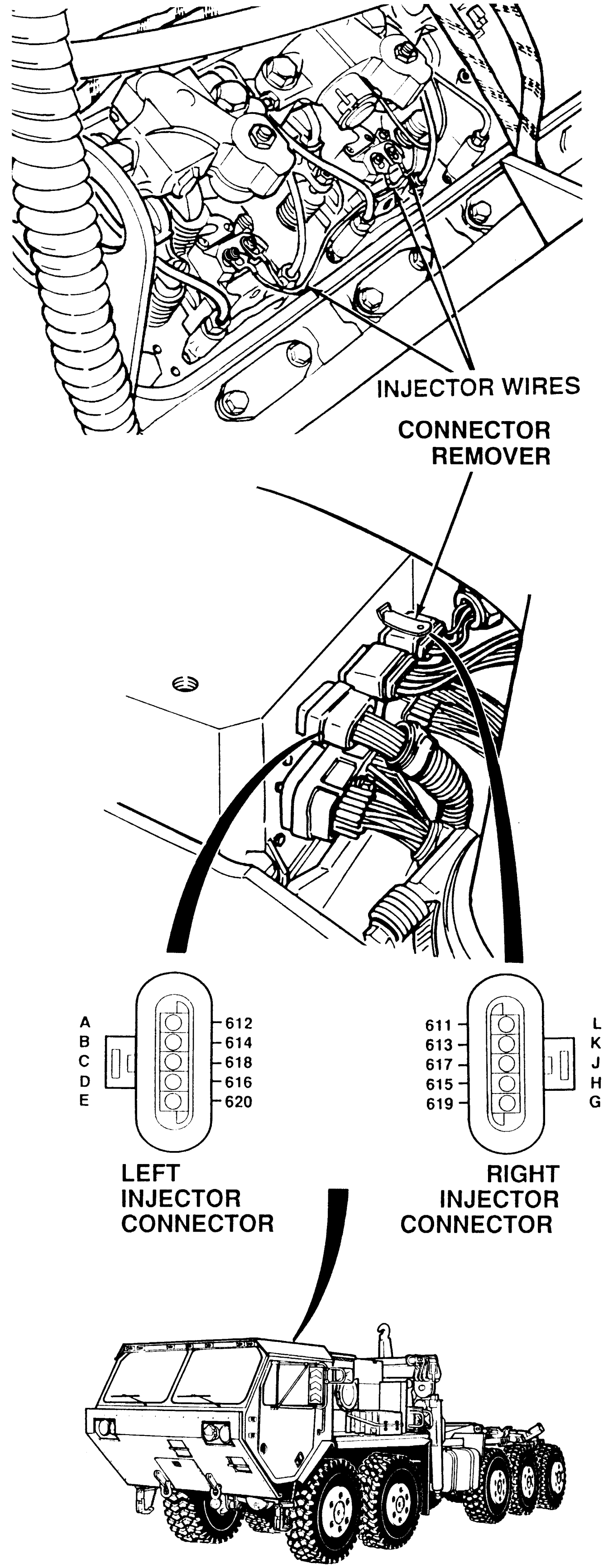
Troubleshooting procedures for codes 71 through 78 are the same for codes 61 through 68.

SIGNAL TEST

(1) Connect two injector harness connectors to DDEC ECM.
(2) Looking at injector with disconnected wires, reattach injector drive wire (Fig 2-4).
(3) Connect one lead of test light to the common side of the injector.
(4) Connect the second test light lead to a known good ground.
(5) While an assistant cranks the engine (TM 9-2320-364-10), observe the test light.
  (a) If the test light does light steady or flashes, turn OFF ENGINE switch and notify DS Maintenance.
  (b) If the test light does not flash or light steady, injector is OK.
(6) Turn OFF ENGINE switch.
(7) Connect wire 619 or wire 620 to injector.

VISUAL INSPECTION

(1) Disconnect both injector harness connectors at the DDEC ECM with connector remover.
(2) Check terminals at both harness connectors (harness and DDEC ECM sides) for damage; bent, corroded and unseated pins or terminals.
  (a) If connectors are damaged, repair connectors (Para 7-101).
  (b) If DDEC ECM connector terminals are damaged, replace DDEC ECM (Para 7-56).
  (c) If connectors are free of damage, go to Step 10 of this Fault.
(3) Connect both injector harnesses.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.

POSSIBLE PROBLEMS

Fault with non-DDEC component.
DDEC ECM faulty.
Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

10.

WARNING

Read WARNING on Page 2-367

Is vehicle free from all problems listed on facing page?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Fault may be caused by non-DDEC engine or chassis component.

NO → Correct problem or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 16 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Tripped DDEC circuit breakers.
Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

11.

Are DDEC circuit breakers, CB22 and CB23 set?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

DDEC will not operate properly if breakers are tripped or defective. If breakers continue to trip, a short or ground exists in wire 240 or 241.

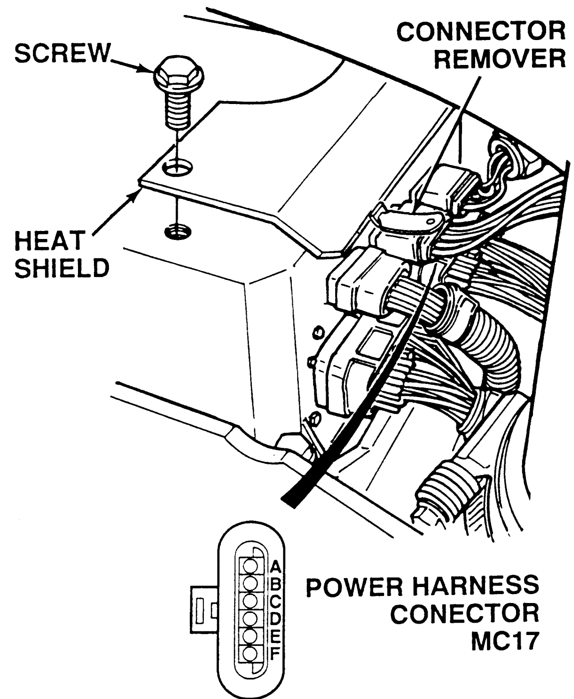
NO → Reset circuit breakers. Verify repair, go to Step 16 of this Fault.

YES ↓

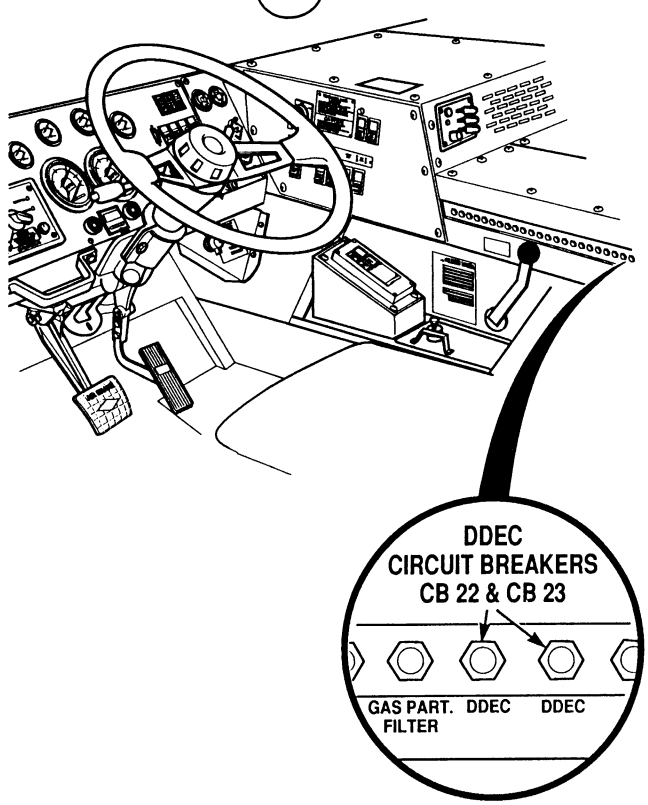
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VISUAL INSPECTION
(1) Check for and correct any of the following problems: • Air in fuel (Refer to Fuel System Troubleshooting - Para 2-17). • Low battery charge (Refer to Electrical System Troubleshooting Para 2-20). • Problems in the charging system (Loose alternator belt, bad grounds, etc.). (Refer to Electrical System Troubleshooting - Para 2-20). • Signs of insulation wear on injector harness (Remove Rocker Arm Cover Para 3-4 or 3-5) If problem has not been corrected notify DS Maintenance. (2) If none of the problems above are present, replace the DDEC ECM (Para 7-56).



VISUAL INSPECTION
Check DDEC circuit breakers CB22 and CB23. (1) If one of these circuit breakers are tripped, reset circuit breakers. Go to Step 16 of this fault. (2) If either of these circuit breakers continue to trip, go to Step 12 of this fault.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.
DDEC circuit breakers not tripped.

POSSIBLE PROBLEMS

Short in bank A or bank B wires 240 and/or 241.
Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

12.

WARNING

Read WARNING on Page 2-369

Are 10 to 14 vdc measured on wires 241 and 240 between DDEC ECM power harness connector, terminals A, B, E and F and a known good ground?

NO → Repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES ↓

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

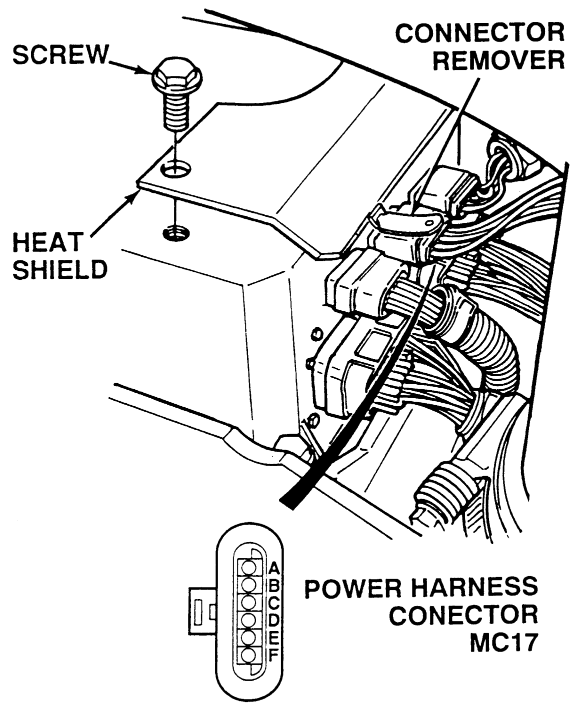
Voltage less than 10 vdc at power harness connector indicates short exists between bank A power wire 240 or bank B wire 241 and ground.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VOLTAGE TEST

(1) Remove two screws and heat shield.
(2) Disconnect power harness connector MC17 with connector remover.
(3) Set multimeter select switch to volts dc.
(4) Connect positive (+) multimeter lead to power harness connector MC17, terminals A, B, E and F.
(5) Connect negative (–) multimeter lead to a known good ground.
(6) Turn ON ENGINE switch (TM 9-2320-364-10).
  (a) If there are less than 10 vdc present, turn OFF ENGINE switch and repair wire 240 or 241 (see schematic Fig 2-3) or notify DS Maintenance.
  (b) If 10 to 14 vdc are present, wires 240 and 241 are OK. Turn OFF ENGINE switch and go to Step 13 of this Fault.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.
DDEC circuit breakers not tripped.
No short in bank A or bank B wires 240 and 241.

POSSIBLE PROBLEMS

Open in bank A or bank B wires 240 and/or 241.
Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

13.

WARNING

Read WARNING on Page 2-371

Are 10 to 14 vdc measured between wires 240 and 241 at DDEC ECM power harness connector, terminals A,B, E and F and a known good ground?

NO → Repair wires 240 and/or 241 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES ↓

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Open is suspect. If voltage at power harness connector is less than 10 vdc, open in bank A power lines wire 240 or bank B power lines wire 241 is indicated.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.
DDEC circuit breakers not tripped.
No short in bank A or bank B wires 240 and 241.
No open in bank A or bank B wires 240 and 241.

POSSIBLE PROBLEMS

Open in ground line wire 150.
Open in injector return lines wires 619 and/or 620.

14.

WARNING

Read WARNING on Page 2-371

Are 5 ohms or less measured on wire 150 at power harness connector MC17, terminals C and D and a known good ground?

NO → Repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

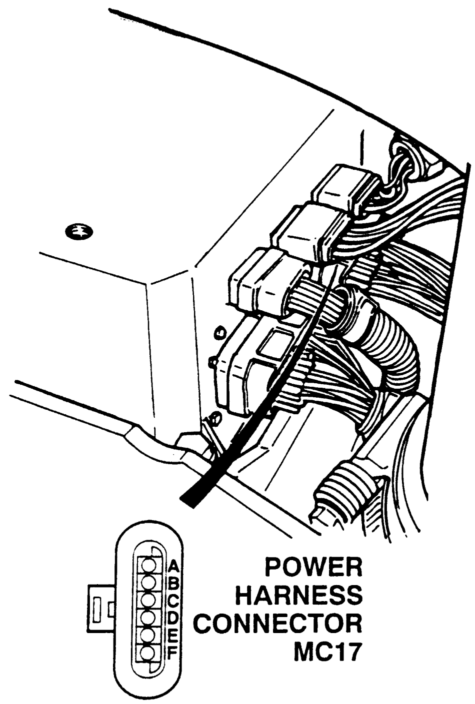
Resistance more than 5 ohms at power harness connector indicates open in ground line(s) wire 150.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VOLTAGE TEST

(1) Connect positive (+) multimeter lead to power harness connector MC17, terminals A, B, E and F one at a time.
(2) Connect negative (–) multimeter lead to a known good ground.
(3) Turn ON ENGINE switch (TM 9-2320-364-10).
  (a) If less than 10 vdc is present, turn OFF ENGINE switch and repair wire 240 or 241 (see schematic Fig 2-3) or notify DS Maintenance.
  (b) If 10 to 14 vdc are present, wires 240 and 241 are OK. Turn OFF ENGINE switch and go to Step 14 of this Fault.



RESISTANCE TEST

(1) Set multimeter select switch to ohms.
(2) Read resistance between wire 150 at power harness connector MC17, terminal C and a known good ground.
  (a) If there are more than 5 ohms present, repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance.
  (b) If there are less than 5 ohms present, wire 150 is OK and perform Step (3) below.
(3) Read resistance between wire 150 at power harness connector MC17, terminal D and a known good ground.
  (a) If there are more than 5 ohms present, repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance.
  (b) If there are less than 5 ohms present, wire 150 is OK. Go to Step 15 of this Fault.

A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.
DDEC circuit breakers not tripped.
No short in bank A or bank B wires 240 and 241.
No open in bank A or bank B wires 240 and 241.
No open in ground line wire 150.

POSSIBLE PROBLEMS

Open in injector return lines wires 619 and/or 620.

15.

WARNING

Read WARNING on Page 2-373

Are 5 ohms or less measured between wires 619 and 611 at injector harness connector, terminals G and L and wires 620 and 612 at injector harness connector, terminals E and A?

NO → Repair wires 619 and/or 620 (see schematic Fig 2-4) or notify DS Maintenance. Verify repair, go to Step 16 of this Fault.

YES → Both readings less than or equal to 5 ohms, go to Step 9 of this Fault.

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

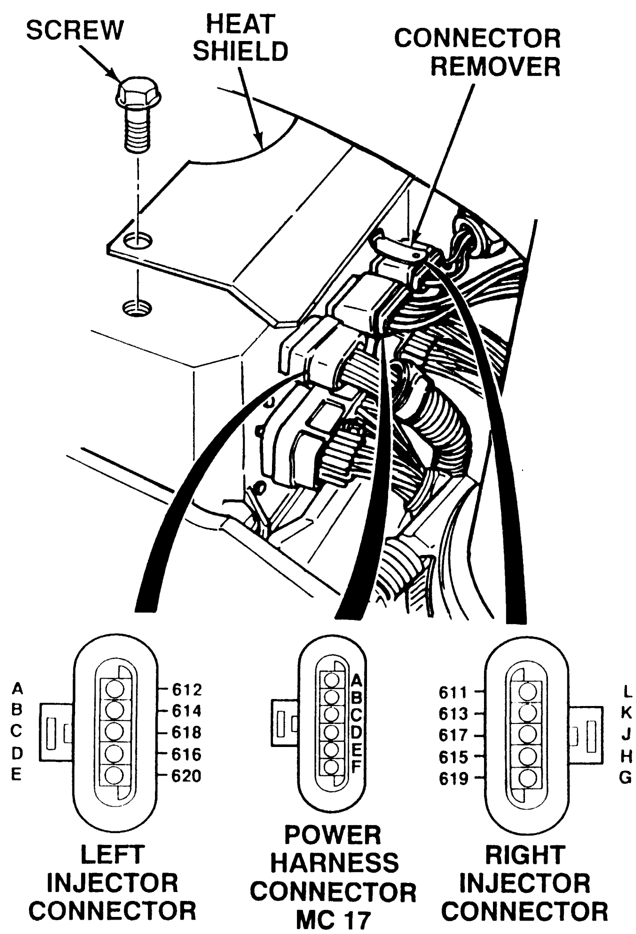
REASON FOR QUESTION

Open is suspect. If resistance is greater than 5 ohms at 5-way injector harness connector, there is an open in injector driver return line wire 619 or 620.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

RESISTANCE TEST
(1) Disconnect both injector harness connectors at DDEC ECM with connector remover. (2) Read resistance between wires 619 and 611 at injector harness connector, terminals G and L. (a) If more than 5 ohms are present, repair wire 619 (see schematic Fig 2-4) or notify DS Maintenance and perform Steps (4) through (8) below. (b) If less than 5 ohms are present, wire 619 is OK. (3) Read resistance between wires 620 and 612 at injector harness connector, terminals E and A. (a) If more than 5 ohms are present, repair wires 620 (see schematic Fig 2-4) or perform Steps (4) through (8) below and notify DS Maintenance. (b) If less than 5 ohms are present, wire 620 is OK. Perform Steps (4) through (8) below and go to Step 16 of this Fault. (4) Connect power harness connector MC17 to DDEC ECM. (5) Connect both injector harness connectors to DDEC ECM. (6) Install heat shield and two mounting screws. (7) Install rocker arm covers (Para 3-4 and/or 3-5). (8) Close top engine access cover.



A4 CODES 61-68 INJECTOR RESPONSE TIME TOO LONG (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Injector response times OK.
Only 1 code displayed on DDR.
No open in wires 619 and 620.
No short in wires 619 and 620.
No short in wires 611 through 618.
Injectors OK.
Terminals at injector harness OK.
DDEC ECM OK.
DDEC circuit breakers not tripped.
No short in bank A or bank B wires 240 and 241.
No open in bank A or bank B wires 240 and 241.
No open in ground line wire 150.
No open in injector return lines wires 619 or 620.

POSSIBLE PROBLEMS

16.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

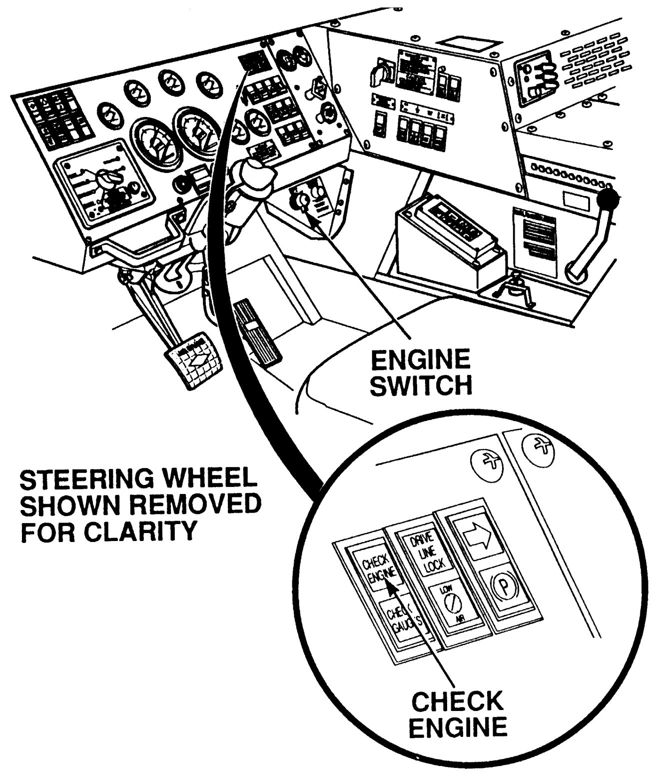
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A4 CODES 71-78 INJECTOR RESPONSE TIME TOO SHORT.

INITIAL SETUP

Tools and Special Tools
Multimeter (Item 44, Appendix G)
Pan, Drain (Item 47, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

Personnel Required
Two

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

Aerated or contaminated fuel.
Charging system faulty.
Bad injector.

1.

WARNING

Read WARNING on Page 2-377

Is fuel system free of aerated fuel and/or contamination?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Fault may be caused by non-DDEC engine or chassis components.

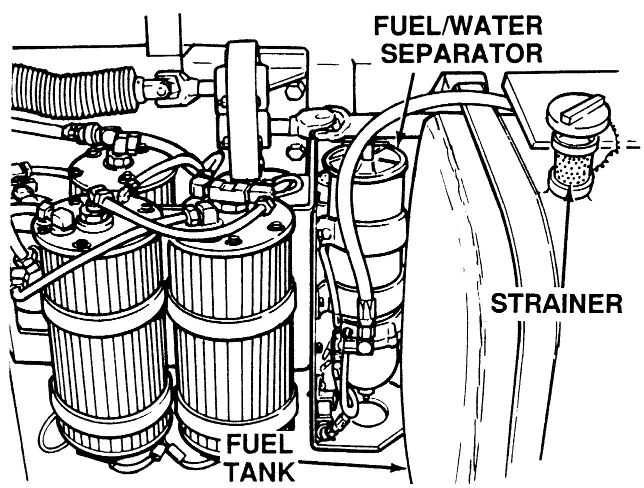
NO → Go to Fuel System Troubleshooting (Para 2-17).

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Check fuel/water separator for water and/or oil in the fuel according to Preventive Maintenance Checks and Services (TM 9-2320-364-10). (a) If there is water in fuel, drain water from fuel/water separator. (b) If there is no water in fuel, go to Step (2) below. (2) Remove fuel tank cap and check fuel strainer for debris. (a) If there is debris in fuel strainer, drain, clean and fill fuel tank (Para 4-8). (b) If there is no debris in fuel strainer, go to Step 2 of this fault.



A4 CODES 71-78 INJECTOR RESPONSE TIME TOO SHORT (CONT).

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON. Fuel OK.
POSSIBLE PROBLEMS
Charging system faulty. Bad injector.

2.

Is alternator or electrical charging system operating properly?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
Fault may be caused by non-DDEC engine or chassis components.

NO → Refer to Electrical Troubleshooting (Para 2-20, Table 2-38).

YES ↓

KNOWN INFO
CHECK ENGINE light (CEL) comes ON and stays ON. Fuel OK. Alternator and charging system OK.
POSSIBLE PROBLEMS
Bad injector.

3.

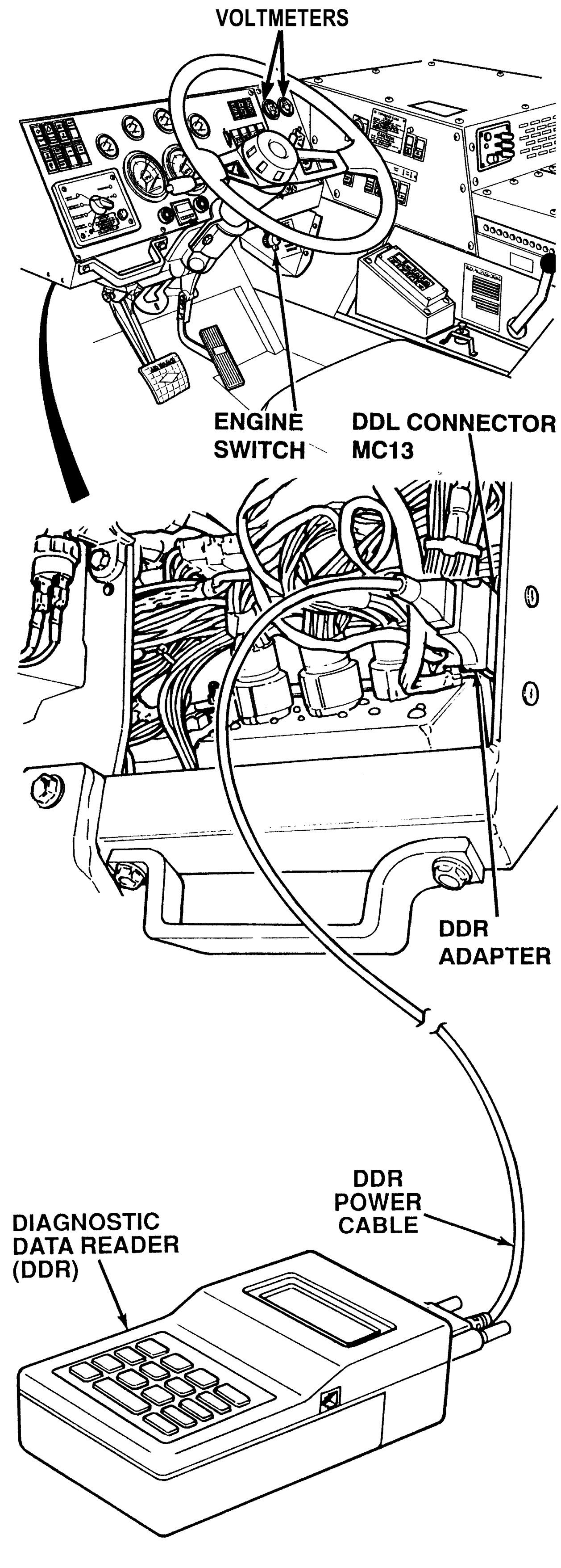
Are Codes 71 through 78 the only codes displayed by DDR?

TEST OPTIONS
DDR TEST.
REASON FOR QUESTION
Isolate Fault.

NO → Service other codes first. Go to Fault Index (Table 2-16).

YES → Go to A4 Codes 61 through 68 Step 2. See note on next page.

ALTERNATOR TEST
(1) Start engine (TM 9-2320-364-10). (a) If 10 to 14 vdc are not indicated on the 12V voltmeter and 22 to 28 vdc are not indicated on the 24V voltmeter, turn OFF ENGINE switch and go to electrical system troubleshooting (Para 2-20). (b) If 10 to 14 vdc are indicated on the 12V voltmeter and 22 to 28 vdc are indicated on the 24V voltmeter, alternator is OK. (2) Turn OFF ENGINE switch.



NOTE

Troubleshooting procedures for Codes 71 through 78 are the same for Codes 61 through 68.

DDR TEST
(1) Connect DDR to connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If there are other codes displayed, turn OFF ENGINE switch and refer to Fault Index (Table 2-16). (b) If there are only Codes 71 through 78 displayed, turn OFF ENGINE switch and go to A4 Codes 61 through 68.

A4 CODES 71-78 INJECTOR RESPONSE TIME TOO SHORT (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
Fuel OK.
Alternator and charging system OK.
Injector OK.

POSSIBLE PROBLEMS

4.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

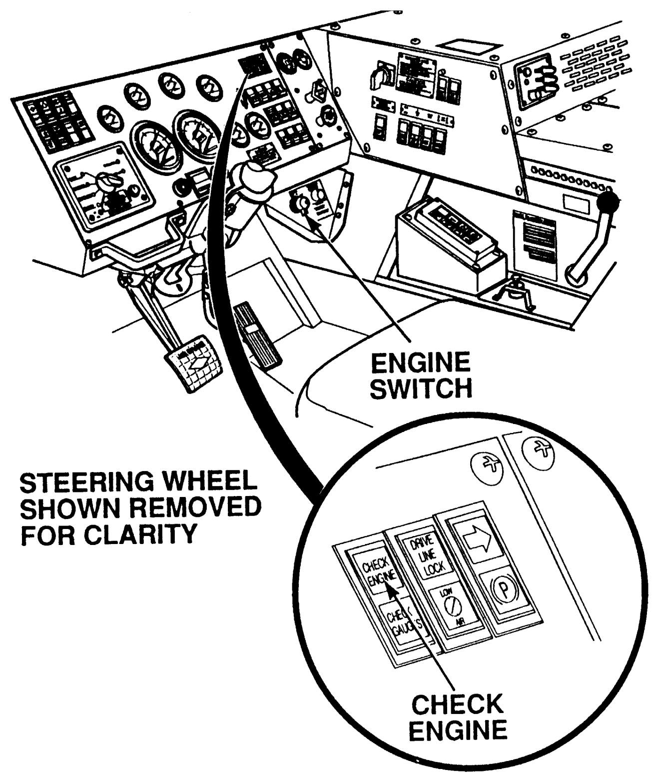
If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear codes on DDR (Para 2-11).
(3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
   (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
   (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A5A VEHICLE HARNESS +5 VOLT SUPPLY.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Wrench, Torque (0 to 175 lb-ft [0-237 N·m]) (Item 95, Appendix G)
Jumperwire

Materials/Parts

Compound, Corrosion Preventive (Item 34, Appendix C)
Lockwasher (Item 168, Appendix F)

References

TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.

POSSIBLE PROBLEMS

4.7 to 5.2 vdc not present on wire 916 at TPS connector, terminal C.
Wire 916 and/or 952 open.
Wire 916 shorted to 952 and/or chassis ground.
Vernier control connector MC38 damaged.
TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

1.

Is Code 46 (Low Battery Voltage) displayed on DDR?

NO → Go to Fault A4 Code 46, (Table 2-16).

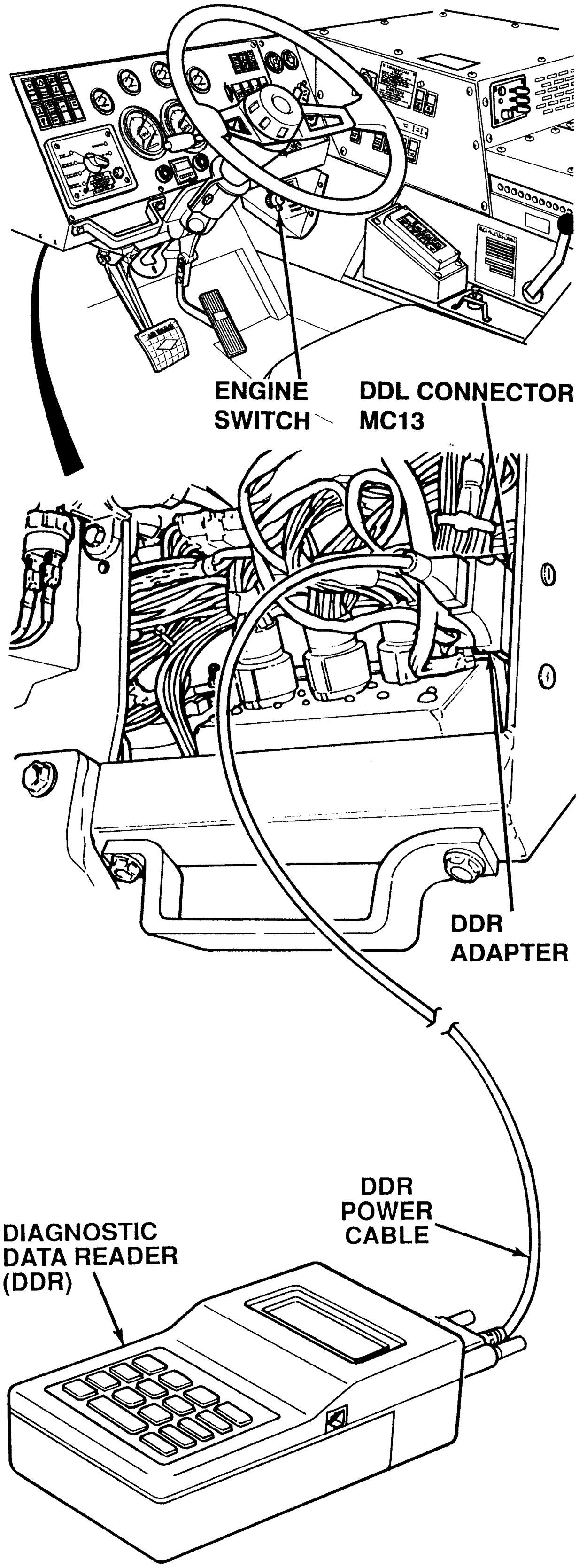
YES ↓

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Low battery voltage is suspect.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 46 fails to display on DDR, turn OFF ENGINE switch and go to Fault A4 (Table 2-16). (b) If Code 46 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this fault.

A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.

POSSIBLE PROBLEMS

4.7 to 5.2 vdc not present on wire 916 at TPS connector, terminal C.
Wire 916 and/or 952 open.
Wire 916 shorted to 952 and/or chassis ground.
Vernier control connector MC38 damaged.
TPS faulty.
TPS harness connector faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

2.

WARNING

Read WARNING on Page 2-385

Are between 4.7 and 5.2 vdc measured between wires 952 and 916 at TPS connector, terminals A and C?

NO → Less than 4.7 vdc, go to Step 3 of this Fault. More than 5.2 volts, go to Step 10 of this Fault.

YES → Between 4.7 and 5.2 vdc, go to Step 7 of this Fault.

TEST OPTIONS

Voltage Test.
STE/ICE-R #89.

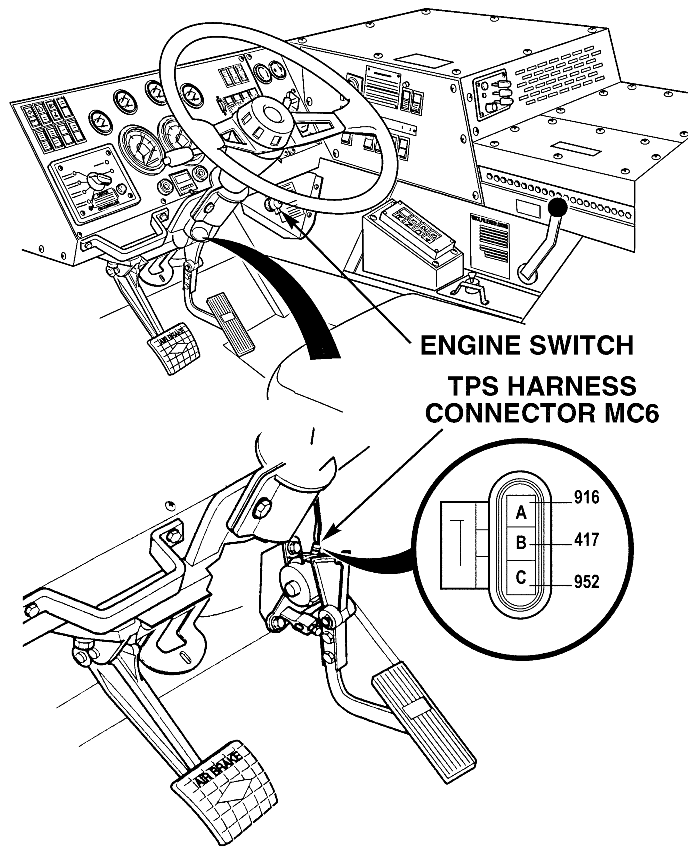
REASON FOR QUESTION

Voltage may not be in acceptable range. Acceptable range is 4.7 to 5.2 vdc.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.

VOLTAGE TEST
(1) Disconnect TPS harness connector MC6. (2) Set multimeter select switch to volts dc. (3) Connect positive (+) multimeter lead to TPS harness connector MC6, terminal C. (4) Connect negative (–) multimeter lead to TPS harness connector MC6, terminal A. (5) Turn ON ENGINE switch (TM 9-2320-364-10). (6) Are 4.7 to 5.2 vdc present on wire 952 to wire 916 at TPS harness connector MC6, terminals C and A. (a) If 4.7 to 5.2 vdc are present, turn OFF Engine switch and go to Step 7 of this Fault. (b) If more than 5.2 vdc are present, turn OFF Engine switch and go to Step 10 of this Fault. (c) If less than 4.7 vdc are present, turn OFF Engine switch and go to Step 3 of this Fault.



A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.

POSSIBLE PROBLEMS

Wire 916 and/or 952 open.
Wire 916 shorted to 952 and/or chassis ground.
Vernier control connector MC38 damaged.
TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

3.

WARNING

Read WARNING on Page 2-387

Are there 5 ohms or less measured between wire 916 and 952 at vehicle harness connector MC18, terminals A3 to C3 with jumperwire installed at TPS, terminals A and C?

NO → Repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Reading greater than 5 ohms indicates +5 volt line wire 916 or sensor return wire 952 is open.

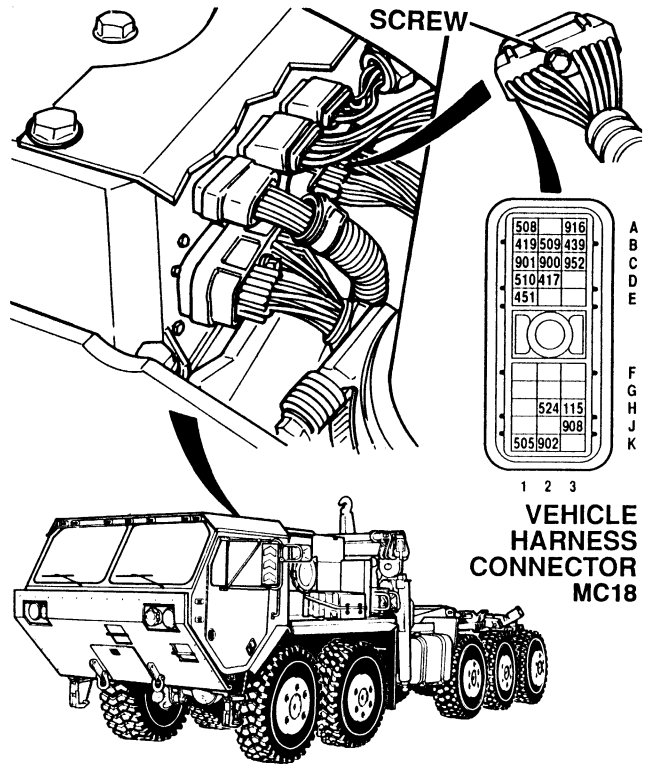
WARNING

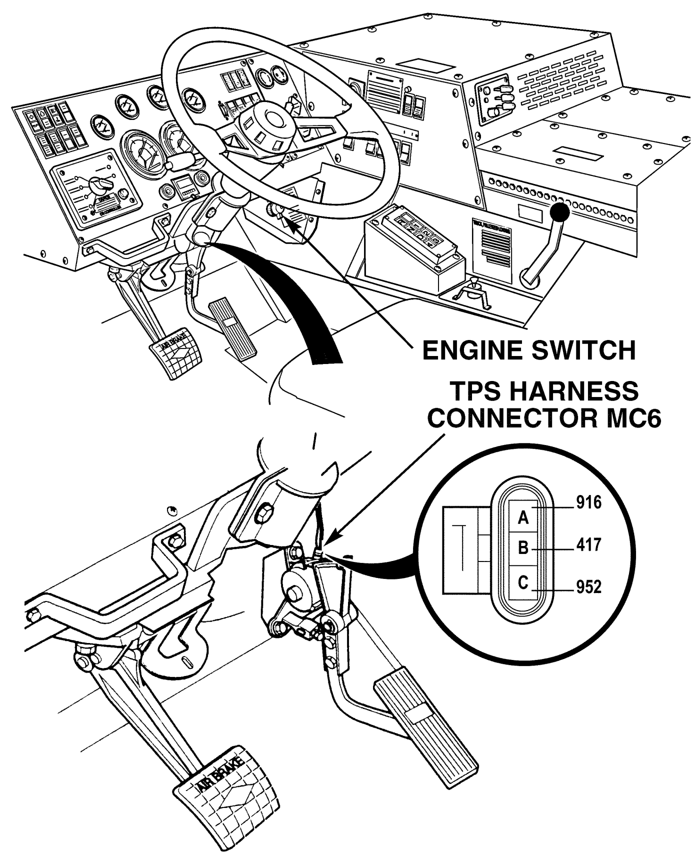
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18 from DDEC ECM. (2) Place jumperwire between terminals A and C at TPS harness connector MC6. (3) Set multimeter select switch to ohms. (4) Are there 5 ohms or less measured between wire 916 and 952 at vehicle harness connector MC18, terminals A3 to C3. (a) If more than 5 ohms are present, remove jumperwire and repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If less than 5 ohms are present, remove jumperwire and go to Step 4 of this Fault.





A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.

POSSIBLE PROBLEMS

Wire 916 and/or 952 open.
Wire 916 shorted to 952 and/or chassis ground.
Vernier control connector MC38 damaged.
TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

4.

WARNING
Read WARNING on Page 2-389

Are there 10,000 ohms or less measured between wire 916 and 952 at TPS connector, terminals A to C and wire 417 at TPS connector, terminal B and a known good ground?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at TPS harness connector indicates short.

NO → If readings are more than 10,000 ohms, go to Step 9 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.

POSSIBLE PROBLEMS

Wire 916 shorted to 952 and/or chassis ground.
Vernier control connector MC38 damaged.
TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

5.

WARNING
Read WARNING on Page 2-389

Are there more than or equal to 4.7 volts measured on wire 916 to wire 952 at vernier control harness connector MC38, terminals C to A?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Reading less than 4.7 vdc at vernier control harness connector indicates wire 916 (+5 volt line) is shorted to return line wire 952 or ground.

NO → Repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

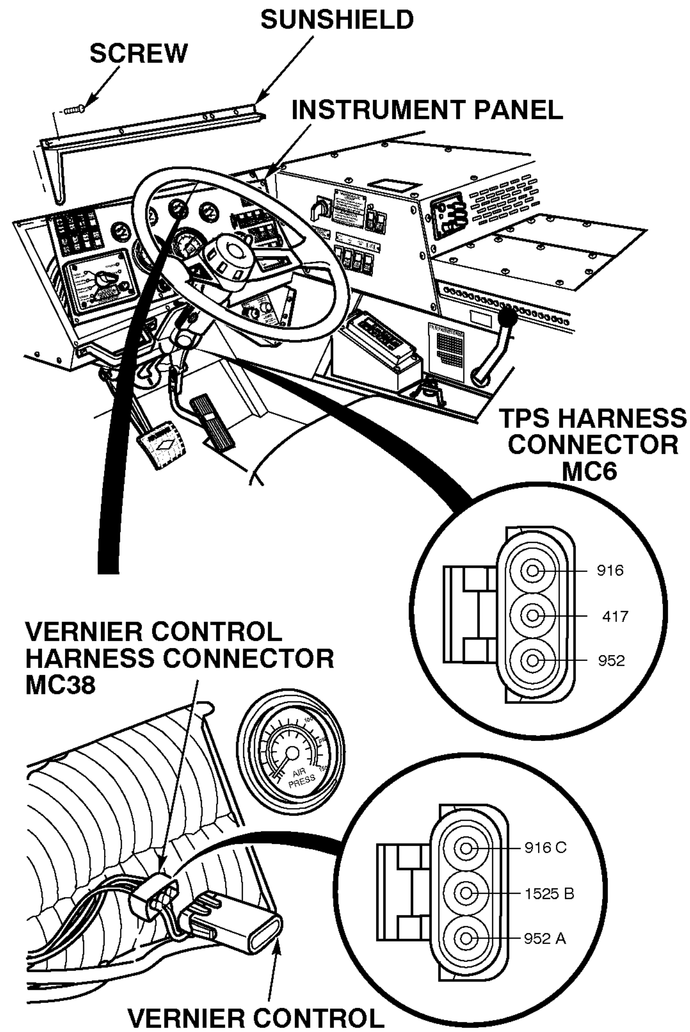
YES ↓

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST

(1) Remove ten screws and sunshield from instrument panel.
(2) Pull top of instrument panel towards steering wheel.
(3) Disconnect vernier control harness connector MC38.
(4) Are 10,000 ohms or less present between wires 916 and 952 at TPS harness connector MC6, terminals A and C?
  (a) If there are 10,000 ohms or less present, repair wire(s) 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If there are more than 10,000 ohms present, go to Step (5) below.
(5) Are there 10,000 ohms or less present between wire 417 at TPS harness connector MC6, terminal B and a known good ground?
  (a) If there are 10,000 ohms or less present, repair wire 417 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If there are more than 10,000 ohms present, go to Step 9 of this Fault.



VOLTAGE TEST

(1) Set multimeter select switch to volts dc.
(2) Connect positive (+) multimeter lead to vernier control harness connector MC38, terminal C.
(3) Connect negative (–) multimeter lead to vernier control harness connector MC38, terminal A.
(4) Turn ON ENGINE switch (TM 9-2320-364-10).
(5) Are there more than or equal to 4.7 vdc present on wire 916 to wire 952 at vernier control harness connector MC38, terminals C to A?
  (a) If there are less than 4.7 vdc present, turn OFF ENGINE switch and repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If there are 4.7 vdc or more present, turn OFF ENGINE switch and go to Step 6 of this Fault.

A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.

POSSIBLE PROBLEMS

Vernier control connector MC38 damaged.
TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

6.

WARNING

Read WARNING on Page 2-391

Are vernier control terminals and connectors (sensor side and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to vernier control.

NO → Repair connectors (Para 7-101). Verify repair, go to Step 12 of this Fault.

YES → Replace vernier control (Para 7-100), Verify repair, go to Step 12 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.

POSSIBLE PROBLEMS

TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

7.

Are the TPS counts 20 to 30 at idle and 200 to 235 counts at full throttle?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

TPS counts should be 20 to 30 counts at idle and no more than 235 counts at full throttle.

NO → Go to Step 9 of this Fault.

YES ↓

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

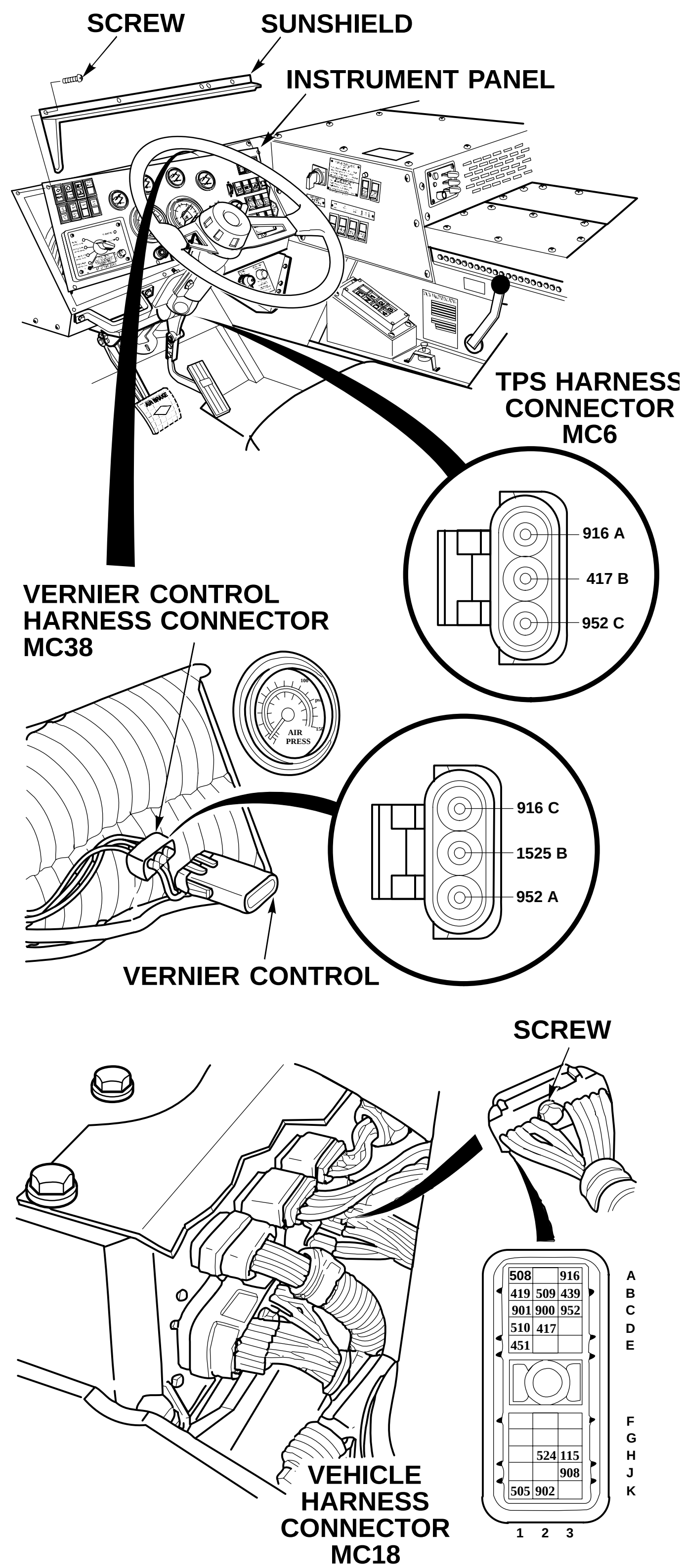
DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION

(1) Check terminals at vernier control and harness connector for damage; bent, corroded and unseated pins or terminals.
  (a) If terminals are damaged, repair connector (Para 7-101) and perform Steps (2) through (5) below.
  (b) If terminals are not damaged, replace vernier control (Para 7-100) and perform Steps (2) through (5) below.
(2) Connect vernier control harness connector MC38.
(3) Connect TPS harness connector MC6.
(4) Connect vehicle harness connector MC18 and tighten screw.
(5) Install instrument panel and sunshield with ten screws.

DDR TEST

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Select MODE 07 (TPS COUNTS) for display on the DDR.
(3) Read throttle counts at idle and at full throttle (engine not running).
  (a) If throttle count is 20 to 30 at idle and 200 to 235 at full throttle, perform Steps (4) and (5) below and go to Step 9 of this Fault.
  (b) If throttle count is not 20 to 30 at idle and 200 to 235 at full throttle, perform Steps (4) and (5) below and go to Step 8 of this Fault.
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.



A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.

POSSIBLE PROBLEMS

TPS harness connector faulty.
TPS faulty.
DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

8.

Are TPS terminals and connectors (ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals can affect signal to TPS.

NO → Repair connectors (Para 7-101). Verify repair, go to Step 12 of this Fault.

YES → Replace TPS (Para 7-58). Verify repair, go to Step 12 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.
TPS harness connector OK.
TPS OK.

POSSIBLE PROBLEMS

DDEC ECM faulty.
Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

9.

WARNING

Read WARNING on Page 2-393

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals can affect signal to DDEC ECM.

NO → Repair connectors (Para 7-101) or replace ECM (Para 7-56). Verify repair, go to Step 12 of this Fault.

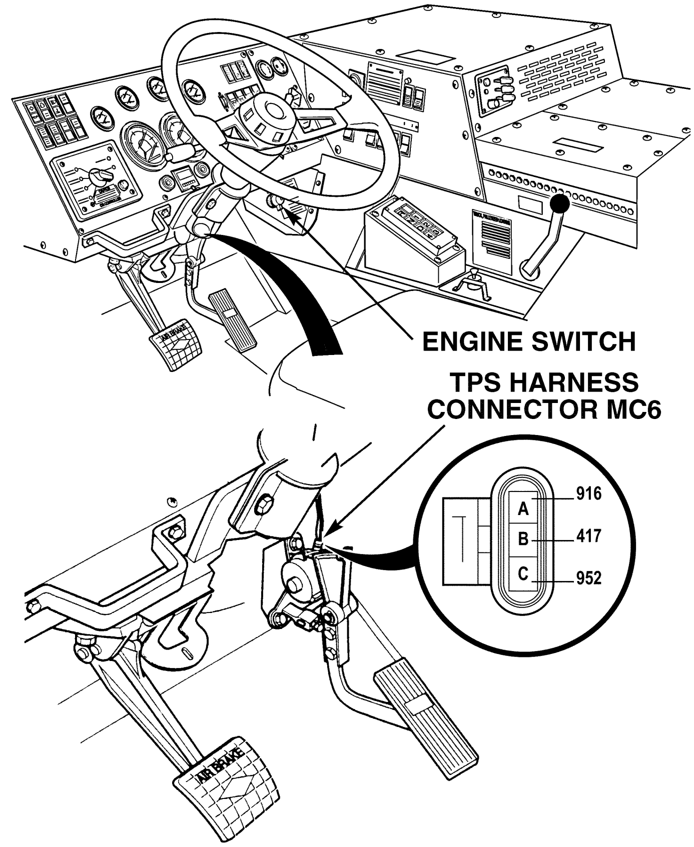
YES → Replace ECM (Para 7-56). Verify repair, go to Step 12 of this Fault.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

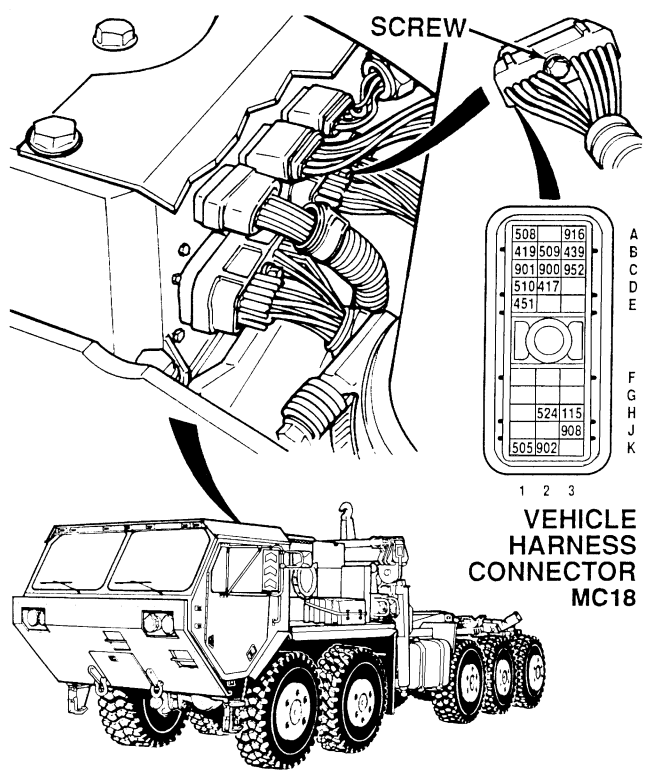
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



VISUAL INSPECTION

(1) Disconnect TPS harness connector MC6.
(2) Inspect TPS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or terminals.
 (a) If vehicle connector is damaged, repair connectors (Para 7-101) and connect TPS harness connector MC6.
 (b) If vehicle connector are free of damage, replace TPS (Para 7-58) and connect TPS harness connector MC6



VISUAL INSPECTION

(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.
(2) Check terminals at vehicle harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
 (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Step (3) below.
 (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
 (c) If vehicle harness connector and ECM connectors are OK, replace DDEC ECM (Para 7-56).
(3) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw.

A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.
TPS harness connector OK.
TPS OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Wire 240 and/or 241 shorted to wire 439 and /or chassis ground.
Wire 952 at vernier control connector MC38 faulty.

10.

WARNING

Read WARNING on Page 2-395

Are there more than 10,000 ohms or an open circuit measured at vehicle harness connector MC18 and/or the power harness connector MC17?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms at power or vehicle harness connectors indicates short where measured.

NO → Repair connector and/or wires 240, 241, 439, 916 (see schematic Fig 2-1 and Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES ↓

WARNING

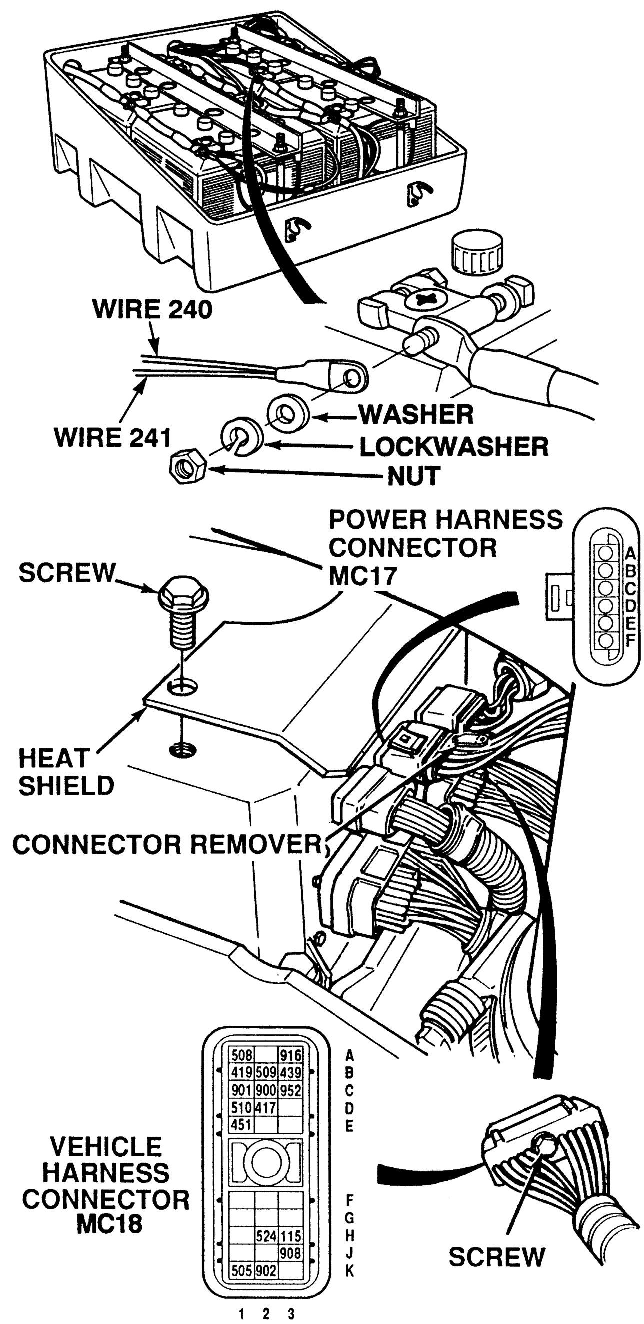
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2320-364-10).
(2) Remove nut, washer, lockwasher, wires 240 and 241 from battery. Discard lockwasher.
(3) Remove two mounting screws and heat shield from DDEC ECM.
(4) Disconnect power harness connector MC17 at DDEC ECM with connector remover.
(5) Loosen screw and disconnect vehicle harness connector MC18.
(6) Set multimeter select switch to ohms.
(7) Are there 10,000 ohms or more present between wires 916 and 439 at vehicle harness connector MC18, terminals A3 and B3.
 (a) If 10,000 ohms or less are present, repair wires 916 and 439 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (9) through (16) below.
 (b) If 10,000 ohms or more are present, go to Step (8) below.
(8) Are there 10,000 ohms or less present between wire 916 on vehicle harness connector MC18, terminal A3 and wires 241 and 240, terminals A, B, E or F on power harness connector MC17?
 (a) If there are 10,000 ohms or less present, repair wires 241 and/or 240 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (9) through (16) below.
 (b) If there are 10,000 ohms or more present, wires 241 and 240 are OK. Perform Steps (9) through (16) below.
(9) Connect power harness connector MC17.
(10) Connect vehicle harness connector MC18 and tighten screw.
(11) Install heat shield with two mounting screws to DDEC ECM.
(12) Connect wires 240/241 to battery with washer, lockwasher and nut.
(13) Tighten nut to 23 lb-ft (31 N·m).
(14) Apply corrosion preventive compound on nut.
(15) Install battery box cover.
(16) Close engine access cover.



A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.
TPS harness connector OK.
TPS OK.
DDEC ECM OK.
No short in wires 240 and 241.

POSSIBLE PROBLEMS

Wire 952 at vernier control connector MC38 faulty.

11.

WARNING

Read WARNING on Page 2-397

Is 4.7 to 5.2 vdc measured at wire 916 at vernier control connector MC38, terminal C and a known good ground and wire 952 at vernier control connector MC38, terminal A and a known good ground?

NO — Repair wires 916 and/or 952 (see schematic 2-1) or notify DS Maintenance. Verify repair, go to Step 12 of this Fault.

YES — Go to Step 6 of this Fault.

TEST OPTIONS

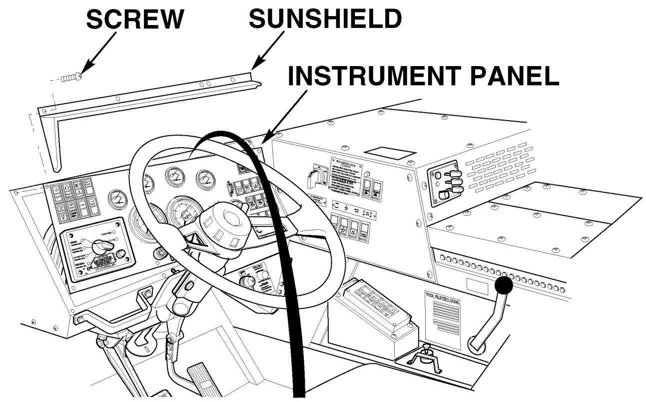
Voltage test.
STE/ICE-R #89.

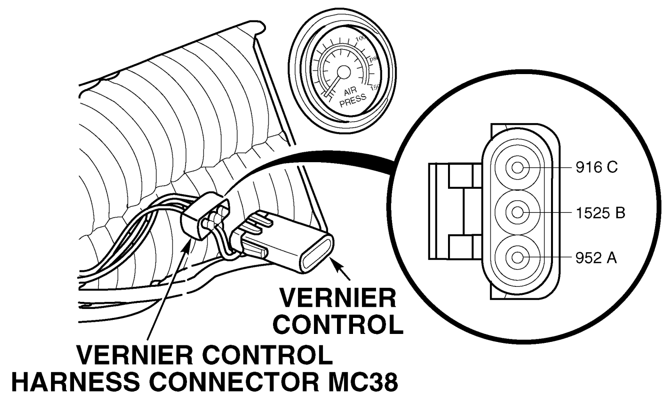
REASON FOR QUESTION

Both readings of 4.7 to 5.2 vdc at vernier control harness connector indicates wire 952 open from connector to DDEC ECM.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.





VOLTAGE TEST
(1) Set multimeter select switch to volts dc. (2) Connect positive (+) multimeter lead to vernier control harness connector MC38, terminal C. (3) Connect negative (–) multimeter lead to a known good ground. (4) Turn ON ENGINE switch (TM 9-2320-364-10). (5) Are there 4.7 to 5.2 vdc present at wire 916 at vernier control harness connector MC38, terminal C and a known good ground. (a) If there are 4.7 to 5.2 vdc present, repair wire 916 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (9) through (11) below. (b) If there are less than or more than 4.7 to 5.2 vdc present, perform Step (6) below. (6) Connect positive (+) multimeter lead to vernier control harness connector MC38, terminal A. (7) Connect negative (–) multimeter lead to a known good ground. (8) Are there 4.7 to 5.2 vdc present at wire 952 at vernier control harness connector MC38, terminal A and a known good ground. (a) If there are less than 4.7 vdc present, turn OFF ENGINE switch and repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (9) through (11) below. (b) If there are 5.2 vdc or more present, perform Steps (9) and (11) below and go to Step 6 of this Fault. (9) Turn OFF ENGINE switch. (10) Connect vernier control harness connector MC38. (11) Install instrument panel and sunshield with ten screws.

A5A VEHICLE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc present on wire 916 at TPS connector, terminal C.
No open in wires 916 and 952.
No short in wires 916 and 952.
Vernier control connector MC38 OK.
TPS harness connector OK.
TPS OK.
DDEC ECM OK.
No short in wires 240 and 241.
Wire 952 at vernier control connector MC38 OK.

POSSIBLE PROBLEMS

12.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

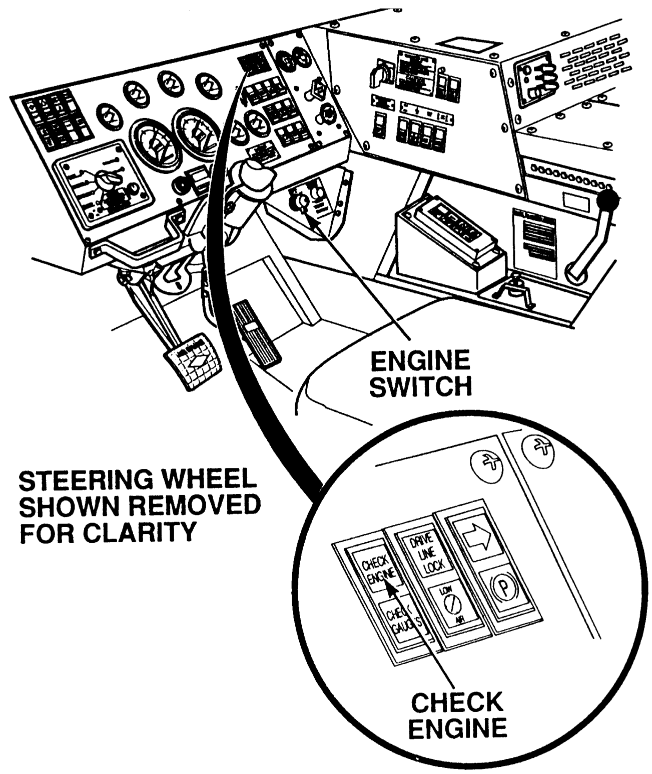
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, fault has been corrected.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not come ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

A5B ENGINE HARNESS +5 VOLT SUPPLY.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Wrench, Torque (0 to 175 lb-ft [0-237 N·m]) (Item 95, Appendix G)
Jumperwire

Materials/Parts
Compound, Corrosion Preventive (Item 34, Appendix C)

Materials/Parts - Continued
Lockwasher (Item 168, Appendix F)
Lockwasher (22) (Item 195, Appendix F)

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)
Right front fender skirt removed, (Para 17-33)

START

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.

POSSIBLE PROBLEMS

4.7 to 5.2 vdc not supplied to FTS or TBS.
4.7 to 5.2 vdc not supplied to OPS or OTS.
Damaged DDEC ECM and engine harness connectors.
Open in engine +5 volt line.
Short in engine +5 volt line.
Short to battery positive.

1.

Is Code 46 (Low Battery Voltage) displayed on DDR?

TEST OPTIONS

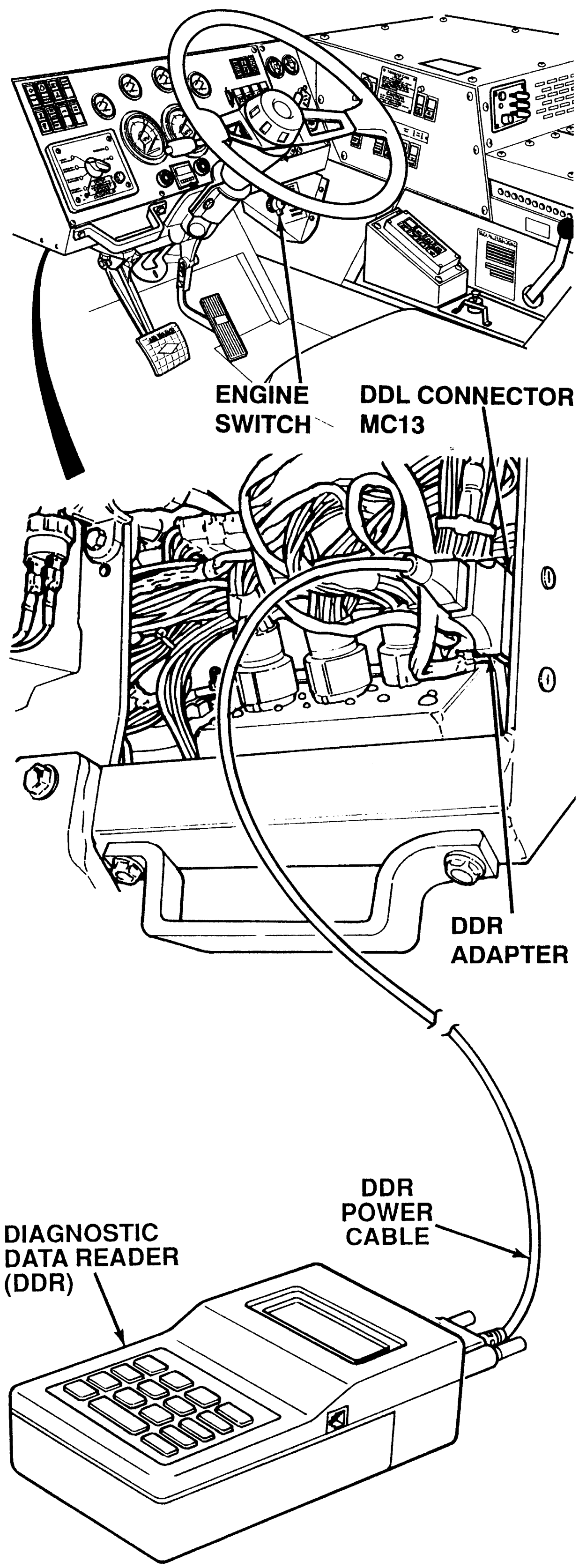
DDR TEST.

REASON FOR QUESTION

Low battery voltage is suspect.

NO → Go to Fault A4 Code 46 (Table 2-16).

YES ↓



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR. (a) If Code 46 fails to display on DDR, turn OFF ENGINE switch and disconnect DDR from DDL MC13. Go to Fault A4 (Table 2-16). (b) If Code 46 is the only active code displayed, turn OFF ENGINE switch and go to Step 2 of this fault.

A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
ECM supply voltage OK.

POSSIBLE PROBLEMS

4.7 to 5.2 vdc not supplied to FTS or TBS.
4.7 to 5.2 vdc not supplied to OPS or OTS.
Damaged DDEC ECM and engine harness connector.
Open in engine +5 volt line.
Short in engine +5 volt line.
Short to battery positive.

2.

WARNING

Read WARNING on Page 2-403

Are 4.7 to 5.2 vdc measured between wires 452 and 472 at FTS and TBS harness connectors, terminals A and B?

NO

If there are less than 4.7 vdc, go to Step 5 of this Fault.
If there are more than 5.2 vdc, go to Step 7 of this Fault.

YES

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Readings between 4.7 and 5.2 vdc are acceptable.

WARNING

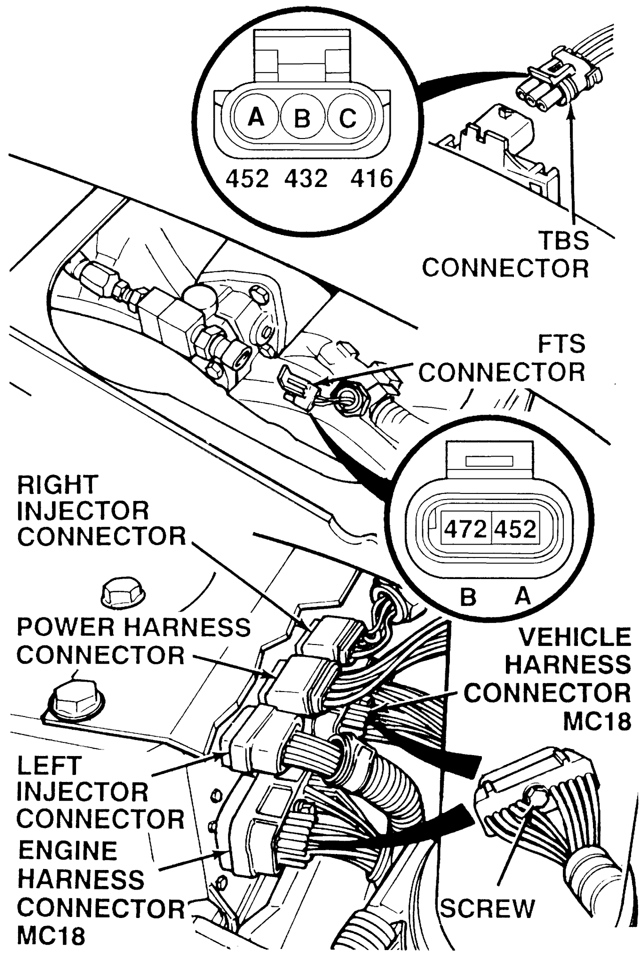
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VOLTAGE TEST

(1) Remove DDEC ECM (Para 7-56).
(2) Disconnect FTS harness connector.
(3) Set DDEC ECM on mounting bracket.
(4) Connect vehicle and engine harness connectors, tighten two screws.
(5) Connect power harness connector, and right and left injector connectors.
(6) Connect positive (+) multimeter lead to FTS harness connector, terminal A.
(7) Connect negative (–) multimeter lead to FTS harness connector, terminal B.
(8) Turn ON ENGINE switch (TM 9-2320-364-10).
(9) Are 4.7 to 5.2 vdc present between wires 452 and 472 at FTS harness connector, terminals A and B?
  (a) If less than 4.7 vdc are present, turn OFF ENGINE switch, and go to Step 5 of this Fault.
  (b) If more than 5.2 vdc are present, turn OFF ENGINE switch and go to Step 7 of this Fault.
  (c) If 4.7 and 5.2 vdc are present, go to Step (10) below.
(10) Disconnect TBS harness connector from sensor.
(11) Connect positive (+) multimeter lead to TBS harness connector, terminal A.
(12) Connect negative (–) multimeter lead TBS harness connector, terminal C.
(13) Turn ON ENGINE switch.
(14) Are 4.7 to 5.2 vdc present between wires 452 and 416 at TBS connector MC6, terminals A and C.
  (a) If less than 4.7 vdc are present, perform Steps (15) through (18) below and go to Step 5 of this Fault.
  (b) If more than 5.2 vdc are present, perform Steps (15) through (18) below and go to Step 7 of this Fault.
  (c) If 4.7 to 5.2 vdc are present, TBS connector is OK.
(15) Turn OFF ENGINE switch.
(16) Connect TBS connector to sensor.
(17) Connect FTS harness connector to sensor.
(18) Install DDEC ECM (Para 7-56).



A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stays ON.
ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.

POSSIBLE PROBLEMS

4.7 to 5.2 vdc not supplied to OPS or OTS.
Damaged ECM and engine harness connector.
Open in engine +5 volt line.
Short in engine +5 volt line.
Short to battery positive.

3.

WARNING

Read WARNING on Page 2-405

Are 4.7 to 5.2 vdc measured between wires 452 and 416 at OPS and OTS harness connectors, terminals A and B?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Voltage of less than 4.7 vdc or more than 5.2 vdc will prevent sensors from operating correctly or cause damage.

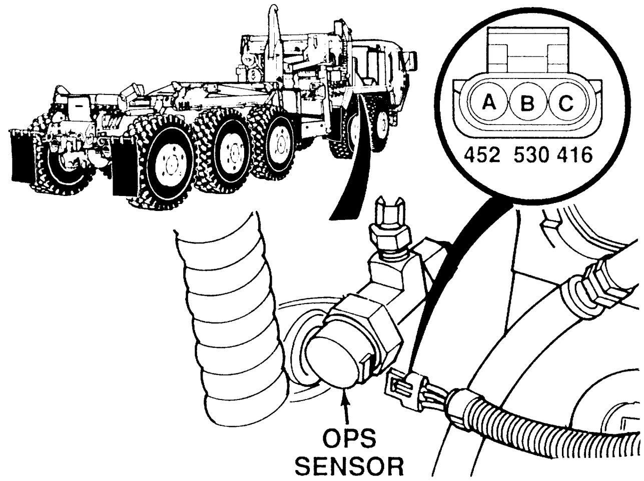
NO → If less than 4.7 vdc are present, go to Step 5 of this Fault. If more than 5.2 vdc are present, go to Step 7 of this Fault.

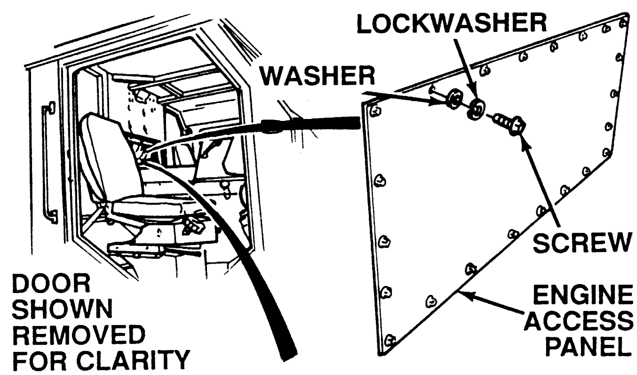
YES ↓

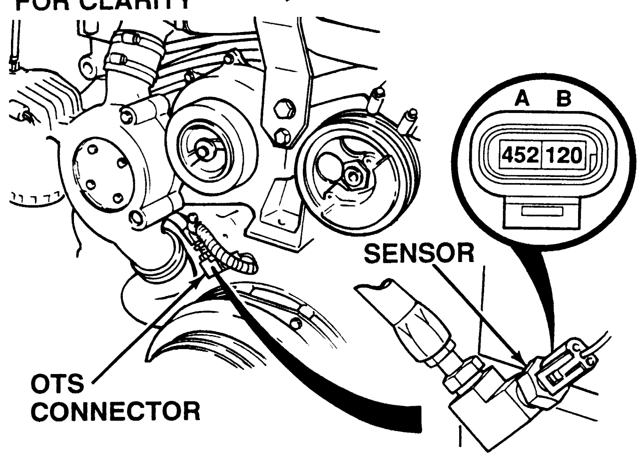
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

VOLTAGE TEST
(1) Remove 22 screws, lockwashers, washers and engine access panel. Discard lockwashers. (2) Disconnect OPS harness connector. (3) Connect positive (+) multimeter lead to OPS harness connector, terminal A. (4) Connect negative (–) multimeter lead OPS harness connector, terminal C. (5) Turn ON ENGINE switch, (TM 9-2320-364-10). (6) Are 4.7 to 5.2 vdc present between wires 452 and 416 at OPS connector, terminals A and C? (a) If less than 4.7 vdc are present, turn OFF ENGINE switch and go to Step 5 of this Fault. (b) If more than 5.2 vdc are present, go to Step 7 of this Fault. (c) If 4.7 and 5.2 vdc are present, OPS connector is OK. Perform Steps (7) and (8) below. (7) Turn OFF ENGINE switch. (8) Connect OPS connector to sensor. (9) Disconnect OTS harness connector from sensor. (10) Connect positive (+) multimeter lead to OTS harness connector, terminal A. (11) Connect negative (–) multimeter lead OTS harness connector, terminal B. (12) Turn ON ENGINE switch, (TM 9-2320-364-10). (13) Are 4.7 to 5.2 vdc present between wires 452 and 120 at OTS connector, terminals A and B? (a) If less than 4.7 vdc are present, turn OFF ENGINE switch, perform Steps (15) through (17) below and go to Step 5 of this Fault. (b) If more than 5.2 vdc are present, turn OFF ENGINE switch, perform Steps (15) through (17) below and go to Step 7 of this Fault. (c) If between 4.7 and 5.2 vdc are present, OTS connector is OK, perform Steps (14) through (17) below. (14) Turn OFF ENGINE switch. (15) Connect OPS connector to sensor. (16) Install engine access panel with 22 washers, lockwashers and screws. (17) Install right front fender skirt (Para 17-33).







A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.
4.7 to 5.2 vdc supplied to OPS or OTS.

POSSIBLE PROBLEMS

Damaged ECM and engine harness connector.
Open in engine +5 volt line.
Short in engine +5 volt line.
Short to battery positive.

4.

WARNING
Read WARNING on Page 2-407

Are ECM and engine harness connectors OK?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to connectors can affect signal to DDEC ECM.

NO → Repair engine harness connector (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.
4.7 to 5.2 vdc supplied to OPS or OTS.
ECM and engine harness connectors OK.

POSSIBLE PROBLEMS

Open in engine +5 volt line.
Short in engine +5 volt line.
Short to battery positive.

5.

CAUTION
Read CAUTION on Page 2-407

Are there 5 ohms or less measured between wires 416 and 452 at engine harness connector, terminals W1 and Y2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms indicates open in wire 416 or sensor return wire 452.

NO → Repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

WARNING

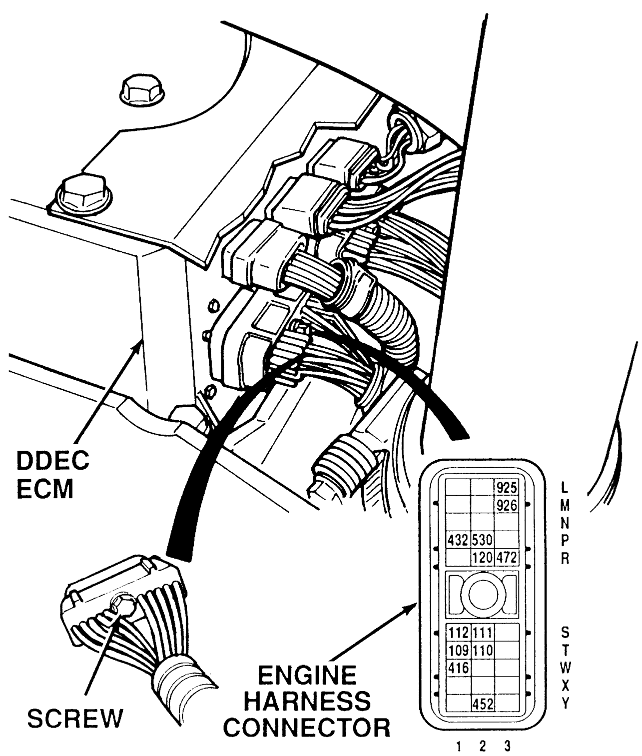
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Check engine harness connector and ECM connector for bent, corroded and unseated terminals. (a) If harness connector is damaged, repair connector (Para 7-101). (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If engine harness and ECM connectors are OK, replace DDEC ECM (Para 7-56).

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Place jumperwire between terminals A and C of any sensor harness connector that measured less than 4.7 vdc in Steps 2 and 3 of this Fault. (3) Place jumperwire between terminals A and B of any sensor harness connector that measured less than 4.7 vdc in Steps 2 and 3 of this Fault. (4) Set multimeter select switch to ohms. (5) Are there 5 ohms or less present between wires wire 416 and 452 at engine harness connector, terminals W1 and Y2? (a) If more than 5 ohms are present, remove jumperwire and repair wires 416 and 452 (see schematic Fig 2-2) or notify DS Maintenance. (b) If less than 5 ohms are present, wire 416 and 452 are OK. (6) Remove jumperwire. (7) Install engine harness connector and tighten screw.



A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.
4.7 to 5.2 vdc supplied to OPS or OTS.
ECM and engine harness connectors OK.

POSSIBLE PROBLEMS

Open in engine +5 volt line short in engine +5 volt line.
Short to battery positive.

6.

WARNING

Read WARNING on Page 2-409

Are there more than 10,000 ohms or an open circuit measured between wires 416 and 452 at TBS connector, terminals A and C?

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms at sensor connector indicates wire 416 is shorted to return line wire 452 or ground.

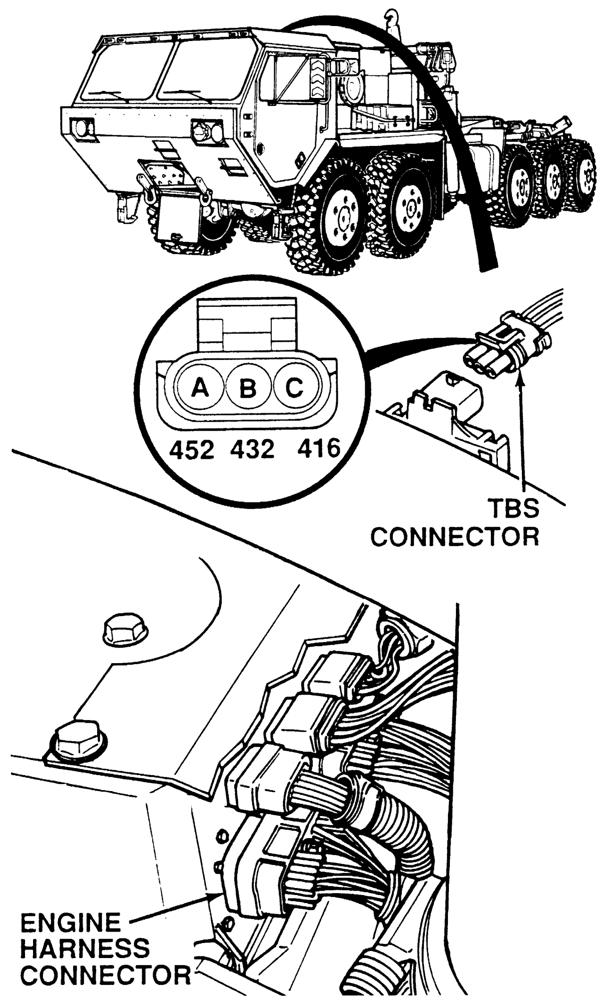
NO → Repair wires 416 and/or 452 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES → Go to Step 4 of this Fault.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST
(1) Disconnect TBS harness connector. (2) Are there more than 10,000 ohms or an open circuit present between wires 416 and 452 at TBS connector, terminals A and C? (a) If less than 10,000 ohms are present repair wires (see schematic Fig 2-2) or notify DS Maintenance. (b) If there are more than 10,000 ohms or an open circuit, wires 416 and 452 are OK. Perform Step (3) below. (3) Are there more than 10,000 ohms or an open circuit present between wire 416 at TBS connector, terminal C and a known good ground? (a) If less than 10,000 ohms are present repair wire 416 (see schematic Fig 2-2) or notify DS Maintenance. (b) If more than 10,000 ohms are present or an open circuit, wire 416 is OK. Go to Step 4 of this Fault.



A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.
4.7 to 5.2 vdc supplied to OPS or OTS.
DDEC ECM and engine harness connectors OK.
No open in engine +5 volt line.
No short in engine +5 volt line.

POSSIBLE PROBLEMS

Short to battery positive.

7.

WARNING

Read WARNING on Page 2-411

Are there more than 10,000 ohms or an open circuit measured between wire 416 at engine harness connector, terminal W1 and 439 at vehicle harness connector MC18, terminal B3?

NO → Repair wires 416, 240, 241 and/or 439 (see schematic Fig 2-1 and/or 2-2) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms at the power harness connector indicates short between terminals where measured.

WARNING

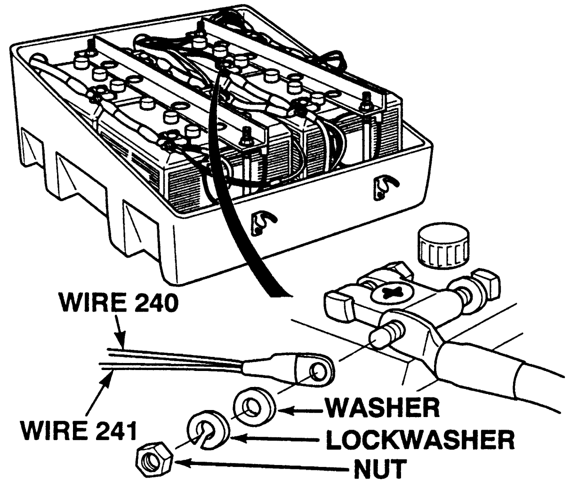
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Corrosion inhibitor contains alkali. Do not get in eyes; wear goggles/safety glasses when using. Avoid contact with skin. In case of contact, immediately wash area with soap and water. If eyes are contacted, flush eyes with large amounts of water for at least 15 minutes and get immediate medical attention.

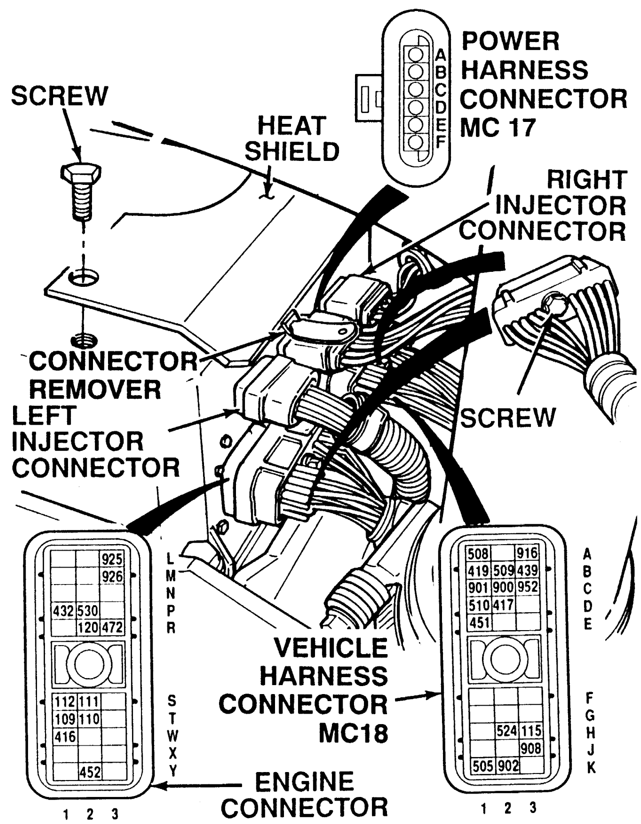
CAUTION

- ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- While applying torque to nut, hold screw with wrench or damage to battery may occur.

RESISTANCE TEST

(1) Remove battery box cover (TM 9-2320-364-10).
(2) Remove nut, washer, lockwasher and disconnect wires 240 and 241 from battery No. 4. Discard lockwasher.
(3) Remove two screws and heat shield from DDEC ECM.
(4) Disconnect power harness connector MC17, right and left injector connectors with connector remover.
(5) Loosen two screws and disconnect engine and vehicle harness connectors from DDEC ECM.
(6) Are there more than 10,000 ohms or an open circuit present between wire 416 at engine harness connector, terminal W1 and wire 439 at vehicle harness connector MC18, terminal B3?
   (a) If less than 10,000 ohms are present, repair wires 416 and 439 (see schematic Fig 2-1 and/or 2-2) or notify DS Maintenance and perform Steps (8) through (14) below.
   (b) If more than 10,000 ohms are present or an open circuit, wires 416 and 439 are OK. Perform Step (7) below.
(7) Are there more than 10,000 ohms present between wire 416 at engine harness connector, terminal W1 and wires 241 and 240 at power harness connector, terminals A, B, E and F?
   (a) If less than 10,000 ohms are present, repair wires 416, 240 or 241 (see schematic Fig 2-2 and/or 2-3) or notify DS Maintenance and perform Steps (8) through (14) below.
   (b) If more than 10,000 ohms are present, DDEC wiring is OK.
(8) Connect engine and vehicle harness connectors to DDEC ECM and tighten two screws.
(9) Connect DDEC ECM power connector and right and left injector connectors.
(10) Connect wires 240/241 to battery No. 4 with washer, lockwasher and nut.
(11) Tighten nut to 23 lb-ft (31 N·m).
(12) Apply corrosion preventive compound on nut.
(13) Install heatshield and two screws to DDEC ECM.
(14) Install battery box cover.





A5B ENGINE HARNESS +5 VOLT SUPPLY (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) comes ON and stay ON.
DDEC ECM supply voltage OK.
4.7 to 5.2 vdc supplied to FTS or TBS.
4.7 to 5.2 vdc supplied to OPS or OTS.
Terminals at DDEC ECM and engine harness connectors OK.
No open in engine +5 volt line.
No short in engine +5 volt line.
No short to battery positive.

POSSIBLE PROBLEMS

8.

Does CEL stay ON longer than five seconds?

NO → Fault corrected.

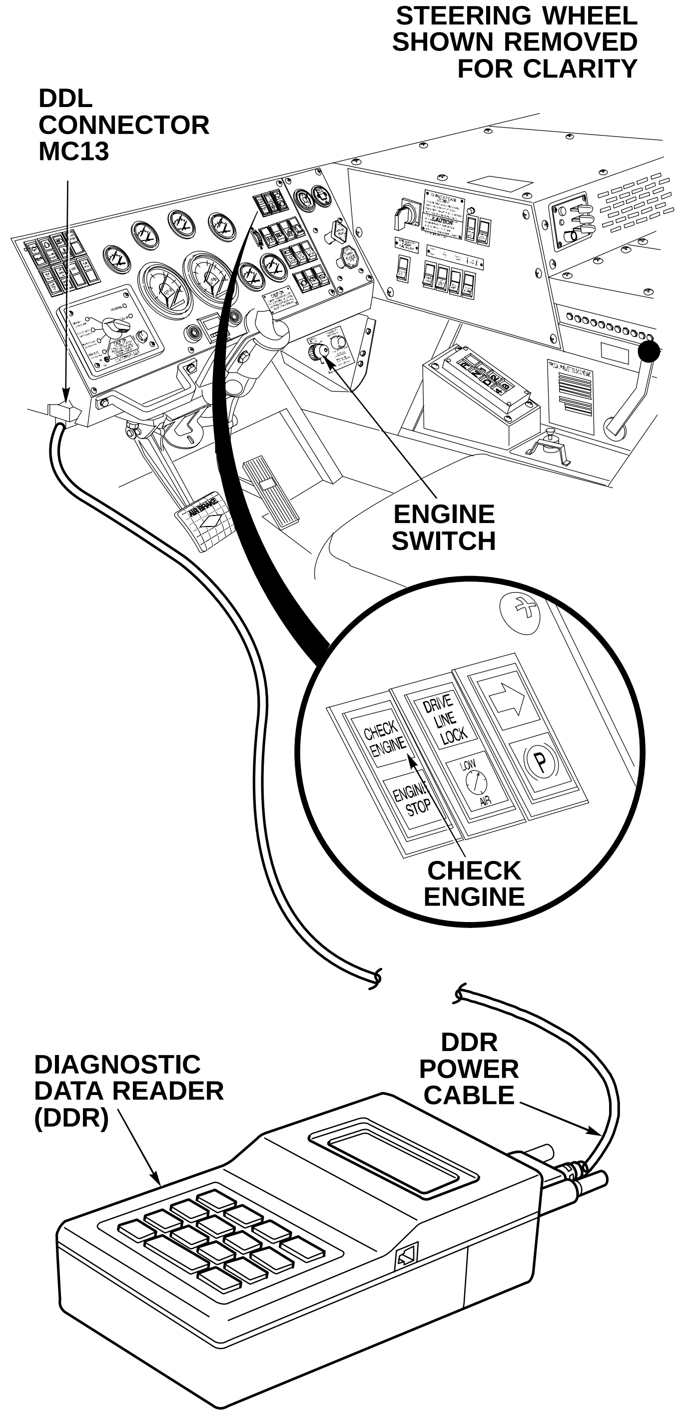
YES → Go to Fault Index (Table 2-16).

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below. (b) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

B CHECK ENGINE LIGHT (CEL) ALWAYS OFF.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Remover, Connector (Item 55, Appendix G)
- Jumperwire

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

START

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.

POSSIBLE PROBLEMS

Loose or unseated DDEC ECM vehicle harness connector.
Short in +12 volt wire 439.
CEL indicator lamp faulty.
Open in CEL driver wire 419.
Open in +12 volt wire 439.
Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

1.

CAUTION
Read CAUTION on Page 2-415

Is DDEC ECM vehicle harness connector MC18 connected and seated correctly?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

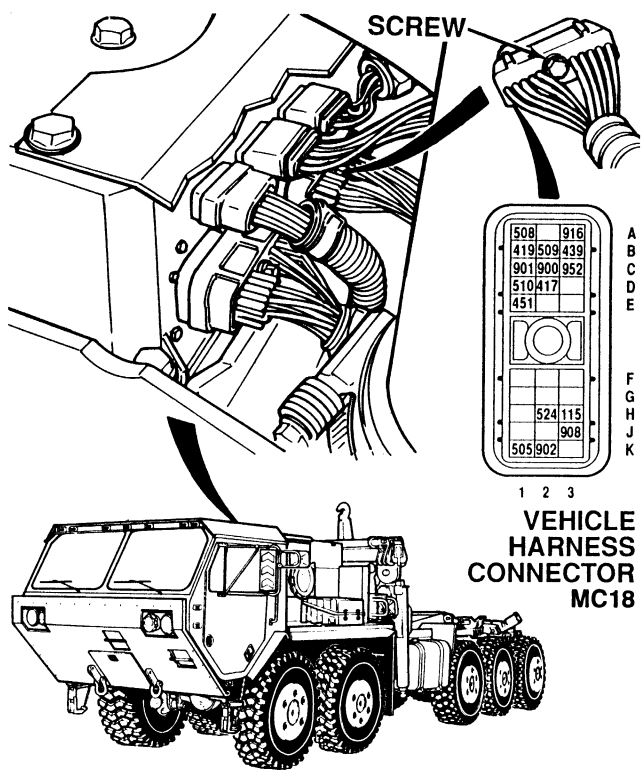
If connector is not seated correctly, CEL will not operate.

NO → Remove and reinstall connector correctly. Verify repair, go to Step 9 of this Fault.

YES ↓

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



VISUAL INSPECTION
Visually inspect DDEC ECM vehicle harness connector MC18. (1) If connector is loose, reinstall and tighten screw. (2) If connector is OK, go to Step 2 of this Fault.

B CHECK ENGINE LIGHT (CEL) ALWAYS OFF (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.

POSSIBLE PROBLEMS

Short in +12 volt wire 439.
CEL indicator lamp faulty.
Open in CEL driver wire 419.
Open in +12 volt wire 439.
Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

2.

WARNING
Read WARNING on Page 2-417

Is CEL off with jumperwire installed at wire 419 on vehicle harness connector MC18, terminal B1 and a known good ground?

NO → Go to Step 5 of this Fault.

YES ↓

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Isolate Fault.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

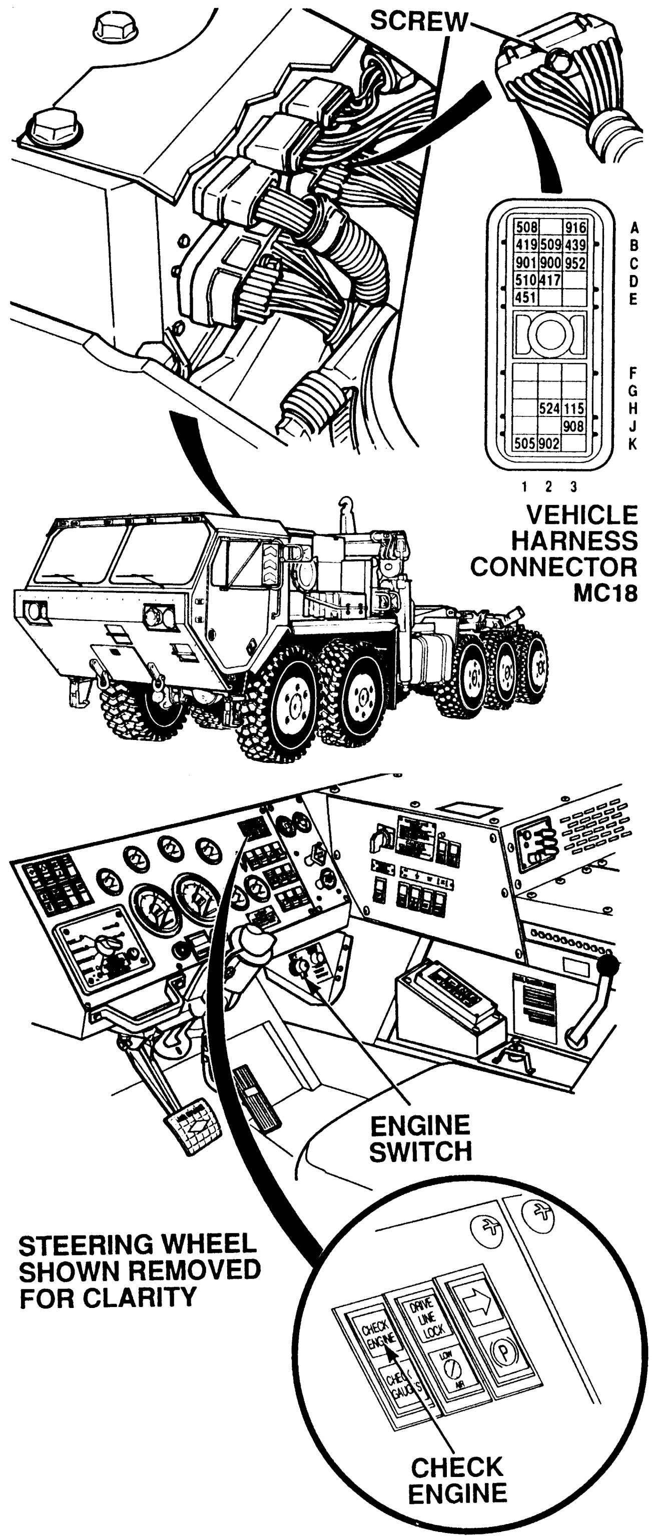
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (2) Place jumperwire between terminal B1 on vehicle harness connector MC18 and a known good ground. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Observe CEL. (a) If CEL does come ON, perform Steps (5) and (6) below and go to Step 5 of this fault. (b) If CEL does not come ON, perform Steps (5) and (6) below and go to Step 3 of this fault. (5) Turn OFF ENGINE switch. (6) Remove jumperwire.



B CHECK ENGINE LIGHT (CEL) ALWAYS OFF (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.

POSSIBLE PROBLEMS

Short in +12 volt wire 439.
CEL indicator lamp faulty.
Open in CEL driver wire 419.
Open in +12 volt wire 439.
Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

3.

WARNING

Read WARNING on Page 2-419

Are there 10 to 14 vdc measured between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground with engine switch on?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 volts at vehicle harness connector indicates wire 439 (+12 volt line) is shorted to ground.

NO → Repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt wire 439.

POSSIBLE PROBLEMS

CEL indicator lamp faulty.
Open in CEL driver wire 419.
Open in +12 volt wire 439.
Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

4.

Is continuity measured between terminals of CEL indicator lamp?

TEST OPTIONS

Continuity test.
STE/ICE-R #91.

REASON FOR QUESTION

Continuity indicates lamp is OK. If lamp is OK, driver wire 419 or ground wire 150 are open.

NO → Replace lamp (Para 7-24). Verify repair, go to Step 9 of this Fault.

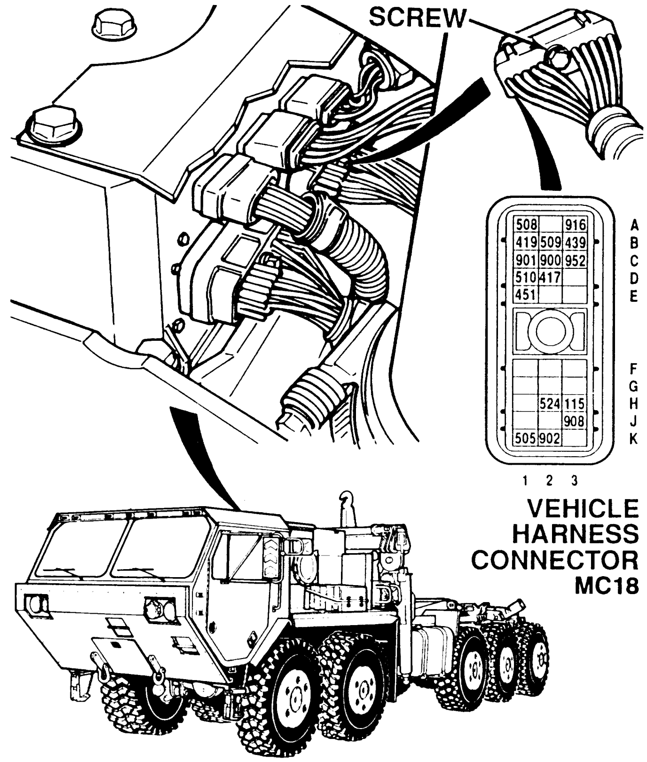
YES ↓

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

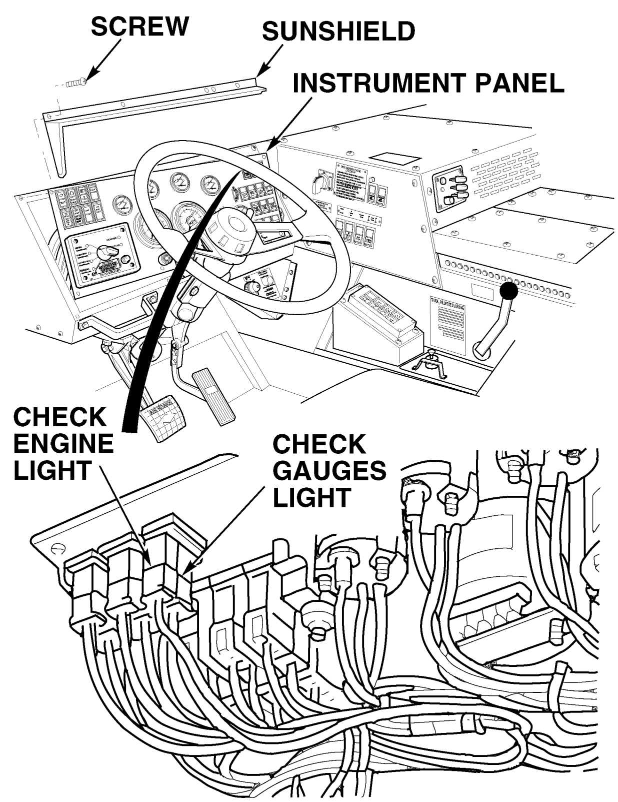
VOLTAGE TEST

(1) Set multimeter select switch to volts dc.
(2) Connect positive (+) multimeter lead to vehicle harness connector MC18, terminal B3.
(3) Connect negative (–) multimeter lead to a known good ground.
(4) Turn ON ENGINE switch (TM 9-2320-364-10).
(5) Are there 10 to 14 vdc present between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?
   (a) If there are less than 10 vdc present, turn OFF ENGINE switch and repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance.
   (b) If there are more than 10 vdc present, turn OFF ENGINE switch and go to Step 4 of this Fault.



CONTINUITY TEST

(1) Remove ten screws and sunshield from instrument panel.
(2) Pull top of instrument panel towards steering wheel.
(3) Remove CEL lamp (Para 7-24).
(4) Set multimeter select switch to ohms.
(5) Is continuity measured across terminals of CEL indicator lamp?
   (a) If there is no continuity, replace lamp (Para 7-24) and perform Step (7) below.
   (b) If there is continuity, lamp is OK. Perform Steps (6) and (7) below.
(6) Install CEL lamp.
(7) Install instrument panel and sunshield with ten screws.



B CHECK ENGINE LIGHT (CEL) ALWAYS OFF (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt line wire 439.
CEL indicator lamp OK.
No open in CEL driver wire 419.

POSSIBLE PROBLEMS

Open in +12 volt wire 439.
Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

5.

WARNING
Read WARNING on Page 2-421

Are there 10 to 14 vdc measured between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 volts at vehicle harness connector indicates wire 439 (+12 volt line) is open.

NO → Repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt line wire 439.
CEL indicator lamp OK.
No open in CEL driver wire 419.
No open in +12 volt wire 439.

POSSIBLE PROBLEMS

Short/Open in battery positive wires 240 or 241.
Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

6.

WARNING
Read WARNING on Page 2-421

Are 10 to 14 vdc measured between wires 241 and 240 at power harness connector MC17, terminals A, B, E and F and a known good ground?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 volts at power harness connector indicates battery positive lines wires 240/241 are shorted (CB22/CB23 tripped) or open.

NO → Repair wires 241 and/or 240 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

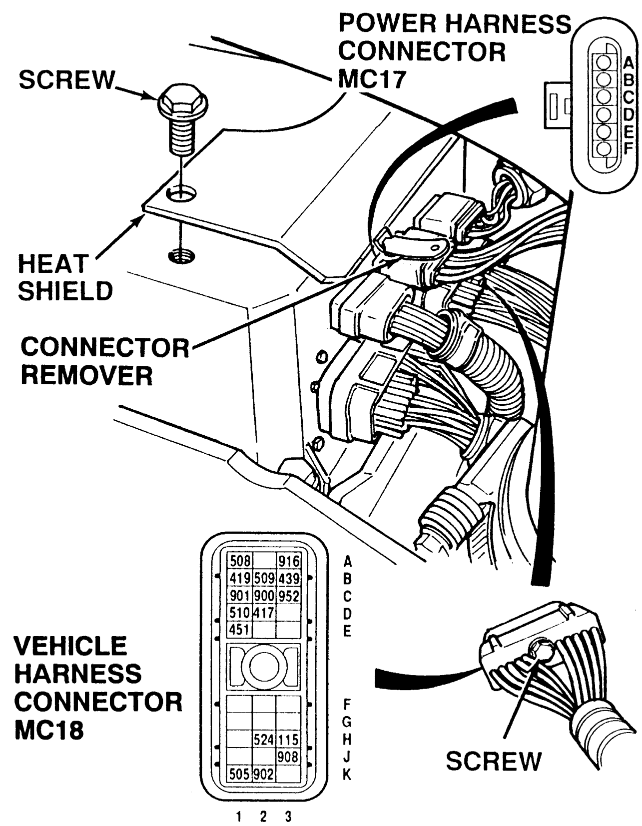
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged.
Use care when connecting and disconnecting connectors.

VOLTAGE TEST
(1) Set multimeter select switch to volts dc. (2) Connect positive (+) multimeter lead to vehicle harness connector MC18, terminal B3. (3) Connect negative (–) multimeter lead to a known good ground. (4) Turn ON ENGINE switch (TM 9-2320-364-10). (5) Are there 10 to 14 vdc present between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground? (a) If there are less than 10 vdc present, turn OFF ENGINE switch and repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. (b) If more than 10 vdc are present, perform Step (6) and (7) below and go to Step 6 of this Fault. (6) Turn OFF ENGINE switch. (7) Connect vehicle harness connector MC18 and tighten screw.



VOLTAGE TEST
(1) Remove two mounting screws and heat shield from DDEC ECM. (2) Disconnect power harness connector MC17 at DDEC ECM with connector remover. (3) Connect positive (+) multimeter lead to power harness connector MC17, terminals A, B, E and F, one at a time. (4) Connect negative (–) multimeter lead to a known good ground. (5) Turn ON ENGINE switch (TM 9-2320-364-10). (6) Are 10 to 14 vdc present between wires 241 and 240 at power harness connector MC17, terminals A, B, E and F and a known good ground? (a) If there are less than 10 vdc present, turn OFF ENGINE switch and repair wires 241 and/or 240 (see schematic Fig 2-3) or notify DS Maintenance. (b) If more than 10 vdc are present, turn OFF ENGINE switch and go to Step 7 of this Fault.

B CHECK ENGINE LIGHT (CEL) ALWAYS OFF (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt line wire 439.
CEL indicator lamp OK.
No open in CEL driver wire 419.
No open in +12 volt wire 439.
No short/open in battery positive wires 240 or 241.

POSSIBLE PROBLEMS

Open in ground wire 150.
Damaged DDEC ECM terminals or connectors.

7.

WARNING

Read WARNING on Page 2-423

Are there 10 to 14 vdc measured between wire 150 at power harness connector MC17, terminals C and D and wires 241 and 240 at terminals A, B, E and F?

NO → Repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 9 of this Fault.

YES ↓

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

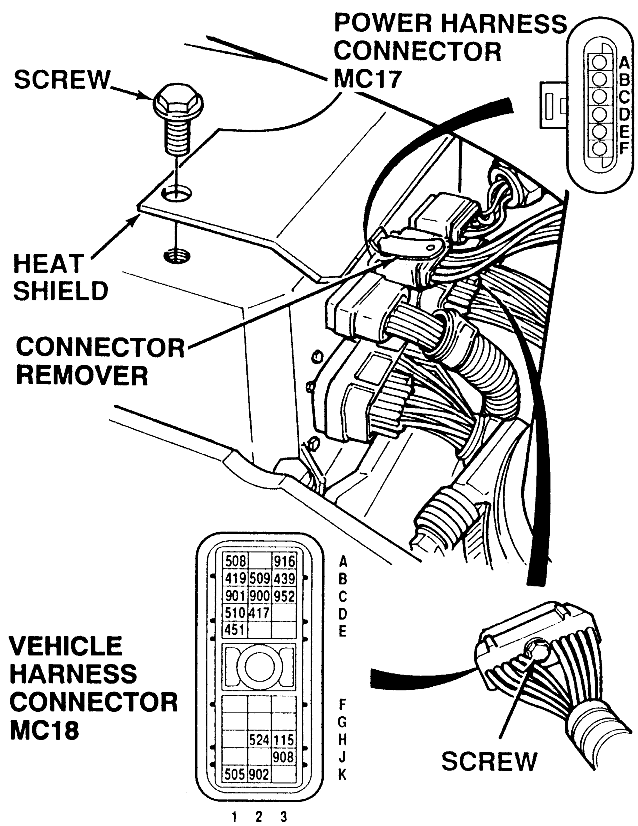
REASON FOR QUESTION

Less than 10 volts at any reading indicates ground line wire 150 is open.

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VOLTAGE TEST
(1) Connect positive (+) multimeter lead to power harness connector MC17, terminals C. (2) Connect negative (–) multimeter lead to terminals A, B, E and F. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Are there more than 10 to 14 vdc present between wire 150 at power harness connector MC17, terminal C and wires 241 and 240 at terminals A, B, E and F one at a time? (a) If there are less than 10 vdc present, repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (6) and (7) below. (b) If there are 10 to 14 vdc present, go to Step (5) below. (5) Are there less than 10 vdc present between wire 150 at power harness connector MC17, terminal D and wires 241 and 240 at terminals A, B, E and F? (a) If there are less than 10 vdc present, repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (6) and (7) below. (b) If there are 10 to 14 vdc present, perform Steps (6) and (7) below and go to Step 8 of this Fault. (6) Connect power harness connector MC17. (7) Install heat shield and two mounting screws.



B CHECK ENGINE LIGHT (CEL) ALWAYS OFF (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt line wire 439.
CEL indicator lamp OK.
No open in CEL driver wire 419.
No open in +12 volt wire 439.
No short/open in battery positive wires 240 or 241.
No open in ground wire 150.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals or connectors.

8.

WARNING
Read WARNING on Page 2-425

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

NO → Repair connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 9 of this Fault.

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged DDEC ECM terminals and connectors can affect signal to DDEC ECM.

KNOWN INFO

CHECK ENGINE light (CEL) does not illuminate.
DDEC ECM vehicle harness connector OK.
CEL OFF with jumperwire installed at vehicle harness connector.
No short in +12 volt line wire 439.
CEL indicator lamp OK.
No open in CEL driver wire 419.
No open in +12 volt wire 439.
No short/open in battery positive wires 240 or 241.
No open in ground wire 150.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

9.

Does CEL come ON for five seconds and go OFF?

NO → Go to Fault Index (Table 2-16).

YES → Fault corrected.

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, fault has been corrected.

WARNING

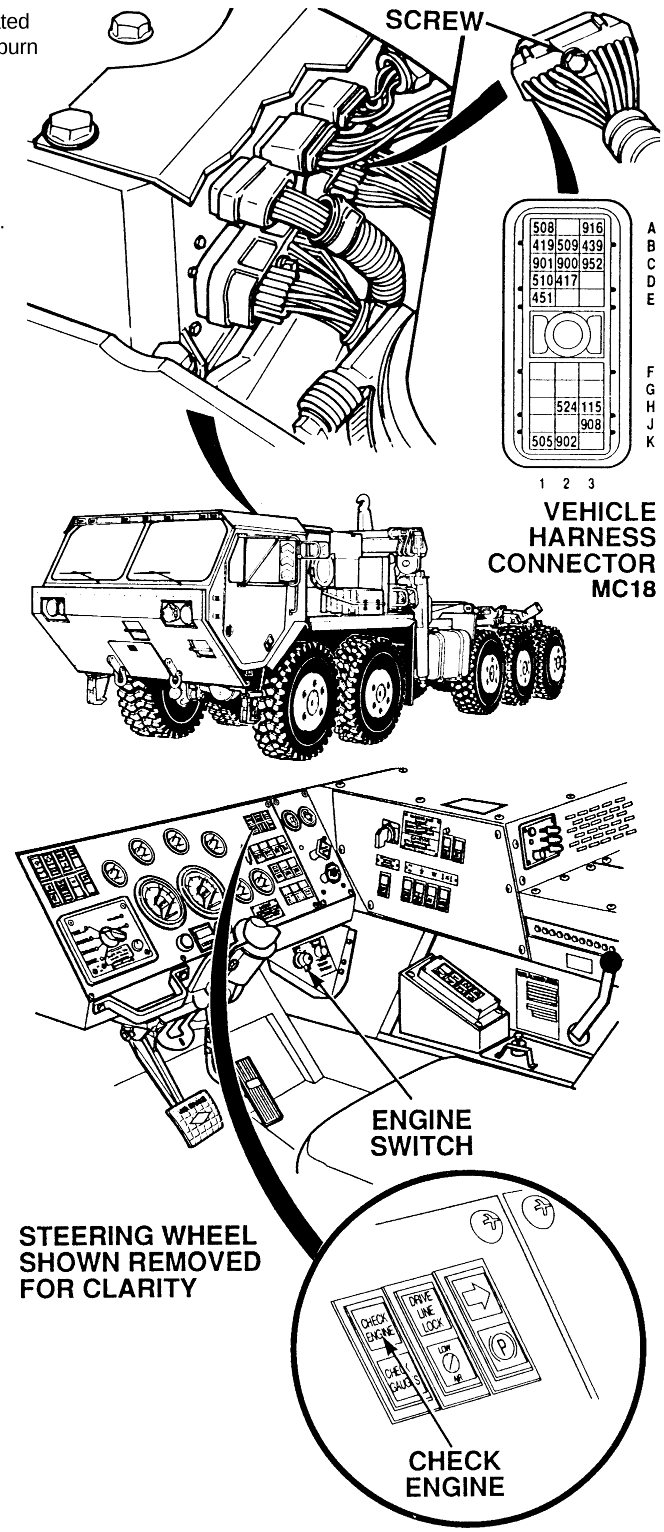
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Check terminals at vehicle harness connector (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56) and go to Step 9 of this Fault. (c) If vehicle harness and ECM connectors are OK, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw. (3) Close top engine access cover.

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear codes on DDR (Para 2-11). (3) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16). (b) If CHECK ENGINE light comes on for about five seconds and then goes off, fault has been corrected. (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

C NORMAL OPERATION OF CHECK ENGINE LIGHT (CEL) AND FAULT PRESENT.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) comes ON for up to 5 seconds, then goes OFF and a Fault is present.
POSSIBLE PROBLEMS

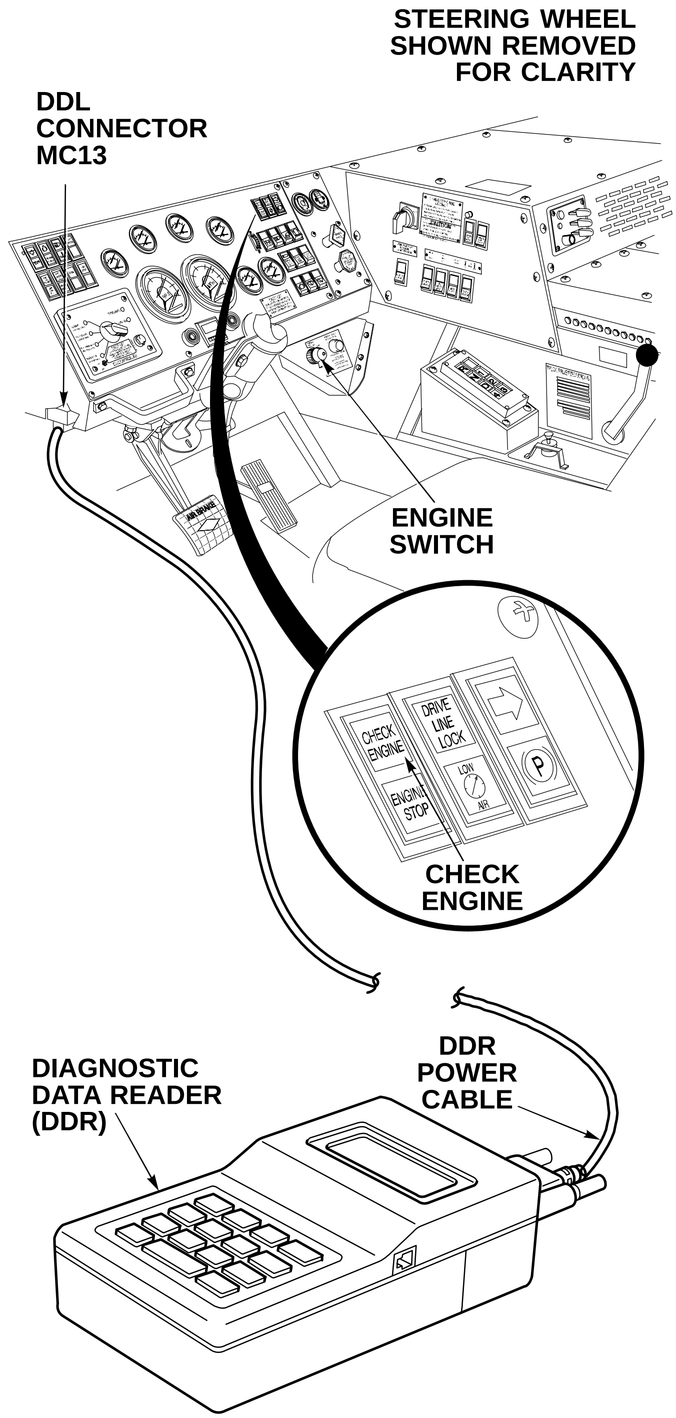
1.

Are active and/or historical codes displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

YES

- If active codes are displayed, follow appropriate troubleshooting chart for code displayed. Go to Fault Index (Table 2-16).
- If historical codes are displayed, go to Fault **C1**.
- If DDR display reads "NO DDEC DATA RECEIVED", go to Fault **C2**.
- If DDR display is blank or random, go to Fault **A3**.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 01 (ACTIVE CODES) on DDR and read codes. (4) Select MODE 02 (HISTORICAL CODES) on DDR and read codes. (5) Turn OFF ENGINE switch. (6) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

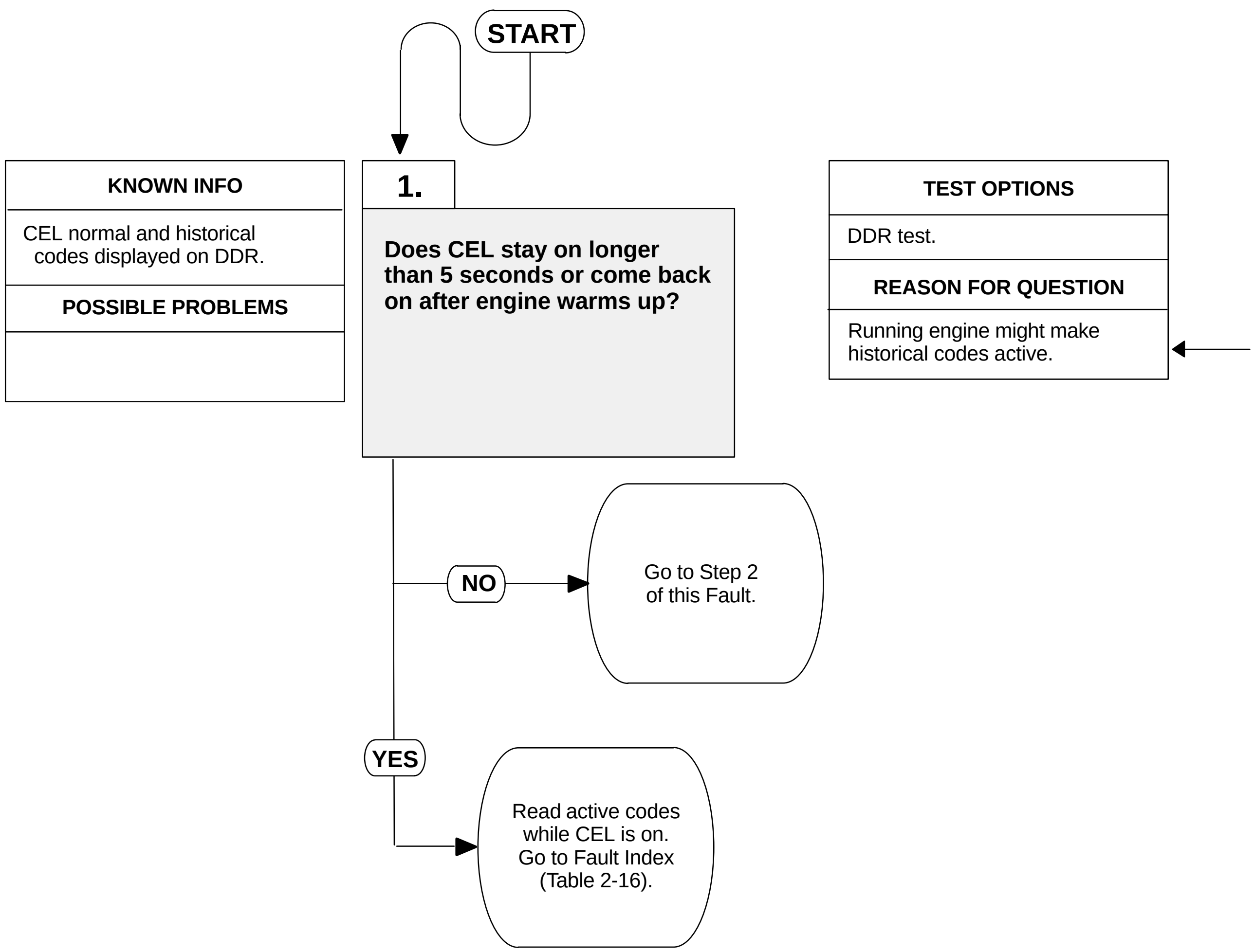
C1 CEL NORMAL AND HISTORICAL CODES DISPLAYED ON DDR.

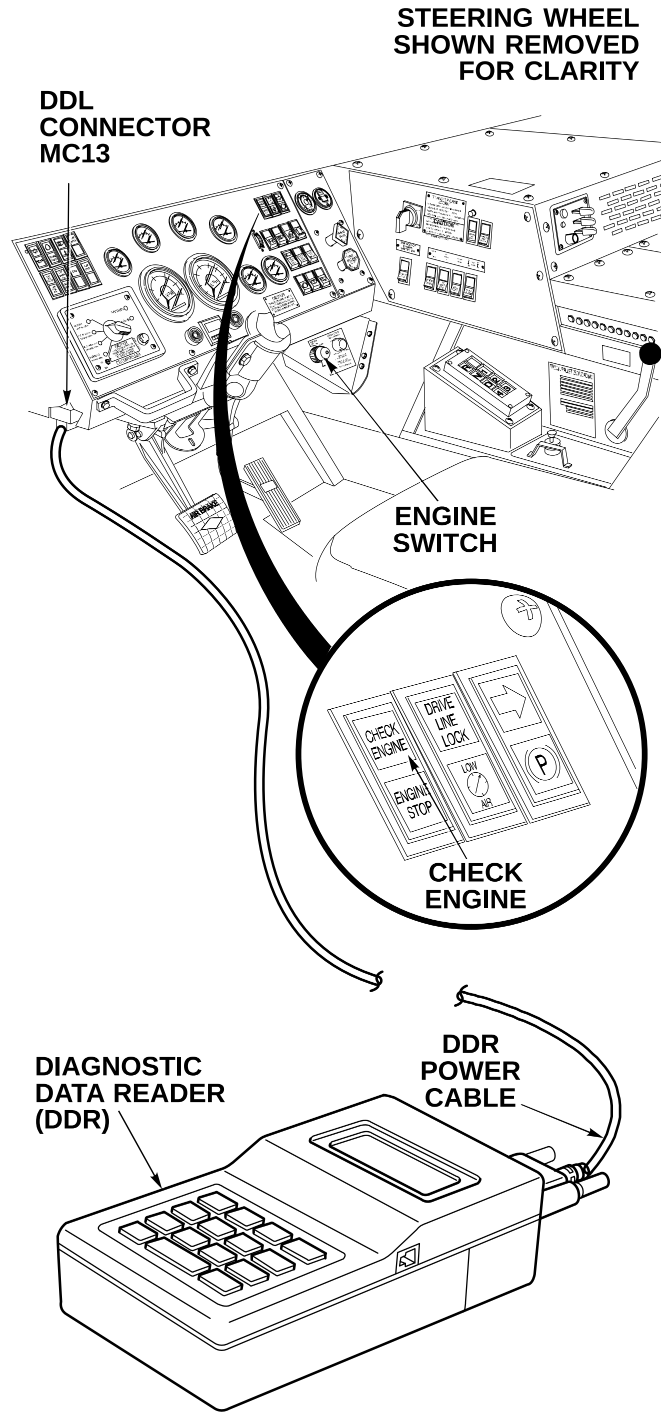
INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)





DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Start engine (TM 9-2320-364-10). (3) Try to get the CEL ON by: • warming up the engine. • changing the RPM from idle to 1500. (4) Let engine run for 10 minutes or until CEL comes ON. (a) If CEL comes ON, select MODE 01 (ACTIVE CODES), read codes and turn OFF ENGINE switch. Go to Fault Index (Table 2-16) (b) If CEL does not come ON, turn OFF ENGINE switch and go to Step 2 of this Fault.

C1 CEL NORMAL AND HISTORICAL CODES DISPLAYED ON DDR (CONT).

KNOWN INFO

Historical codes will not go active after running engine.

POSSIBLE PROBLEMS

2.

Are historical codes displayed on DDR after clearing?

TEST OPTIONS

DDR test.

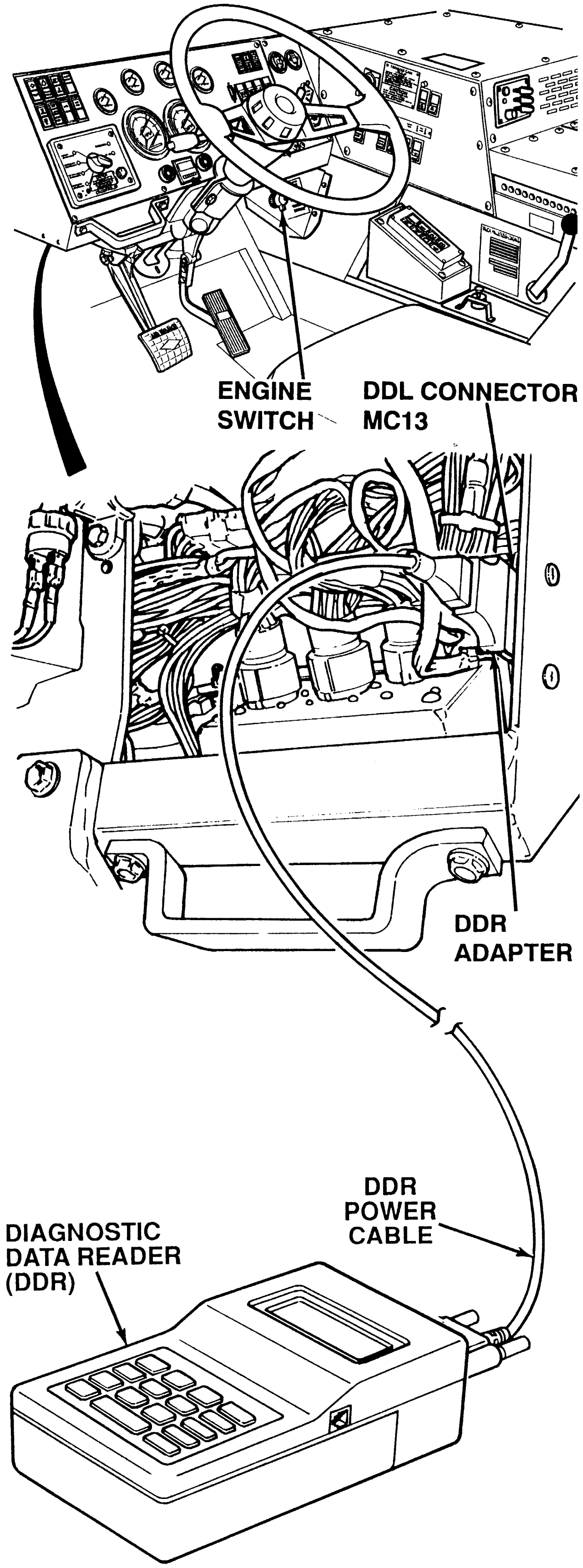
REASON FOR QUESTION

Clearing codes with DDR will determine if historical codes are valid.

NO → Go to Fault Index (Table 2-16) and troubleshoot historical codes as active codes.

YES → Fault corrected.

DDR TEST
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Clear Codes on DDR (Para 2-11). (3) Select MODE 02 (HISTORICAL CODES) on DDR and read codes. (a) If codes are not displayed after clearing, perform Steps (4) and (5) below and go to Fault Index (Table 2-16) and troubleshoot historical codes as active codes. (b) If codes are displayed, fault has been corrected. (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

C2 NO DATA LINK AND LAMP CHECK OK.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Jumperwire

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.

POSSIBLE PROBLEMS

Open in diagnostic request line.
Damaged DDEC ECM connectors.
Open in data line.
Short in data line.
DDR fuse faulty.
Short to ignition and ground.

1.

WARNING
Read WARNING on Page 2-433

Do codes flash out on CHECK ENGINE light with jumperwire installed in DDL connector?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

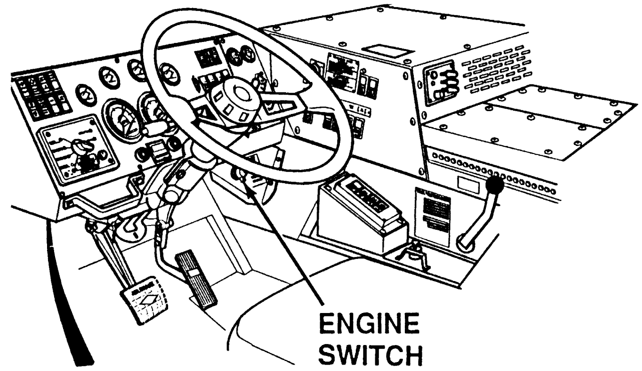
To isolate fault location.

NO → Go to Step 2 of this Fault

YES → Go to Step 4 of this Fault.

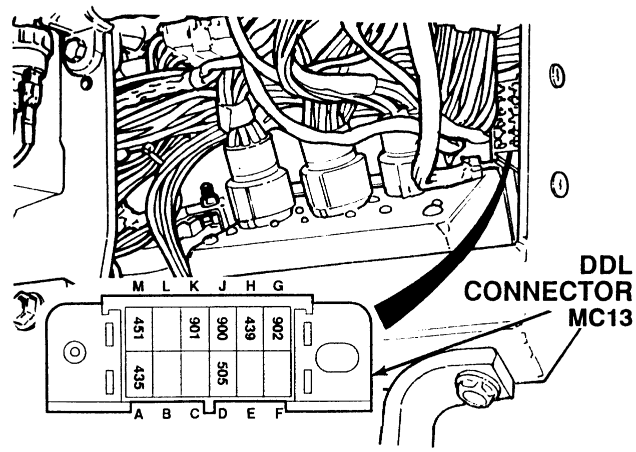
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.



CAUTION

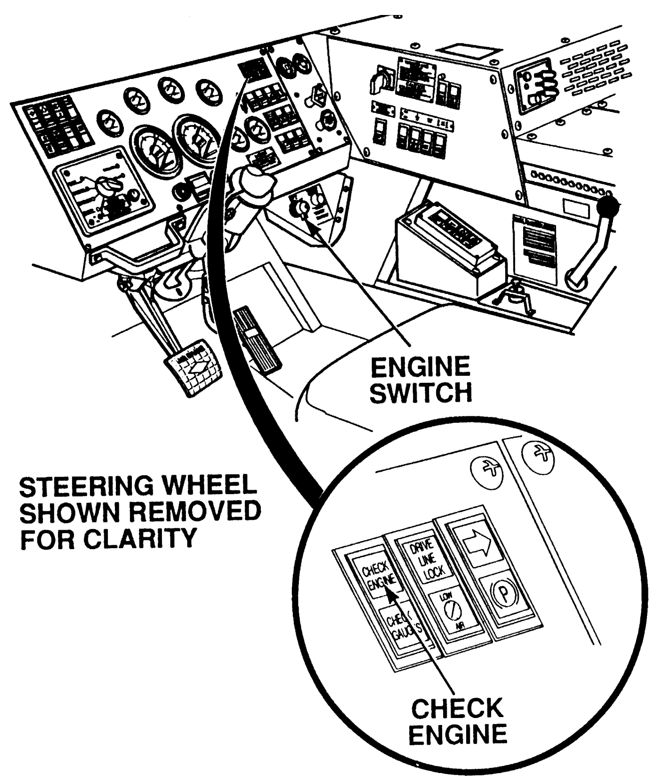
Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions), and you were referred here.

VISUAL INSPECTION
(1) Place jumperwire between terminals A and M at DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Observe CEL for flashing codes. (a) If there are no flashing codes, perform Steps (4) and (5) below and go to Step 2 of this Fault. (b) If there are flashing codes, perform Steps (4) and (5) below and go to Step 4 of this Fault. (4) Turn OFF ENGINE switch. (5) Remove jumperwire.



C2 NO DATA LINK AND LAMP CHECK OK (CONT).

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.

POSSIBLE PROBLEMS

Open in diagnostic request line.
Damaged DDEC ECM connectors.
Open in data line.
Short in data line.
DDR fuse faulty.
Short to ignition and ground.

2.

CAUTION
Read CAUTION on Page 2-435

Are more than 5 ohms measured between wires 435 and 451 at DDL connector MC13, terminals A and M?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at DDL connector indicates open in diagnostic request line wire 451 or bad ground at terminal A on DDL connector.

NO → Go to Step 3 of this Fault.

YES → Repair wire 451 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 in this Fault.

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.

POSSIBLE PROBLEMS

Damaged DDEC ECM connectors.
Open in data line.
Short in data line.
DDR fuse faulty.
Short to ignition and ground.

3.

CAUTION
Read CAUTION on Page 2-435

Are vehicle and power harness connectors free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged connectors could affect signal to DDEC ECM.

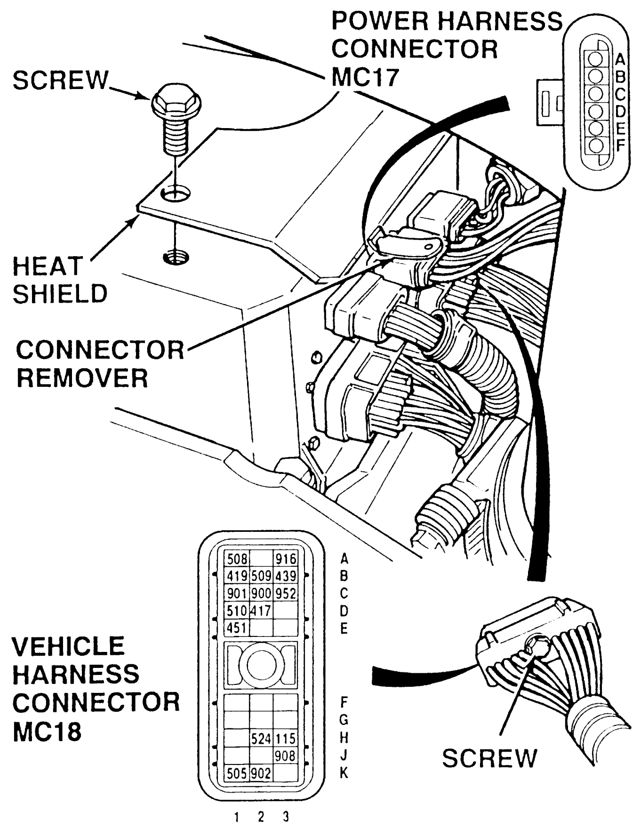
NO → Repair harness connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

RESISTANCE TEST
(1) Remove two mounting screws and heat shield from DDEC ECM. (2) Disconnect power harness connector MC17 with connector remover. (3) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (4) Place jumperwire between terminal E1 at vehicle harness connector MC18 and terminal D at power harness connector MC17. (5) Are more than 5 ohms present between wires 435 and 451 at DDL connector MC13, terminals A and M? (a) If there are more than 5 ohms present, remove jumperwire and repair wire 451 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are 5 ohms or less present, wire 451 is OK. Remove jumperwire and go to Step 3 of this Fault.



VISUAL INSPECTION
(1) Disconnect remaining harness connectors at DDEC ECM (Para 7-56). (2) Check all terminals at harness connectors (ECM and harness side) for damage, bent, corroded and unseated pins or terminals. (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Steps (3) through (5) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If vehicle harness connector and DDEC ECM connector are OK, replace DDEC ECM (Para 7-56). (3) Connect all harness connectors to DDEC ECM (Para 7-56). (4) Install heat shield and two screws. (5) Close top engine access cover.

C2 NO DATA LINK AND LAMP CHECK OK (CONT).

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.
DDEC ECM connectors OK.

POSSIBLE PROBLEMS

Open in data line.
Short in data line.
DDR fuse faulty.
Short to ignition and ground.

4.

CAUTION

Read CAUTION on Page 2-437

Are there 5 ohms or less measured between wires 901 and 900 at vehicle harness connector MC18, terminals C1 and C2 with jumperwire across terminals J and K of the DDL connector?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance greater than 5 ohms at vehicle harness connector indicates open in wire 900 or wire 901.

NO → Repair wires 900 or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.
DDEC ECM connectors OK.
No open in data line.

POSSIBLE PROBLEMS

Short in data line.
DDR fuse faulty.
Short to ignition and ground.

5.

Are there more than 5 ohms measured between wires 900 and 901 at vehicle harness connector MC18, terminals C1 and C2 with jumperwire removed?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 5 ohms at vehicle harness connector indicates short between wires 900 and 901.

NO → Repair wires 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

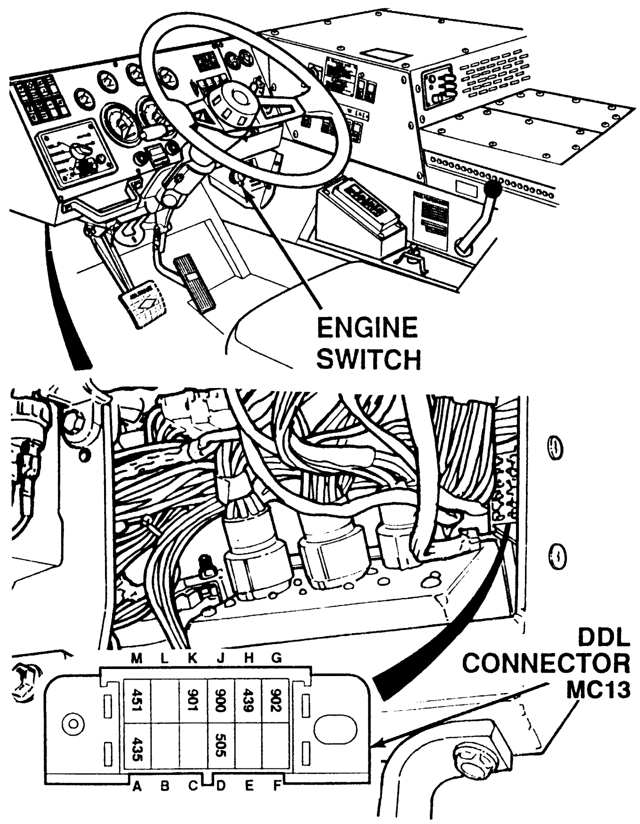
YES ↓

CAUTION

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.
- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

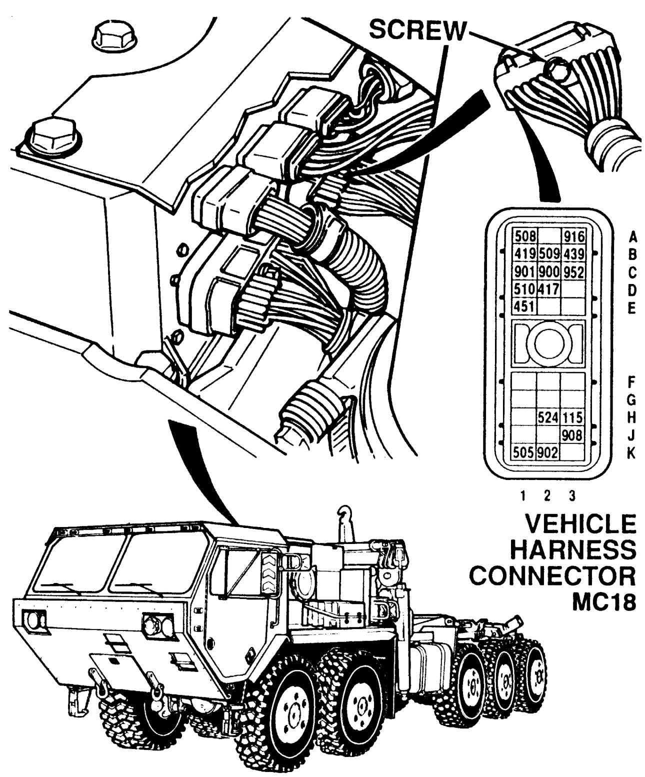
RESISTANCE TEST

(1) Loosen screw and disconnect vehicle harness connector MC18.
(2) Place jumperwire across terminals J and K at DDL connector MC13.
(3) Are there 5 ohms or less present between wires 900 and 901 at vehicle harness connector MC18, terminals C1 and C2?
   (a) If there are more than 5 ohms or an open circuit present, remove jumperwire and repair wires 900 or 901 (see schematic Fig 2-1) or notify DS Maintenance.
   (b) If there are less than 5 ohms present, remove jumperwire and go to Step 5 of this Fault.



RESISTANCE TEST

(1) Are there more than 5 ohms present between wires 900 and 901 at vehicle harness connector MC18, terminals C1 and C2?
   (a) If there are less than 5 ohms, repair wires 900 and/or 901 (see schematic Fig 2-1) or notify DS Maintenance and perform Steps (2) through (4) below.
   (b) If there are more than 5 ohms, wires 900 and 901 are OK. Perform Steps (2) through (4) below.
(2) Remove jumperwire from DDL harness connector MC13.
(3) Install vehicle harness connector MC18, and tighten screw.
(4) Close top engine access cover.



C2 NO DATA LINK AND LAMP CHECK OK (CONT).

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.
DDEC ECM connectors OK.
No open in data line.
No short in data line.

POSSIBLE PROBLEMS

DDR fuse faulty.
Short to ignition and ground.

6.

Is DDR fuse free of damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Faulty DDR fuse will also cause this symptom, even if there is no problem with DDEC.

NO → Replace DDR fuse.

YES ↓

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.
DDEC ECM connectors OK.
No open in data line.
No short in data line.
DDR fuse OK.

POSSIBLE PROBLEMS

Short to ignition and ground.

7.

WARNING

Read WARNING on Page 2-439

Are there more than 5 ohms measured between wires 900 and 435, 900 and 432, 901 and 435, and 901 and 432 at DDL connector MC13, terminals J and A, J and H, K and A, and K and H?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Short is suspect. Resistance less than 5 ohms on any reading at DDL connector indicates short between a data line and ignition wire 439 or ground wire 150.

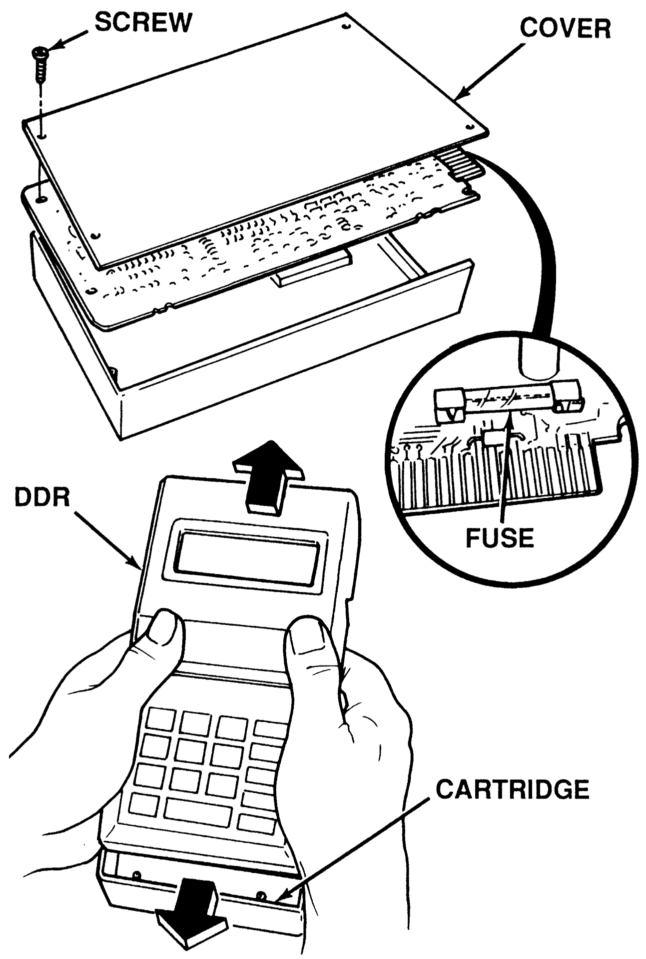
NO → Repair wires 900, 435, 439, 150, or 901 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 in this Fault.

YES ↓

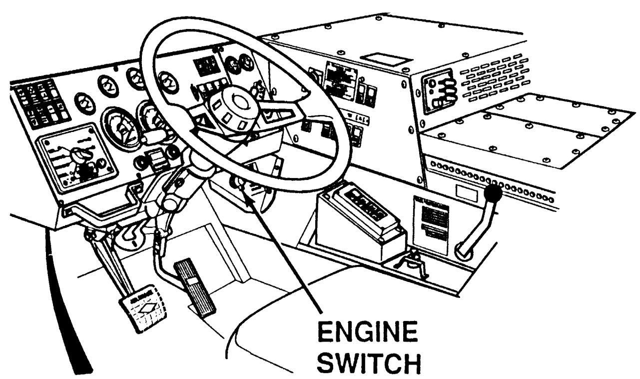
WARNING

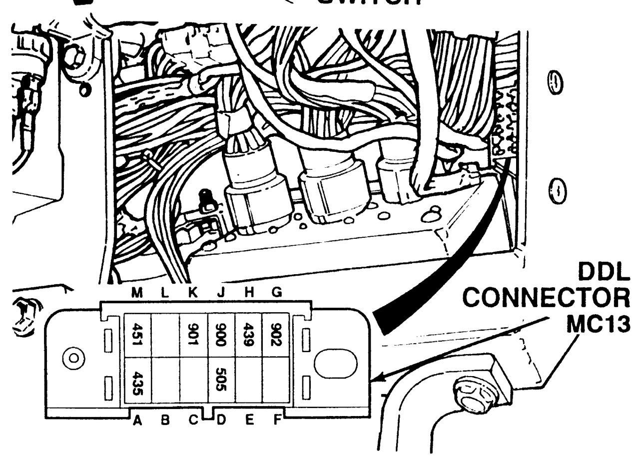
Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

VISUAL INSPECTION
(1) Disconnect DDR from DDL connector MC13. (2) Hold DDR with thumbs placed against slanted surface and grasp cartridge with fingers. (3) Squeeze DDR, push thumbs forward against slanted surface and slide cartridge back at the same time. (4) Slide cartridge from DDR. (5) Remove four screws, cover and circuit board. (6) Remove fuse. (7) Visually inspect fuse. (a) If fuse is damaged, replace fuse and perform Steps (9) through (11) below. (b) If fuse is OK, perform Steps (8) through (11) below. (8) Install fuse. (9) Install circuit board, cover and four screws. (10) Seat cartridge flat on back of DDR. (11) Slide cartridge forward until it clicks into place.



RESISTANCE TEST
Check resistance between wires 900, 435, 900, 439, 150 or 190 at DDL connector MC13, terminals J and A, J and H, K and A, and K and H. (1) If less than 5 ohms are present, repair wires 439, 900, 435, 150, and/or 901 (see schematic Fig 2-1) or notify DS Maintenance. (2) If more than 5 ohms are present or an open circuit, wires are OK. Go to Step 8 of this Fault.





C2 NO DATA LINK AND LAMP CHECK OK (CONT).

KNOWN INFO

Lamp check OK, no data link or no DDEC data received.
Codes are not flashing out when CHECK ENGINE light is illuminated.
Diagnostic request line OK.
DDEC ECM connectors OK.
No open in data line.
No short in data line.
No short to ignition and ground.

POSSIBLE PROBLEMS

8.

Does CHECK ENGINE light stay on longer than five seconds?

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

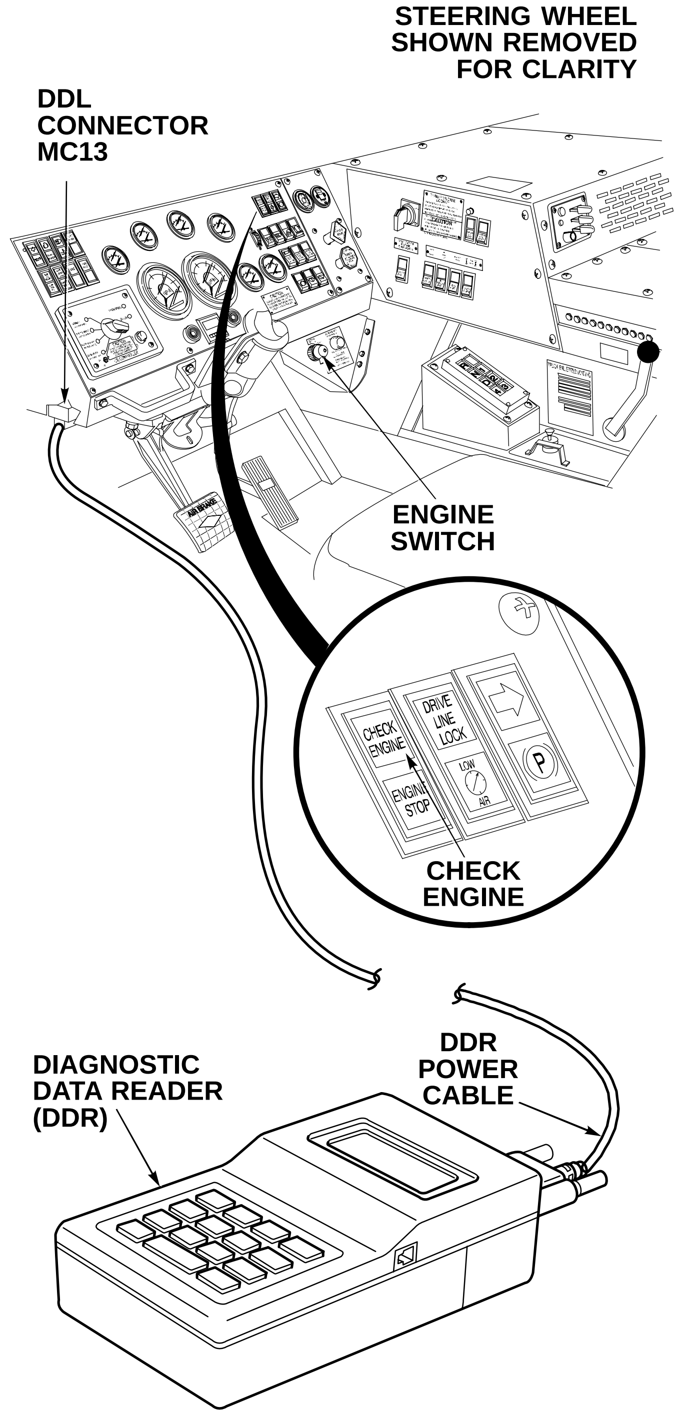
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CHECK ENGINE indicator lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON position, fault has been corrected.

VERIFY REPAIR
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Clear codes (Para 2-11). (4) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If CHECK ENGINE light comes on and stays on, perform Steps (5) and (6) below and go to Fault Index (Table 2-16). (b) If check engine light comes on for about five seconds and then goes off, fault has been corrected. (5) Turn OFF ENGINE switch. (6) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

D CHECK ENGINE LIGHT (CEL) AND FAULT ARE INTERMITTENT.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) is erratic or intermittent.
POSSIBLE PROBLEMS

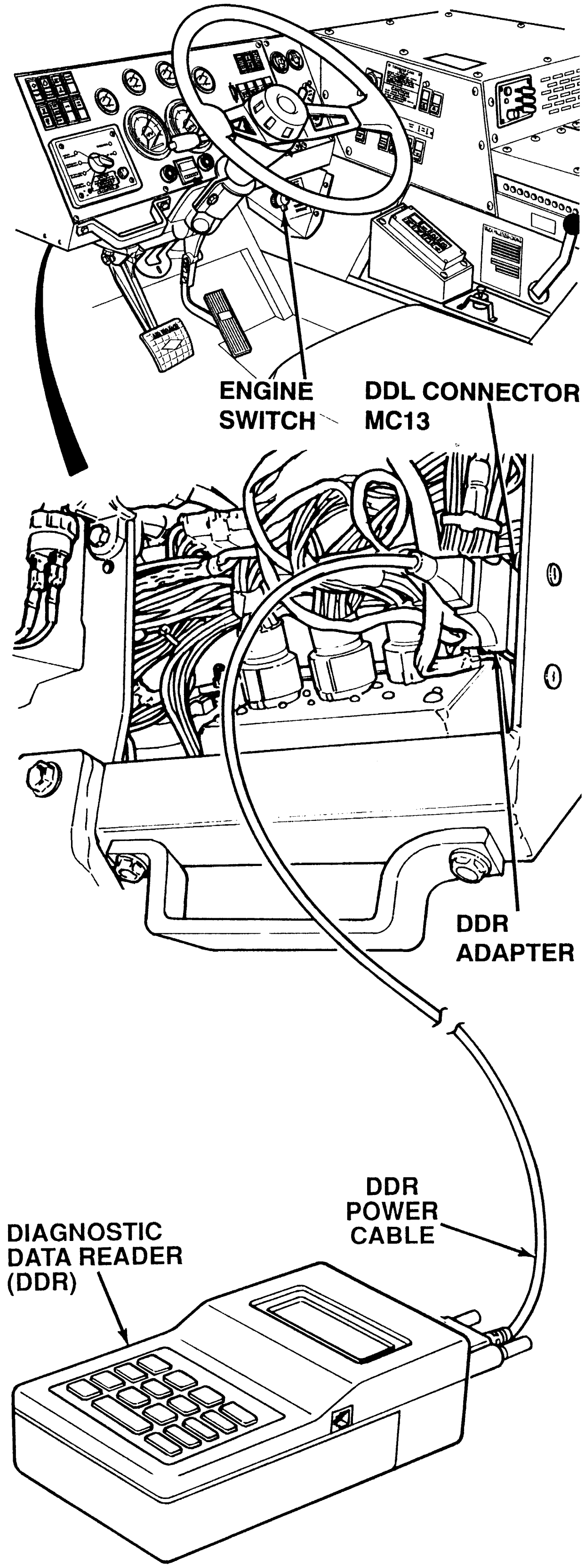
1.

Are historical codes displayed on DDR?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Isolate Fault.

YES

- If historical codes are displayed, go to **D1**.
- If CEL and Fault are intermittent, go to **D2**.
- If CEL is flashing a valid active code, go to **D3**.
- If crane high idle is not working, go to **D4**.
- If engine brake is not working, go to **D5**.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 02 (HISTORICAL CODES) on DDR and read codes.

2-13. DDEC II TROUBLESHOOTING (CONT).

D1 CEL ERRATIC AND HISTORICAL CODES DISPLAYED ON DDR.

INITIAL SETUP

Tools and Special Tools
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CHECK ENGINE light (CEL) erratic and historical codes displayed on DDR.
POSSIBLE PROBLEMS

1.

Does CEL stay OFF after running engine?

TEST OPTIONS
DDR test.
REASON FOR QUESTION
Running engine might make historical codes active.

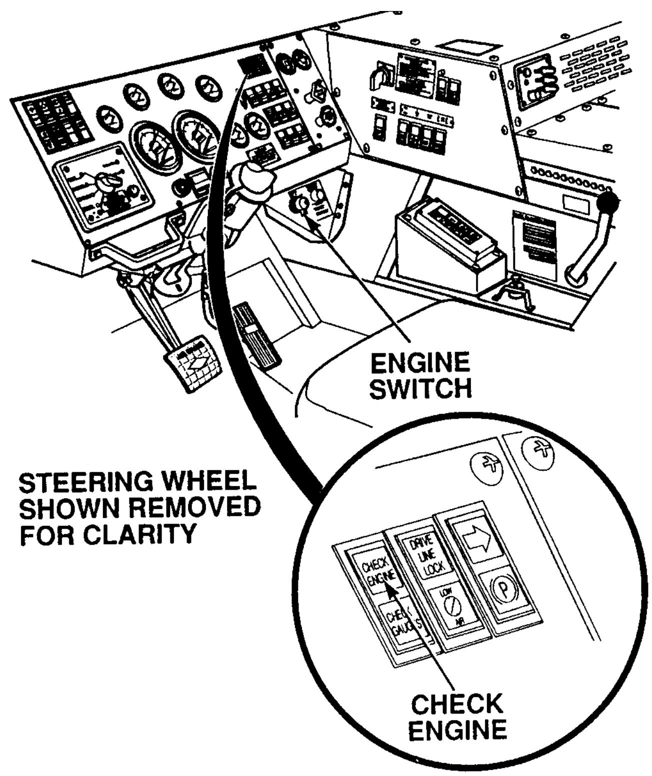
NO → Read active codes while CEL is ON, go to Fault Index (Table 2-16).

YES ↓

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

DDR TEST
(1) Start engine (TM 9-2320-364-10). (2) Try to get the CEL ON by: • warming up the engine. • changing the RPM from idle to 1500. (3) Let engine run for 8 minutes or until CEL comes ON. (a) If CEL comes ON, turn OFF ENGINE switch and select MODE 01 (ACTIVE CODES) and read codes (Para 2-11). (b) If CEL does not come ON, turn OFF ENGINE switch.



D1 CEL ERRATIC AND HISTORICAL CODES DISPLAYED ON DDR (CONT).

KNOWN INFO

Historical codes will not go active after running engine.

POSSIBLE PROBLEMS

2.

Are historical codes displayed on DDR after clearing?

TEST OPTIONS

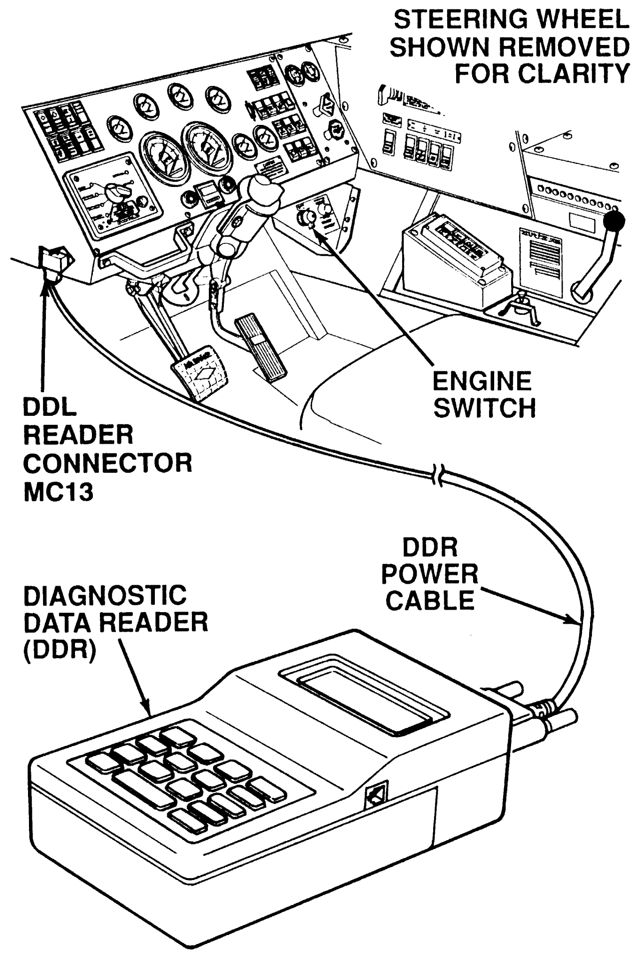
Verify repair.

REASON FOR QUESTION

Clearing codes with DDR will determine if historical codes are valid.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16) and troubleshoot historical codes as active codes.



VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear Codes on DDR (Para 2-11).
(3) Select MODE 02 (HISTORICAL CODES) on DDR and read codes.
  (a) If there are no historical codes displayed, fault has been corrected. Perform Steps (4) and (5) below.
  (b) If there are historical codes displayed, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.

2-13. DDEC II TROUBLESHOOTING (CONT).

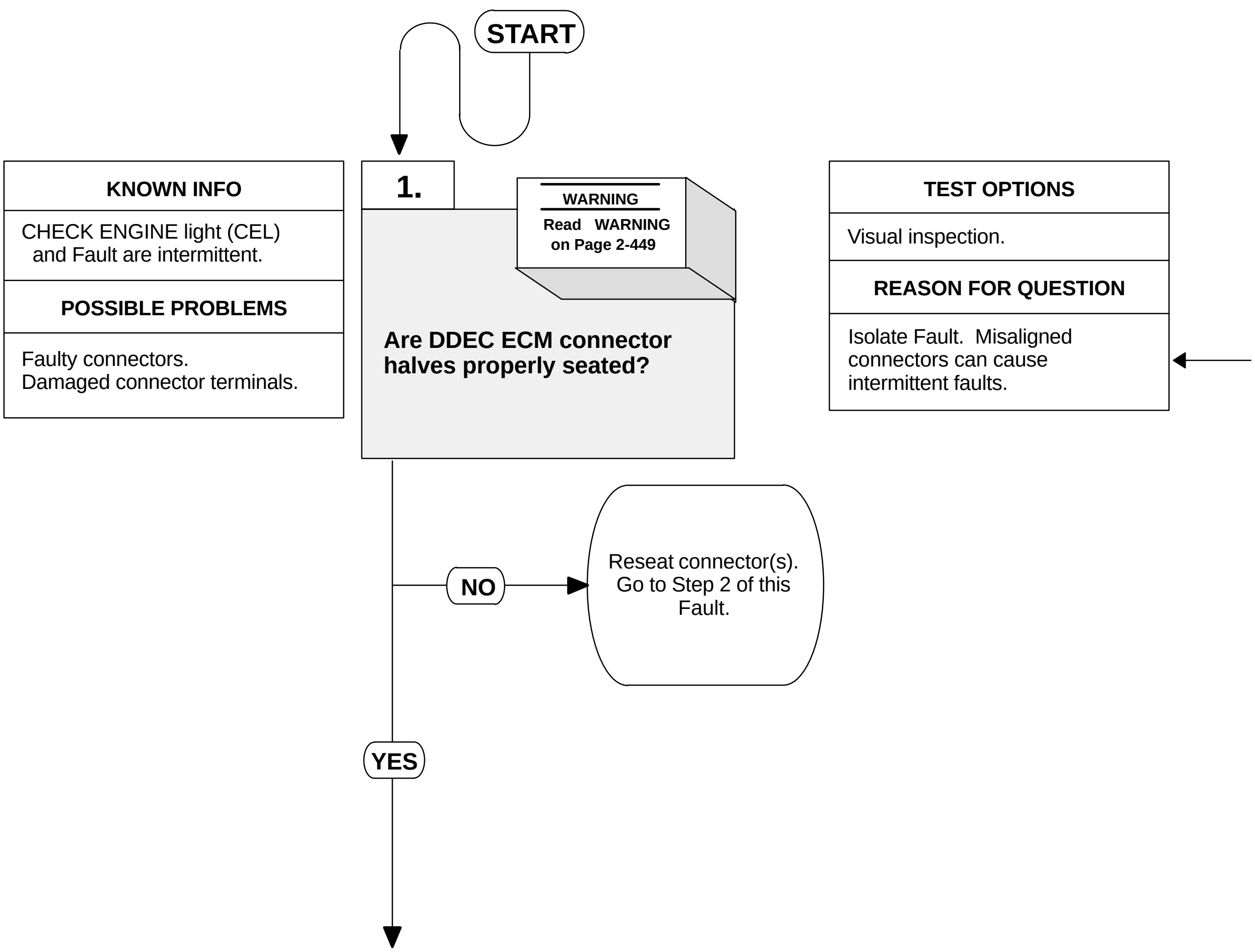
D2 CEL AND FAULT ARE INTERMITTENT.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)



WARNING

Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

- Do not use any other procedures in this manual (except for the suggestions listed below and Fault steps) when trying to solve an intermittent problem. Use of any other procedures for this kind of problem CAN result in the replacement of non-defective parts. Many intermittent problems are caused by faulty electrical connectors or wiring. Diagnosis must include a careful inspection of the indicated wiring and connectors. Example: an intermittent Code 35 (Oil Pressure Sensor Voltage High) should cause suspicion of a problem in the following areas associated with the Oil Pressure Sensor.

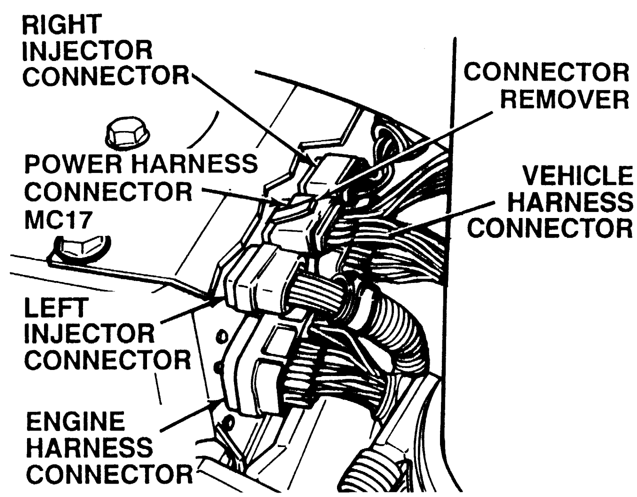
  1. Wire 530 (signal line), Wire 416 (+5 volt line) or Wire 452 (ground line).
  2. The Oil Pressure Sensor connector or DDEC ECM connector.
  3. An intermittent in the Oil Pressure Sensor (least likely).

- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
Inspect all DDEC ECM connectors for proper alignment and seating. (1) If connectors are not seated properly, reseat and go to Step 2 of this Fault. (2) If connectors are seated properly, go to Step 2 of this Fault.



D2 CEL AND FAULT ARE INTERMITTENT (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) and Fault are intermittent.
All DDEC ECM connectors properly seated.

POSSIBLE PROBLEMS

Damaged connector terminals.

2.

WARNING
Read WARNING on Page 2-451

Are all DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged connector terminals can cause intermittent faults.

NO → Repair DDEC ECM harness connector(s) (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) and Fault are intermittent.
All DDEC ECM connectors properly seated.
Connector terminals OK.

POSSIBLE PROBLEMS

3.

Does CEL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

WARNING

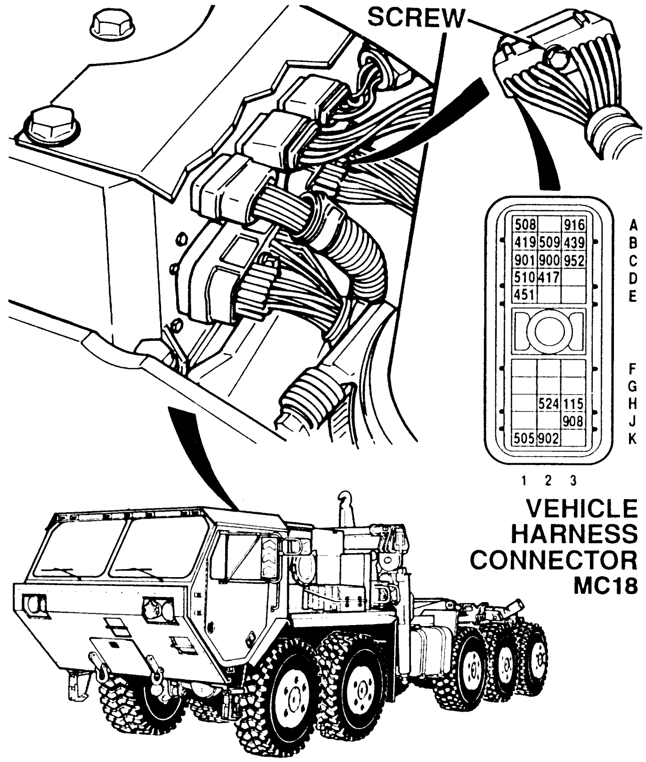
Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

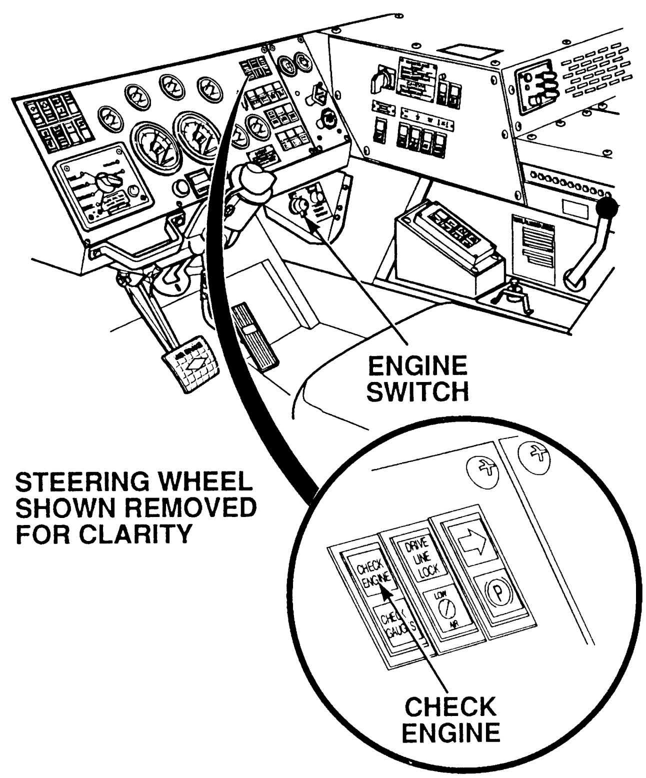
VISUAL INSPECTION

(1) Disconnect all connectors at DDEC ECM (Para 7-56).
(2) Check terminals at connectors (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If harness connector(s) is damaged, repair connector (Para 7-101) and perform Steps (3) through (5) below.
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) If harness connector DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56).
(3) Connect all harness connectors to DDEC ECM (Para 7-56).
(4) Install heat shield and two screws.
(5) Close top engine access cover.



VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON.
  (a) If check engine light comes on for about five seconds and then goes off, fault has been corrected. Perform Step (3) below.
  (b) If check engine light comes on and stays on, perform Step (3) below and go to Fault Index (Table 2-16).
(3) Turn OFF ENGINE switch.



2-13. DDEC II TROUBLESHOOTING (CONT).

D3 CEL FLASHES A VALID ACTIVE CODE.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Jumperwire

References
TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

CHECK ENGINE light (CEL) flashes a valid active code.

POSSIBLE PROBLEMS

Short in diagnostic request wire 435 or 451.
Open in data wire 901 or 900.
Short in data wire 901 or 900.
Damaged DDEC ECM terminals or connectors.

1.

WARNING
Read WARNING on Page 2-453

Are there more than 200 ohms measured between wires 435 and 451 at DDL connector MC13, terminals A and M?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

If there are 200 ohms or less at DDL connector MC13, the diagnostic request line wire 451 or 435 is shorted to ground.

NO → Repair wires 435 and/or 451 (see schematic Fig 2-2) or notify DS Maintenance. Verify repair, go to Step 5 of this Fault.

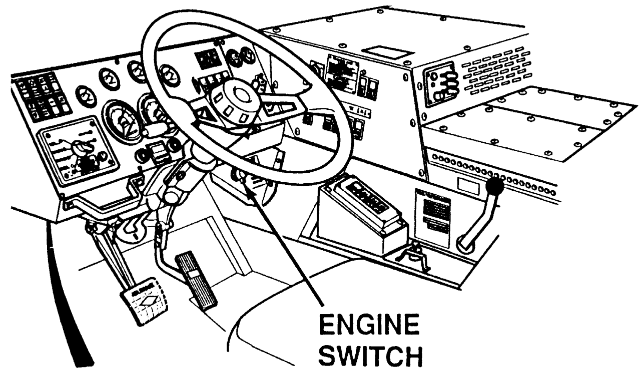
YES ↓

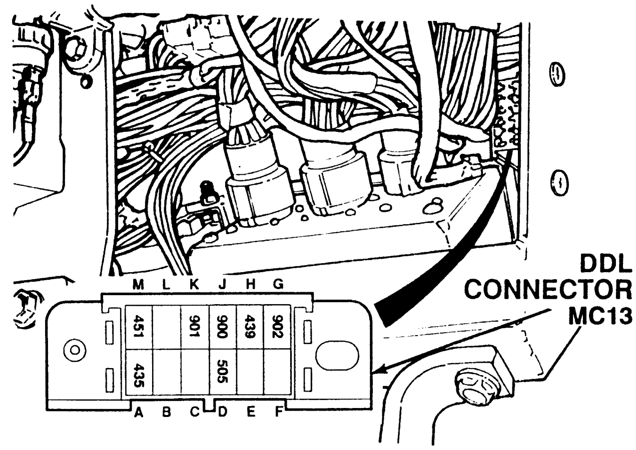
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

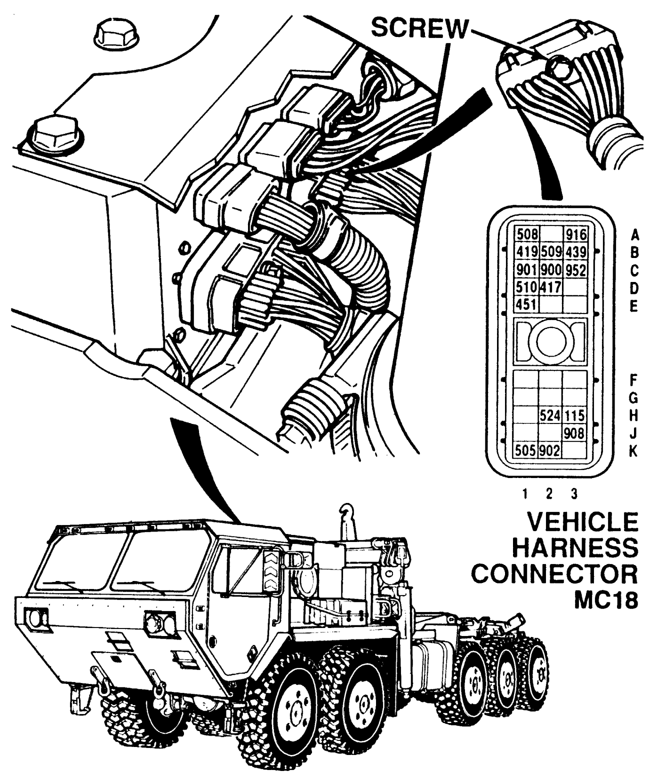




NOTE

The following flowchart should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

RESISTANCE TEST
(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Are there more than 200 ohms present between wires 435 and 451 at DDL connector MC13, terminals A and M? (a) If there are less than 200 ohms present, turn OFF ENGINE switch and repair wires 435 and/or 451 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are more than 200 ohms present, turn OFF ENGINE switch and go to Step 2 of this Fault.



D3 CEL FLASHES A VALID ACTIVE CODE (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) flashes a valid active code.
No short in diagnostic request wires 435 and 451.

POSSIBLE PROBLEMS

Open in data wire 901 or 900.
Short in data wire 901 or 900.
Damaged DDEC ECM terminals or connectors.

2.

WARNING

Read WARNING on Page 2-455

Are 5 ohms or less measured between wires 901 and 900 at vehicle harness connector MC18, terminals C2 and C1 with jumperwire installed at DDL connector, terminals J and K?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at vehicle harness connector indicates open in one or both data lines wire 901 or 900.

NO → Repair wires 901 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 5 of this Fault.

YES → Step 3.

KNOWN INFO

CHECK ENGINE light (CEL) flashes a valid active code.
No short in diagnostic request wires 435 and 451.
No open in data wires 901 and 900.

POSSIBLE PROBLEMS

Short in data wire 901 or 900.
Damaged DDEC ECM terminals or connectors.

3.

Are 5 ohms or less measured between wires 901 and 900 at vehicle harness connector MC18, terminals C2 and C1?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 5 ohms at vehicle harness connector indicates two data lines wire 901 and 900 are shorted together.

NO → Go to Step 4 of this Fault.

YES → Repair wires 901 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 5 of this Fault.

WARNING

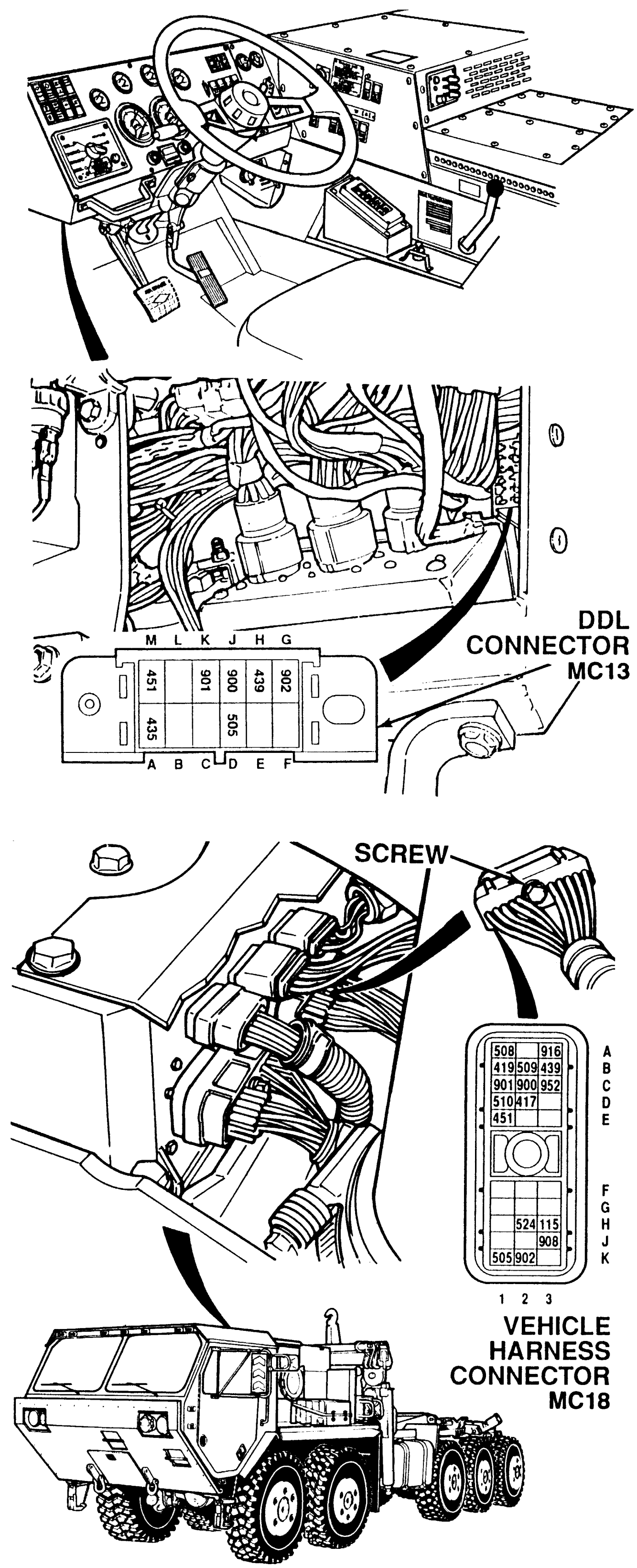
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

RESISTANCE TEST
(1) Place jumperwire between terminals J and K at DDL connector MC13. (2) Are there 5 ohms or less present between wires 901 and 900 at vehicle harness connector MC18, terminals C2 and C1. (a) If there are more than 5 ohms present, remove jumperwire and repair wires 901 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. (b) If there are less than 5 ohms present, remove jumperwire and go to Step 3 of this Fault.

RESISTANCE TEST
Are there 5 ohms or less present between wires 901 and 900 at vehicle harness connector MC18, terminals C2 and C1. (1) If there are more than 5 ohms present, repair wires 901 and/or 900 (see schematic Fig 2-1) or notify DS Maintenance. (2) If there are less than 5 ohms present, go to Step 4 of this Fault.



D3 CEL FLASHES A VALID ACTIVE CODE (CONT).

KNOWN INFO

CHECK ENGINE light (CEL) flashes a valid active code.
No short in diagnostic request wires 435 and 451.
No open in data wires 901 and 900.
No short in data wires 901 and 900.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals or connectors.

4.

WARNING
Read WARNING on Page 2-457

Are DDEC ECM terminals and vehicle harness connector MC18 (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals or connectors can affect signal to DDEC ECM.

NO → Repair vehicle harness connector MC18 (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 5 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 5 of this Fault.

KNOWN INFO

CHECK ENGINE light (CEL) flashes a valid active code.
No short in diagnostic request wires 435 and 451.
No open in data wires 901 and 900.
No short in data wires 901 and 900.
DDEC ECM terminals or connectors OK.

POSSIBLE PROBLEMS

5.

Does CEL stay ON longer than 5 seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CEL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

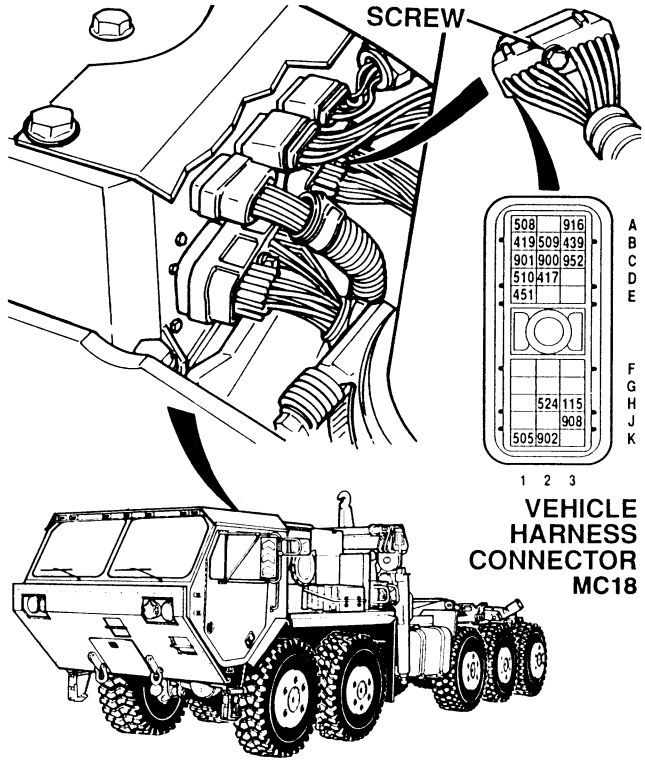
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

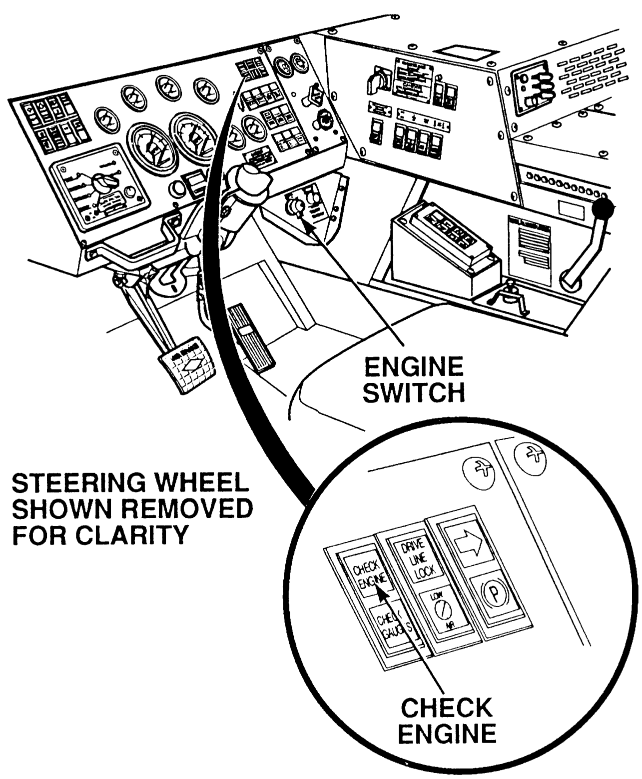
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Check terminals at vehicle harness connector MC18 (DDEC ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Steps (2) and (3) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If vehicle harness connector and DDEC ECM connector are OK, replace DDEC ECM (Para 7-56). (2) Connect vehicle harness connector MC18, and tighten screw. (3) Close top engine access cover.



VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If check engine light comes on for about five seconds and then goes off, fault has been corrected. Perform Step (3) below. (b) If check engine light comes on and stays on, perform Step (3) below and go to Fault Index (Table 2-16). (3) Turn OFF ENGINE switch.



2-13. DDEC II TROUBLESHOOTING (CONT).

D4 CRANE HIGH IDLE NOT WORKING.

INITIAL SETUP

Tools and Special Tools
- Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
- STE/ICE-R (optional) (Item 3, Appendix G)
- DDEC Repair Kit (Item 15, Appendix G)
- Multimeter (Item 44, Appendix G)
- Reader, Diagnostic (Item 53, Appendix G)
- Terminal Remover (Item 70, Appendix G)
- Weatherpac Crimper (Item 76, Appendix G)
- Jumperwire

References
- TM 9-2320-364-10
- TM 9-4910-571-12&P

Equipment Condition
- Engine OFF, (TM 9-2320-364-10)
- Parking brake applied, (TM 9-2320-364-10)
- Wheels chocked, (TM 9-2320-364-10)
- Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.

POSSIBLE PROBLEMS

Throttle position sensor faulty.
DDEC ECM faulty.
Damaged DDEC ECM terminals or connectors.
Open in signal or ground wire 510/1525 or 952.
Open in +5 volt wire 916.
Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

1.

Does throttle position sensor read 0% at idle?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Faulty throttle position sensor can cause this Fault.

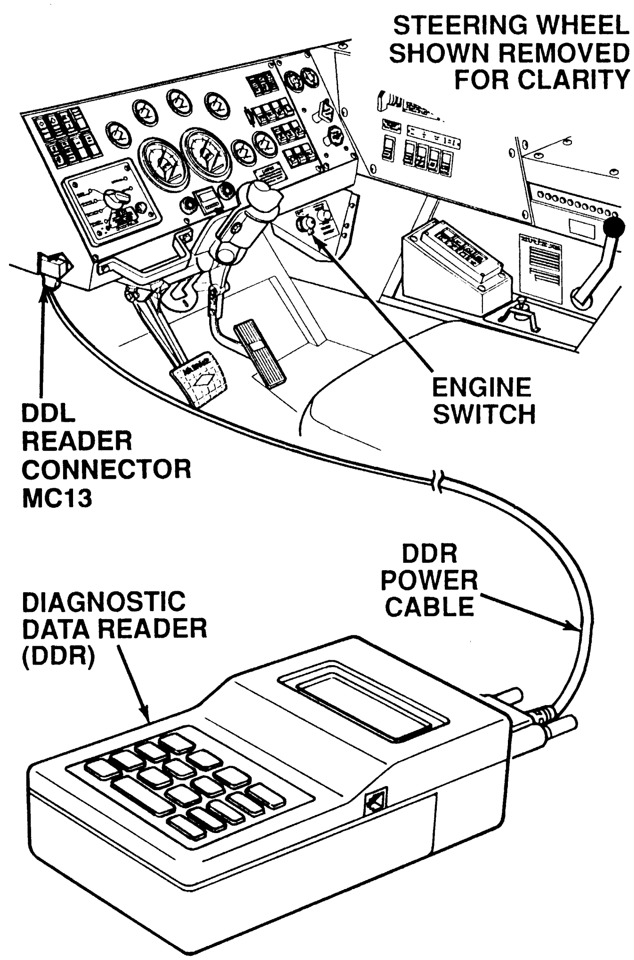
NO → Go to Fault A4 Code 22, Step 3.

YES ↓

NOTE

- The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.
- To verify throttle percent (%), the engine does not need to be running.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 07 (TPS IN %) on DDR (Para 2-11). (4) Read throttle position percentage with zero throttle. (a) If throttle position is greater than 0%, turn OFF ENGINE switch and go to Fault A4 Code 22, Step 3. (b) If throttle position is 0% at idle, turn OFF ENGINE switch and go to Step 2 of this Fault.



D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-29, Fault 19
Troubleshooting completed.
Throttle position sensor OK.

POSSIBLE PROBLEMS

DDEC ECM faulty.
Damaged DDEC ECM terminals or connectors.
Open in signal or ground wire 510/1525 or 952.
Open in +5 volt wire 916.
Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

2.

Does PTO RPM change smoothly from idle to 1250 ± 50?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

DDEC ECM may be faulty if it fails to read vernier control.

NO → Go to Step 5 of this Fault.

YES ↓

KNOWN INFO

Para 2-29, Fault 19
Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.

POSSIBLE PROBLEMS

DDEC ECM faulty.
Damaged DDEC ECM terminals or connectors.
Open in signal or ground wire 510/1525 or 952.
Open in +5 volt wire 916.
Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

3.

Does engine RPM increase when HIGH IDLE switch is set to LATCH?

TEST OPTIONS

DDR test.

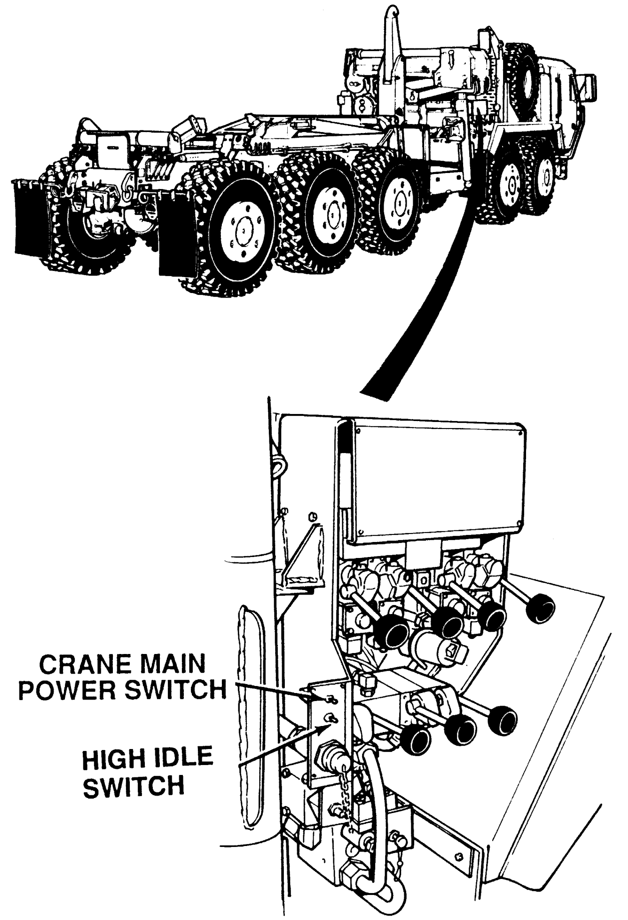
REASON FOR QUESTION

Isolate Fault.

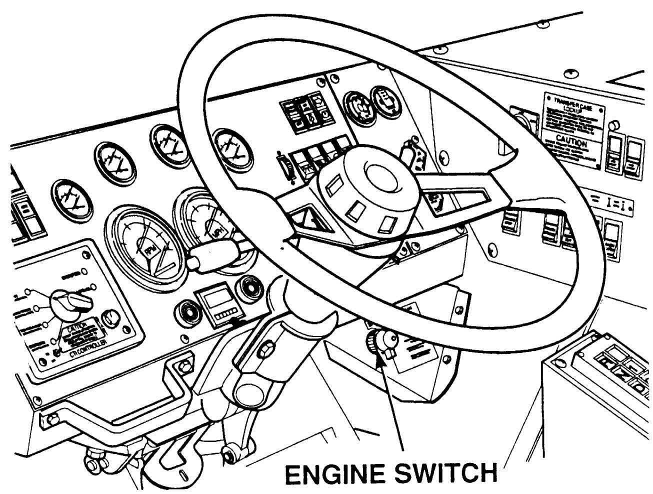
NO → Problem is intermittent. Go to DDEC Troubleshooting Fault D2 (Table 2-16).

YES ↓

DDR TEST
(1) Select MODE 22 (PTO RPM) on DDR (Para 2-11). (2) Prepare crane for use (TM 9-2320-364-10). (3) Position CRANE MAIN POWER switch to ON and the ENGINE HIGH IDLE switch to LATCH. Note reading on DDR. (4) Does PTO RPM change smoothly from idle to 1250 ± 50? (a) If PTO RPM does not change smoothly, perform Steps (5) through (7) below and then go to Step 5 of this Fault. (b) If PTO RPM does change smoothly, perform Steps (5) through (7) below and go to Step 3 of this Fault. (5) Turn OFF CRANE MAIN POWER switch. (6) UNLATCH HIGH IDLE switch. (7) Turn OFF ENGINE switch.



DDR TEST
(1) Start engine (TM 9-2320-364-10). (2) Select MODE 04 (ENGINE RPM) on DDR (Para 2-11). (3) Position CRANE MAIN POWER switch to ON and the HIGH IDLE switch to LATCH. Note reading on DDR. (a) If engine RPM increases, turn OFF ENGINE switch and go to DDEC Troubleshooting Fault D2 (Table 2-16). (b) If engine RPM fails to increase, perform Steps (4) and (5) below and go to Step 4 of this Fault. (4) Turn OFF ENGINE switch. (5) Disconnect DDR from DDL connector MC13.



D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-43, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.

POSSIBLE PROBLEMS

DDEC ECM faulty.
Damaged DDEC ECM terminals or connectors.

4.

WARNING
Read WARNING on Page 2-463

Are DDEC ECM terminals and vehicle harness connector MC18 (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damage to terminals or connectors can affect signal to DDEC ECM.

NO → Repair vehicle harness connector MC18 (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 11 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 11 of this Fault.

KNOWN INFO

Para 2-43, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.

POSSIBLE PROBLEMS

Open in signal or ground wire 510/1525 or 952.
Open in +5 volt wire 916.
Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

5.

CAUTION
Read CAUTION on Page 2-463

Are less than 5 ohms measured between wires 510/1525 and 952 at vehicle harness connector MC18, terminals D1 and C3 with jumperwire installed at vernier control connector MC38, terminals A and B?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at vehicle harness connector indicates signal line wire 1525 or 510, ground line wire 952 are open.

NO → Repair wires 510, 1525 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 11 of this Fault.

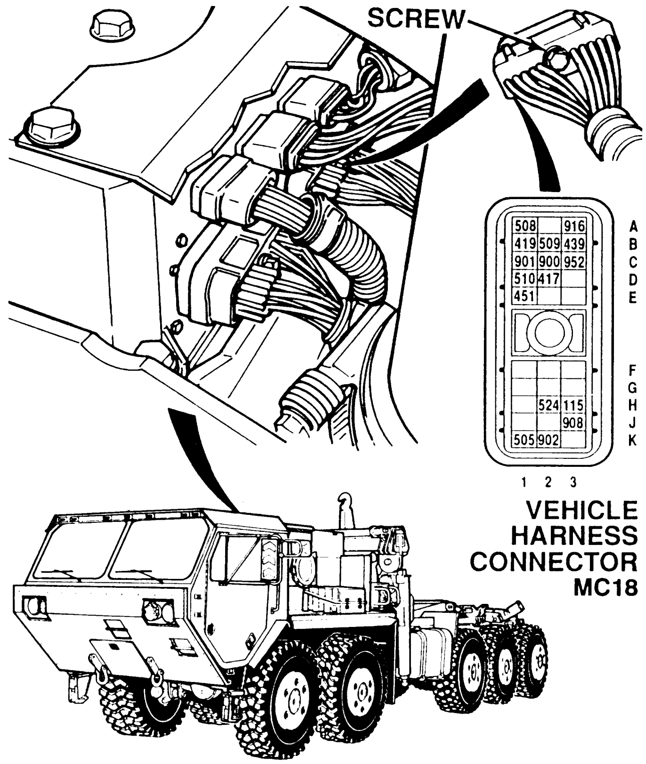
YES ↓

WARNING

- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

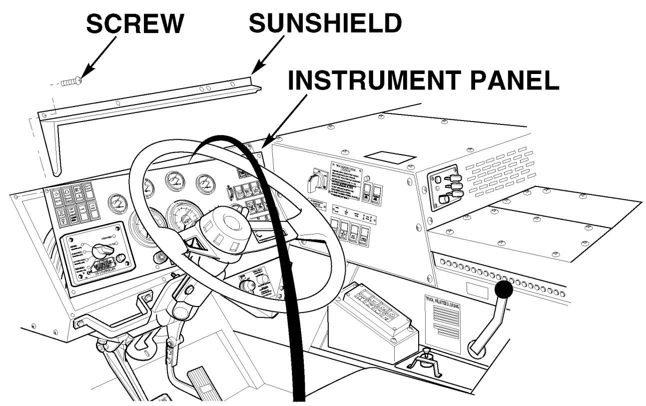
CAUTION

- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connector.



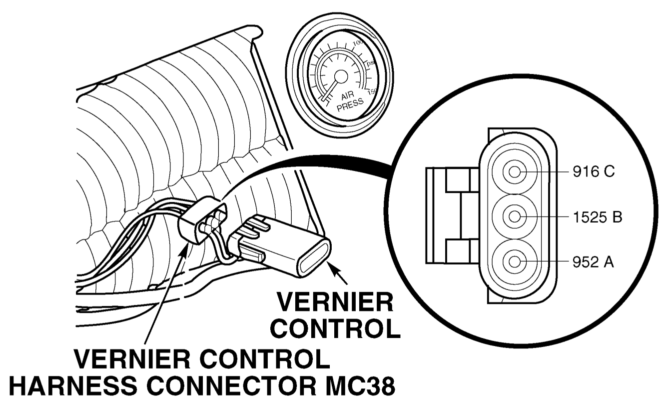
VISUAL INSPECTION

(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.
(2) Inspect terminals and connectors (DDEC ECM and harness side) at vehicle harness for damage; bent, corroded and unseated pins or terminals.
  (a) If vehicle harness connector is damaged,repair connector (Para 7-101).
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56).
  (c) If vehicle harness connector and if DDEC ECM connectors are OK, replace DDEC ECM (Para 7-56).



RESISTANCE TEST

(1) Remove ten screws and sunshield from instrument panel.
(2) Pull top of instrument panel towards steering wheel.
(3) Disconnect vernier control harness connector MC38.
(4) Place jumperwire between terminals A and B at vernier control harness connector MC38.
(5) Are there 5 ohms or less present between wires 510 and 952 at vehicle harness connector MC18, terminals D1 and C3?
  (a) If more than 5 ohms are present, remove jumperwire and repair wires 510 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If less than 5 ohms are present, go to Step 6 of this Fault.



D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.

POSSIBLE PROBLEMS

Open in +5 volt wire 916.
Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

6.

WARNING

Read WARNING on Page 2-465

Are there 5 ohms or less measured between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3 with jumperwire installed at vernier control MC38, terminals A and C?

NO → Repair wire 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance more than 5 ohms at vehicle harness connector indicates open in wire 916 (+5 volt line).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.
No open in +5 volt wire 916.

POSSIBLE PROBLEMS

Short in signal or ground wire 510/1525 or 952.
Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

7.

WARNING

Read WARNING on Page 2-465

Are there more than 10,000 ohms or an open circuit measured between wires 510/1525 and 952 at vehicle harness connector MC18, terminals D1 and C3?

NO → Repair wires 510, 1525 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than or equal to 10,000 ohms at vehicle harness connector indicates signal line wire 1525 and/or 510 or parking brake switch are shorted to ground.

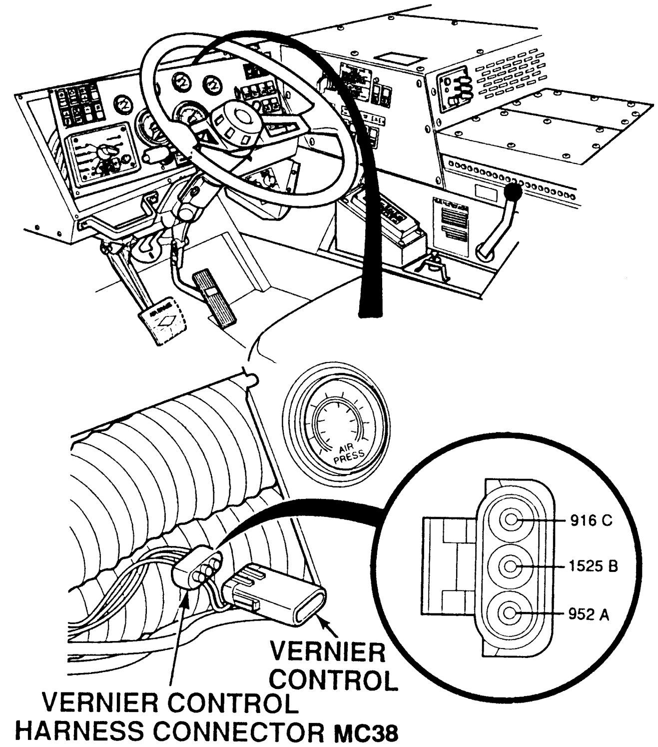
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

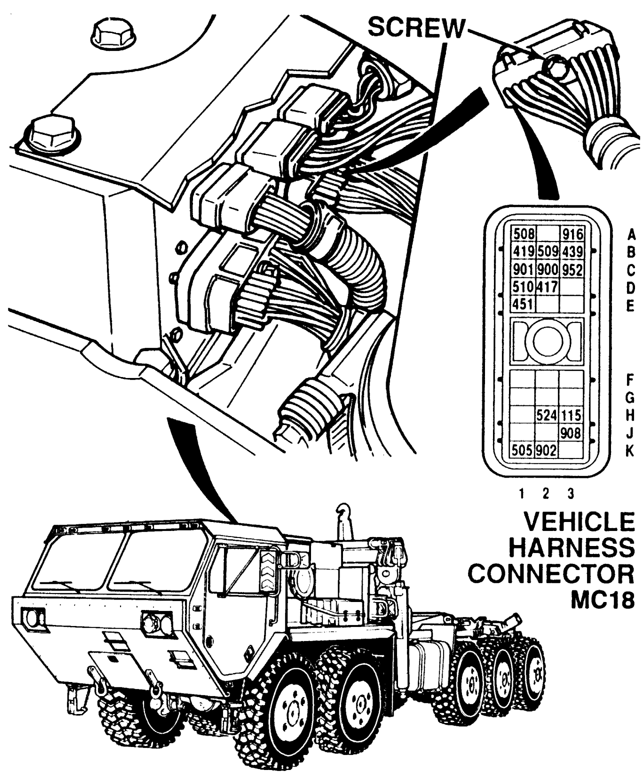
CAUTION

Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.

RESISTANCE TEST
(1) Place jumperwire between terminals C and A at vernier control harness connector MC38. (2) Are there 5 ohms are less present between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3? (a) If more than 5 ohms are present, remove jumperwire and repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If 5 ohms or less are present, remove jumperwire and go to Step 7 of this Fault.



RESISTANCE TEST
(1) Are there more than 10,000 ohms or an open circuit measured between wires 510 and 952 at vehicle harness connector MC18, terminals D1 and C3? (a) If less than 10,000 ohms are present, repair wires 510 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If more than 10,000 ohms are present, perform Step (2) below. (2) Are there more than 10,000 ohms or an open circuit measured between wires 510 at vehicle harness connector MC18, terminals D1 and a known good ground. (a) If less than 10,000 ohms are present, repair wire 510 (see schematic Fig 2-1) or notify DS Maintenance (b) If more than 10,000 ohms are present, wire 510 is OK, go to Step 8 of this Fault.



D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.
No open in +5 volt wire 916.
No short in signal and ground wires 510/1525 and 952.

POSSIBLE PROBLEMS

Short in +5 volt wire 916.
Damaged vernier control terminals or connectors.
Vernier control faulty.

8.

WARNING

Read WARNING on Page 2-467

Are there more than 10,000 ohms or an open circuit measured between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3?

NO → Repair wires 916 or 952 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms at vehicle harness connector indicates short in wire 916 (+5 volt line).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.
No open in +5 volt wire 916.
No short in signal and ground wires 510/1525 and 952.
No short in +5 volt wire 916.

POSSIBLE PROBLEMS

Damaged vernier control terminals or connectors.
Vernier control faulty.

9.

Are vernier control terminals and connectors (sensor side and harness side) free from damage?

NO → Repair connectors (Para 7-101). Verify repair, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

Visual inspection.

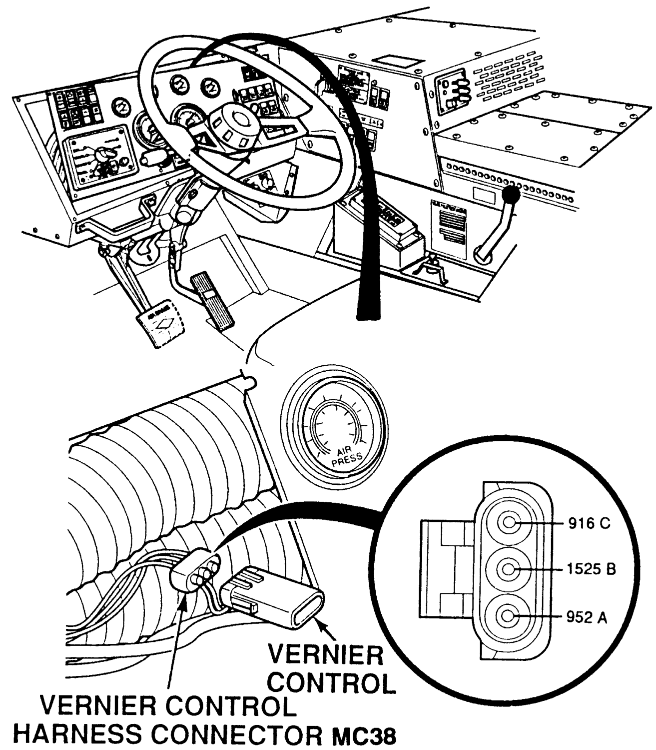
REASON FOR QUESTION

Damaged terminals or connectors can affect signal to vernier control.

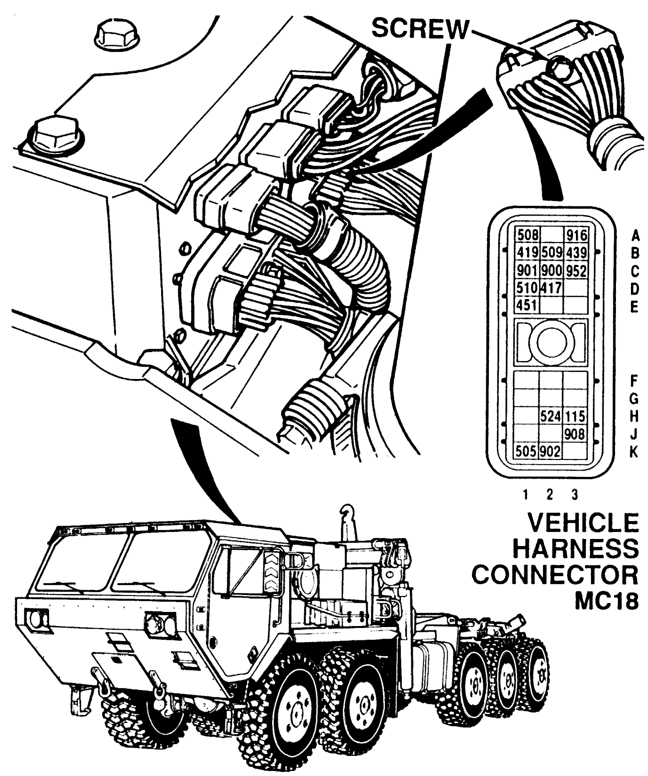
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST
(1) Are there more than 10,000 ohms or an open circuit measured between wires 916 and 952 at vehicle harness connector MC18, terminals A3 and C3? (a) If less than 10,000 ohms are present, repair wires 916 and/or 952 (see schematic Fig 2-1) or notify DS Maintenance. (b) If more than 10,000 ohms are present, perform Step (2) below. (2) Are there more than 10,000 ohms or an open circuit measured between wires 916 at vehicle harness connector MC18, terminals A3 and a known good ground? (a) If less than 10,000 ohms are present, repair wire 916 (see schematic Fig 2-1) or notify DS Maintenance. (b) If more than 10,000 are ohms present, wire 916 is OK, go to Step 9 of this Fault.



VISUAL INSPECTION
Check terminals at vernier control and vehicle harness connector MC18 for damage; bent, corroded and unseated pins or terminals. (1) If terminals are damaged, repair connector (Para 7-101), go to Step 11 of this Fault. (2) If terminals are not damaged, go to Step 10 of this Fault.



D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.
No open in +5 volt wire 916.
No short in signal and ground wires 510/1525 and 952.
No short in +5 volt wire 916.

POSSIBLE PROBLEMS

Damaged vernier control terminals or connectors.
Vernier control faulty.

10.

WARNING

Read WARNING on Page 2-469

Are 3200 to 3400 ohms measured between vernier control harness connector MC38, terminals A and B and 5500 to 5700 ohms measured between terminals B and C?

NO → Replace vernier control (Para 7-100). Verify repair, go to Step 11 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Vernier control is faulty if 3,200 to 3400 ohms are not measured between terminals A and B and if 5500 to 5700 ohms are not measured between terminals B and C.

WARNING

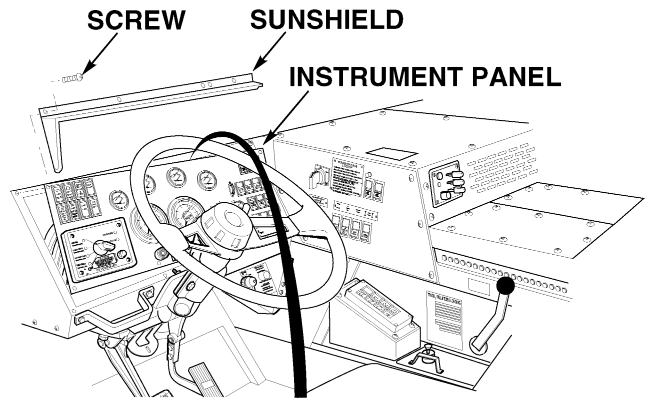
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

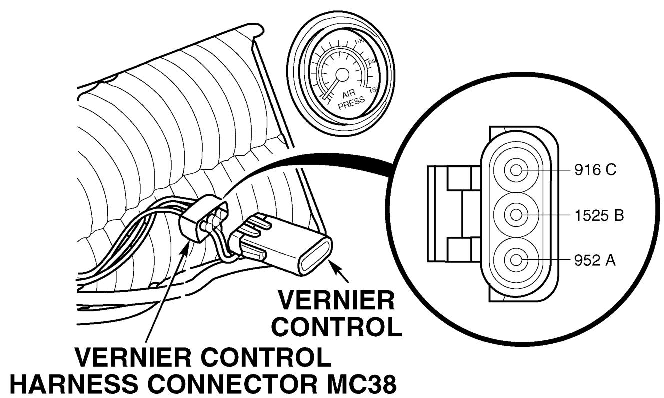
CAUTION

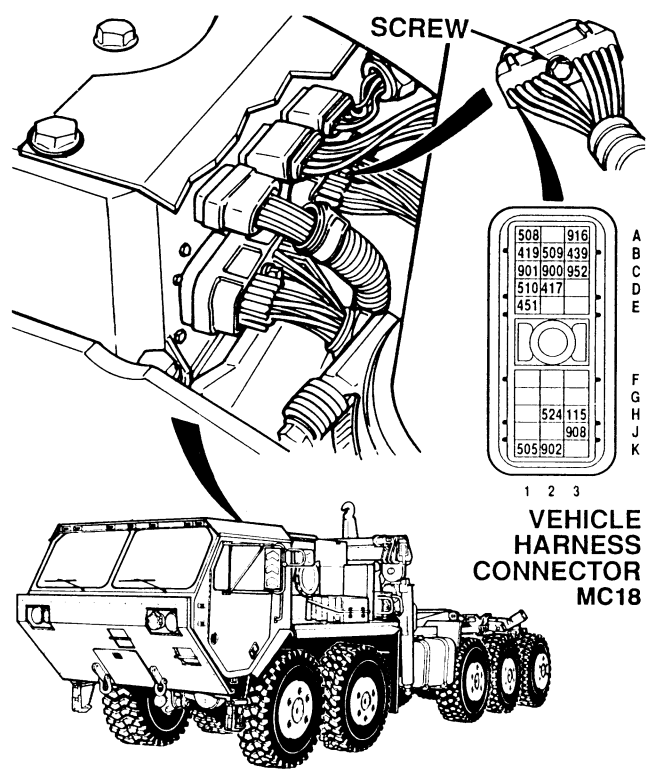
DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST

(1) Are 3200 to 3400 ohms present at Vernier Control harness connector MC38 between terminals A and B?
  (a) If 3200 to 3400 ohms are not present, replace vernier control (Para 7-100) and perform Steps (3) through (5) below.
  (b) If 3200 to 3400 ohms are present, vernier control is OK, perform Step (2) below.
(2) Are 5500 to 5600 ohms present at vernier control harness connector MC38 between terminals B and C?
  (a) If 5500 to 5600 ohms are not present, replace vernier control (Para 7-100) and perform Steps (3) through (5) below.
  (b) If 5500 to 5600 ohms are present, vernier control is OK.
(3) Connect vehicle harness connector MC18 and tighten screw.
(4) Connect vernier control harness connector MC38.
(5) Install instrument panel and sunshield with ten screws.







D4 CRANE HIGH IDLE NOT WORKING (CONT).

KNOWN INFO

Para 2-29, Fault 19 Troubleshooting completed.
Throttle position sensor OK.
DDEC ECM is reading vernier control.
DDEC ECM terminals and connectors OK.
DDEC ECM OK.
No open in signal and ground wires 510/1525 and 952.
No open in +5 volt wire 916.
No short in signal and ground wires 510/1525 and 952.
No short in +5 volt wire 916.
Vernier control terminals and connectors OK.
Vernier control OK.

POSSIBLE PROBLEMS

11.

Does crane HIGH IDLE operate?

NO → Fault not corrected, notify DS Maintenance.

YES → Fault corrected.

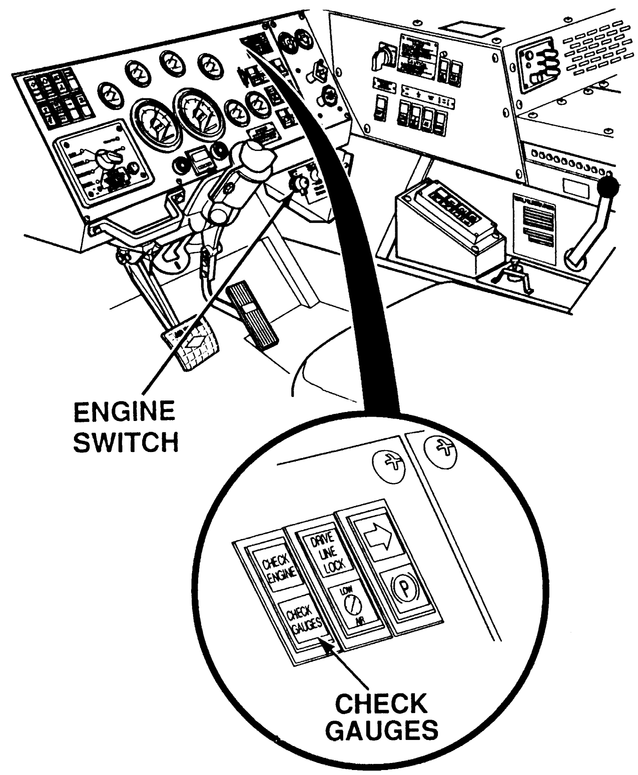
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If crane HIGH IDLE operates, fault has been corrected.

VERIFY REPAIR
(1) Start engine (TM 9-2320-364-10). (2) Operate crane. (a) If crane HIGH IDLE does not operate, turn OFF ENGINE switch and notify DS Maintenance. (b) If crane HIGH IDLE operates, fault has been corrected. Turn OFF ENGINE switch.



2-13. DDEC II TROUBLESHOOTING (CONT).

D5 ENGINE BRAKE INOPERATIVE.

INITIAL SETUP

Tools and Special Tools
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

Engine brake faulty.

POSSIBLE PROBLEMS

DDEC ECM faulty.
Damaged DDEC ECM terminals or connectors.

1.

Is DDEC ECM operating engine brake properly?

TEST OPTIONS

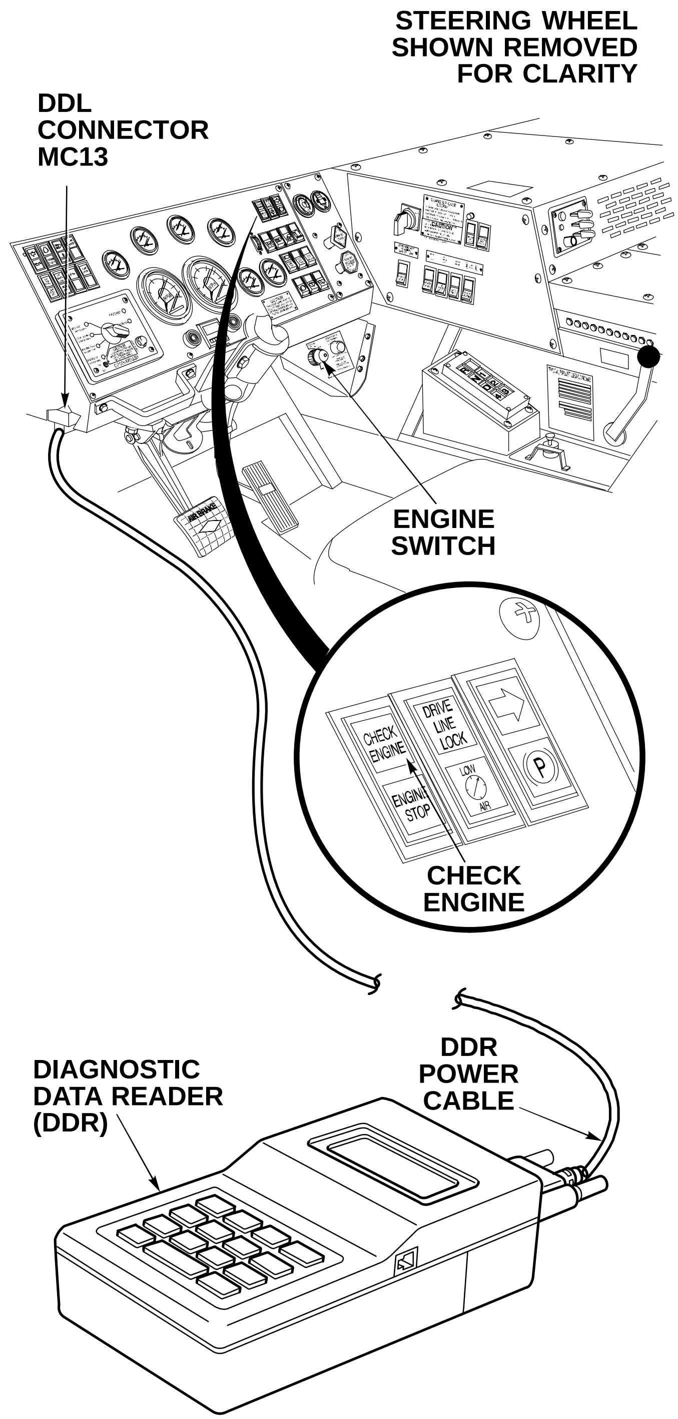
DDR test.

REASON FOR QUESTION

If DDR always displays OFF, DDEC ECM is faulty.

NO → Go to Electrical Troubleshooting (Para 2-20) Faults 34 and 35.

YES ↓



NOTE

DDR should read OFF when engine is started and while increasing or holding throttle. When throttle is released, display changes to ON. When engine returns to idle, DDR will read OFF.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Start ENGINE (TM 9-2320-364-10). (3) Select MODE 30 (ENG BRK ENBLE) on DDR. (4) Run engine at greater than 1800 rpm for 10 seconds and quickly release throttle control. (a) If DDR does not read ON when throttle is released and return to OFF when engine speed returns to idle, turn OFF ENGINE switch and go to Electrical Troubleshooting (Para 2-20) Faults 34 and 35. (b) If DDR reads ON when throttle is released and OFF when engine speed returns to idle, turn OFF ENGINE switch and go to Step 2 of this Fault.

D5 ENGINE BRAKE INOPERATIVE (CONT).

KNOWN INFO

DDEC ECM OK.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals or connectors.

2.

WARNING

Read WARNING on Page 2-475

Are DDEC ECM terminals and vehicle harness connector MC18 (DDEC ECM and harness side) free from damage?

NO → Repair vehicle harness connector MC18 or replace DDEC ECM (Para 7-101). Verify repair, go to Step 3 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals or connectors can affect signal to DDEC ECM. If DDEC ECM terminals and connectors are OK, either wire 508 is open (Figure 2-1) or the Fault exists outside the DDEC system.

KNOWN INFO

DDEC ECM OK.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

3.

Does engine brake operate correctly in low?

NO → Fault not corrected. Notify DS Maintenance.

YES → Fault corrected.

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If engine brake operates in low, fault has been corrected.

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

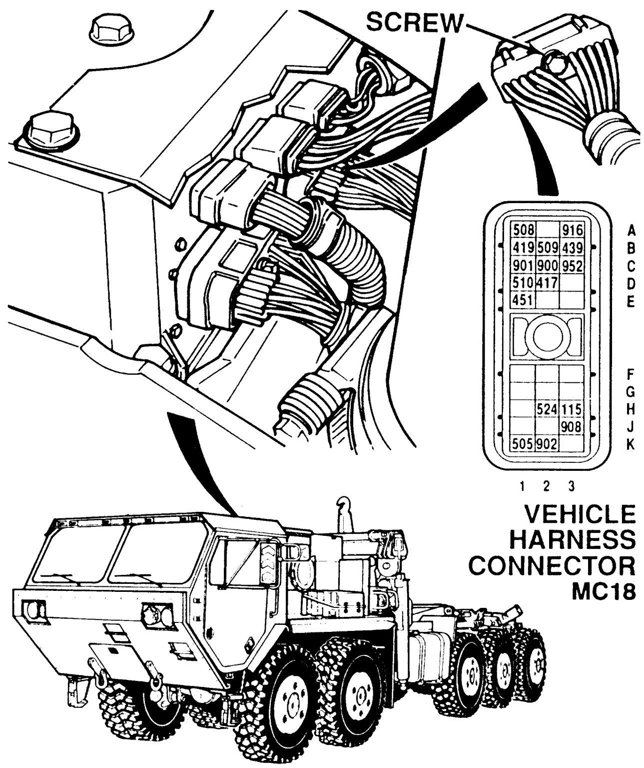
DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION

(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM.
(2) Inspect DDEC ECM terminals and vehicle harness connector MC18 (DDEC ECM and harness side) at vehicle harness connector for damage; bent, corroded, or unseated pins or terminals.
  (a) If vehicle harness connector is damaged, repair connector (Para 7-101) and perform Steps (3) and (4) below.
  (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56) and perform Steps (3) and (4) below.
  (c) If vehicle harness connector and DDEC ECM connector are OK, replace DDEC ECM (Para 7-56).
(3) Connect vehicle harness connector MC18 and tighten screw.
(4) Close top engine access cover.

VERIFY REPAIR

(1) START engine (TM 9-2320-364-10).
(2) Set engine brake switch to low position.
(3) Drive truck and allow engine brake to apply.
  (a) If engine brake does not operate, fault not corrected. Perform Steps (4) and (5) below and notify DS Maintenance.
  (b) If engine brake operates, fault has been corrected.
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

E1 ENGINE CRANKS BUT WILL NOT START.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Pan, Drain (Item 47, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)

References

TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

Lamp check OK, no data link or DDEC data received.

POSSIBLE PROBLEMS

Fuel supply empty.
Aerated fuel.
Clogged fuel filter.
Emergency shut-off switch faulty.
TRS out of adjustment.
TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

1.

Is fuel supply OK?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

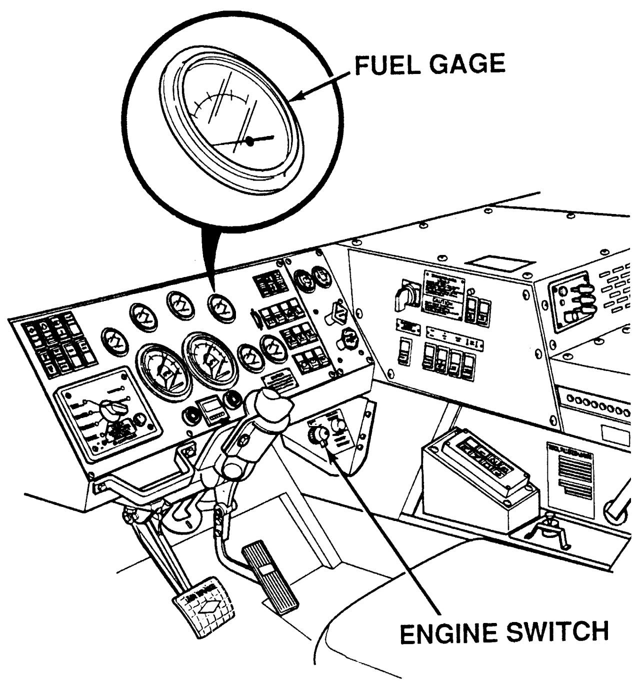
Inadequate fuel supply will cause engine to crank but not start.

NO

Refuel vehicle (TM 9-2320-364-10). Verify repair, go to Step 13 of this Fault.

YES

VISUAL INSPECTION
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Verify adequate fuel supply by observing fuel gage. (a) If fuel supply is low, turn OFF ENGINE switch and refuel vehicle. (b) If fuel supply is OK, turn OFF ENGINE switch and go to Step 2 of this Fault.



STEERING WHEEL SHOWN REMOVED FOR CLARITY

E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.

POSSIBLE PROBLEMS

Aerated fuel.
Clogged fuel filter.
Emergency shut-off switch faulty.
TRS out of adjustment.
TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

2.

WARNING

Read WARNING on Page 2-479

Is fuel flow steady at return line?

NO → Go to Fuel System Troubleshooting (Para 2-17).

YES ↓

TEST OPTIONS

Fuel flow test.

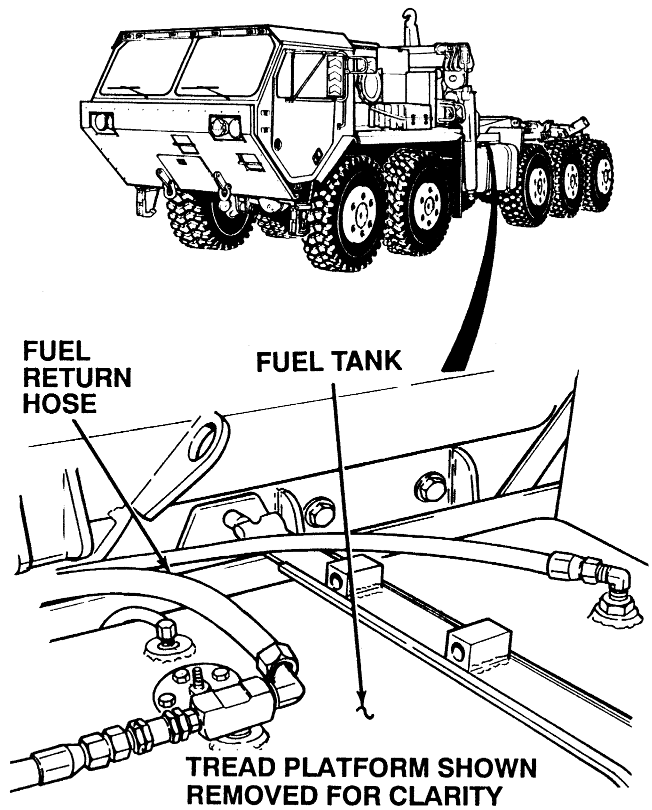
REASON FOR QUESTION

Non-steady fuel flow at return line indicates aerated fuel supply or clogged fuel filter.

WARNING

- Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

FUEL FLOW TEST
(1) Disconnect fuel return line from fuel tank. (2) Direct fuel into suitable container. (3) Observe fuel flow out of line while cranking engine (TM 9-2320-364-10). (a) If fuel flow is intermittent or no flow, turn OFF ENGINE switch, connect fuel return line and go to Fuel System Troubleshooting (Para 2-17). (b) If fuel supply is OK, turn OFF ENGINE switch, connect fuel return line and go to Step 5 of this Fault.



E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.

POSSIBLE PROBLEMS

Emergency shut-off switch faulty.
TRS out of adjustment.
TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

3.

WARNING

Read WARNING on Page 2-481

Is continuity measured between terminals 5 and 7 of emergency shut-off switch?

NO → Replace emergency shut-off switch. (Para 7-27). Verify repair, go to Step 13 of this fault.

YES ↓

TEST OPTIONS

Continuity test.
STE/ICE-R #91.

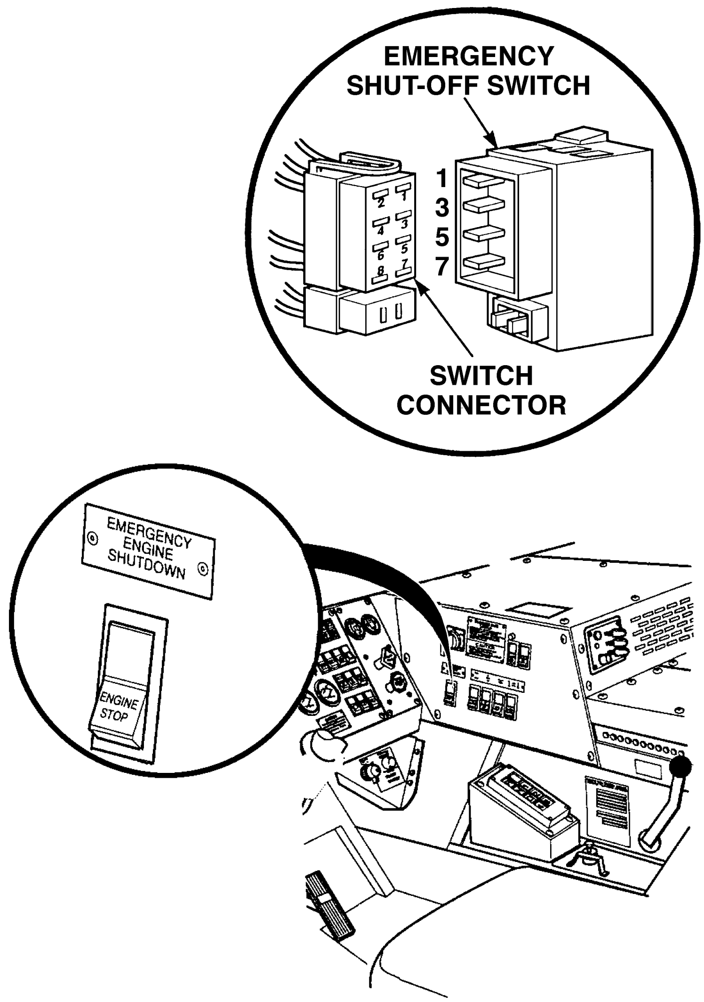
REASON FOR QUESTION

If continuity is not present at switch, switch is faulty and will not allow engine to run.

WARNING

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CONTINUITY TEST
(1) Remove emergency shut-off switch from side cover (Para 7-27). (2) Disconnect emergency shut-off switch from switch connector. (3) Set multimeter select switch to ohms. (4) Is there continuity between terminals 5 and 7 at emergency shut-off switch? (a) If there is no continuity, replace emergency shut-off switch (Para 7-27). (b) If there is continuity, emergency shut-off switch is OK. (5) Connect emergency shut-off switch to switch connector. (6) Install emergency shut-off switch in side cover.



STEERING WHEEL SHOWN REMOVED FOR CLARITY

E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.

POSSIBLE PROBLEMS

TRS out of adjustment.
TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

4.

WARNING

Read WARNING on Page 2-483

Does DDR display read more than 0 (zero) rpm while cranking engine.

NO → Notify DS Maintenance

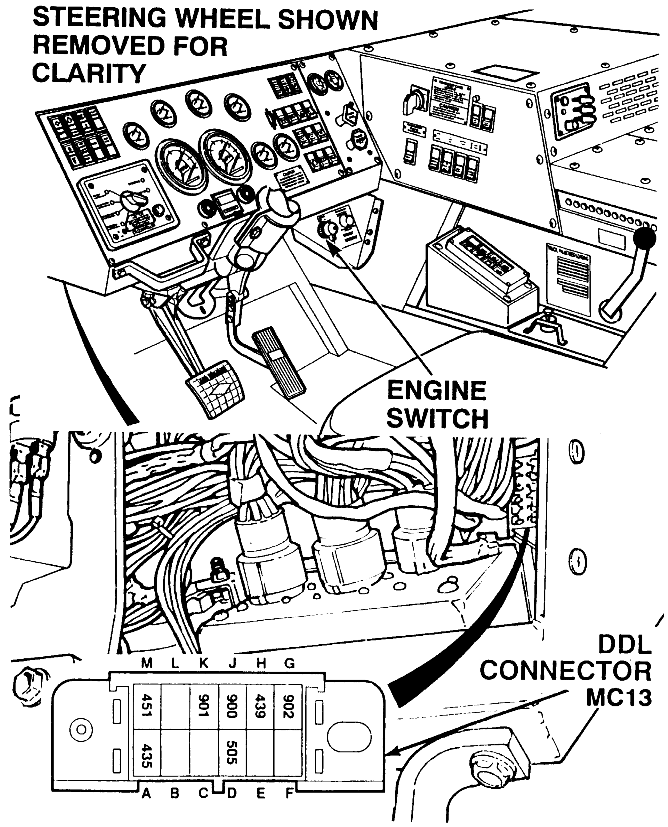
YES ↓

TEST OPTIONS

DDR test.

REASON FOR QUESTION

If 0 rpm is displayed, TRS is out of adjustment and engine will not start.



NOTE

Battery voltage surges, while cranking the engine, may blank out or reset DDR.

DDR TEST
(1) Connect DDR to DDL connector MC13. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Select MODE 04 (ENGINE RPM) on DDR (Para 2-11). (4) Turn engine switch to start and observe DDR display. (a) If engine RPM is more than 0, turn OFF ENGINE switch and go to Step 5 of this Fault. (b) If engine RPM remains at 0, TRS is not adjusted correctly. Turn OFF ENGINE switch and notify DS Maintenance.

E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.

POSSIBLE PROBLEMS

TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

5.

Is engine RPM less than 60 while cranking engine?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Less than 60 RPM indicates possible TRS Fault, more than 60 RPM indicates possible SRS Fault.

NO → Go to Step 8 of this Fault.

YES ↓

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.

POSSIBLE PROBLEMS

TRS faulty.
Damaged DDEC pulse wheel.
Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

6.

WARNING
Read WARNING on Page 2-485

Are there 100 to 200 ohms measured between wires 109 and 110 at engine harness connector, terminals T1 and T2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 100 or more than 200 ohms indicates a TRS Fault.

NO → Go to Fault A4 CODE 41, Step 2.

YES ↓

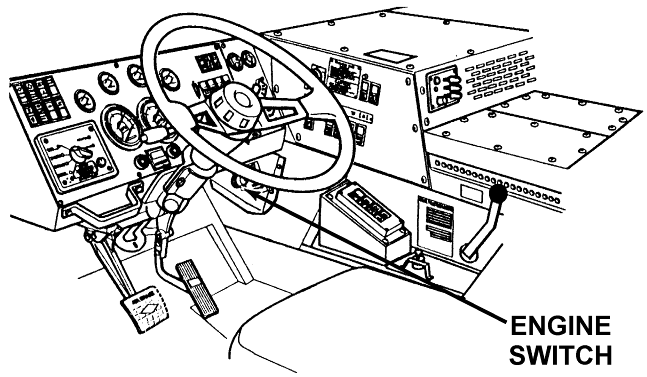
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

NOTE

Battery voltage surges, while cranking the engine, may blank out or reset DDR.

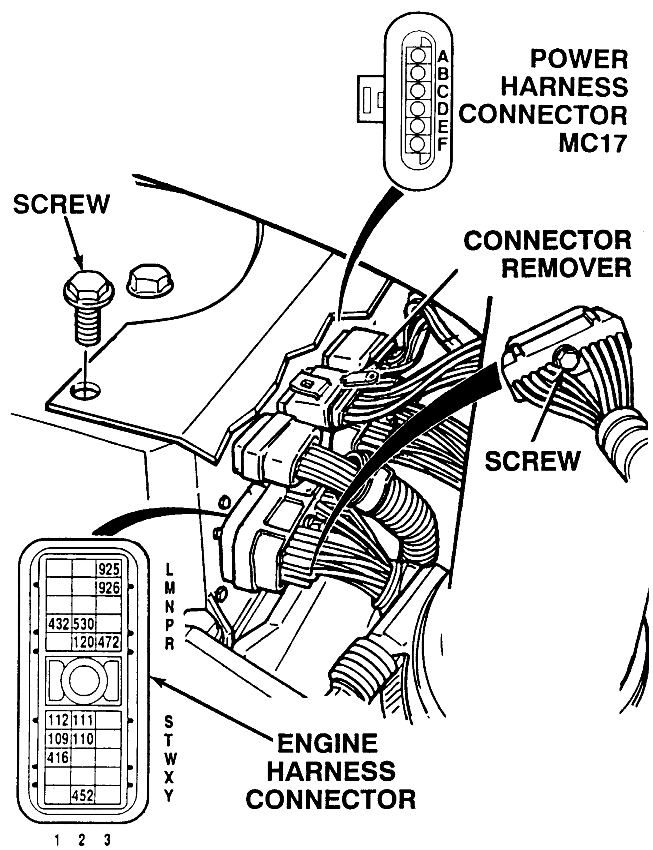
DDR TEST
(1) Remove two mounting screws and heat shield from DDEC ECM. (2) Disconnect power harness connector MC17 from DDEC ECM with connector removed. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Select MODE 04 (ENGINE RPM) on DDR (Para 2-11). (5) Turn engine switch to start and observe DDR display. (a) If engine RPM is more than 60, turn OFF ENGINE switch and go to Step 8 of this Fault. (b) If engine RPM is less than 60, turn OFF ENGINE switch and go to Step 6 of this Fault.



CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST
(1) Loosen screw and disconnect engine harness connector at DDEC ECM. (2) Set multimeter select switch to ohms. (3) Are there 100 to 200 ohms present between wires 109 and 110 at engine harness connector, terminals T1 and T2? (a) If there are less than 100 ohms or more than 200 ohms present, connect engine harness connector and go to A4 Code 41 Step 2. (b) If there are 100 to 200 ohms present, go to Step 7 of this Fault.



E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals or connectors.
SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

7.

WARNING
Read WARNING on Page 2-487

Are all DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged terminals and connectors can affect signal to DDEC ECM.

NO → Repair connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 13 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 13 of this Fault.

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

8.

Is an SRS signal received?

TEST OPTIONS

DDR test.

REASON FOR QUESTION

If an SRS signal is not received by DDEC ECM, the engine will not start.

NO → Go to Step 10 of this Fault.

YES ↓

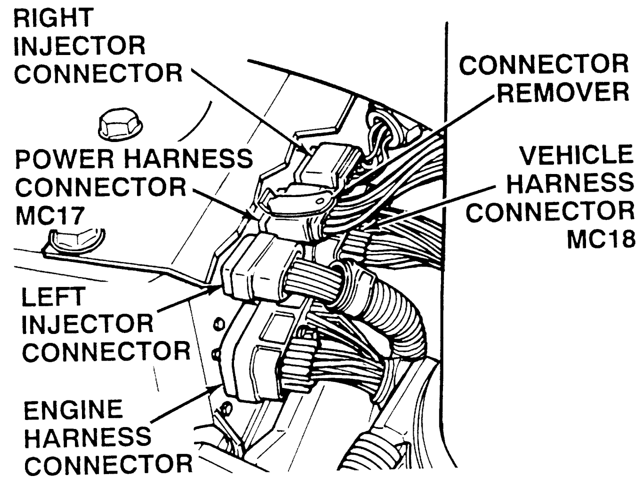
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

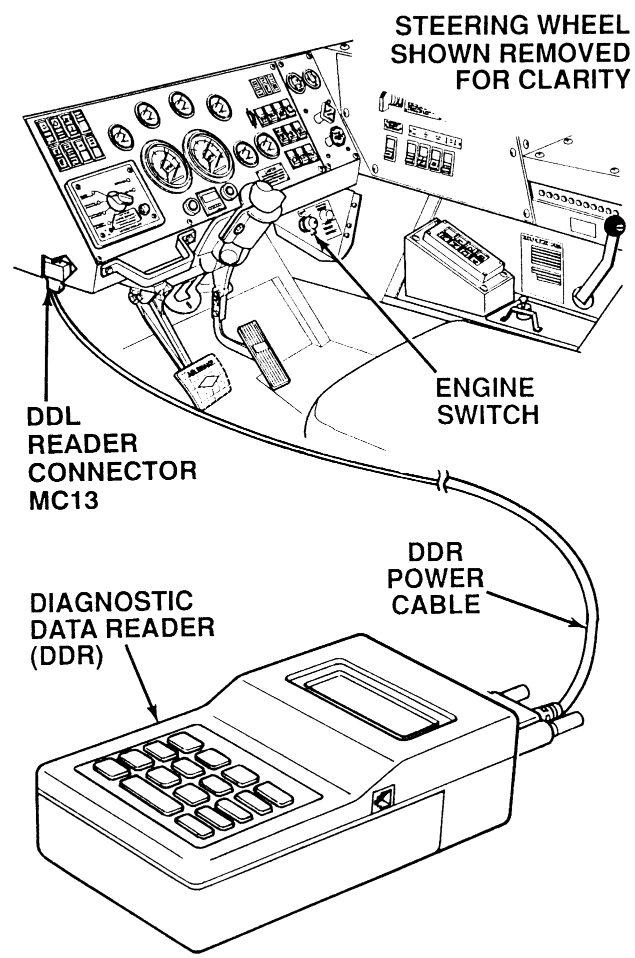
VISUAL INSPECTION
(1) Disconnect all connectors at DDEC ECM (Para 7-56). (2) Check all terminals at harness connectors (ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector(s) is damaged, repair connector(s) (Para 7-101) and perform Steps (3) through (5) below. (b) If DDEC ECM connector is damaged, replace DDEC ECM (Para 7-56). (c) If harness connector and DDEC ECM harness connectors are OK, replace DDEC ECM (Para 7-56). (3) Connect engine harness connector to DDEC ECM and tighten screw. (4) Install heat shield and two screws. (5) Close top engine access cover.



NOTE

Battery voltage surges, while cranking the engine, may blank out or reset DDR.

DDR TEST
(1) Select MODE 31 (SRS RECEIVED) on DDR. (2) Observe DDR display while cranking engine (TM 9-2320-364-10). (a) If SRS received is not displayed in the DDR, SRS signal is faulty, turn OFF ENGINE switch and go to Step 8 of this Fault. (b) If SRS received is displayed, SRS signal is OK. Turn OFF ENGINE switch and go to Step 9 of this Fault.



E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

SRS faulty.
Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

9.

WARNING
Read WARNING on Page 2-489

Are there are 100 to 200 ohms measured between wires 112 and 111 at engine harness connector, terminals S1 and S2?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

Resistance less than 100 or more than 200 ohms indicates a SRS Fault.

NO → Go to Fault A4 Code 42, Step 2.

YES ↓

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.
SRS OK.

POSSIBLE PROBLEMS

Open in injector return line.
Short in injector return line.
DDEC ECM input voltage faulty.

10.

Are there less than or equal to 5 ohms at both injector harness connectors?

TEST OPTIONS

Resistance test.
STE/ICE-R #91.

REASON FOR QUESTION

More than 5 ohms at any reading indicates an open exists in one of the injector driver or return lines.

NO → Repair injector harness wires (see schematic 2-4) or notify DS Maintenance. Verify repair, go to Step 13 of this Fault.

YES ↓

WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

CAUTION

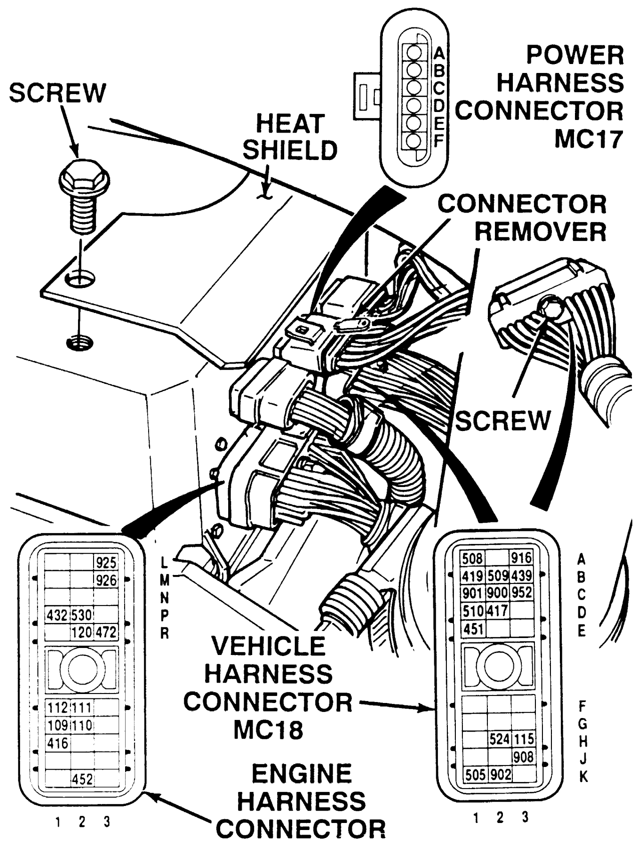
DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

RESISTANCE TEST

(1) Loosen screw and disconnect engine harness connector at DDEC ECM.
(2) Are there 100 to 200 ohms present between wires 112 and 111 at engine harness connector, terminals S1 and S2?
  (a) If there are not 100 to 200 ohms present, perform Step (3) below and go to Fault A4 Code 42 Step 2.
  (b) If there are between 100 to 200 ohms present, perform Step (3) below and go to Step 10 of this Fault.
(3) Connect engine harness connector and tighten screw.

RESISTANCE TEST

(1) Remove two screws and heat shield.
(2) Disconnect both injector harness connectors at DDEC ECM with connector remover.
(3) Read resistance between the injector return terminal and all the driver terminals at both harness connectors (Example: E to A, E to B, G to L, G to J, E to C and E to D).
  (a) If less than 5 ohms are present, repair wires (see schematic Fig 2-4) or notify DS Maintenance.
  (b) If 5 ohms or more are present, go to Step 11 of this Fault.



E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.
SRS OK.
No open in injector return line.

POSSIBLE PROBLEMS

Short in injector return line.
DDEC ECM input voltage faulty.

11.

WARNING

Read WARNING on Page 2-491

Are there more than or equal to 10,000 ohms or an open circuit at power harness and injector harness connectors?

NO → Repair injector and/or power harness wires (see schematic Fig 2-4) or notify DS Maintenance. Verify repair, go to Step 13 of this Fault.

YES ↓

TEST OPTIONS

Resistance test.
STE/ICE-R #92.

REASON FOR QUESTION

Resistance less than 10,000 ohms indicates a short to ground where measured.

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergecny shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.
SRS OK.
No open in injector return line.
No short in injector return line.

POSSIBLE PROBLEMS

DDEC ECM input voltage faulty.

12.

WARNING

Read WARNING on Page 2-491

Are 10 to 14 vdc measured between two wires 241 at power harness connector MC17, terminals A and B and a known good ground?

NO → Go to Fault A4 Code 46, Step 4.

YES ↓

TEST OPTIONS

DDR test.

REASON FOR QUESTION

Less than 10 vdc on DDR indicates battery supplied +12 volts are faulty.

WARNING

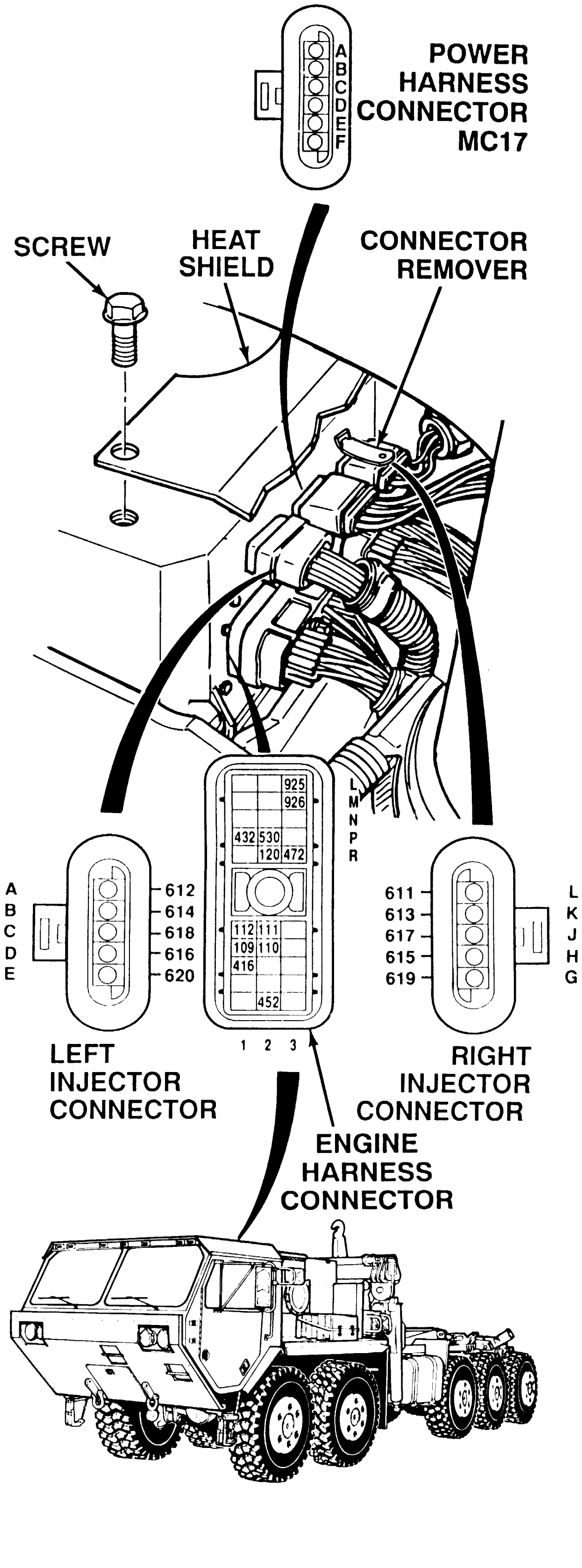
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.

RESISTANCE TEST

(1) Read resistance between wire 150 at power harness connector MC17, terminal C and terminals A, B, C, D, E, G, H, J, K, and L of injector harness connectors.
   (a) If less than 10,000 ohms are present, repair power harness wire 150 and/or injector wire(s) (see schematic Fig 2-4) or notify DS Maintenance and perform Steps (2) and (3) below.
   (b) If more than 10,000 ohms are present, power harness and injector wires are OK. Perform Steps (2) and (3) below.
(2) Connect both injector harness connectors to DDEC ECM.
(3) Connect engine harness connector to DDEC ECM and tighten screw.

DDR TEST

(1) Set multimeter select switch to volts dc.
(2) Turn ON ENGINE switch (TM 9-2320-364-10).
(3) Select MODE 05 (DDEC ECM VOLTAGE) on DDR (Para 2-11).
(4) Are 10 to 14 vdc present between two wires 241 at power harness connector MC17, terminals A and B and a known good ground?
   (a) If less than 10 vdc are present, turn OFF ENGINE switch, perform Steps (5) through (7) below and go to A4 Code 46, Step 4.
   (b) If more than 14 vdc are present, turn OFF ENGINE switch and perform Steps (5) through (7) below.
(5) Connect power harness connector MC17.
(6) Install heat shield and tighten two mounting screws.
(7) Close top engine access cover.



E1 ENGINE CRANKS BUT WILL NOT START (CONT).

KNOWN INFO

Fuel supply OK.
No aerated fuel.
Fuel filter OK.
Emergency shut-off switch OK.
TRS adjustment OK.
TRS OK.
DDEC pulse wheel OK.
DDEC ECM terminals and connectors OK.
SRS OK.
No open in injector return line.
No short in injector return line.
DDEC ECM input voltage OK.
DDEC ECM terminals and connectors OK.
TRS OK.
DDEC pulse wheel OK.

POSSIBLE PROBLEMS

13.

Does engine start?

NO → Fault not corrected. Go to Fault Index (Table 2-16).

YES → Fault corrected.

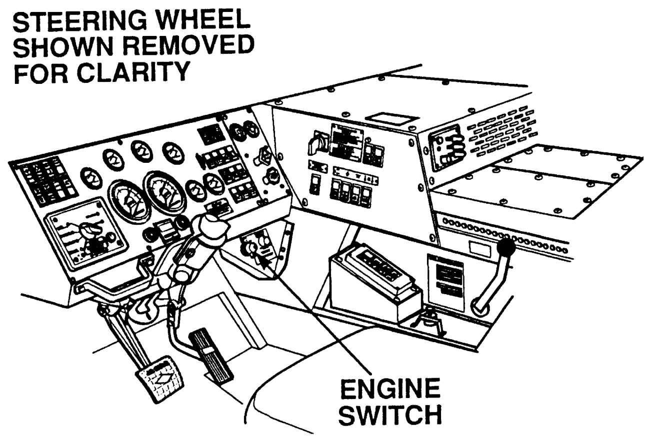
TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If engine starts, fault has been corrected.

VERIFY REPAIR
(1) Start ENGINE (TM 9-2320-364-10). (b) If engine starts, fault has been corrected. Perform Steps (2) and (3) below. (b) If engine does not start, turn OFF ENGINE switch and go to Fault Index (Table 2-16). (2) Turn OFF ENGINE switch. (3) Disconnect DDR from DDL connector MC13.



2-13. DDEC II TROUBLESHOOTING (CONT).

E2 CHECK GAGES LIGHT (CGL) ALWAYS ON OR ALWAYS OFF.

INITIAL SETUP

References
TM 9-2320-364-10

Equipment Condition
Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)

START

KNOWN INFO
CGL not working normally.
POSSIBLE PROBLEMS

1.

Is CGL always ON?

TEST OPTIONS
Visual inspection.
REASON FOR QUESTION
Determine status of CGL.

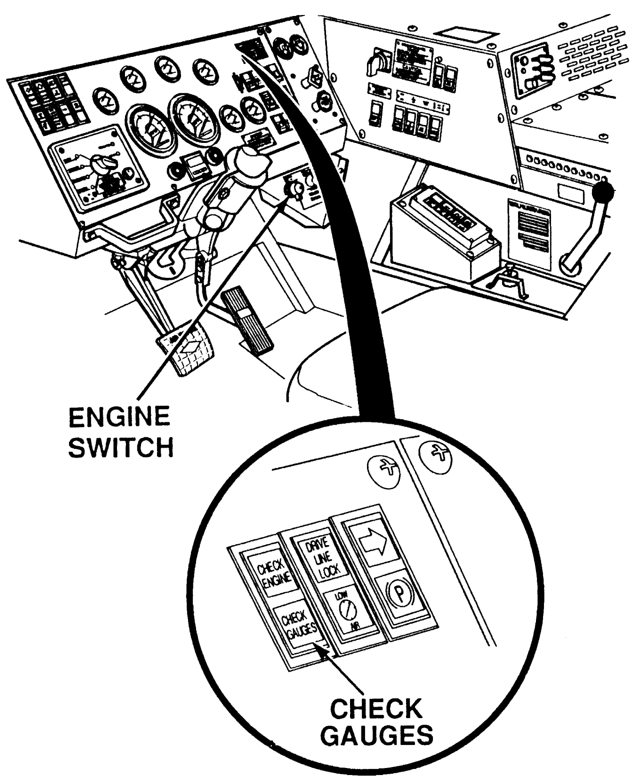
NO → Go to Fault E4.

YES → Go to Fault E3.

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Is CGL always ON? (a) If CGL is not always ON, turn OFF ENGINE switch and go to Fault E4. (b) If CGL is always ON, turn OFF ENGINE switch and go to go to Fault E3.



2-13. DDEC II TROUBLESHOOTING (CONT).

E3 CHECK GAGES LIGHT (CGL) ALWAYS ON.

INITIAL SETUP

Tools and Special Tools

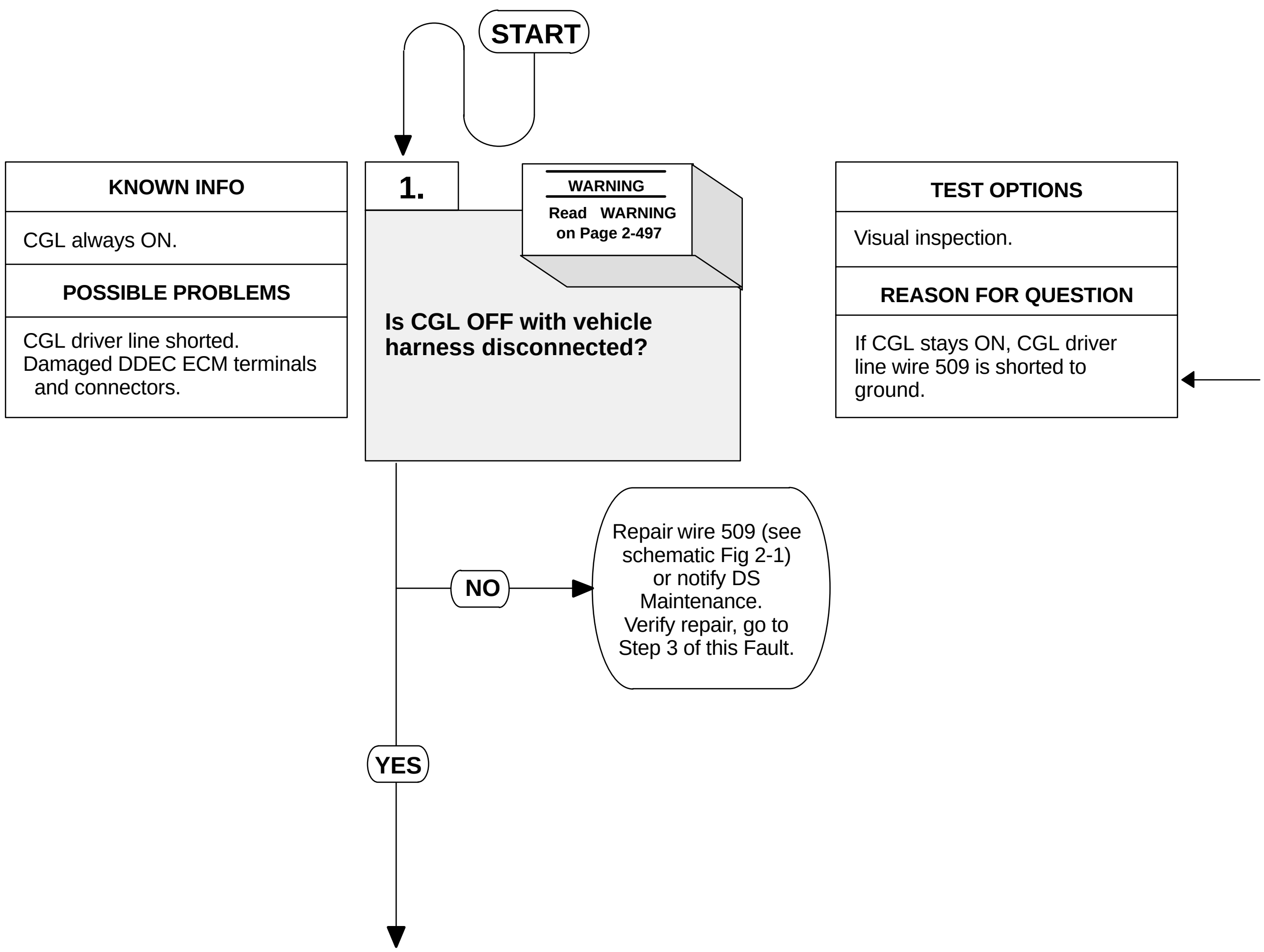
Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Remover, Connector (Item 55, Appendix G)

References

TM 9-2320-364-10

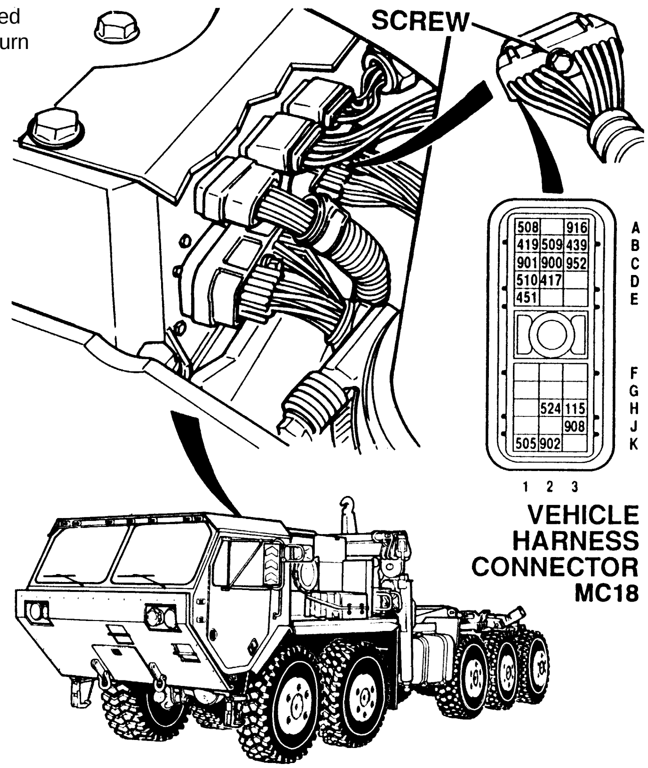
Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)



WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.



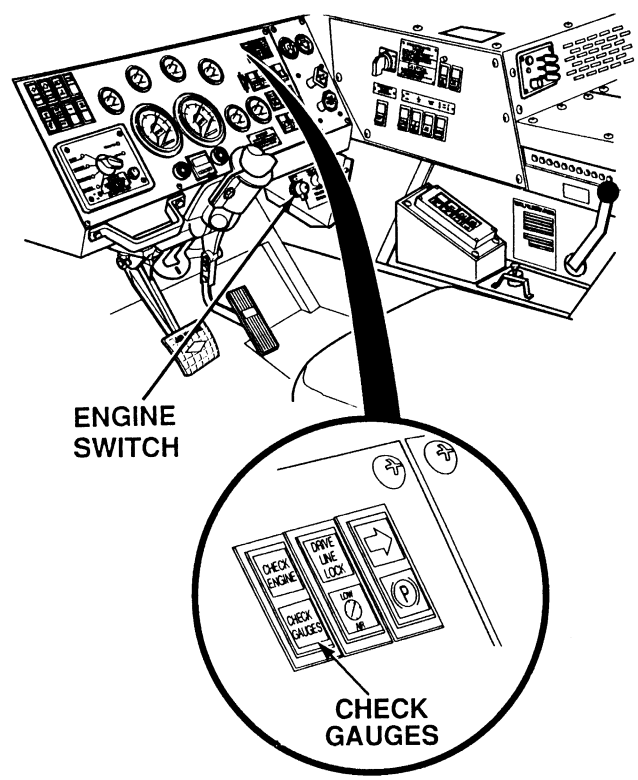
CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (2) Turn ON ENGINE switch (TM 9-2320-364-10). (3) Is CGL OFF with vehicle harness disconnected? (a) If CGL is ON with vehicle harness connector disconnected, turn OFF ENGINE switch and repair wire 509 (see schematic Fig 2-1) or notify DS Maintenance. (b) If CGL is OFF with vehicle harness connector disconnected, turn OFF ENGINE switch. Wire 509 is OK.



E3 CHECK GAGES LIGHT (CGL) ALWAYS ON (CONT).

KNOWN INFO

CGL driver line OK.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals and connectors.

2.

WARNING

Read WARNING on Page 2-499

Are DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged DDEC ECM terminals or connectors can affect signal to DDEC ECM.

NO → Repair connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 3 of this Fault.

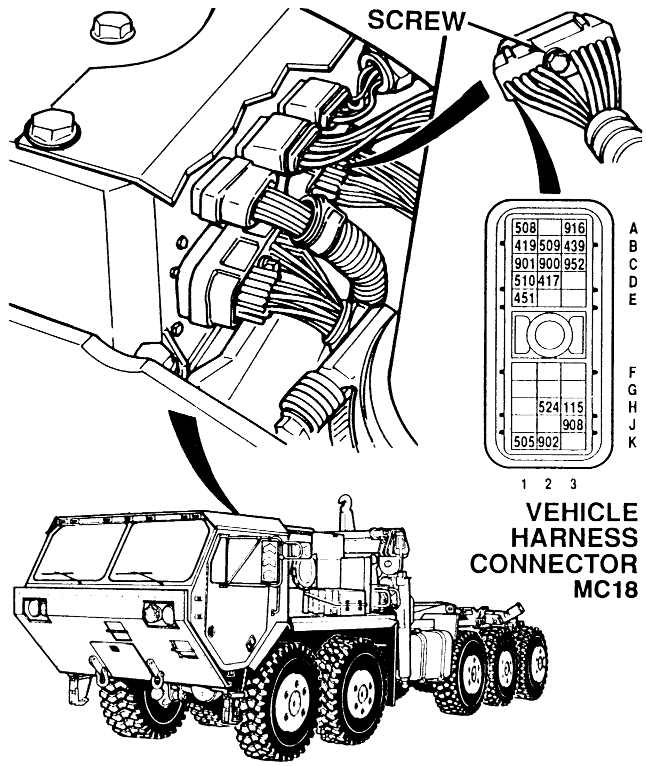
WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.

VISUAL INSPECTION
(1) Disconnect all connectors at DDEC ECM (Para 7-56). (2) Check all terminals at harness connectors (ECM and harness side) for damage; bent, corroded and unseated pins or terminals. (a) If harness connector(s) is damaged, repair connector(s) (Para 7-101) and perform Steps (3) and (4) below. (b) If DDEC ECM connector is damaged, replace ECM (Para 7-56). (c) If harness connector and DDEC ECM harness connectors are OK, replace DDEC ECM (Para 7-56). (3) Connect vehicle harness connector MC18 to DDEC ECM and tighten screw. (4) Close top engine access cover.



E3 CHECK GAGES LIGHT (CGL) ALWAYS ON (CONT).

KNOWN INFO
CGL driver line OK. DDEC ECM terminals and connectors OK.
POSSIBLE PROBLEMS

3.

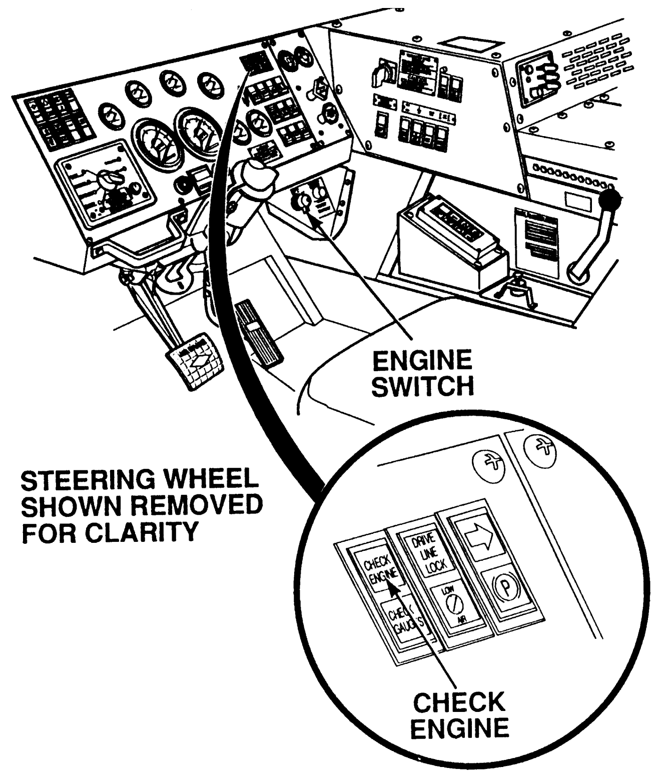
Does CGL stay ON longer than 5 seconds?

TEST OPTIONS
Verify repair.
REASON FOR QUESTION
If CGL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, Fault has been corrected.

NO → Fault corrected.

YES → Go to Fault Index (Table 2-16).

VERIFY REPAIR
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. (a) If check engine light comes on for about five seconds and then goes off, fault has been corrected. Perform Step (3) below. (b) If check engine light comes on and stays on, perform Step (3) below and go to Fault Index (Table 2-16). (3) Turn OFF ENGINE switch.



2-13. DDEC II TROUBLESHOOTING (CONT).

E4 CHECK GAGES LIGHT (CGL) ALWAYS OFF.

INITIAL SETUP

Tools and Special Tools

Tool Kit, General Mechanic's: Automotive (Item 74, Appendix G)
STE/ICE-R (optional) (Item 3, Appendix G)
DDEC Repair Kit (Item 15, Appendix G)
Multimeter (Item 44, Appendix G)
Reader, Diagnostic (Item 53, Appendix G)
Remover, Connector (Item 55, Appendix G)
Jumperwire

References

TM 9-2320-364-10
TM 9-4910-571-12&P

Equipment Condition

Engine OFF, (TM 9-2320-364-10)
Parking brake applied, (TM 9-2320-364-10)
Wheels chocked, (TM 9-2320-364-10)
Top engine access cover opened, (TM 9-2320-364-10)

START

KNOWN INFO

Nothing.

POSSIBLE PROBLEMS

CGL indicator lamp faulty.
Open in CGL driver line.
Short/Open in battery positive lines.
Short in ignition line.
Open in ignition line.
Open in ground line.
Damaged DDEC ECM terminals or connectors.

1.

WARNING

Read WARNING on Page 2-503

Is CGL OFF with jumperwire installed between wire 509 at vehicle harness connector MC18 terminals B2 and a known good ground?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Isolate Fault.

NO → Go to Step 4 of this Fault.

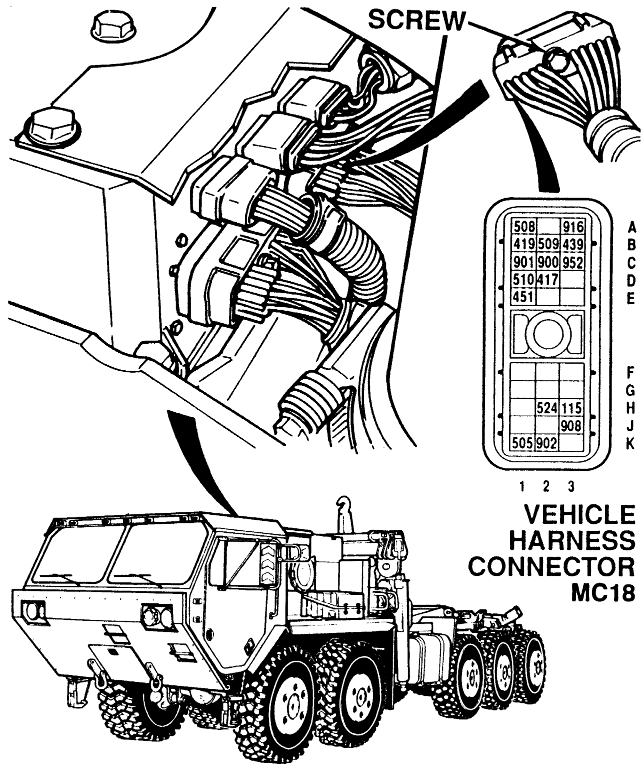
YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

CAUTION

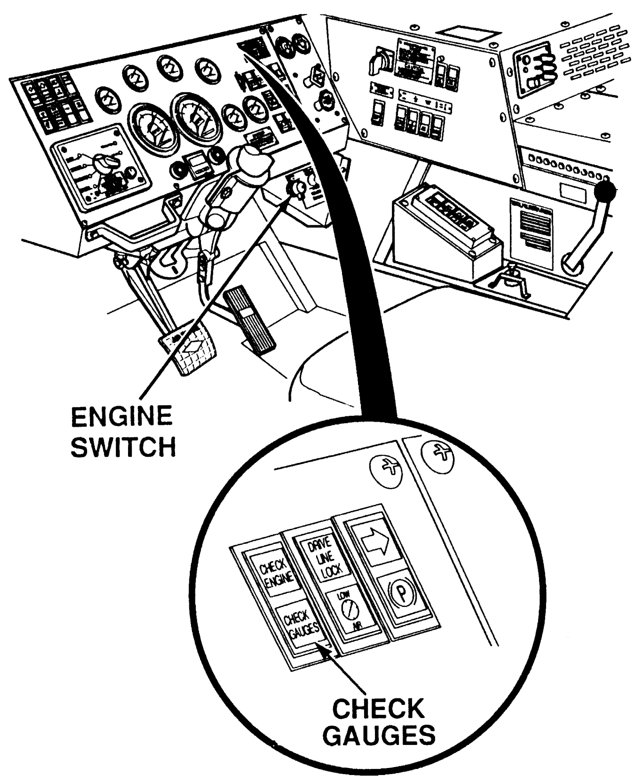
- Use jumperwire only between terminals indicated. Failure to comply may result in damage to DDEC components or wiring.
- DDEC ECM connector terminals are easily damaged. Use care when connecting and disconnecting connectors.



NOTE

The following steps should only be used if troubleshooting was started at DDEC II Troubleshooting (All Conditions) and you were referred here.

VISUAL INSPECTION
(1) Loosen screw and disconnect vehicle harness connector MC18 at DDEC ECM. (2) Place jumperwire between terminal B2 at vehicle harness connector MC18 and a known good ground. (3) Turn ON ENGINE switch (TM 9-2320-364-10). (4) Is CGL OFF with jumperwire installed at vehicle harness connector MC18? (a) If CGL is ON, remove jumperwire, turn OFF ENGINE switch and go to Step 4 of this fault. (b) If CGL is OFF, remove jumperwire, turn OFF ENGINE switch and go to Step 2 of this Fault.



E4 CHECK GAGES LIGHT (CGL) ALWAYS OFF (CONT).

KNOWN INFO

CGL is OFF with jumperwire installed at vehicle harness connector.

POSSIBLE PROBLEMS

CGL indicator lamp bad.

2.

WARNING

Read WARNING on Page 2-505

Are there 10 to 14 vdc measured between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 vdc at vehicle harness connector indicates ignition line wire 439 is shorted to ground.

NO → Repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES → Step 3.

KNOWN INFO

No short in ignition line.

POSSIBLE PROBLEMS

CGL indicator lamp bad.

3.

Is continuity measured across CGL lamp?

TEST OPTIONS

Continuity test.
STE/ICE-R #91.

REASON FOR QUESTION

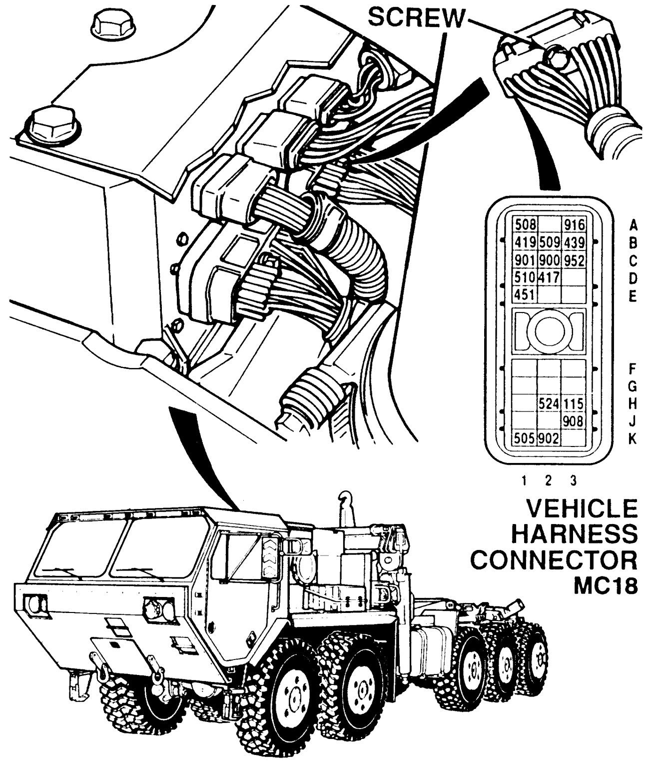
If there is continuity the lamp is OK. If lamp is OK, driver line Wire 509 is open.

NO → Replace lamp (Para 7-24). Verify repair, go to Step 8 of this Fault.

YES → Repair wire 509 (see schematic Fig 2-1) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

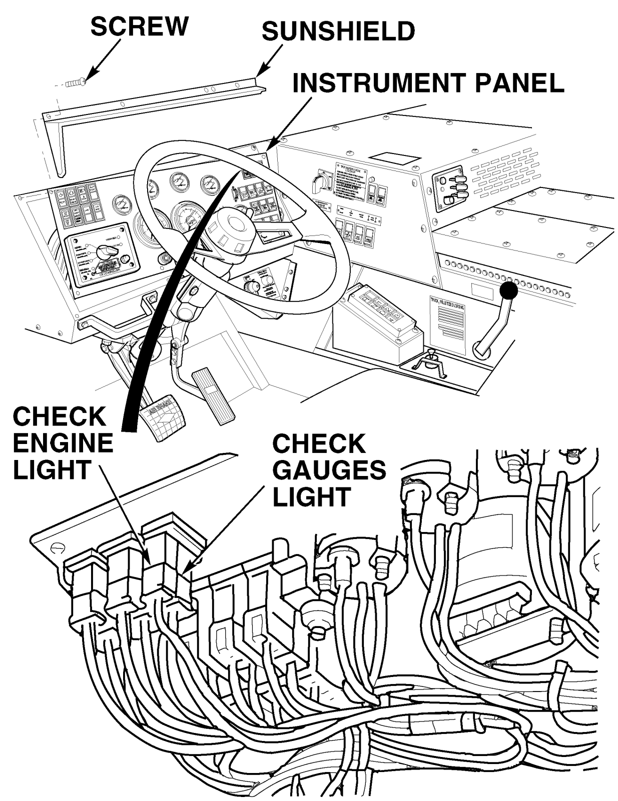
WARNING

- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause injury to personnel.
- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.



VOLTAGE TEST

(1) Set multimeter select switch to volts dc.
(2) Turn ON ENGINE switch (TM 9-2320-364-10).
(3) Are there 10 to 14 vdc present between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?
  (a) If less than 10 to 14 vdc are not present, turn OFF ENGINE switch and repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and go to Step 3 of this Fault.
(4) Connect vehicle harness connector MC18 and tighten screw.



CONTINUITY TEST

(1) Remove ten screws and sunshield from instrument panel.
(2) Pull top of instrument panel towards steering wheel.
(3) Remove CGL lamp.
(4) Set multimeter select switch to ohms.
(5) Is continuity measured across CGL lamp?
  (a) If there is no continuity, replace lamp (Para 7-24).
  (b) If there is continuity, lamp is OK. Repair wire 509 (see schematic Fig 2-1) or notify DS Maintenance.
(6) Install instrument panel and sunshield with ten screws.
(7) Close top engine access cover.

E4 CHECK GAGES LIGHT (CGL) ALWAYS OFF (CONT).

KNOWN INFO

CGL ON with jumperwire installed at vehicle harness connector.

POSSIBLE PROBLEMS

Open in ignition line.
Short/Open in battery positive lines.
Open in ground line.
Damaged DDEC ECM terminals or connectors.

4.

WARNING
Read WARNING on Page 2-507

Are there 10 to 14 vdc measured between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 vdc at vehicle harness connector indicates ignition line wire 439 is open.

NO → Repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance
Verify repair, go to Step 8 of this Fault.

YES ↓

KNOWN INFO

CGL ON with jumperwire installed at vehicle harness connector.
No open in ignition line.

POSSIBLE PROBLEMS

Short/Open in battery positive lines.
Open in ground line.
Damaged DDEC ECM terminals or connectors.

5.

WARNING
Read WARNING on Page 2-507

Are there 10 to 14 vdc measured between wires 241 and/or 240 at power harness connector MC17, terminals A, B, E and F and a known good ground?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 vdc at power harness connector indicates battery positive line wire 241 and\or 240 are shorted or CB22/CB23 are tripped.

NO → Repair wire 241 and/or 240 (see schematic Fig 2-3) or notify DS Maintenance.
Verify repair, go to Step 8 of this Fault.

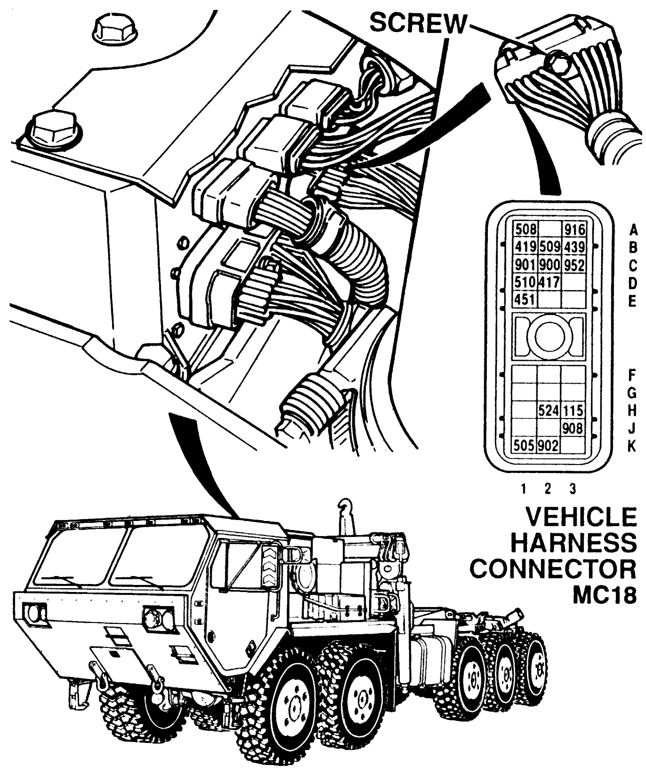
YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing trouble-shooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

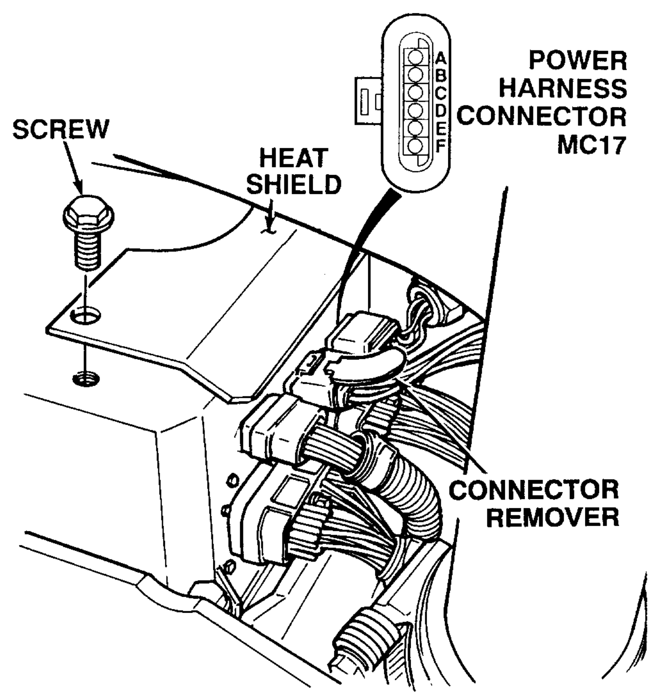
VOLTAGE TEST

(1) Set multimeter select switch to volts dc.
(2) Turn ON ENGINE switch (TM 9-2320-364-10).
(3) Are there 10 to 14 vdc present between wire 439 at vehicle harness connector MC18, terminal B3 and a known good ground?
  (a) If less than 10 vdc are present, turn OFF ENGINE switch and repair wire 439 (see schematic Fig 2-1) or notify DS Maintenance.
  (b) If there is 10 to 14 vdc present, turn OFF ENGINE switch and go to Step 5 of this Fault.



VOLTAGE TEST

(1) Remove two screws and heat shield from DDEC ECM.
(2) Disconnect power harness connector MC17 with connector remover.
(3) Set multimeter select switch to volts dc.
(4) Turn ON ENGINE switch (TM 9-2320-364-10).
(5) Are there 10 to 14 vdc present between wire 241 at power harness connector MC17, terminal A and B and a known good ground?
  (a) If less than 10 vdc are present, turn OFF ENGINE switch and repair wire 241 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (7) and (8) below.
  (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and perform Step (6) below.
(6) Are there 10 to 14 vdc present between wire 240 at power harness connector MC17, terminal E and F and a known good ground?
  (a) If less than 10 vdc are present, turn OFF ENGINE switch and repair wire 240 (see schematic Fig 2-3) or notify DS Maintenance and perform Steps (7) and (8) below.
  (b) If 10 to 14 vdc are present, wire 240 is OK. Turn OFF ENGINE switch, perform Steps (7) and (8) below and go to Step 6 of this Fault.
(7) Connect power harness connector MC17.
(8) Install heat shield and two mounting screws.



E4 CHECK GAGES LIGHT (CGL) ALWAYS OFF (CONT).

KNOWN INFO

CGL ON with jumperwire installed at vehicle harness connector.
No open in ignition line.
No short/open in battery positive lines.

POSSIBLE PROBLEMS

Open in ground line.
Damaged DDEC ECM terminals or connectors.

6.

WARNING

Read WARNING on Page 2-509

Are there 10 to 14 vdc measured between wire 241 and 150 at power harness connector MC17, terminals A and C?

TEST OPTIONS

Voltage test.
STE/ICE-R #89.

REASON FOR QUESTION

Less than 10 vdc indicates ground line wire 150 is open.

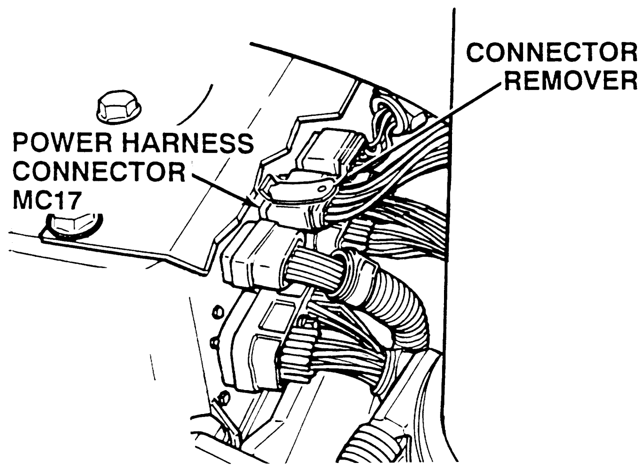
NO → Repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance. Verify repair, go to Step 8 of this Fault.

YES ↓

WARNING

- Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts positive electrical circuits, a direct short may result. Damage to equipment, injury or death to personnel may occur.
- Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.

VOLTAGE TEST
(1) Turn ON ENGINE switch (TM 9-2320-364-10). (2) Are there 10 to 14 vdc present between wires 241 and 150 at power and harness connector MC17, terminals A, B and C? (a) If less than 10 vdc are present, turn OFF ENGINE switch and repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance. (b) If 10 to 14 vdc are present, perform Step (3) below. (3) Are there 10 to 14 vdc present between wire 150 and 240 at power harness connector MC17, terminals E, F and D and E? (a) If less than 10 vdc are present, turn OFF ENGINE switch and repair wire 150 (see schematic Fig 2-3) or notify DS Maintenance. (b) If 10 to 14 vdc are present, turn OFF ENGINE switch and go to Step 7 of this Fault.



E4 CHECK GAGES LIGHT (CGL) ALWAYS OFF (CONT).

KNOWN INFO

No open in ignition line.
No short/open in battery positive lines.
No open in ground line.

POSSIBLE PROBLEMS

Damaged DDEC ECM terminals or connectors.

7.

CAUTION
Read CAUTION on Page 2-511

Are all DDEC ECM terminals and connectors (DDEC ECM and harness side) free from damage?

TEST OPTIONS

Visual inspection.

REASON FOR QUESTION

Damaged DDEC ECM terminals and connectors can affect signal to DDEC ECM.

NO → Repair connectors (Para 7-101) or replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

YES → Replace DDEC ECM (Para 7-56). Verify repair, go to Step 8 of this Fault.

KNOWN INFO

No open in ignition line.
No short/open in battery positive lines.
No open in ground line.
DDEC ECM terminals and connectors OK.

POSSIBLE PROBLEMS

8.

Does CGL stay ON longer than five seconds?

TEST OPTIONS

Verify repair.

REASON FOR QUESTION

If CGL lights for approximately five seconds and then goes OUT after ENGINE switch is turned to ON, fault has been corrected.

NO → Fault corrected.

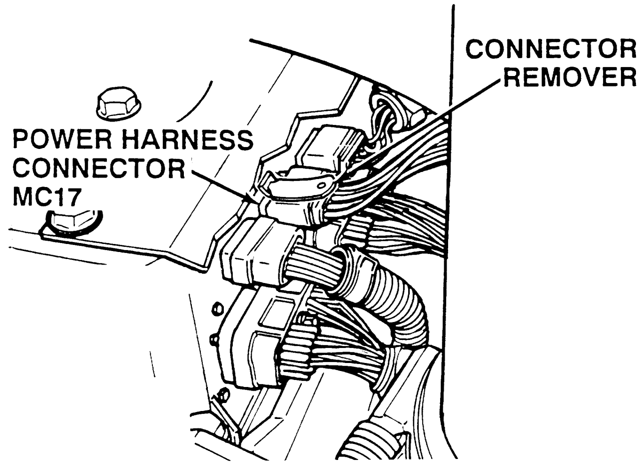
YES → Go to Fault Index (Table 2-16).

CAUTION

DDEC ECM connectors terminals are easily damaged. Use care when connecting and disconnecting connectors.

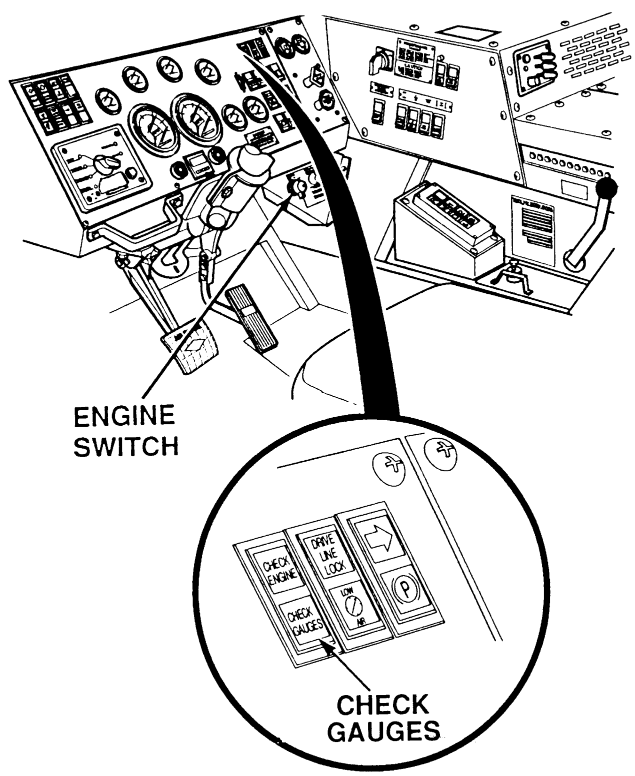
VISUAL INSPECTION

(1) Disconnect all connectors at DDEC ECM (Para 7-56).
(2) Check all terminals at harness connectors (ECM and harness side) for damage; bent, corroded and unseated pins or terminals.
  (a) If harness connector(s) is damaged, repair connector(s) (Para 7-101) and perform Steps (3) through (5) below.
  (b) If DDEC ECM connector is damaged, replace ECM (Para 7-56).
  (c) If harness connector and DDEC ECM harness connectors are OK, replace DDEC ECM (Para 7-56).
(3) Connect engine harness connector to DDEC ECM and tighten screw.
(4) Install heat shield and two screws.
(5) Close top engine access cover.



VERIFY REPAIR

(1) Turn ON ENGINE switch (TM 9-2320-364-10).
(2) Clear codes on DDR (Para 2-24).
(3) If CGL does not stay ON, start engine and run for 8 minutes or until CGL comes ON.
  (a) If check engine light comes on for about five seconds and then goes off, fault has been corrected. Perform Steps (4) and (5) below.
  (b) If check engine light comes on and stays on, perform Steps (4) and (5) below and go to Fault Index (Table 2-16).
(4) Turn OFF ENGINE switch.
(5) Disconnect DDR from DDL connector MC13.



2-14. DDEC III TROUBLESHOOTING.

This paragraph covers DDEC III System Troubleshooting. The DDEC III System Index, Table 2-19, lists sections, subsections and charts associated with the DDEC III system of the PLS truck.

Table 2-19. DDEC III System Index

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Table 2-19. DDEC III System Fault Index (CONT).

	Description			Page
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E.	Diagnostics Code Charts			2-617
	Flash Codes:	**SAE Codes:**	**(Refer to Table 2-20 for Cross Reference)**	
	11	P187 4	-Vernier Control Input Failed Low (Voltage Low) (Also Called Variable Speed Governor - VSG)	2-617
	12	P187 3	- Vernier Control Input Failed High (High Voltage) (Also Called Variable Speed Governor - VSG)	2-625
	14	P110 3	- Coolant Temperature Circuit Failed High (Voltage High)	
	OR:	P175 3	- Oil Temperature Circuit Failed High (Voltage High)	2-631
	15	P110 4	- Coolant Temperature Circuit Failed Low (Low Voltage)	
	OR:	P175 4	- Oil Temperature Circuit Failed Low (Low Voltage)	2-631
	21	P91 3	- Electronic Foot Pedal ASM (EFPA) Circuit Failed High (Voltage High) Also Called Throttle Position Sensor (TPS)	2-643
	22	P91 4	- Electronic Foot Pedal ASM (EFPA) Circuit Failed Low (Voltage Low) Also Called Throttle Position Sensor (TPS)	2-649
	23	P174 3	- Fuel Temperature Circuit Failed High (High Voltage)	2-657
	24	P174 4	- Fuel Temperature Circuit Failed Low (Low Voltage)	2-661
	25	None	- No Codes	2-665
	33	P102 3	- Turbo Boost Pressure Circuit Failed High (High Voltage)	2-667
	34	P102 4	- Turbo Boost Pressure Circuit Failed Low (Low Voltage)	2-673
	35	P100 3	- Oil Pressure Circuit Failed High (High Voltage)	2-681
	36	P100 4	- Oil Pressure Circuit Failed Low (Low Voltage)	2-687
	41	S21 0	- Too Many SRS (Missing TRS)	2-695
	42	S21 1	- Too Few SRS (Missing SRS)	2-705
	44	P110 0	- Coolant Temperature High Or	
		P175 0	- Oil Temperature High	2-715
	45	P100 1	- Oil Pressure Low	2-717
	46	P168 1	- Battery Voltage Low	2-719
	52	S254 12	- Analog To Digital (A/D) Conversion Failure	2-725
	53	S253 12	- Nonvolatile Memory Failure	2-727
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Table 2-19. DDEC III System Fault Index (CONT).

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	Flash Codes: / **SAE Codes:**	
	61 Sxxx 0 - Injector Response Time Long	2-731
	62 S026 3/4 - Auxiliary Output Short To Battery, - Auxiliary Output Open Circuit	2-747
	63 S057 3/4 - PWM Short To Battery/PWM Open Circuit	2-749
	71 Sxxx 1 - Injector Response Time Short	2-751
	75 P168 0 - Battery Voltage High	2-755
	76 P121 0 - Engine Overspeed With Engine Brake	2-757
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2-14. DDEC III TROUBLESHOOTING (CONT).

Section I. HOW TO USE THIS PARAGRAPH

1. Section II (Basic Knowledge Required) and Section III (Testing the DDEC III System) should be read and understood completely.

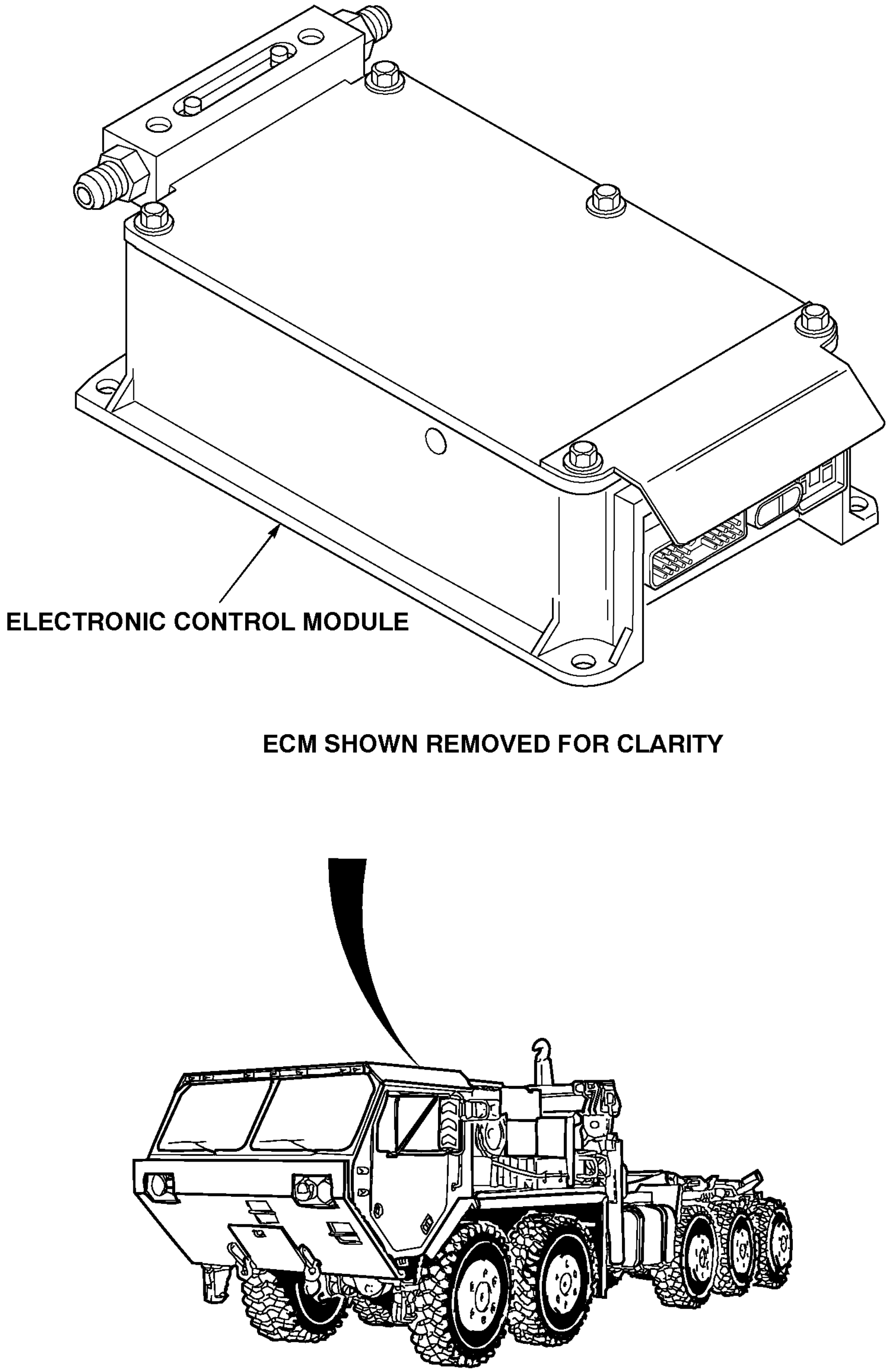
2. **If basic mechanical checks have been made, no trouble was found,** and the problem is now believed to be in the DDEC III System, turn to Section IV (Troubleshooting Charts). Always start with the first Chart (labeled START) on page 2-539. If a Diagnostic Data Reader (DDR) is not available, the chart labeled CEL (Check Engine Light) on page 2-549 can be used.

3. Use the charts to pinpoint the problem and perform repairs. The charts are in a three-column format. The first column lists the test steps to perform and in what sequence to perform them. The second column gives the list of possible results you may obtain, based on the steps performed. The third column indicates what to do next, based on your results.

EXAMPLE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C2-9 Check ECM Connectors		
• Turn ignition off. • Disconnect all connectors at the ECM. • Check terminals at all ECM connectors (both the ECM and harness side) for damage, corrosion, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM. Then go to C 2–30.
	Problem found. →	Repair terminals/connectors. Then go to C 2–30.

4. The charts will always instruct you to clear the codes after all repair work is done, and confirm the repair (typically by running the engine and checking if the codes and/or symptoms have returned).


ELECTRONIC CONTROL MODULE
ECM SHOWN REMOVED FOR CLARITY

2-14. DDEC III TROUBLESHOOTING (CONT).

Section II. BASIC KNOWLEDGE REQUIRED

Before using this manual, there are some areas that you should be familiar. With this basic knowledge, you will have success using the diagnostic charts.

A. ELECTRICAL CIRCUITS

- You should understand the theory of electricity and know the meaning of voltage and ohms. You should understand what happens in a circuit with an open or shorted wire. You should be able to read and understand a wiring diagram.
- You should be able to use jumper wires to make circuit checks.

B. USE OF DIGITAL VOLT-OHM METER

- You should be familiar with the digital volt-ohm meter. You should be able to measure voltage and resistance. You should be familiar with the controls of the meter and how to use it correctly.

Instructions for use of a typical digital volt-ohm meter are as follows:

Resistance Measurements

1. Connect the red test lead to the V-Ω (Volt-Ohm) input connector and the black lead to the com input connector on the meter.
2. Set the function/range switch to the desired Ω position. If the magnitude of the resistance is not known, set the switch to the highest range, then reduce until a satisfactory reading is obtained.
3. If the resistance being measured is connected to a circuit, turn off the power to the circuit being tested (turn off ignition).
4. Connect the test leads to the circuit being measured. When measuring high resistance, be careful not to contact adjacent points, even if they are insulated. Some insulators have a relatively low insulation resistance which can affect the resulting measurement.
5. Read the resistance value on the digital display.

Continuity Checks

In addition to measuring the specific resistance value of a circuit, some meters will also tell if a continuous electrical path exists. If a path exists, the circuit is said to have “continuity.” (This continuity check can be used in any section of the DDEC III Troubleshooting Guide where the test is looking for greater than, less than, or equal to 5 ohms.) An open circuit (broken electrical path) would have ∞ resistance and would not have continuity. To utilize this continuity feature of certain meters:

1. Place the function/range switch in any Ω range.
2. Connect the red lead to the V-Ω connector and the black lead to the com connector on the meter. With the test leads separated or measuring an out-of-range resistance, the digital display will indicate “OL” (overlimit; some meters show “1 +”, “↑”, or simply “1”).

Section II. BASIC KNOWLEDGE REQUIRED (Cont.)

3. Put one test probe at one end of the wire or circuit to be tested. Use the other test lead to trace the circuit. When continuity is established, an Ω symbol will appear in the upper left corner of the digital display. If contact in the wire is maintained long enough (about 1/4 of a second), the OL will disappear and the resistance value of the wire or circuit will appear next to the symbol.

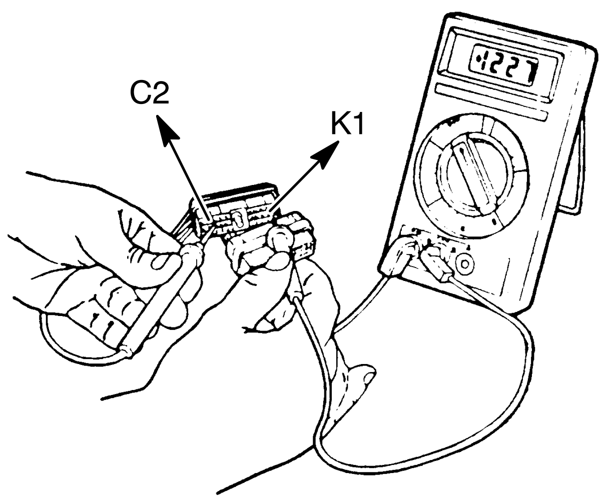
4. If your VOM does not work in the manner described above, you must know how your VOM operates in order to use this troubleshooting guide.

Voltage Measurements

1. Connect the red test lead to the V-Ω input connector and the black lead to the com input on the meter. If a DC-AC switch is present, make sure it is switched to the DC position.

2. Set the function range switch to the desired volts position. If the magnitude of the voltage is not known, set the switch to a range which will be able to read most voltages seen on a vehicle. (Typical, a 20V range will do.) Then reduce the range until a satisfactory reading is obtained.

3. Connect the test leads to the circuit being measured. In the DDEC III diagnostic procedures, voltage measurements are always given as being taken at pins, sockets, Battery +, or ground. Following the voltage measurement point, the color test lead to be used is given in parenthesis (red is the V-Ω connection, an black is the com connection). Example: If the procedure says, “Take voltage reading at socket C2 (red lead) to socket K1 (black lead)”, the hook-up would be as follows:



C. IMPORTANT INFORMATION

The following items must be read and thoroughly understood before using this manual.

1. The engine and ignition should always be off before the harness connectors are disconnected or reconnected.

2. When disconnecting harness connectors, be sure that the pulling force is applied to the connectors themselves and not the wires extending from them. Procedures for disconnecting ECM connectors are found in para 7-57.

3. After harness connectors are reconnected to the DDEC III system, the codes logged should be ignored and cleared.

4. In most all areas of Repair/Troubleshooting, a diagnostic data reader will be required.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section II. BASIC KNOWLEDGE REQUIRED (Cont.)

D. EXPLANATION OF ABBREVIATIONS/TERMS

A/D – Analog to Digital: The computer inside the ECM uses an A/D converter to convert a sensor voltage into a number which the computer can work with.

BAT – Battery

BOI – Beginning of Injection: The number of crank angle degrees, Before Top Dead Center, where the ECM is requesting the injectors be turned on.

CAN Controller Area Network: J1939 High speed control data link.

CEL – Check Engine Light: Typically mounted on the instrument panel. It has two functions:

1. It is used as a warning lamp to tell the operator of the vehicle that a fault has occurred and the unit should be taken in for service as soon as possible.
2. It is used by the operator or technician to “flash” out inactive trouble codes to help diagnose a problem.

As a light bulb check and system check, the check engine light will come on for about 5 seconds when the ignition is turned on. If the CEL remains on, or comes back on, the self diagnostic system has detected a problem. If the problem goes away, the light will go out, but a trouble code will be stored in the ECM as an inactive code. (general diagnostic information, section II, E for details.)

CGL – Check Gauges Light: Typically mounted on the instrument panel. It has two functions:

1. It is used as a warning to the operator that a potential engine damaging condition has been detected.
2. It is used by the operator or technician to “flash” out active trouble codes.

As a light bulb check and system check, the “Check Gauges” light will come on for about 5 seconds when the ignition is turned on.

CKT – Circuit

CP – Crankshaft Position: An ECM output generated anytime an SRS signal occurs.

COM – Common

CTS – Coolant Temperature Sensor: Monitors coolant temperature.

DDEC II – Second generation Detroit Diesel Electronic Controls.

DDEC III – Third generation Detroit Diesel Electronic Controls.

DDL – Diagnostic Data Link: The lines (wires) over which the ECM transmits information which can be read by a Diagnostic Data Reader.

DDL+ – Data Link, Positive side: J1587 data link.

DDL– – Data Link, Negative side: J1587 data link.

Section II. BASIC KNOWLEDGE REQUIRED (Cont.)

DDR – Diagnostic Data Reader: The hand held tool used for troubleshooting the DDEC system. MPSI PRO-LINK 9000.

ECM – Engine Control Module: The controller of the DDEC III system. It reads the engine and vehicle inputs, sensors and switches, calculates injector firing time and duration, and fires injectors at appropriate times.

EERPOM – Electrically Erasable Programmable Read Only Memory

PWM – Pulsewidth Modulated: Modulated signal provided by the DDEC system.

EFPA – Electronic Foot Pedal Assembly: Contains the Throttle Position Sensor.

EUI – Electronic Unit Injector

FTS – Fuel Temperature Sensor: Monitors fuel temperature.

GND – Ground

INJ – Injector (fuel)

LSG – Limiting Speed Governor

N/A – Not Applicable

OPS – Oil Pressure Sensor: Monitors oil pressure.

OTS – Oil Temperature Sensor: Monitors oil temperature.

PW – Pulsewidth

SRS – Synchronous Reference Sensor: Detects when the first cylinder in the firing order is about to be fired.

TBS – Turbocharged Boost Sensor: Monitors Turbo boost.

TBD – To be determined.

TD – Tachometer Driver: An output from the ECM for electronic tachometers and/or data loggers.

TPS – Throttle Position Sensor: Used to detect throttle request (a component of the EFPA). Also referred to as LSG.

TRS – Timing Reference Sensor: Used to detect whenever any cylinder is about to be fired.

VIN – Vehicle Identification Number

VSG – Variable Speed Governor.

VSS – Vehicle Speed Sensor: Used to detect vehicle speed.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section II. BASIC KNOWLEDGE REQUIRED (Cont.)

E. GENERAL DIAGNOSTIC INFORMATION

As a bulb and system check, the “Check Engine” and “Check Gauges” lights will come on for 5 seconds when the ignition switch is first turned on.

If the “Check Engine” light comes on during vehicle operation, this indicates the self diagnostic system has detected a fault.

When the diagnostic request switch is held, the diagnostic system will flash the orange lights located on the vehicle’s dash. The light will be flashing the code(s) indicating the problem area(s). If the “Check Gauges” light comes on during vehicle operation, this indicates the DDEC System has detected a potential engine damaging condition. The engine should be shutdown immediately and have the engine checked for the problem.

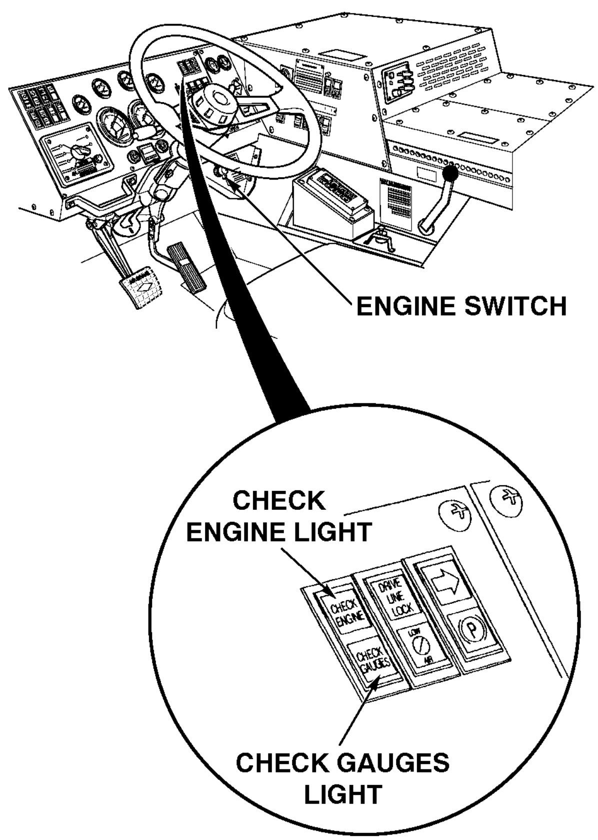
*Active codes will be flashed on the “Check Gauges” light in order from most recent to least recent occurrence based on engine hours. If there are no active codes, a code 25 will be flashed.

*Inactive codes will be flashed on the “Check Engine” light in order from most recent to least recent occurrence based on engine hours. If there are no inactive codes, a code 25 will be flashed.

* FLASHING CODES SHOULD BE DONE WITH THE ENGINE NOT RUNNING AND IGNITION ON. *

A diagnostic code indicates a problem in a given circuit (i.e., diagnostic Code 14 indicates a problem in the oil or coolant temperature sensor circuit. This includes the oil or coolant temperature sensor, connector, harness, and Electronic Control Module (ECM). The procedure for finding the problem can be found in Diagnosis Chart Code 14. Similar charts are provided for each code. Remember, diagnosis should always begin at the starting chart (START). For an oil or coolant temperature sensor problem, it will quickly lead you to Chart 14 – but first it gets you to verify the code/symptom.

Since the self-diagnostics do not detect all possible faults, the absence of a code does not mean there are not problems in the system. If a DDEC III problem is suspected, even in the absence of a code, go to START anyway. This chart can lead you to other charts which can aid in the troubleshooting process – where DDEC III problems may occur but do not generate a code. **Basic mechanical checks, however, are not covered in this guide, refer to Chapter 2, Vehicle Troubleshooting**.



Section III. TESTING THE DDEC III SYSTEM

A. TOOLS NEEDED TO DIAGNOSE THE SYSTEM

The following tools and equipment are required to properly diagnose a complete system:

- MPSI – PRO-LINK Diagnostic Data Reader (DDR) – J38500-750 (cartridge only).
- Voltmeter and Ohmmeter: Use a digital volt-ohmmeter J-34029 or equivalent to measure voltage and resistance where required. A digital volt-ohmmeter must be used when specified in a procedure.
- Test Light 6V: Must be used when specified in the procedure.
- Jumper Wires: To bypass a circuit and to insert between special connectors. This will permit access to the connector terminals for circuit checking.
- TRS/SRS Alignment Tool: J-39815.
- .020” Feeler Gauge
- Crankshaft Position Timing Tool: J34930-A

B. DIFFERENCES BETWEEN DDEC III AND DDEC II

To those thoroughly familiar with DDEC II, an outline is given of the differences in DDEC III. From an installation and testing viewpoint, these differences are:

- DDEC fault codes are still able to be “flashed”, but with DDEC III, a diagnostic request switch has been installed. There are no longer provisions to use a jumper wire. The DDC assigned fault codes no longer appear on the “MPSI” diagnostic data reader.
- **When using the MPSI DDR, the diagnostic codes are now displayed in a SAE J1587 format. The SAE have developed a standardized list of Parameter Identification Descriptions (PID), and a System Identification Description (SID). These PIDs and SID will define the area where the fault has occurred. Following the PID or SID will be a Failure Mode Identifier (FMI). The diagnostic codes (both DDEC and SAE) and their description can be found in Section IV of this Troubleshooting Guide.**
- Fault codes are now referred to as active and inactive.
- DDEC III requires injector calibrations to be entered into the EEPROM with the DDR. DDEC III uses this information to provide proper cylinder balancing. Injector information must be programmed whenever an injector is replaced, or changed for different cylinder location.
- DDEC III engines are equipped with a 36 tooth pulse wheel, instead of DDEC II’s 13 tooth pulse wheel.
- Added information now appears for some fault codes. This data includes: the hour the code is first logged, last logged, number of occurrences, number of overrides (if applicable), and the value that caused the fault to be logged (if applicable). Refer to code 85 page 2-759 for details.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section III. TESTING THE DDEC III SYSTEM (Cont.)

C. READING THE DIAGNOSTIC CODES

NOTE: If you have turned here to begin diagnosis of a problem and already know how to read codes, as well as understand active and inactive codes, turn to the first chart (labeled START) on page 2-539.

1. Active vs. Inactive Codes:

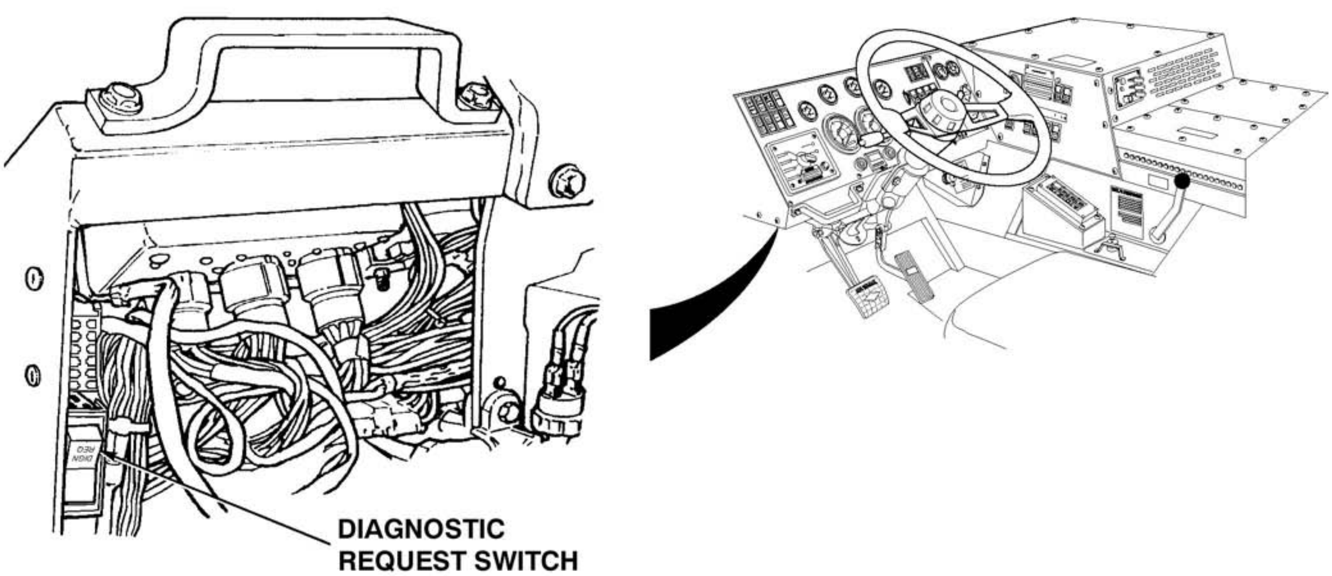
   DDEC III makes use of both types of codes. As their names imply, the difference between the two are as follows:

   a. Active Codes – These are the codes which are currently keeping the “Check Engine or Check Gauges” light on. Active codes are flashed via the Check Gauges Light.
   b. Inactive Codes – These are all the codes logged in the ECM (whether or not they are currently turning on the “Check Gauges or Check Engine” light). These codes can be cleared by using the Diagnostic Data Reader. Inactive codes are flashed via the Check Engine Light.

2. Using the Diagnostic Request Switch – Flash Method

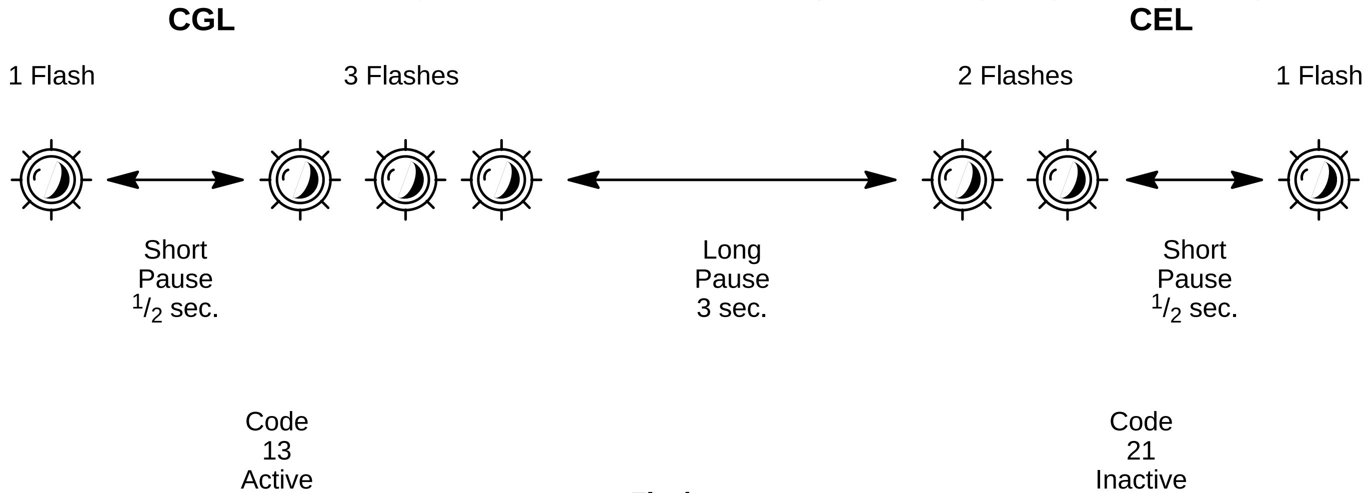
   This Troubleshooting Guide is intended to be used with a Diagnostic Data Reader (DDR). In most instances, only the DDR can provide the information necessary for a quick diagnosis of the problem. Should you just need to read out codes, however, and not have a DDR available, the following procedure will let you read out codes on the CEL and CGL:

   a. Turn ignition on.
   b. Depress and hold the diagnostic request switch.



Section III. TESTING THE DDEC III SYSTEM (Cont.)

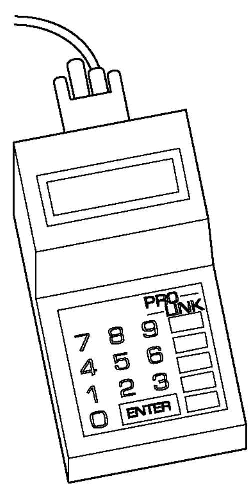
c. Observe the codes flashing out on the CEL and CGL. Example: Code 13 (active) and 21 (inactive) below.



Flashers

This will continue as long as the diagnostic request switch is held with the ignition on.

3. Using the Diagnostic Data Reader (DDR) or PRO-LINK 9000.



Pro-Link 9000

Proper use of this reader is described in the instruction manual supplied. This device is infinitely more useful in reading fault codes and diagnosing engine electronic faults than the flash code process. Section V of this paragraph provides the information obtainable with the reader.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section III. TESTING THE DDEC III SYSTEM (Cont.)

D. CLEARING CODES

This can only be done using the Diagnostic Data Reader (DDR). Refer to DDR Instruction Manual for details.

Note that removing the battery cables will not clear codes.

E. CONNECTOR CHECKOUT

All system connections are environmentally protected. These connectors protect the terminations from the harsh corrosive engine compartment environment. This is important since most system signals are low voltage and corrosion could make them inoperative.

Before repairing or replacing any system component (i.e., harness, sensor, ECM, etc.) as indicated by the diagnostic charts, you should:

1. Disconnect the appropriate connector(s) associated with the suspected defective component and check for bent, broken, or dirty terminals or mating tabs. Clean, straighten, or replace as required.

2. If a problem was found, reconnect all connectors previously disconnected. Then recheck the system to see if the problem has been corrected.

NOTE: Don't probe the back of a connector or pierce the DDEC III wiring for purposes of taking measurement. This can cause intermittent faults or system failures and may affect the engine warranty.

F. DIGITAL INPUT/OUTPUT FUNCTIONS

DIGITAL OUTPUTS

DDEC III provides three discrete output pins on the vehicle harness which may be customized to the customer application. These outputs provide a ground (less than 0.8 volts with respect to DDEC ground) capable of sinking up to 1 ampere of DC current when the output is active.

The function may be selected by its "function number" found in the list below. No function should be assigned to more than one pin (except FUNCTION #0 – No Function).

Examples:

1. Pin J3 of the ECM's 30-pin vehicle harness connector has a transmission signal assigned to it. This function causes the DDEC ECM to provide a signal to the ATEC ECM. This provides a signal that corresponds with the Throttle Position Sensor. ATEC modulates shift point based on this position.

2. Pin A1 of the ECM's 30-pin vehicle harness connector has the engine brake function assigned to it. This function causes the DDEC ECM to provide a ground to activate the engine brake relay (R7) under those conditions when the engine brakes can be used. This function occurs under no-fuel conditions (TPS value = 0%) and when the engine speed is greater than 1000 RPM. Relay R8 is assigned to ATEC which is included in the engine brake operation.

3. Pin K1 of the ECM's 30-pin vehicle harness connector has the engine speed function assigned to it. This function causes the DDEC ECM to provide a digital output signal of the engine RPM to the tachometer.

Section IV. TROUBLESHOOTING CHARTS

A. THE DIAGNOSTIC PROCEDURE - WHERE TO START

When diagnosing the cause for engine performance, fuel economy or exhaust system complaints, perform Vehicle Troubleshooting (Chapter 2) before considering DDEC as the possible source of the problem.

When diagnosing the system, always start with the first chart (labeled "START") on page 2-539. This will ultimately lead to other diagnostic charts, even in the cases where no fault codes were logged but a symptom(s) was noted. In fact, if no faults were recorded (but a symptom remains), the "START" chart will refer you to "Diagnosis by Symptom", Chart 1, on page 2-554, which can identify fault trees to use based on the customer complaint.

NOTE: Although there are many charts connected with diagnostics, only one is needed to determine that the system is operating properly. Normally, only two charts are necessary to find a problem.

B. DDEC III DIAGNOSTIC CODES/WHAT THEY MEAN

The following pages give a brief description of each diagnostic code. Basic facts about these codes are given below:

- Most problems must occur for a total of at least two (2) seconds before the "Check Engine" light comes on and a code is stored.
- If a problem goes away, the "Check Engine" light will turn off. But the code will remain stored in the ECM.
- Code 25 means no codes were stored at all.

FLASH CODE: 11
DDR DISPLAY: PTO SENSOR (VERNIER CONTROL) INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 187 FMI: 4

Indicates that the vernier control input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:
(1) open sensor signal circuit
(2) open sensor +5 volt supply circuit
(3) sensor signal is shorted to the sensor return circuit or to ground
(4) sensor +5 volt supply is shorted to sensor return circuit or to ground

FLASH CODE: 12
DDR DISPLAY: PTO SENSOR (VERNIER CONTROL) INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 187 FMI: 3

Indicates that the vernier control input to the ECM has exceeded 95% (normally > 4.75 volts) of the sensor supply voltage. This diagnostic condition is typically:
(1) open sensor return circuit
(2) sensor signal circuit is shorted to the sensor +5 volt supply

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 14
DDR DISPLAY: COOLANT TEMP SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 110 FMI: 3

Indicates that the engine Coolant Temperature Sensor (CTS) input to the ECM has exceeded 95% (normally 4.75 volts) of the sensor supply voltage. NOTE: This code will only be logged during warm engine operation. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor return circuit
(3) sensor signal circuit is shorted to the sensor +5 volt supply

FLASH CODE: 14
DDR DISPLAY: OIL TEMP SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 175 FMI: 3

Indicates that the engine Oil Temperature Sensor (OTS) input to the ECM has exceeded 95% (normally > 4.75 volts) of the sensor supply voltage. NOTE: This code will only be logged during warm engine operation. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor return circuit
(3) sensor signal circuit is shorted to the sensor +5 volt supply

FLASH CODE: 15
DDR DISPLAY: COOLANT TEMP SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 110 FMI: 4

Indicates that the engine Coolant Temperature Sensor (CTS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) sensor signal circuit is shorted to sensor return or to ground
(2) sensor +5 volt supply is shorted to sensor return circuit or to ground

FLASH CODE: 15
DDR DISPLAY: OIL TEMP SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 175 FMI: 4

Indicates that the engine Oil Temperature Sensor (OTS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) sensor signal circuit is shorted to sensor return or to ground
(2) sensor +5 volt supply is shorted to sensor return circuit or to ground

FLASH CODE: 21
DDR DISPLAY: THROTTLE SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 91 FMI: 3

Indicates that the Throttle Position Sensor (TPS) input to the ECM has exceeded 95% (normally > 4.75 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor return circuit
(2) sensor signal circuit is shorted to the sensor +5 volt supply

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 22
DDR DISPLAY: THROTTLE SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 91 FMI: 4

Indicates that the Throttle Position Sensor (TPS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor +5 volt supply circuit
(3) sensor signal is shorted to sensor return circuit or to ground
(4) sensor +5 volt supply is shorted to the sensor return circuit or ground

FLASH CODE: 23
DDR DISPLAY: FUEL TEMP SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 174 FMI: 3

Indicates that the engine Fuel Temperature Sensor (FTS) input to the ECM has exceeded 95% (normally > 4.75 volts) of the sensor supply voltage. NOTE: This code will only be logged during warm engine operation. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor return circuit
(3) sensor signal circuit is shorted to the sensor +5 volt supply

FLASH CODE: 24
DDR DISPLAY: FUEL TEMP SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 174 FMI: 4

Indicates that the engine Fuel Temperature Sensor (FTS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) sensor signal circuit is shorted to sensor return or to ground
(2) sensor +5 volt supply is shorted to sensor return circuit or to ground

FLASH CODE: 32
DDR DISPLAY: CHECK GAUGES LIGHT SHORT TO BATTERY (+)
SAE J1587 CODE: SID: 238 FMI: 3

Indicates that the Check Gauges Light (CGL) circuit is shorted to battery (+). This diagnostic condition is detected when the DDEC III ECM is unsuccessful in turning **ON** the stop engine light. This diagnostic code is typically:

(1) failed short CGL light bulb
(2) CGL wire in vehicle harness is shorted to battery (+)

NOTE: The DDEC III ECM supplies a switched ground to the stop engine light circuit to turn **ON** the light.

FLASH CODE: 32
DDR DISPLAY: CHECK GAUGES LIGHT OPEN CIRCUIT
SAE J1587 CODE: SID: 238 FMI: 4

Indicates that the Check Gauges Light (CGL) circuit is open or shorted to ground. This diagnostic condition is detected when the stop engine light is **OFF** and the DDEC III ECM measures a low voltage on the stop engine light circuit output. This diagnostic code is typically:

(1) failed open CGL light bulb
(2) CGL wire in vehicle harness is open or shorted to ground

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 32
DDR DISPLAY: CHECK ENGINE LIGHT SHORT TO BATTERY (+)
SAE J1587 CODE: SID: 239 FMI: 3

Indicates that the Check Engine Light (CEL) circuit is shorted to battery (+). This diagnostic condition is detected when the DDEC III ECM is unsuccessful in turning **ON** the stop engine light. This diagnostic code is typically:

(1) Failed short CEL light bulb
(2) CEL wire in vehicle harness is shorted to battery (+)

NOTE: The DDEC III ECM supplies a switched ground to the check engine light circuit to turn **ON** the light.

FLASH CODE: 32
DDR DISPLAY: CHECK ENGINE LIGHT OPEN CIRCUIT
SAE J1587 CODE: SID: 239 FMI: 4

Indicates that the Check Engine Light (CEL) circuit is open or shorted to ground. This diagnostic condition is detected when the check engine light is **OFF** and the DDEC III ECM measures a low voltage on the check engine light circuit output. This diagnostic code is typically:

(1) failed open CEL light bulb
(2) CEL wire in vehicle is open or shorted to ground

FLASH CODE: 33
DDR DISPLAY: TURBO BOOST SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 102 FMI: 3

Indicates that the engine Turbo Boost Sensor (TBS) input to the ECM has exceeded 85% (normally > 4.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor return circuit
(2) sensor signal circuit is shorted to the sensor +5 volt supply

FLASH CODE: 34
DDR DISPLAY: TURBO BOOST SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 102 FMI: 4

Indicates that the engine Turbo Boost Sensor (TBS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor +5 volt supply circuit
(3) sensor signal is shorted to the sensor return circuit or to ground
(4) sensor +5 volt supply is shorted to sensor return circuit

FLASH CODE: 35
DDR DISPLAY: OIL PRESSURE SENSOR INPUT VOLTAGE HIGH
SAE J1587 CODE: PID: 100 FMI: 3

Indicates that the engine Oil Pressure Sensor (OPS) input to the ECM has exceeded 95% (normally > 4.75 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor return circuit
(2) sensor signal circuit is shorted to the sensor +5 volt supply

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 36
DDR DISPLAY: OIL PRESSURE SENSOR INPUT VOLTAGE LOW
SAE J1587 CODE: PID: 100 FMI: 4

Indicates that the engine Oil Pressure Sensor (OPS) input to the ECM has dropped below 5% (normally < 0.25 volts) of the sensor supply voltage. This diagnostic condition is typically:

(1) open sensor signal circuit
(2) open sensor +5 volt supply circuit
(3) sensor signal is shorted to the sensor return circuit or to ground
(4) sensor +5 volt supply is shorted to sensor return circuit

FLASH CODE: 41
DDR DISPLAY: TOO MANY SRS (MISSING TRS)
SAE J1587 CODE: PID: 21 FMI: 0

Indicates that the Synchronous Reference Sensor (SRS) has detected extra pulses, or the Timing Reference Sensor (TRS) has detected missing pulses.

FLASH CODE: 42
DDR DISPLAY: TOO FEW SRS (MISSING SRS)
SAE J1587 CODE: PID: 21 FMI: 1

Indicates that the Synchronous Reference Sensor (SRS) has detected missing pulses, or the Timing Reference Sensor (TRS) has detected extra pulses.

FLASH CODE: 44
DDR DISPLAY: COOLANT TEMPERATURE HIGH
SAE J1587 CODE: PID: 110 FMI: 0

Indicates that the Coolant Temperature Sensor (CTS) has detected that the engine coolant temperature has exceeded the recommended safe operating range.

FLASH CODE: 44
DDR DISPLAY: OIL TEMPERATURE HIGH
SAE J1587 CODE: PID: 175 FMI: 0

Indicates that the Oil Temperature Sensor (OTS) has detected that the engine oil temperature has exceeded the recommended safe operating range.

FLASH CODE: 45
DDR DISPLAY: OIL PRESSURE LOW
SAE J1587 CODE: PID: 100 FMI: 1

Indicates that the Oil Pressure Sensor (OPS) has detected that the engine oil pressure has dropped below the recommended safe operating range.

FLASH CODE: 46
DDR DISPLAY: ECM BATTERY VOLTAGE LOW
SAE J1587 CODE: PID: 168 FMI: 1

Indicates that the DDEC III ECM has detected that the main battery supply voltage to the ECM has dropped below the recommended operating range.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 52
DDR DISPLAY: ECM A/D CONVERSION FAILURE
SAE J1587 CODE: SID: 254 FMI: 12

Indicates that the DDEC III ECMs internal Analog to Digital (A/D) Convertor device has malfunctioned. Intermittent diagnostic conditions of this type can be caused by faulty external electrical system.

FLASH CODE: 53
DDR DISPLAY: NONVOLATILE MEMORY DATA INCORRECT
SAE J1587 CODE: SID: 253 FMI: 2

Indicates that the ECM upon startup has been unable to read a valid copy of a engine data record (calibration, faults, or accumulators) stored in nonvolatile memory.

FLASH CODE: 53
DDR DISPLAY: NONVOLATILE MEMORY FAILURE
SAE J1587 CODE: SID: 253 FMI: 12

Indicates that the ECM was unable to update an engine data record (calibration, faults, or accumulators) stored in nonvolatile memory.

FLASH CODE: 56
DDR DISPLAY: J1587 DATA LINK FAILURE
SAE J1587 CODE: SID: 250 FMI: 12

Indicates that the J1587 (diagnostic) data link is no longer allowing the ECM to transmit data. This diagnostic condition is typically:

(1) either or both of the data link circuits are open at some point in the network
(2) either or both of the data link circuits are shorted to ground at some point in the network
(3) either or both of the data link circuits are shorted to battery (+) at some point in the network
(4) the pair of data link circuits are shorted together

FLASH CODE: 61
DDR DISPLAY: *XXX* INJECTOR RESPONSE TIME LONG
SAE J1587 CODE: SID: *XX* FMI: 0

Indicates that the time it takes from when the DDEC III ECM requests an injector be turned on to when the injector solenoid valve actually closes is longer than the high limit of the expected range. This diagnostic condition is typically:

(1) bad injector harness/connection (high resistance)
(2) blown fuses in the ECM battery (+) voltage supply harness
(3) sticky solenoid valve

NOTE: The injector diagnostic SID (Subsystem Identifier) indicates which cylinder number has an injector with a long response time. The injector number describes the cylinder and/or bank which has the injector with a long response time.

Injector response times generally increase with low battery supply voltage and decrease with high battery supply voltage. Although injector response times vary from injector to injector at a given RPM, each individual injector response time should remain relatively consistent from one firing to the next. Wide variations in response time (typically +/– 0.2 msec) for one injector at a steady engine RPM may indicate an electrical problem (faulty alternator or voltage regulator, poor or broken ground cables, etc.).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 62
DDR DISPLAY: (*AUXILIARY OUTPUT #1*) SHORT TO BATTERY (+)
SAE J1587 CODE: SID: 026 FMI: 3

Indicates that the function (engine brake) assigned to the Auxiliary Output #1 circuit output is shorted to battery (+). This diagnostic condition is detected when the DDEC III ECM is unsuccessful in turning **ON** the configurable function.

NOTE: The DDR will display the parameter text description in TABLE 2-22 (ECM Output Options) to identify the function assigned to AUXILIARY OUTPUT #1.

The DDEC III ECM supplies a switched ground to the AUXILIARY OUTPUT #1 circuit to turn **ON** the function assigned.

FLASH CODE: 62
DDR DISPLAY: (*AUXILIARY OUTPUT #1*) OPEN CIRCUIT
SAE J1587 CODE: SID: 026 FMI: 4

Indicates that the function (engine brake) assigned to the Auxiliary Output #1 circuit output is open or is shorted to ground. This diagnostic condition is detected when the Auxiliary Output #1 function is **OFF** and the DDEC III ECM measures a low voltage on the circuit output.

NOTE: The DDR will display the parameter text description in TABLE 2-22 (ECM Output Options) to identify the function assigned to AUXILIARY OUTPUT #1.

FLASH CODE: 63
DDR DISPLAY: PWM DRIVER #1 SHORT TO BATTERY (+)
SAE J1587 CODE: SID: 057 FMI: 3

Indicates that the PWM DRIVER #1 circuit (transmission modulator) output is shorted to battery (+). This diagnostic condition is detected when the DDEC III ECM is unsuccessful in turning ON the circuit function.

NOTE: The DDEC III ECM supplies a switched ground to the PWM DRIVER #1 circuit to turn **ON** the circuit function.

FLASH CODE: 63
DDR DISPLAY: PWM DRIVER #1 OPEN CIRCUIT
SAE J1587 CODE: SID: 057 FMI: 4

Indicates that the PWM DRIVER #1 circuit (transmission modulator) output is open or is shorted to ground. This diagnostic condition is detected when the PWM Driver #1 function is OFF and the DDEC III ECM measures a low voltage on the circuit output.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: 71
DDR DISPLAY: *XXX* INJECTOR RESPONSE TIME SHORT
SAE J1587 CODE: SID: *XX* FMI: 1

Indicates that the time it takes from when the DDEC III ECM requests an injector be turned on to when the injector solenoid valve actually closes is shorter than the lower limit of the expected range. This diagnostic condition is typically:

(1) aerated fuel system
(2) high system battery (+) supply voltage
(3) failed solenoid valve

NOTE: The injector diagnostic SID (Subsystem IDentifier) indicates which cylinder number has an injector with a short response time. The injector number describes the cylinder and/or bank which has the injector with a short response time.

Injector response times generally increase with low battery supply voltage and decrease with high battery supply voltage. Although injector response times vary from injector to injector at a given RPM, each individual injector response time should remain relatively consistent from one firing to the next. Wide variations in response time (typically +/– 0.2 msec) for one injector at a steady engine RPM may indicate an electrical problem (faulty alternator or voltage regulator, poor or broken ground cables, etc.).

FLASH CODE: 75
DDR DISPLAY: ECM BATTERY VOLTAGE HIGH
SAE J1587 CODE: PID: 168 FMI: 0

Indicates that the DDEC III ECM has detected that the main battery supply voltage to the ECM has exceeded the recommended operating range.

FLASH CODE: 76
DDR DISPLAY: ENGINE OVERSPEED WITH ENGINE BRAKE
SAE J1587 CODE: PID: 121 FMI: 0

Indicates that the engine RPM has exceeded the recommended safe operating range.

FLASH CODE: 85
DDR DISPLAY: ENGINE OVERSPEED
SAE J1587 CODE: PID: 190 FMI: 0

Indicates that the engine RPM has exceeded the recommended safe operating range.

FLASH CODE: —
DDR DISPLAY: FRAM CHECKSUM INCORRECT
SAE J1587 CODE: SID: 240 FMI: 2

Indicates that the ECM system operation software has been corrupted and is unable to operate. This diagnostic condition is typically:
The ECM system programming operation failed to run to completion. Replace ECM (para 7-57).

FLASH CODE: —
DDR DISPLAY: INCOMPATIBLE CALIBRATION VERSION
SAE J1587 CODE: SID: 253 FMI: 13

Indicates that the current ECM system operation software is not compatible with the engine calibration loaded in the ECM. This diagnostic condition is typically:
The ECM programming process was performed in the incorrect order or did not run to completion. Replace ECM (para 7-57).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

FLASH CODE: —
DDR DISPLAY: CALIBRATION CHECKSUM INCORRECT
SAE J1587 CODE: SID: 253 FMI: 2

Indicates that the engine calibration loaded in the ECM has been corrupted and is unable to operate. This diagnostic condition is typically:

The engine calibration programming operation failed to run to completion. Replace ECM (para 7-57).

FLASH CODE: —
DDR DISPLAY: FAILED EXTERNAL RAM
SAE J1587 CODE: SID: 254 FMI: 0

Indicates that some or all of the memory circuitry that is external to the ECM microprocessor has failed and is unable to operate. Replace ECM (para 7-57).

FLASH CODE: —
DDR DISPLAY: FAILED INTERNAL RAM
SAE J1587 CODE: SID: 254 FMI: 1

Indicates that some or all of the memory circuitry that is internal to the ECM microprocessor has failed and is unable to operate. Replace ECM (para 7-57).

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

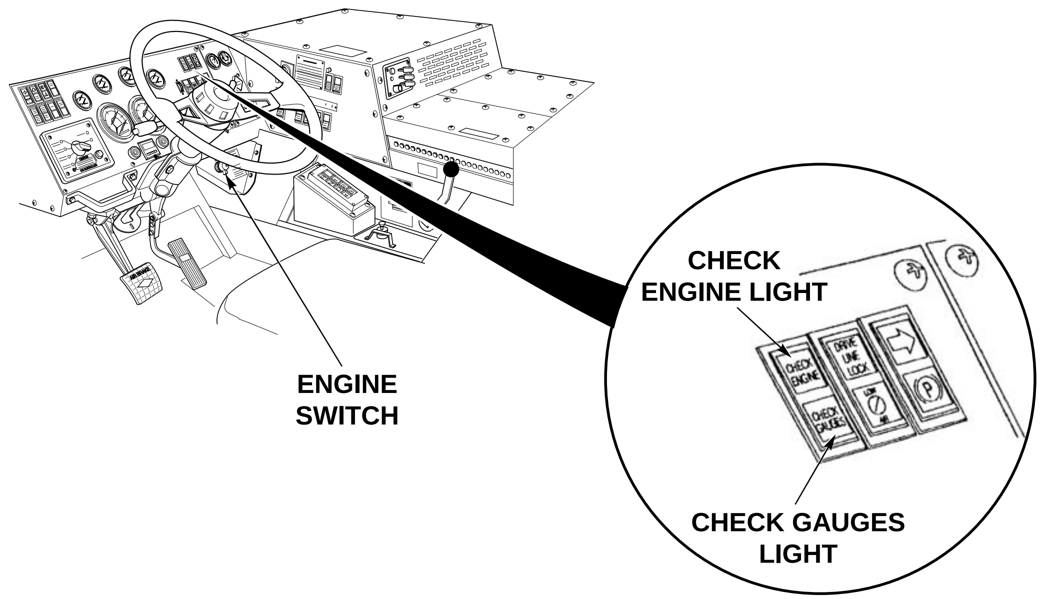
***Table 2-20*. J-1587 To Flash Code Cross Reference**

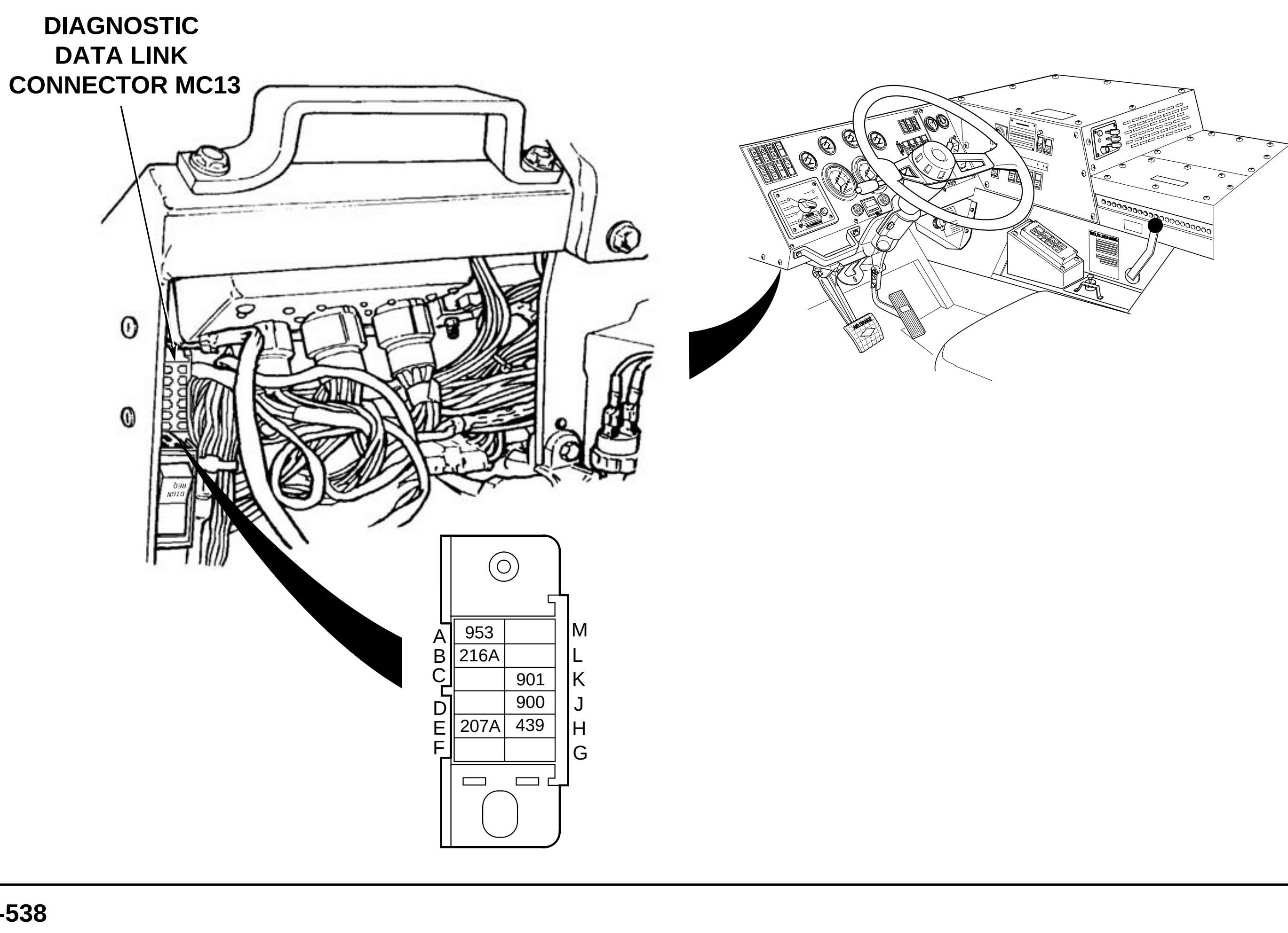
J-1587 CODE (SID - PID/FMI)	DESCRIPTION	FLASH CODE
S001 / 0	INJECTOR RESPONSE LONG #1 CYL	61
S002 / 0	INJECTOR RESPONSE LONG #2 CYL	61
S003 / 0	INJECTOR RESPONSE LONG #3 CYL	61
S004 / 0	INJECTOR RESPONSE LONG #4 CYL	61
S005 / 0	INJECTOR RESPONSE LONG #5 CYL	61
S006 / 0	INJECTOR RESPONSE LONG #6 CYL	61
S007 / 0	INJECTOR RESPONSE LONG #7 CYL	61
S008 / 0	INJECTOR RESPONSE LONG #8 CYL	61
S001 / 1	INJECTOR RESPONSE SHORT #1 CYL	71
S002 / 1	INJECTOR RESPONSE SHORT #2 CYL	71
S003 / 1	INJECTOR RESPONSE SHORT #3 CYL	71
S004 / 1	INJECTOR RESPONSE SHORT #4 CYL	71
S005 / 1	INJECTOR RESPONSE SHORT #5 CYL	71
S006 / 1	INJECTOR RESPONSE SHORT #6 CYL	71
S007 / 1	INJECTOR RESPONSE SHORT #7 CYL	71
S008 / 1	INJECTOR RESPONSE SHORT #8 CYL	71
S021 / 0	TOO MANY SRS (MISSING TRS)	41
S021 / 1	TOO FEW SRS (MISSING SRS)	42
S026 / 3	AUXILIARY OUTPUT #1 SHORT TO BATTERY	62
S026 / 4	AUXILIARY OUTPUT #1 OPEN TO BATTERY	62
S057 / 3	PWM #1 SHORT TO BATTERY	63
S057 / 4	PWM #1 OPEN CIRCUIT	63
P091 / 3	THROTTLE SENSOR CIRCUIT HIGH VOLTAGE	21
P091 / 4	THROTTLE SENSOR CIRCUIT LOW VOLTAGE	22
P100 / 1	OIL PRESSURE LOW	45
P100 / 3	OIL PRESSURE CIRCUIT HIGH VOLTAGE	35
P100 / 4	OIL PRESSURE CIRCUIT LOW VOLTAGE	36
P102 / 3	BOOST PRESSURE CIRCUIT HIGH VOLTAGE	33
P102 / 4	BOOST PRESSURE CIRCUIT LOW VOLTAGE	34
P110 / 0	COOLANT TEMPERATURE HIGH	44
P110 / 3	COOLANT TEMP. CIRCUIT HIGH VOLTAGE	14
P110 / 4	COOLANT TEMP. CIRCUIT LOW VOLTAGE	15
P121 / 0	ENGINE OVERSPEED WITH ENG. BRAKE	76
P168 / 0	BATTERY VOLTAGE HIGH	75

Table 2-20. J-1587 To Flash Code Cross Reference (Cont.)

P168 / 1	BATTERY VOLTAGE LOW	46
P174 / 3	FUEL TEMP. CIRCUIT HIGH VOLTAGE	23
P174 / 4	FUEL TEMP. CIRCUIT LOW VOLTAGE	24
P175 / 0	OIL TEMPERATURE HIGH	44
P175 / 3	OIL TEMP. CIRCUIT HIGH VOLTAGE	14
P175 / 4	OIL TEMP. CIRCUIT LOW VOLTAGE	15
P187 / 3	VERNIER CONTROL (VSG) CIRCUIT HIGH VOLTAGE	12
P187 / 4	VERNIER CONTROL (VSG) CIRCUIT LOW VOLTAGE	11
P190 / 0	ENGINE OVERSPEED	85
S238 / 3	STOP ENGINE LIGHT SHORT TO BATTERY	32
S238 / 4	STOP ENGINE LIGHT OPEN CIRCUIT	32
S239 / 3	CHECK ENGINE LIGHT SHORT TO BATTERY	32
S239 / 4	CHECK ENGINE LIGHT OPEN CIRCUIT	32
S240 / 2	FRAM CHECKSUM INCORRECT	NONE*
S250 / 12	J1587 DATA LINK FAULT	56
S253 / 2	CALIBRATION CHECKSUM INCORRECT	NONE*
S253 / 13	INCOMPATIBLE CALIBRATION VERSION	NONE*
S253 / 12	NONVOLATILE MEMORY FAILURE	53
S254 / 0	FAILED EXTERNAL RAM	NONE*
S254 / 1	FAILED INTERNAL RAM	NONE*
S254 / 12	A/D CONVERSION FAILURE	52

* See Table 2-19 for Troubleshooting Charts.


CHECK
ENGINE LIGHT
ENGINE
SWITCH
CHECK GAUGES
LIGHT

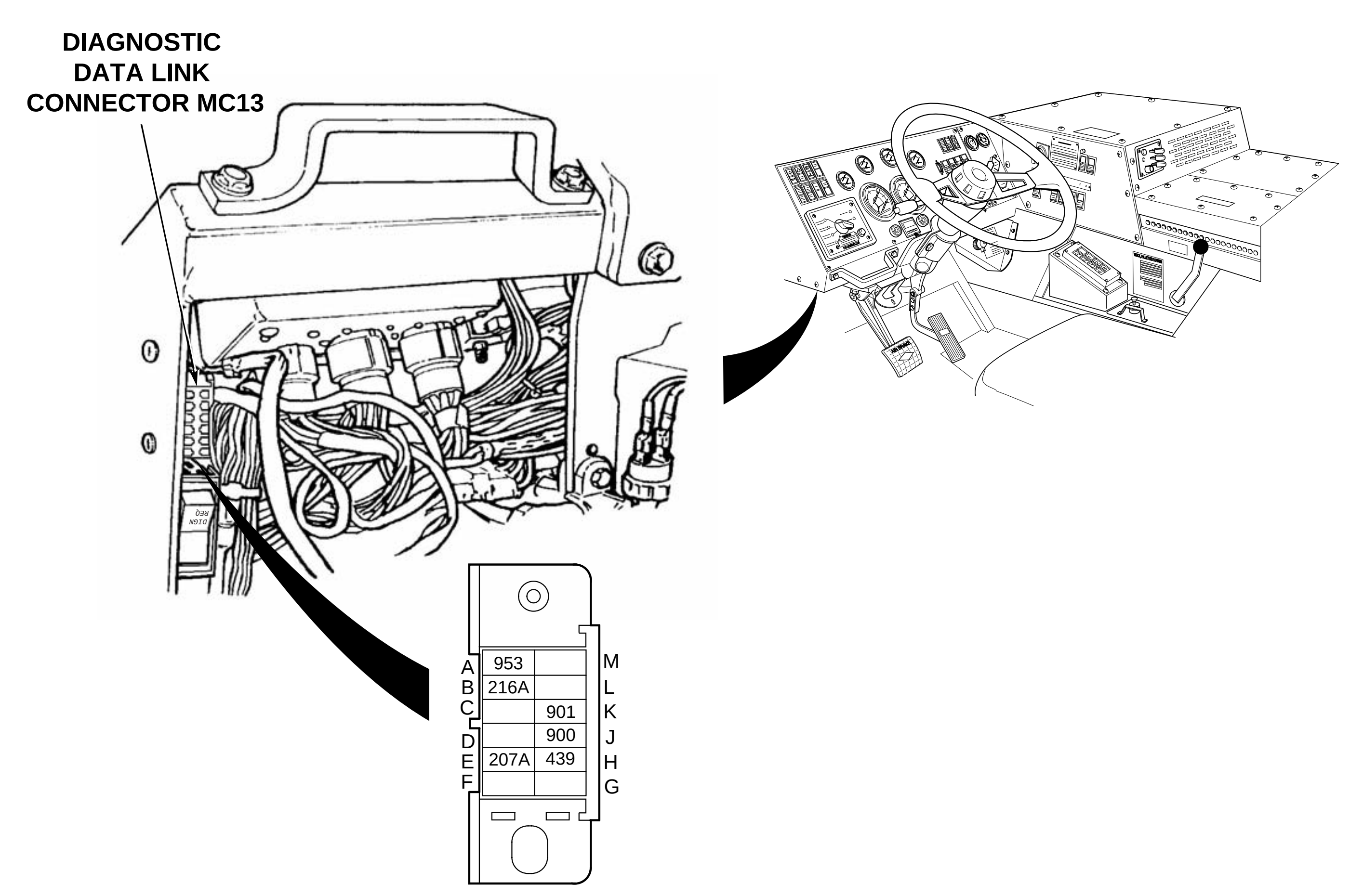

DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A 953
B 216A
C
D
E 207A
F
M
L
K 901
J 900
H 439
G

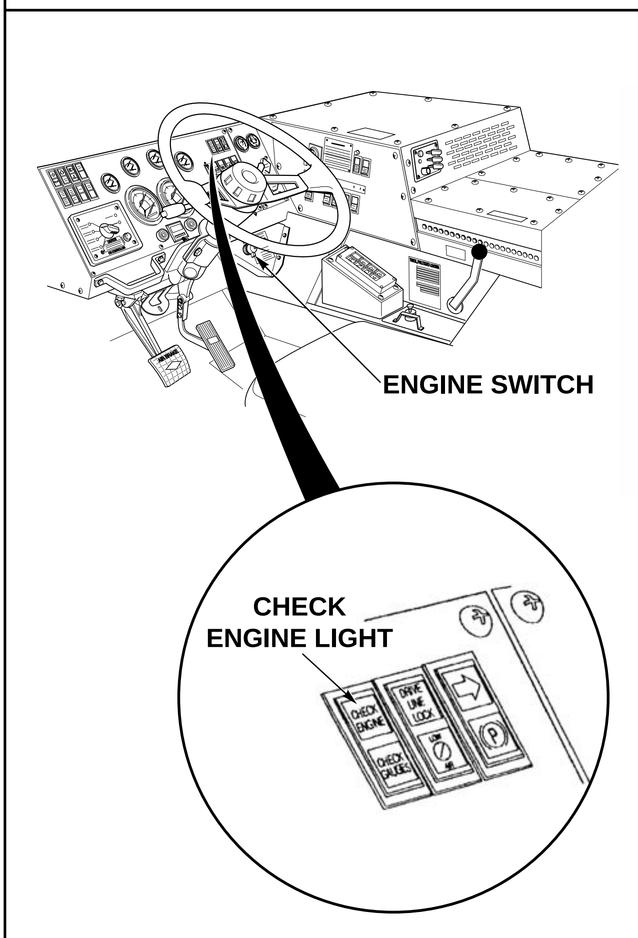
2-14. DDEC III TROUBLESHOOTING (CONT).

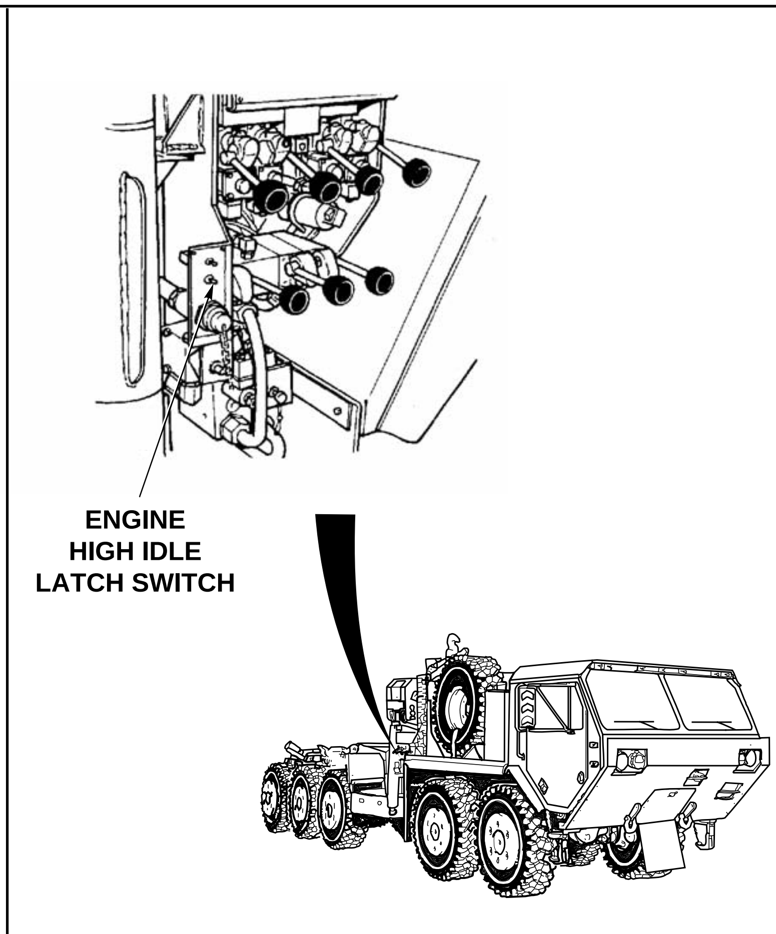
Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. START - FIRST CHART FOR DIAGNOSIS OF DDEC-III USING DDR

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
START-1 Note "Check Engine/Check Gauges" Light		
• Turn ignition on while at the same time observing the "Check Engine/ Check Gauges" lights (engine not running).	Light or lights comes on and stays on.	Go to START-2.
	Lights come on for up to 5 seconds, then goes out.	Go to START-3.
	Lights are off.	Go to Chart 4, page 2-579.
	Erratic or intermittent light.	Go to START-7.
START-2 Read Active Codes Using DDR		
• Plug DDR into the DDL connector. • Read active codes by selecting the DIAGNOSTIC CODE MENU (ACTIVE CODES) on the DDR.	Active codes (other than "NO CODES") on DDR.	Follow appropriate diagnostic charts for code(s) received. (See Table 2-19).
	No active code.	Go to Chart 5, page 2-585.
	DDR display reads "NO DATA RECEIVED FROM SYSTEM" or "DDEC SYSTEM NOT RESPONDING".	Go to START-6.
	DDR display is blank or random.	Go to START-9.


DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A 953 M
B 216A L
C 901 K
D 900 J
E 207A 439 H
F G


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES
LOW AIR

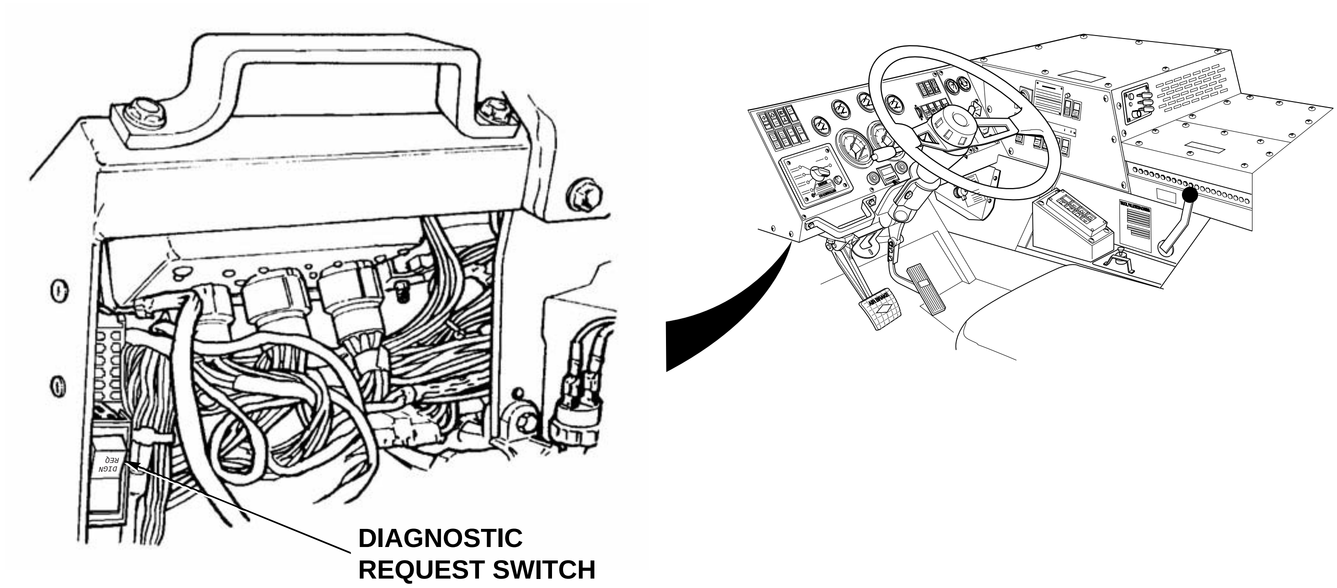

ENGINE
HIGH IDLE
LATCH SWITCH

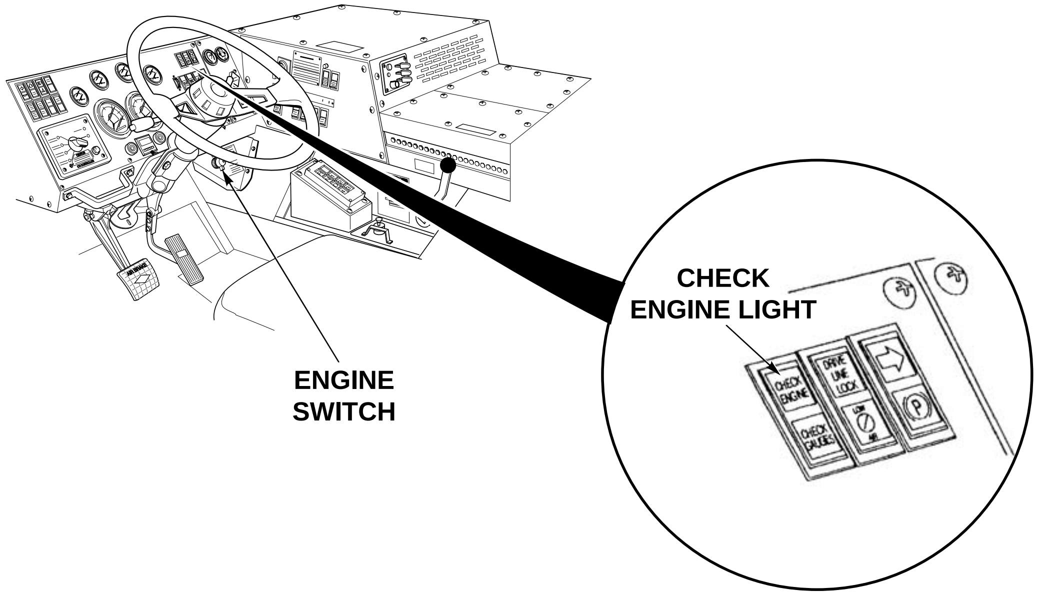
Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. START - FIRST CHART FOR DIAGNOSIS OF DDEC-III USING DDR (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
START-3 Read All Codes Using DDR		
• Plug DDR into DDL connector.	Codes 52, 110, 175/3, 174/3, or 190/0. →	Follow appropriate diagnostic charts for code(s) received. (See Table 2-19).
• Read all inactive codes by selecting inactive codes on DDR.	Any codes except 52, 110, 175/3, 174/3, or 190/0. →	Go to START-4.
	No Codes. →	Go to Chart 1, page 2-554.
	DDR display reads "NO DATA RECEIVED FROM SYSTEM" or "DDEC SYSTEM NOT RESPONDING". →	Go to Chart 7, page 2-593.
	DDR display is blank or random. →	Go to START-9.
START-4 Attempt to Make Codes Active *SEE NOTE BELOW*		
• Clear codes by selecting CLEAR CODES on the DDR. • Attempt to start and run the engine (TM 9-2320-364-10). • Try to get the "Check Engine" light on by: – warming up the engine. – slowly changing the RPM from idle to no load speed. • If truck is equipped with crane, push ENGINE HIGH IDLE LATCH switch to LATCH and release. • Run engine for 1 minute or until "Check Engine" light comes on.	Engine will not start. →	Go to Chart 2, page 2-557.
	"Check Engine" light is on. →	Read active codes on DDR while light is on and follow the appropriate diagnostic chart in Table 2-19.
	"Check Engine" light is off. →	Problem may be intermittent – See Chart 1, page 2-554, Step C 1-2.
	"Check Engine" flashes briefly. →	Go to START-5.

*NOTE: If a potential engine damaging Code (i.e., 100/1) exists, monitor that parameter when running engine.

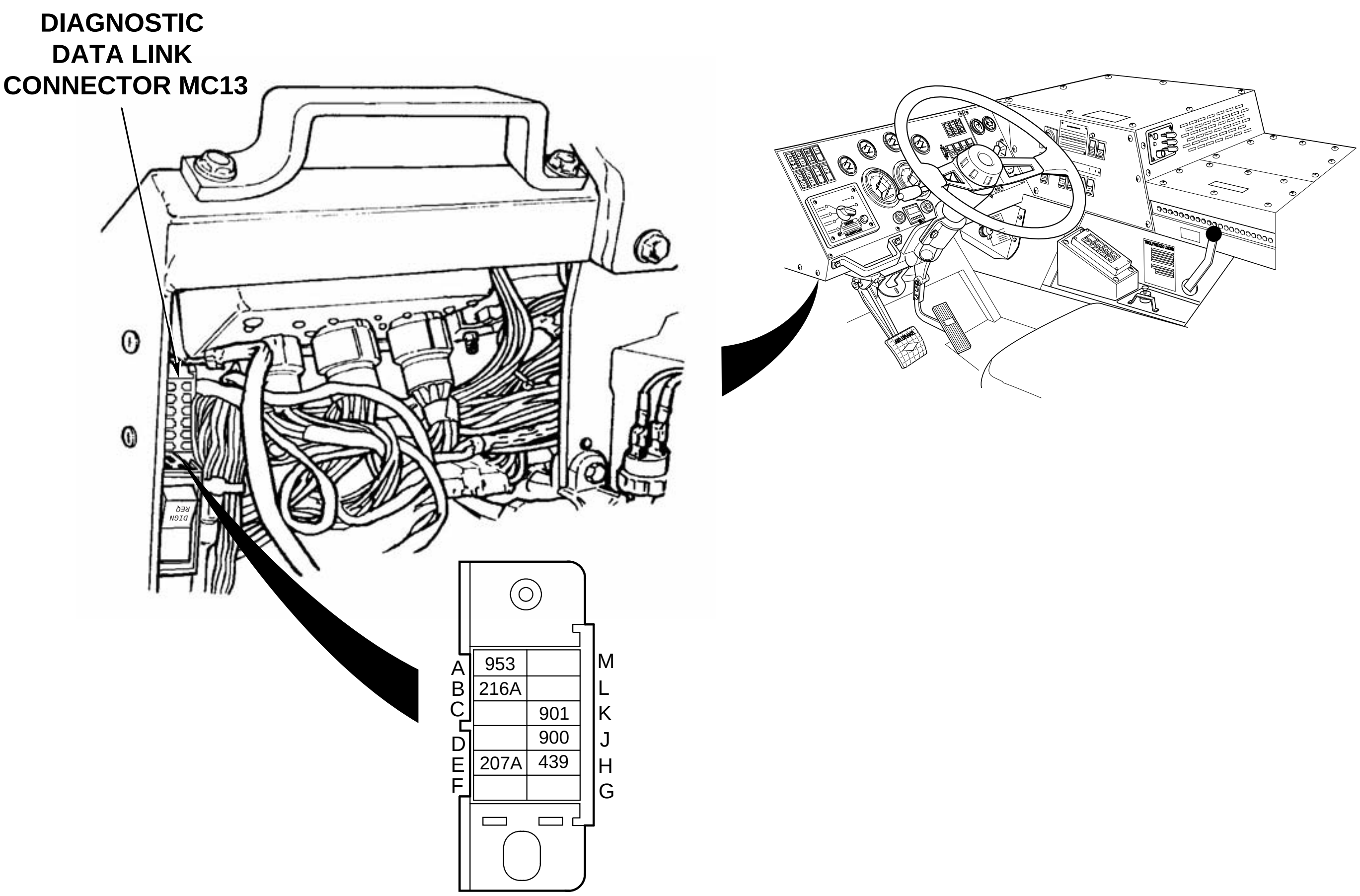

DIAGNOSTIC
REQUEST SWITCH


CHECK
ENGINE LIGHT
ENGINE
SWITCH

Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. START - FIRST CHART FOR DIAGNOSIS OF DDEC-III USING DDR (Cont'd)

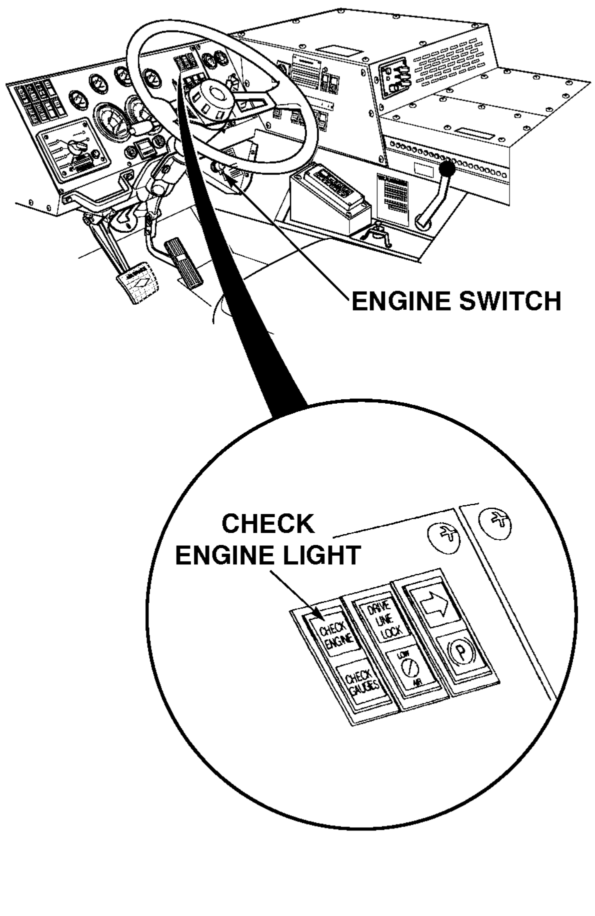
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
START-5 Read All Codes Again		
• Read inactive codes on DDR. .	Any codes.	Follow appropriate diagnostic chart for codes received. (See Table 2-19).
	DDR display reads "NO DATA RECEIVED FROM SYSTEM" or "DDEC SYSTEM NOT RESPONDING".	Go to Chart 7, page 2-593.
	DDR display is blank or random.	Go to START-9.
START-6 Read Codes on the "Check Engine" Light		
• Unplug the DDR. • Ignition on. Engine not running. Depress and hold diagnostic request switch. • Read codes flashing out on the "Check Engine" light.	Flashes out codes.	To diagnose codes, follow appropriate diagnostic chart for codes received. (See Table 2-19). To diagnose DDR system, go to C 7-4, page 2-595.
	Does not flash out codes.	Go to Chart 9, page 2-605.
START-7 Intermittent "Check Engine" Light		
• Note whether flashing "Check Engine" light is reading a valid code or if it's just erratic.	Flashing a valid code.	Go to START-8.
	Erratic or intermittent "Check Engine" light.	Go to Chart 1, page 2-554.


DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A 953
B 216A
C
D
E 207A
F
M
L
K 901
J 900
H 439
G

Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. START - FIRST CHART FOR DIAGNOSIS OF DDEC-III USING DDR (Cont'd)

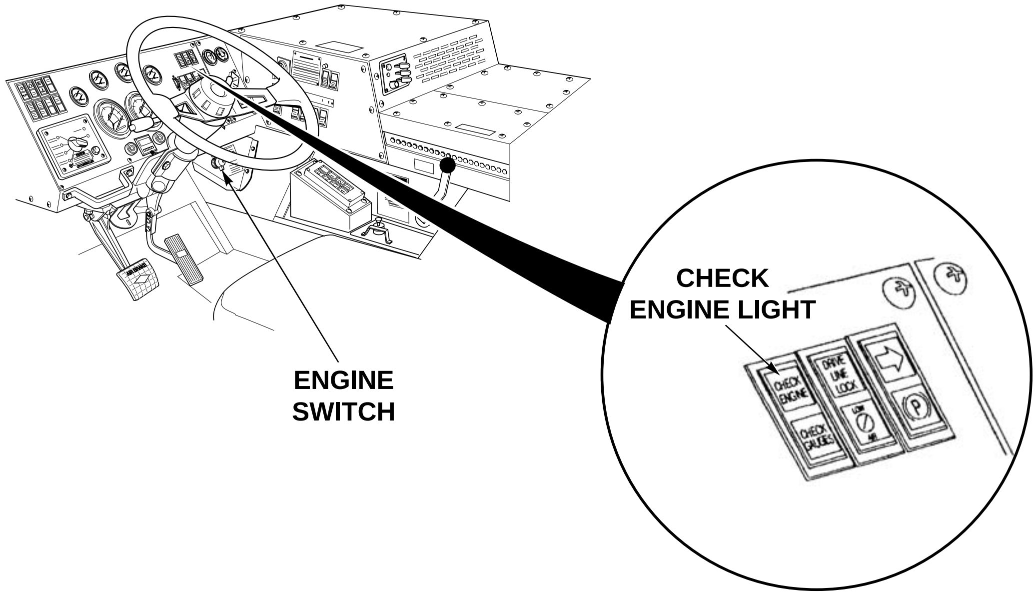
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
START-8 Check for Short		
• Plug DDR into Connector. Select SWITCH/LIGHT STATS on DDR. • Read Diagnostic Request SW. status.	ON.	Ckt #528 is shorted to ground. Repair short, then go to START-30.
	OFF.	Go to Chart 9, page 2-605.
START-9 Check for +12 Volts at DDR Connector		
• Turn ignition on. • Read voltage at the DDR connector, from pin "H" (red lead) to pin "A" (black lead).	Greater than or equal to 10.0 volts.	There is a problem with either the DDR or the data link lines. Go to C 7-4, page 2-595. (For diagnosis of DDEC III without a DDR, go to CEL-1 on page 2-549).
	Less than 10.0 volts.	Either the switched +12 volt line or the ground line is open to the DDR connector. Repair open. Then go to START-30.

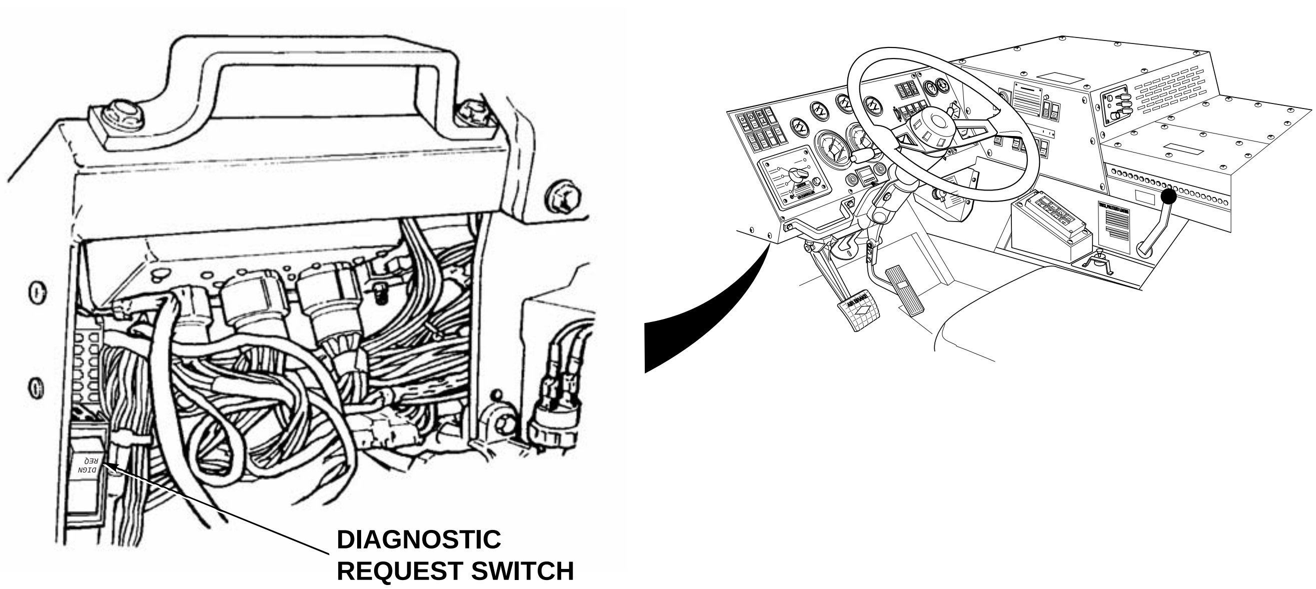

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
DRIVE
LINE
LOCK
CHECK
GAUGES
LOW
AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. START - FIRST CHART FOR DIAGNOSIS OF DDEC-III USING DDR (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
START-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on. • Observe the "Check Engine" light.	"Check Engine" light comes on for up to 5 seconds, then goes out.	Repairs are complete.
	"Check Engine" light is flashing.	All system diagnostics are complete. Please review this section from the first step to find the error.
	"Check Engine" light comes on and stays on.	Go to START-1, pg 2-539.


CHECK
ENGINE LIGHT
ENGINE
SWITCH
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES


DIAGNOSTIC
REQUEST SWITCH

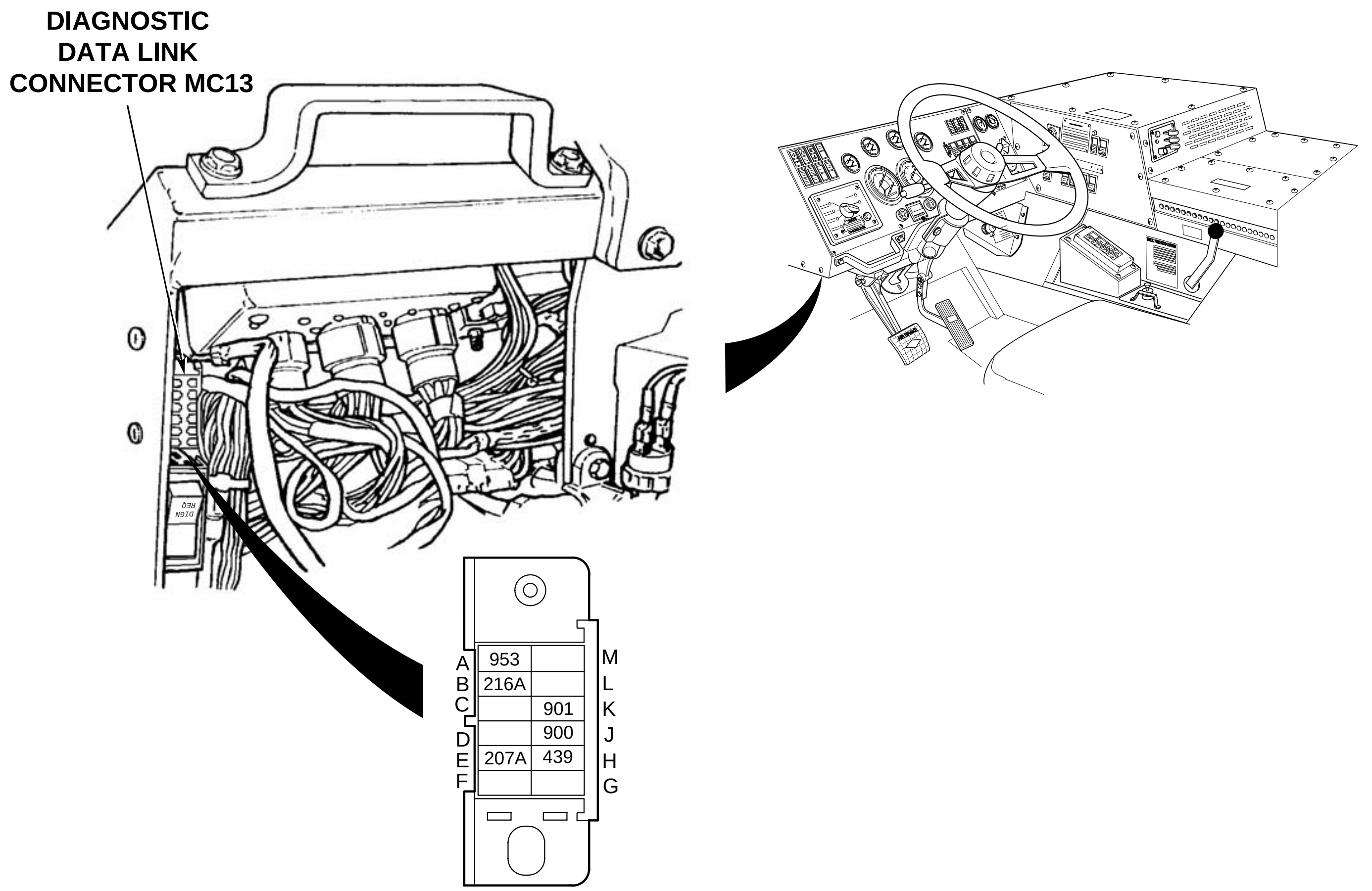
2-14. DDEC III TROUBLESHOOTING (CONT).

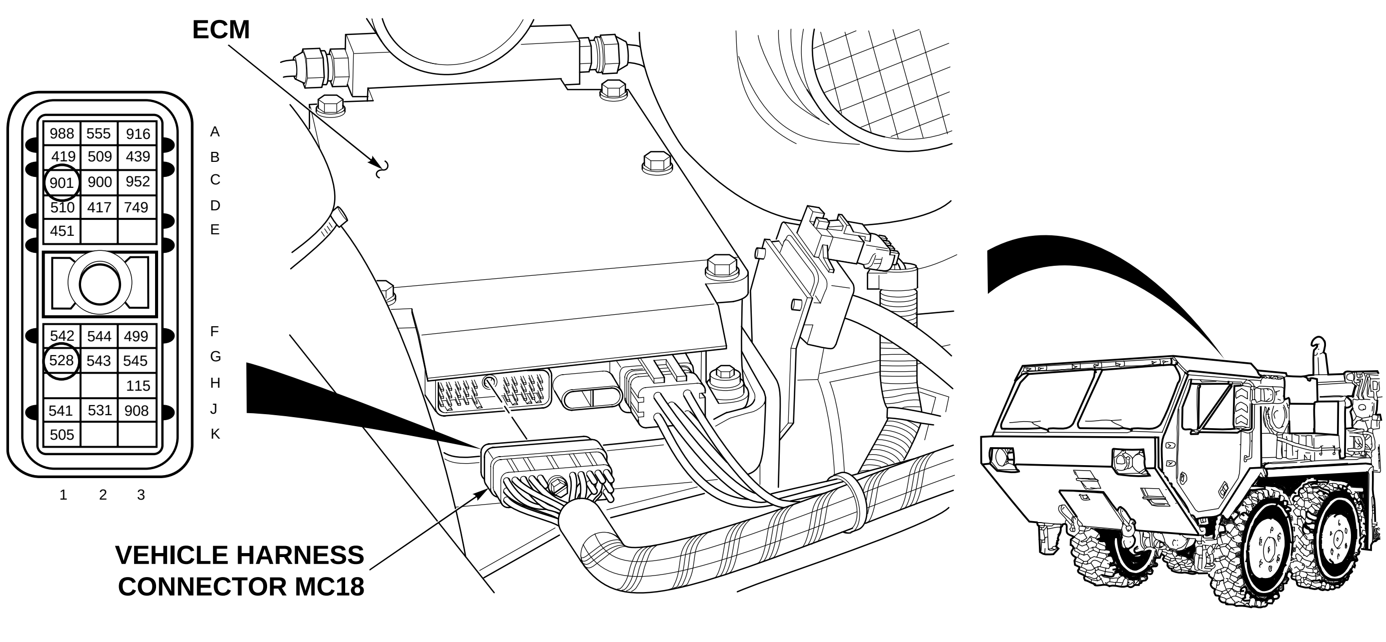
Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. CEL - FIRST CHART FOR DIAGNOSIS OF DDEC-III WHEN NO DDR IS AVAILABLE

NOTE: Although this section will help you get started, later sections of the Troubleshooting Guide may require using a DDR.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
CEL-1 Note "Check Engine" Light		
• Turn ignition on while at the same time observing the "Check Engine" light.	Light comes on and stays on. →	Go to CEL-2.
	Light comes on for up to 5 seconds, then goes out. →	Go to CEL-2.
	Light is off. →	Go to Chart 4, page 2-579.
	Flashing light. →	Go to CEL-8.
CEL-2 Read Codes		
• Turn ignition on. • Depress and hold the diagnostic request switch.	Flashes out codes. →	Go to CEL-3.
	"Check Engine" light is always on but doesn't flash out codes. →	Go to Chart 6, page 2-589.
	"Check Engine" light never comes on. →	Go to CEL-6.
CEL-3 Follow Codes		
• Note and record code(s).	Flash Codes 14, 15, 23, 44, or 85. →	Follow appropriate diagnostic charts for the code(s) received. (See Table 2-19.)
	Any flash codes except 14, 15, 23, 44, or 85. →	Go to CEL-4.
	Flash code 25 – (No codes.) →	If drive complaint persists, go to Chart 1, page 2-554.

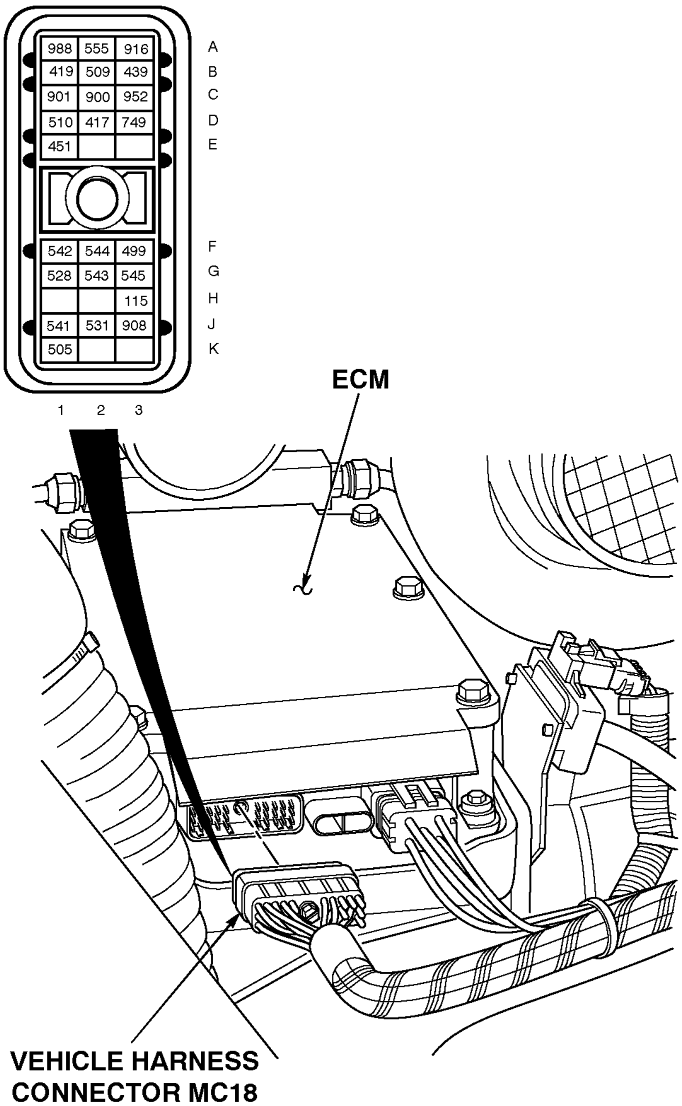

DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A B C D E F
953
216A
207A
901
900
439
M L K J H G

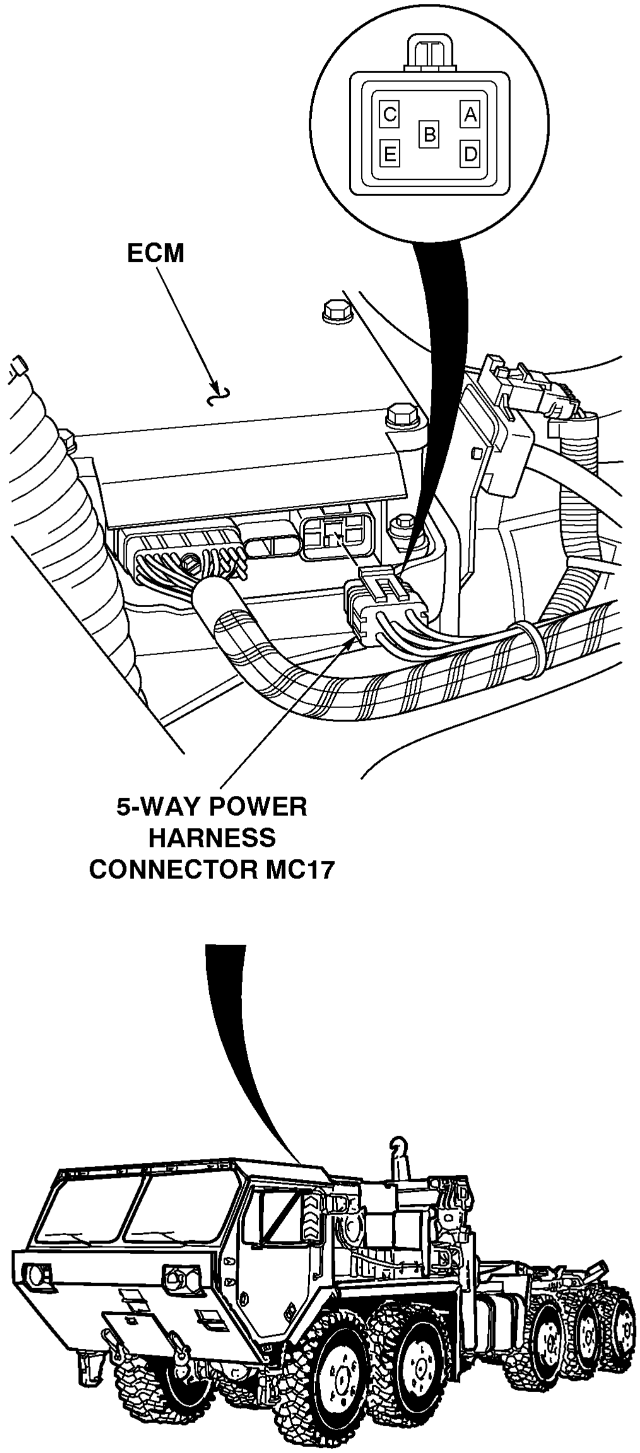

ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A B C D E
F G H J K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. CEL - FIRST CHART FOR DIAGNOSIS OF DDEC-III WHEN NO DDR IS AVAILABLE (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
CEL-4 Verify Code(s)		
• Turn ignition on. • Obtain a DDR. • Clear codes. • Turn ignition off then back on. • Note status of "Check Engine" light.	"Check Engine" light stays on.	Read codes and follow appropriate diagnostic chart (see Table 2-19).
	"Check Engine" light goes on for 5 seconds, then goes out.	Go to CEL-5.
	"Check Engine" light is erratic or intermittent.	Go to CEL-8.
CEL-5 Verify Code(s) with the Engine Running		
• Attempt to start and run the engine (TM 9-2320-364-10). • Try to get the "Check Engine" light on by: – warming up the engine – slowly changing the engine from idle to no load speed. • Run engine until the "Check Engine" light comes on or for 1 minute.	Engine will not start.	Go to Chart 2, pg 2-557.
	"Check Engine" light is off.	Previous codes should be regarded as intermittent. Go to Chart 1, pg 2-554.
	"Check Engine" light is on.	Read codes. Follow appropriate diagnostic code chart, Table 2-19.
CEL-6 Check for Open		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM. • Install a jumper wire between sockets C1 and G1 of the vehicle harness connector. • Also read resistance between pin A of DDL connector and a good ground.	Less than or equal to 5 ohms on either reading.	Go to CEL-7.
	Greater than 5 ohms or open on either reading.	An open exists either in the diagnostic request line (ckt #528) or in the DDR ground line (ckt #901). Repair open. Then go to CEL-30.


988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

C. CEL - FIRST CHART FOR DIAGNOSIS OF DDEC-III WHEN NO DDR IS AVAILABLE (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
CEL-7 Check ECM Connectors		
• Disconnect the 5-way power harness connector at the ECM. • Check terminals at both the 5-way power harness connector, and vehicle harness connector (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to CEL-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to CEL-30.
CEL-8 Intermittent Check		
• Note whether flashing "Check Engine" light is reading a valid code or if it's just erratic.	Flashing a valid code. →	Go to CEL-9.
	Erratic or intermittent "Check Engine" light. →	Go to Chart 1, page 2-554.
CEL-9 Check for Short		
• Plug DDR into DDL connector. Select SWITCH/LIGHT STATS on DDR. • Read Diagnostic Request SW. status.	ON. →	Circuit #528 is shorted to ground. Repair short, then go to CEL-30.
	OFF. →	Go to Chart 5, page 2-585.
CEL-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on while at the same time observing the "Check Engine" light.	"Check Engine" light comes on for up to 5 seconds, then goes out. →	Repairs are complete.
	"Check Engine" light is flashing. →	All system diagnostics are complete. Please review this section from the first step to find the error.
	"Check Engine" light comes on and stays on. →	Go to START-1, page 2-539.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –1 - INTERMITTENT CODE OR A SYMPTOM AND NO CODES

NOTE: This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, page 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 1-1 Diagnosis by Symptom		
• Turn ignition off. • Go to appropriate result in the next column based on engine symptom.	Intermittent code.	Go to Chart 1, page 2-554.
	Engine cranks but will not start.	Go to Chart 2, page 2-557.
	Erratic performance and No Codes.	Go to Chart 3, page 2-577.
	No “Check Engine” light during bulb check.	Go to Chart 4, page 2-579.
	“Check Engine” light always on and No Codes.	Go to Chart 5, page 2-585.
	“Check Gauges” light always on, and No Codes.	Go to Chart 6, page 2-589.
	No data to DDR.	Go to Chart 7, page 2-593.
	No “Check Gauges” light during bulb check.	Go to Chart 8, page 2-599.
	Diagnostic request switch inoperative.	Go to Chart 9, page 2-605.
	Vernier Control (VSG) inoperative.	Go to Chart 10, page 2-609.

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –1 - INTERMITTENT CODE OR A SYMPTOM AND NO CODES (Cont'd)

STEP/SEQUENCE

C 1-2 Diagnosis of an Intermittent Code or Symptom

NOTE: Do not use any other procedures in this manual (except for the suggestions listed below) when trying to solve an intermittent problem. Use of any other procedures for this kind of problem can result in the replacement of non-defective parts.

Many intermittent problems are caused by faulty electrical connectors or wiring. Diagnosis must include a careful inspection of the indicated circuit wiring and connectors. Example: an intermittent Code 35 (Oil Pressure Sensor High) should cause suspicion of a problem in the following areas associated with the Oil Pressure Sensor.

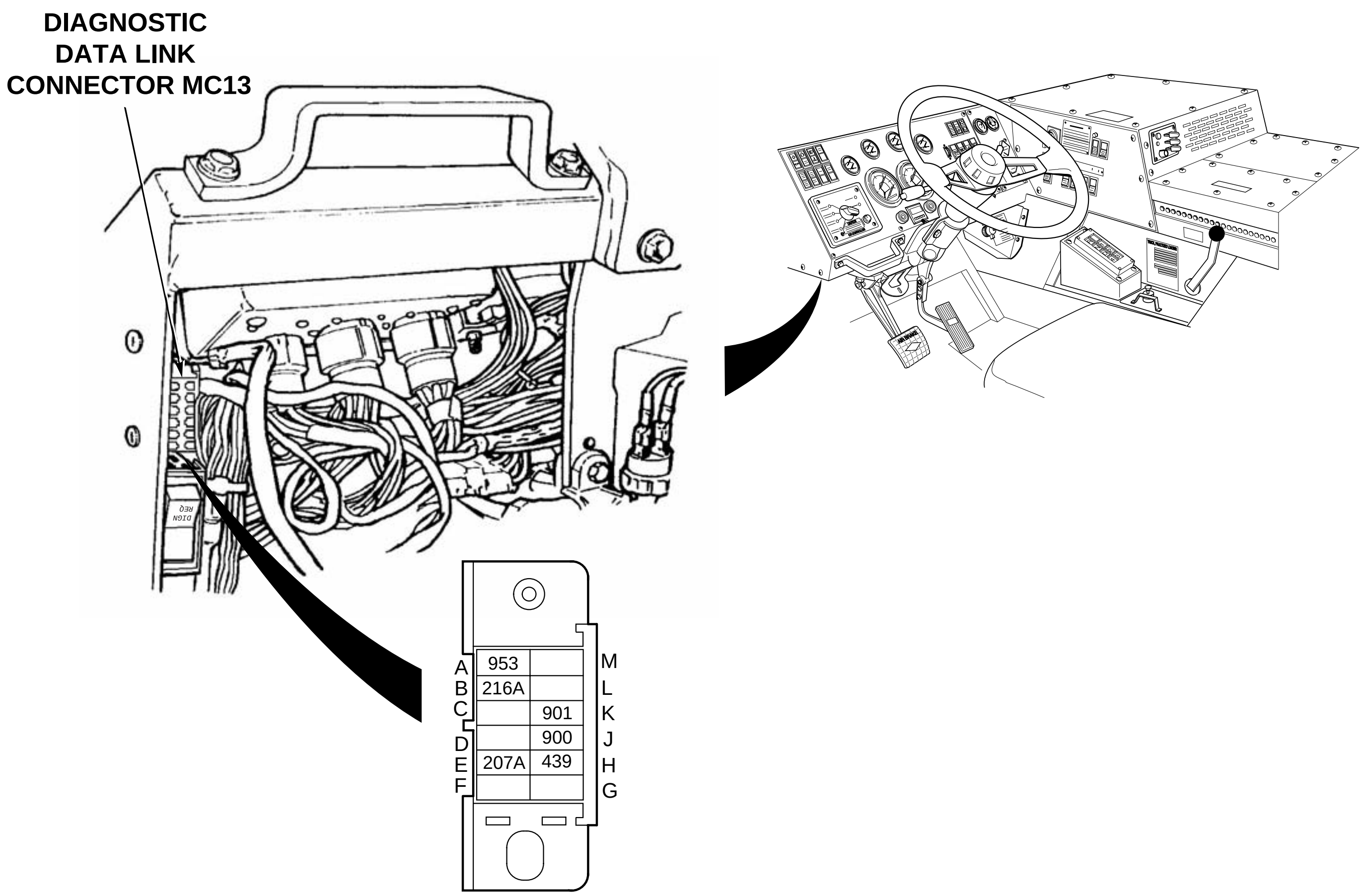
1. Wire #'s 530 (signal line), 416 (+5 volt line) or 452 (ground line).
2. The Oil Pressure Sensor connector or ECM connector.
3. An intermittent in the Oil Pressure Sensor (least likely).

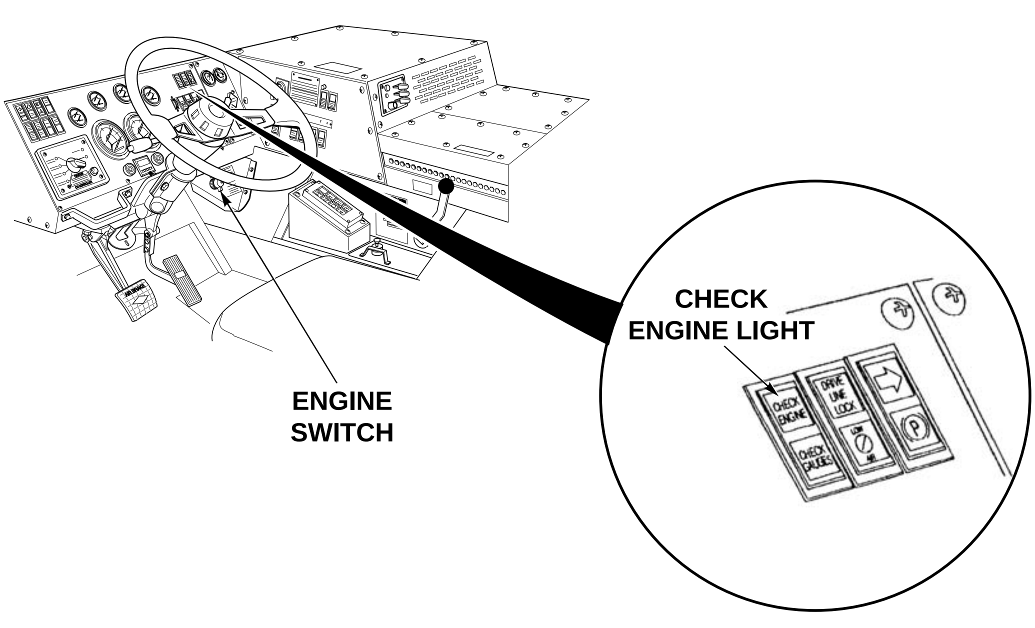
A good check list to run through includes the following:

1. Check for poor mating of the connector halves or terminals not fully seated in the connector body ("backed-out" terminals).
2. Look for improperly formed or damaged terminals. All connector terminals in the problem circuit should be carefully reformed to contact tension.
3. Electrical system interference caused by a defective relay, ECM driven solenoid, or a switch causing an electrical surge. Look for problems with the charging system (alternator, etc.). In certain cases, the problem can be made to occur when the faulty component is operated (as in the case of a relay).

After repairs or adjustments have been made, clear the codes and confirm that the "Check Engine" light does not come on (except for the 5 second bulb check when the ignition is first turned on). Also run the engine to see if that problem is cured. If the "Check Engine" light stays on, refer to the START-1 Chart on page 2-539.

Refer to the DDR instructions manual. Using the "Snapshot" function may assist in isolating the cause for the problem. This function is useful in troubleshooting many areas of the DDEC System.


DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A 953
B 216A
C
D
E 207A
F
M
L
K 901
J 900
H 439
G


CHECK
ENGINE LIGHT
ENGINE
SWITCH

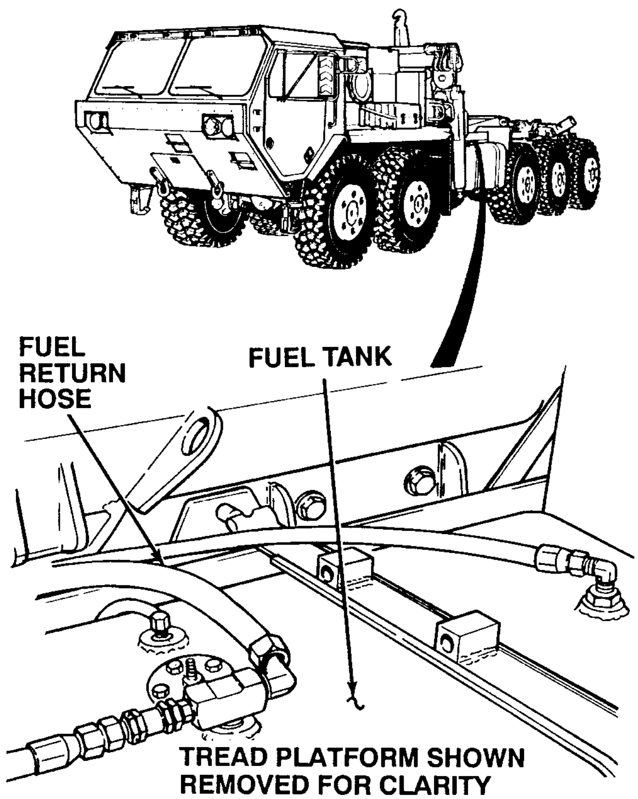
2-14. DDEC III TROUBLESHOOTING (CONT).

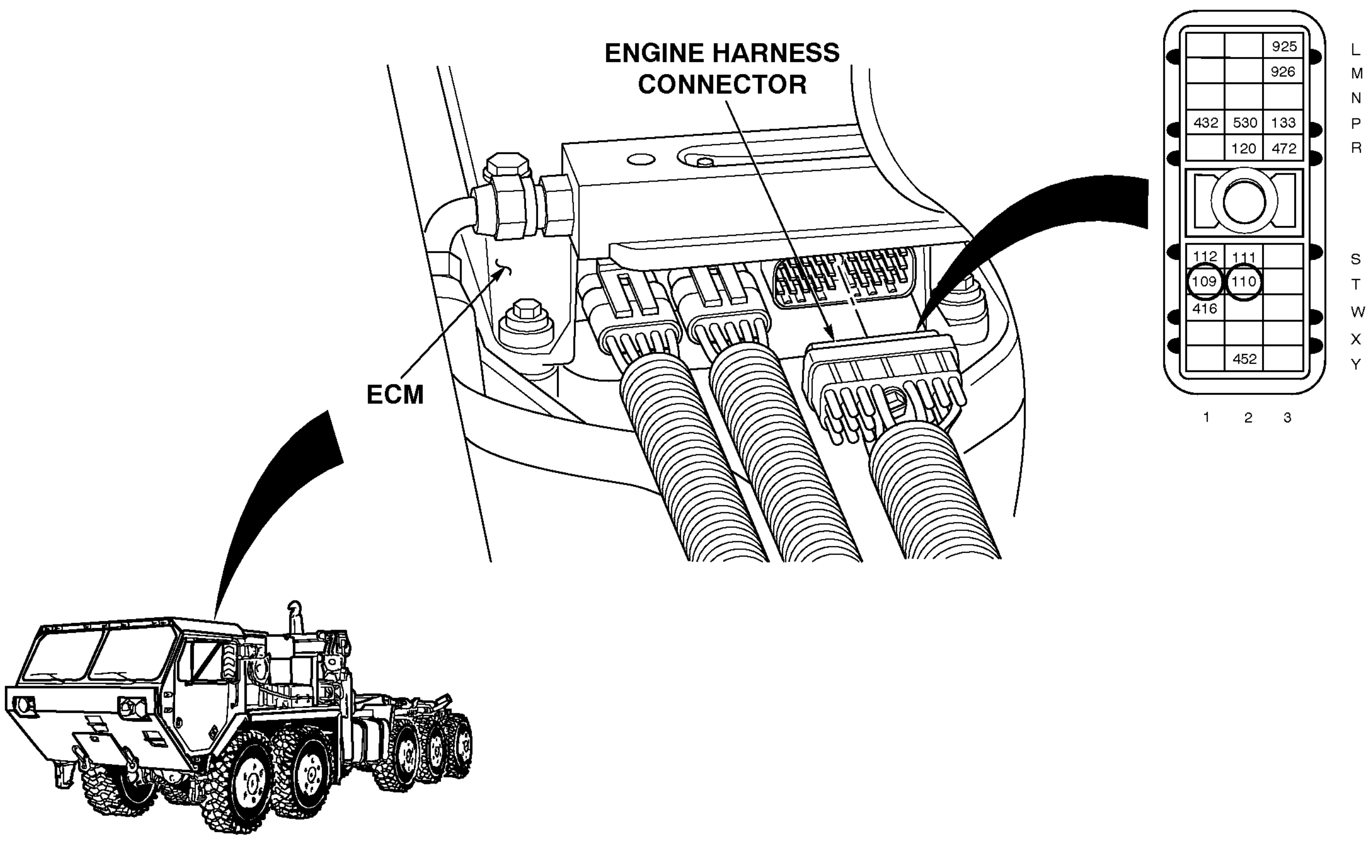
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START

NOTE: This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–1 Observe "Check Engine" Light Status		
• Turn ignition on while observing the "Check Engine" light.	"Check Engine" light comes on for up to 5 seconds, then goes out.	Go to C 2–3.
	"Check Engine" light does not come on at all.	Go to C 2–17.
	"Check Engine" light comes on goes off and comes back on or stays on.	Go to C 2–2.
C 2–2 Read Active Codes Using DDR		
• Plug DDR into the DDL connector. • Read active codes by selecting (ACTIVE CODES) on the DDR.	Active codes on DDR.	Follow appropriate diagnostic charts for code(s) received. (See Table 2-19.)
	No codes.	Go to C 5-1.
	Display reads "NO DATA RECEIVED FROM SYSTEM or DDEC SYSTEM NOT RESPONDING" or a blank or random display.	Go to START-6, page 2-543.
C 2–3 Check if Out of Fuel		
• Check fuel supply.	Fuel supply okay.	Go to C 2–4.
	No fuel.	Refuel vehicle. May have to prime system (TM 9-2320-364-10). Then go to C 2–30.

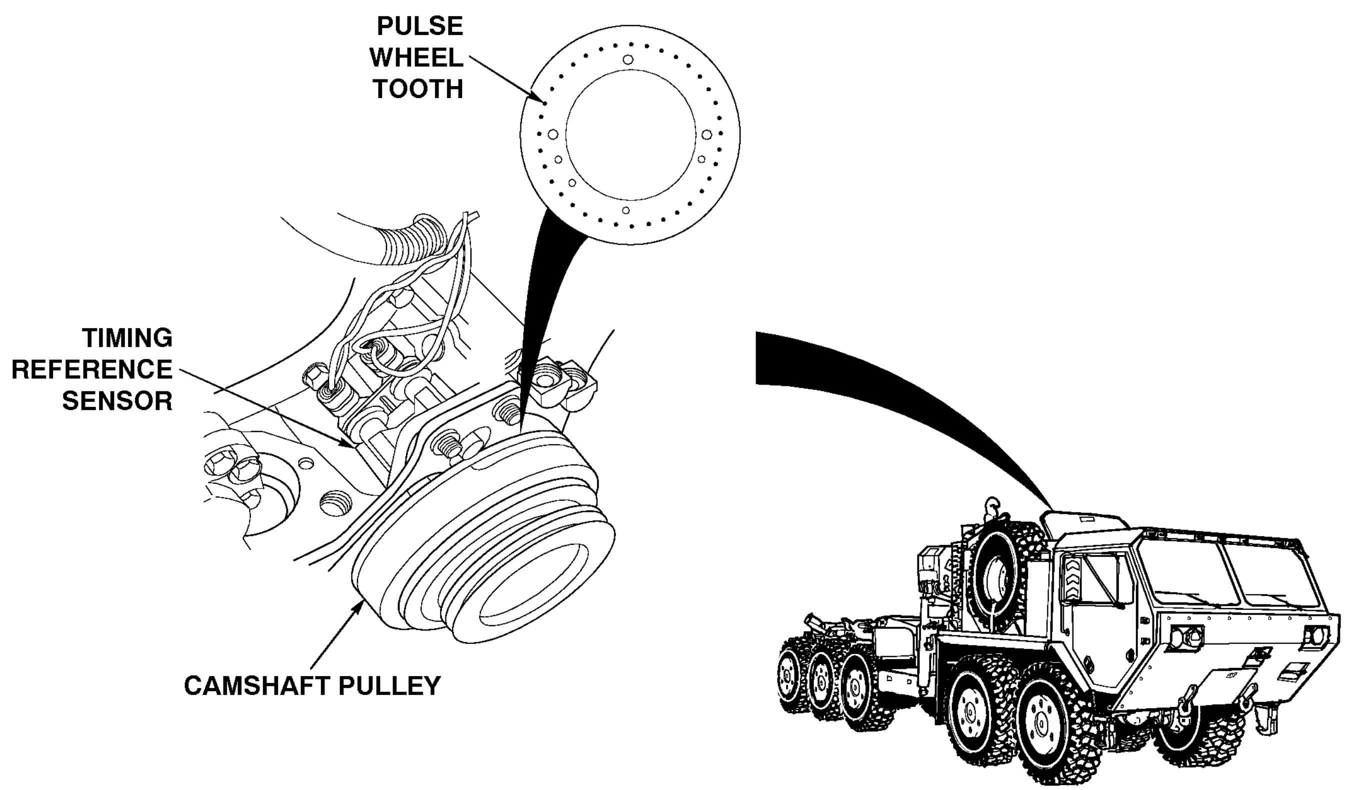

FUEL
RETURN
HOSE
FUEL TANK
TREAD PLATFORM SHOWN
REMOVED FOR CLARITY

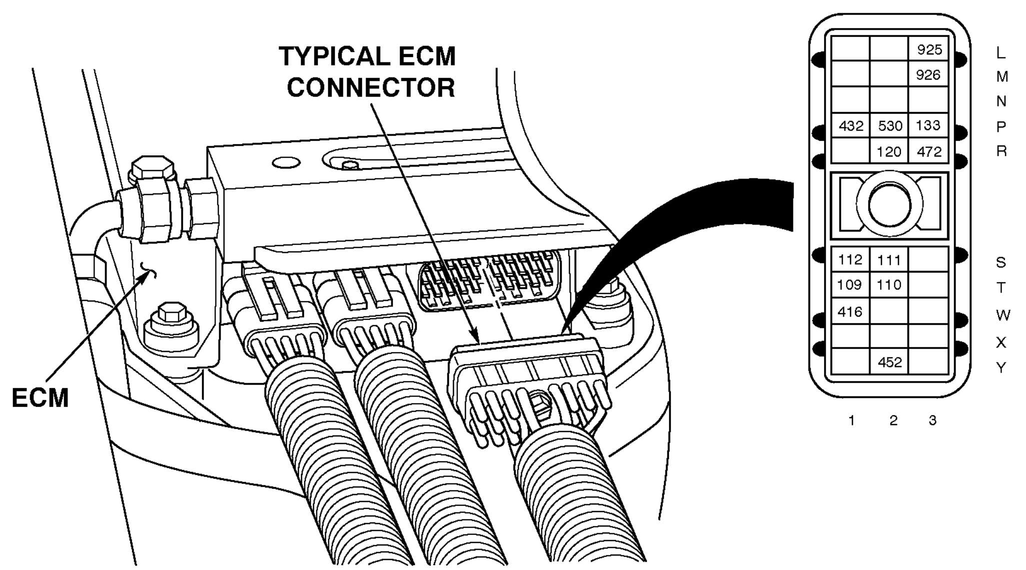

ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–4 Check for Aerated Fuel		
• Loosen fuel return line. • Observe fuel flow out of line while cranking. (You can direct the fuel into a bucket.)	Flow is steady. →	Go to C 2–5.
	No flow or intermittent flow. →	Check fuel filter(s) and supply lines to determine cause of problem (refer to Chapter 2, Vehicle Troubleshooting, for details).
C 2–5 Check for White Smoke		
• Reconnect fuel return line. • Look for white smoke coming out of the exhaust stack while cranking the engine.	White smoke. →	Your problem appears to be with cylinder compression or restricted air intake. Notify supervisor.
	No white smoke. →	Go to C 2–31.
C 2–6 Check TRS Status via RPM Read-out		
• Select ENGINE RPM on DDR. • Crank engine while observing DDR display. (NOTE: Battery voltage surge while cranking with electric starters may blank out or reset DDR.)	Display always reads greater than or equal to 60 RPM while cranking. →	Go to C 2–12.
	Display sometimes or always reads less than 60 RPM while cranking. →	Go to C 2–7.
C 2–7 Check TRS		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Read resistance between sockets T1 and T2 at the engine harness connector.	Between 100 and 200 ohms. →	Go to C 2–8.
	Less than 100 ohms. →	Go to 41-2.
	Greater than 200 ohms. →	Go to 41-3.

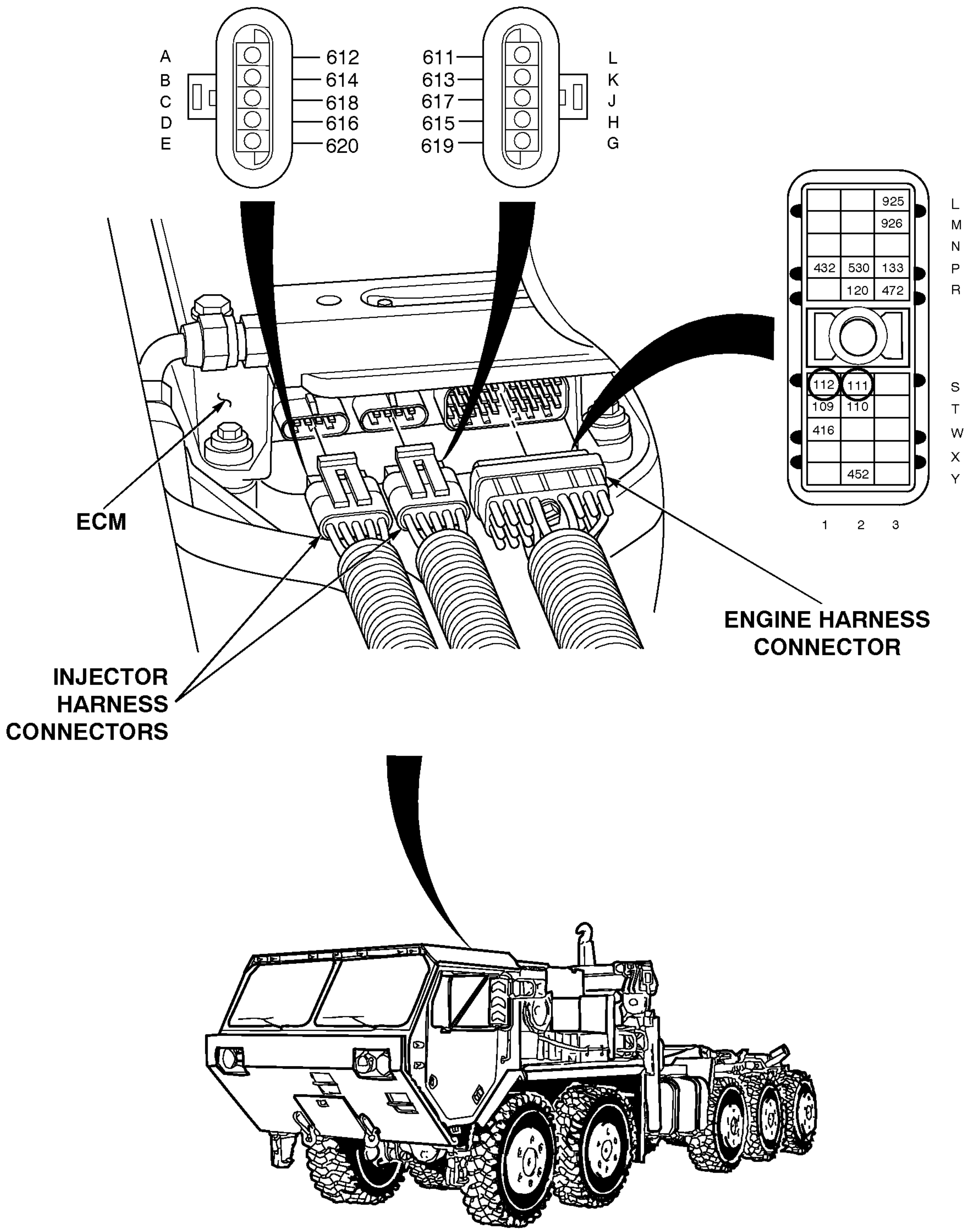

PULSE
WHEEL
TOOTH
TIMING
REFERENCE
SENSOR
CAMSHAFT PULLEY


TYPICAL ECM
CONNECTOR
ECM
925
926
432 530 133
120 472
112 111
109 110
416
452
L M N P R
S T W X Y
1 2 3

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

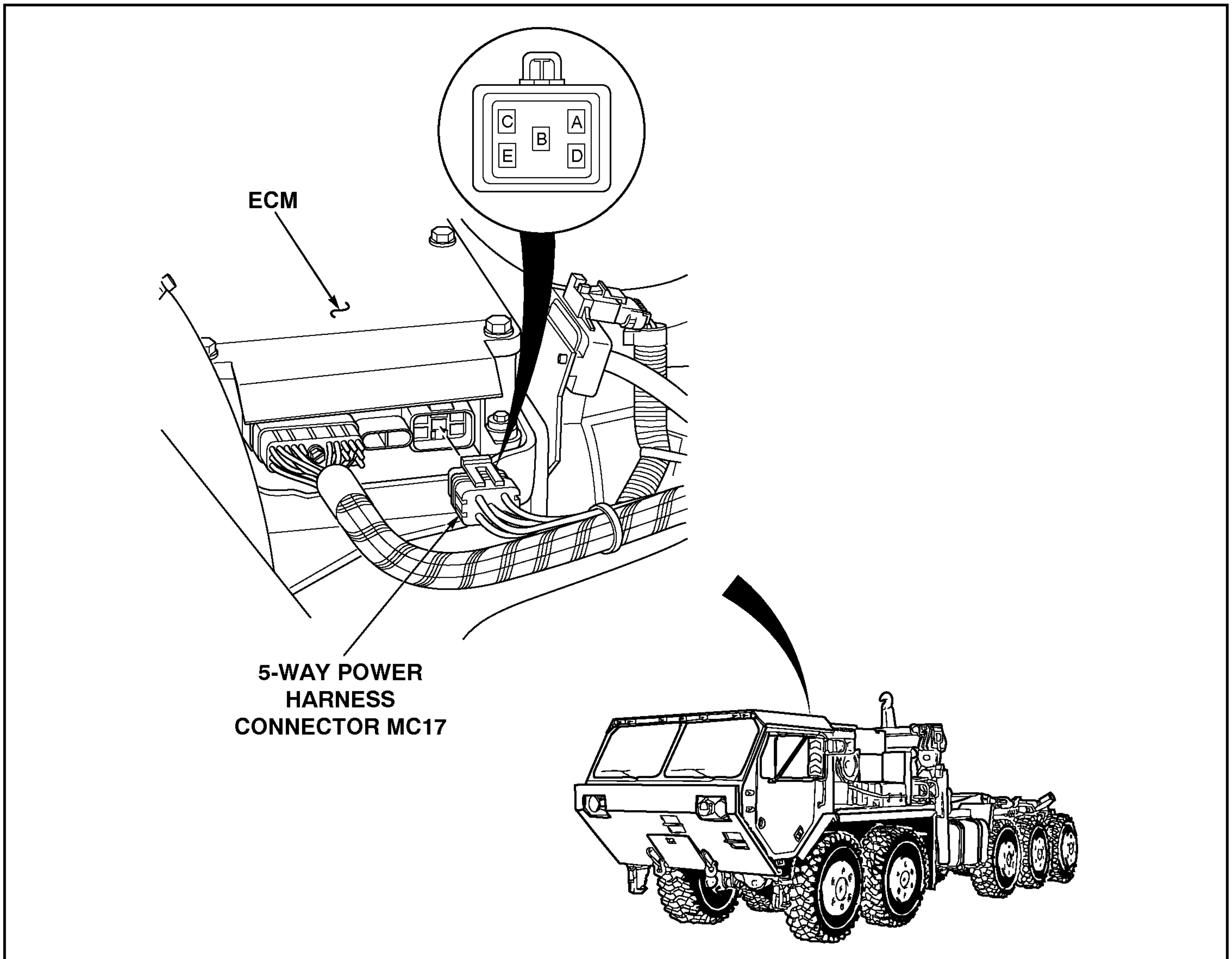
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–8 Check TRS/SRS Gap		
• Remove ECM (para 7-57). • Turn camshaft counterclockwise until the TRS is over a TRS "tooth" of the pulse wheel. • Tap the front of the camshaft rearward with a soft hammer (to remove camshaft end play).	Incorrect gap. →	Loosen the screw at the top of the TRS/SRS mounting bracket. (Don't touch the two screws that go into the block front end plate-they will affect engine timing.) Adjust the TRS/SRS until the gap setting is correct. Tighten screw. (If problems returns, pulse wheel may be loose or bad, notify supervisor.) Then go to C 2–30.
• Using a feeler gauge check gap between the pulse wheel teeth and TRS (nominal gap is 0.020" or 0.5 mm).	Gap setting is correct. →	Go to C 2–10.
C 2–10 Check Pulse Wheel		
• Inspect DDEC pulse wheel for: –Loose wheel. –Chipped or missing teeth.	Pulse wheel OK. →	Go to C 2–11.
	Problem found. →	Pulse wheel requires repair or replacement. Notify supervisor.
C 2–11 Check ECM Connectors		
• Turn ignition off. • Disconnect all connectors at the ECM. • Check terminal at all ECM connectors (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminal and connectors are okay. →	Replace ECM (para 7-57). Then go to C 2–30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to C 2–30.

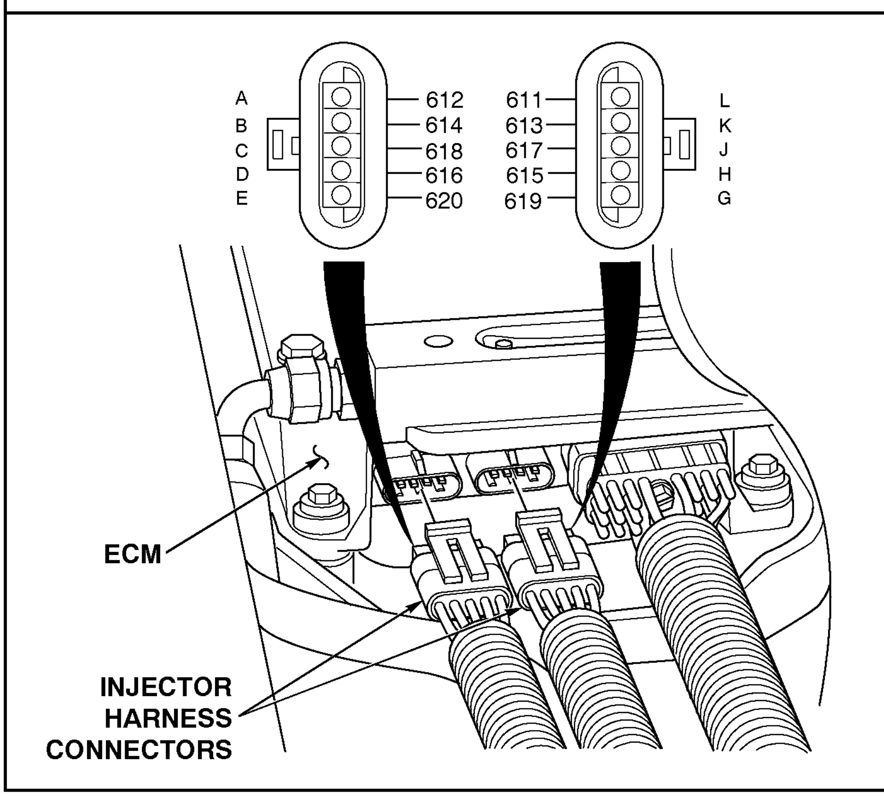

A
B
C
D
E
612
614
618
616
620
611
613
617
615
619
L
K
J
H
G
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3
ECM
ENGINE HARNESS CONNECTOR
INJECTOR HARNESS CONNECTORS

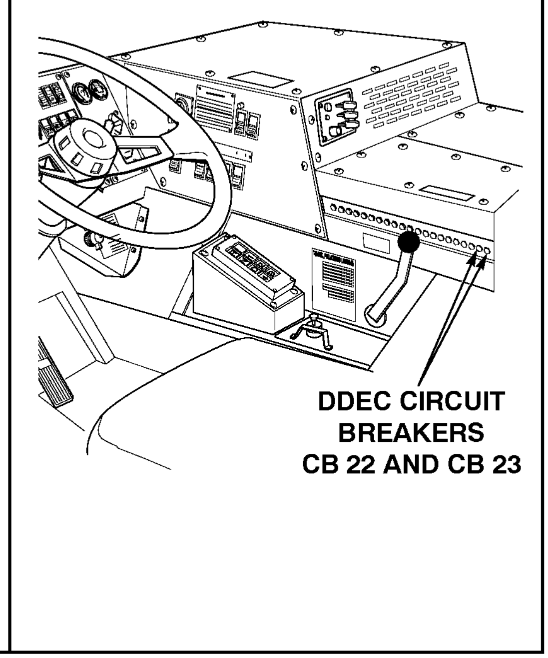
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–12 Check for Good SRS Signal		
• Select engine data list on DDR. • Crank engine while observing DDR display of "SRS RECEIVED". (NOTE: Battery voltage surges while cranking with electric starters may blank out or reset DDR.)	Display reads SRS RECEIVED while cranking.	Go to C 2–14.
	Display does not read SRS RECEIVED while cranking.	Go to C 2–13.
C 2–13 Check SRS		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Read resistance between sockets S1 and S2 at the engine harness connector.	Between 100 and 200 ohms.	Go to C 2–8.
	Less than 100 ohms.	Go to 41-2, page 2-695.
	Greater than 200 ohms.	Go to 41-2, page 2-695.
C 2–14 Check if Injector Return Wires are Open		
• Turn ignition off. • Disconnect both injector harness connectors at the ECM. • Read resistance between the injector return pin and all the power driver pins on both harness connectors (example: G to L, E to A, E to B, G to K, etc.). • Circuits 620 and 619 are common.	Less than or equal to 5 ohms for any reading.	Go to C 2–15.
	Greater than 5 ohms on any reading.	An open exists in one of the injector power driver or return wires. Repair open. Then go to C 2–30.


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

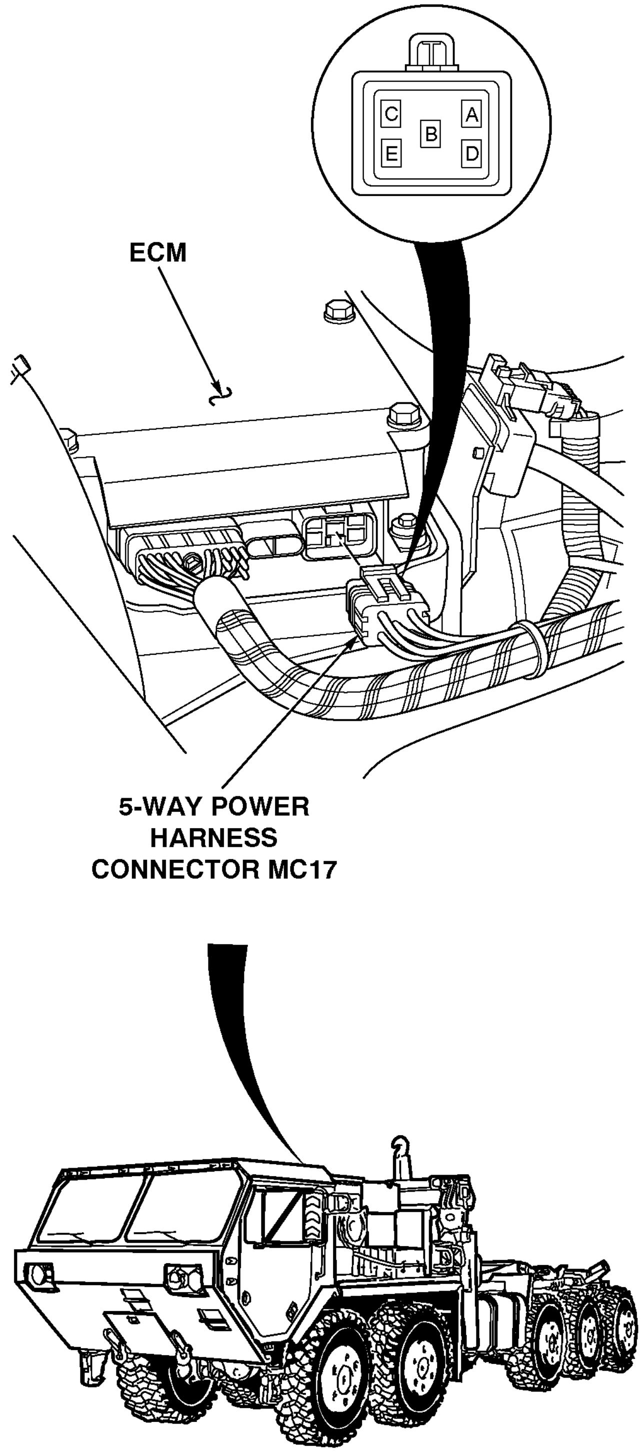

A
B
C
D
E
612
614
618
616
620
611
613
617
615
619
L
K
J
H
G
ECM
INJECTOR
HARNESS
CONNECTORS

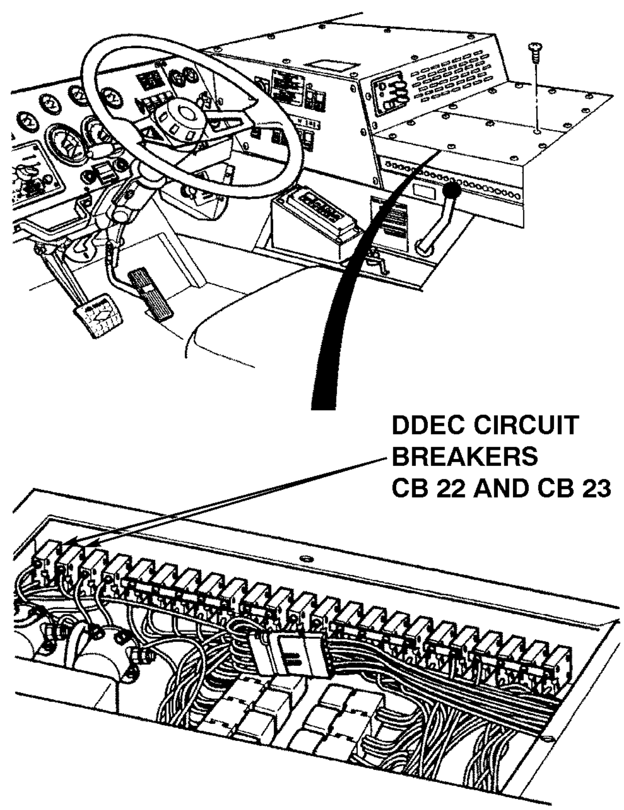

DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–15 Check if Injector Drive or Return Lines are Shorted to Ground		
• Disconnect the 5-way power harness connector at the ECM. • Read resistance between socket D of the 5-way power harness connector to the following sockets on the injector harness connectors: A, B, C, D, E, G, H, J, K, and L.	Greater than or equal to 10,000 ohms or open on all readings.	Go to C 2–16.
	Less than 10,000 ohms on any reading.	A short to ground on wire where resistance was less than 10,000 ohms. Repair short. Then go to C 2–30.
C 2–16 Injector Drive Pulses		
• Turn ignition off. • Reconnect all ECM connectors. • Remove rocker arm cover(s) (para 3-4 and 3-5). • Place a 6 volt test light across the injector return side (return wire #619 or #620) and a good ground. • Crank engine and note if the test light flashes. • Reconnect the return wire. • Repeat the above procedure with all other injectors until all have been tested or until one test fails.	All tests pass.	The problem does not appear to be in the DDEC system. Refer to Chapter 2, Vehicle Troubleshooting, for other possible causes of a no-start condition.
	Light not flashing for one or more tests.	Go to C 2–11.
C 2–17 Check DDEC Circuit Breakers		
• Check two DDEC circuit breakers (CB22 and CB23).	Open circuit breaker(s).	Go to C 2–28.
	Circuit breakers are okay.	Go to C 2–18.

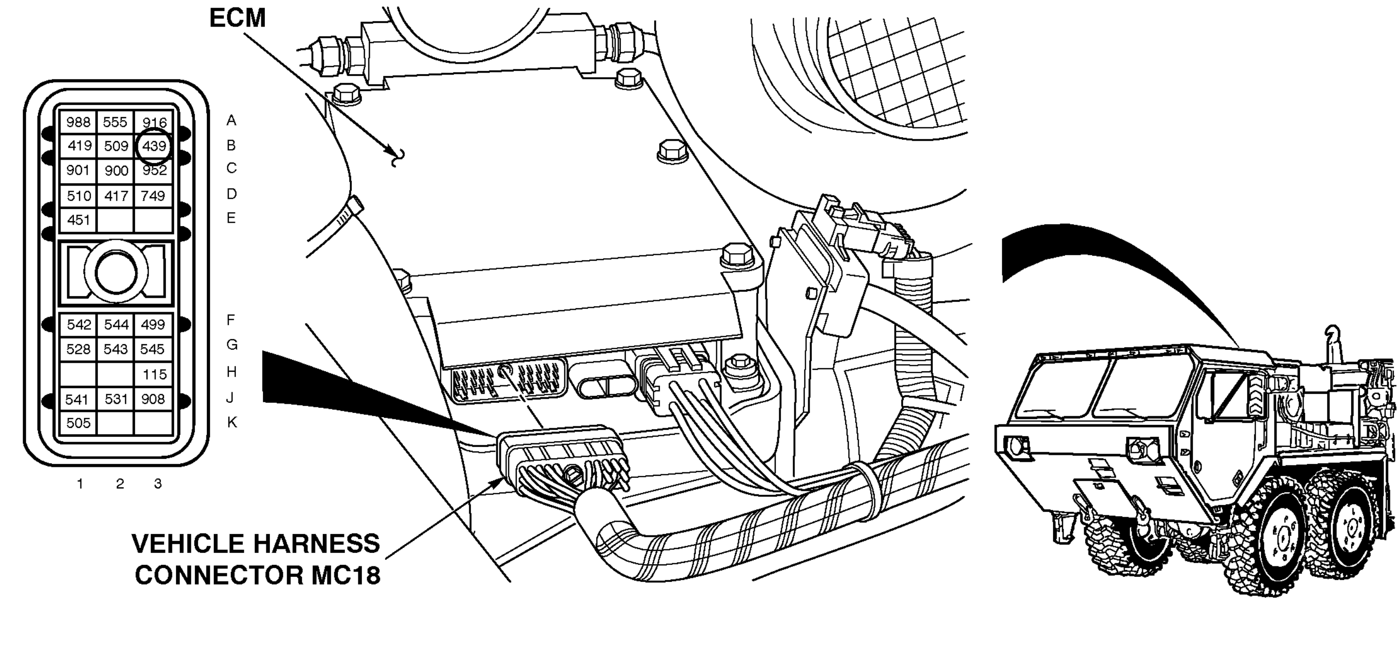

C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

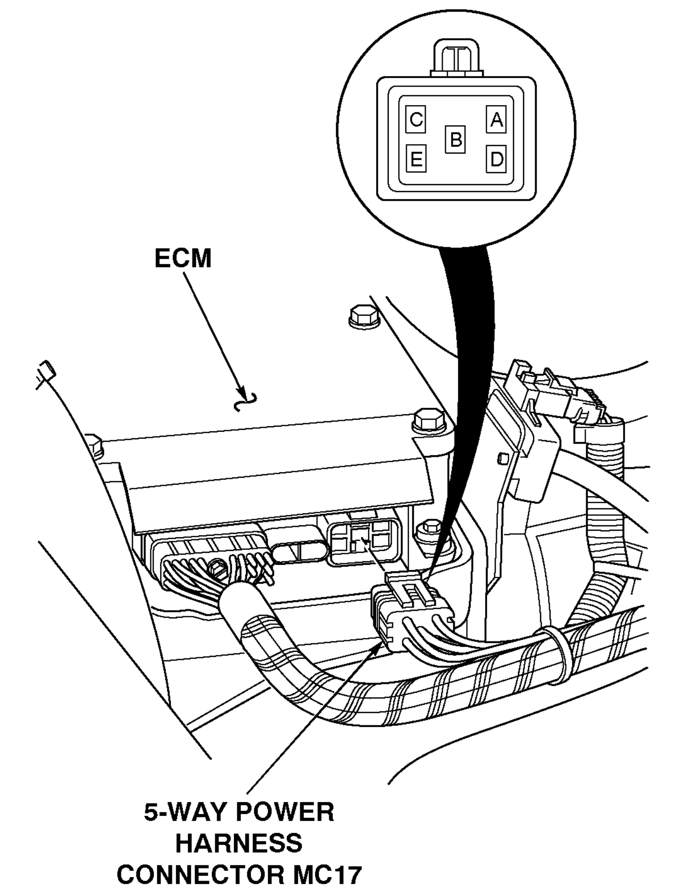

DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23

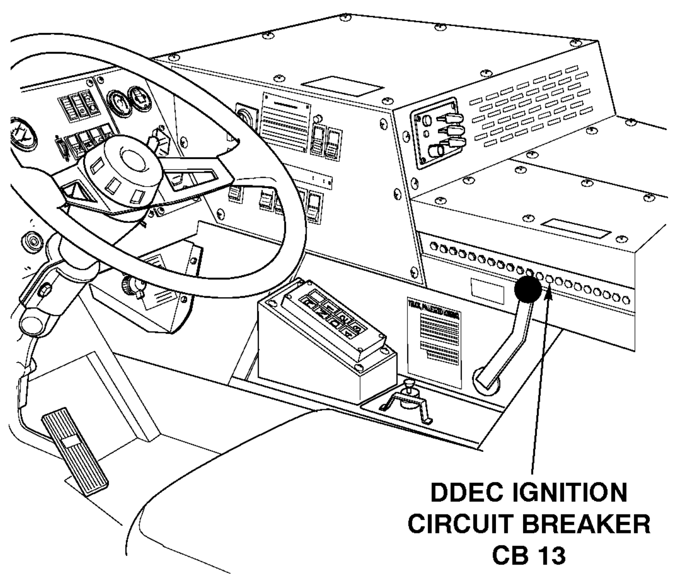
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–18 Check for Battery Volts at the 5-way Power Harness Connector		
• Turn ignition off. • Disconnect the 5-way power harness connector. • Read voltage from socket A (red lead) of 5-way power harness connector to a good ground (black lead). • Also read voltage from socket C (red lead) to a good ground (black lead).	Less than 11.5 volts on any reading.	Go to C 2–19.
	Greater than 11.5 volts on all readings.	Go to C 2–21.
C 2–19 Check if ECM Power Line(s) are Open.		
• Read voltage between battery side of DDEC circuit breaker CB22 (red lead) and a good ground (black lead). • Read voltage reading at DDEC circuit breaker CB23. (NOTE: Battery side does not contain #240 or #241 wires.)	Less than 11.5 volts on either reading.	Go to C 2–20.
	Greater than 11.5 volts on both readings.	An open exists in either Power line (ckt #240) or (ckt #241). Repair open. Then go to C 2–30.
C 2–20 Check Battery		
• Connect all connectors. • Turn ignition on. • Try to start engine. • Read voltage at battery + terminal (red lead) to the battery – terminal (black lead).	Less than 10.0 volts.	Service discharged battery (TM 9-6140-200-14). (NOTE: If a short to ground exists anywhere in a battery + circuit, the engine will shut down again if not repaired.) Then go to C 2–30.
	Greater than or equal to 10.0 volts.	An open or short to ground exists in the Batt + line. Repair open or short to ground. Then go to C 2–30.


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

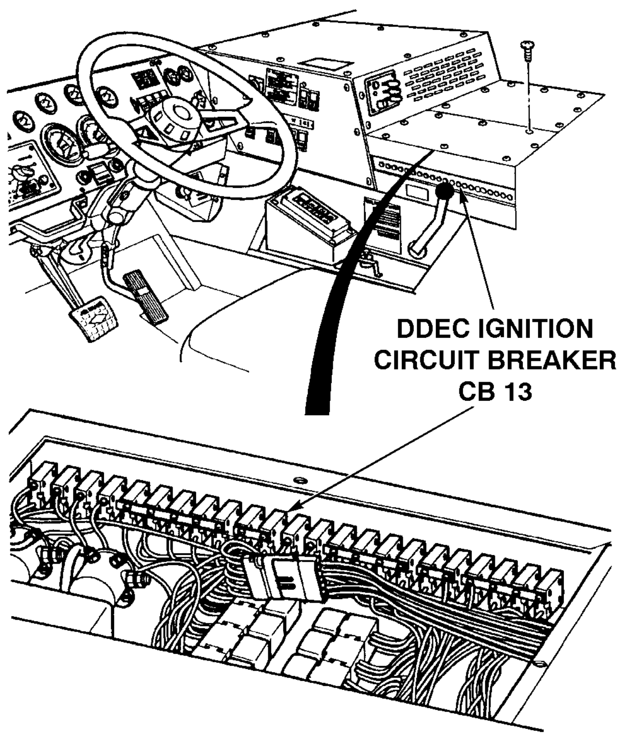

C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

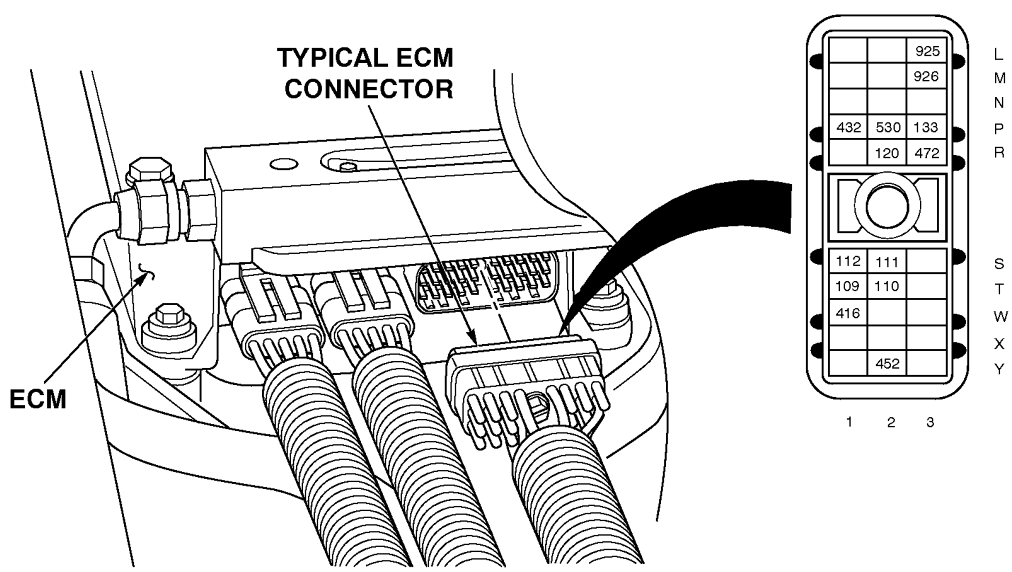

DDEC IGNITION
CIRCUIT BREAKER
CB 13

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–21 Check for +12 or +24 Volts at Ignition Wire		
• Turn ignition off. • Disconnect vehicle harness connector at ECM. • Turn ignition on. • Read voltage between socket B3 on the vehicle harness connector (red lead) and a good ground (black lead).	Less than 11.5 volts.	Go to C 2–23.
	Greater than or equal to 11.5 volts.	Go to C 2–22.
C 2–22 Check for Good Ground Wire		
• Read voltage between socket B3 on vehicle harness connector (red lead) and socket D and E on 5-way power harness.	Less than 11.5 volts.	ECM ground wire (ckt #150) is open or has a poor connection. Repair open or poor connection. Then go to C 2–30.
	Greater than or equal to 11.5 volts.	Go to C 2–11.
C 2–23 Check if Ignition Circuit Breaker is Okay		
• Turn ignition off. • Check DDEC ignition circuit breaker (CB13).	Circuit breaker is okay.	Go to C 2–24.
	Circuit breaker open.	Go to C 2–25.

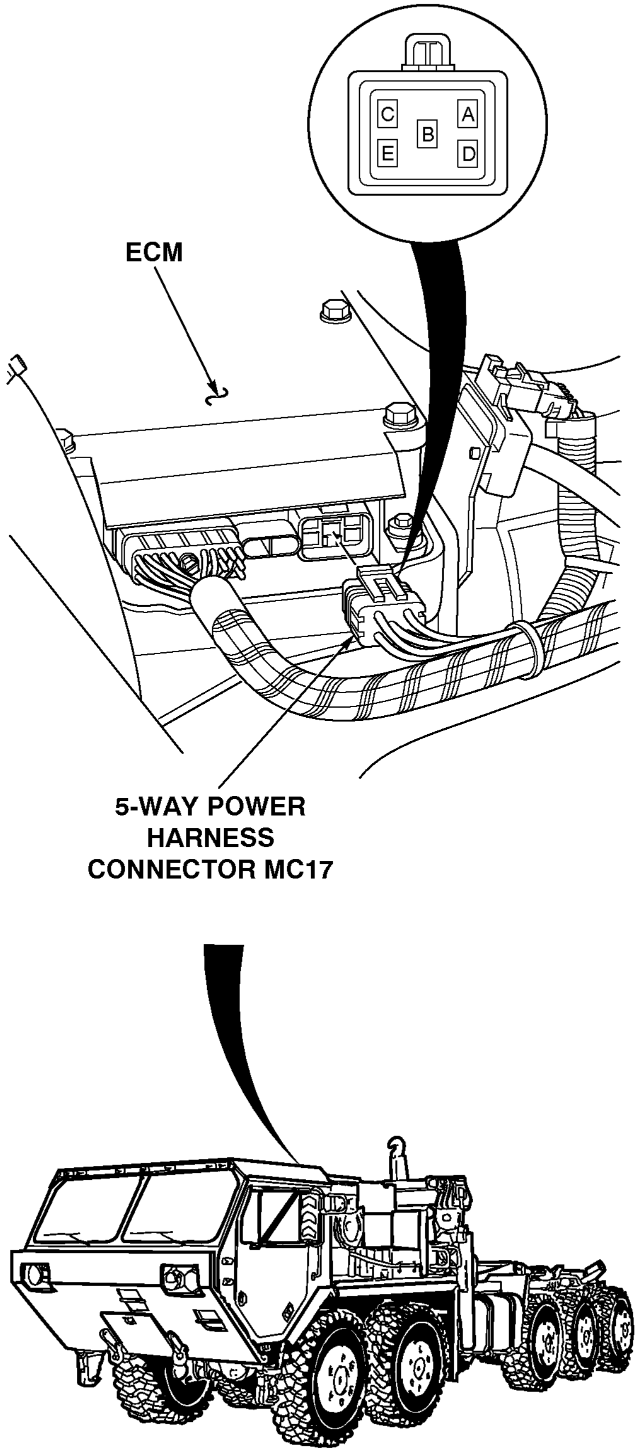

DDEC IGNITION
CIRCUIT BREAKER
CB 13


TYPICAL ECM
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

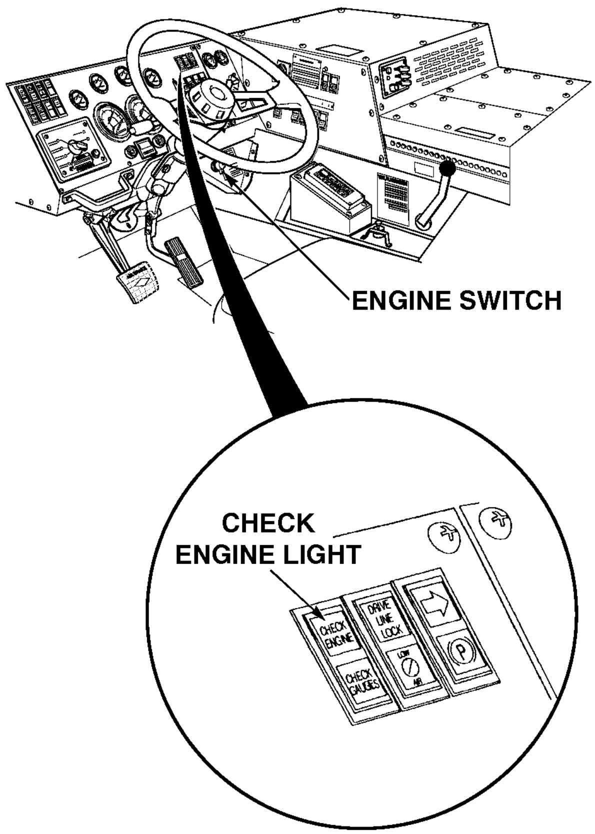
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–24 Check if Ignition Wire (Circuit #2) is Open		
• Read voltage between battery side (hot side) of the DDEC ignition circuit breaker (CB13) (red lead) and a good ground (black lead).	Less than 11.5 volts.	Go to C 2–27.
	Greater than or equal to 11.5 volts.	Ignition line (ckt #439) is open. Repair open. Then go to C 2–30.
C 2–25 Check if Ignition Wire is Shorted to Ground		
• Reset open circuit breaker. • Turn ignition on for at least 10 seconds. • Turn ignition off. • Check DDEC ignition circuit breaker (CB13) again.	Circuit breaker is still okay.	Go to C 2–26.
	Circuit breaker open.	Ignition line (ckt #439) is shorted to ground. Repair short. Then go to C 2–30.
C 2–26 Check if Ignition Circuit Breaker is Okay		
• Reconnect all harness connectors at ECM. • Attempt to start. • If engine starts, run engine for at least one minute. • Turn ignition off. • Check DDEC ignition circuit breaker (CB13).	Circuit breaker is still okay.	No short is currently present. (WARNING: If there is an intermittent short, engine will shut down again if not repaired. Also note circuit breaker may have blown due to temporary reverse voltage at the battery.) Go to C 2–30.
	Circuit breaker open.	Go to C 2–11.


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

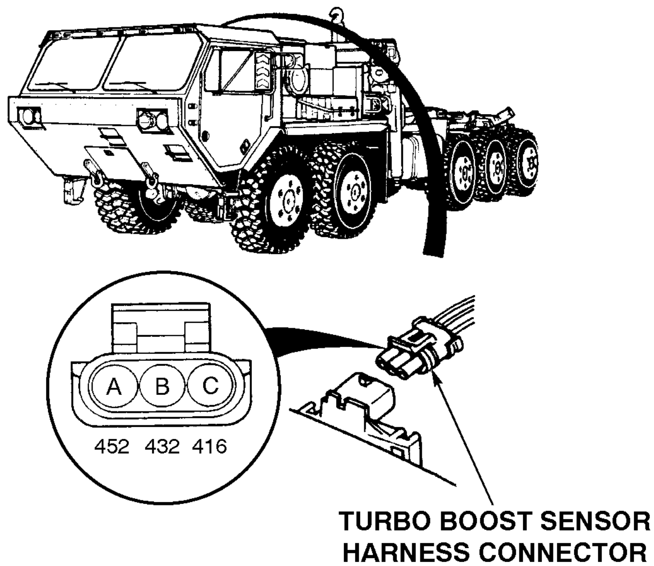
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–27 Check Battery		
• Disconnect battery cables at battery (para 7-87). • Read voltage at battery + terminal (red lead) to battery – terminal (black lead).	Less than 11.5 volts. →	Service discharged battery (TM 9-6140-200-14). (NOTE: If a short to ground exists anywhere in battery + circuit, this vehicle will shut down again if not repaired.) Then go to C 2–30.
	Greater than or equal to 11.5 volts. →	An open or short to ground exists in unfused ignition line (ckt #1866). Repair open or short to ground. Then go to C 2–30.
C 2–28 Check if Fuses Blow Again		
• Turn ignition off. • Disconnect the 5-way power harness connector at ECM. • Reset DDEC circuit breaker(s). • Wait 10 seconds. • Check if circuit breaker(s) has blown or opened up again.	Circuit breaker(s) are still okay. →	Go to C 2–26.
	Circuit breaker(s) are blown or open again. →	Go to C 2–29.
C 2–29 Check for Short to Ground in Wiring		
• Read resistance between (ckt #240) and a good ground. • Read resistance between (ckt #241) and a good ground.	Greater than or equal to 10,000 ohms or open on all readings. →	Go to C 2–11.
	Less than 10,000 ohms on any reading. →	Short to ground exists. Repair short(s). Then go to C 2–30.

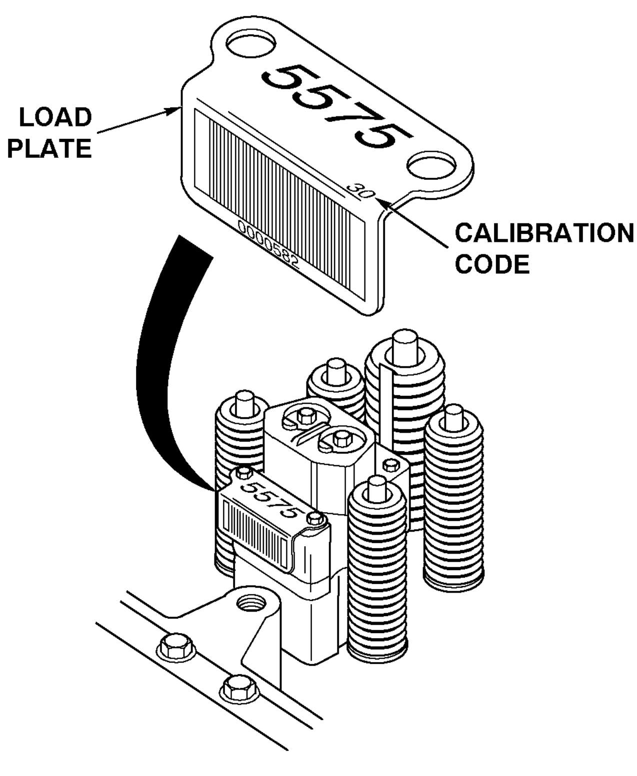

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
DRIVE
LINE
LOCK
CHECK
GAUGES
LOW
AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –2 - ENGINE CRANKS BUT WILL NOT START (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 2–30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) for 1 minute or until "Check Engine" light comes on. Stop engine. • Read inactive codes.	Engine will not start.	All system diagnostics are complete. Please review this section from the first step to find error.
	Engine starts and DDR reads No Codes.	Repairs are complete.
	Engine starts codes appear.	Go to START-1, pg 2-539, to service codes.
C 2–31 Check Fuel Filters		
• Turn ignition off. • Check primary and secondary fuel filters to be sure they are not clogged and that they are full of clean fuel.	Clogged filter(s).	Service fuel/water separator (para 4-15). Replace secondary filter (para 4-13). Prime system (TM 9-2320-364-10), if required. Then go to C 2–30.
	Clean filters and no air in filters.	Go to C 2–6.


A
B
C
452 432 416
TURBO BOOST SENSOR
HARNESS CONNECTOR


LOAD
PLATE
5575
30
0000582
CALIBRATION
CODE
5575

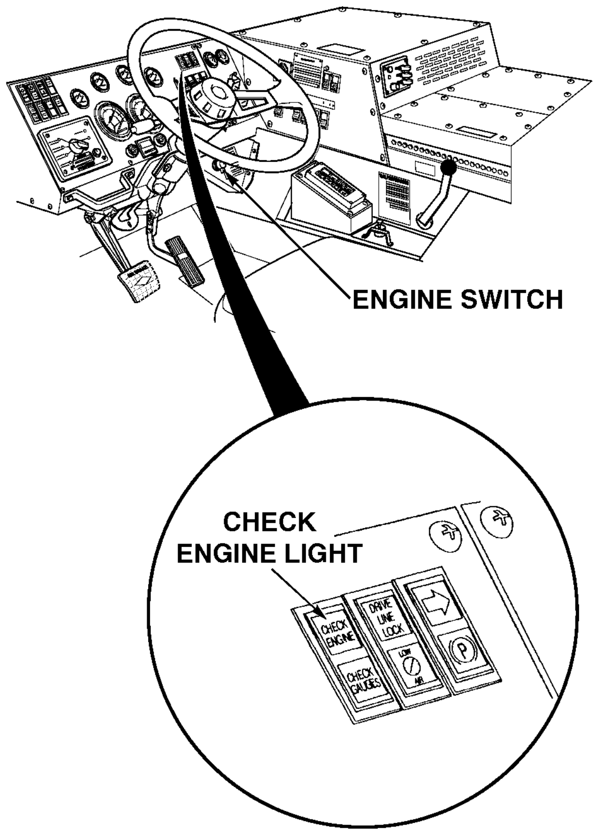
2-14. DDEC III TROUBLESHOOTING (CONT).

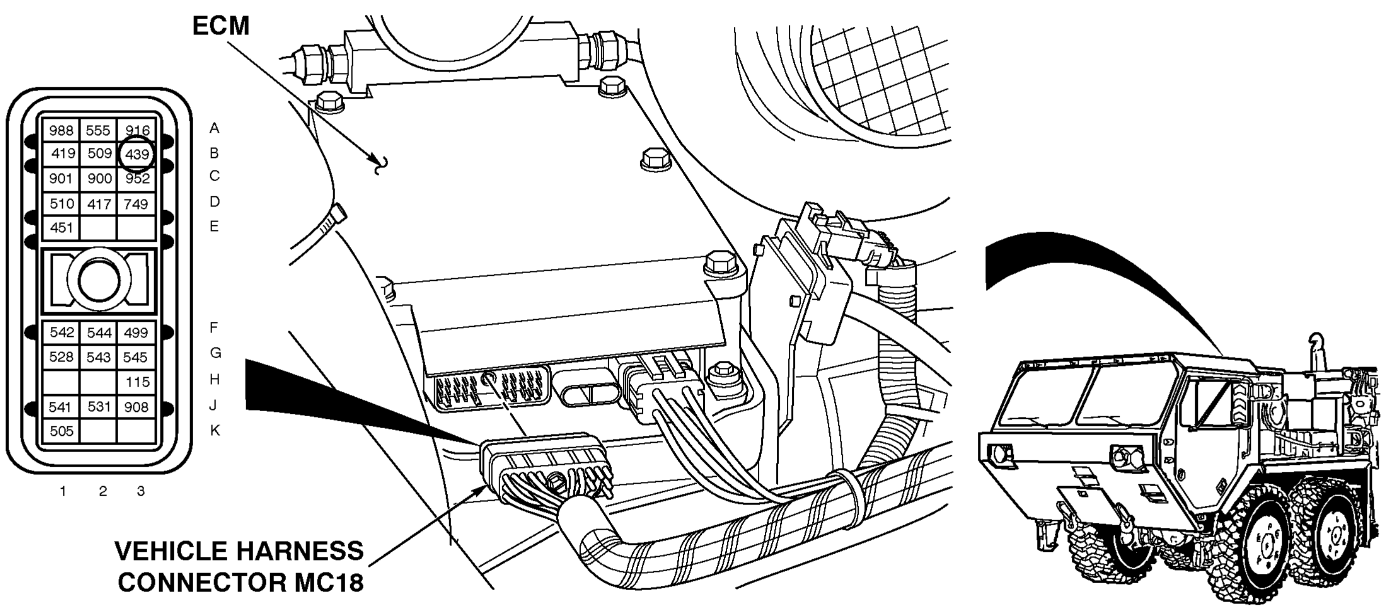
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –3 - ERRATIC PERFORMANCE AND NO CODES

This is a helpful hints chart. It assumes that you have received no codes, made all the basic mechanical checks first, could not find the problem, and suspect the DDEC III system to be at fault. Based on the particular symptom here's what to look for:

SYMPTOM	WHAT TO LOOK FOR
1. Can't get full power.	Plugged fuel filters (para 4-13 and 4-17). Hose not connected to Turbo Boost Sensor (TBS). Verify injector calibration(s) are correct: Remove rocker covers (para 3-4 and 3-5). Record the injector calibration codes found on the injector load plate for each injector. Compare the calibration codes with those on the DDR FUEL INJECTOR CAL display. Update calibration codes if necessary. See Section V for additional details. Install rocker covers (para 3-4 and 3-5).
2. Can't get full throttle.	Incorrect Throttle Position Sensor (TPS) counts. See Step 21-4 for details (page 2-643).
3. Runs rough, misses and/or occasionally stalls.	• Proper gapping of Timing Reference & Synchronous Reference Sensors (TRS and SRS). See Step C 2–8 (page 2-561) on how to check this. • Check for Fuel Leaks. • Loose battery power (ckt #240 or #241) ignition (ckt #439) or ground (ckt #150) wires. • Check power contribution from each cylinder using cylinder cut-out feature described in Diagnostic Data Reader (DDR) instruction manual. • Check pulse wheel: missing teeth, damaged or loose. • Check for signs of insulation wear on injector harnesses.
4. Engine idles high (after warm-up) or slow return to idle.	• Check calibration of Throttle Position Sensor (TPS) using procedure in Step 21-4 (page 2-643). You may have a TPS or pedal problem. • Check vernier control signal line (ckt #525) for short to voltage source.


ENGINE SWITCH
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A B C D E F G H J K
1 2 3
VEHICLE HARNESS CONNECTOR MC18

2-14. DDEC III TROUBLESHOOTING (CONT).

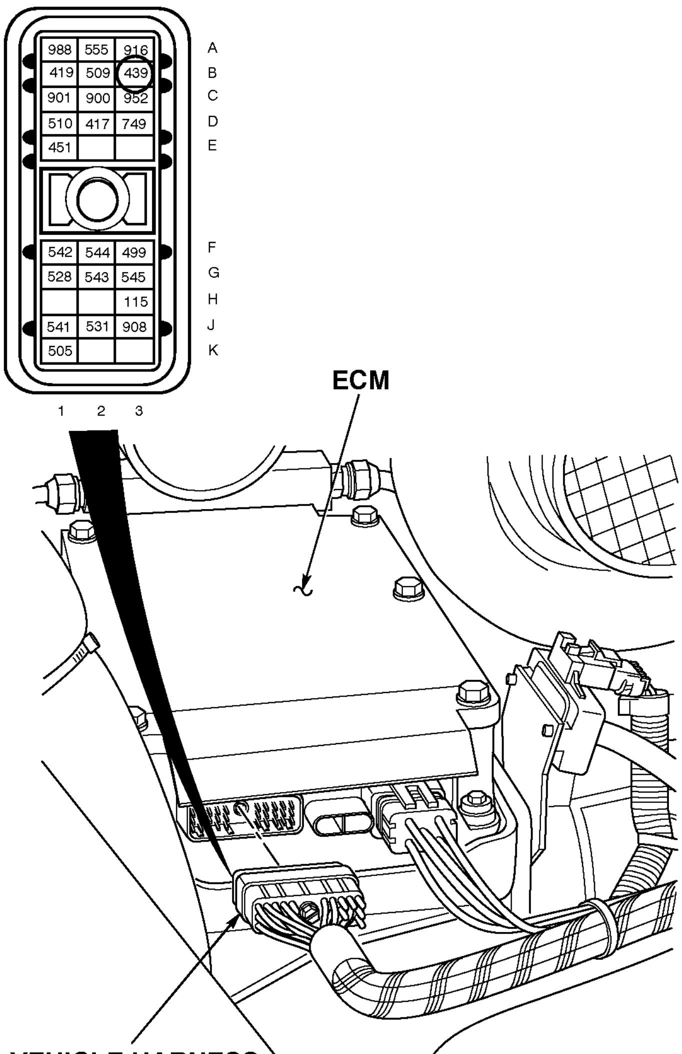
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –4 - NO "CHECK ENGINE" LIGHT DURING BULB CHECK OR CANNOT CLEAR CODES

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 4–1 Try to Force CEL On		
• Plug in DDR. • Turn ignition on. • Select ACTIVATE OUTPUTS. • Activate "Check Engine" light.	DDR display is blank or random.	Go to C 4–2.
	"Check Engine" light is still off.	Go to C 4–2.
	"Check Engine" light is still on.	Go to C 4–4.
C 4–2 Check for Ignition		
• Read voltage on vehicle harness connector, socket B3 (red lead) to a good ground (black lead) with the ignition on and engine off.	Less than 10.0 volts.	The DDEC ignition circuit breaker (CB13) is blown and/or ignition wires are open or shorted to ground, and/or the ignition line (ckt #439) is shorted to ground or is not wired to switch ignition source (See note below). Repair problem. Then go to C 4-30.
	Greater than or equal to 10.0 volts.	Go to C 4–3.
C 4–3 CEL Drive Line and Bulb Check		
• Turn ignition off. • Remove CEL bulb and check whether it's burned out or otherwise damaged.	Bulb is okay.	CEL driver line (ckt #419) or ground line (ckt #150) is open. Repair open. Then go to C 4-30.
	Bulb is not okay.	Replace bulb (para 7-24). Then go to C 4-30.

*NOTE: Inactive codes will not clear and engine hours/fuel consumption values will not update if main ECM power (ckt #240 and #241) is switched off with or before ignition.


988
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916
419
509
439
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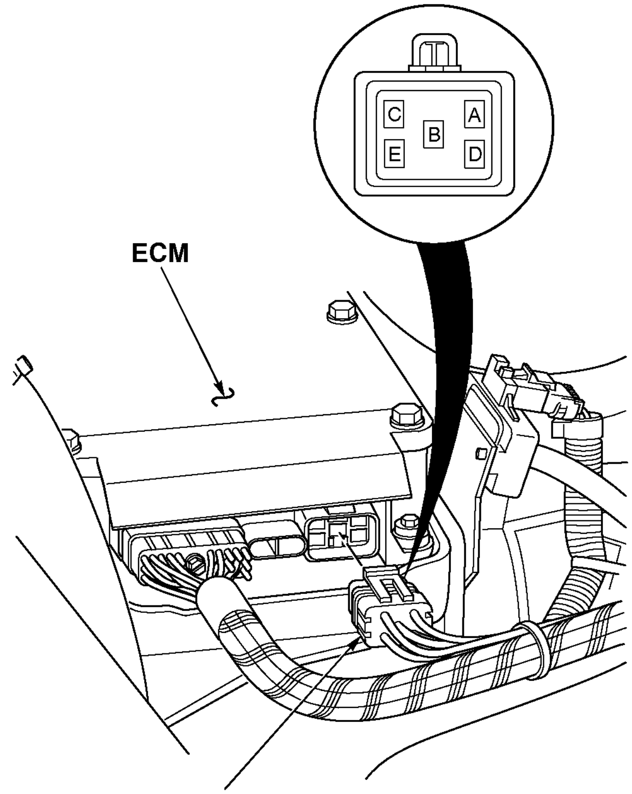
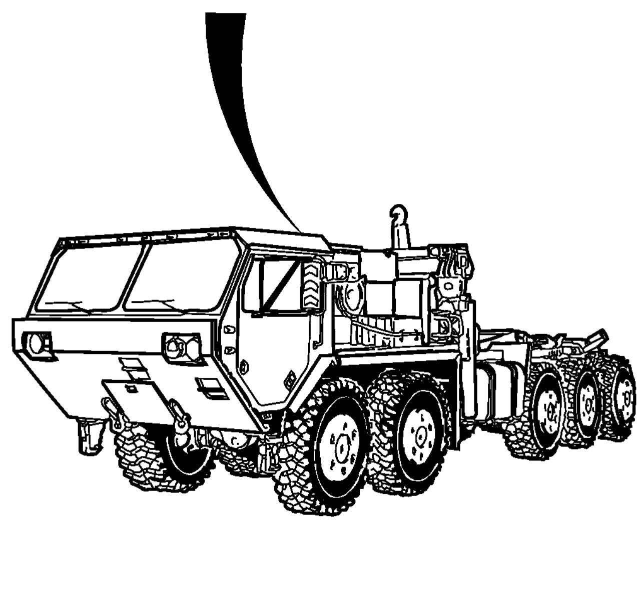
900
952
510
417
749
451
542
544
499
528
543
545
115
541
531
908
505
A
B
C
D
E
F
G
H
J
K
1
2
3
ECM
VEHICLE HARNESS
CONNECTOR MC18


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

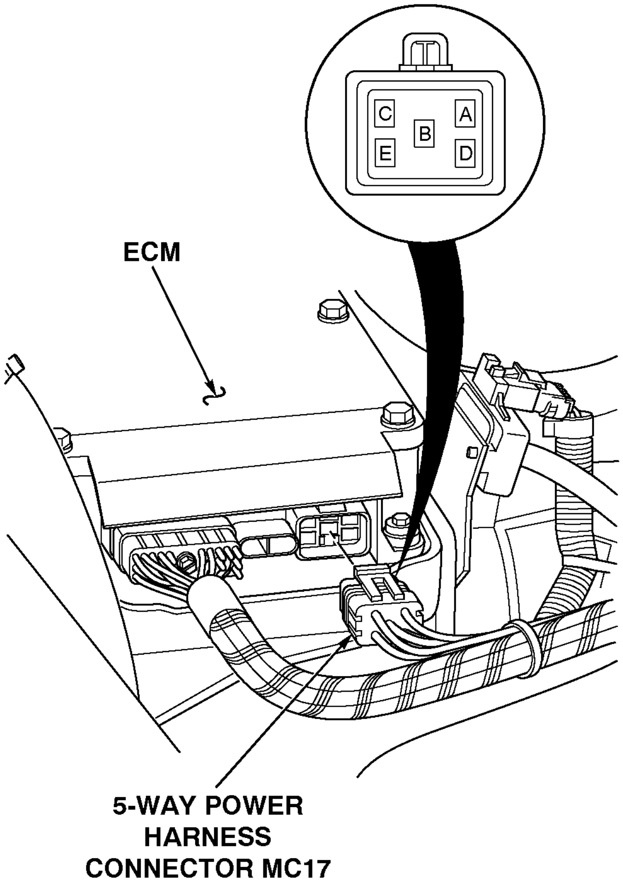


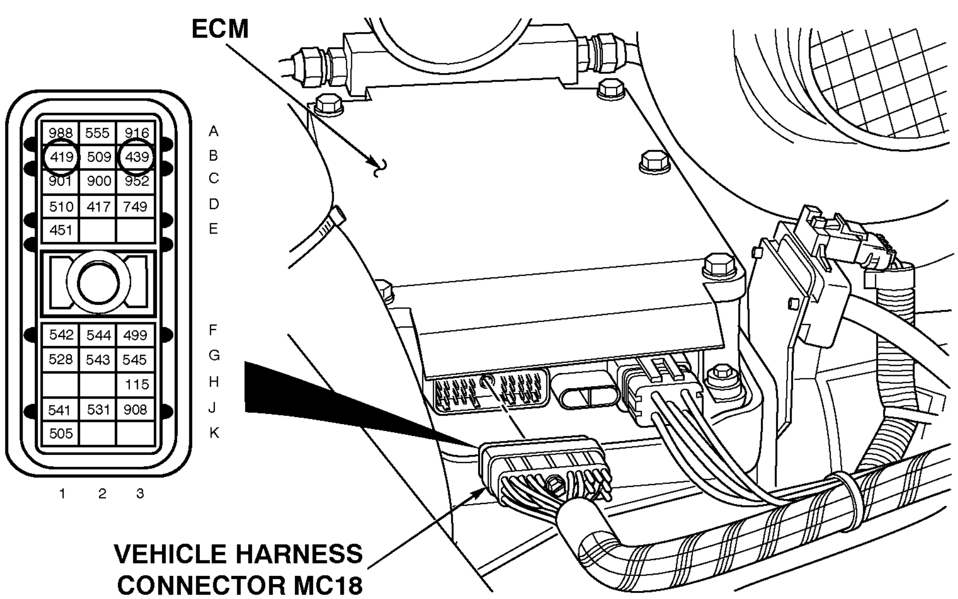
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –4 - NO "CHECK ENGINE" LIGHT DURING BULB CHECK OR CANNOT CLEAR CODES (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 4–4 Check for Open		
• Remove jumper wire. With ignition on, read voltage on vehicle harness connector, socket B3 (red lead) to a good ground (black lead).	Less than 10.0 volts. →	The ignition line (ckt #439) is open. Repair open. Then go to C 4-30.
	Greater than or equal to 10.0 volts. →	Go to C 4–5.
C 4–5 Check for Bat +		
• Turn ignition off. • Disconnect the 5-way power harness connector. • Read voltage at the 5-way power harness connector. Socket A (red lead) to a good ground (black lead). • Repeat voltage readings on 5-way power harness connector, keeping the black lead to a good ground and the red lead to socket C.	Less than 10.0 volts on any reading. →	Either one of the 20 Amp, DDEC circuit breakers (CB22 or CB23) is blown and/or the Battery Power line(s) (ckt #240 or #241) has an open or short to ground. Check that the battery power (ckt #240 and #241) are not switched off when the ignition is turned off (see note below). Repair problem. Then go to C 4-30.
	Greater than or equal to 10.0 volts on readings. →	Go to C 4–6.

*NOTE: Engine update information may not update if main ECM power (ckt #240 and #241) is switched off with/or before ignition.


C
B
A
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17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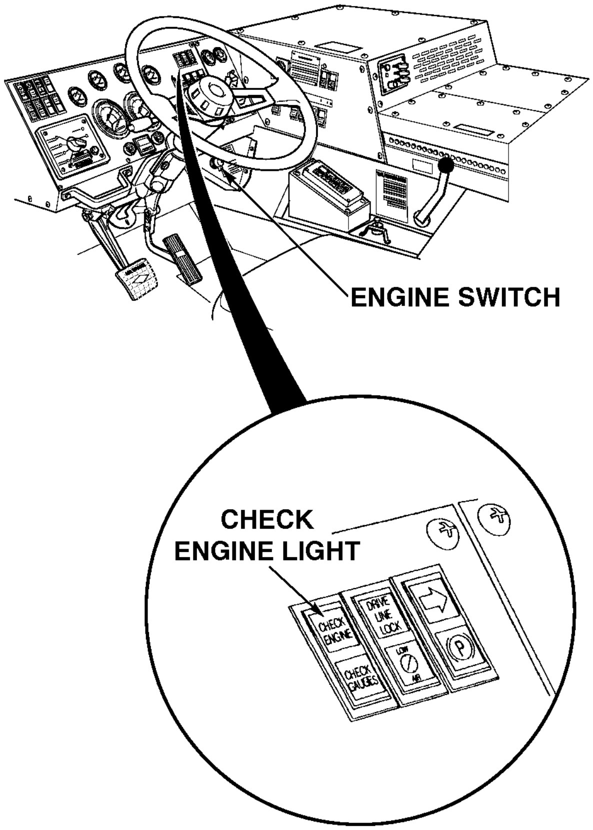
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

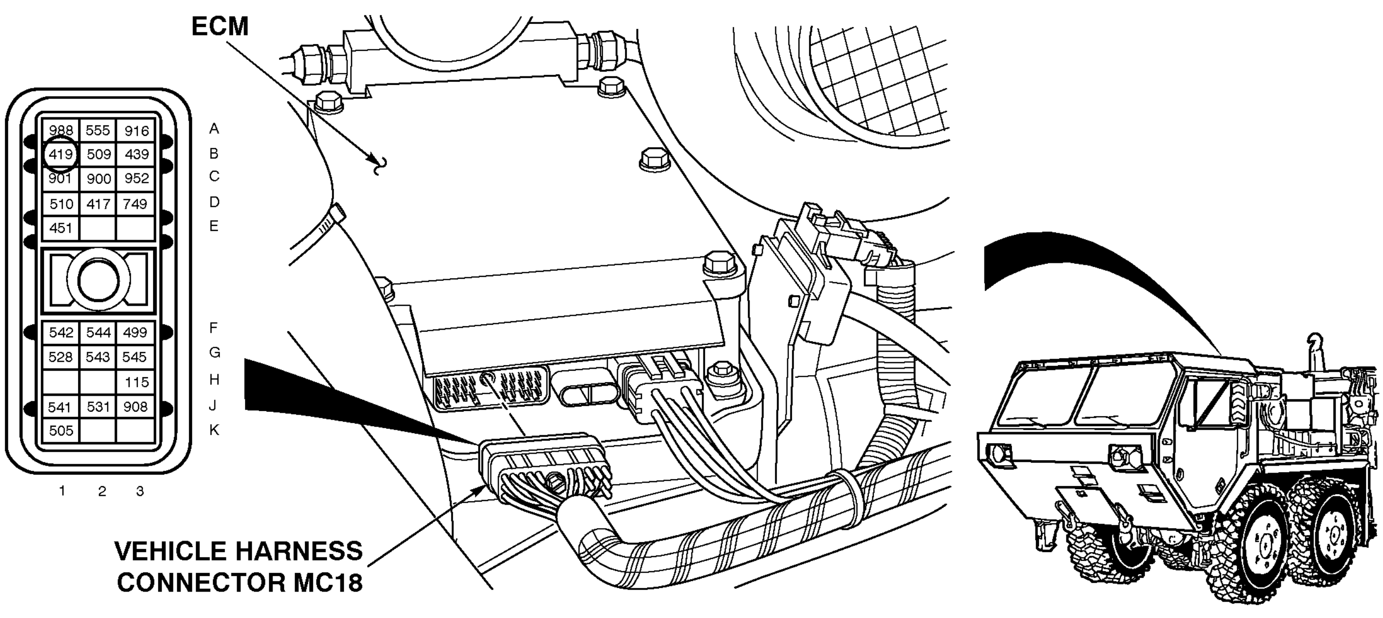
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –4 - NO “CHECK ENGINE” LIGHT DURING BULB CHECK OR CANNOT CLEAR CODES (Cont’d)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 4–6 Check for Open		
• Move black lead of voltmeter to socket D (of the 5-way power harness connector). • Read voltage using red lead at sockets A and C of the 5-way power harness connector. • Move black lead of voltmeter to socket E of the 5-way power harness connector. • Again read voltage at sockets A, and C of the 5-way power harness connector. • Move black lead to socket B of 5-way. Check voltage at A and C.	Less than 10.0 volts on any reading. →	Ground line(s) (ckt #150 or 151) has an open. Repair open. Then go to C 4-30.
	Greater than or equal to 10.0 volts on all readings. →	Go to C 4–7.
C 4–7 Check ECM Connectors		
• Check terminals at vehicle harness (especially B3 and B1) and all the terminals in the 5-way power harness connectors (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to C 4-30.
	Problem found. →	Repair terminals/connectors (para 7-101).Then go to C 4-30.
C 4-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on while at the same time observing the “Check Engine” light.	“Check Engine” light comes on for up to 5 seconds, then goes out. →	Repairs are complete.
	“Check Engine” light does not come on at all. →	All system diagnostics are complete. Please review this section from the first step to find the error.
	“Check Engine” light comes on and stays on. →	Go to START-1, pg 2-539.

*NOTE: Historical codes will not clear and engine hours/fuel consumption values will not update if main ECM power (ckt #240 and #241) is switched off with ignition.


ENGINE SWITCH
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK


ECM
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS CONNECTOR MC18

2-14. DDEC III TROUBLESHOOTING (CONT).

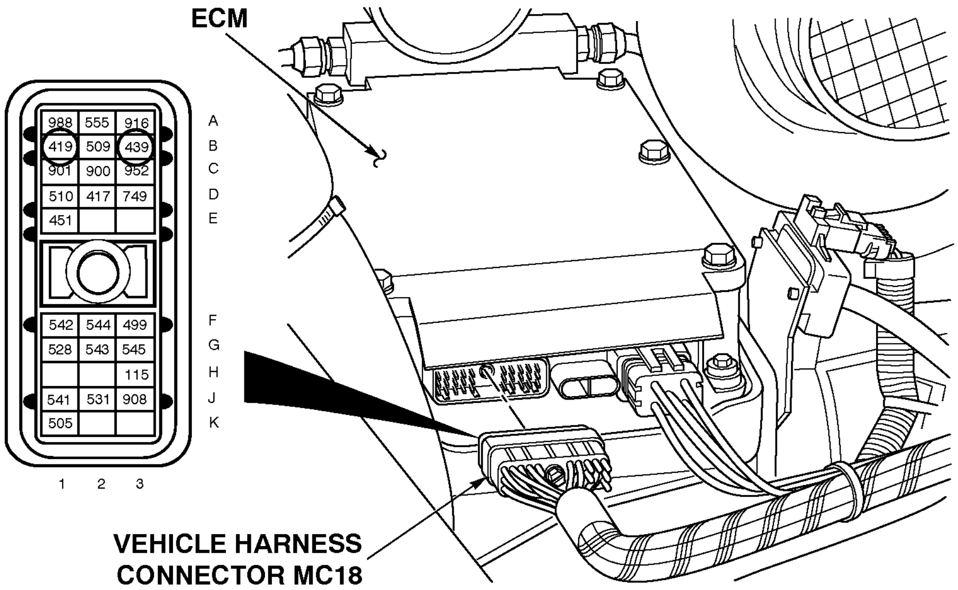
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –5 - "CHECK ENGINE" LIGHT ON AND NO ACTIVE CODE ON DDR

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

This is a digital output function.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 5-1 Check for Short (Ckt #528)		
• Turn ignition on. Observe "Check Engine" light.	Erratic or intermittent "Check Engine" light.	Check for short to ground on diagnostic request line (ckt #528). Repair short. Then go to C 5-30.
	"Check Engine" light comes on and stays on.	Go to C 5-2.
C 5-2 Check Light Status		
• Plug in DDR. • Select SWITCH/LIGHT STATS.	CEL reads on.	Go to C 5-4.
	CEL reads off.	Go to C 5-3.
C 5-3 Check for Short (Ckt #419)		
• Turn ignition off. • Disconnect the vehicle harness connector at ECM. • Turn ignition on (engine not running) while at same time observing "Check Engine" light.	"Check Engine" light comes on and stays on.	CEL driver line (ckt #419) is shorted to ground. Repair short Then go to C 5-30.
	"Check Engine" light stays off.	Go to C 5-4.
C 5-4 Force CEL On		
• Install jumper wire between socket B1 of vehicle harness connector and a good ground. • Observe "Check Engine" light.	"Check Engine" light comes on and stays on.	Go to C 5-5.
	"Check Engine" light stays off.	The ignition line (ckt #439) is not correctly wired to CEL bulb. See if bulb has been wired into ignition line (#439) instead of the proper #419 wire. Correct problem. Then go to C 5-30.


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
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A
B
C
D
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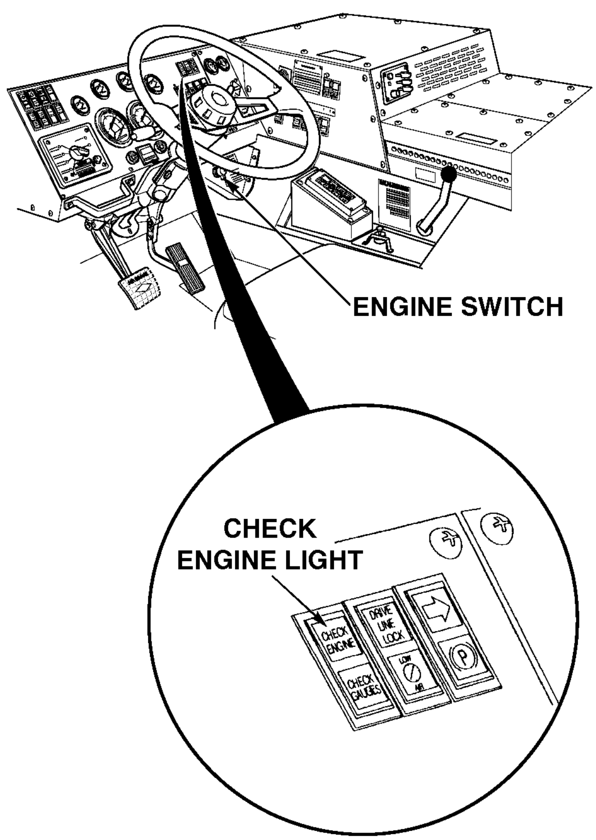
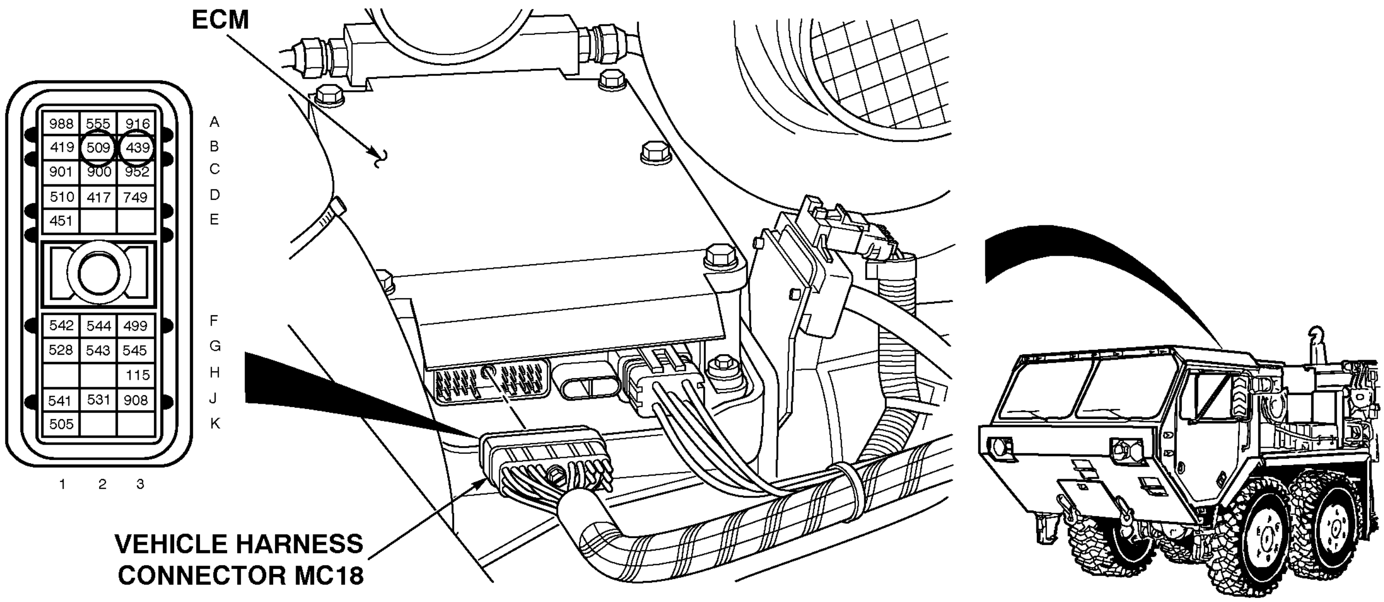
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

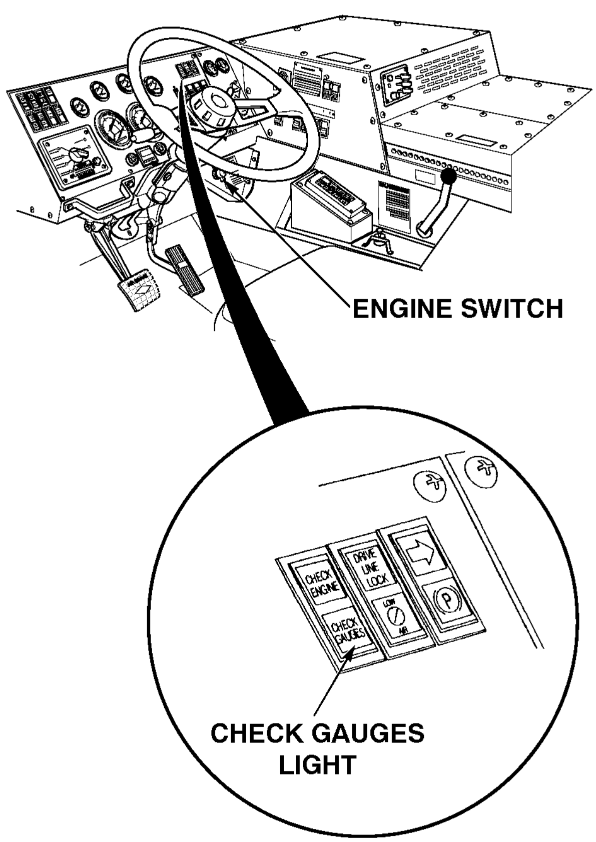

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –5 - "CHECK ENGINE" LIGHT ON AND NO ACTIVE CODE ON DDR (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 5-5 Check ECM Connectors		
• Turn ignition off. • Check terminals at vehicle harness connectors (both ECM and harness side) for damage; bent, corroded and unseated pins or sockets. • Check terminals in connector to be sure B1 is wire #419 and B3 is wire #439.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then to go C 5-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to C 5-30.
C 5-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on while at same time observing "Check Engine" light. • If "Check Engine" light stays on, read inactive code.	"Check Engine" light comes on for up to 5 seconds, then goes out. →	Repairs are complete.
	"Check Engine" light does not come on at all. →	Go to C 4–1.
	No active codes and "Check Engine" light comes on and stays on. →	All system diagnostics are complete. Please review this section from first step to find the error.
	Fault codes present. →	Go to START-1, pg 2-539 to service other codes.


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18


ENGINE SWITCH
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES
CHECK GAUGES
LIGHT

2-14. DDEC III TROUBLESHOOTING (CONT).

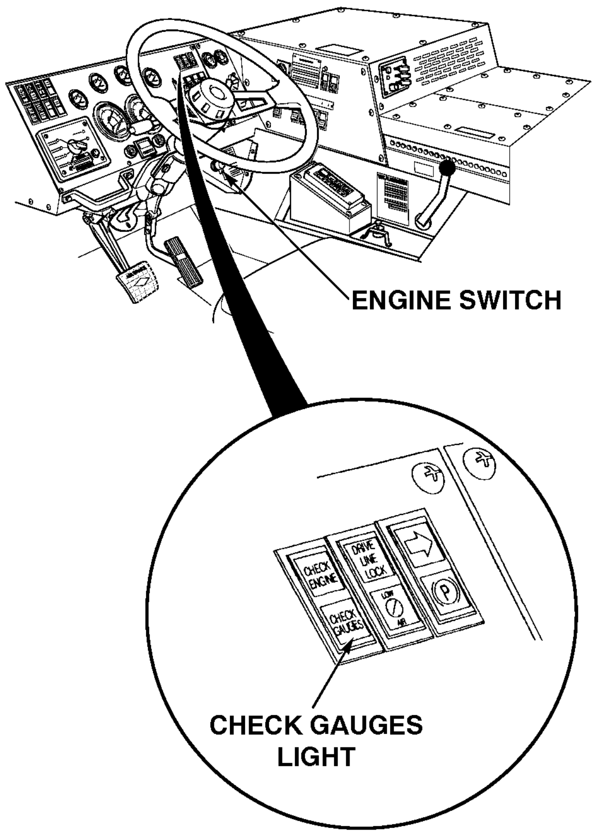
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –6 - “CHECK GAUGES” LIGHT ON AND NO ACTIVE CODE ON DDR

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

This is a Digital output function.

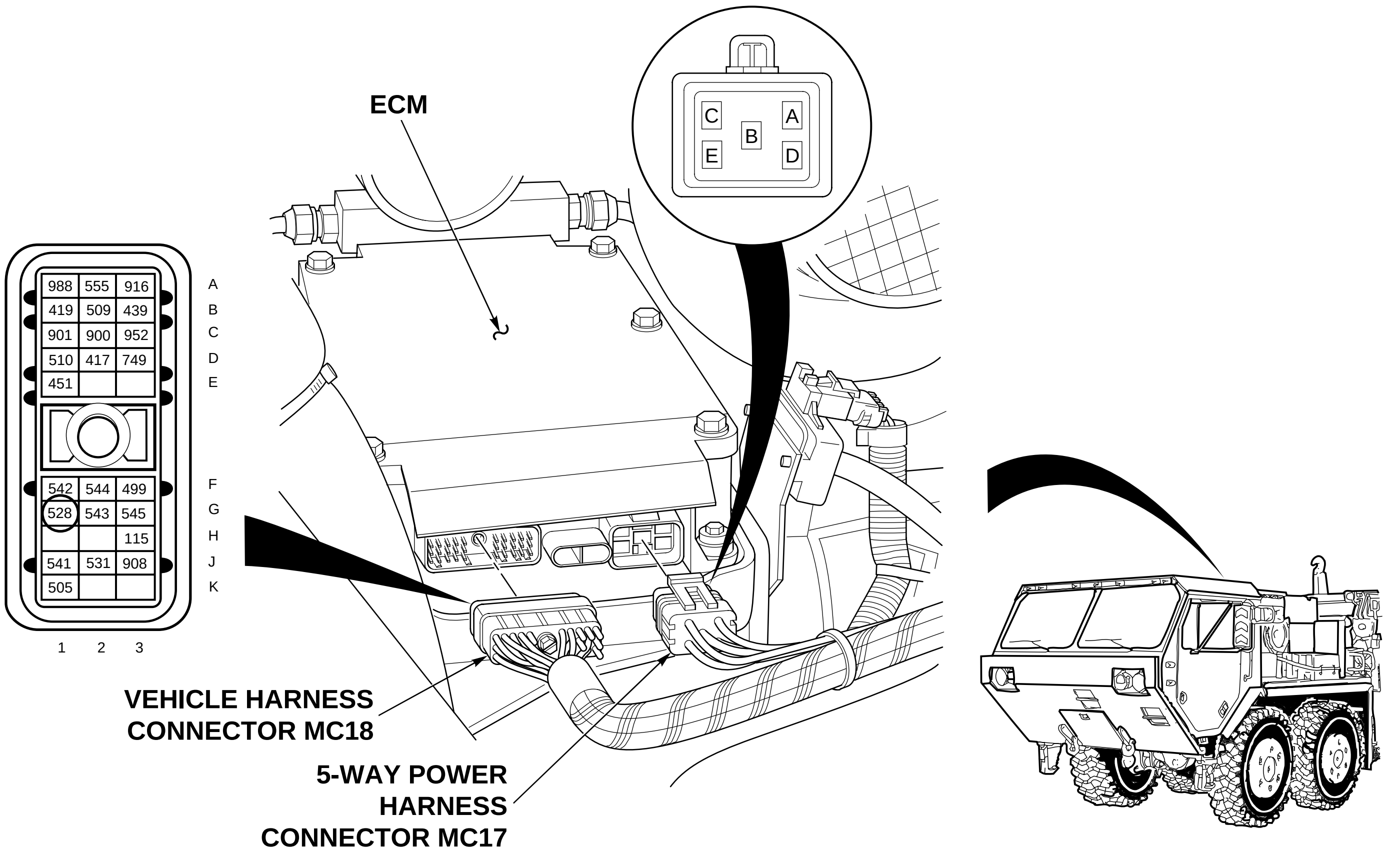
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 6-1 Determine “Check Gauges” Light Status		
• Turn ignition on (engine not running) while at the same time observing “Check Gauges” light.	“Check Gauges” light comes on for up to 5 seconds, then goes out.	This is the normal operation. Unless other problems exist, return to service.
	“Check Gauges” light comes on and stays on.	Go to C 6-2.
C 6-2 Light Status - DDR		
• Plug in DDR. • Select SWITCH/LIGHT STATS. • Read CGL.	CGL reads on.	Go to C 6-4.
	CGL reads off.	Go to C 6-3.
C 6-3 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector at ECM. • Turn ignition on (engine not running) while at same time observing “Check Gauges” light.	“Check Gauges” light comes on and stays on.	“Check Gauges” light driver line (ckt #509) is shorted to ground. Repair short. Then go to C 6-30.
	“Check Gauges” light stays off.	Go to C 6-4.
C 6-4 Check ECM Connectors		
• Check terminals at vehicle harness connector (both ECM and harness side) for damage bent, corroded, and unseated pins or sockets. Pay close attention to B2 and B3.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to C 6-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to C 6-30.


ENGINE SWITCH
CHECK ENGINE
DRIVE LINE LOCK
LOW AIR
CHECK GAUGES
CHECK GAUGES LIGHT

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –6 - “CHECK GAUGES” LIGHT ON AND NO ACTIVE CODE ON DDR (Cont’d)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 6-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on while at same time observing “Check Gauges” light.	“Check Gauges” light comes on for up to 5 seconds then goes out.	Repairs are complete.
	“Check Gauges” light comes on and stays on.	All system diagnostics are complete. Please review this section from the first step to find error.


ECM
C
A
B
E
D
988 555 916
419 509 439
901 900 952
510 417 749
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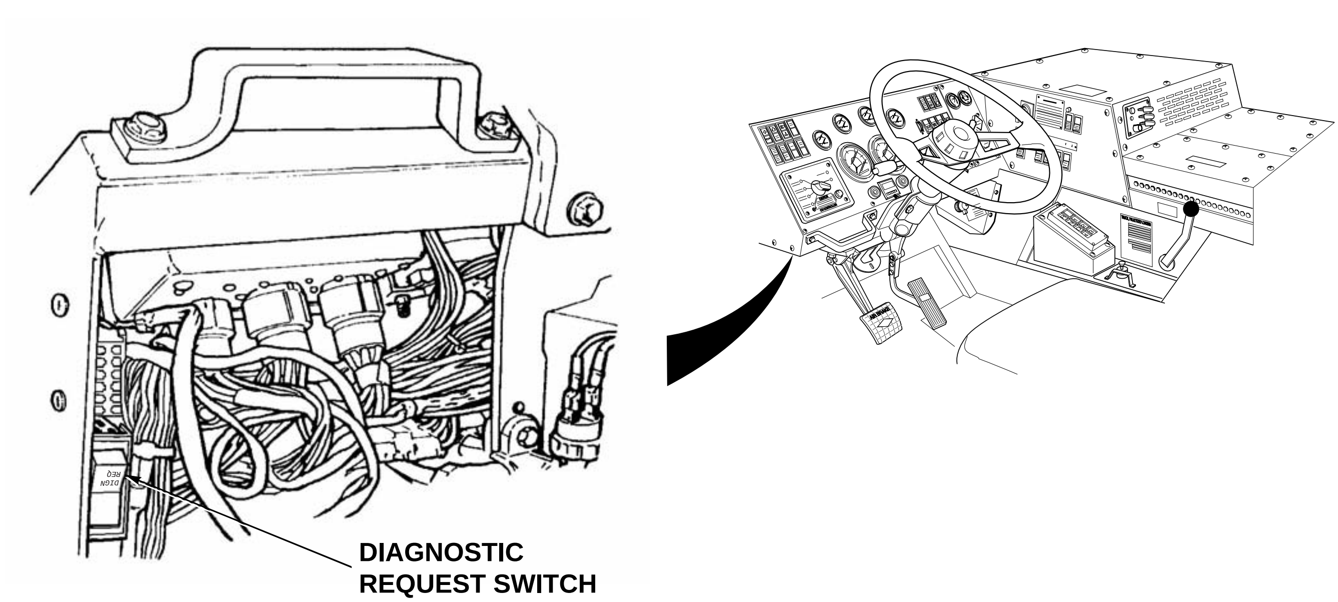
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18
5-WAY POWER
HARNESS
CONNECTOR MC17


DIAGNOSTIC
REQUEST SWITCH

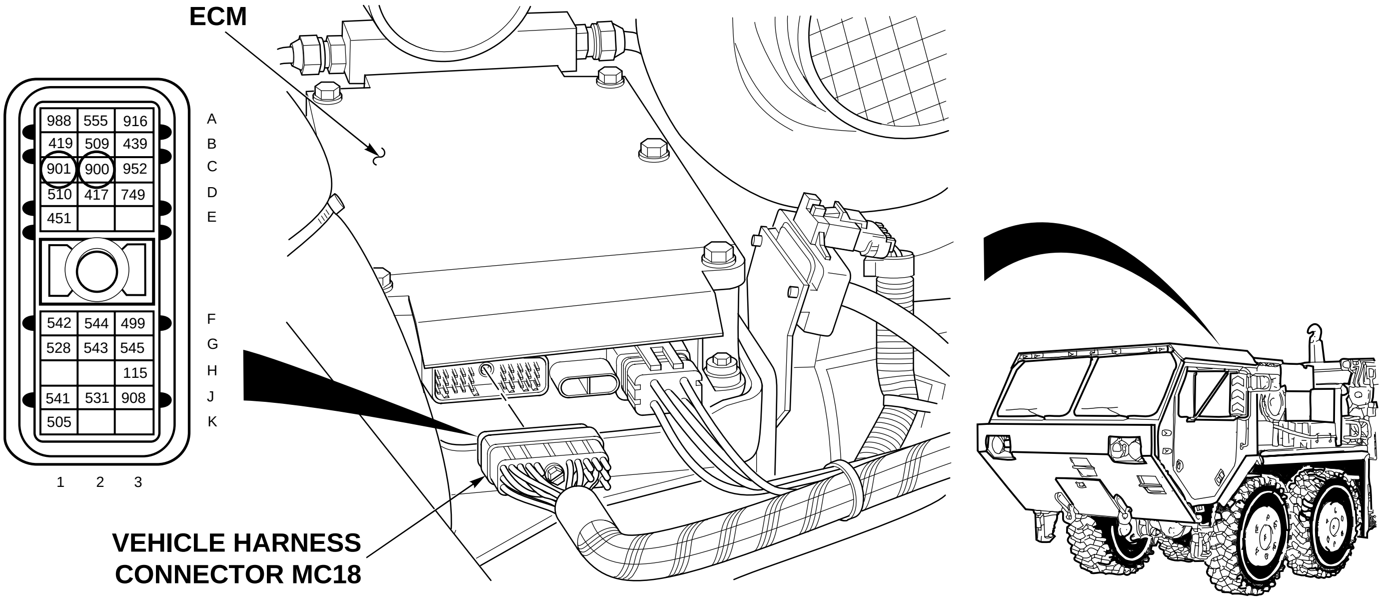
2-14. DDEC III TROUBLESHOOTING (CONT).

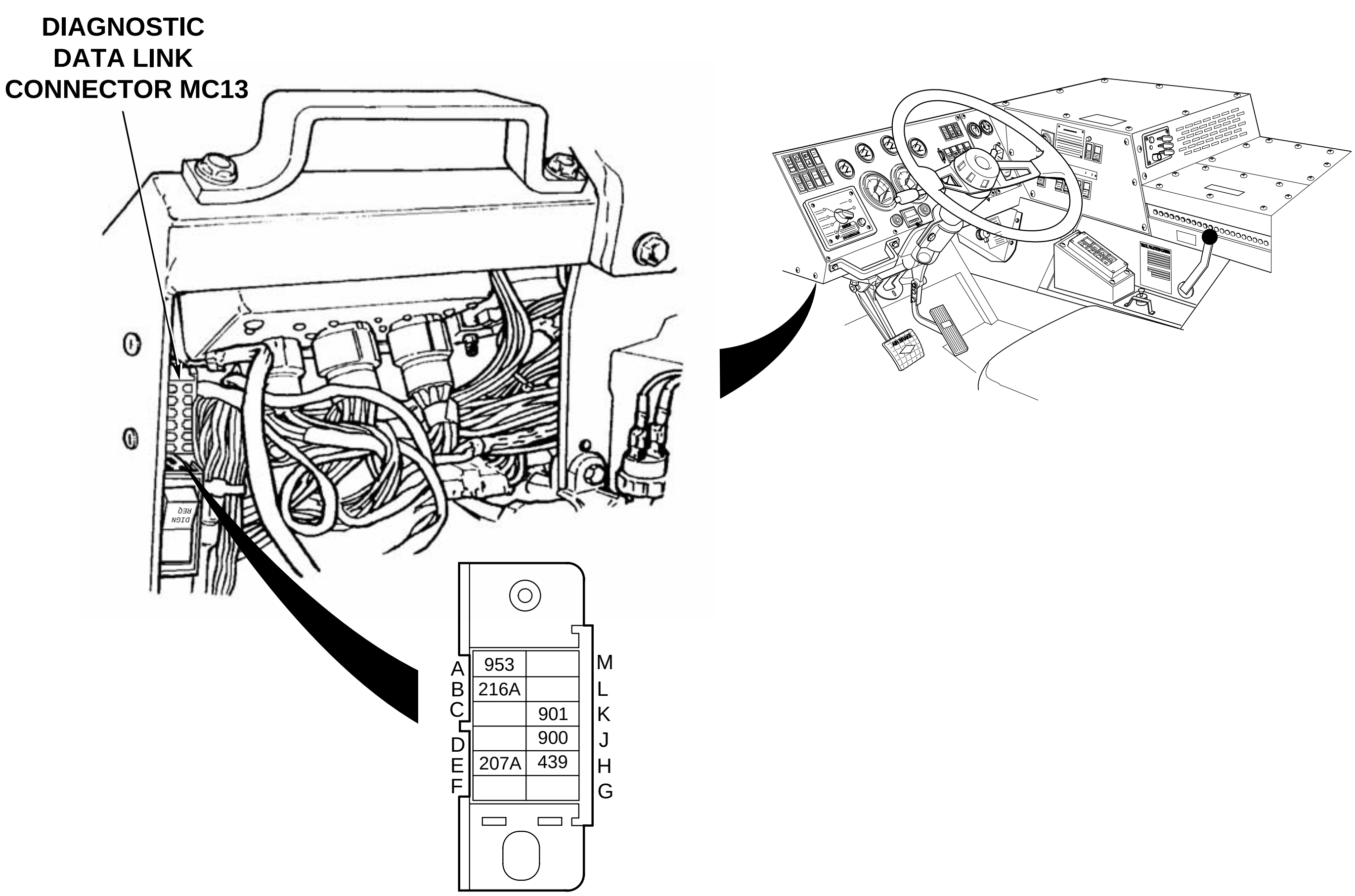
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –7 - NO DATA TO DDR

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 7-1 Read Codes on the "Check Engine" Light		
• Unplug DDR. • Ignition on. Engine not running. • Depress and hold diagnostic request switch. • Read codes flashing out on "Check Engine" light.	Flashes out codes. →	Go to C 7-4 (NOTE: If you wish to bypass diagnosis of a potential data line of DDR problem for now, go to CEL-3, page 2-549).
	Does not flash out codes. →	Go to C 7-2.
C 7-2 Check Diagnostic Request Circuit		
• Ignition on. • Plug in DDR. • Select VIEW CALIBRATION. • Select ECM INs/OUTs to determine port assigned to "Diagnostic Request" (i.e., G1 - #528) • Go to SWITCH/LIGHT STATS. • Depress and hold diagnostic request switch. • Read status of diagnostic request.	Switch reads off. →	The diagnostic request circuit (#528) is open or ground is poor or open. Repair open wire or bad ground. Then go to C 7-30.
	Switch reads on. →	Go to C 7-3.
C 7-3 Check ECM Connectors		
• Check terminals at vehicle harness and 5-way power harness connectors (both ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to C 7-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to C 7-30.

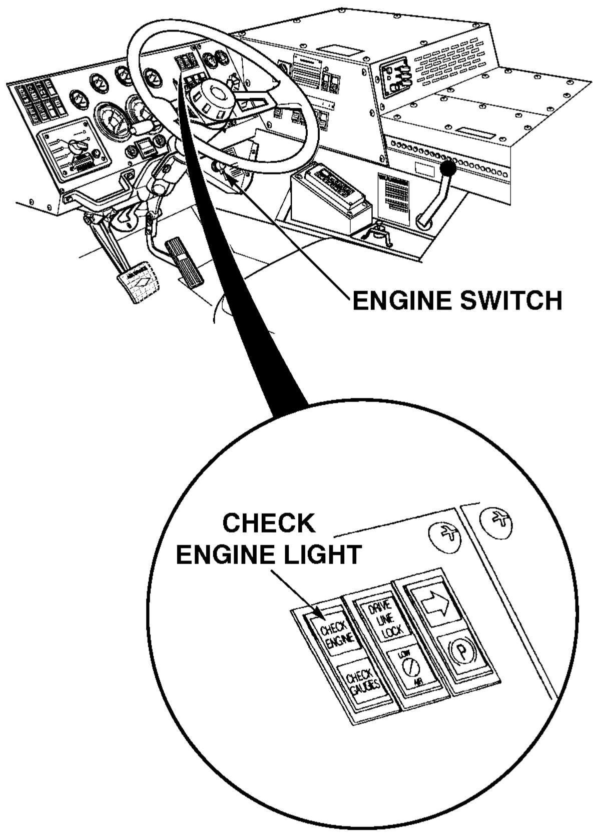

ECM
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18


DIAGNOSTIC
DATA LINK
CONNECTOR MC13
A 953 M
B 216A L
C 901 K
D 900 J
E 207A 439 H
F G

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –7 - NO DATA TO DDR (Cont'd)

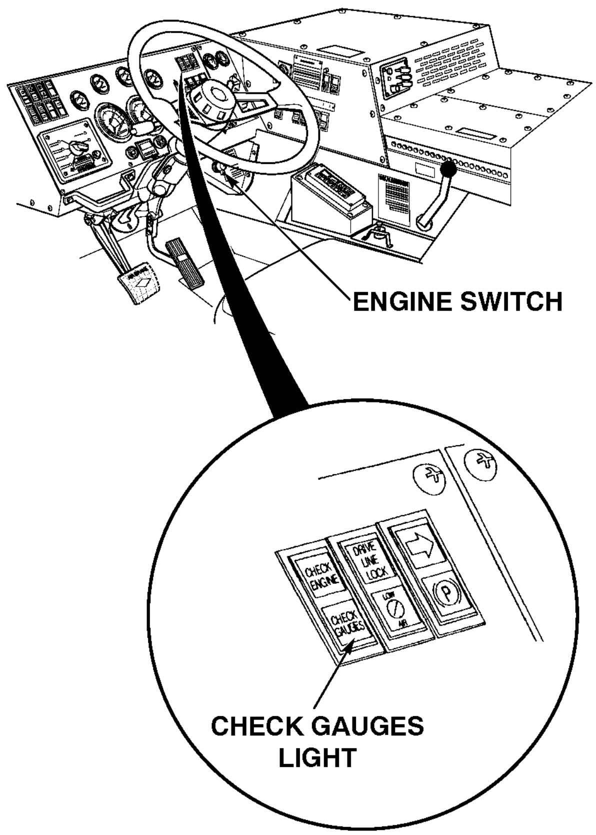
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 7-4 Check for Open Light		
• Turn off ignition. • Place a jumper wire across pins – J (#900) and K (#901) of DDL connector. • Unplug vehicle harness connector and measure resistance between sockets C1 and C2.	Greater than 5 ohms. →	One or both data wires (ckt #900 or #901) is open. Repair open and go to C 7-30.
	Less than 5 ohms. →	Go to C 7-5.
C 7-5 Check for Short		
• Remove jumper wire from DDL connector. • Read resistance between sockets C1 (#901) and C2 (#900) of vehicle harness connector.	Less than 5 ohms. →	Two data wires are shorted together (ckt #900 and #901). Repair short and go to C 7-30.
	Greater than 5 ohms. →	Go to C 7-6.
C 7-6 Check for Short to Ignition and Ground		
• Remove all jumpers from the DDL connector. • Measure resistance between socket J (#900) and A (ground), J (#900) and C (sw-ign), K (#901) and A (ground), and K (#901) and C (sw-ign) of DDL connector.	Less than 5 ohms on any reading. →	A short exists between a data wires and ignition or ground. Repair short and go to C 7-30.
	Greater than 5 ohms on any reading. →	Go to C 7-7.
C 7-7 Check DDR on Another Engine		
• Connect DDR to another engine and read any parameter in menu.	Works okay. →	Go to C 7-30.
	Does not work. →	DDR is probably defective. See DDR instruction manual for repair.

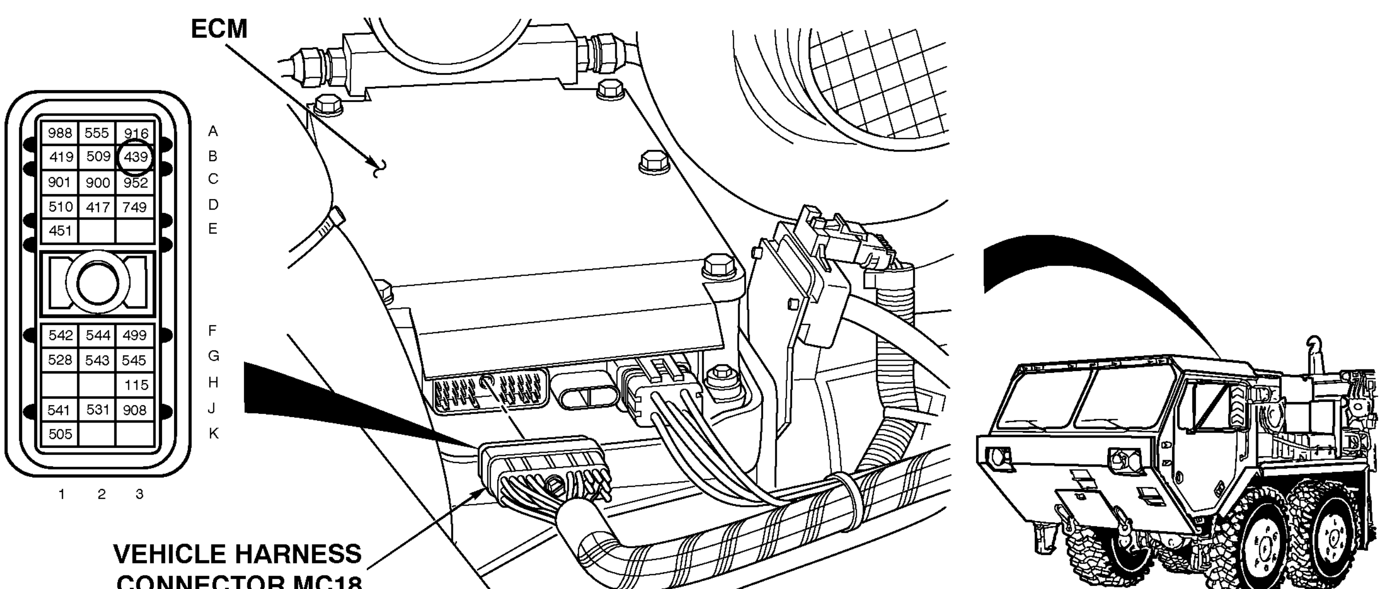

ENGINE SWITCH
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –7 - NO DATA TO DDR (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 7-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) for 1 minute or until "Check Engine" light comes on. Stop engine. • Read inactive codes.	DDR display reads "NO DATA RECEIVED FROM SYSTEM" or "DDEC SYSTEM NOT RESPONDING".	All system diagnostics are complete. Review this section from first step to find error.
	Engine starts and DDR reads No Codes.	Repairs are complete.
	Engine starts and code appears.	Go to START-1, pg 2-539, to service codes.


ENGINE SWITCH
CHECK ENGINE
DRIVE LINE LOCK
LOW AIR
CHECK GAUGES
CHECK GAUGES LIGHT


ECM
988 555 916
419 509 439
901 900 952
510 417 749
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528 543 545
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541 531 908
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1 2 3
VEHICLE HARNESS CONNECTOR MC18

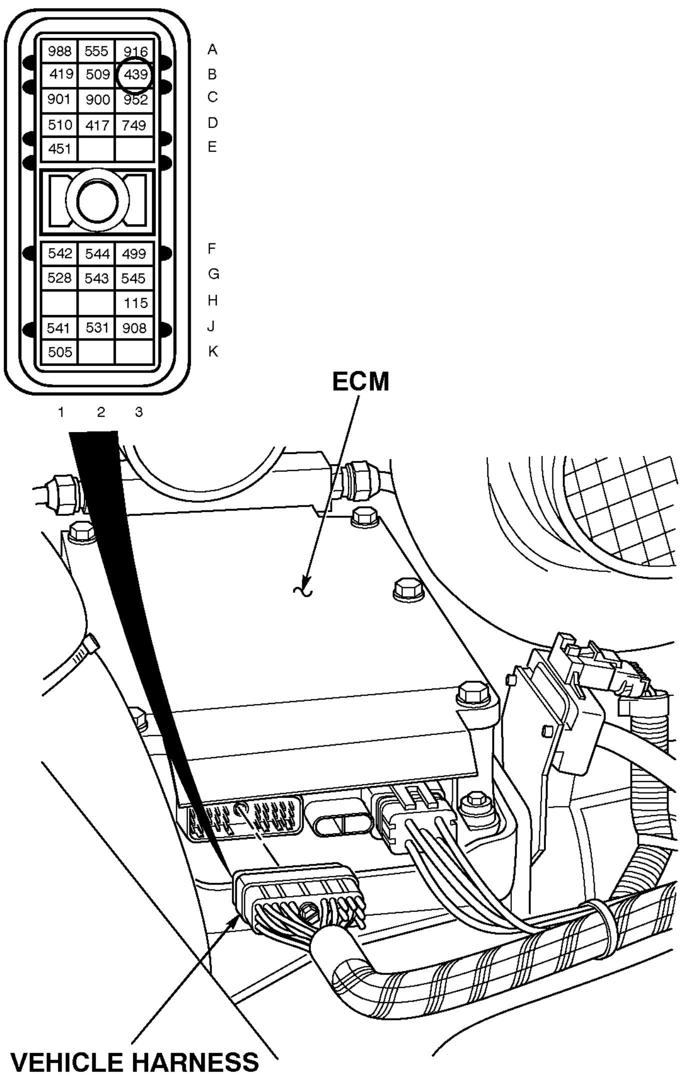
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –8 - NO "CHECK GAUGES" LIGHT (CGL) DURING BULB CHECK

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 8-1 Try to Force CGL on		
• Plug in DDR. • Turn ignition on. • Select activate outputs • Activate CGL with DDR.	CGL is still off. →	Go to C 8-2.
	CGL is on. →	Go to C 8-4.
C 8-2 Check for Short		
• Remove jumper wire. • Read voltage on vehicle harness connector, socket B3 (red lead) to a good ground (black lead).	Less than 11.5 volts. →	DDEC ignition circuit breaker (CB13) is blown, and/or ignition line (ckt #439) is open or shorted to ground. Repair problem. Then go to C 8-30.
	Greater than or equal to 11.5 volts. →	Go to C 8-3.
C 8-3 Bulb Check		
• Remove CGL bulb and check whether it's burned out or otherwise damaged.	Bulb is okay. →	CGL Driver line (ckt #509) is open. Repair open. Then go to C 8-30.
	Bulb is not okay. →	Replace bulb (para 7-24). Then go to C 8-30.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901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
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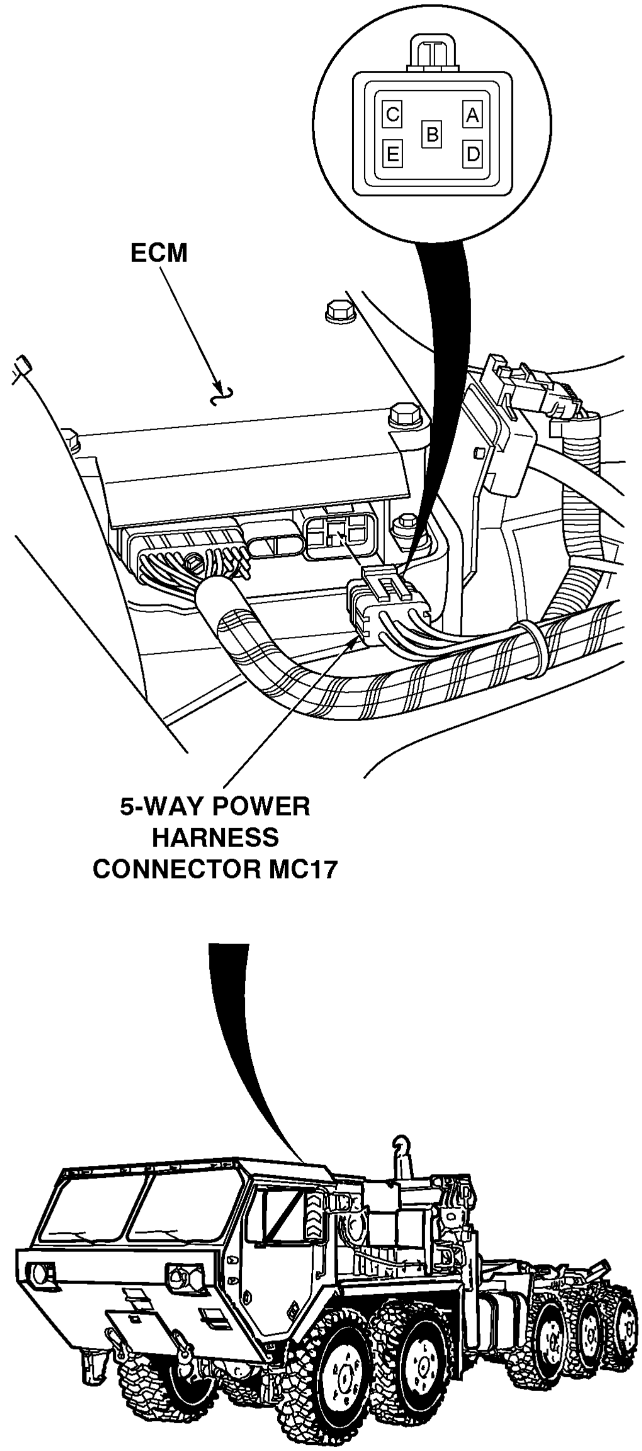
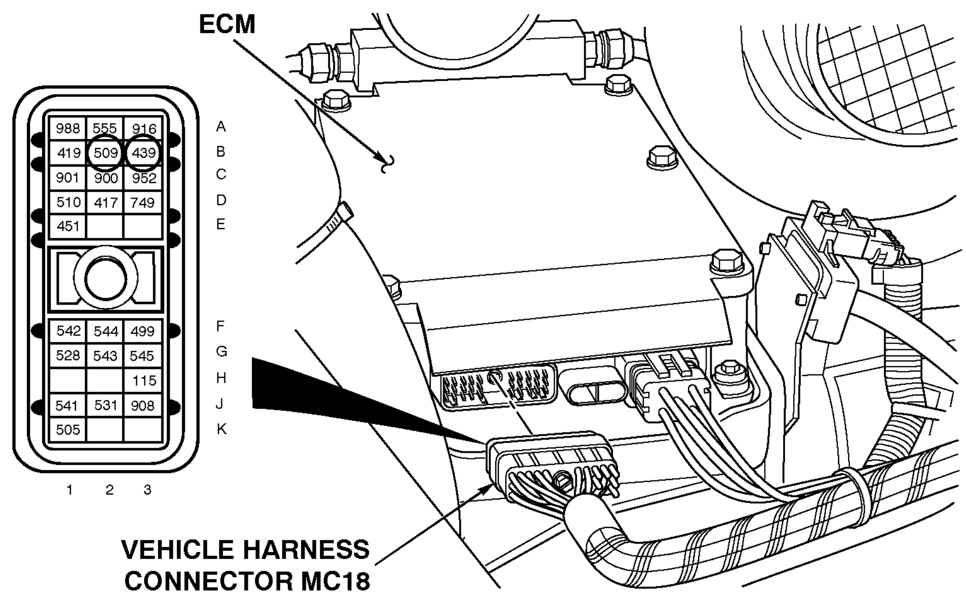
F
G
H
J
K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18


C
B
A
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –8 - NO "CHECK GAUGES" LIGHT (CGL) DURING BULB CHECK (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 8-4 Check for Open		
• Remove jumper wire. • Read voltage on vehicle harness connector, socket B3 (red lead) to a good ground (black lead).	Less than 11.5 volts.	Ignition line (ckt #439) open. Repair open. Then go to C 8-30.
	Greater than or equal to 11.5 volts.	Go to C 8-5.
C 8-5 Check for Battery +		
• Turn ignition off. • Disconnect 5-way power harness connector at ECM. • Read voltage on 5-way power harness connector, socket A (red lead), to a good ground (black lead). • Also read voltage on socket C (red lead) to a good ground (black lead).	Less than 11.5 volts on either reading.	Either a DDEC circuit breaker (CB22 or CB23) is blown, and/or battery power line(s)(ckt #240 or #241) has an open or short to ground. Repair problem. Then go to C 8-30.
	Greater than or equal to 11.5 volts on both readings.	Go to C 8-6.
C 8-6 Check for Ground		
• Read voltage on 5-way power harness connector, socket A (red lead) to socket D (black lead). • Also read voltage on 5-way power harness connector, socket C (#240) (red lead) to socket E (#150) (black lead).	Less than 11.5 volts on either reading.	Ground line(s) (ckt #150) has an open. Repair open. Then go to C 8-30.
	Greater than or equal to 11.5 volts on both readings.	Go to C 8-7.


ECM
988
555
916
419
509
439
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900
952
510
417
749
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542
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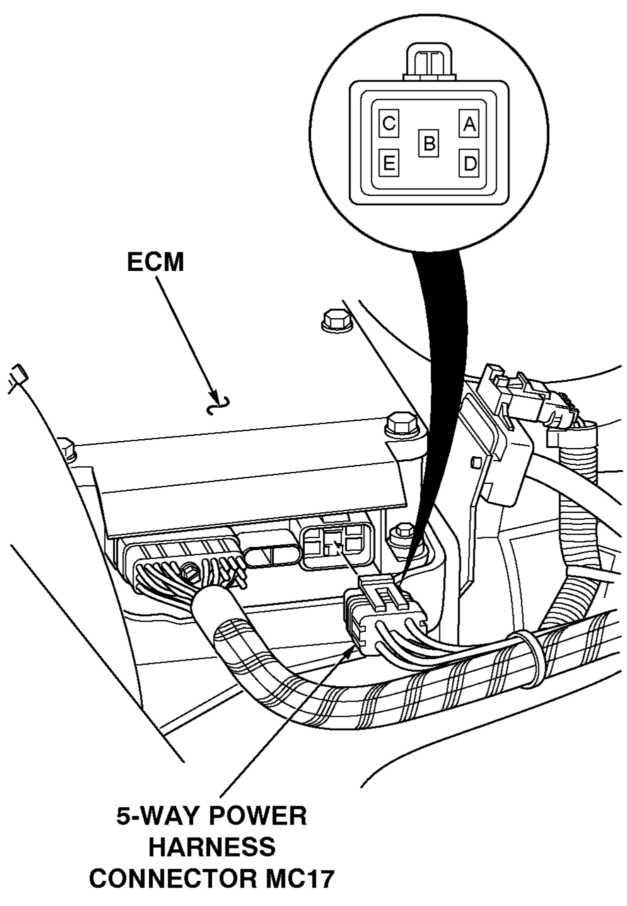
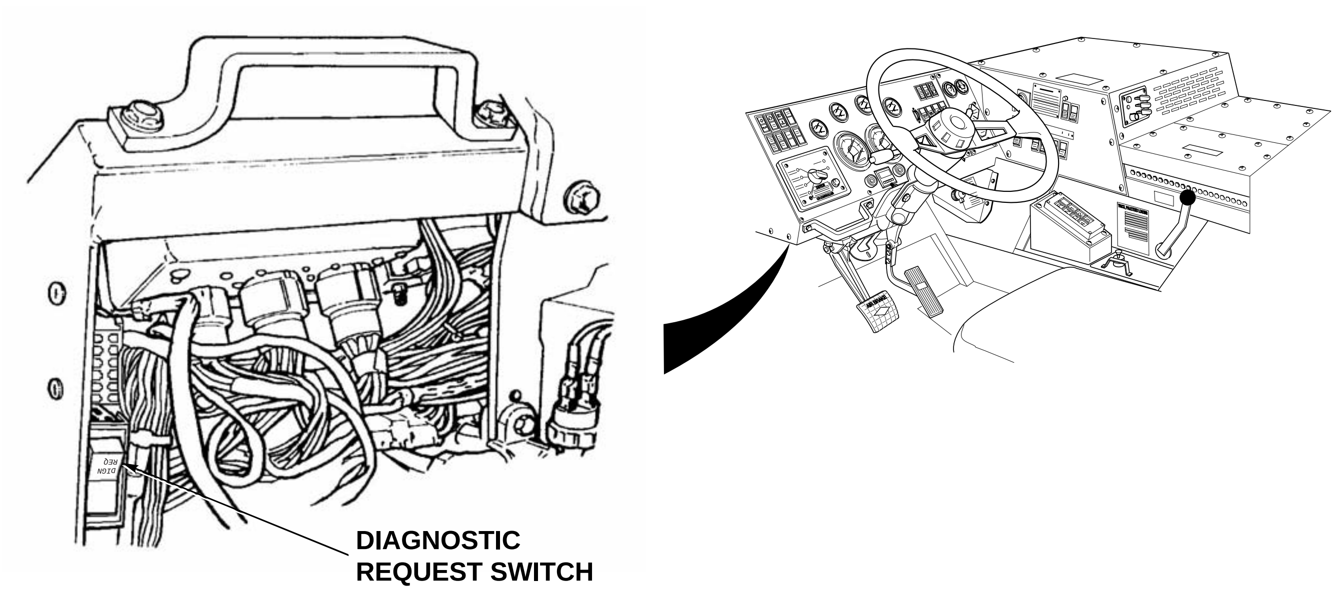
528
543
545
115
541
531
908
505
A
B
C
D
E
F
G
H
J
K
1
2
3
VEHICLE HARNESS
CONNECTOR MC18

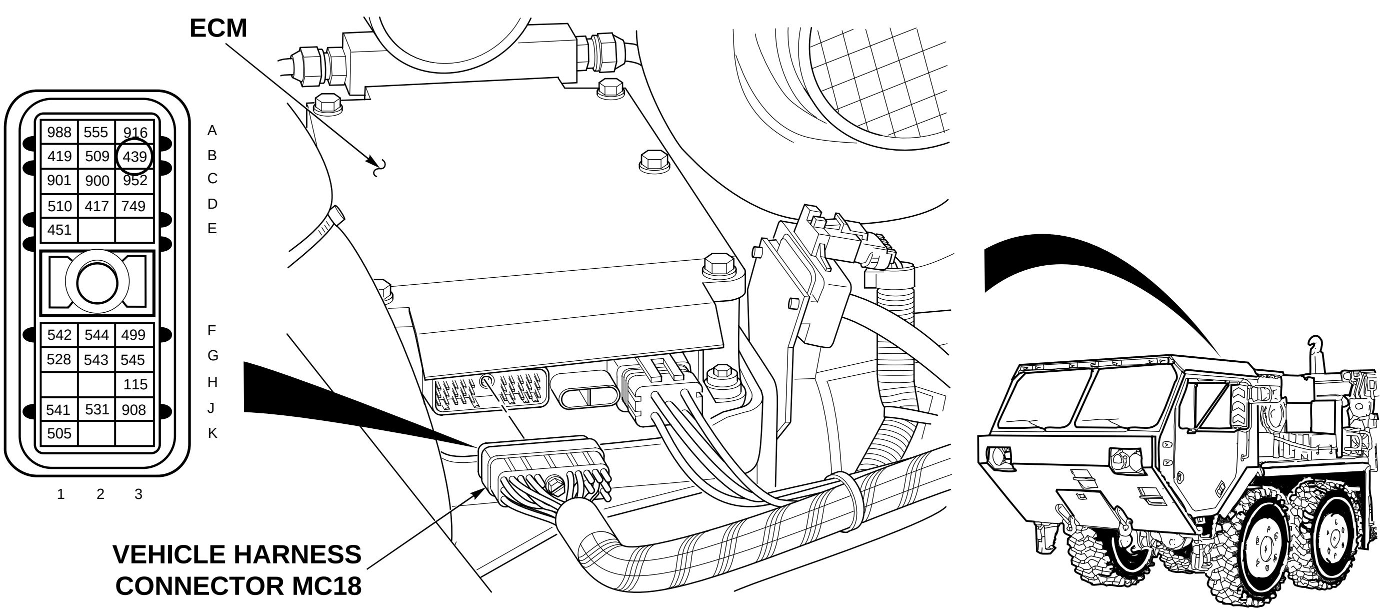

C
B
A
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –8 - NO “CHECK GAUGES” LIGHT (CGL) DURING BULB CHECK (Cont’d)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 8-7 Check ECM Connectors		
• Check terminals at both 5-way power harness and vehicle harness connectors (both ECM and harness side) for damage; bent, corroded, and unseated pins or sockets. Pay close attention to terminals B2 and B3 of vehicle harness connector and D and E power harness.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to C 8-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to C 8-30.
C 8-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Turn ignition off. • Turn ignition on while at same time observing “Check Gauges” light.	“Check Gauges” light comes on for up to 5 seconds then goes out. →	Repairs are complete.
	“Check Gauges” light comes on and stays on. →	All system diagnostics are complete. Please review this section from the first step to find error.


DIAGNOSTIC
REQUEST SWITCH


ECM
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

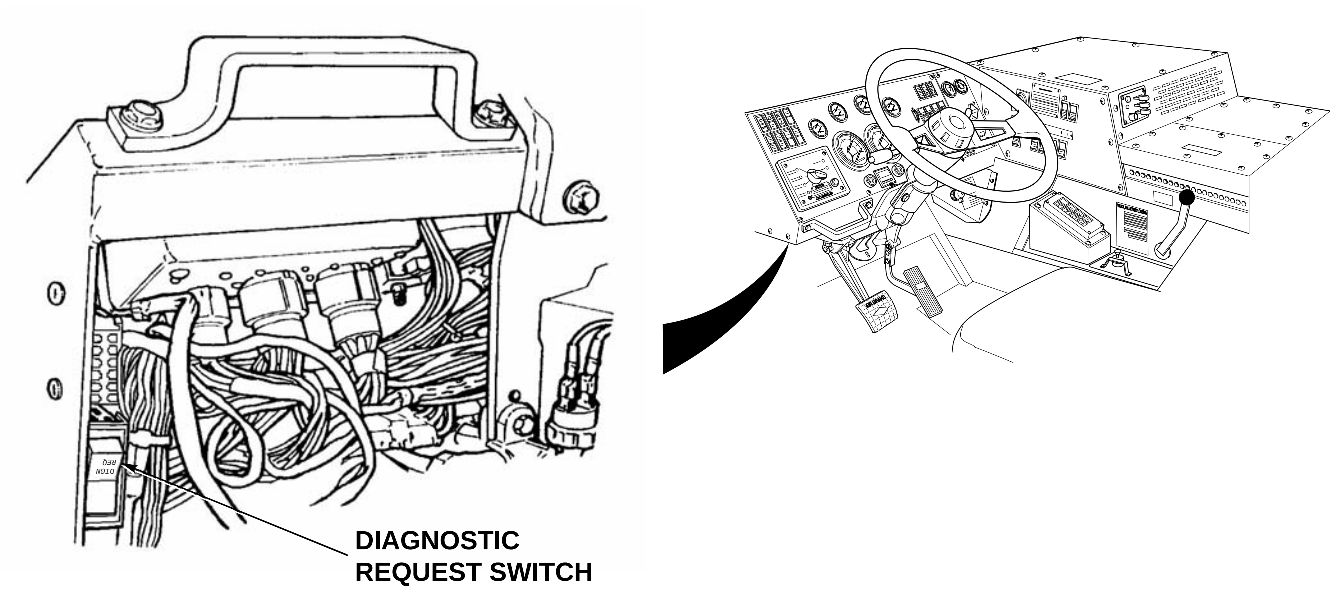
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –9 - DIAGNOSTIC REQUEST SWITCH INOPERATIVE

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

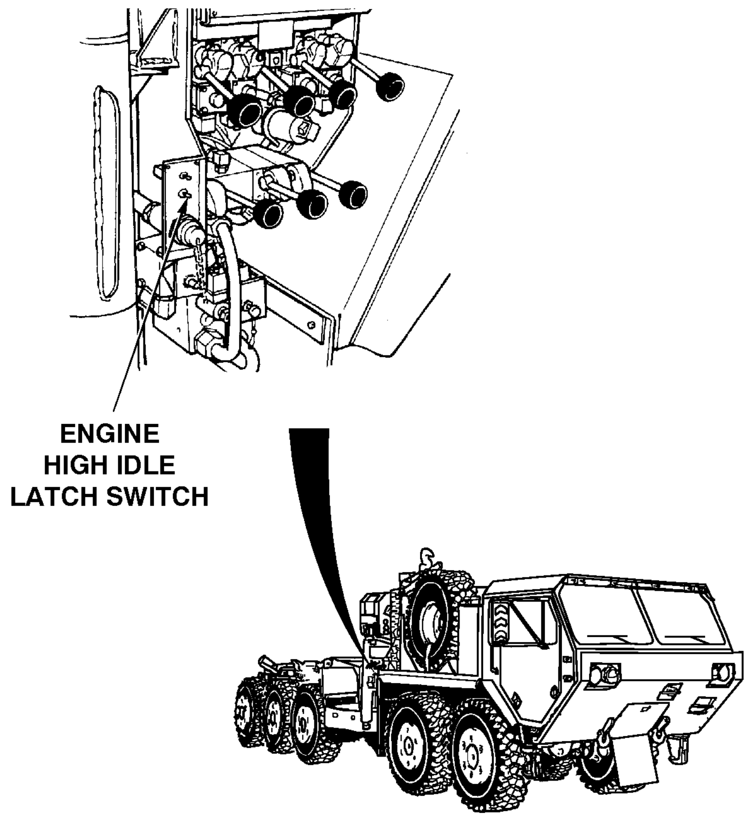
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 9-1 Check Diagnostic Request Circuit		
• Turn ignition on/engine not running. • Plug in DDR. • Select SWITCH/LIGHT STATS • Depress and hold diagnostic request switch. • Observe "Diagnostic Request" status on DDR.	Display reads "ON".	Go to C 9-2.
	Display reads "OFF".	Diagnostic request line (#528) is open, or is not being grounded when switch is depressed. Check #528 wire and ground for diagnostic request switch. Repair problem then go to C 9-30.
	Display reads "N/A".	Replace ECM (para 7-57).
C 9-2 Check CGL/CEL Bulb		
• Turn ignition off. • Remove CEL and CGL Bulb, check to see if it is burned out or damaged.	Bulb is okay.	Go to C 9-3.
	Bulb is not okay.	Replace bulb(s) (para 7-24). Then go to C 9-30.
C 9-3 Check Ignition Line		
• Turn ignition off. • Disconnect vehicle harness connector at ECM. • Read voltage at cavity B3 (#439).	Less than 11.5V.	DDEC ignition circuit breaker (CB13) is blown and/or ignition line is open or shorted to ground.
	Greater than 11.5V.	Ckt #419 or #509 is open. Repair open and go to C 9-30.


DIAGNOSTIC
REQUEST SWITCH

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –9 - DIAGNOSTIC REQUEST SWITCH INOPERATIVE (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 9-30 Verify Repairs		
• Reconnect all connectors. • Turn ignition on. • Depress and hold diagnostic request switch.	Flashes codes (works). →	Repairs are complete. If any other problems exists, go to START-1, pg 2-539.
	Does not function. →	All system diagnostics are complete. Please review this section to find error.


ENGINE
HIGH IDLE
LATCH SWITCH

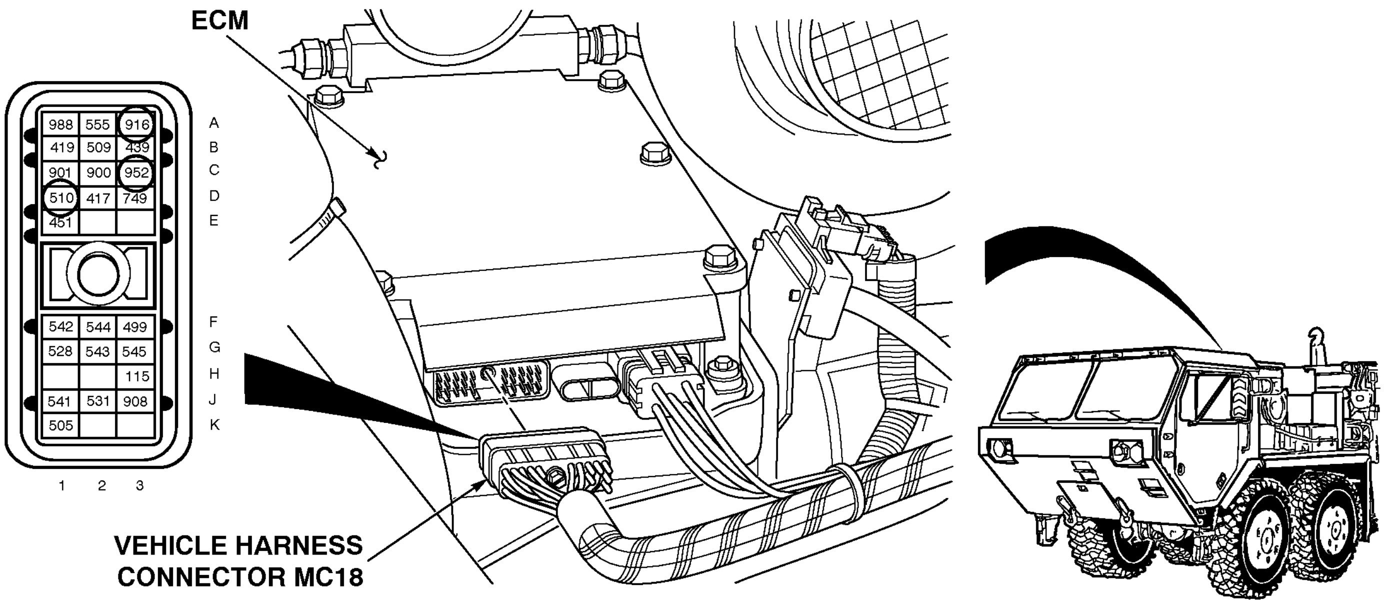
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –10 - VARIABLE SPEED GOVERNOR (VSG OR CRANE HIGH IDLE) INOPERATIVE

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 10-1 through C 10-4 (Deleted)		
C 10-5 Check Throttle Position Sensor		
• Turn ignition on. • Plug DDR into DDL connector. • Engine at no throttle • Read TPS PCT using DDR.	At 0% throttle. → Greater than 0% throttle. →	Go to C 10-6. Check throttle position sensor adjustment. Go to 21-4 (page 2-643).
C 10-6 Check if ECM is Reading VSG Speed		
• Start engine (TM 9-2320-364-10). • Position transmission range selector to N (neutral). • Select the VSG RPM on the DDR reader. • Push ENGINE HIGH IDLE LATCH switch to LATCH and release. • Shut off engine (TM 9-2320-364-10).	DDR display changes smoothly from idle (typically 650 RPM) to high idle speed (1275 RPM). → DDR does not change at all or does not change smoothly. →	Go to C 10-7. Go to C 10-9.
C 10-7 Verify Complaint		
• Start engine (TM 9-2320-364-10) and run at idle. • Using the DDR reader, make sure that TPS PCT is 0. • Position ENGINE HIGH IDLE LATCH switch to LATCH and release.	RPM is increasing. → RPM does not increase. →	Problem no longer exists. Go to C 1-2 for more information (page 2-555). Go to C 10-8.


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
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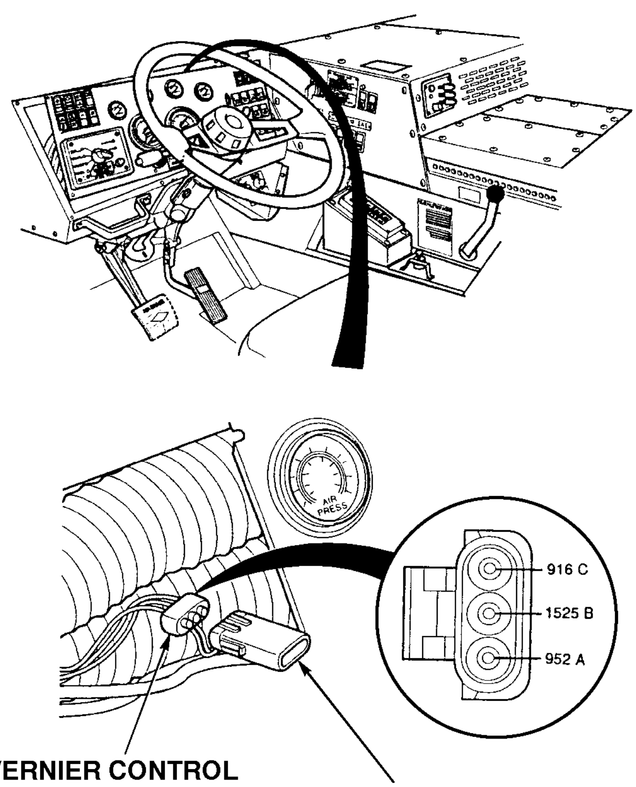
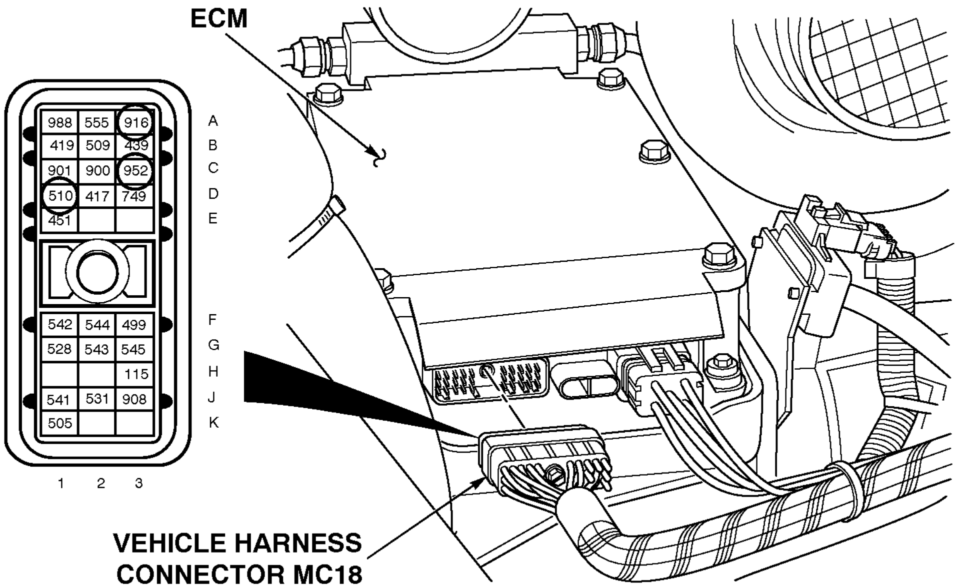
K
1 2 3
VEHICLE HARNESS CONNECTOR MC18


AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL HARNESS CONNECTOR MC38
VERNIER CONTROL

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –10 - VARIABLE SPEED GOVERNOR (VSG OR CRANE HIGH IDLE) INOPERATIVE (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 10-8 Check ECM Connectors		
• Turn ignition off. • Disconnect vehicle harness connector at ECM. • Check terminals at vehicle harness connector (both ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to C 10-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to C 10-30.
C 10-9 Check for Open		
• Turn ignition off. • Make sure vehicle is in neutral. • Disconnect vehicle harness connector at ECM. • Also disconnect vernier control connector (para 7-95). • Install a jumper wire between pins A and B of the vernier control connector. • Read resistance between sockets D1 (#510) and C3 (#952) on vehicle harness connector.	Greater than 5 ohms or open.	Signal line (ckt #525 or #510) ground line (ckt #952) or the Neutral start circuit has an open. Repair open. Then go to C 10-30.
	Less than or equal to 5 ohms.	Go to C 10-10.
C 10-10 Check for +5 Volt Line Open		
• Move jumper so that it is now between pins C and A of vernier control connector. • Read resistance between sockets A3 (#916) and C3 (#952) on vehicle harness connector.	Greater than 5 ohms or open.	The +5 volt line (ckt #916) is open. Repair open. Then go to C 10-30.
	Less than or equal to 5 ohms.	Go to C 10-11.


ECM
988
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509
439
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952
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417
749
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545
115
541
531
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H
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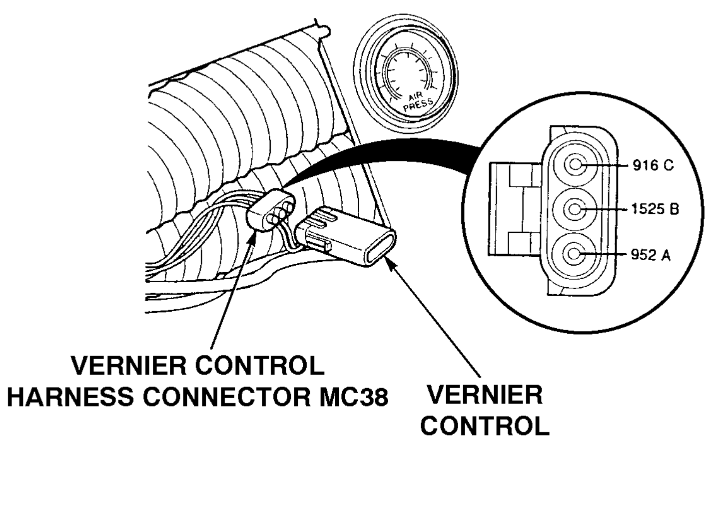
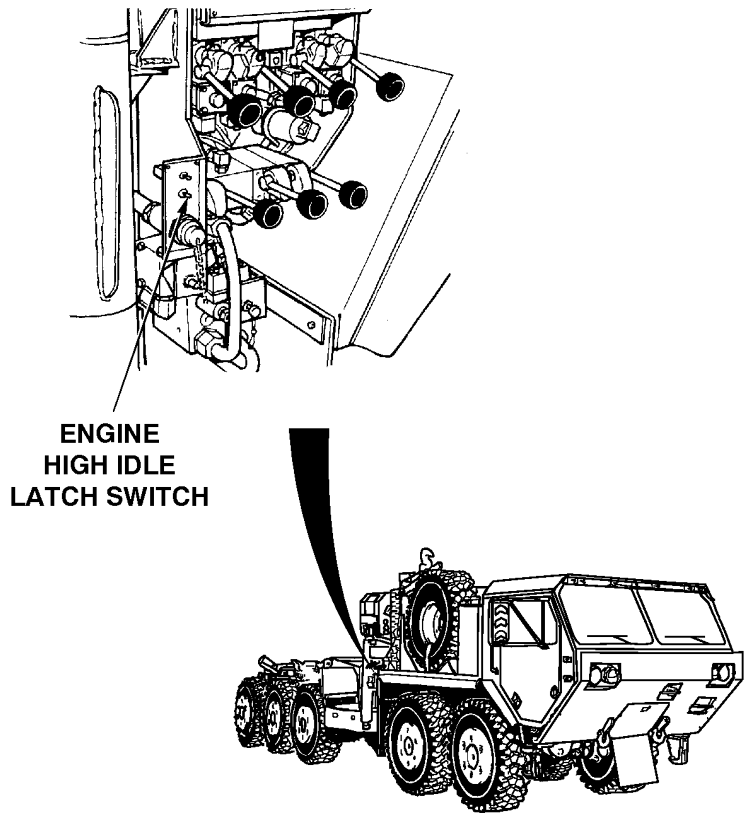
K
1
2
3
VEHICLE HARNESS
CONNECTOR MC18


AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –10 - VARIABLE SPEED GOVERNOR (VSG OR CRANE HIGH IDLE) INOPERATIVE (Cont'd)

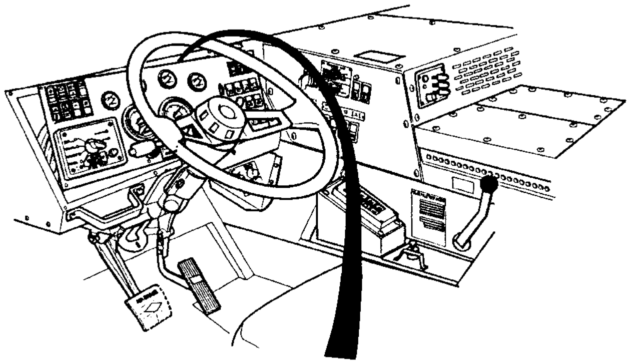
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 10-11 Check for Short Between Signal and Ground		
• Remove jumper wire. • Read resistance between sockets D1 (#510) and C3 (#952) on vehicle harness connector. • Also read resistance between socket D1 (#510) and a good ground.	Both readings are greater than 10,000 ohms or open. →	Go to C 10-12.
	Either reading is less than equal to 10,000 ohms. →	Signal line (ckt #525 or #510) or Neutral start circuit is shorted to ground (either ckt #952 or chassis ground). Repair short. Then go to C 10-30.
C 10-12 Check for Short Between +5 Volt Line and Ground		
• Disconnect vernier control connector (para 7-95). • Read resistance between sockets A3 (#916) and C3 (#952) on vehicle harness connector. • Also read resistance between socket A3 (#916) and a good ground.	Both readings are greater than 10,000 ohms or open. →	Go to C 10-13.
	Either reading is less than or equal to 10,000 ohms. →	The +5 volt line (ckt #916) is shorted to ground (either ckt #952 or chassis ground). Repair short. Then to to C 10-30.
C 10-13 Check Vernier Control Connectors		
• Inspect terminals at vernier control connectors (sensor side and harness side) for damaged; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace vernier control (para 7-100). Then go to C 10-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to C 10-30.

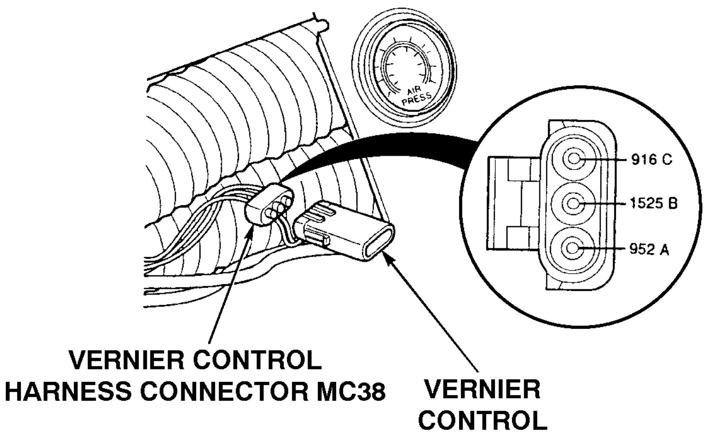

ENGINE
HIGH IDLE
LATCH SWITCH

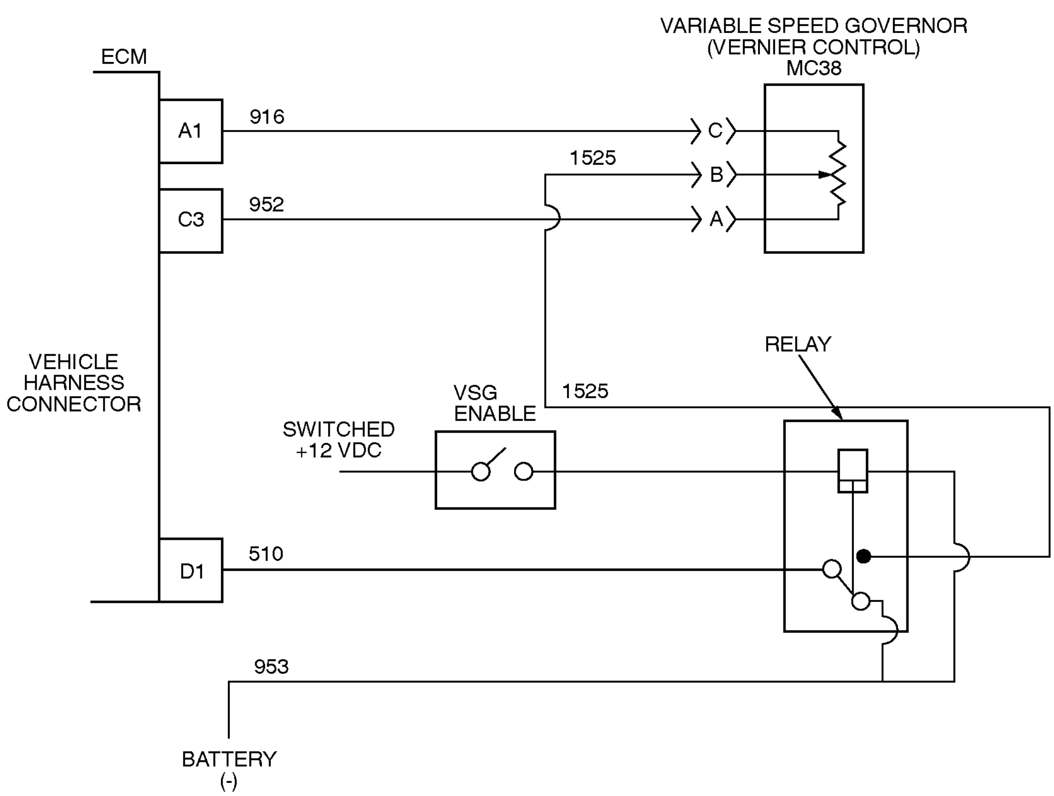
Section IV. TROUBLESHOOTING CHARTS (Cont.)

D. CHART –10 - VARIABLE SPEED GOVERNOR (VSG OR CRANE HIGH IDLE) INOPERATIVE (Cont'd)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C 10-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Start engine (TM 9-2320-364-10). • Push ENGINE HIGH IDLE LATCH switch to LATCH and release. • Stop engine. • Read inactive codes.	Crane high idle speed still does not work.	All system diagnostics are complete. Please review this section from the first step to find error.
	Crane high idle speed works and no codes.	Repairs are complete.
	Crane high idle speed works and codes appear.	Go to START-1, pg 2-539, to service codes.







VERNIER CONTROL (VSG) CIRCUITS

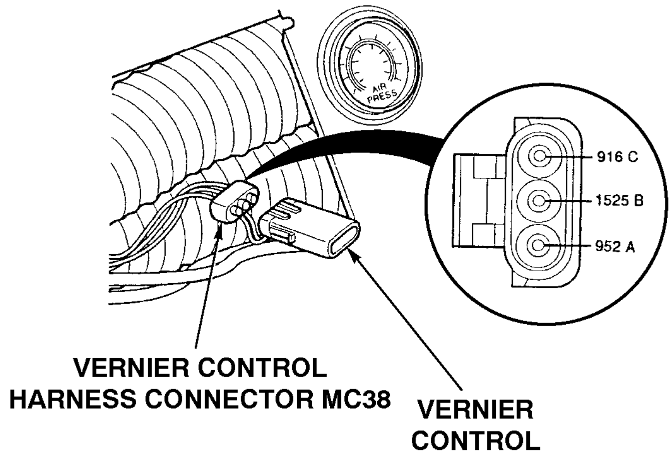
2-14. DDEC III TROUBLESHOOTING (CONT).

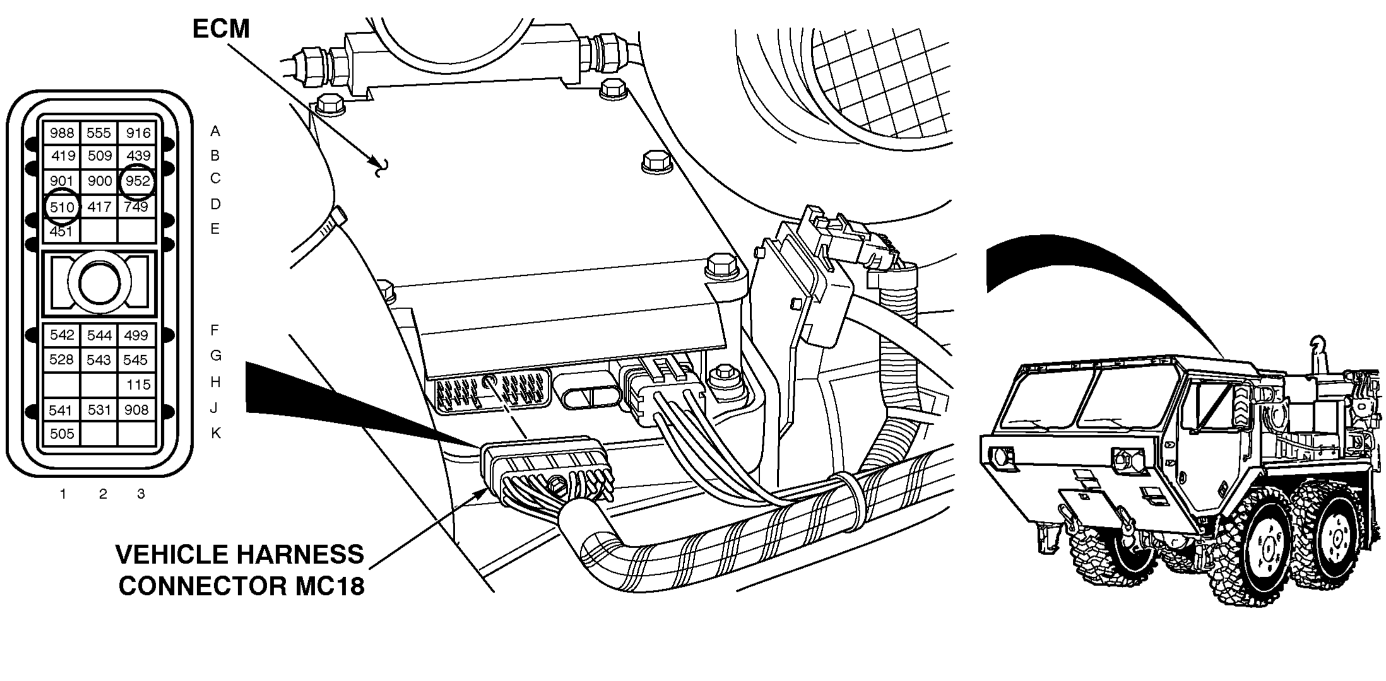
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 11
J1587 CODE: P187 4 - VERNIER CONTROL INPUT FAILED LOW (VOLTAGE LOW) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
11-1 Multiple Code Check		
• Were there any other active codes besides 187/4?	No other active codes.	Go to 11–2.
	Yes, any or all of the following active codes: 187/3, 91/3 or 4, 100/4, 102/4, 110/4, 174/4, 175/4.	Go to VEH5V-1 , page 2-767.
	Yes - but none of the above.	Go to 11–2.
11-2 Sensor Check		
• Turn ignition off. • Disconnect vernier control connector. • Install a jumper wire between sockets B and C of the vernier harness connector. • Turn ignition on. • Read active codes.	Code 187/3 (and/or other codes).	Go to 11–6.
	Code 187/4 (and any other codes).	Go to 11–3.
11-3 Check Vernier Control Adjustment		
• Remove jumper and reconnect vernier control. • Hook-up DDR to the DDL connector and select VSG CNTS. • Push ENGINE HIGH IDLE LATCH switch to LATCH and release. • Read counts.	Getting 48 to 968 counts.	Go to 11–5.
	Not getting the above readings.	Go to 11–4.
11-4 Attempt Vernier Control Adjustment		
• Replace vernier control (para 7-100).	Corrected problem so that Throttle Counts is now correct.	Go to 11-30.
	Could not correct the problem.	Go to 11–5.

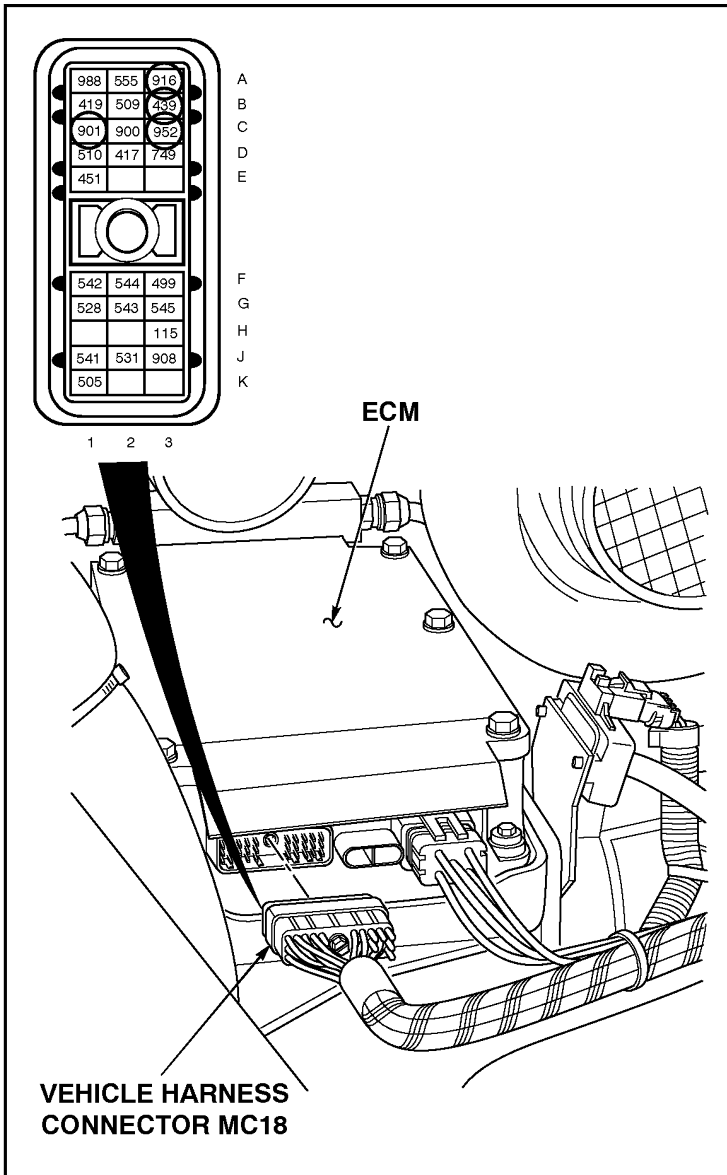

AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

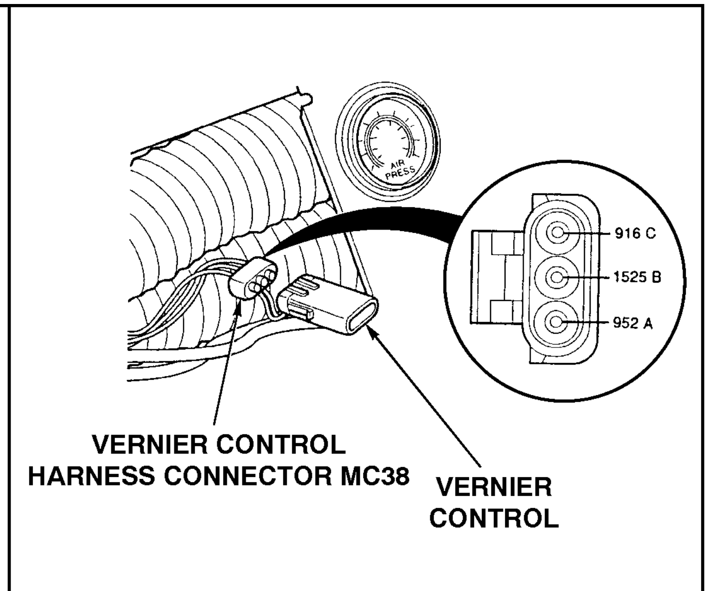

ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

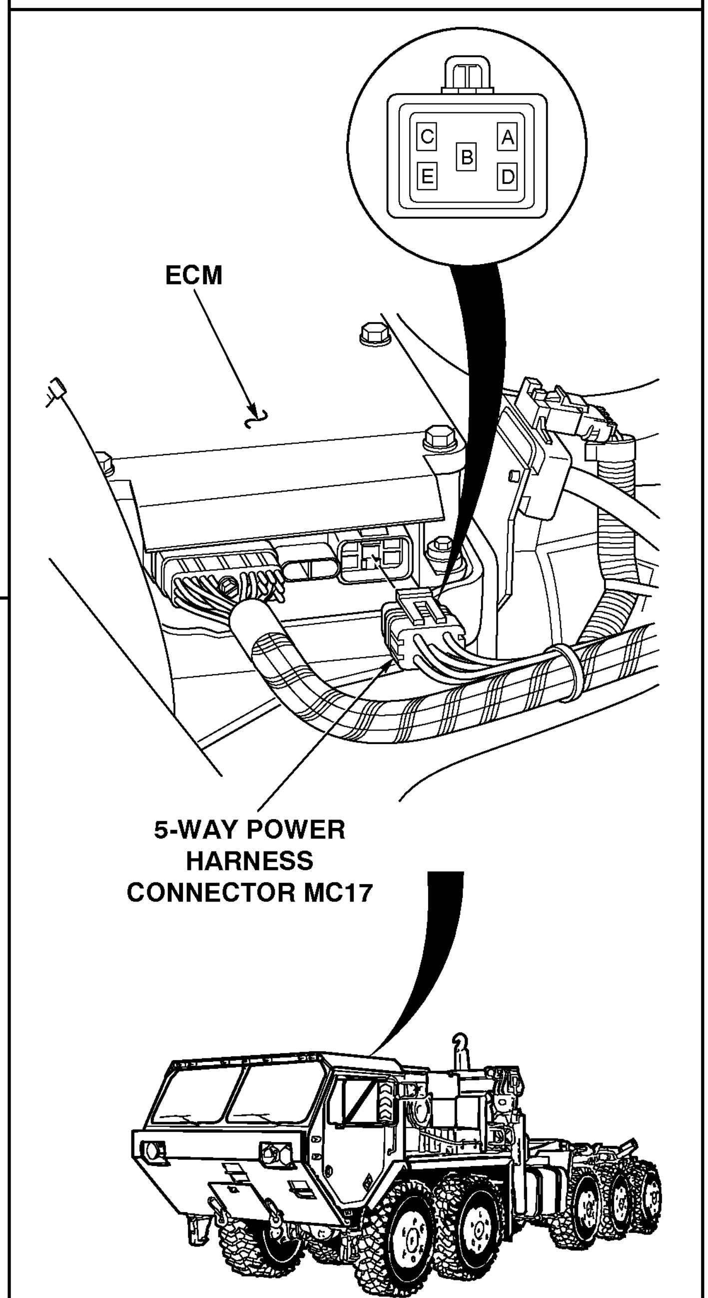
Section IV. TROUBLESHOOTING CHARTS (Cont.)

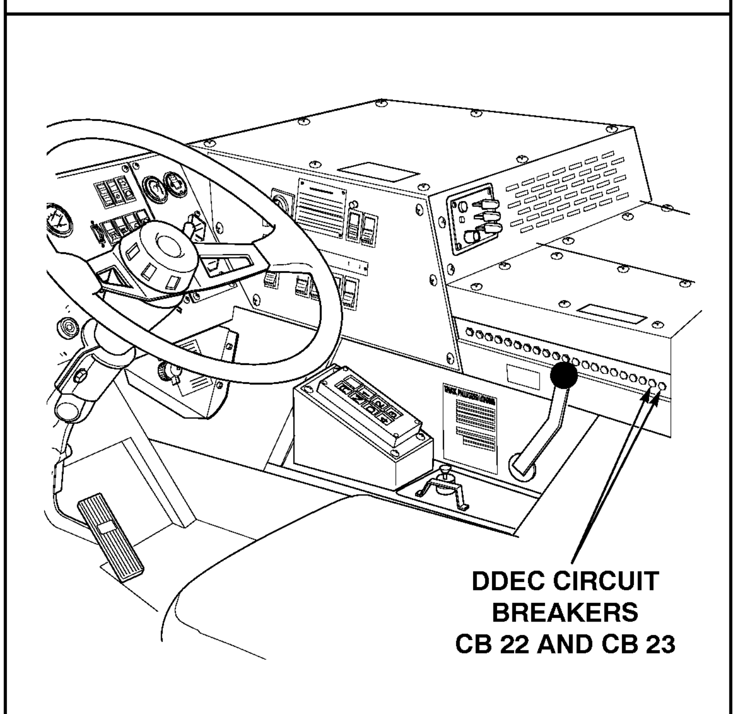
E. FLASH CODE: 11
J1587 CODE: P187 4 - VERNIER CONTROL INPUT FAILED LOW (VOLTAGE LOW) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
11-5 Check Vernier Control Connectors		
• Inspect terminals at the vernier control connectors (sensor side and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace vernier control (para 7-100). Then go to 11-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 11-30.
11-6 Check for +5 Volts		
• Remove jumper. • Turn ignition on. • Read voltage on vernier control connector, socket C (red lead) to socket A (black lead).	Between 4 to 6 volts.	Go to 11-7.
	Less than 4 volts.	Go to 11-10.
	Greater than 6 volts.	Go to 11-12.
11-7 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector ECM. • Read resistance between sockets A and B on the vernier control connector.	Less than or equal to 10,000 ohms.	Signal line (ckt #525) is shorted to the return line (ckt #952). Repair short. Then go to 11-30.
	Greater than 10,000 ohms or open.	Go to 11-8.
11-8 Check for Signal Open		
• Install a jumper wire between sockets A and B of the vernier control connector. • Read resistance between sockets D1 (510) & C3 (952) on the vehicle harness connector.	Less than or equal to 5 ohms.	Go to 11-9.
	Greater than 5 ohms or open.	Signal line (ckt #510) is open, and/or signal return (ckt #952) is open. Repair open. If no open was found, check ECM terminals A3, D1, C3, and vernier control pins. Then go to 11-30.


988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18


AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

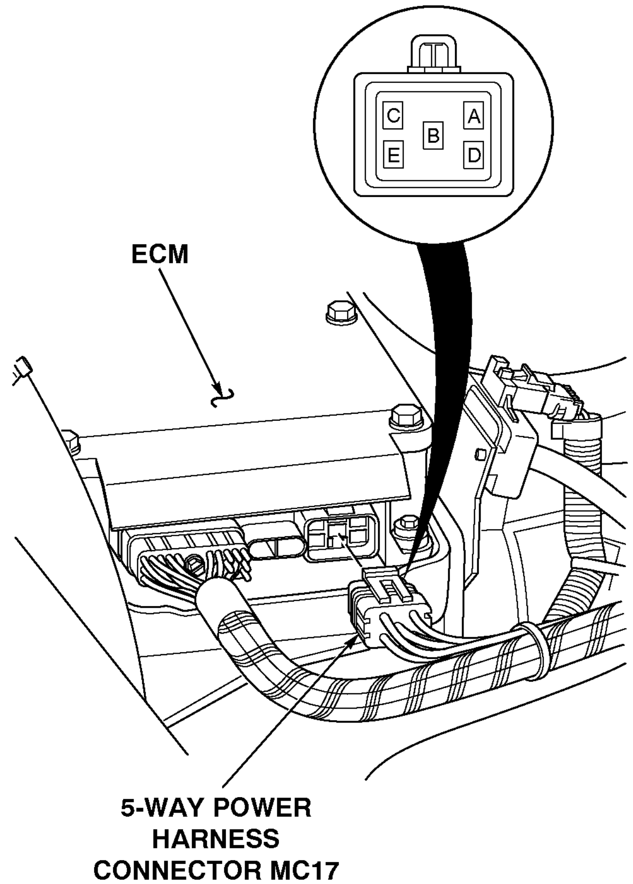

C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17


DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23

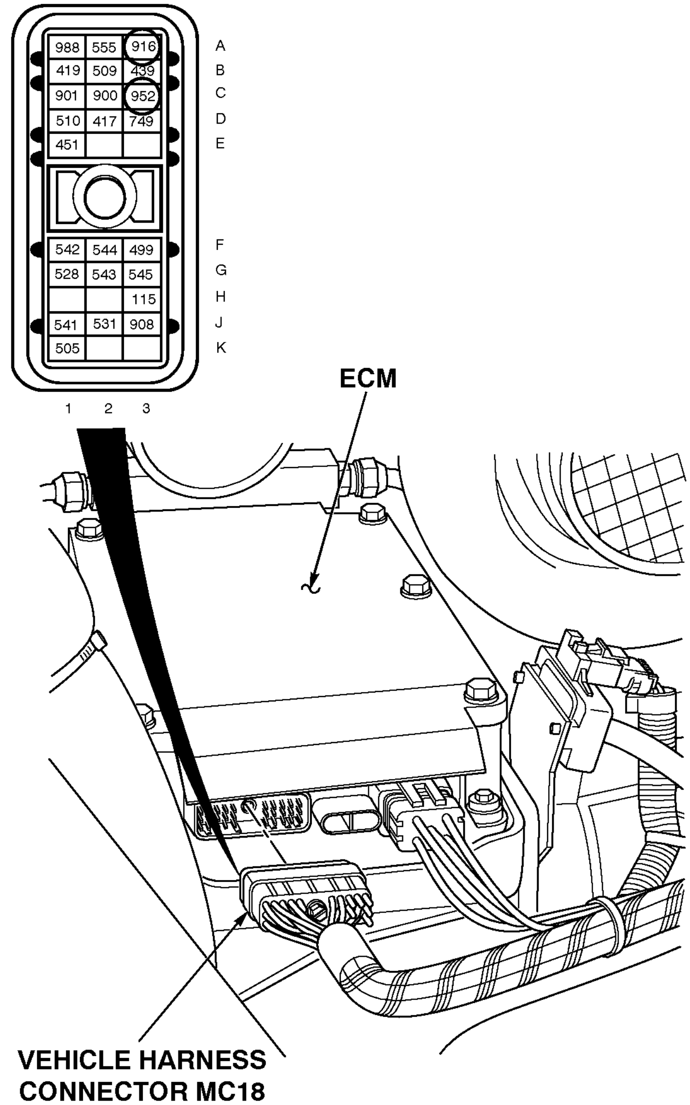
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 11
J1587 CODE: P187 4 - VERNIER CONTROL INPUT FAILED LOW (VOLTAGE LOW) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

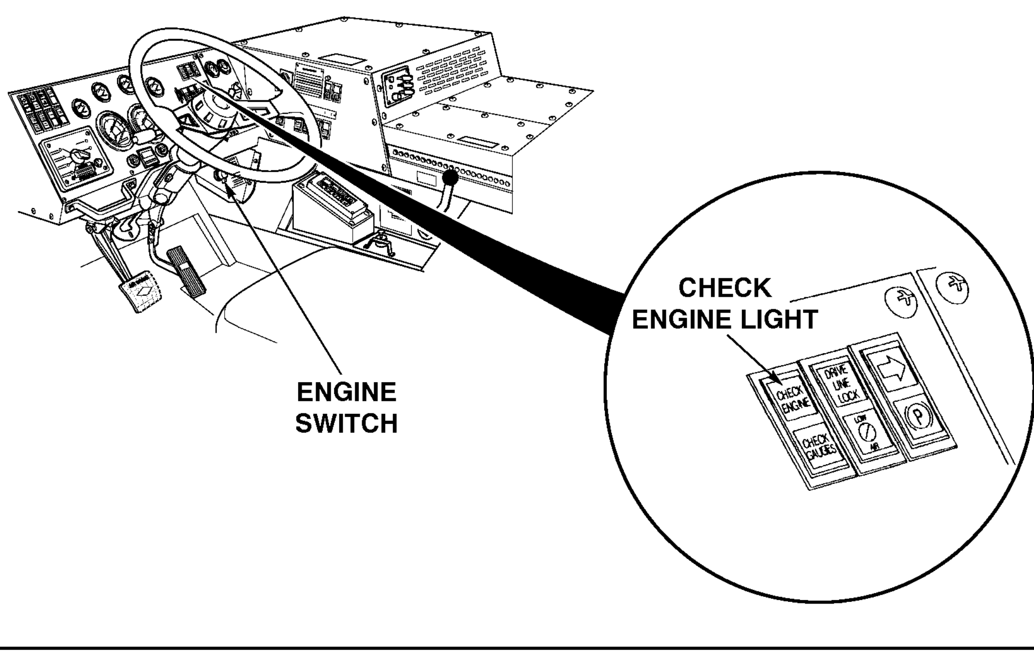
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
11-9 Check ECM Connectors		
• Check terminals at the vehicle harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 11-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 11-30.
11-10 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM. • Read resistance between sockets A and C on the vernier control connector.	Less than or equal to 10,000 ohms. →	The vehicle +5 volt line (ckt #916) is shorted to the return line (ckt #952). Repair short. Then go to 11-30.
	Greater than 10,000 ohms or open. →	Go to 11-11.
11-11 Check for Open +5 Volt Line		
• Install a jumper wire between sockets A and C of the vernier control connector. • Read resistance between sockets A3 (916) & C3 (952) on the vehicle harness connector.	Less than or equal to 5 ohms. →	Go to 11-9.
	Greater than 5 ohms or open. →	The vehicle +5 volt line (ckt #916) is open. Repair open. Then go to 11-30.
11-12 Check for Short to Battery +		
• Turn ignition off. • Pull out both DDEC circuit breaker buttons (CB22 & CB23). • Disconnect 5-way power harness connector at the ECM. • Read resistance between sockets D1 (510) & B3 (439) on the vehicle harness connector. • Also read resistance between socket D1 (510) on the vehicle harness connector and the following sockets on the 5-way power harness connector: C, D, E, and B.	All readings are greater than 10,000 ohms or open. →	Go to 11-13.
	Any reading is less than or equal to 10,000 ohms. →	A short exists between sockets where less the 10,000 ohms resistance was read. Repair short and reset circuit breakers. Then go to 11-30.



C
A
B
E
D
ECM
5-WAY POWER HARNESS CONNECTOR MC17



988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
ECM
VEHICLE HARNESS CONNECTOR MC18

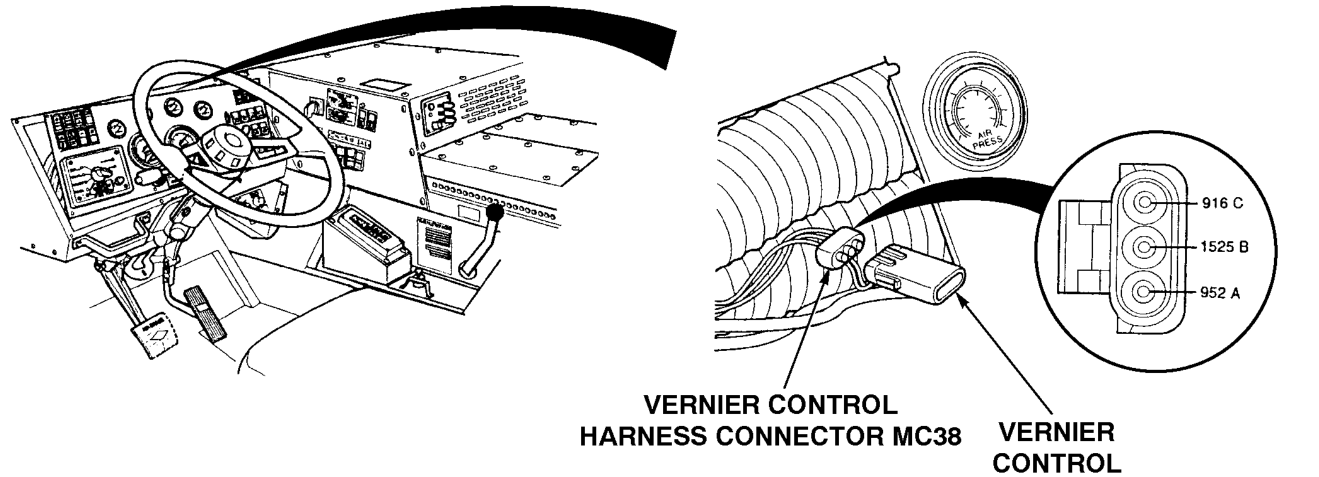


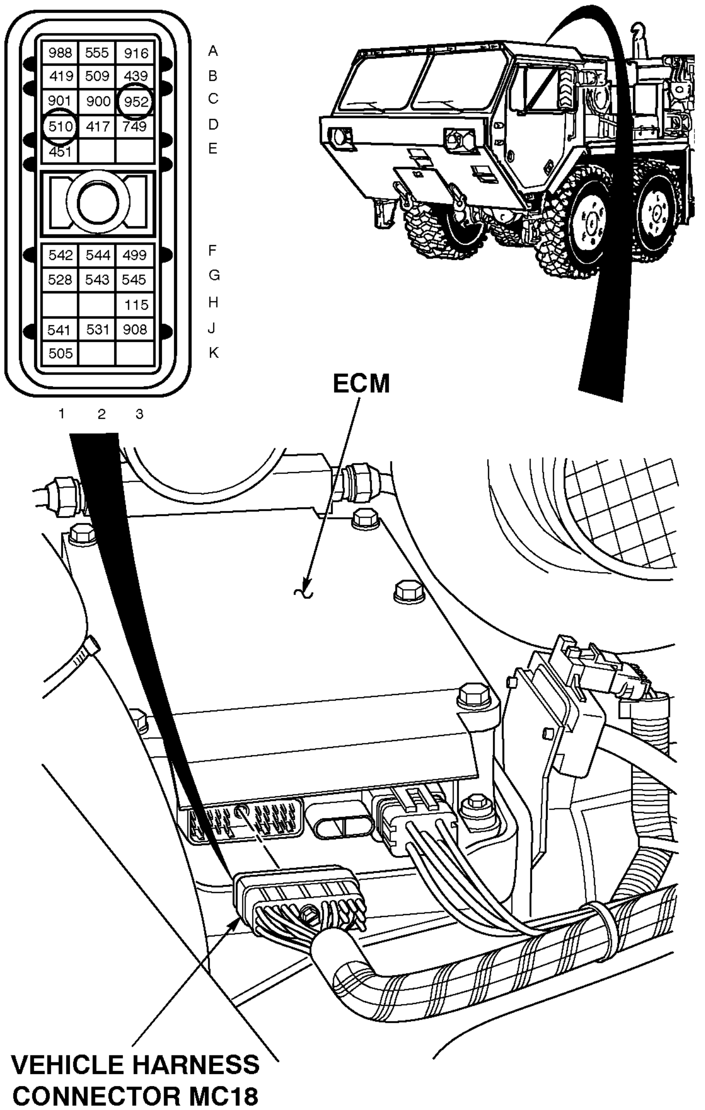
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR
ENGINE SWITCH

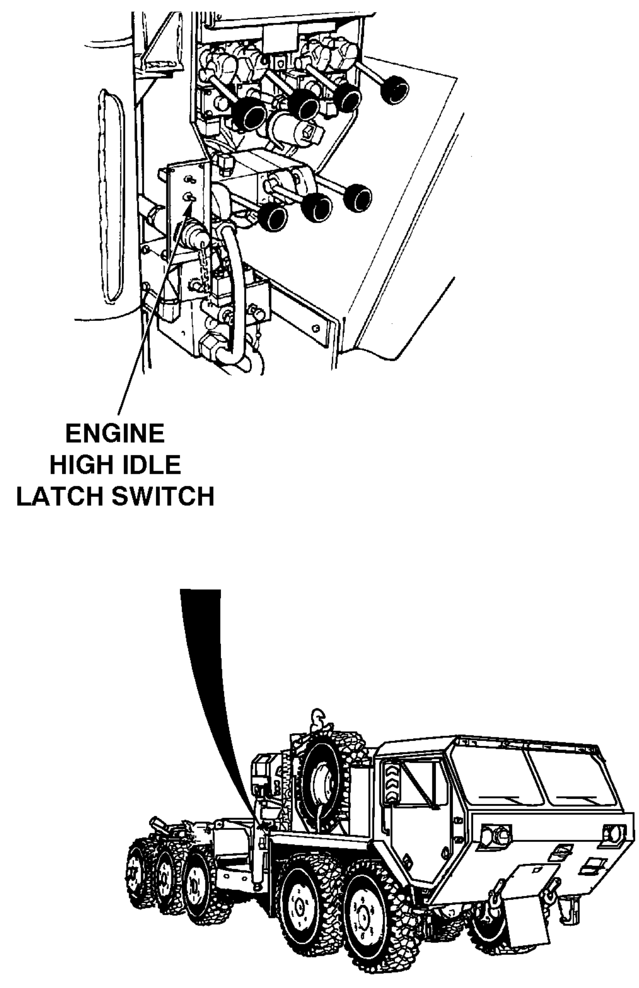
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 11
J1587 CODE: P187 4 - VERNIER CONTROL INPUT FAILED LOW (VOLTAGE LOW) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
11-13 Check for Outside DDEC Battery +		
• Turn ignition off. • Remove ECM 5-way power harness connector. • Remove ECM vehicle harness connector. • Turn ignition on. • Read voltage A3 (916) to a good ground. • Read voltage C3 (952) to a good ground.	All readings less then 4.0 volts.	Go to 11-9.
	Either reading greater than or equal to 4.0 volts.	Outside power is shorted to either ckt #952 or ckt #916. Repair short. Then go to 11-30.
11-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or 1 minute. • Stop engine. • Read all codes.	No codes.	Repairs are complete.
	Code 187/4 (and any other codes).	All system diagnostics are complete. Please review this section from the first step to find the error.
	Any other codes except Code 187/4.	Go to START-1, pg 2-539, to service other codes.


916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL


988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18


ENGINE
HIGH IDLE
LATCH SWITCH

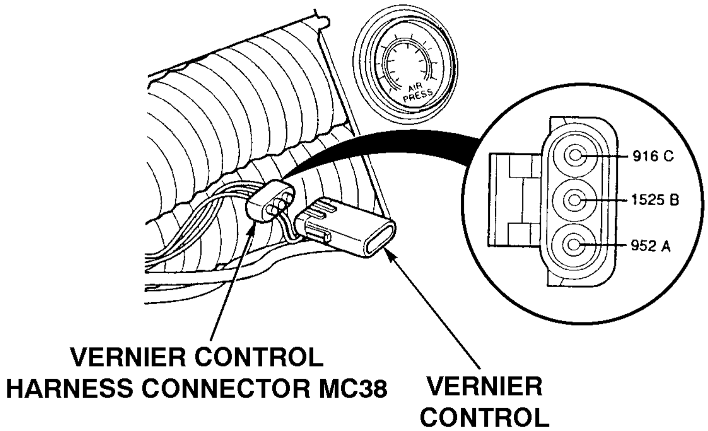
2-14. DDEC III TROUBLESHOOTING (CONT).

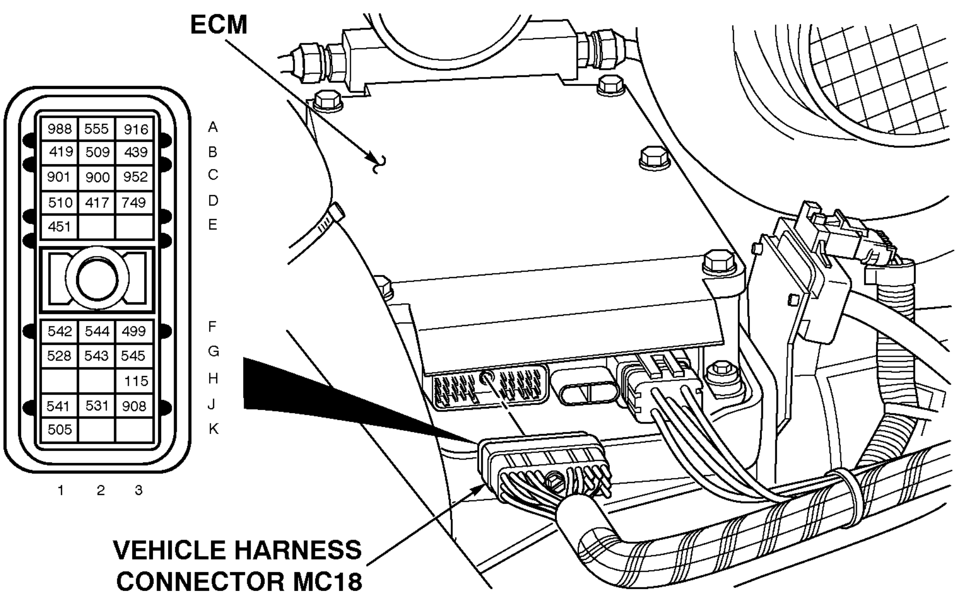
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 12
J1587 CODE: P187 3 - VERNIER CONTROL INPUT FAILED HIGH (HIGH VOLTAGE) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
12-1 Multiple Code Check		
• Were there any other active codes besides Code 187/3?	No other active codes.	Go to 12-2.
	Yes, either code 91/3 or 4.	Go to VEH5V-1 , page 2-767.
	Yes - but none of the above.	Go to 12-2.
12-2 Sensor Check		
• Turn ignition off. • Unplug the vernier control from vernier control harness connector. • Turn ignition on. • Read active codes.	Any codes except Code 187/3.	Go to 12-3.
	Code 187/3 (and any other codes).	Go to 12-5.
12-3 Return Circuit Check		
• Transmission in neutral. • Turn ignition off. • Install a jumper wire between pin A and pin B of the vernier control connector. • Disconnect the vehicle harness connector at the ECM. • Turn ignition on. • Push ENGINE HIGH IDLE LATCH switch to LATCH and release. • Read resistance between sockets C3 (952) and D1 (510) on the vehicle harness connector.	Less than or equal to 5 ohms.	Go to 12-4.
	Greater than 5 ohms or open.	Return line (ckt #952) is open. Repair open. Then go to 12-30.
12-4 Check Vernier Control Connectors		
• Inspect terminals at the vernier control connectors (sensor side and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace vernier control (para 7-100). Then go to 12-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 12-30.

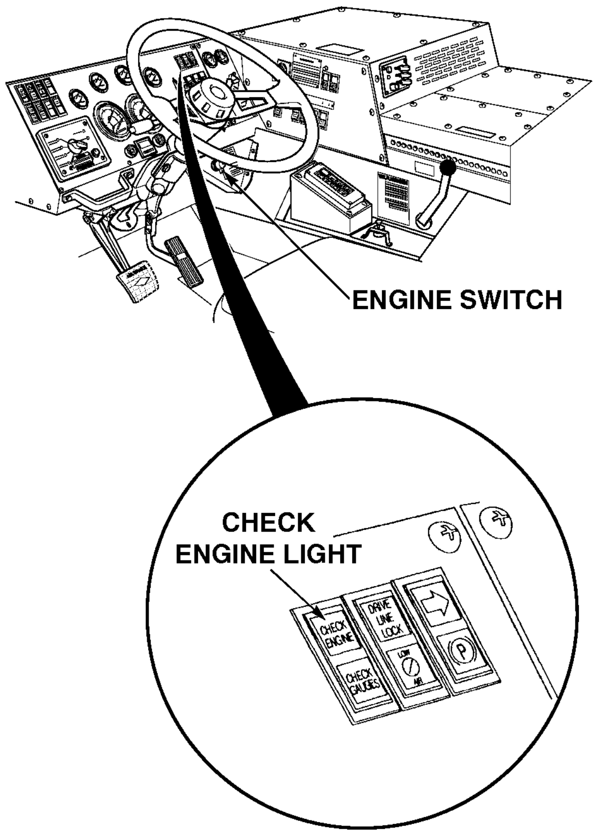

AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL


ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 12
J1587 CODE: P187 3 - VERNIER CONTROL INPUT FAILED HIGH (HIGH VOLTAGE) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

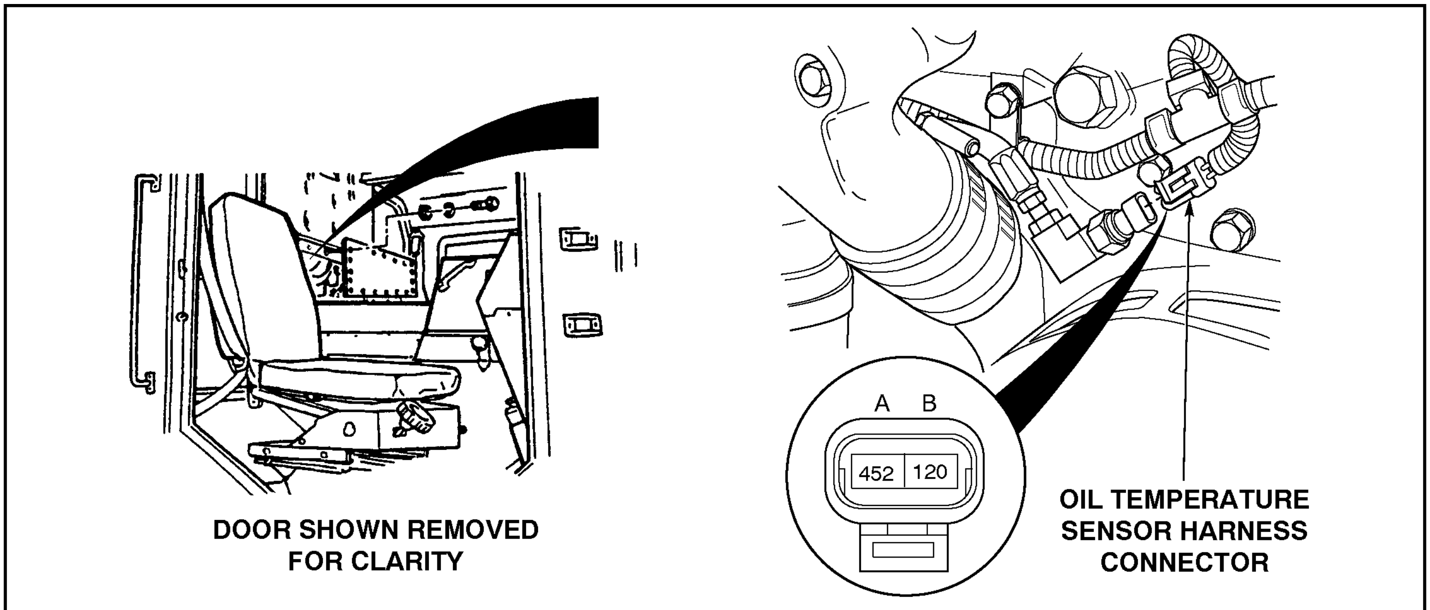
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
12-5 Check for Short to +5 Volt Line		
• Connect all connectors to ECM. Turn ignition on. • Read voltage on vernier control harness connector pin B (525) to pin A (952).	Greater than 1.0 volts.	Signal line (ckt #510 or #525) is shorted to the vehicle +5 volt line (ckt #916) or another voltage source. Repair short. Then go to 12-30.
	Less than or equal to 1.0 volts.	Go to 12-7.
12-7 Check ECM Connectors		
• Disconnect the vehicle harness connector. • Check terminals at the vehicle harness connector (both ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 12-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 12-30.

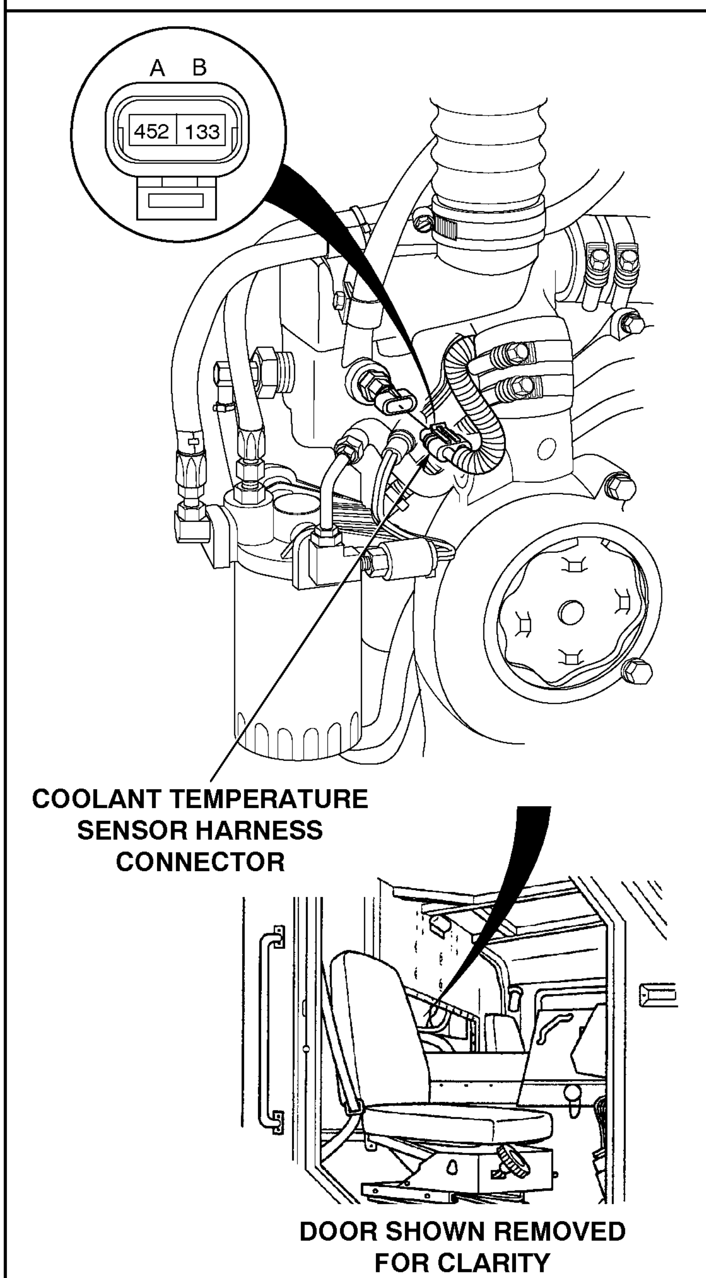

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

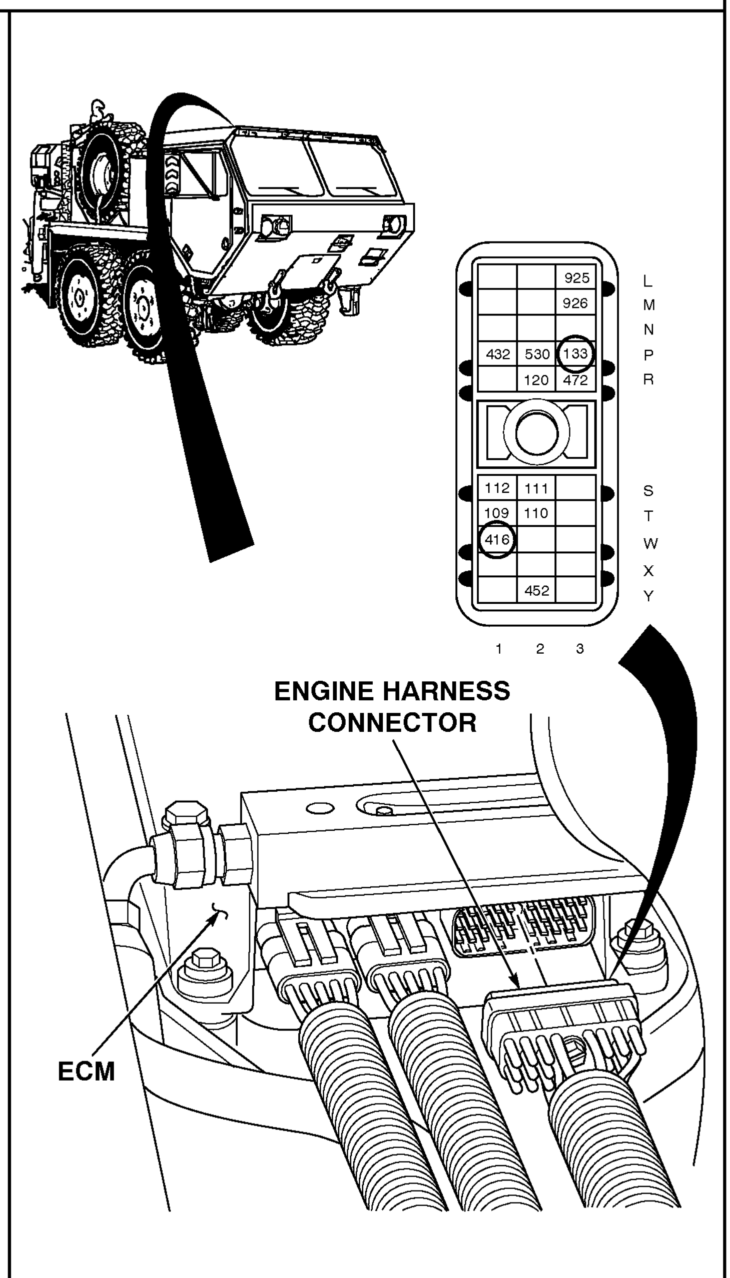
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 12
J1587 CODE: P187 3 - VERNIER CONTROL INPUT FAILED HIGH (HIGH VOLTAGE) (ALSO CALLED VARIABLE SPEED GOVERNOR - VSG)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
12-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or 1 minute. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 187/3 (and any other codes). →	All system diagnostics are complete. Please review this section from the first step to find the error.
	Any other codes except Code 187/3. →	Go to START-1, pg 2-539, to service other codes.


DOOR SHOWN REMOVED
FOR CLARITY
A B
452 120
OIL TEMPERATURE
SENSOR HARNESS
CONNECTOR


A B
452 133
COOLANT TEMPERATURE
SENSOR HARNESS
CONNECTOR
DOOR SHOWN REMOVED
FOR CLARITY


925
926
432 530 133
120 472
112 111
109 110
416
452
L
M
N
P
R
S
T
W
X
Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM

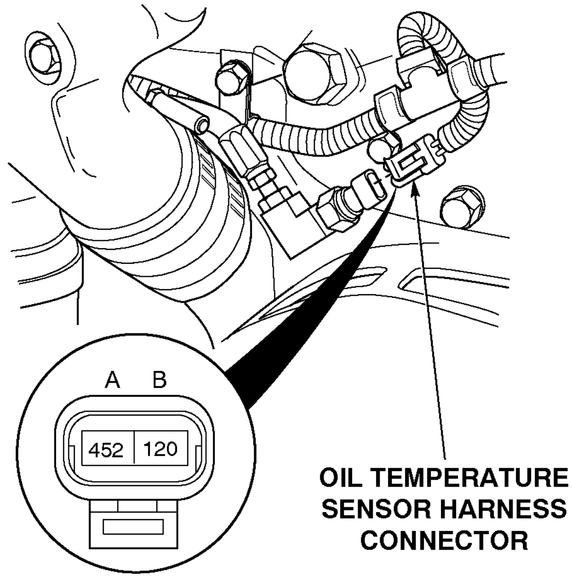
2-14. DDEC III TROUBLESHOOTING (CONT).

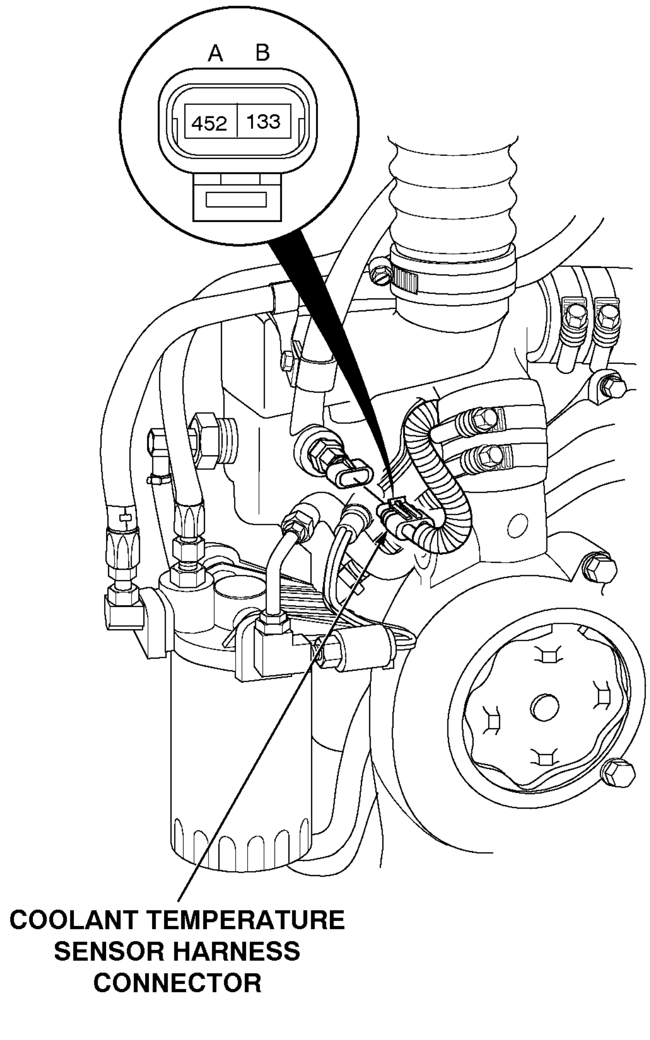
Section IV. TROUBLESHOOTING CHARTS (Cont.)

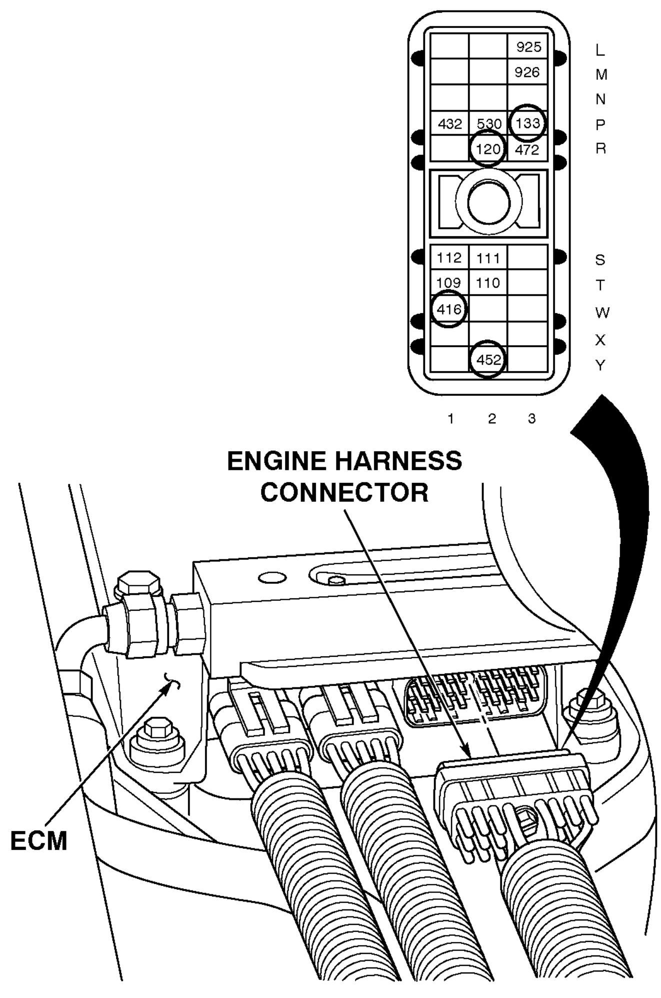
E. FLASH CODE: 14
J1587 CODE: P110 3 - COOLANT TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH) (BELOW)
OR: P175 3 - OIL TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH) (BELOW)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
14-1 Code Check		
• Turn ignition on. • Plug in DDR and determine which code is present.	PID 110 - FMI 3 →	Go to 14-2.
	PID 175 - FMI 3 →	Go to 14-3.
14-2 Coolant Temp Sensor Check		
• Turn ignition off. • Disconnect CTS (para 7-69) and install a jumper between the CTS connector sockets A and B. • Turn ignition on. • Read active codes.	Code 110/4 (or any codes except Code 110/3). →	Go to 14-4.
	Anything except Code 110/4. →	Go to 14-8.
14-3 Oil Temp Sensor Check		
• Turn ignition off. • Disconnect OTS (para 7-70) and install jumper between OTS connector sockets A and B. • Turn ignition on. • Read active codes.	Code 175/4 (or any codes except Code 175/4). →	Go to 14-5.
	Anything except Code 175/4. →	Go to 14-9.
14-4 Check for Short to +5 Volt Line		
• Turn ignition off. • Remove jumper wire. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets P3 (ckt #133) and W1 (ckt #416) on the engine harness connector.	Less than or equal to 10,000 ohms. →	Signal line (ckt #133) is shorted to the engine +5 volt line (ckt #416), and/or (ckt #133) signal line is shorted to ground and/or sensor return (ckt #452). Repair short. Then go to 14-30.
	Greater than 10,000 ohms or open. →	Go to 14-6.


A
B
452
120
OIL TEMPERATURE
SENSOR HARNESS
CONNECTOR

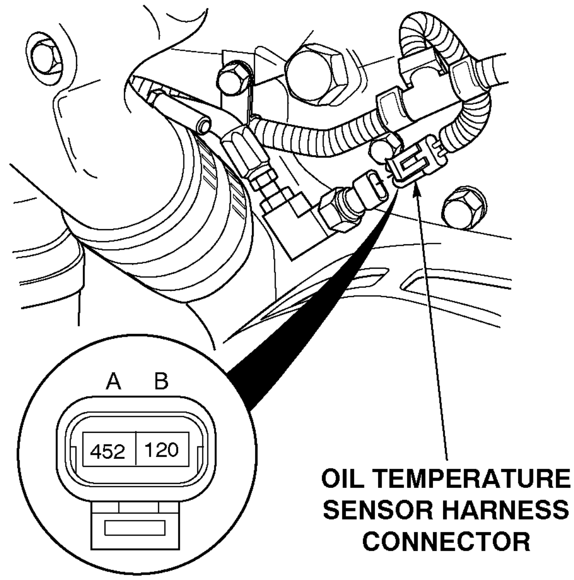

A
B
452
133
COOLANT TEMPERATURE
SENSOR HARNESS
CONNECTOR

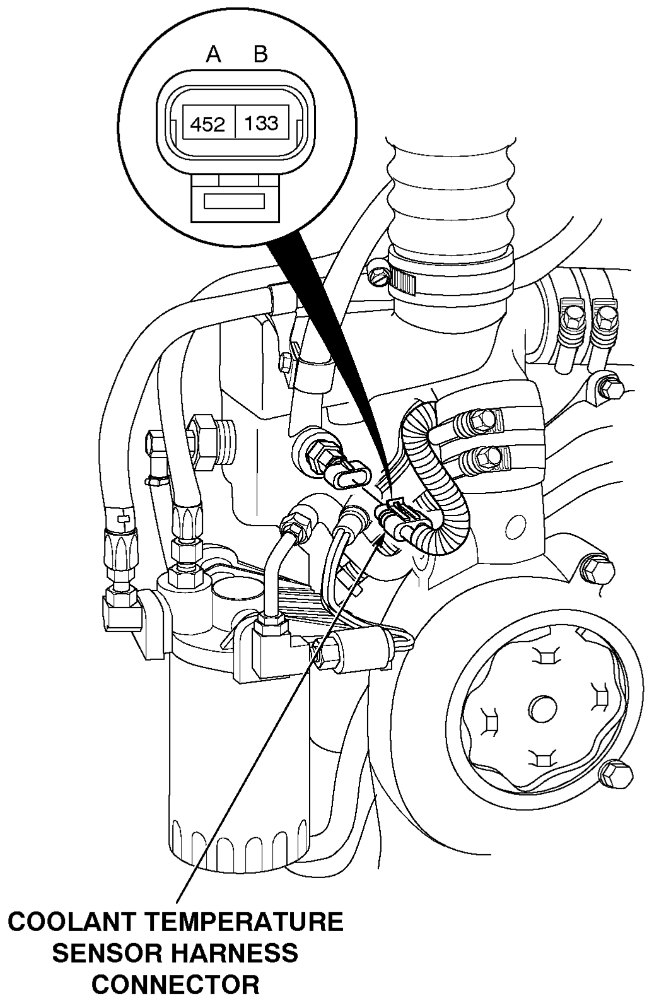

925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3
ENGINE HARNESS
CONNECTOR
ECM

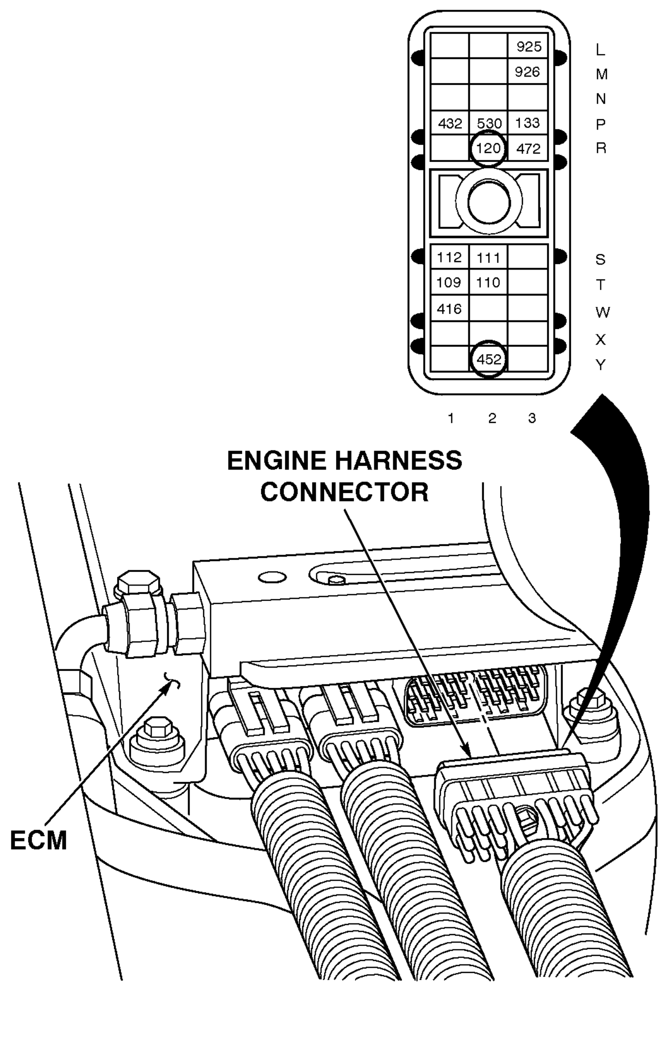
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 14
J1587 CODE: P110 3 - COOLANT TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH)
OR: P175 3 - OIL TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
14-5 Check for Short to +5 Volt Line		
• Turn ignition off. • Remove jumper wire. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets R2 (ckt #120) and W1 (ckt #416) on the engine harness connector.	Less than or equal to 10,000 ohms. →	Signal line (ckt #120) is shorted to the engine +5 volt line (ckt #416), and/or (ckt #120) signal line is shorted to ground and/or sensor return (ckt #452). Repair short. Then go to 14-30.
	Greater than 10,000 ohms or open. →	Go to 14-7.
14-6 Check CTS Connectors		
• Inspect terminals at the CTS connector (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace CTS (para 7-69). Then go to 14-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 14-30.
14-7 Check OTS Connectors		
• Inspect terminals at the OTS connector (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace OTS (para 7-70). Then go to 14-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 14-30.
14-8 Open Line Check		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets P3 (ckt #133) and Y2 (ckt #452) on the engine harness connector.	Less than or equal to 5 ohms. →	Go to 14-10.
	Greater than 5 ohms or open. →	Signal line (ckt #133) or return line (ckt #452) is open. Repair open. Then go to 14-30.


A B
452 120
OIL TEMPERATURE
SENSOR HARNESS
CONNECTOR

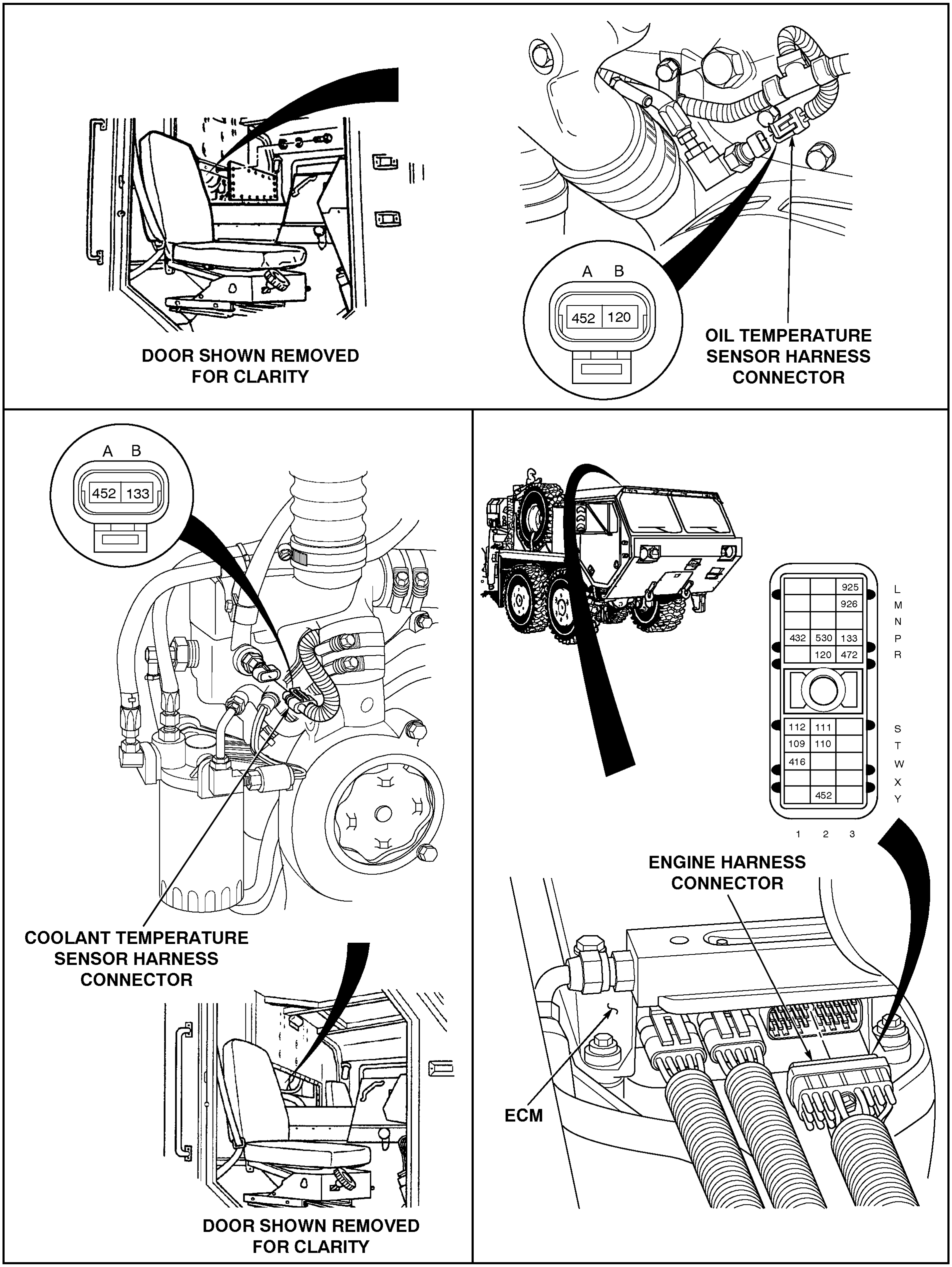

A B
452 133
COOLANT TEMPERATURE
SENSOR HARNESS
CONNECTOR


925
926
432 530 133
120 472
L
M
N
P
R
112 111
109 110
416
452
S
T
W
X
Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 14
J1587 CODE: P110 3 - COOLANT TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH)
OR: P175 3 - OIL TEMPERATURE CIRCUIT FAILED HIGH (VOLTAGE HIGH)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
14-9 Open Line Check		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets R2 (ckt #120) and Y2 (ckt #452) on the engine harness connector.	Less than or equal to 5 ohms.	Go to 14-11.
	Greater than 5 ohms or open.	Signal line (ckt #120) or return line (ckt #452) is open. Repair open. Then go to 14-30.
14-10 Check ECM Connectors		
• Check terminals at the ECM engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 14-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 14-30.
14-11 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 14-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 14-30.
14-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or after 8 minutes. Stop engine. • Read inactive codes.	No codes.	Repairs are complete.
	Code 110/3 or 175/3 (any other codes.)	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Codes 110/3 or 175/3.	Go to START-1, pg 2-539, to service other codes.


DOOR SHOWN REMOVED
FOR CLARITY
A B
452 120
OIL TEMPERATURE
SENSOR HARNESS
CONNECTOR
A B
452 133
COOLANT TEMPERATURE
SENSOR HARNESS
CONNECTOR
DOOR SHOWN REMOVED
FOR CLARITY
925
926
432 530 133
120 472
112 111
109 110
416
452
L M N P R S T W X Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM

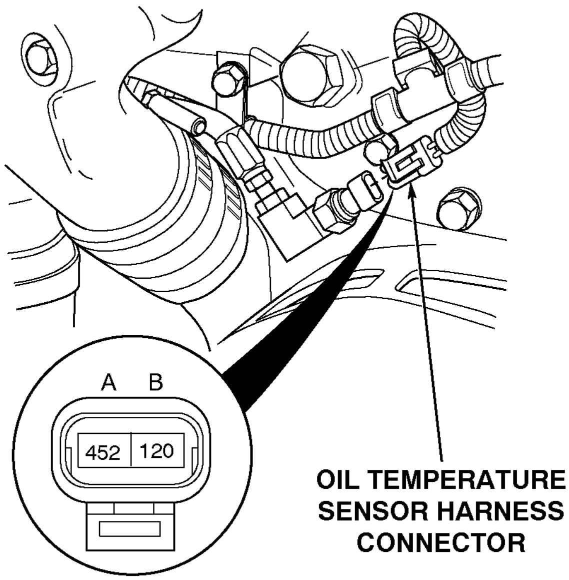
2-14. DDEC III TROUBLESHOOTING (CONT).

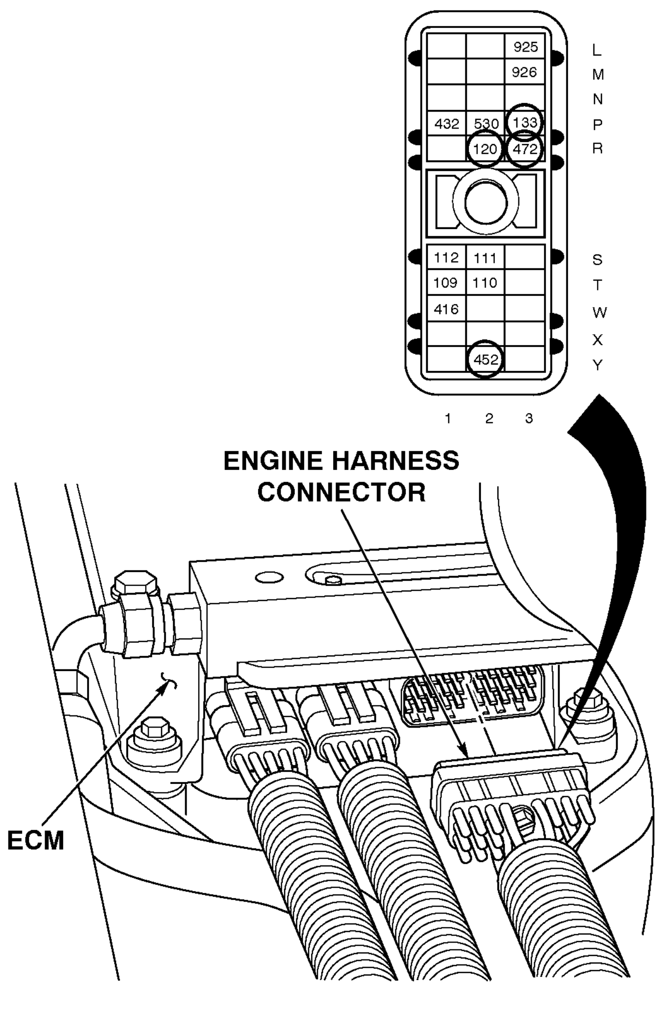
Section IV. TROUBLESHOOTING CHARTS (Cont.)

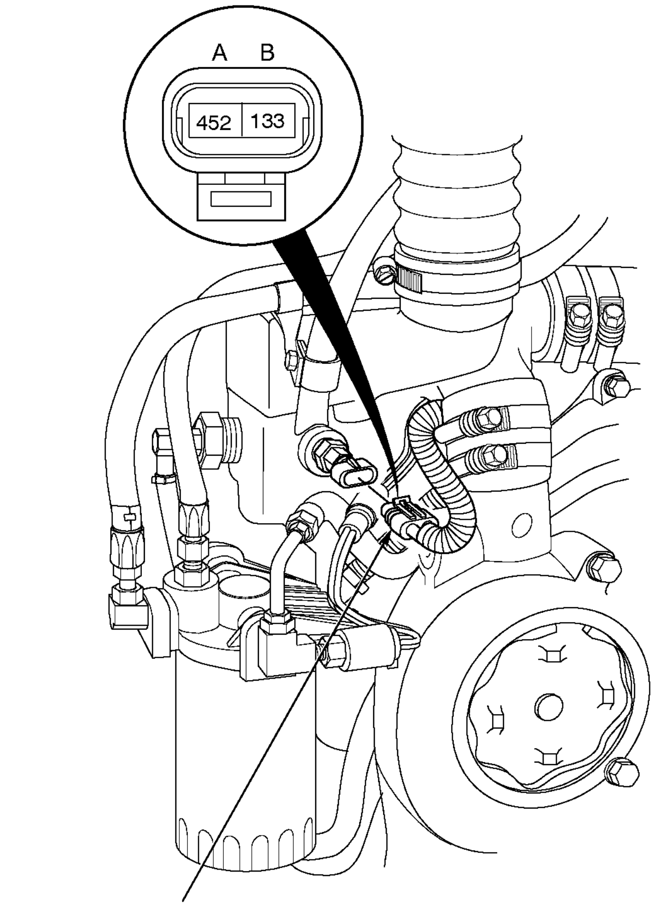
E. FLASH CODE: 15
J1587 CODE: P110 4 - COOLANT TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)
OR: P175 4 - OIL TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
15-1 Code Check		
• Turn ignition on. • Plug in DDR and determine which code is present.	PID 110 - FMI 4 PID 175 - FMI 4	Go to 15-2. Go to 15-3.
NOTE: If any of the following SAE J1587 Codes are also present go to ENG5V-1(page 2-761): 110/3, 174/3, 174/4, 187/4, 91/4, 100/4, 102/4, and 102/3.		
15-2 Coolant Temp Sensor Check		
• Turn ignition off. • Disconnect CTS connector (para 7-69). • Start engine and run until "Check Engine" light comes on or after 8 minutes. • Read active codes with engine still running.	Any codes except Code 110/4. Code 110/4 (and any other codes).	Go to 15-4. Go to 15-6.
15-3 Oil Temp Sensor Check		
• Turn ignition off. • Disconnect OTS harness connector (para 7-70). • Start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or after 8 minutes. • Read active codes with engine still running.	Any codes except Code 175/4. Code 175/4 (and any other codes).	Go to 15-5. Go to 15-7.
15-4 Check CTS Connectors		
• Inspect terminals at the CTS connector (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. Problem found.	Replace CTS (para 7-69). Then go to 15-30. Repair terminals/connectors (para 7-101). Then go to 15-30.


A B
452 120
OIL TEMPERATURE SENSOR HARNESS CONNECTOR

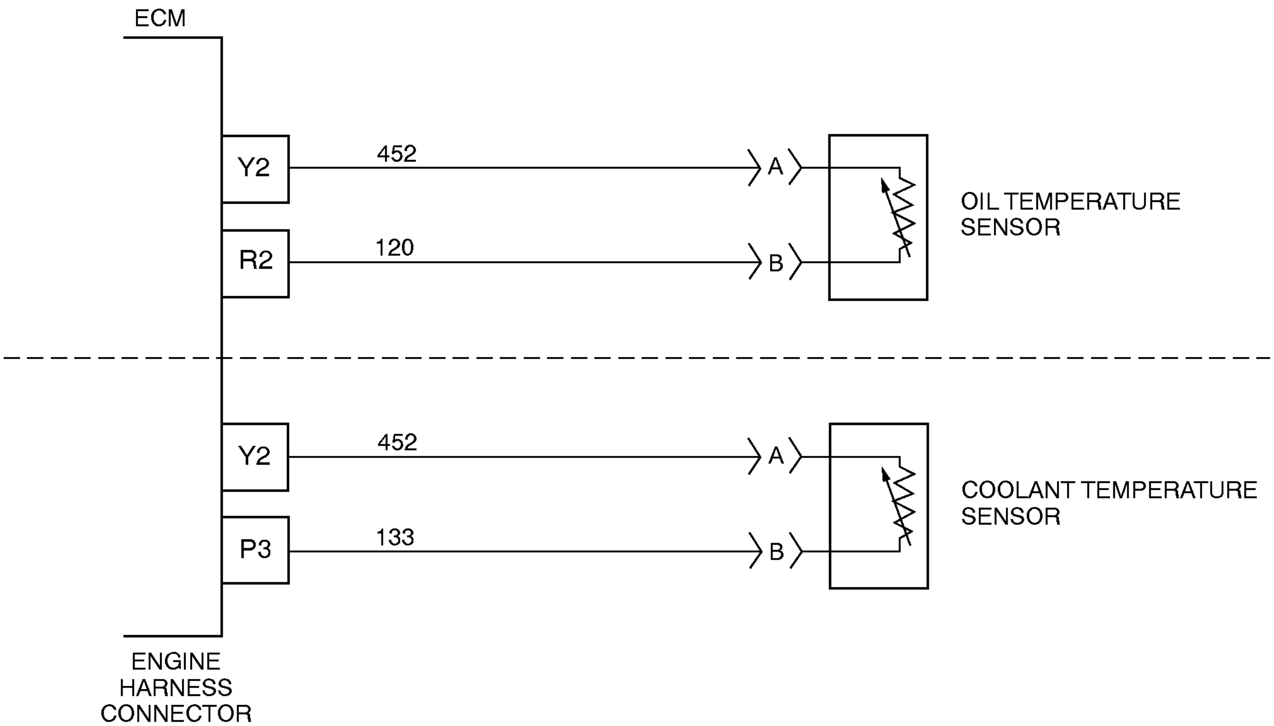

925
926
432 530 133
120 472
L
M
N
P
R
112 111
109 110
416
452
S
T
W
X
Y
1 2 3
ENGINE HARNESS CONNECTOR
ECM


A B
452 133
COOLANT TEMPERATURE SENSOR HARNESS CONNECTOR

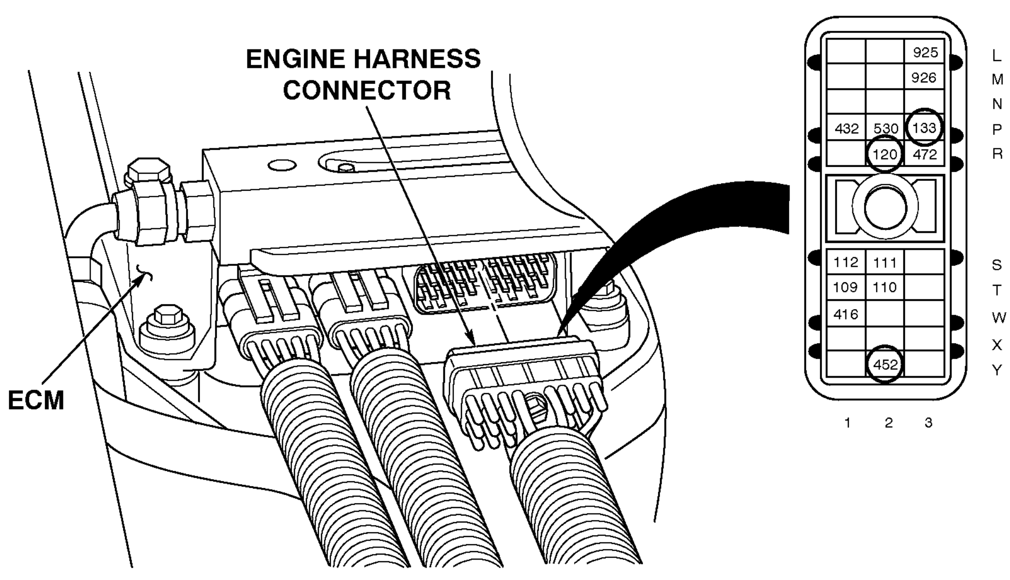
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 15
J1587 CODE: P110 4 - COOLANT TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)
OR: P175 4 - OIL TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
15-5 Check OTS Connectors		
• Inspect terminals at the OTS connector (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace OTS (para 7-70). Then go to 15-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 15-30.
15-6 Check for Short		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Read resistance between sockets P3 (ckt #133) and Y2 (ckt #452) on the engine harness connector. • Also read resistance between socket B of CTS connector and a good ground.	Less than or equal to 10,000 ohms on either reading. →	Signal line (ckt #133) is shorted to the return line (ckt #452) or battery ground. Repair short. Then go to 15-30.
	Greater than 10,000 ohms or open on both readings. →	Go to 15-8.
15-7 Check for Short		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Read resistance between sockets R2 (ckt #120) and Y2 (ckt #452) on the engine harness connector. • Also read resistance between socket B of OTS connector and a good ground.	Less than or equal to 10,000 ohms on either reading. →	Signal line (ckt #120) is shorted to the return line (ckt #452) or battery ground. Repair short. Then go to 15-30.
	Greater than 10,000 ohms or open on both readings. →	Go to 15-9.



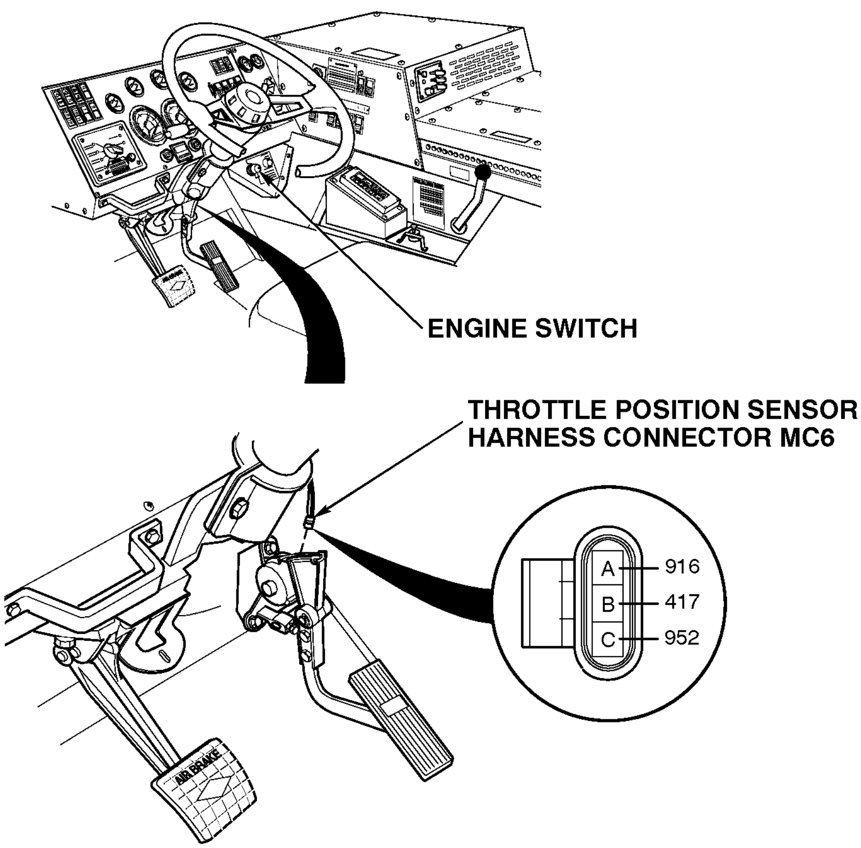
OIL AND COOLANT TEMPERATURE CIRCUITS

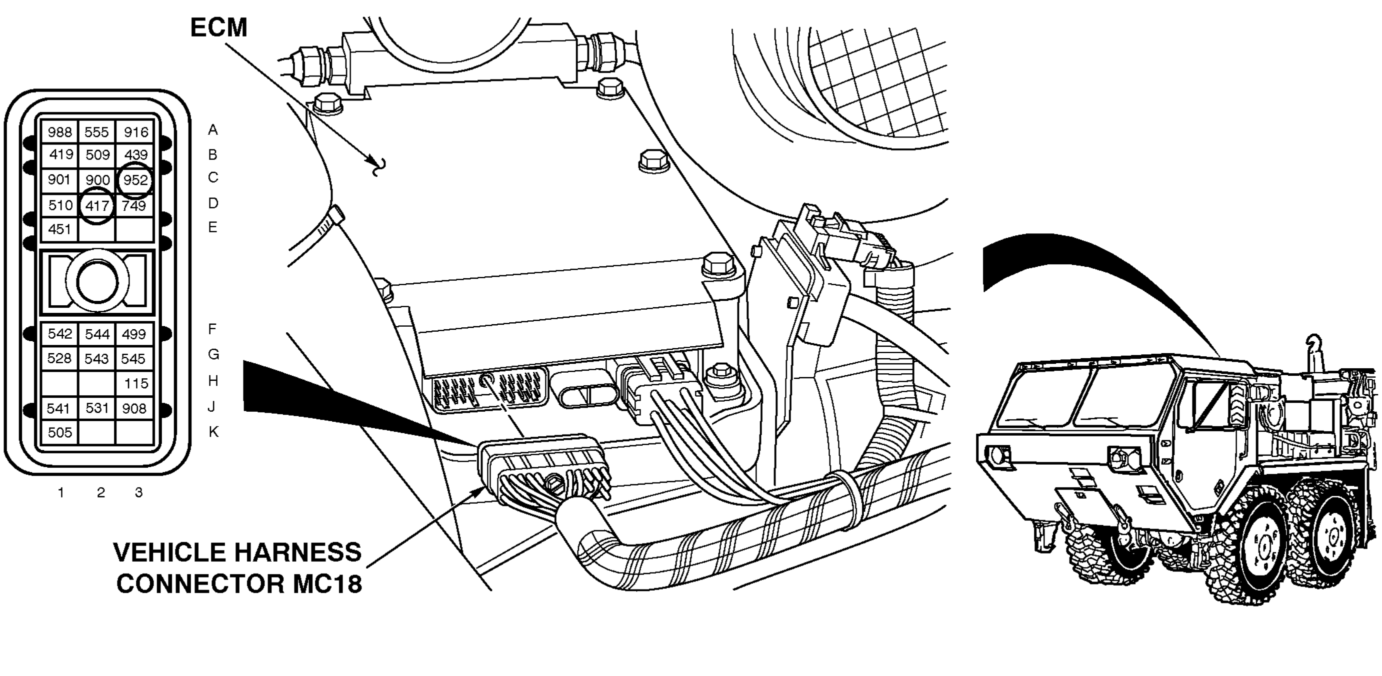


Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 15
J1587 CODE: P110 4 - COOLANT TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)
OR: P175 4 - OIL TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
15-8 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets. Especially terminals P3 and Y2 of the engine harness connector.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 15-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 15-30.
15-9 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets. Especially terminals R2 and Y2 of the engine harness connector.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 15-30.
	Problem found. →	Repair terminals/connectors (para 7-101).
15-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or for 1 minute. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 110 or 175/4 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 110 or 175/4. →	Go to START-1, pg 2-539, to service other codes.


ENGINE SWITCH
THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952


ECM
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18

2-14. DDEC III TROUBLESHOOTING (CONT).

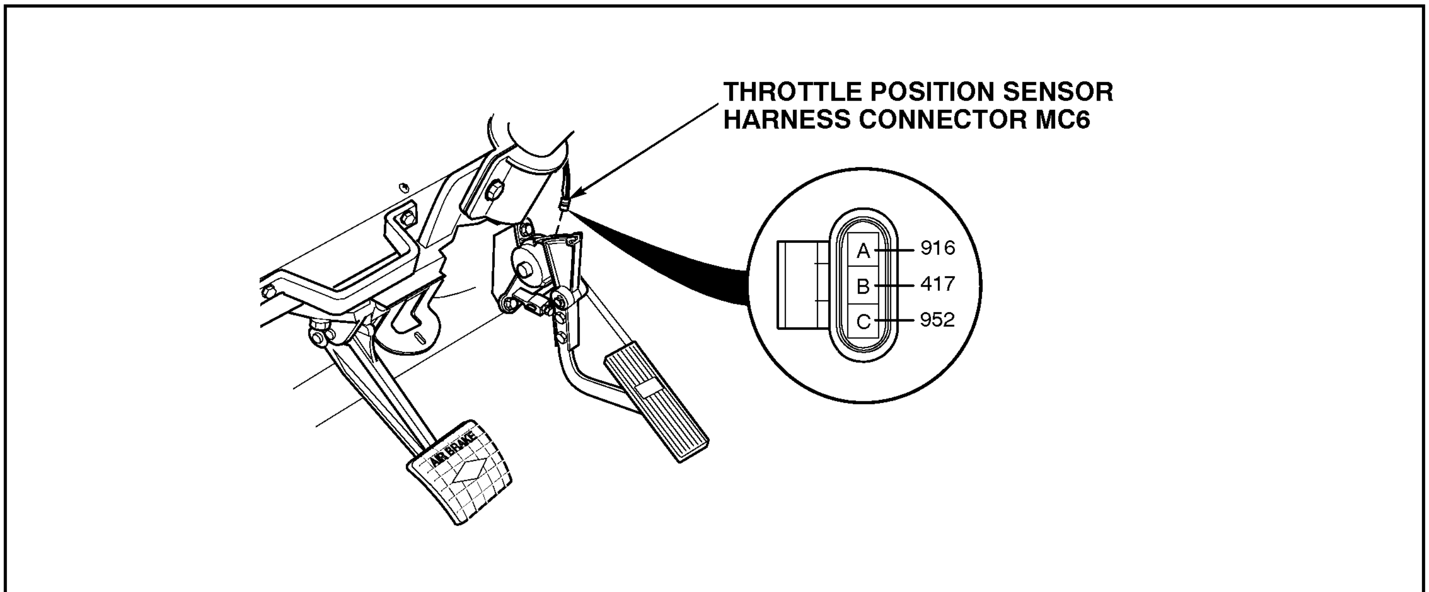
Section IV. TROUBLESHOOTING CHARTS (Cont.)

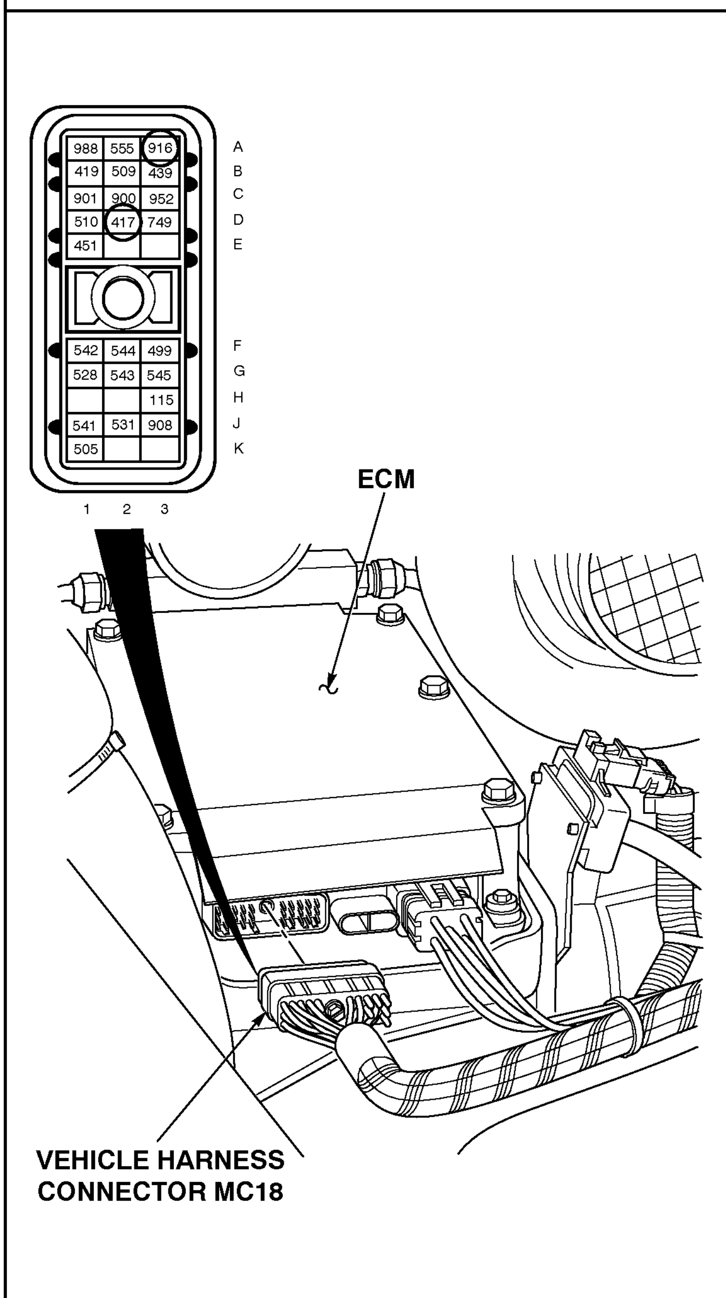
E. FLASH CODE: 21
J1587 CODE: P91 3 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

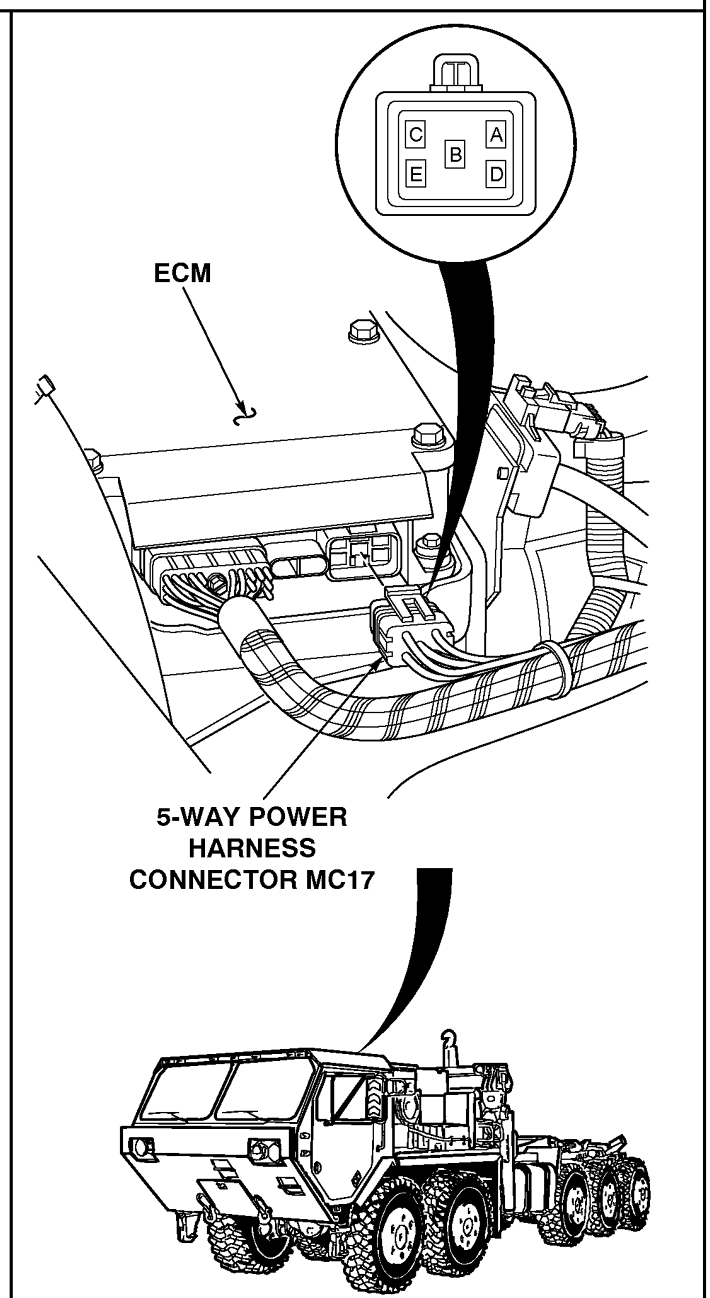
NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

NOTE – Checks at the TPS connector must be made at MC6, not at the connector on the electronic throttle.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
21-1 Multiple Code Check		
• Were there any other active codes besides 91/3?	No other active codes.	Go to 21-2.
	Yes, any or all of the following active codes: 187/3, 91/4.	Go to VEH5V-1 (page 2-767).
	Yes - But none of the above.	Go to 21-2.
21-2 Sensor Check		
• Turn ignition off. • Disconnect TPS connector. • Turn ignition on. • Read active codes.	Any code (except Code 91/3).	Go to 21-3.
	Code 91/3 (and any other codes).	Go to 21-7.
21-3 Return Circuit Check		
• Turn ignition off. • Install a jumper wire between pins A and B of the TPS harness connector. • Disconnect the vehicle harness connector at the ECM. • Read resistance between sockets D2 and C3 on the vehicle harness connector.	Less than or equal to 5 ohms.	Go to 21-4.
	Greater than 5 ohms open.	Return line (ckt #952) and/or signal (ckt #417) is open. Repair open. Then go to 21-30.
21-4 Check TPS Adjustment		
• Reconnect vehicle harness connector and plug TPS back in. • Hook-up DDR to the DDL connector and select TPS CNTS. • Turn ignition on. • Read TPS Counts at both no throttle and full throttle.	Getting 64-205 counts at no throttle and less than 968 counts at full throttle.	Go to 21-6.
	Not getting the above reading.	Replace TPS (para 7-58). Then go to 21-30.


THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952
AIR BRAKE

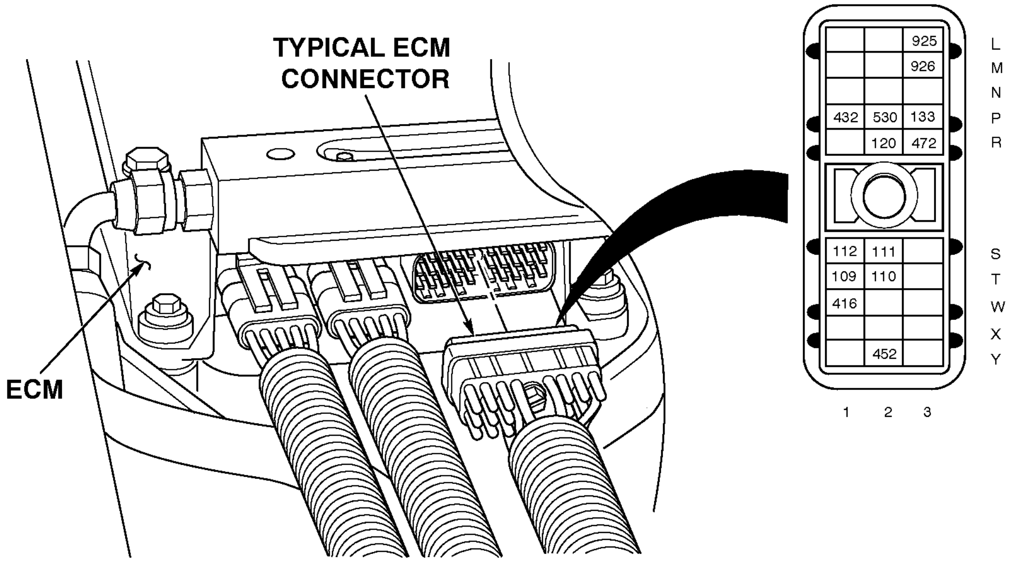

988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18

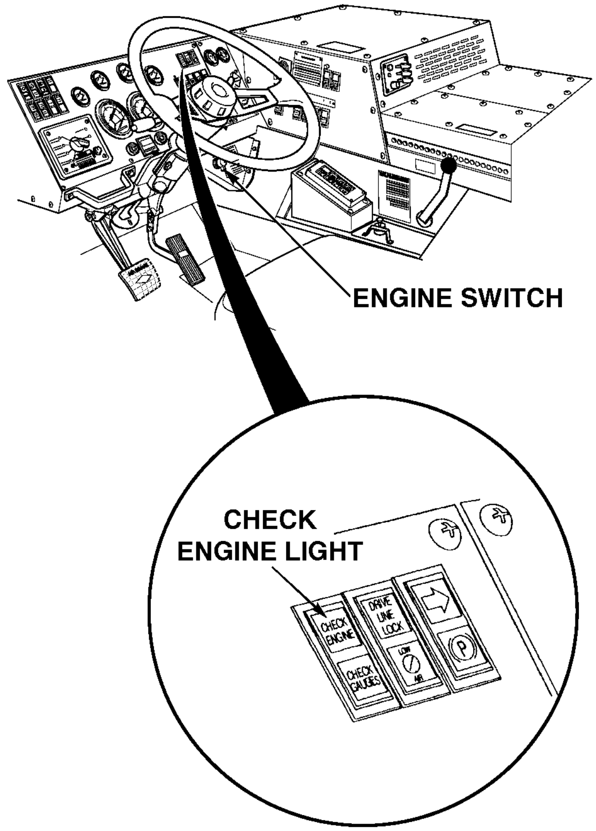

C B A
E D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 21
J1587 CODE: P91 3 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
21-5 (Deleted)		
21-6 Check TPS Connectors		
• Inspect terminals at the TPS connectors (sensor side and harness side) for damage; bent, corroded, and unseated pins of sockets.	Terminals and connectors are okay. →	Replace TPS (Electronic Throttle) (para 7-58). Then go to 21-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 21-30.
21-7 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM. • Read resistance between sockets D2 and A3 on the vehicle harness connector.	Less than or equal to 10,000 ohms. →	Signal line (ckt #417) is shorted to the vehicle + 5 volt line (ckt #916). Repair short. Then go to 21-30.
	Greater than 10,000 ohms or open. →	Go to 21-8.
21-8 Check for Short to Battery +		
• Disconnect batteries (para 7-90). • Disconnect the vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between socket D2 of the vehicle harness connector and socket B3 of the vehicle harness connector. • Also read resistance between socket D2 on the vehicle harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open. →	Go to 21-9.
	Any reading is less than or equal to 10,000 ohms. →	A short exists between the sockets where less than 10,000 ohms resistance was read. Repair short. Then go to 21-30.

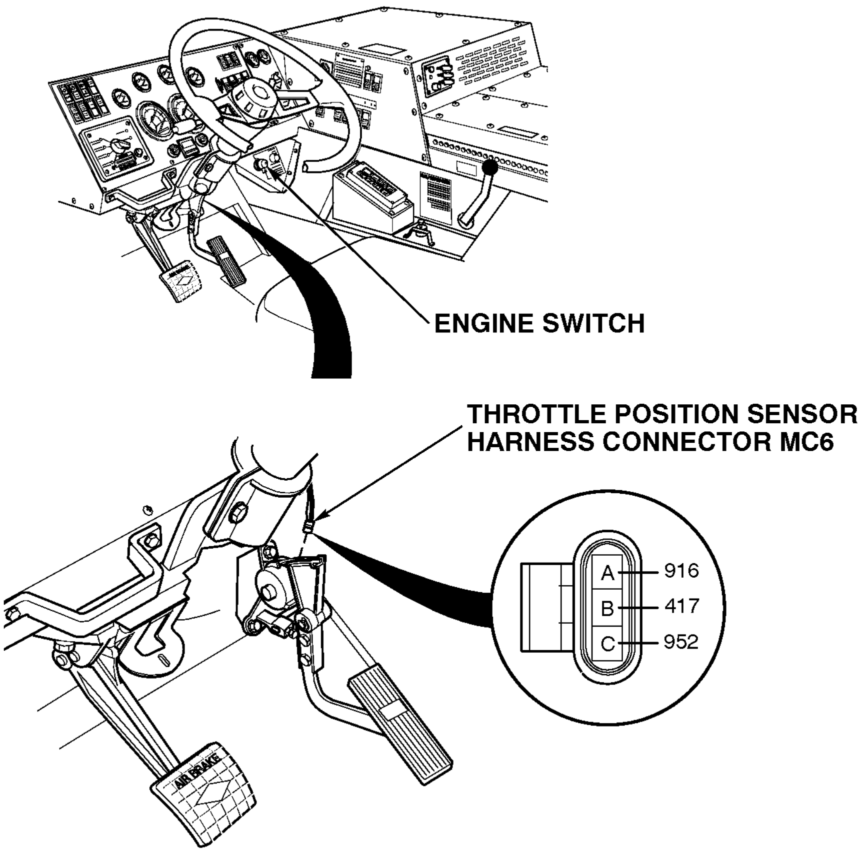

TYPICAL ECM
CONNECTOR
ECM
925
926
432 530 133
120 472
112 111
109 110
416
452
L
M
N
P
R
S
T
W
X
Y
1 2 3


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 21
J1587 CODE: P91 3 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
21-9 Check ECM Connectors		
• Check terminals at the vehicle harness connector (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 21-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 21-30.
21-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or 1 minute. Stop engine. • Read all codes.	No codes.	Repairs are complete.
	Code 91/3 (and any other codes).	All system diagnostics are complete. Please review this section from the first step to find the error.
	Any other codes except Code 91/3.	Go to START-1, pg 2-539, to service other codes.


ENGINE SWITCH
THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A
916
B
417
C
952

2-14. DDEC III TROUBLESHOOTING (CONT).

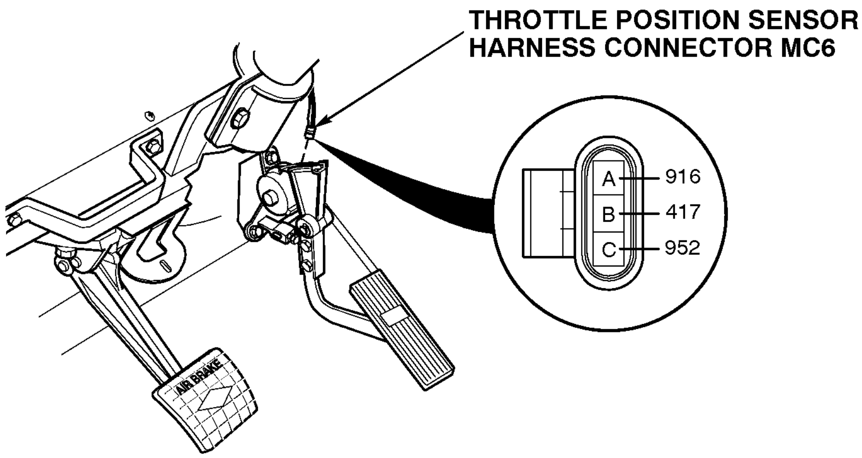
Section IV. TROUBLESHOOTING CHARTS (Cont.)

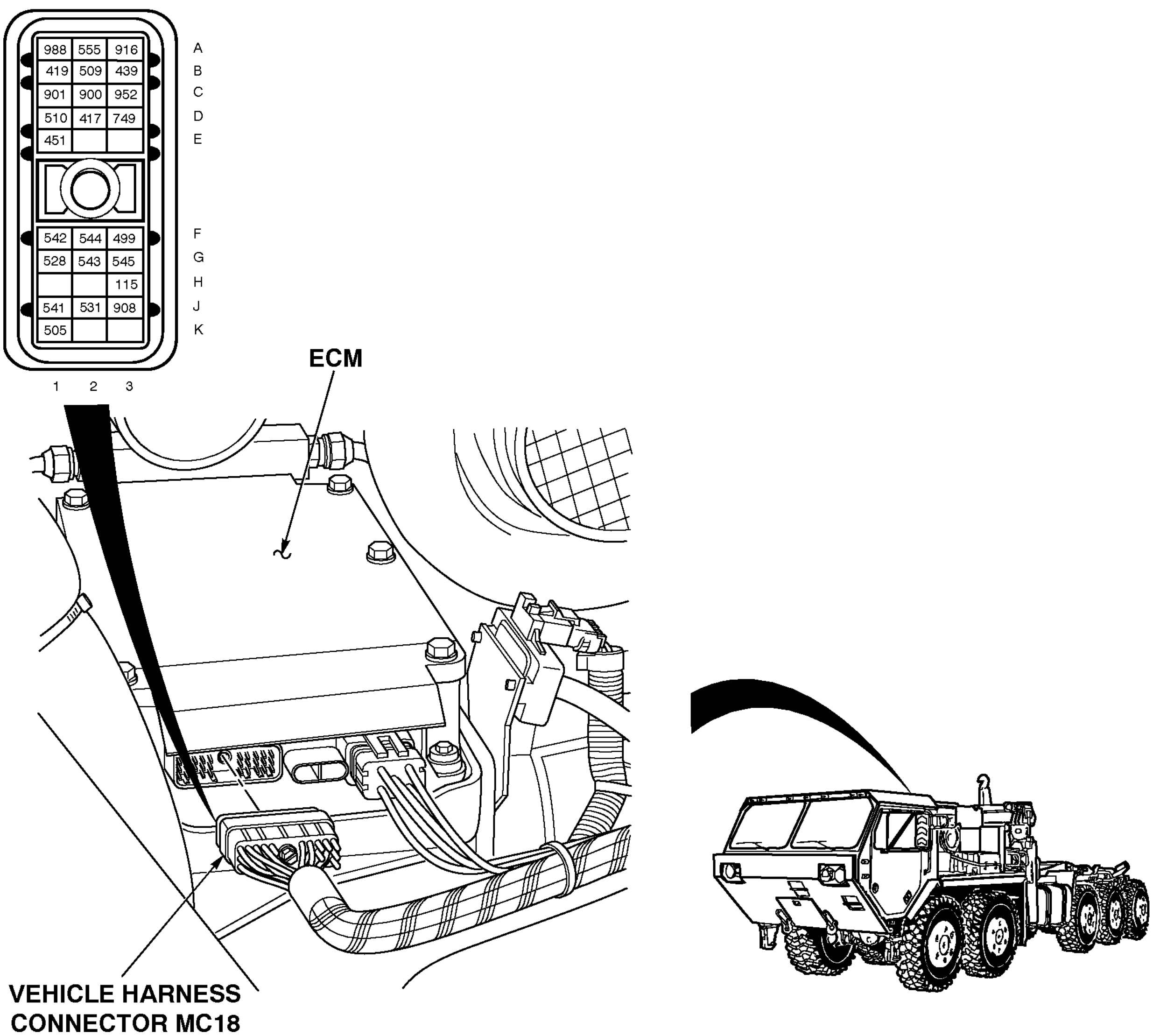
E. FLASH CODE: 22
J1587 CODE: P91 4 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED LOW (VOLTAGE LOW) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

NOTE – Checks at the TPS connector must be made at MC6, not at the connector on the electronic throttle.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
22-1 Multiple Code Check		
• Were there any other active codes besides 91/4?	No other active codes.	Go to 22-2.
	Yes, any or all of the following codes: 187/3, 91/3.	Go to VEH5V-1 (page 2-767).
	Yes - But none of the above.	Go to 22-2.
22-2 Sensor Check		
• Turn ignition off. • Disconnect the TPS connector. • Install a jumper wire between sockets B and C of the TPS harness connector. • Turn ignition on. • Read active codes.	Code 91/4 and/or other codes.	Go to 22-6.
	Code 91/3 (and any other codes).	Go to 22-3.
22-3 Check TPS Adjustment		
• Remove jumper and reconnect TPS. • Hook-up DDR to the DDL connector and select TPS CNTS. • Read TPS Counts at both no throttle and full throttle.	Getting 64-205 counts at no throttle and less than 968 counts at full throttle.	Go to 22-5.
	Not getting the above readings.	Replace TPS (para 7-58). Then go to 22-30.

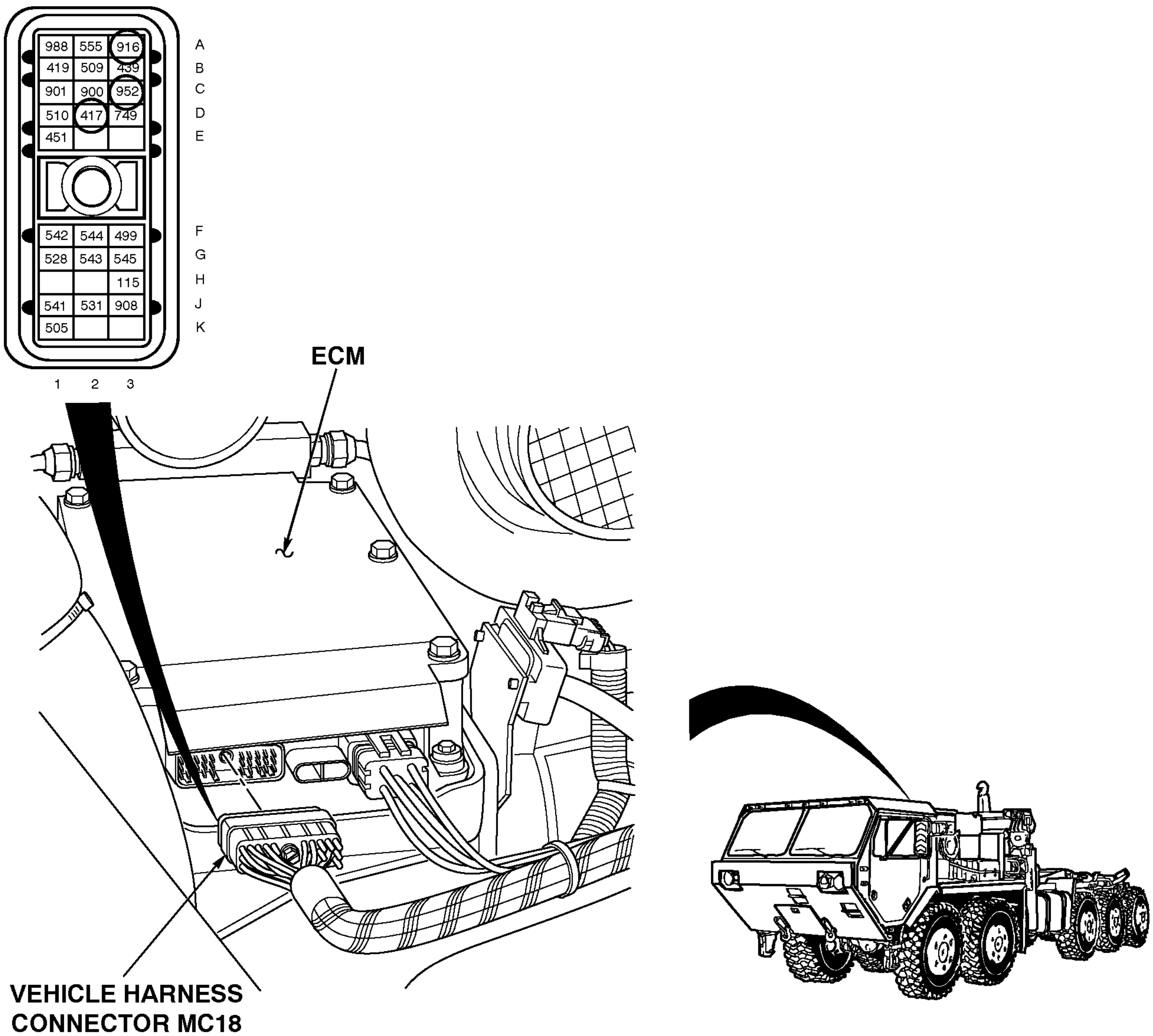

THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952
AIR BRAKE

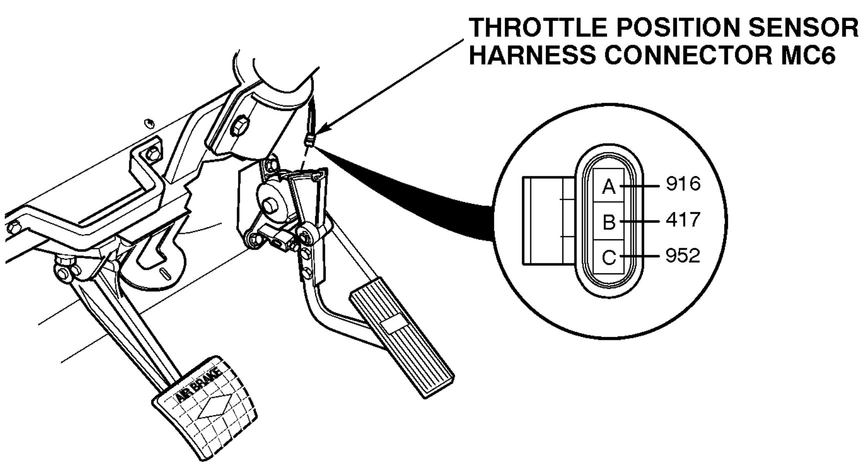

988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 22
J1587 CODE: P91 4 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
22-4 (Deleted)		
22-5 Check TPS Connectors		
• Inspect terminals at the TPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace TPS (para 7-58). Then go to 22-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 22-30.
22-6 Check for +5 Volts		
• Turn ignition off. • Remove jumper • Turn ignition on. • Read voltage on TPS connector, socket C (red lead) to socket A (black lead).	Between 4 to 6 volts. →	Go to 22-7.
	Less than 4 volts. →	Go to 22-10.
	Greater than 6 volts. →	Go to 22-12.
22-7 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector at ECM. • Read resistance between sockets A and B on the TPS connector. • Also read resistance between socket B of TPS connector and a good ground.	Less than or equal to 10,000 ohms on either reading. →	Signal line (ckt #417) is shorted to the return line (ckt #952) or battery ground. Repair short. Then go to 22-30.
	Greater than 10,000 ohms or open on both readings. →	Go to 22-8.

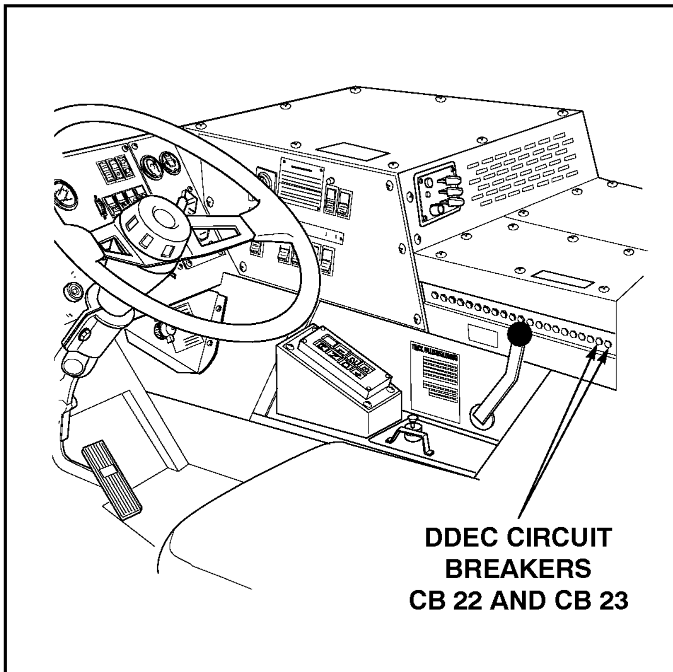

988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18

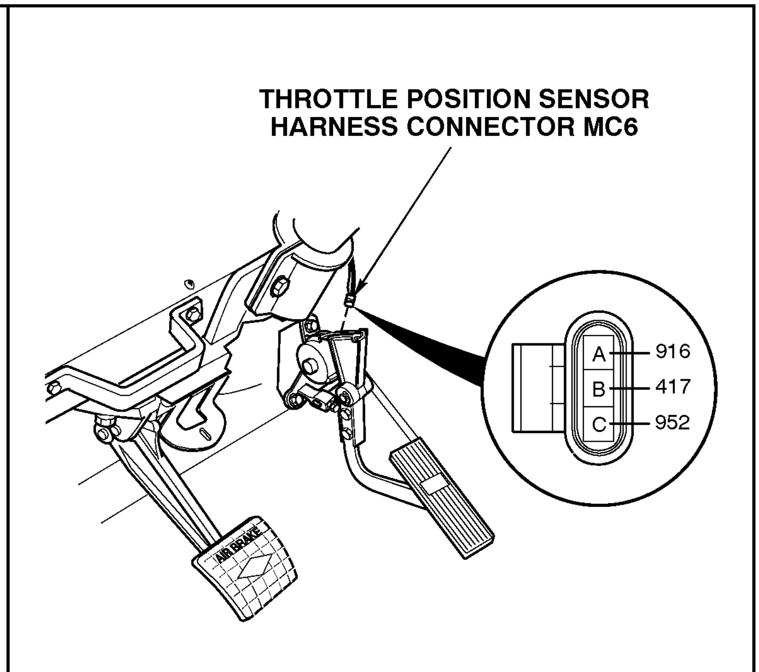

THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952
AIR BRAKE

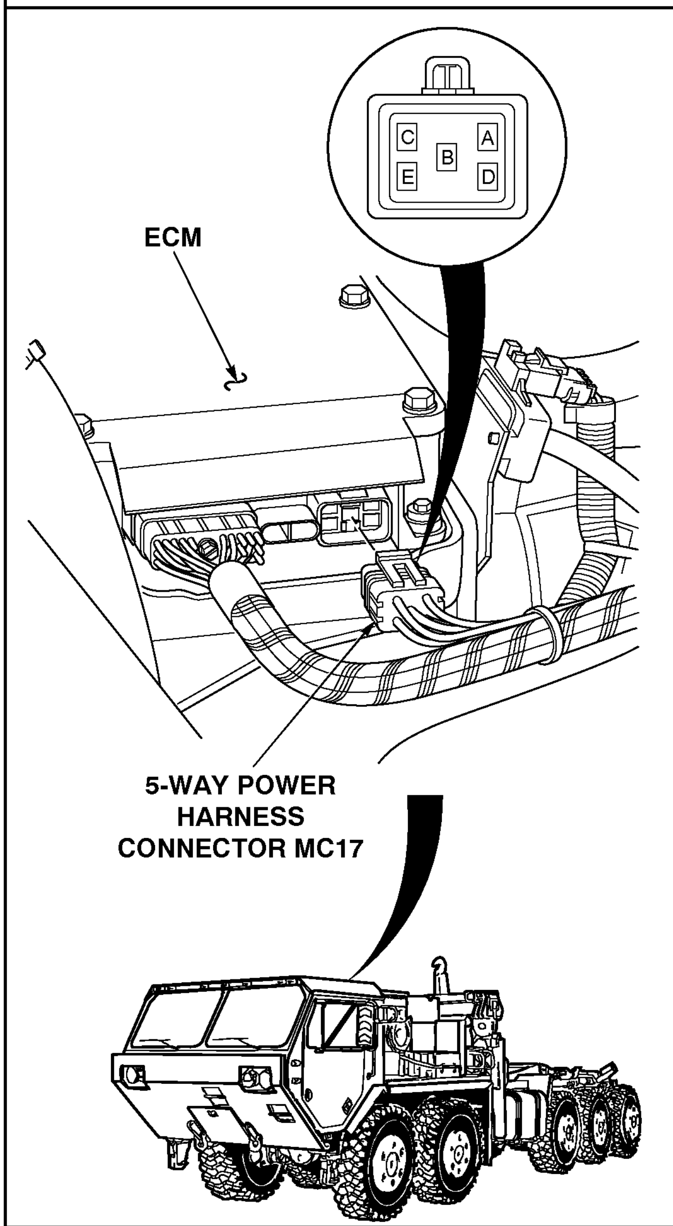
Section IV. TROUBLESHOOTING CHARTS (Cont.)

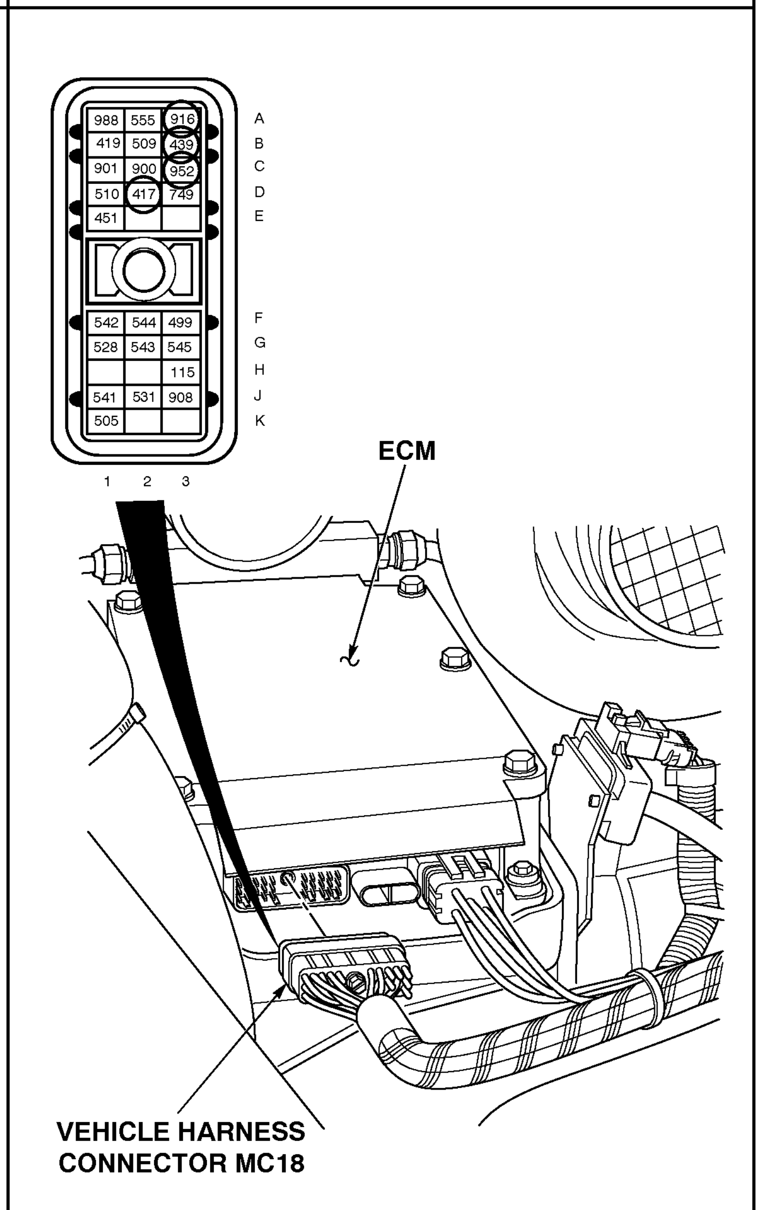
E. FLASH CODE: 22
J1587 CODE: P91 4 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
22-8 Check for Signal Open		
• Install a jumper wire between sockets A and B of the TPS connector. • Read resistance between sockets D2 and C3 on the vehicle harness connector.	Less than or equal to 5 ohms.	Go to 22-9.
	Greater than 5 ohms or open.	Signal line (ckt # 417) is open. and/or signal return (ckt #952) is open. Repair open. If no open was found, check ECM terminals A3, D2, C3, and TPS pins. Then go to 22-30.
22-9 Check ECM Connectors		
• Check terminals at the vehicle harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 22-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 22-30.
22-10 Check for Short		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM. • Read resistance between sockets A and C on the TPS connector.	Less than or equal to 10,000 ohms.	The vehicle +5 volt line (ckt #916) is shorted to the return line (ckt #952). Repair short. Then go to 22-30.
	Greater than 10,000 ohms or open.	Go to 22–11.
22-11 Check for Open +5 Volt Line		
• Install a jumper wire between sockets A and C of the TPS connector. • Read resistance between sockets A3 and C3 on the vehicle harness connector.	Less than or equal to 5 ohms.	Go to 22-9.
	Greater than 5 ohms or open.	The vehicle +5 volt line (ckt #916) is open. Repair open. Then go to 22-30.


DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23


THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952

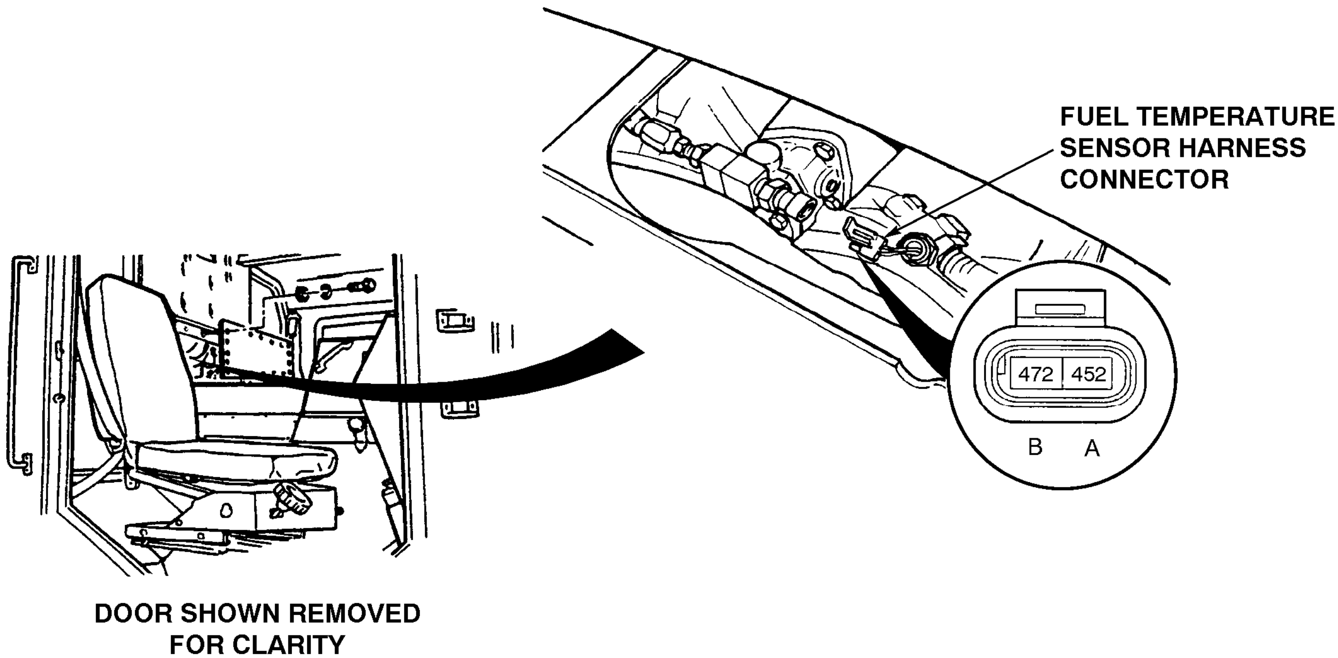

C B A
E D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

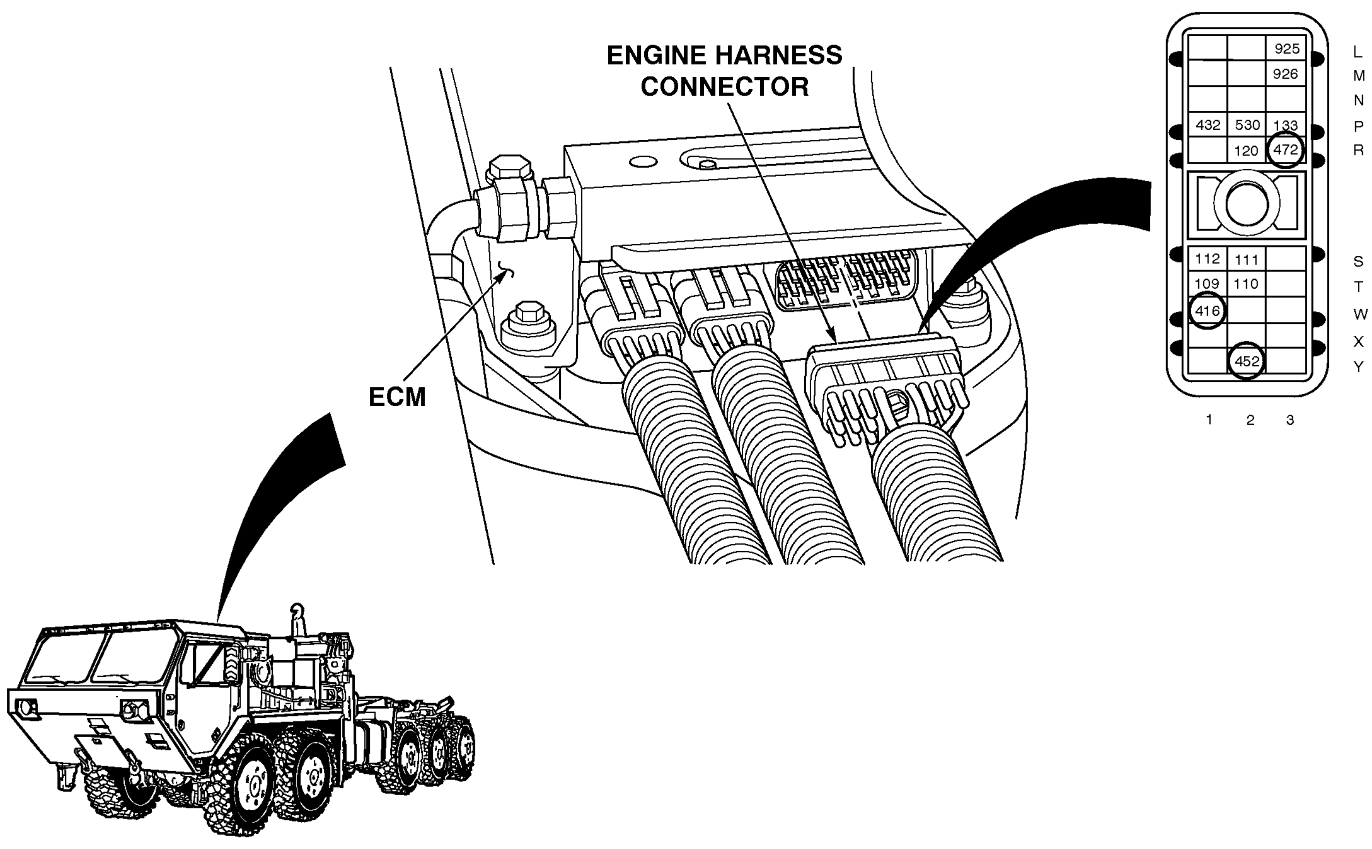

A 988 555 916
B 419 509 439
C 901 900 952
D 510 417 749
E 451
F 542 544 499
G 528 543 545
H 115
J 541 531 908
K 505
1 2 3
ECM
VEHICLE HARNESS
CONNECTOR MC18

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 22
J1587 CODE: P91 4 - ELECTRONIC FOOT PEDAL ASM (EFPA) CIRCUIT FAILED HIGH (VOLTAGE HIGH) ALSO CALLED THROTTLE POSITION SENSOR (TPS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
22-12 Check for Short to Battery +		
• Turn ignition off. • Pull out both DDEC circuit breakers (CB22 & CB23). • Disconnect 5-way power harness connector at the ECM. • Read resistance between sockets D2 and B3 on the vehicle harness connector. • Also read resistance between socket D2 on the vehicle harness connector and the following sockets on the 5-way power harness connector: B, C, D, & E.	All readings are greater than 10,000 ohms or open. →	Go to 22-13.
	Any reading is less than or equal to 10,000 ohms. →	A short exists between sockets where less than 10,000 ohms resistance was read. Repair short and reset circuit breakers. Then go to 22-30.
22-13 Check for Outside DDEC Battery +		
• Turn ignition off. • Remove ECM 5-way power harness connectors. • Remove vehicle harness connector. • Turn ignition on. • Read voltage A3 (red lead) to a good ground (black lead). • Read voltage C3 (red lead) to a good ground (black lead).	All readings less than 4.0 volts. →	Go to 22-9.
	Either reading greater than or equal to 4.0 volts. →	Outside power is shorted to either (ckt #952) or (ckt #916). Repair short. Then go to 22-30.
22-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or 1 minute. Stop engine. • Read all codes.	No codes. →	Repairs are complete.
	Code 91/4 (and any other codes). →	All system diagnostics are complete. Please review this section from the first step to find the error.
	Any other codes except Code 91/4. →	Go to START-1, pg 2-539, to service other codes.


FUEL TEMPERATURE
SENSOR HARNESS
CONNECTOR
472
452
B
A
DOOR SHOWN REMOVED
FOR CLARITY


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

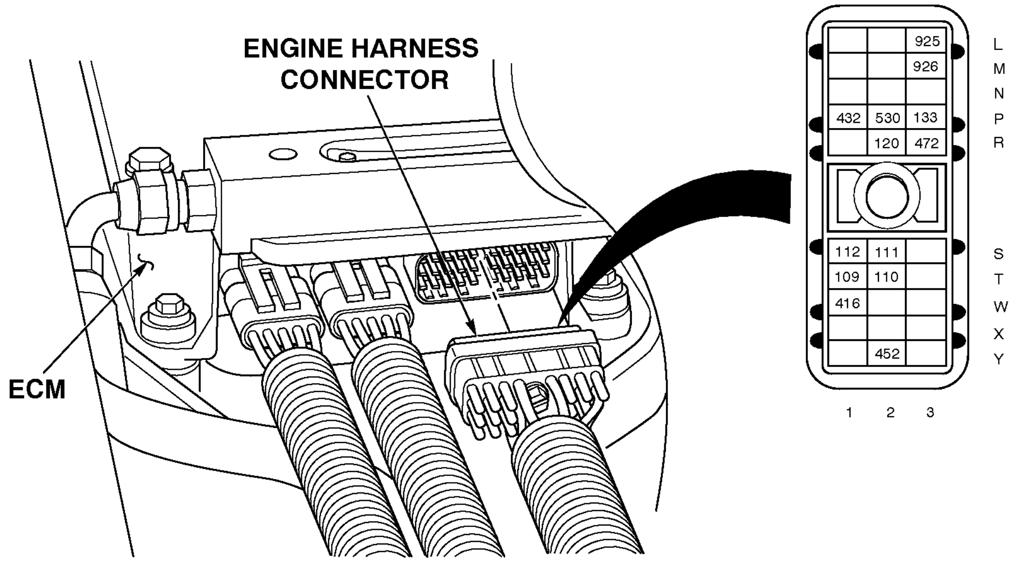
2-14. DDEC III TROUBLESHOOTING (CONT).

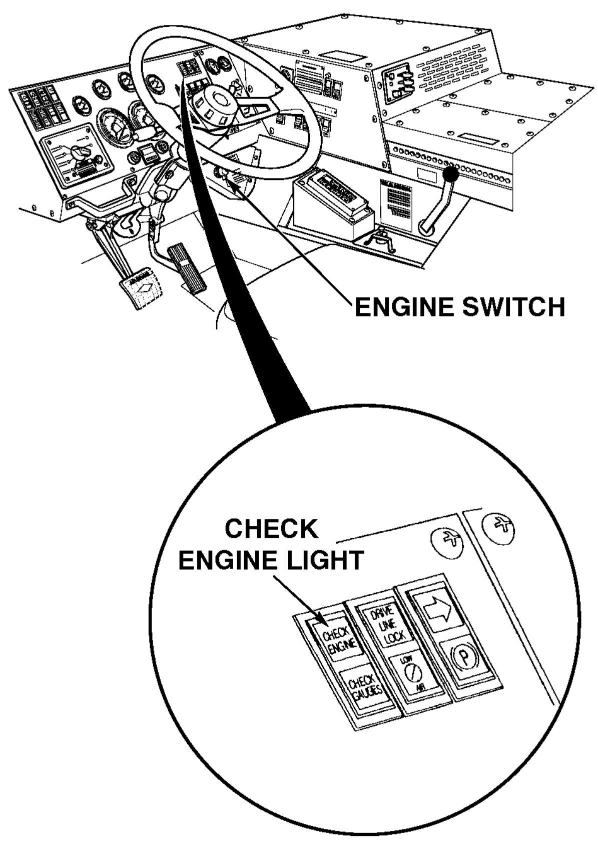
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 23
J1587 CODE: P174 3 - FUEL TEMPERATURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
23-1 Sensor Check		
• Turn ignition off. • Disconnect FTS sensor connector (para 7-62) and install a jumper wire between the FTS connector sockets A and B. • Turn ignition on. • Read active codes.	Code 174/4 and/or any codes except Code 174/3.	Go to 23-2.
	Anything except Code 174/4.	Go to 23-4.
23-2 Check for Short to +5 Volt Line		
• Turn ignition off. • Remove jumper wire. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets R3 and W1 on the engine harness connector.	Less than or equal to 10,000 ohms.	Signal line (ckt #472) is shorted to the engine +5 volt line (ckt #416), and/or (ckt #472) signal is shorted to (ckt #452) sensor return and/or ground. Repair short. Then go to 23-30.
	Greater than 10,000 ohms or open.	Go to 23-3.
23-3 Check FTS Connectors		
• Inspect terminals at the FTS connectors (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace FTS (para 7-62). Then go to 23-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 23-30.
23-4 Open Line Check		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets R3 and Y2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 23-5.
	Greater than 5 ohms or open.	Signal line (ckt #472) or return line (ckt #452) is open. Repair open. Then go to 23-30.

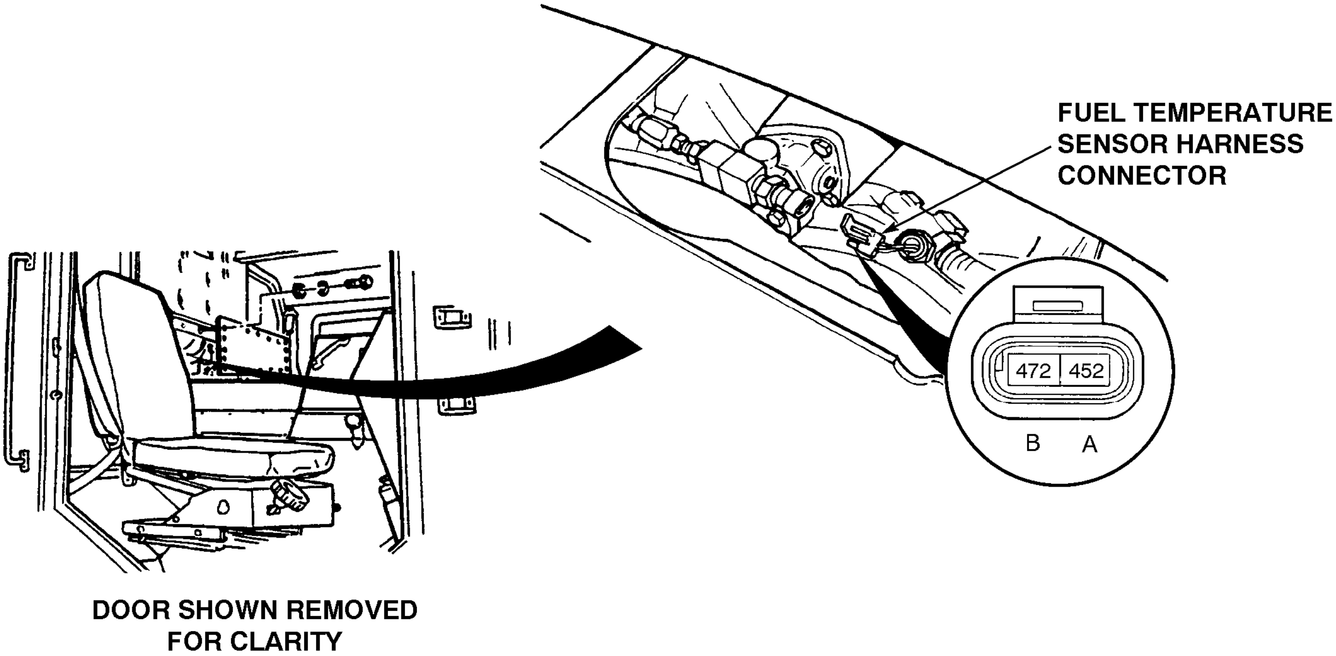

ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

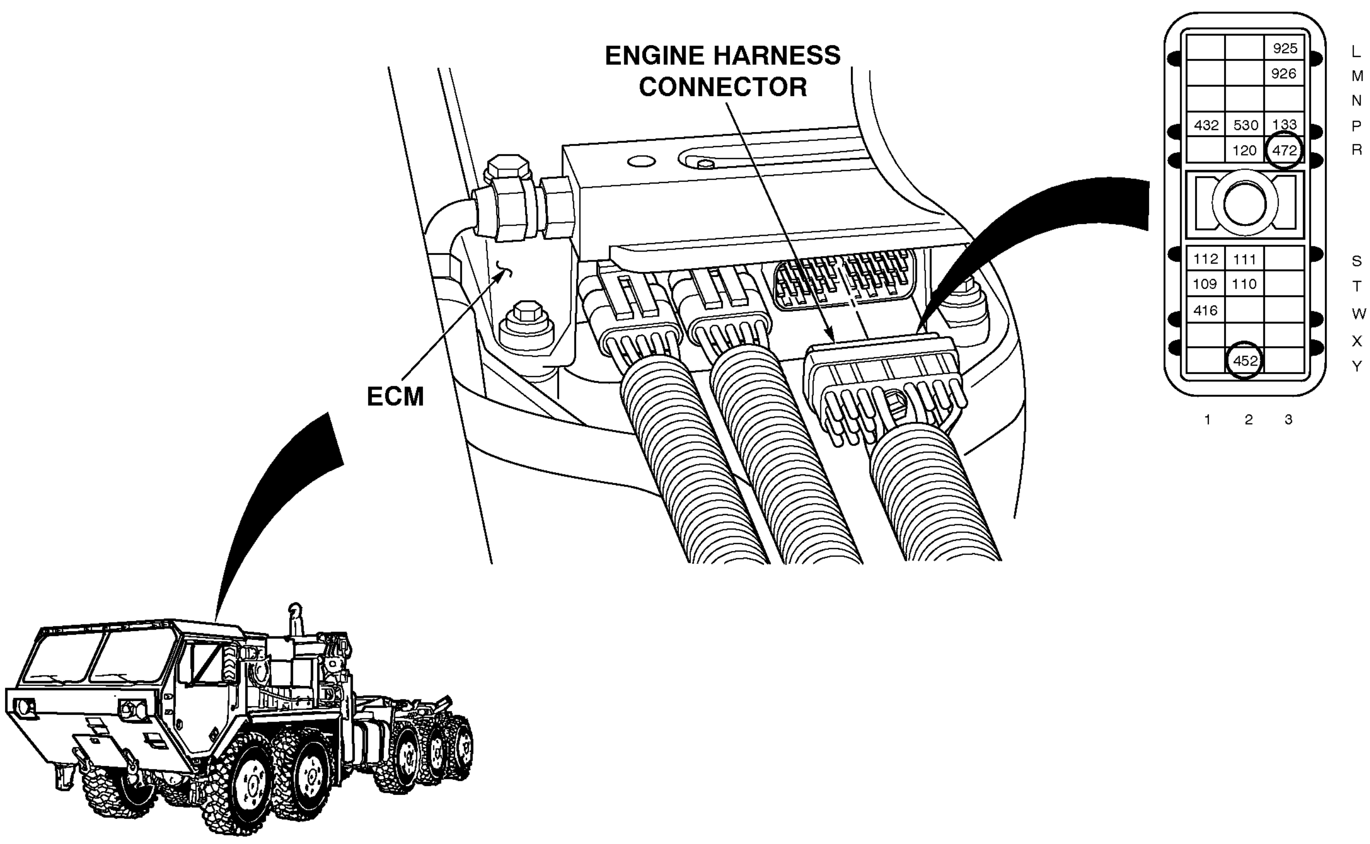

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 23
J1587 CODE: P174 3 - FUEL TEMPERATURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
23-5 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 23-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 23-30.
23-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or for 8 minutes. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 174/3 (and any other codes). →	All system diagnostics are complete. Please review this section from the first step to find the error.
	Any other codes except Code 174/3. →	Go to START-1, pg 2-539, to service other codes.


FUEL TEMPERATURE
SENSOR HARNESS
CONNECTOR
472
452
B
A
DOOR SHOWN REMOVED
FOR CLARITY


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

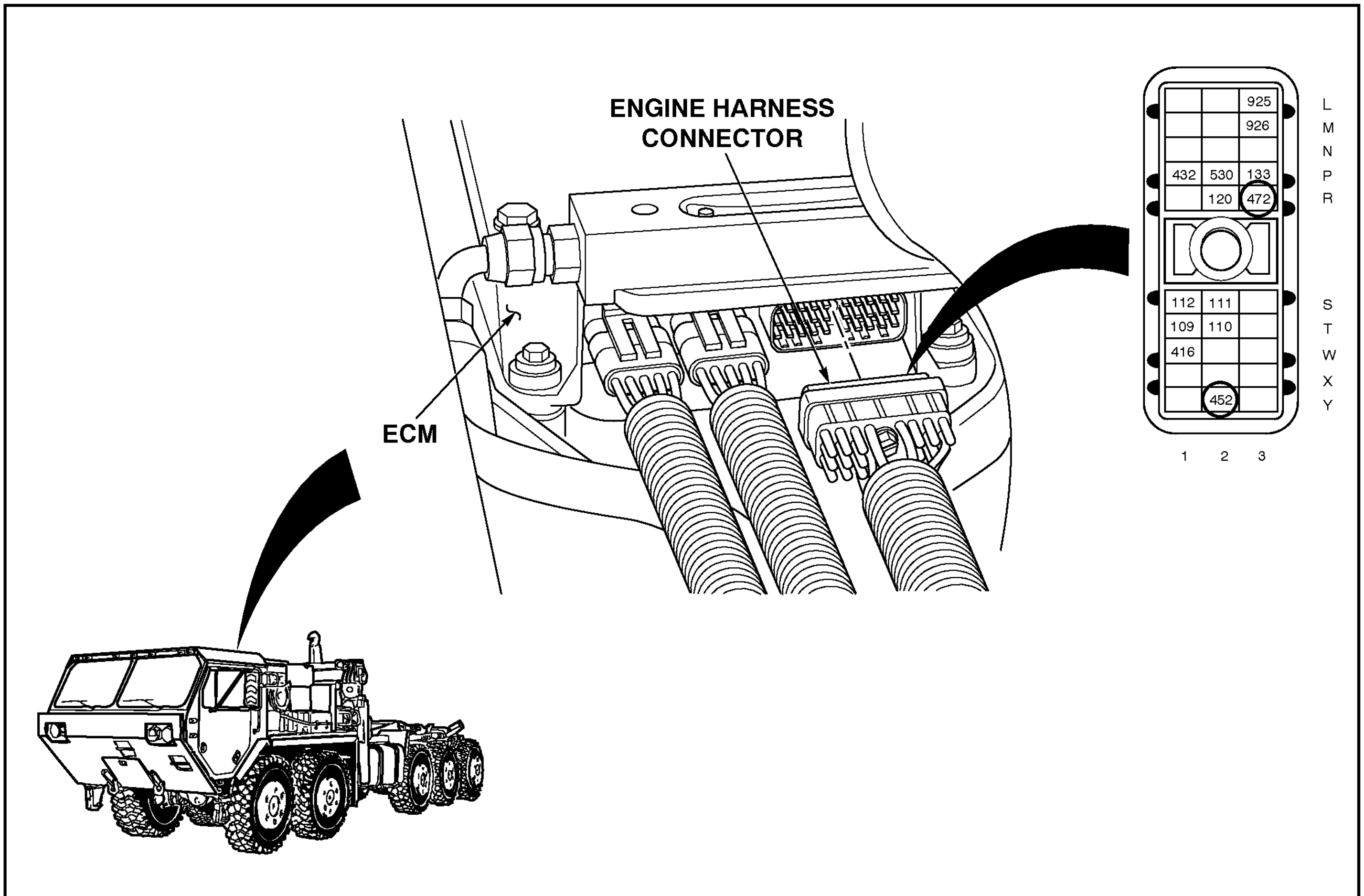
2-14. DDEC III TROUBLESHOOTING (CONT).

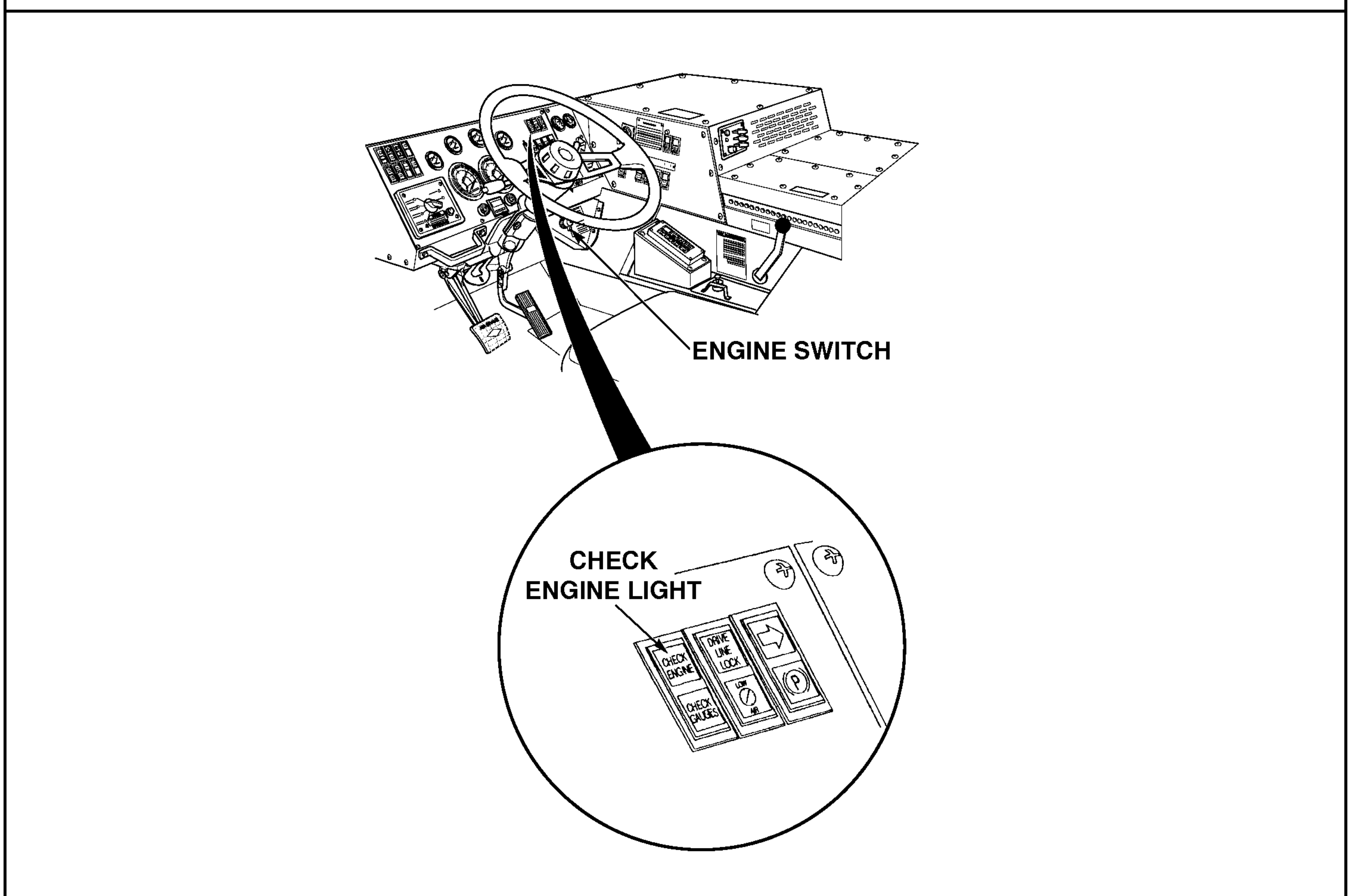
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 24
J1587 CODE: P174 4 - FUEL TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
24-1 Multiple Code Check		
• Were there any other active codes besides Code 174/4?	No other codes.	Go to 24-2.
	Yes, any or all of the following codes: 110/3, 175/3, 174/3, 102/3, 187/4, 91/4, 100/4, 102/4, 110/4, 175/4.	Go to VEH5V-1 (page 2-767).
	Yes - but none of the above.	Go to 24-2.
24-2 Sensor Check		
• Turn ignition off. • Disconnect FTS connector (para 7-62). • Start engine and run (TM 9-2320-364-10) until “Check Engine“ light comes on or for 8 minutes. • Read active codes with engine still running.	Code 174/3 (or any other codes except Code 174/4).	Go to 24-3.
	Code 174/4 (and any other codes).	Go to 24-4.
24-3 Check FTS Connectors		
• Inspect terminals at the FTS connectors (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace FTS (para 7-62). Then go to 24-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 24-30.
24-4 Open Line Check		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets R3 and Y2 on the engine harness connector. • Also read resistance between socket B of FTS connector and a good ground.	Less than or equal to 10,000 ohms on either reading.	Signal line (ckt #472) is shorted to the return line (ckt #452) or battery ground. Repair short. Then go to 24-30.
	Greater than 10,000 ohms or open on both readings.	Go to 24-5.

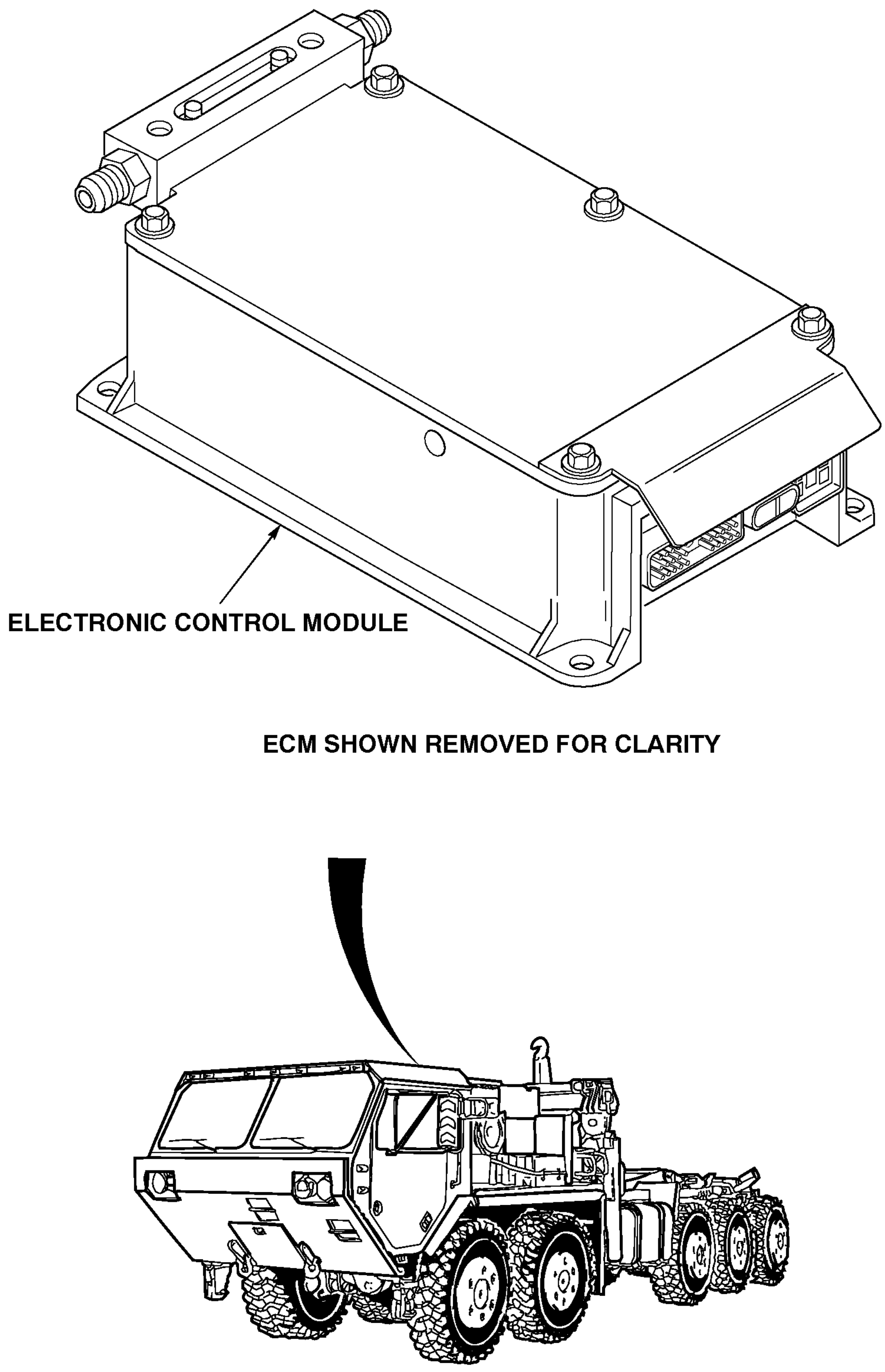

ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 24
J1587 CODE: P174 4 - FUEL TEMPERATURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
24-5 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets. Especially R3 and Y2 of the engine harness connector.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 24-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 24-30.
24-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or for 8 minutes. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 174/4 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 174/4. →	Go to START-1, pg 2-539, to service other codes.


ELECTRONIC CONTROL MODULE
ECM SHOWN REMOVED FOR CLARITY

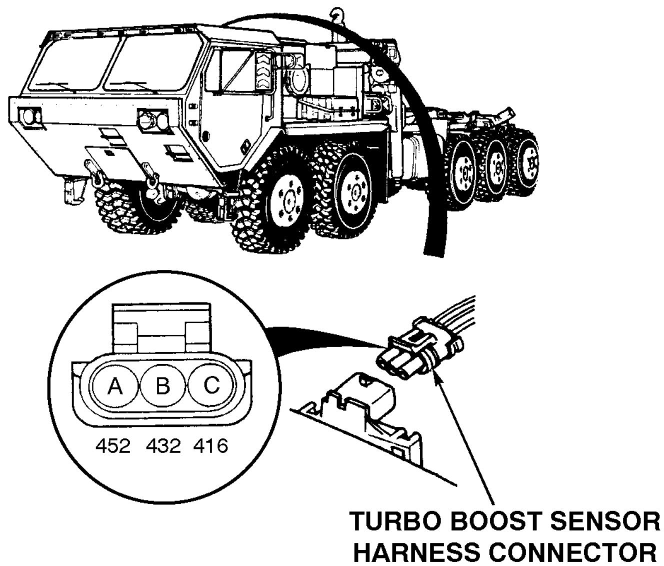
2-14. DDEC III TROUBLESHOOTING (CONT).

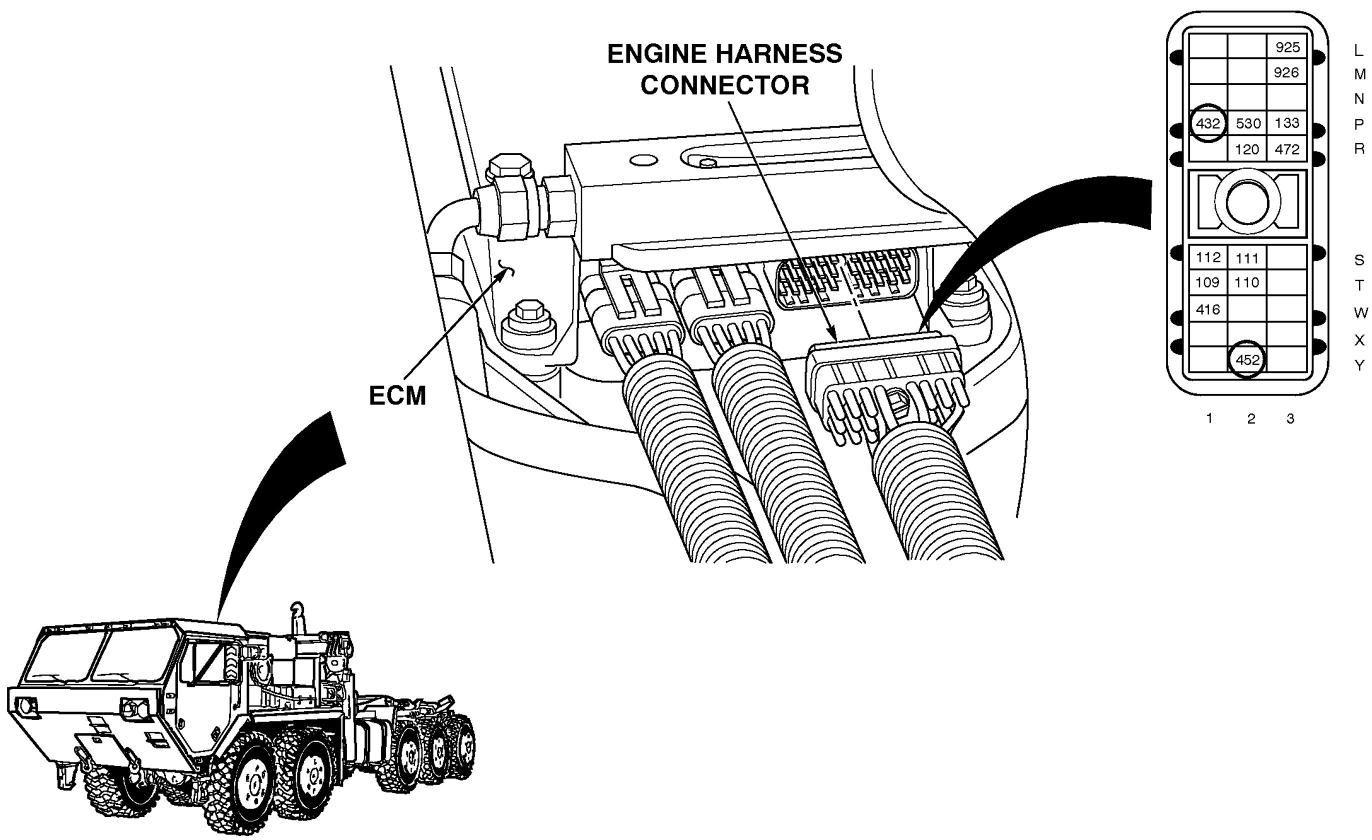
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 25
J1587 CODE: NONE NO CODES

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

No faults have been detected by DDEC-III since the last time the codes were cleared. If symptoms remain, and all basic mechanical and visual inspections have been performed with no causes to the problem found, you can try using Chart 1 (Intermittent Code or a Symptom and No Codes) on Page 2-554.


A
B
C
452 432 416
TURBO BOOST SENSOR
HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

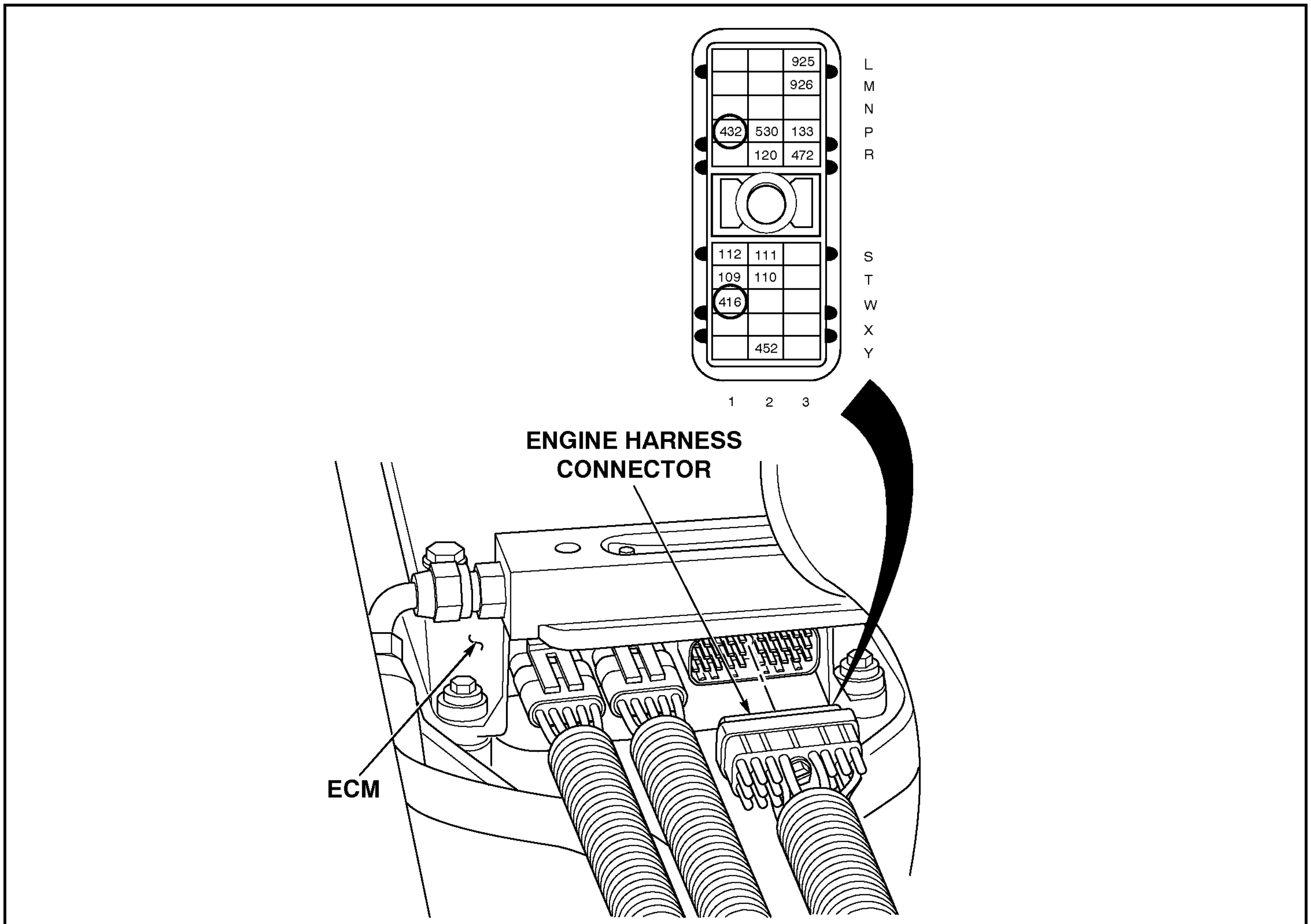
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

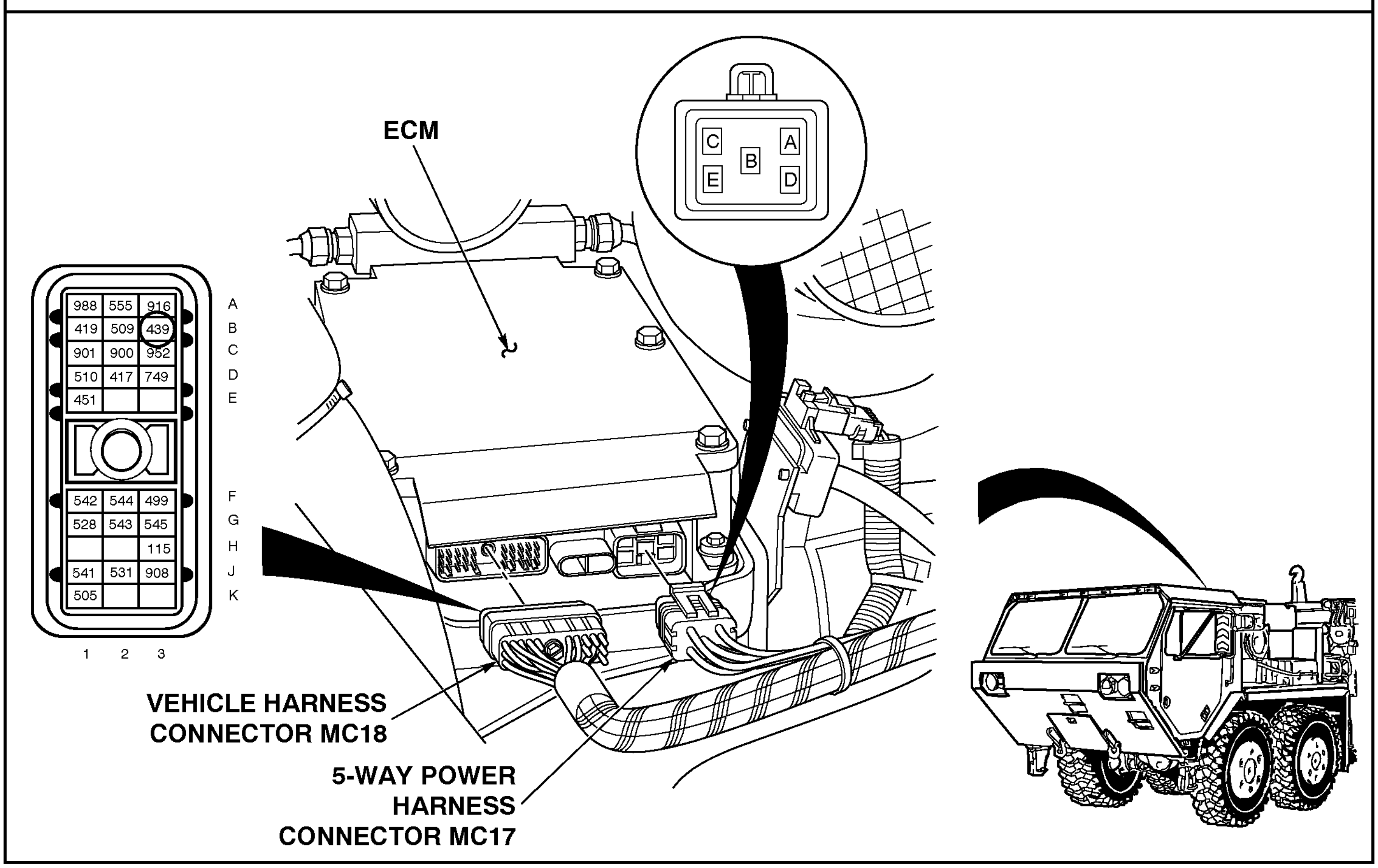
E. FLASH CODE: 33
J1587 CODE: P102 3 - TURBO BOOST PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
33-1 Multiple Code Check		
• Were there any other active codes besides Code 102/3?	No other codes. →	Go to 33-2.
	Yes, any or all of the following codes: 110/3 or 4, 175/3 or 4, 174/3 or 4, 100/3 or 4. →	Go to ENG5V-1 (pg 2-761).
	Yes - but none of the above. →	Go to 33-2.
33-2 Sensor Check		
• Turn ignition off. • Disconnect TBS connector (para 7-63). • Start and run engine at idle (TM 9-2320-364-10). • Read active codes with engine running.	Code 102/4 (and any codes except Code 102/3). →	Go to 33-3.
	Code 102/3 (and any other codes). →	Go to 33-5.
33-3 Return Circuit Check		
• Turn ignition off. • Install a jumper wire between pins A and B of the TBS connector. • Disconnect engine harness connector at the ECM. • Read resistance between sockets P1 and Y2 on the engine harness connector.	Less than or equal to 5 ohms. →	Go to 33-4.
	Greater than 5 ohms or open. →	Return line (ckt #452) is open. Repair open. Then go to 33-30.
33-4 Check TBS Connectors		
• Inspect terminals at the TBS connectors (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace TBS (para 7-63). Then go to 33-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 33-30.



925
926
432 530 133
120 472
112 111
109 110
416
452
L M N P R S T W X Y
1 2 3
ENGINE HARNESS CONNECTOR
ECM

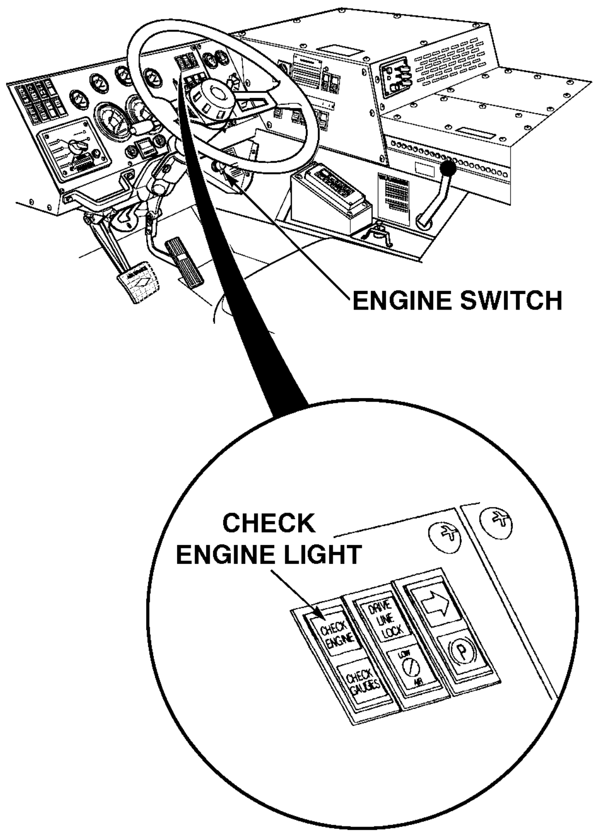


ECM
C A B E D
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A B C D E F G H J K
1 2 3
VEHICLE HARNESS CONNECTOR MC18
5-WAY POWER HARNESS CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 33
J1587 CODE: P102 3 - TURBO BOOST PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

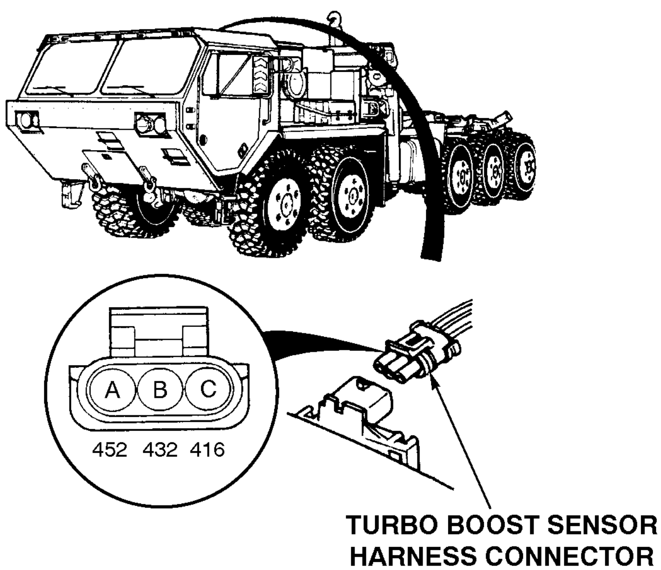
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
33-5 Check for Short to +5 Volt Line		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Read resistance between sockets W1 and P1 on the engine harness connector.	Less than or equal to 10,000 ohms.	Signal line (ckt #432) is shorted to the engine +5 volt line (ckt #416). Repair short. Then go to 33-30.
	Greater than 10,000 ohms or open.	Go to 33-6.
33-6 Check for Short to Battery +		
• Disconnect batteries (para 7-87). • Disconnect the vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between socket P1 of the engine harness connector and socket B3 of the vehicle harness connector. • Also read resistance between socket P1 on the engine harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open.	Go to 33-7.
	Any reading is less than or equal to 10,000 ohms.	A short exists between the sockets where less than 10,000 ohms resistance was read. Repair short and connect batteries. Then go to 33-30.
33-7 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 33-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 33-30.

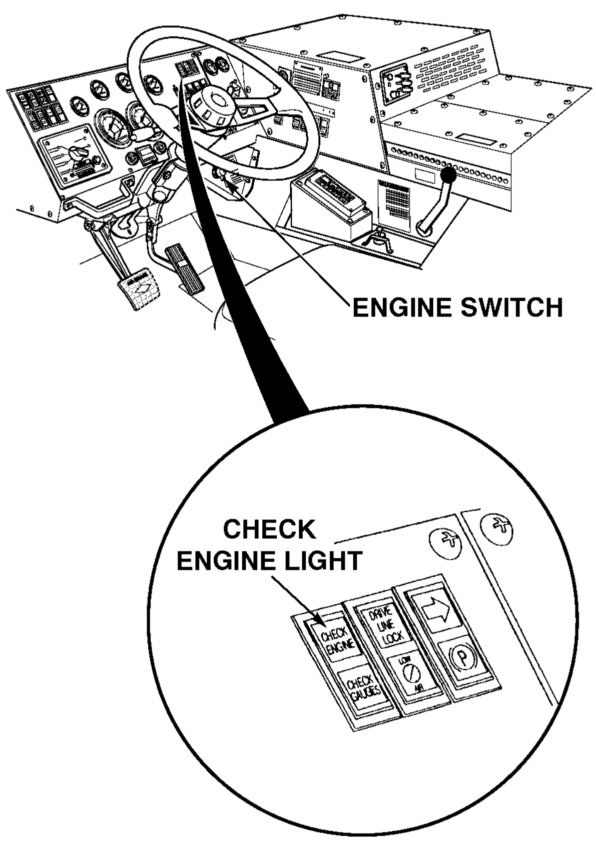

ENGINE SWITCH
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 33
J1587 CODE: P102 3 - TURBO BOOST PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
33-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or 1 minute. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 102/3 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 102/3. →	Go to START-1, pg 2-539, to service other codes.


A B C
452 432 416
TURBO BOOST SENSOR
HARNESS CONNECTOR


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

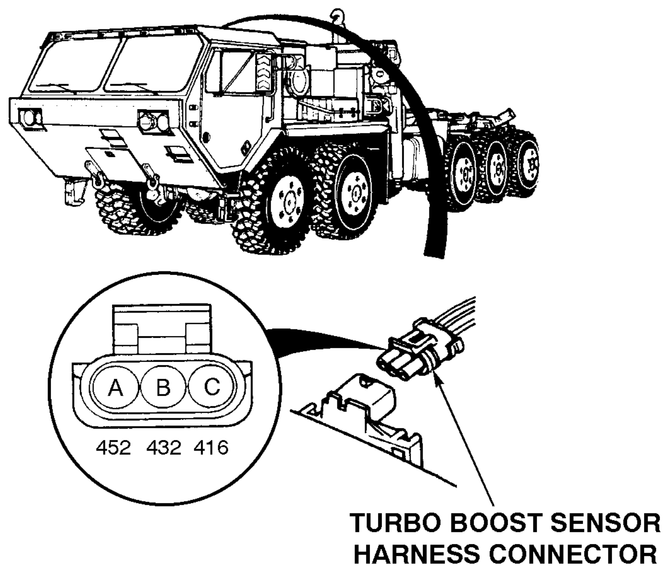
2-14. DDEC III TROUBLESHOOTING (CONT).

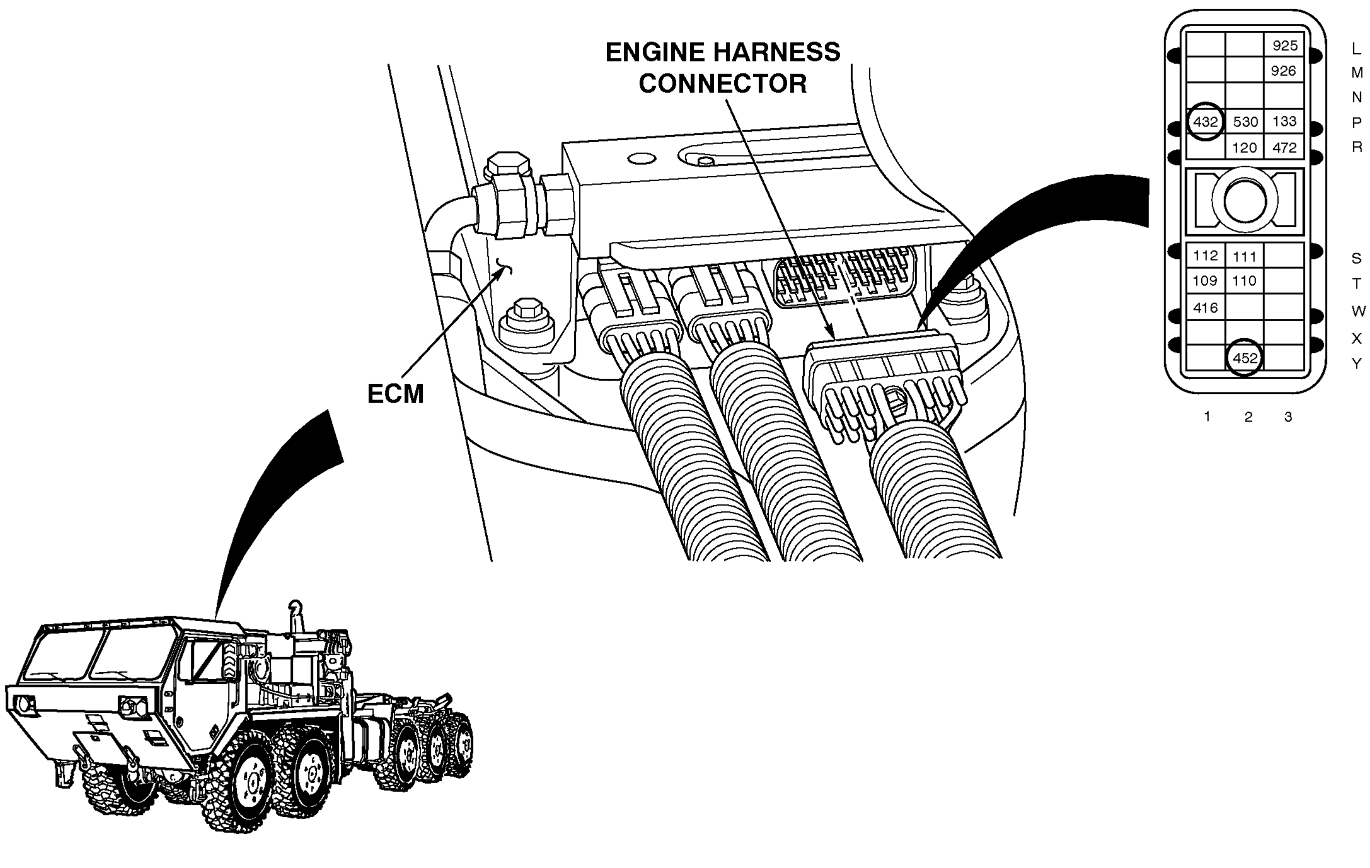
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 34
J1587 CODE: P102 4 - TURBO BOOST PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
34-1 Multiple Code Check		
• Were there any other active codes besides Code 102/4?	No other codes.	Go to 34-2.
	Yes, any or all of the following codes: 110/3 or 4, 175/3 or 4, 174/3 or 4, 102/3, 100/3 or 4, 187/4, 91/4.	Go to ENG5V-1 (page 2-761).
	Yes - but none of the above.	Go to 34-2.
34-2 Sensor Check		
• Turn ignition off. • Disconnect TBS connector (para 7-63). • Install a jumper wire between sockets B and C of the TBS connector. • Turn ignition on. • Read active codes. • If active Code 102/3 or 4 exists, go to RESULT column. • If no active Code 102/3 or 4 exists, start engine and run (TM 9-2320-364-10) until either the “Check Engine” light comes on or the engine has been running warm for at least one minute at greater than 1000 RPM. • Read active codes.	Code 102/3 (and any codes except Code 102/4).	Go to 34-3.
	Code 102/4 (and any other codes).	Go to 34-4.
34-3 Check TBS Connectors		
• Inspect terminals at the TBS connectors (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace TBS (para 7-63). Then go to 34-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 34-30.

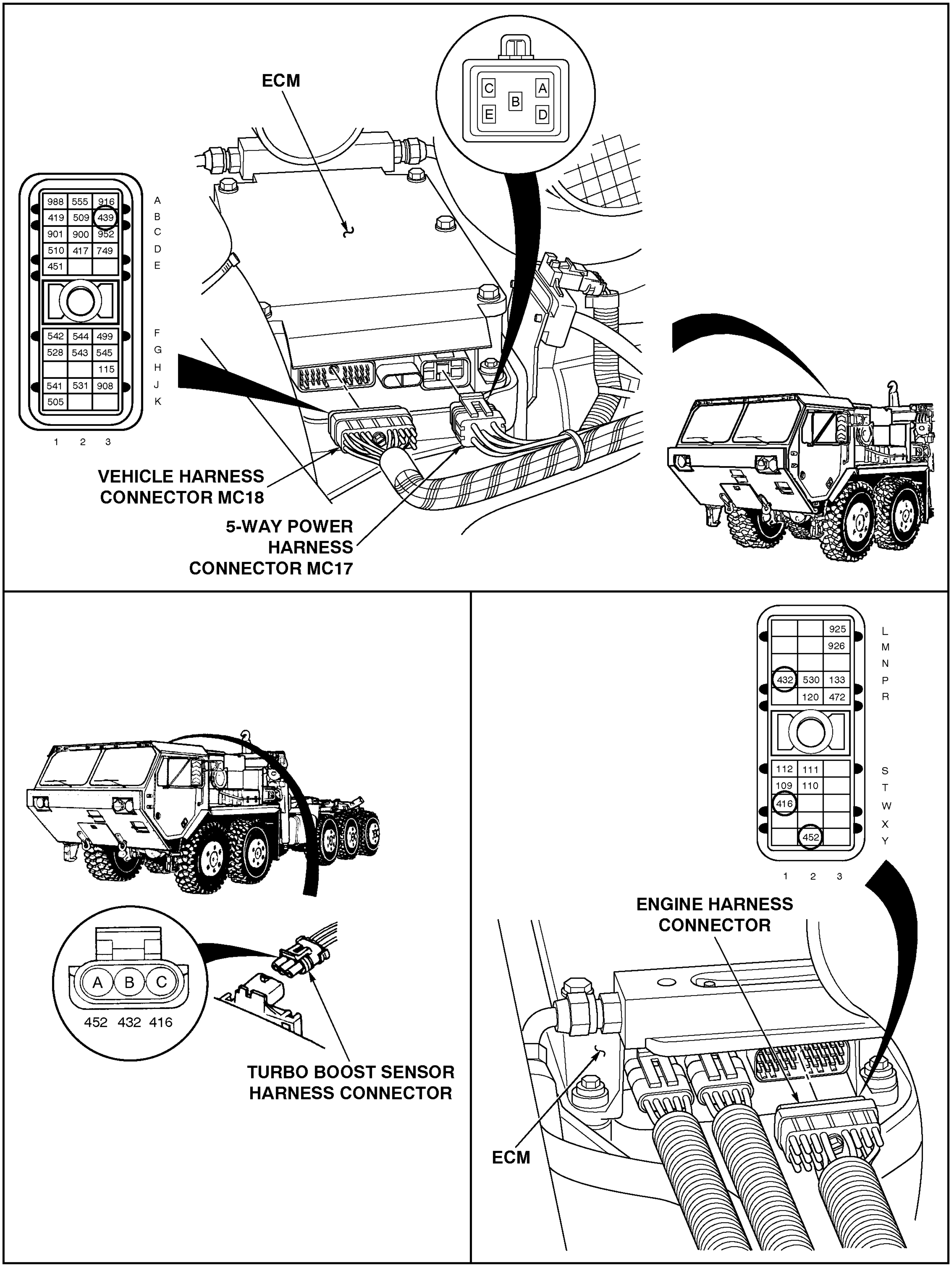

A B C
452 432 416
TURBO BOOST SENSOR
HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
925
926
432 530 133
120 472
112 111
109 110
416
452
L
M
N
P
R
S
T
W
X
Y
1 2 3

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 34
J1587 CODE: P102 4 - TURBO BOOST PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

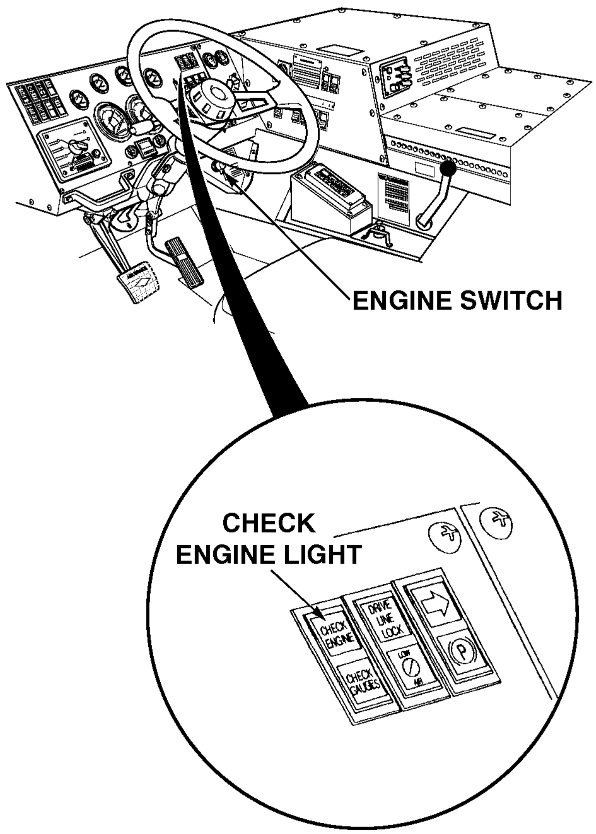
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
34-4 Check for +5 Volts		
• Remove jumper wire. • Turn ignition on. • Read voltage on TBS connector, pin C (red lead) to pin A (black lead).	Between 4 to 6 volts.	Go to 34-5.
	Less than 4 volts.	Go to 34-8.
	Greater than 6 volts.	Go to 34-10.
34-5 Check for Signal Open		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Install a jumper wire between pins A and B of the TBS connector. • Read resistance between sockets P1 and Y2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 34-6.
	Greater than 5 ohms or open.	Signal line (ckt #432) or return line (ckt #452) is open. Repeat check from pin A to Y2 and pin B to P1. Repair open. Then go to 34-30.
34-6 Check for Short		
• Remove jumper. • Read resistance between pins A and B on the TBS connector. • Also read resistance between socket B and a good ground.	Less than or equal to 10,000 ohms on either readings.	Signal line (ckt #432) is shorted to the return line (ckt #452). Repair short. Then go to 34-30.
	Greater than 10,000 ohms or open on both readings.	Then go to 34-7.
34-7 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 34-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 34-30.


ECM
C A B E D
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS CONNECTOR MC18
5-WAY POWER HARNESS CONNECTOR MC17
A B C
452 432 416
TURBO BOOST SENSOR HARNESS CONNECTOR
925 L
926 M
N
432 530 133 P
120 472 R
112 111 S
109 110 T
416 W
X
452 Y
1 2 3
ENGINE HARNESS CONNECTOR
ECM

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 34
J1587 CODE: P102 4 - TURBO BOOST PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

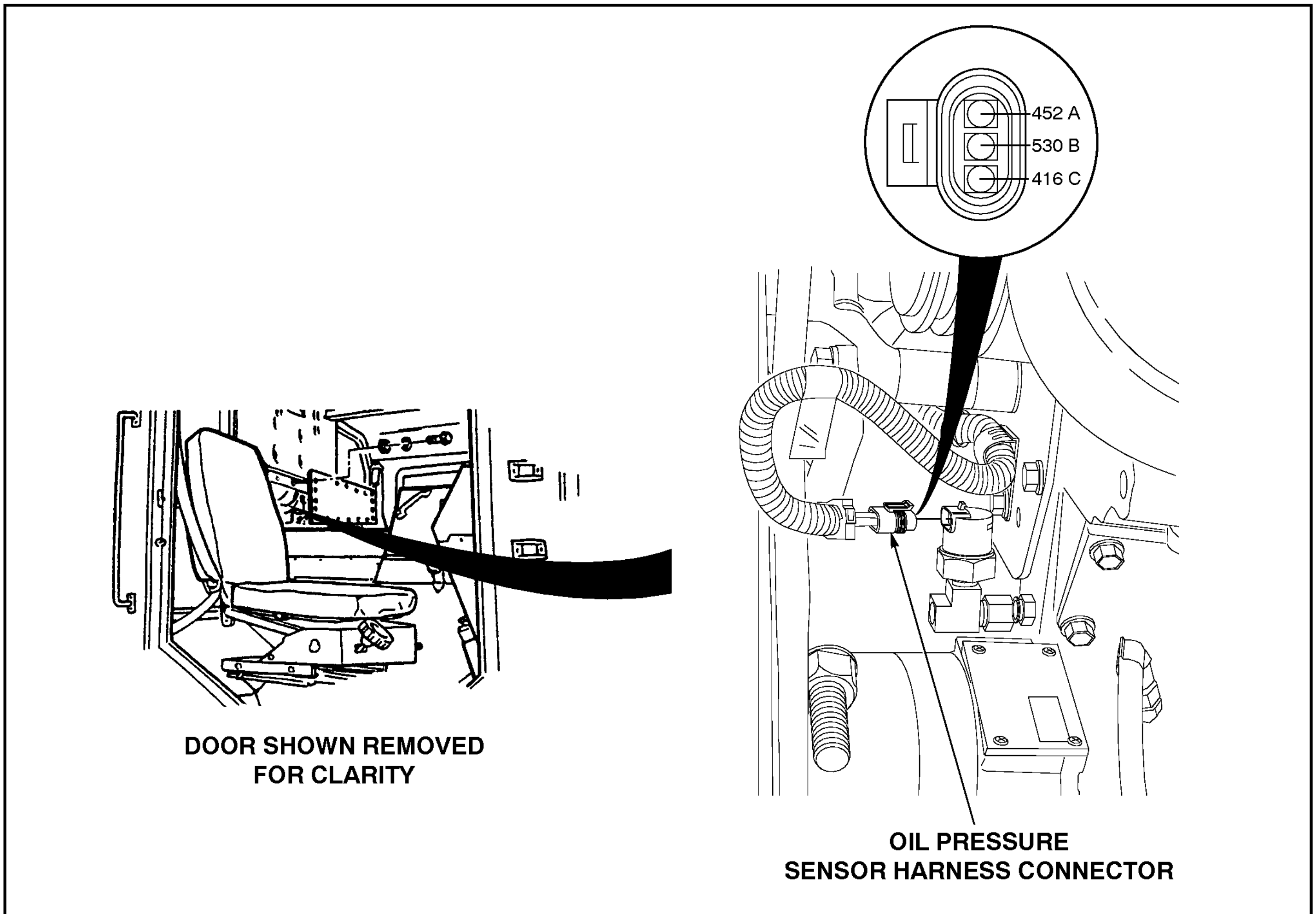
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
34-8 Check for Open +5 Volt Line		
• Turn ignition off. • Disconnect the vehicle harness connectors at the ECM. • Install a jumper wire between pins A and C of the TBS connector. • Read resistance between sockets W1 and Y2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 34-9.
	Greater than 5 ohms or open.	The engine +5 volt line (ckt #416) is open. Repair open. Then go to 34-30.
34-9 Check for Short		
• Remove jumper. • Read resistance between pins A and C on the TBS connector.	Less than or equal to 10,000 ohms.	The +5 volt line (ckt #416) is shorted to return line (ckt #452). Repair short. Then go to 34-30.
	Greater than 10,000 ohms or open.	Go to 34-7.
34-10 Check for Short to Battery +		
• Turn ignition off. • Disconnect batteries (para 7-87). • Disconnect the engine harness vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between socket P1 of the engine harness connector and socket B3 of the vehicle harness connector. • Also read resistance between socket P1 on the engine harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open.	Go to 34-7.
	Any reading is less than or equal to 10,000 ohms.	A short exists between the sockets where less than 10,000 ohms resistance was read. Repair short and connect batteries. Then go to 34-30.

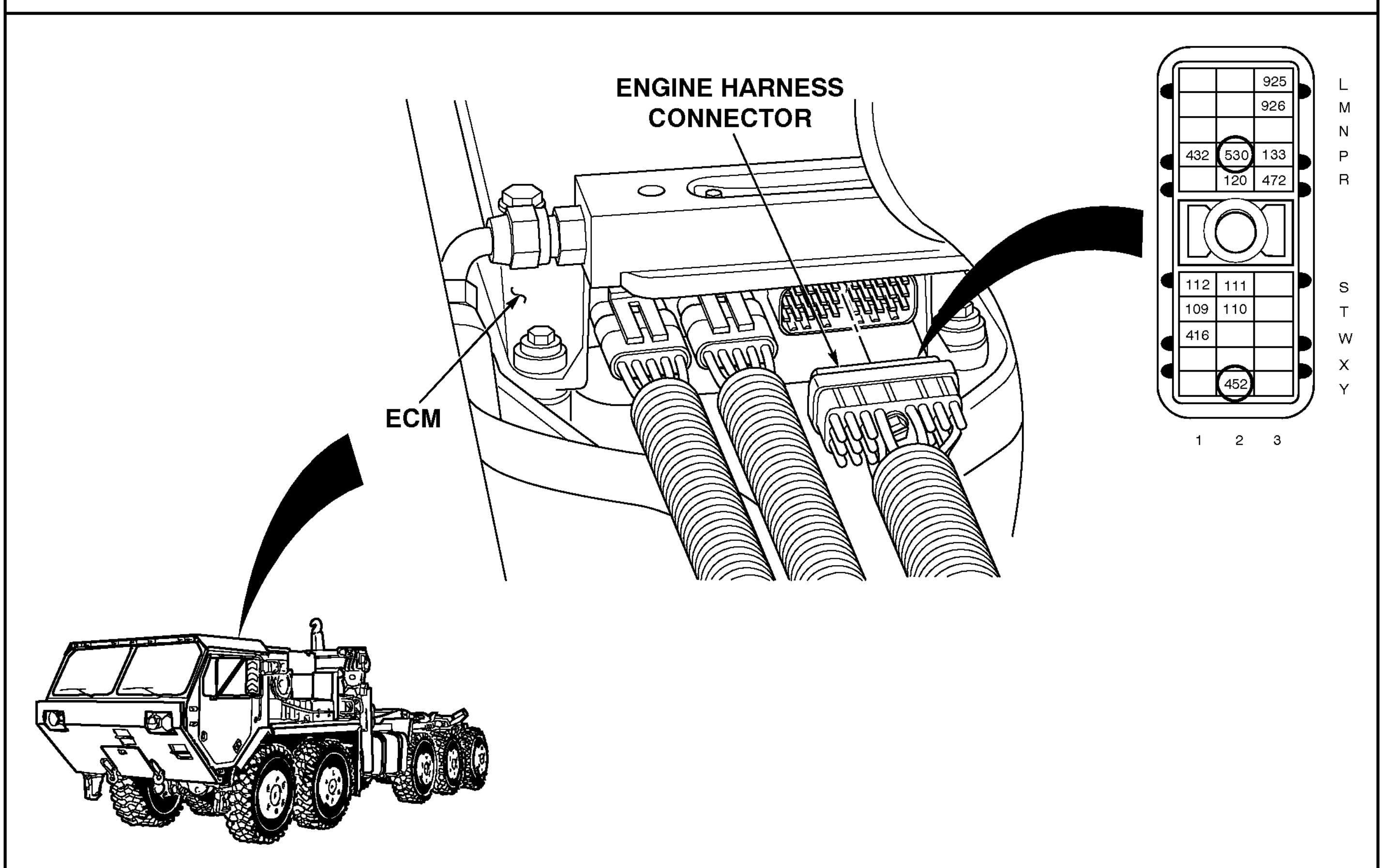

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 34
J1587 CODE: P102 4 - TURBO BOOST PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
34-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or 1 minute. Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 102/4 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 102/4. →	Go to START-1, pg 2-539, to service other codes.


452 A
530 B
416 C
DOOR SHOWN REMOVED
FOR CLARITY
OIL PRESSURE
SENSOR HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

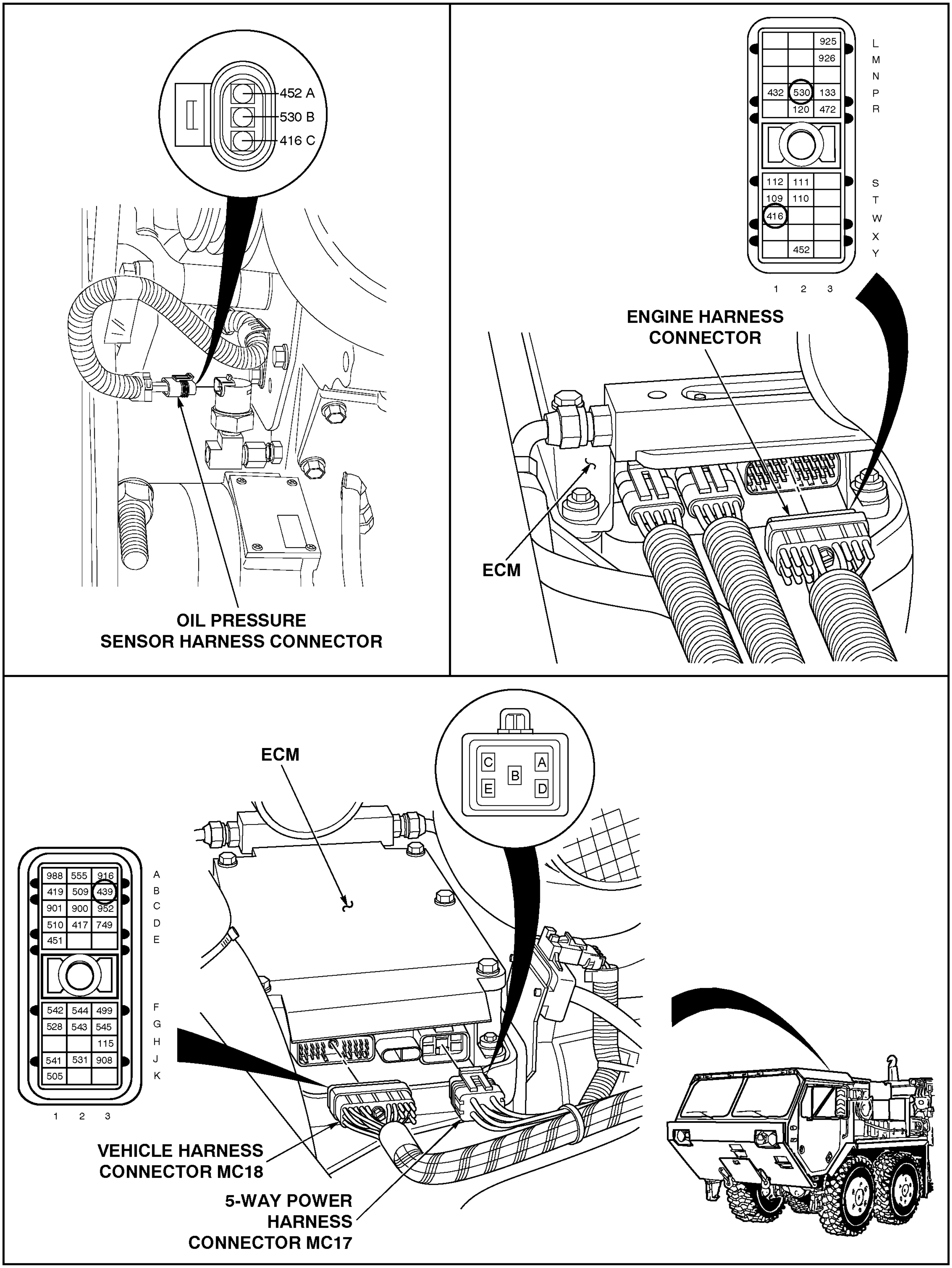
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 35
J1587 CODE: P100 3 - OIL PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

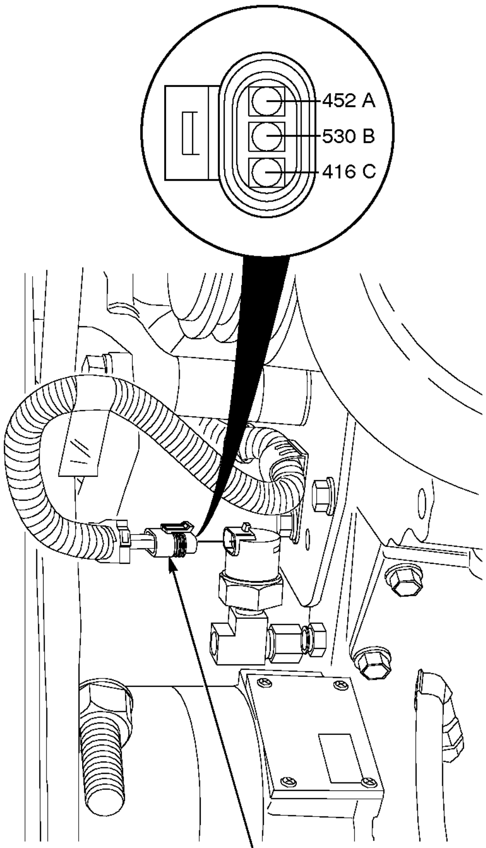
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
35-1 Multiple Code Check		
• Were there any other active codes besides Code 100/3?	No other codes.	Go to 35-2.
	Yes, any or all of the following codes: 110/3 or 4, 175/3 or 4, 174/3 or 4, 102/3 or 4, 100/4.	Go to ENG5V-1 (page 2-761).
	Yes - but none of the above.	Go to 35-2.
35-2 Sensor Check		
• Turn ignition off. • Disconnect OPS connector (para 7-68). • Turn ignition on. • Start and run engine (TM 9-2320-364-10). • Select Engine Temperature (COOLANT TEMP or OIL TEMP) on the DDR. • Warm up engine until engine temperature reading is greater than 60 degrees C (140 degrees F). • Leave engine running at idle after warm up. • Read active codes.	Code 100/4 (and any codes except Code 100/3).	Go to 35-3.
	Code 100/3 (and any other codes).	Go to 35-5.
35-3 Return Circuit Check		
• Turn ignition off. • Disconnect engine harness connector at the ECM. • Install a jumper wire between pins A and B of the OPS connector. • Read resistance between sockets P2 and Y2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 35-4.
	Greater than 5 ohms or open.	Return line (ckt #452) is open. Repair open. Then go to 35-30.

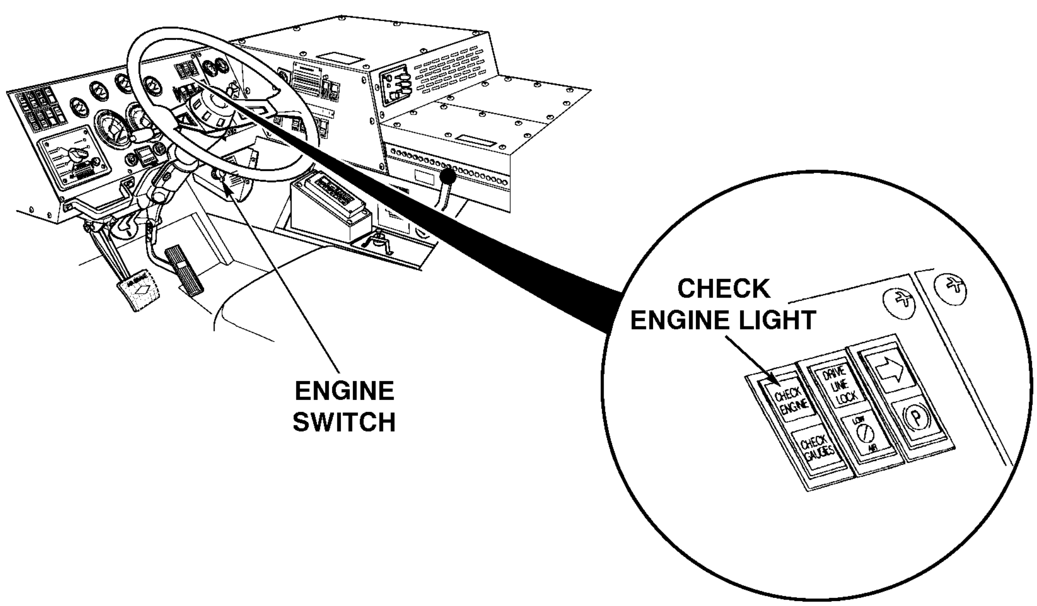

452 A
530 B
416 C
OIL PRESSURE
SENSOR HARNESS CONNECTOR
925
926
432 530 133
120 472
112 111
109 110
416
452
L M N P R S T W X Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM
C B A
E D
ECM
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A B C D E F G H J K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 35
J1587 CODE: P100 3 - OIL PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
35-4 Check OPS Connectors		
• Inspect terminals at the OPS connectors (both the sensor and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace OPS (para 7-68). Then go to 35-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 35-30.
35-5 Check for Short		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets W1 and P2 on the engine harness connector.	Less than or equal to 10,000 ohms. →	Signal line (ckt #530) is shorted to the engine +5 volt line (ckt #416). Repair short. Then go to 35-30.
	Greater than 10,000 ohms or open. →	Go to 35-6.
35-6 Check for Short to Battery +		
• Disconnect batteries (para 7-87). • Disconnect the vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between socket P2 of the engine harness connector and socket B3 of the vehicle harness connector. • Also read resistance between socket P2 on the engine harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open. →	Go to 35-8.
	Any reading is less than or equal to 10,000 ohms. →	A short exists between the sockets where less than 10,000 ohms resistance was read. Repair short and connect batteries. Then go to 35-30.

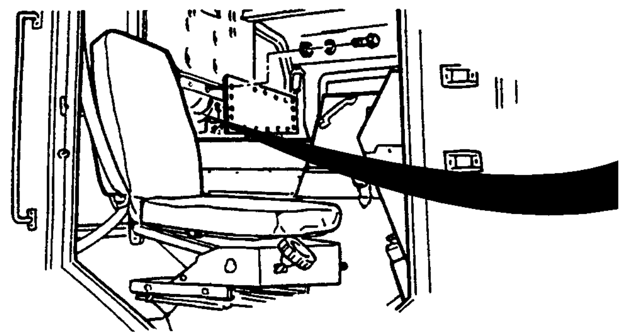

452 A
530 B
416 C
OIL PRESSURE
SENSOR HARNESS CONNECTOR


ENGINE
SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

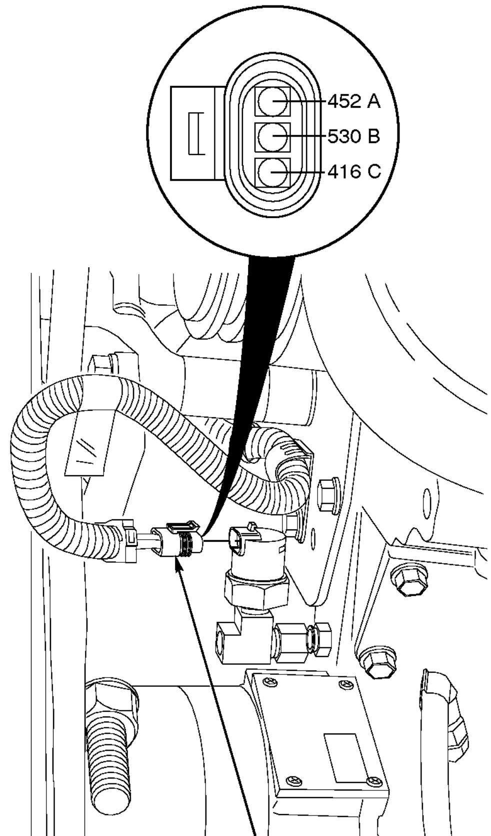
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 35
J1587 CODE: P100 3 - OIL PRESSURE CIRCUIT FAILED HIGH (HIGH VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
35-7 Final Check		
• Reconnect all connectors. • Turn ignition on. • Clear codes. • Start engine (TM 9-2320-364-10). Run for one minute or until “Check Engine” light comes on. • Stop engine. • Check active codes.	Code 100/3. →	Replace ECM (para 7-57). Then go to 35-30.
	No codes. →	Repairs are complete.
	Any other codes except Code 100/3. →	Go to START-1, pg 2-539, to service other codes.
35-8 Check OPS Connectors		
• Inspect terminals at OPS connectors (sensor and harness sides) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay. →	Replace OPS (para 7-68). Then go to 35-7.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 35-30.
35-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or engine has run warm (greater than 60 degrees C, 140 degrees F) 1 minute. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 100/3 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 100/3. →	Go to START-1, pg 2-539, to service other codes.



DOOR SHOWN REMOVED
FOR CLARITY



OIL PRESSURE
SENSOR HARNESS CONNECTOR

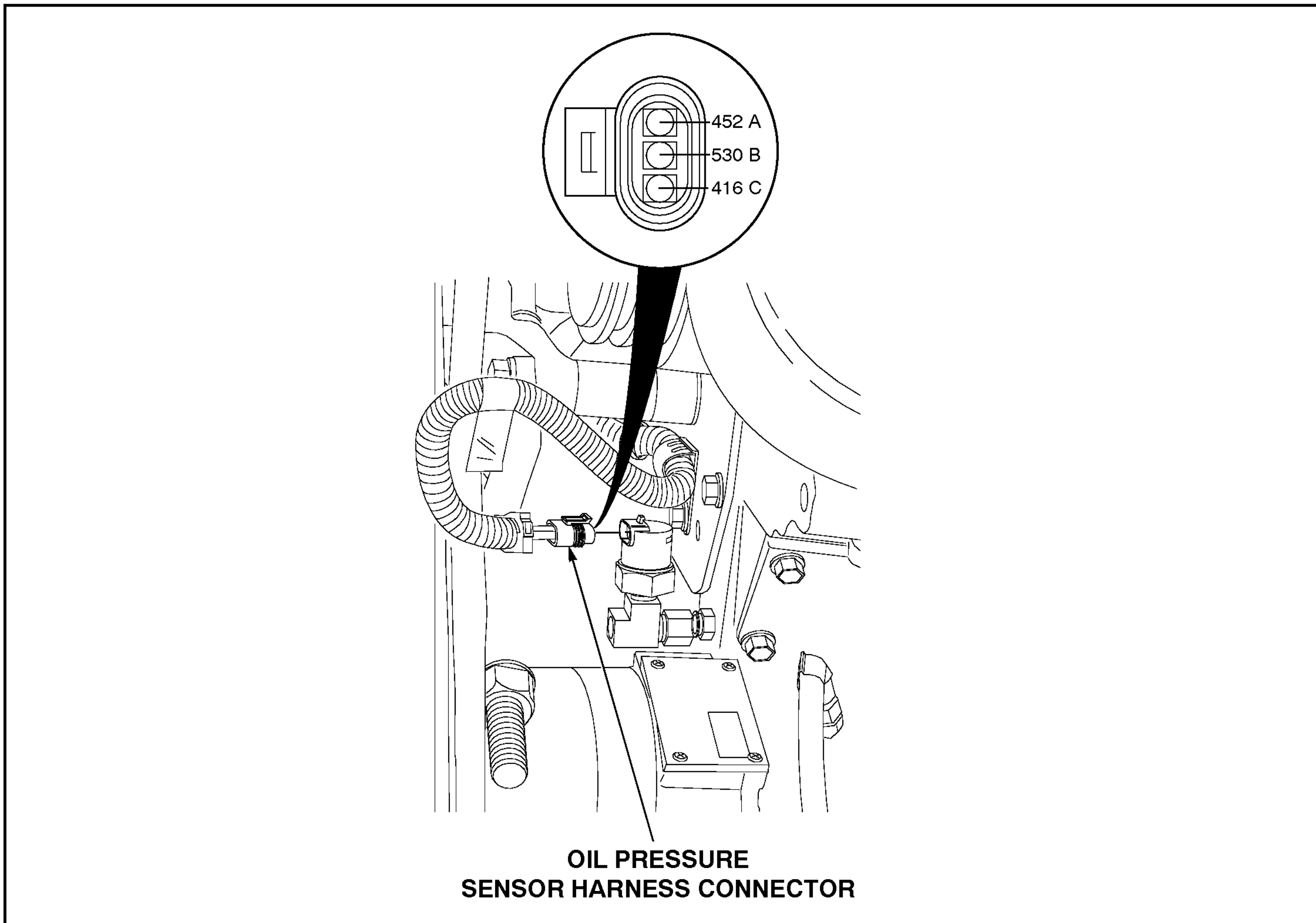
2-14. DDEC III TROUBLESHOOTING (CONT).

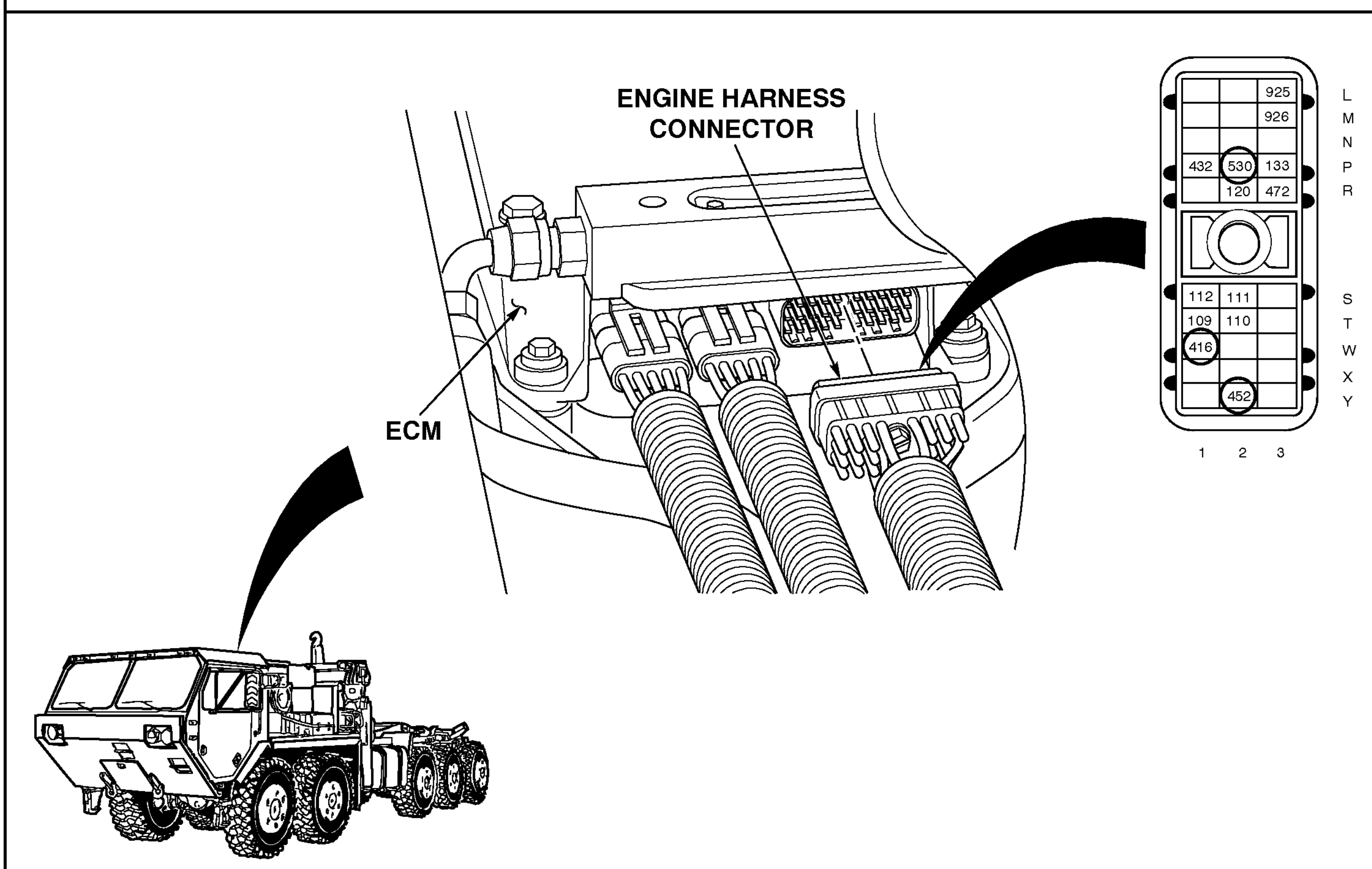
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 36
J1587 CODE: P100 4 - OIL PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
36-1 Multiple Code Check		
• Were there any other active codes besides Code 100/4?	No other codes.	Go to 36-2.
	Yes, any or all of the following codes: 110/3 or 4, 175/3 or 4, 174/3 or 4, 102/3 or 4, 100/3, 187/4, 91/4.	Go to ENG5V-1 (page 2-761).
	Yes - but none of the above.	Go to 36-2.
36-2 Sensor Check		
• Turn ignition off. • Disconnect OPS connector (para 7-68) and install a jumper wire between sockets B and C of the OPS connector. • Turn ignition on. • Read active codes. • If active Code 100/3 or 4 exists, go to RESULT column. • If no active Code 100/3 or 4 exists, start and run engine (TM 9-2320-364-10) until either active Code 100/3 or 4 appears or the COOLANT TEMP or OIL TEMP on the DDR has been greater than 60 degrees C (140 deg F) for more than 1 minute.	Code 100/3 (and any codes except Code 100/4).	Check to be sure ECM and OPS connectors are wired properly. If wired properly then go to 36-3.
	Code 100/4 (and any other codes).	Go to 36-4.
	No codes.	Go to 36-4.
36-3 Check OPS Connectors		
• Turn ignition off. • Inspect terminals at the OPS connectors (sensor side and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay.	Replace OPS (para 7-68). Then go to 36-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 36-30.


452 A
530 B
416 C
OIL PRESSURE
SENSOR HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
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W
X
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1
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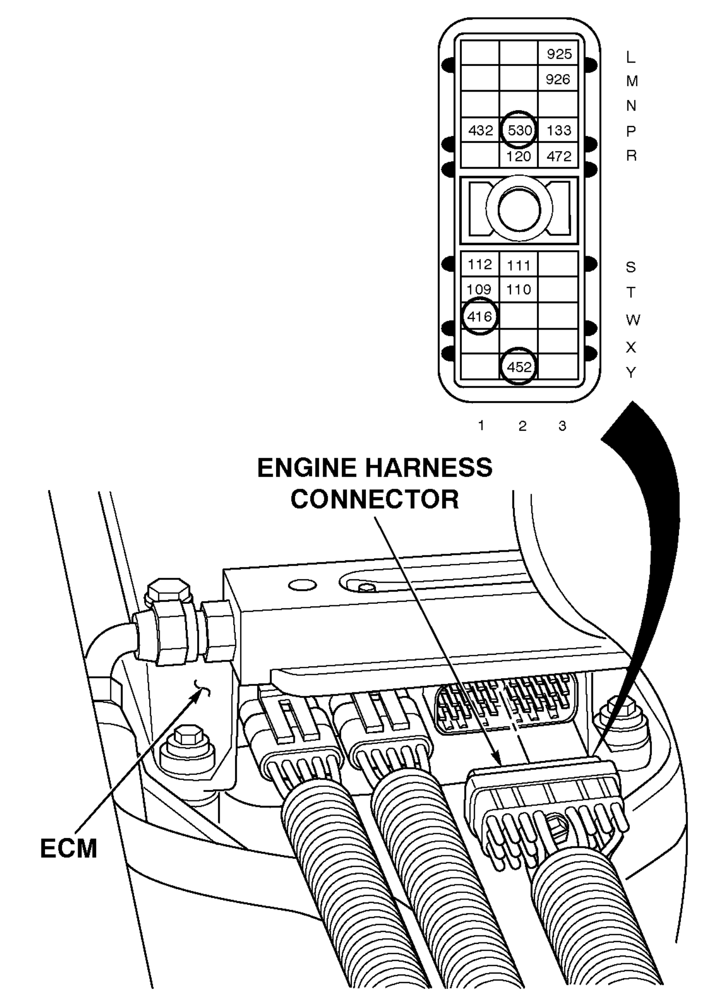
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 36
J1587 CODE: P100 4 - OIL PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
36-4 Check for +5 Volts		
• Turn ignition off. • Remove jumper wire. • Turn ignition on. • Read voltage on OPS connector, socket C (red lead) to socket A (black lead).	Between 4 to 6 volts.	Go to 36-5.
	Less than 4 volts.	Go to 36-8.
	Greater than 6 volts.	Go to 36-10.
36-5 Check for Signal Open		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Install a jumper wire between sockets A and B of the OPS connector. • Read resistance between sockets P2 and Y2 on the engine harness connectors.	Less than or equal to 5 ohms on either reading.	Go to 36-11.
	Greater than 5 ohms or open.	Signal line (ckt #530) is open. Repair open. Then go to 36-30.
36-6 Check for Short		
• Remove jumper wire. • Disconnect the engine harness connector at the ECM. • Read resistance between sockets A and B on the OPS connector. • Also read resistance between socket B and a good ground.	Less than or equal to 10,000 ohms.	Signal line (ckt #530) is shorted to the return line (ckt #452) or battery ground. Repair short. Then go to 36-30.
	Greater than 10,000 ohms or open. on both readings.	Go to 36-12.
36-7 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets. Especially W1, P2, and Y2 terminals and pins at ECM.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 36-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 36-30.


925
926
432 530 133
120 472
112 111
109 110
416
452
L
M
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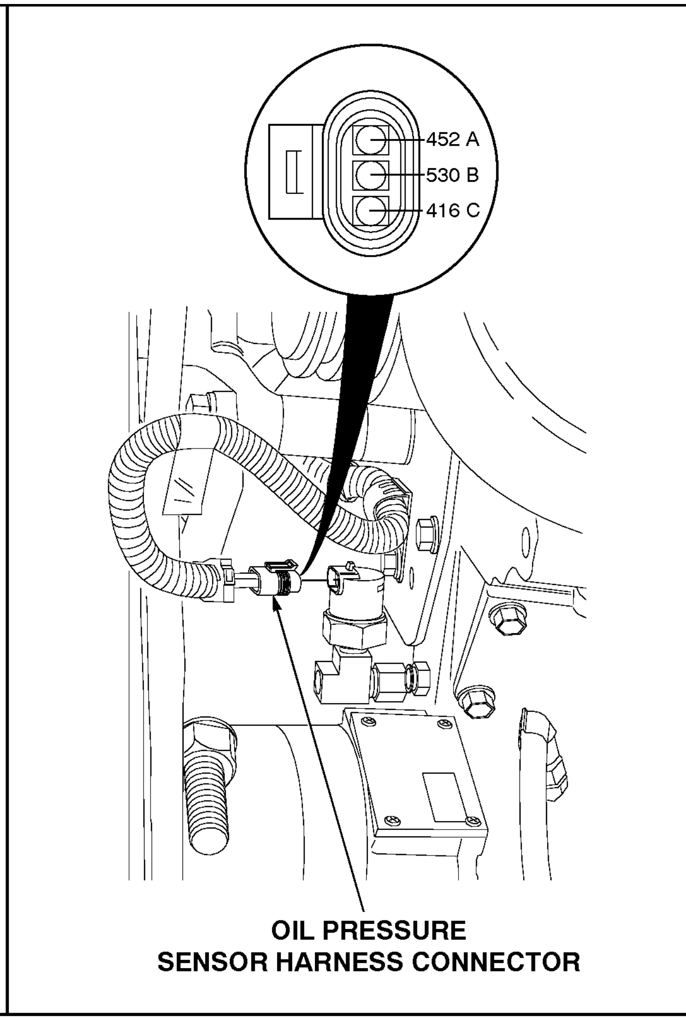
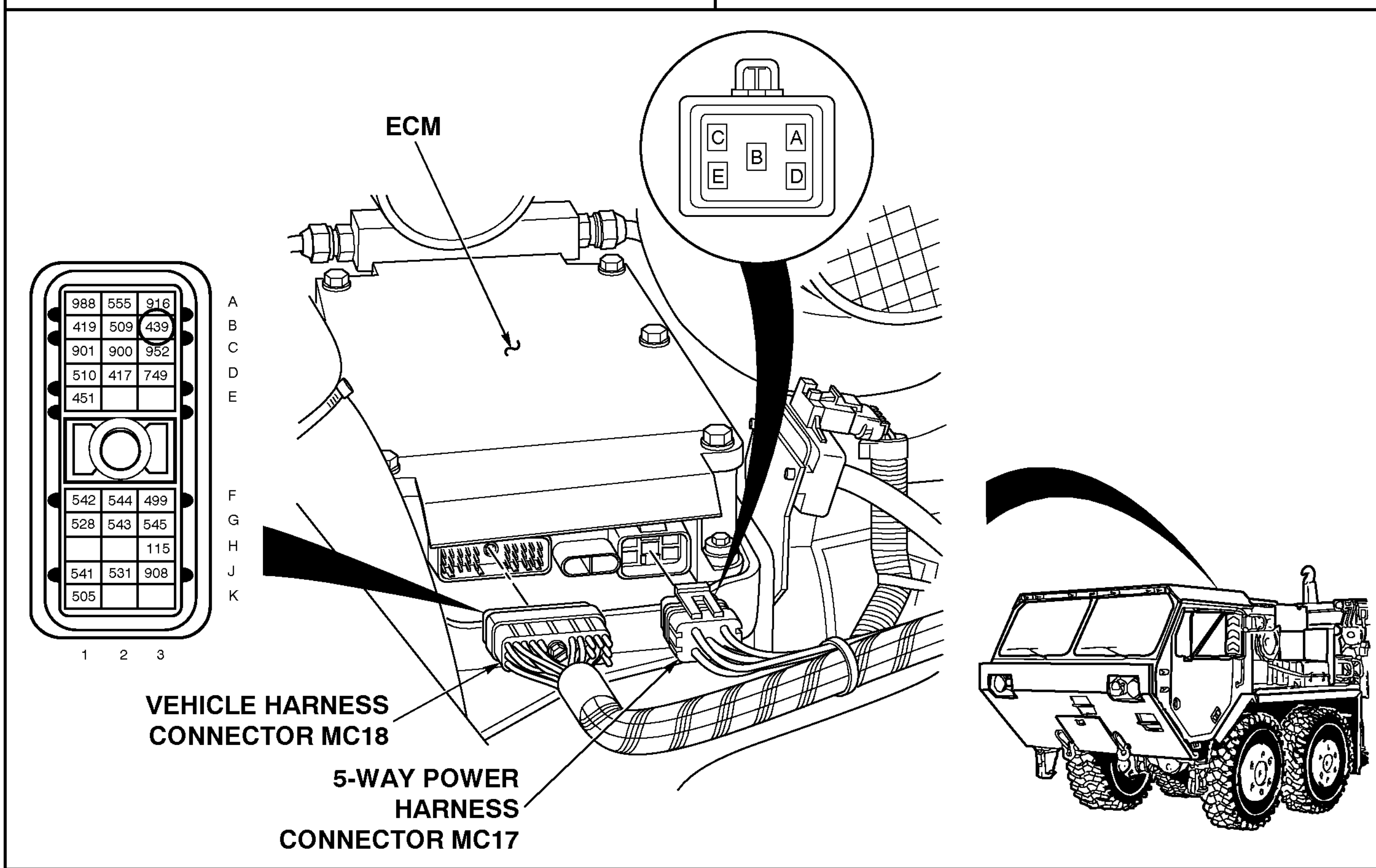
S
T
W
X
Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM

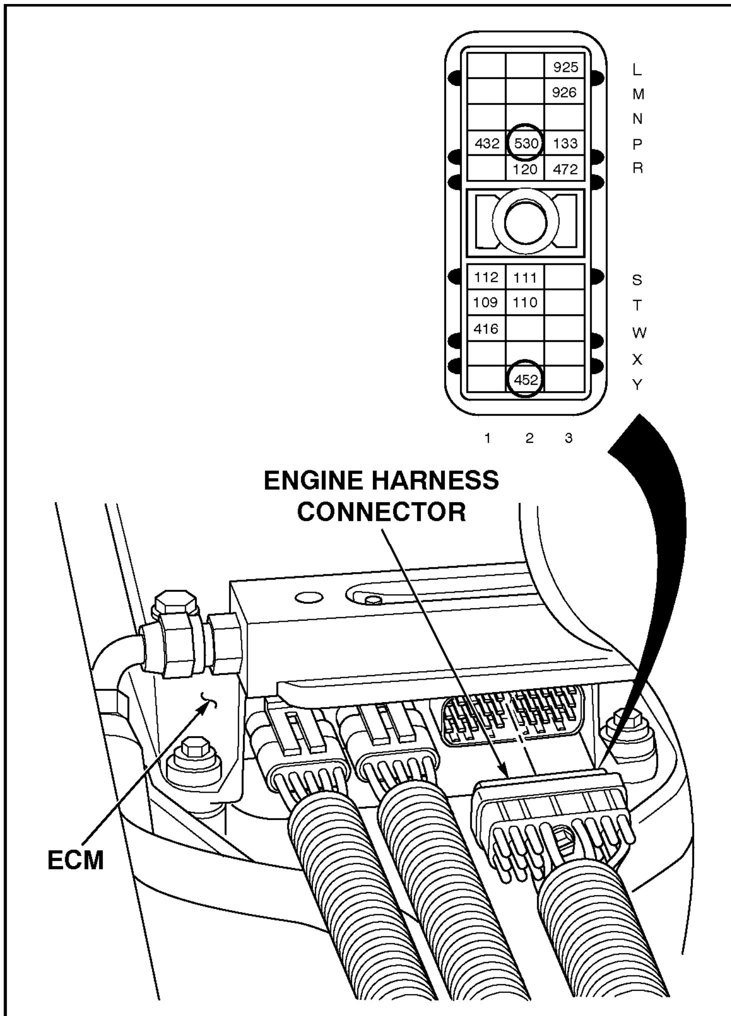

452 A
530 B
416 C
OIL PRESSURE
SENSOR HARNESS CONNECTOR


ECM
C
A
B
E
D
988 555 916
419 509 439
901 900 952
510 417 749
451
542 544 499
528 543 545
115
541 531 908
505
A
B
C
D
E
F
G
H
J
K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 36
J1587 CODE: P100 4 - OIL PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
36-8 Check for Open +5 Volt Line		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Install a jumper wire between sockets A and C of the OPS connector. • Read resistance between sockets W1 and Y2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 36-9.
	Greater than 5 ohms or open.	The engine +5 volt line (ckt #416) is open. Repair open. Then go to 36-30.
36-9 Check for Short		
• Remove jumper wire. • Read resistance between sockets A and C of the OPS connector.	Less than or equal to 10,000 ohms.	The engine +5 volt line (ckt #416) is shorted to the return line (ckt #452). Repair short. Then go to 36-12.
	Greater than 10,000 ohms or open.	Go to 36-12.
36-10 Check for Short to Battery +		
• Disconnect batteries (para 7-87). • Disconnect the vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between socket P2 of the engine harness connector and socket B3 of the vehicle harness connector. • Also read resistance between socket P2 on the engine harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open.	Go to 36-12.
	Any reading is less than or equal to 10,000 ohms.	A short exists between the sockets where less than 10,000 ohms resistance was read. Repair short and connect batteries. Then go to 36-30.


925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
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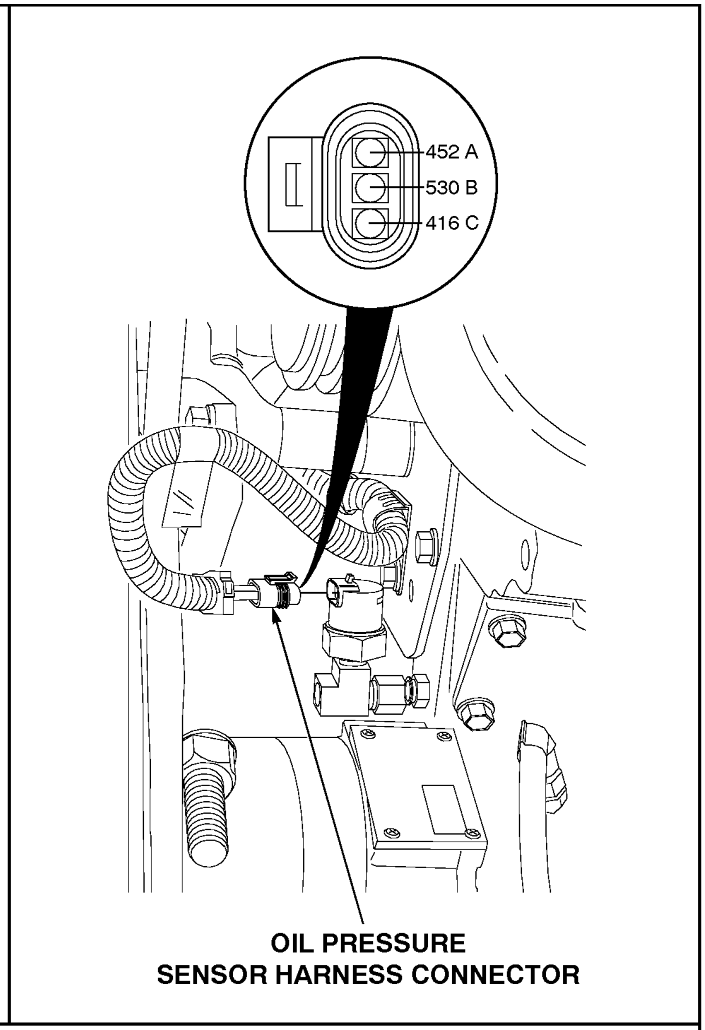
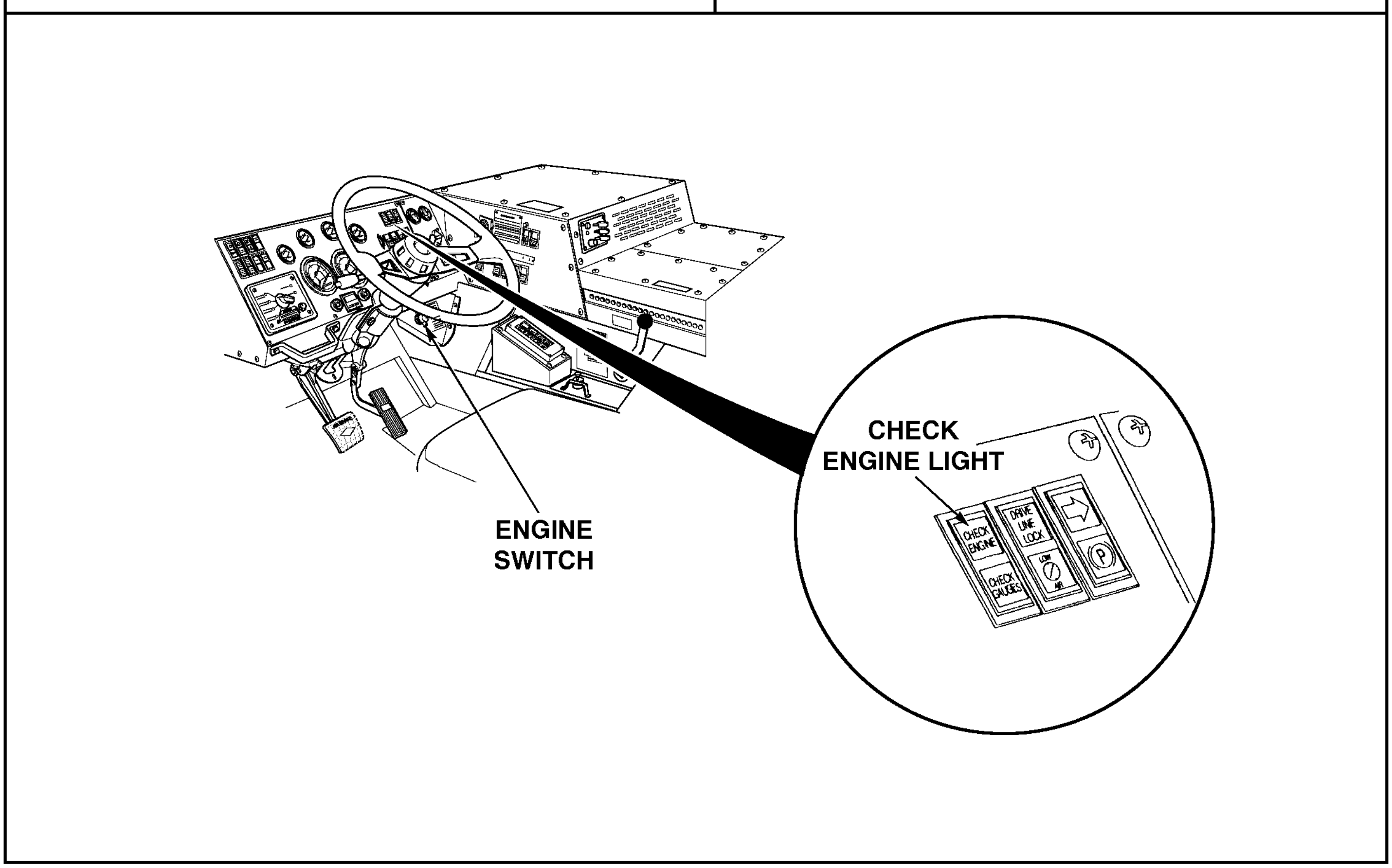
P
R
S
T
W
X
Y
1
2
3
ENGINE HARNESS CONNECTOR
ECM

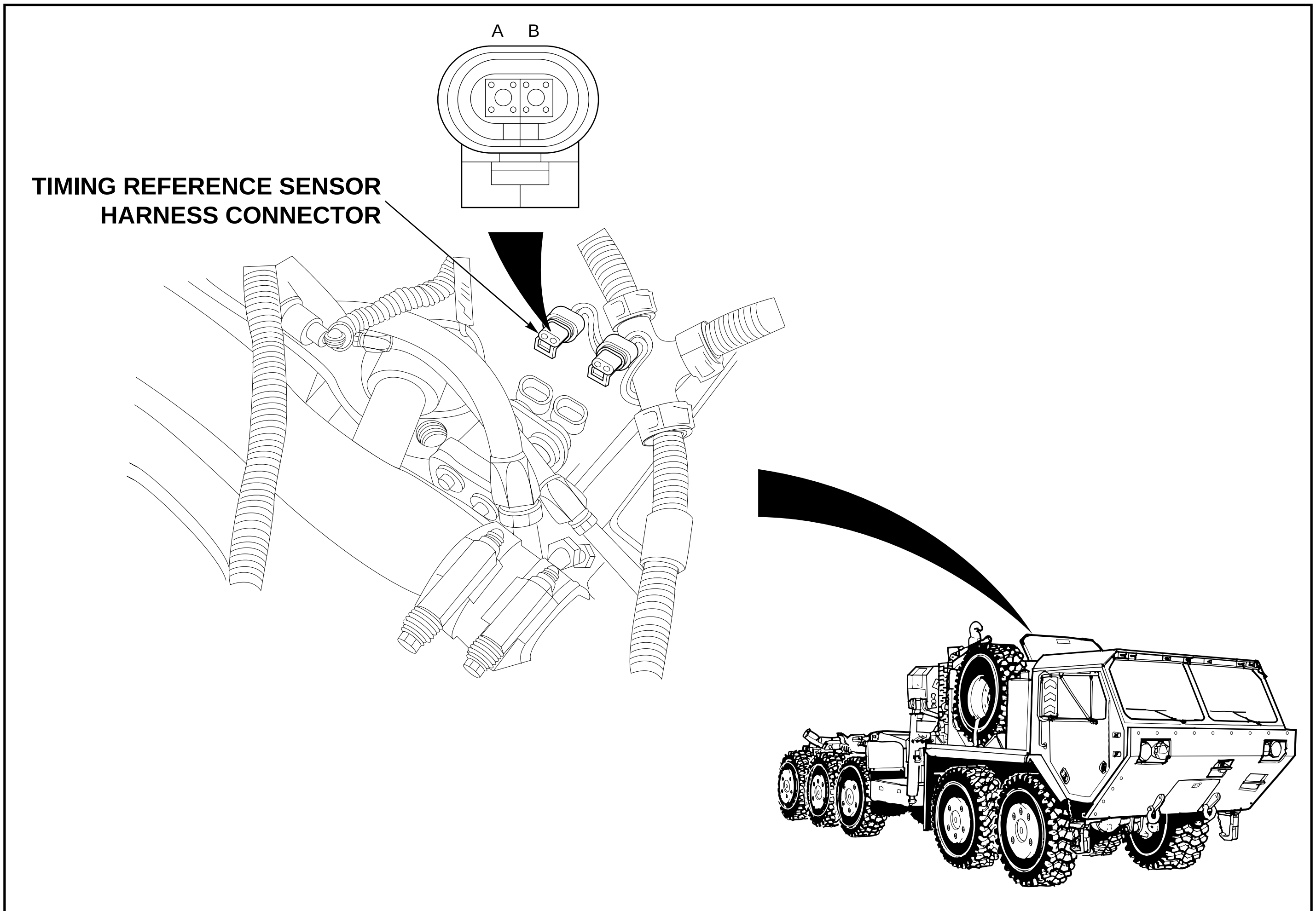

452 A
530 B
416 C
OIL PRESSURE SENSOR HARNESS CONNECTOR

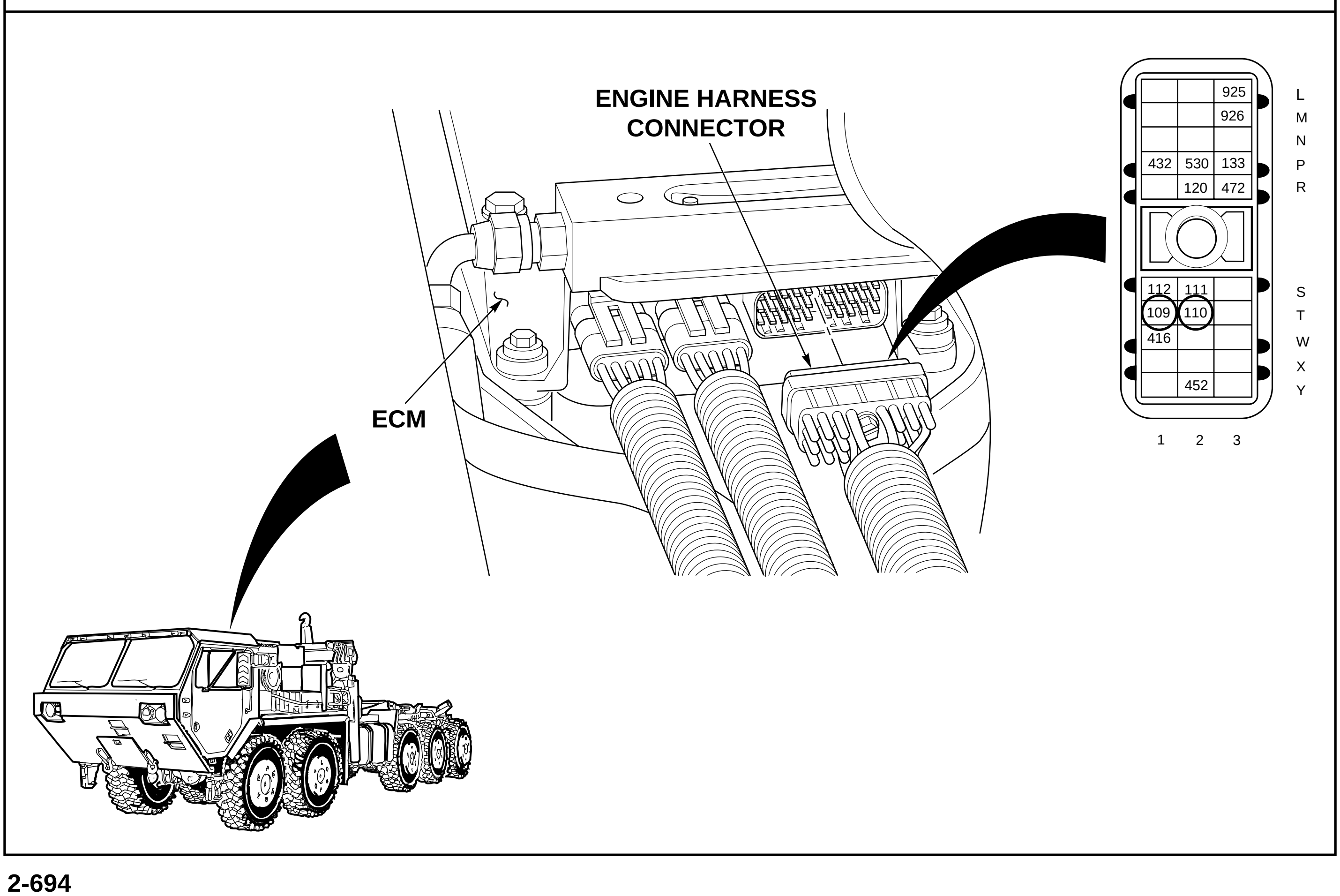

CHECK ENGINE LIGHT
ENGINE SWITCH
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 36
J1587 CODE: P100 4 - OIL PRESSURE CIRCUIT FAILED LOW (LOW VOLTAGE)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
36-11 Check for Short on Ground		
• Turn ignition off. • Remove jumper wires. • Measure resistance between sockets P2 and Y2 on the engine harness.	Greater than 10,000 ohms.	Go to 36-6.
	Less than or equal to 10,000 ohms.	Signal line (ckt #530) and return line (ckt #452) are shorted together. Repair short. Then go to 36-30.
36-12 Replace OPS		
• Turn ignition off. • Replace OPS (para 7-68). • Reconnect all connectors. • Turn ignition on. • Clear codes. • Start engine (TM 9-2320-364-10). Run until "Check Engine" light comes on or for 1 minute.	Check engine light comes on.	Go to 36-7.
	Check engine light does not comes on.	Go to 36-30.
36-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or engine has run warm (greater than 60 degrees C, 140 degrees F) 1 minute. • Read inactive codes.	No codes.	Repairs are complete.
	Code 100/4 (and any other codes).	All system diagnostics are complete. Please review this section from the start to find the error.
	Any other codes except Code 100/4.	Go to START-1, pg 2-539, to service other codes.


A
B
TIMING REFERENCE SENSOR
HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

2-14. DDEC III TROUBLESHOOTING (CONT).

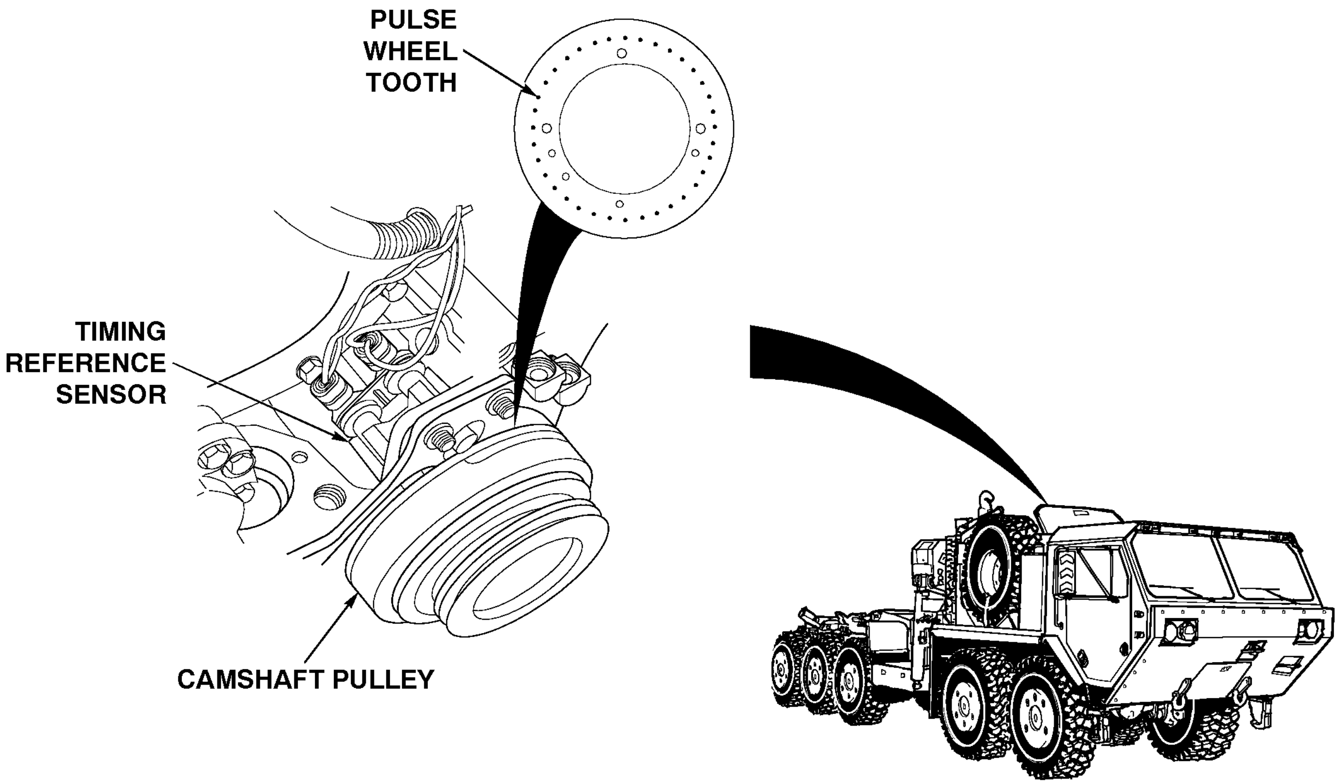
Section IV. TROUBLESHOOTING CHARTS (Cont.)

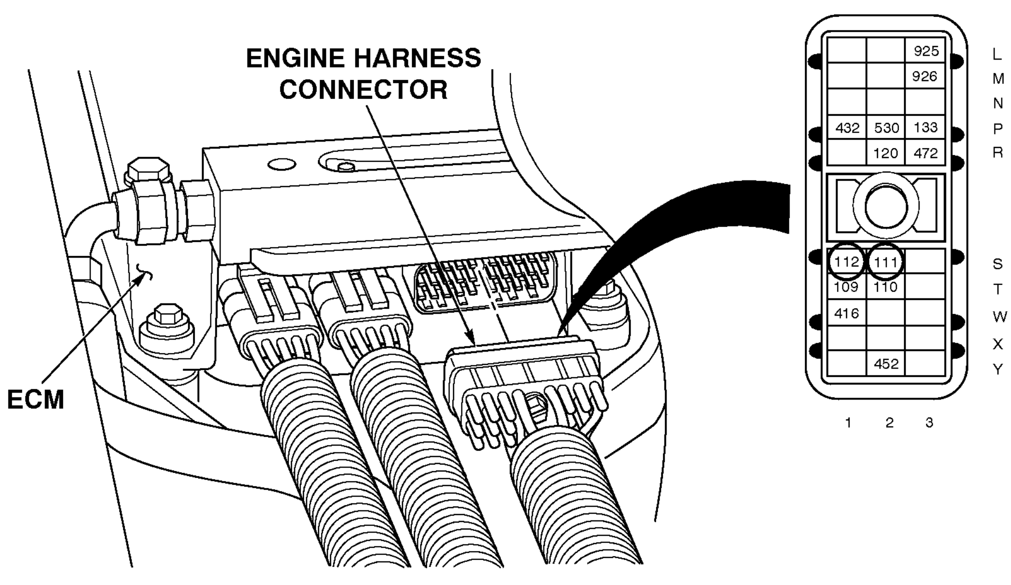
E. FLASH CODE: 41
J1587 CODE: S21 0 - TOO MANY SRS (MISSING TRS)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

NOTE – ECM must be removed (para 7-57) for access to TRS/SRS connectors.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
41-1 Resistance Check		
• Turn ignition off. • Disconnect engine harness connector at ECM. • Read resistance between socket T1 and T2 on engine harness connector.	Less than or equal to 200 ohms.	Go to 41-2.
	Greater than 200 ohms or open.	Go to 41-3.
41-2 Check for Short		
• Remove ECM (para 7-57). • Disconnect TRS connector. • Read resistance between sockets T1 and T2 on the engine harness connector. • Also read resistance between socket T1 and ground, then between socket T2 and ground.	Less than or equal to 10,000 ohms on any reading.	A short exists between (ckt #110) and (ckt #109) or where resistance was less than 10,000 ohms. Repair short. Then go to 41-30.
	Greater than 10,000 ohms or open on all readings.	Go to 41-4.
41-3 Open TRS Line Check		
• Remove ECM (para 7-57). • Disconnect TRS connector and install a jumper wire between sockets A and B of the TRS connector. • Read resistance between sockets T1 and T2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 41-4.
	Greater than 5 ohms or open.	Signal line (ckt #110) or return and (ckt #109) is open. Repair open. Then go to 41-30.
41-4 Check TRS Resistance		
• Read resistance of TRS across sensor pins A and B.	Less than 100 ohms.	Go to 41-12.
	From 100 to 200 ohms.	Go to 41-5.
	Greater than 200 ohms.	Go to 41-12.


PULSE
WHEEL
TOOTH
TIMING
REFERENCE
SENSOR
CAMSHAFT PULLEY


ENGINE HARNESS
CONNECTOR
ECM
925
926
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530
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120
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416
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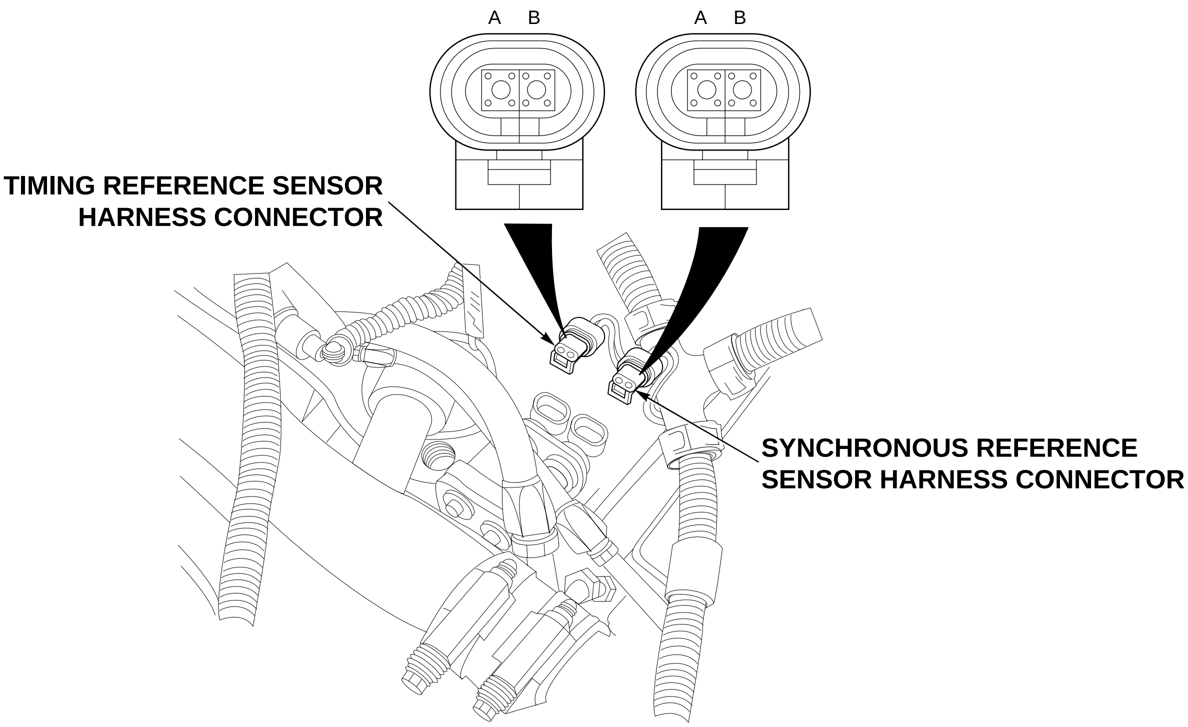
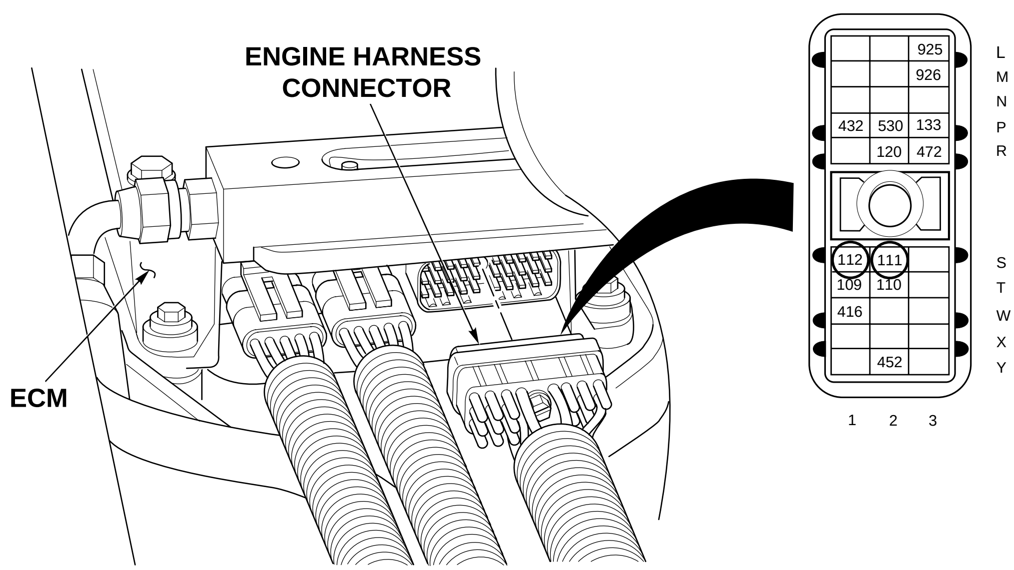
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 41
J1587 CODE: S21 0 - TOO MANY SRS (MISSING TRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
41-5 Check TRS/SRS Gap		
• Turn camshaft counterclockwise until TRS is over a TRS "tooth" of pulse wheel. • Tap the front of camshaft rearward with a soft hammer (to remove camshaft end play). • Using a feeler gauge check gap between the pulse wheel teeth and TRS (nominal gap 0.020" or 0.5 mm).	Incorrect gap.	Loosen the screw at top of TRS/SRS mounting bracket. (Don't touch the two screws that go into block front end plate -they will affect engine timing.) Adjust the TRS/SRS until gap setting is correct. Tighten screw. (If problem returns, pulse wheel may be loose or bad, notify supervisor). Then go to 41-30.
	Gap setting is correct.	Go to 41-6.
41-6 Check for SRS Code		
• Was there also a Code 21/1?	Yes.	Go to 41-8.
	No.	Go to 41-15.
41-7 Check ECM Connectors		
• Check terminals at engine harness connector (both ECM and harness side) for damage, corrosion, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to 41-30.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 41-30.
41-8 SRS Resistance Check		
• Read resistance between sockets S1 and S2 on engine harness connector.	Less than or equal to 200 ohms.	Go to 41-9.
	Greater than 200 ohms or open.	Go to 41-10.


A B
A B
TIMING REFERENCE SENSOR HARNESS CONNECTOR
SYNCHRONOUS REFERENCE SENSOR HARNESS CONNECTOR


ENGINE HARNESS CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
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R
S
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X
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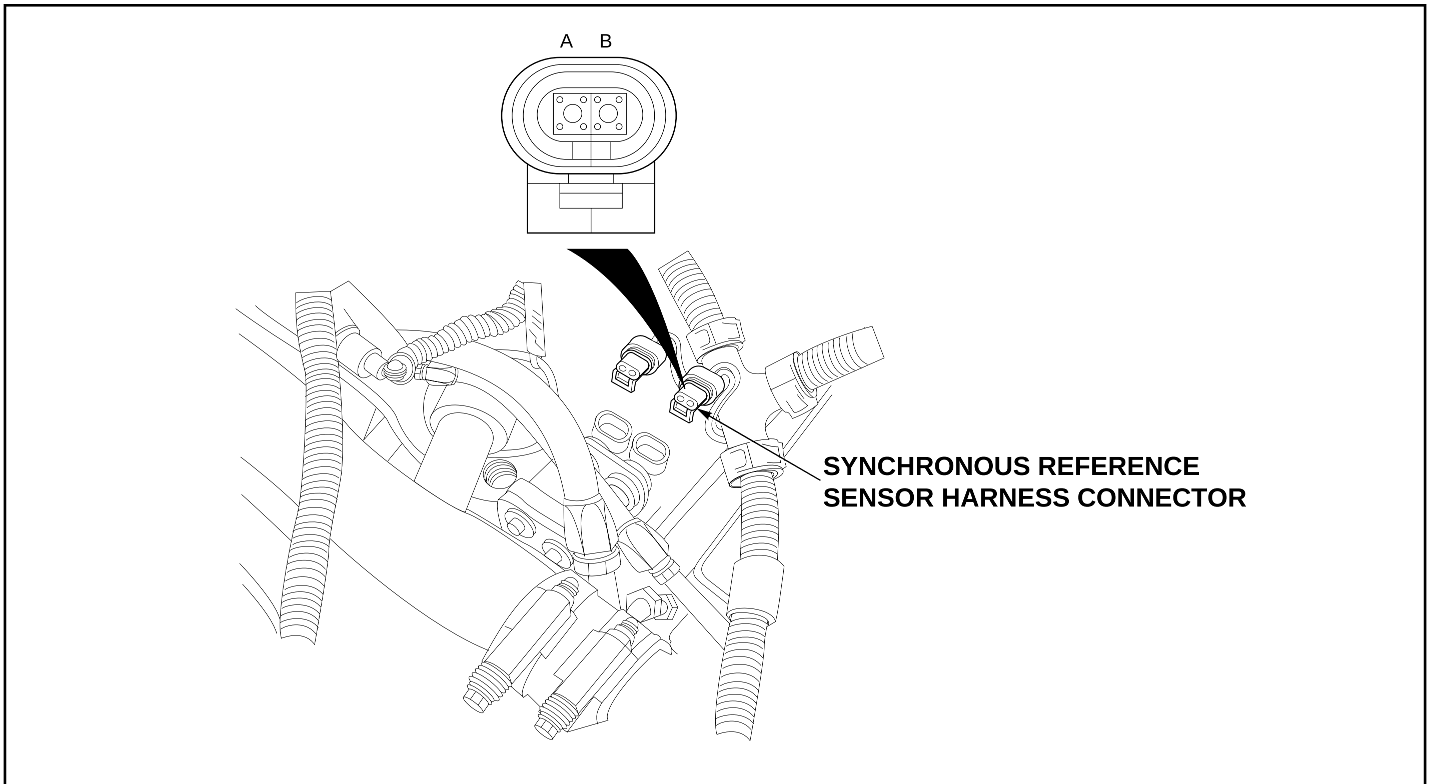
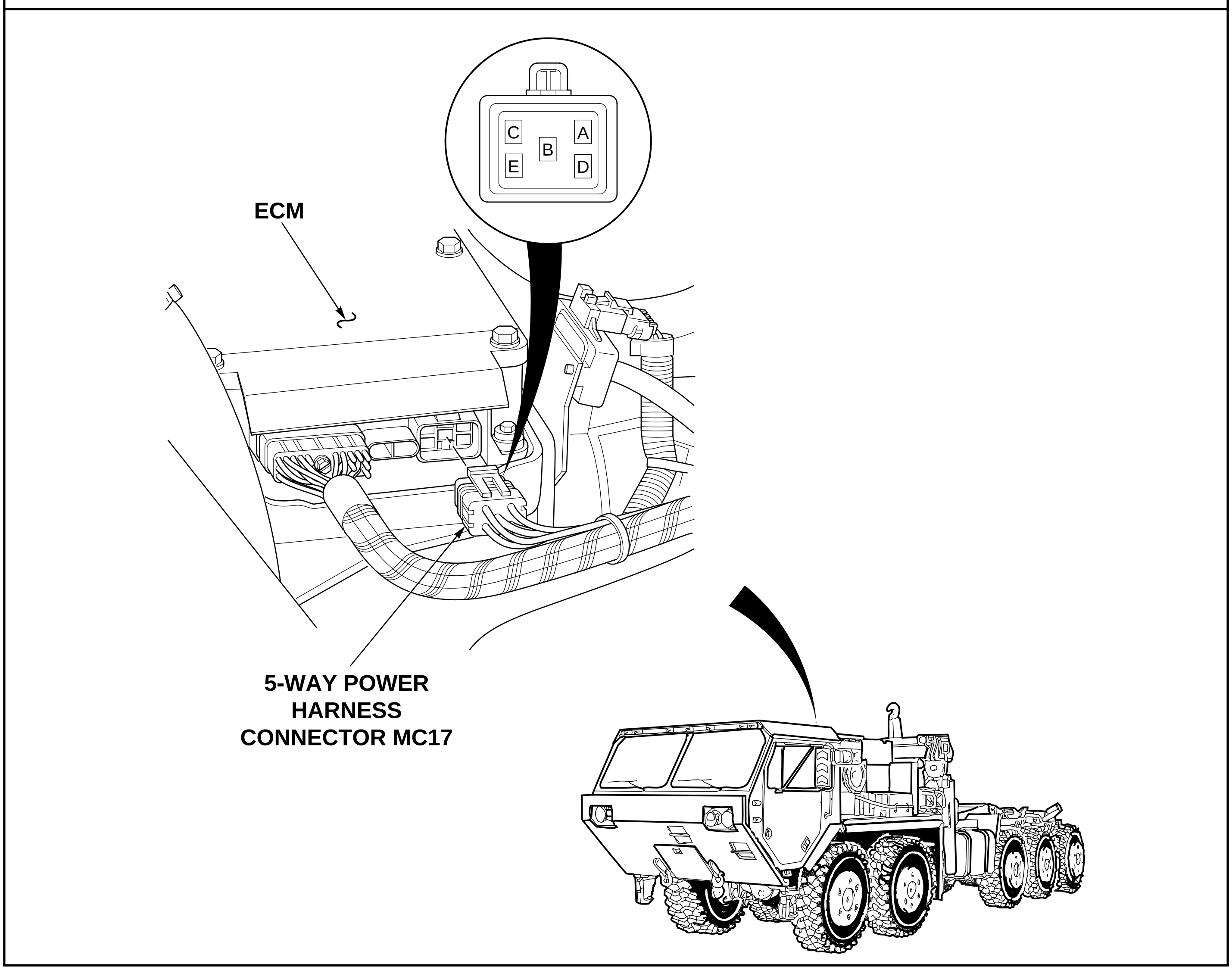
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 41
J1587 CODE: S21 0 - TOO MANY SRS (MISSING TRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
41-9 Check for Short		
• Disconnect SRS connector. • Read resistance between sockets S1 and S2 on engine harness connector.	Less than or equal to 10,000 ohms.	Signal line (ckt #111) is shorted to return line (ckt #112). Repair short. Then go to 41-30.
	Greater than 10,000 ohms or open.	Go to 41-11.
41-10 Open SRS Line Check		
• Install a jumper wire between sockets A and B of SRS connector. • Read resistance between sockets S1 and S2 of engine harness connector.	Less than or equal to 5 ohms.	Go to 41-11.
	Greater than 5 ohms or open.	Signal line (ckt #111) or return line (ckt #112) is open. Repair open. Then go to 41-30.
41-11 SRS Test		
• Read resistance of the SRS across the sensor pins A and B.	Less than 100 ohms.	Go to 41-13.
	From 100 to 200 ohms.	Go to 41-7.
	Greater than 200 ohms.	Go to 41-13.
41-12 Check TRS Connectors		
• Check connectors at the TRS (both the harness side and the TRS side) for damage; bent, corroded or unseated pins or sockets, or bad contacts.	Connectors are okay.	TRS requires replacement. Notify supervisor. Then go to 41-14.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 41-30.

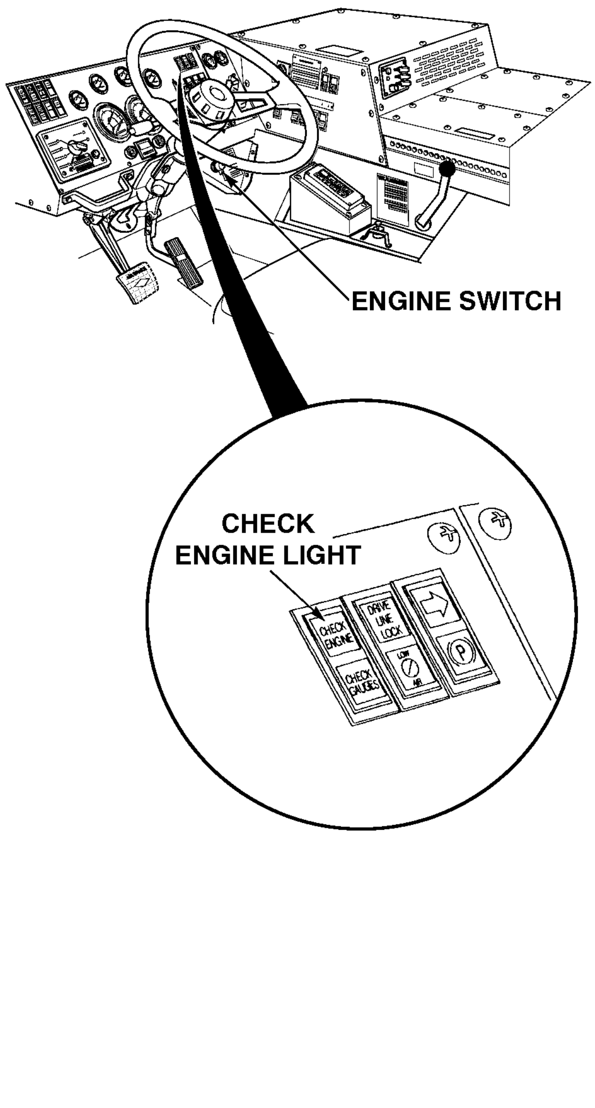

A
B
SYNCHRONOUS REFERENCE
SENSOR HARNESS CONNECTOR


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 41
J1587 CODE: S21 0 - TOO MANY SRS (MISSING TRS)

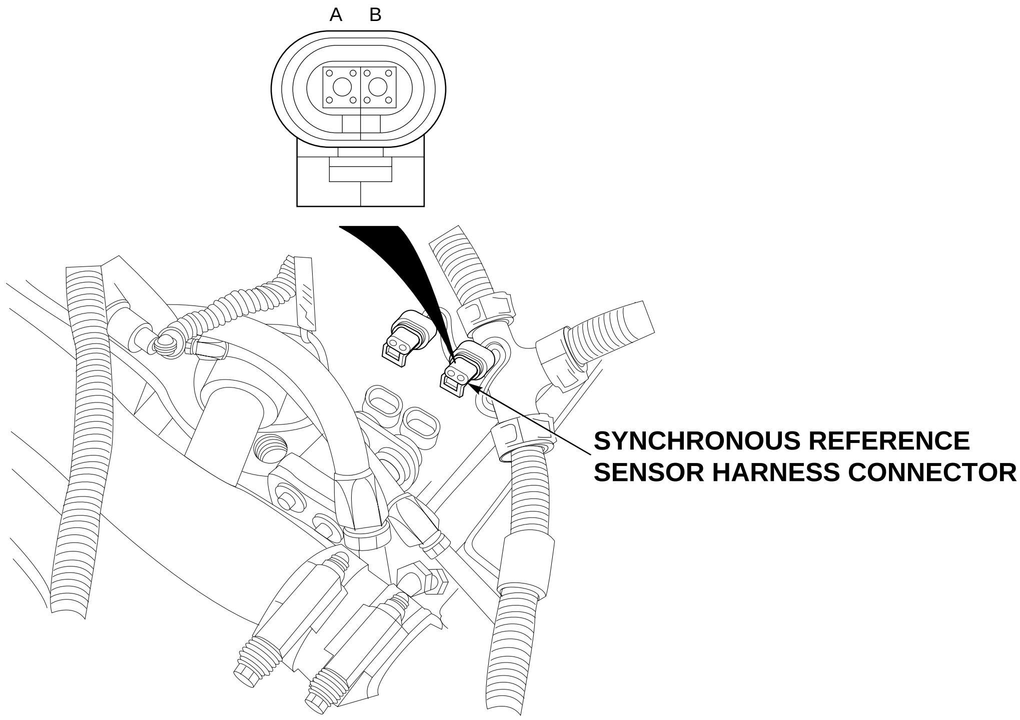
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
41-13 Check SRS Connectors		
• Check connectors at the SRS (both the harness side and the sensor side) for damage; bent, corroded or unseated pins or sockets, or bad contacts.	Connectors are okay. →	SRS requires replacement. Notify supervisor. Then go to 41-14.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 41-30.
41-14 Verify TRS/SRS		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Start and run engine until the “Check Engine” light comes on or for 1 minute (TM 9-2320-364-10). • Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 21/0 reappears (and any other codes). →	If the SRS was just replaced, go to 41-15. If the SRS was not replaced, go to 41-6.
	Code(s) other than Code 21/0 received. →	Go to START-1, pg 2-539, to service other codes.
41-15 Check Cranking Voltage		
• Turn ignition off. • Connect other connectors. • Fabricate temporary jumper harness per instructions in Appendix D, Figure D-14. • Connect jumper harness to fully charged battery (12 volt). • Connect jumper harness to ECM. • Turn ignition on. • Clear codes. • Start engine (TM 9-2320-364-10). Run until “Check Engine” light comes on or for 1 minute. • Stop engine. • Read active codes.	Engine won’t start and/or Code 21/0 (and any other codes). →	Go to 41-7.
	Engine starts and no Code 21/0. →	Service discharged battery (TM 9-6140-200-14). Repair, then to go 41-30.

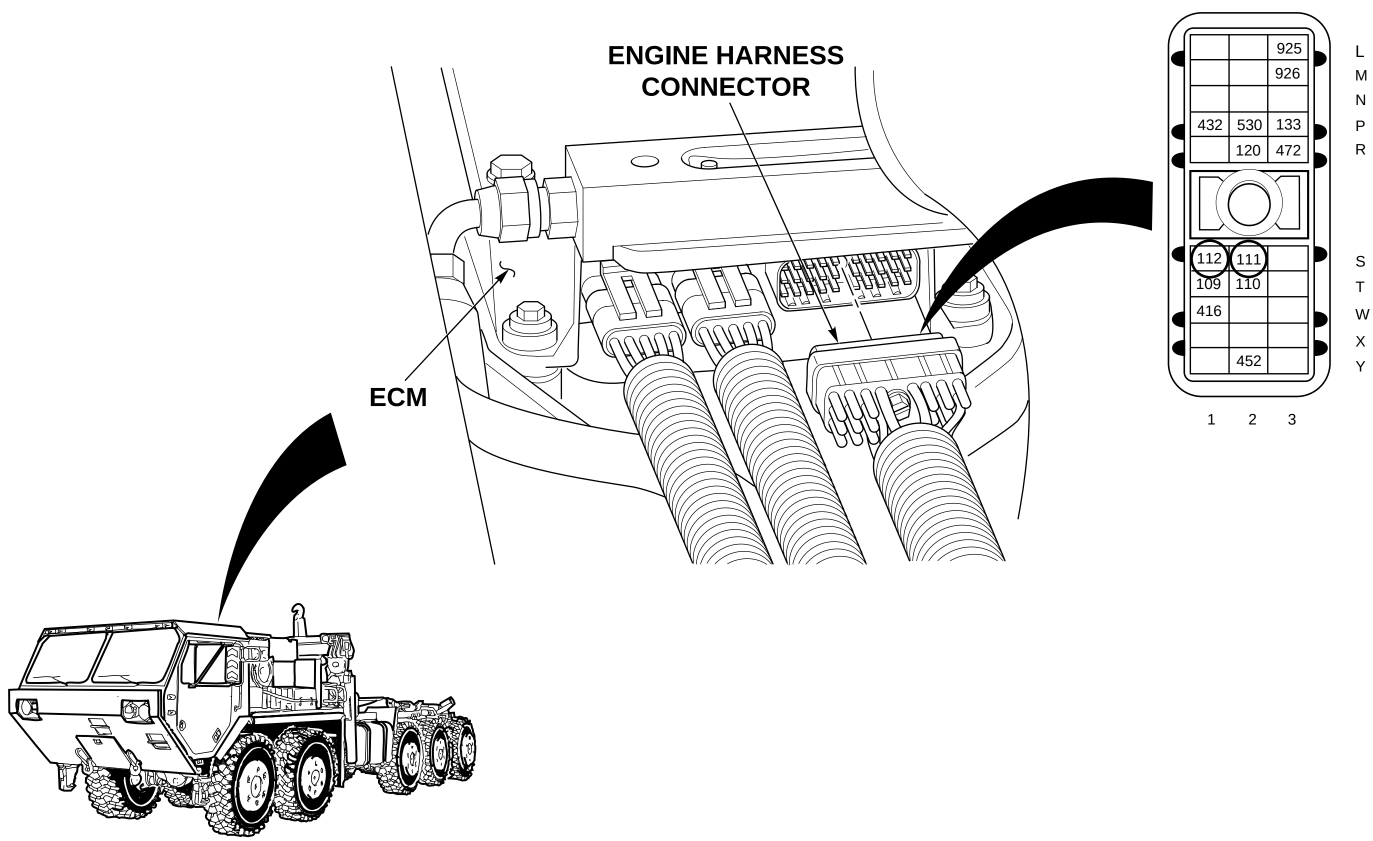

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 41
J1587 CODE: S21 0 - TOO MANY SRS (MISSING TRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
41-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of “Check Engine” light. • If “Check Engine” light does not stay on, start engine and run (TM 9-2320-364-10) until “Check Engine” light comes on or for 1 minute. • Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Code 21/0 (and any other codes). →	All system diagnostics are complete. Please review this section from the start to find error.
	Any other codes except Code 21/0. →	Go to START-1, pg 2-539 to service other codes.


A
B
SYNCHRONOUS REFERENCE
SENSOR HARNESS CONNECTOR


ENGINE HARNESS
CONNECTOR
ECM
L
M
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S
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W
X
Y
925
926
432
530
133
120
472
112
111
109
110
416
452
1
2
3

2-14. DDEC III TROUBLESHOOTING (CONT).

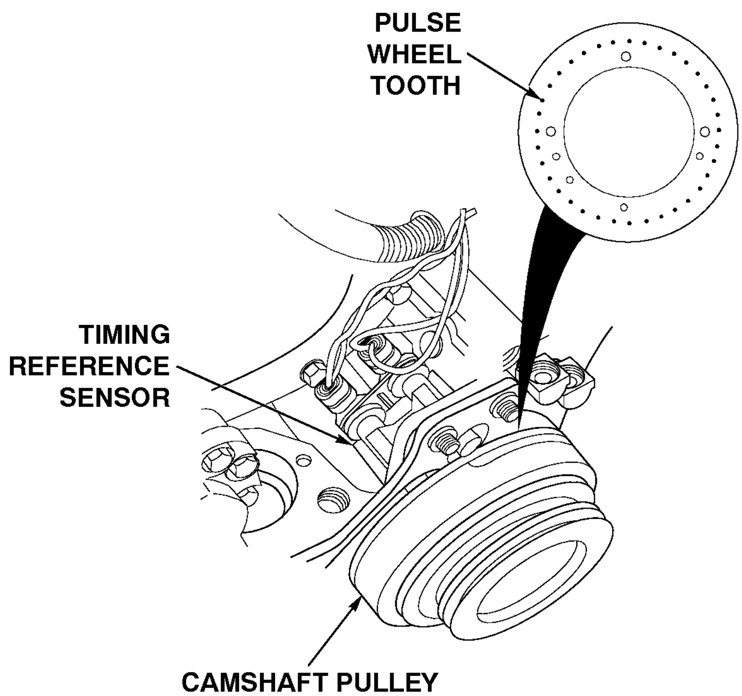
Section IV. TROUBLESHOOTING CHARTS (Cont.)

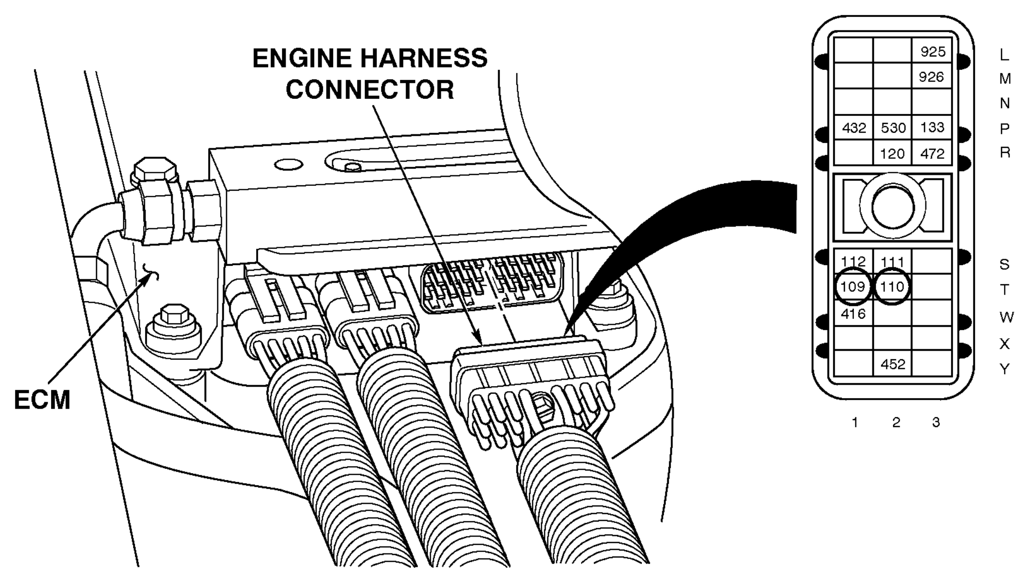
E. FLASH CODE: 42
J1587 CODE: S21 1 - TOO FEW SRS (MISSING SRS)

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

NOTE – ECM must be removed (para 7-57) for access to TRS/SRS connectors.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
42-1 Resistance Check		
• Turn ignition off. • Disconnect engine harness connector at ECM. • Read resistance between socket S1 and S2 on engine harness connector.	Less than or equal to 200 ohms.	Go to 42-2.
	Greater than 200 ohms or open.	Go to 42-3.
42-2 Check for Short		
• Remove ECM (para 7-57). • Disconnect SRS connector. • Read resistance between sockets S1 and S2 on engine harness connector. • Also read resistance between socket S1 and ground, then between socket S2 and ground.	Less than or equal to 10,000 ohms on any reading.	A short exists where resistance was less than 10,000 ohms. Repair short. Then go to 42-30.
	Greater than 10,000 ohms or open on all readings.	Go to 42-4.
42-3 Open SRS Line Check		
• Remove ECM (para 7-57). • Disconnect SRS connector and install a jumper wire between sockets A and B of the SRS connector. • Read resistance between sockets S1 and S2 on the engine harness connector.	Less than or equal to 5 ohms.	Go to 42-4.
	Greater than 5 ohms or open.	Signal line (ckt #111) or return line (ckt #112) is open. Repair open. Then go to 42-30.
42-4 Check SRS Resistance		
• Read resistance of SRS across sensor pins A and B.	Less than 100 ohms.	Go to 42-12.
	From 100 to 200 ohms.	Go to 42-5.
	Greater than 200 ohms.	Go to 42-12.

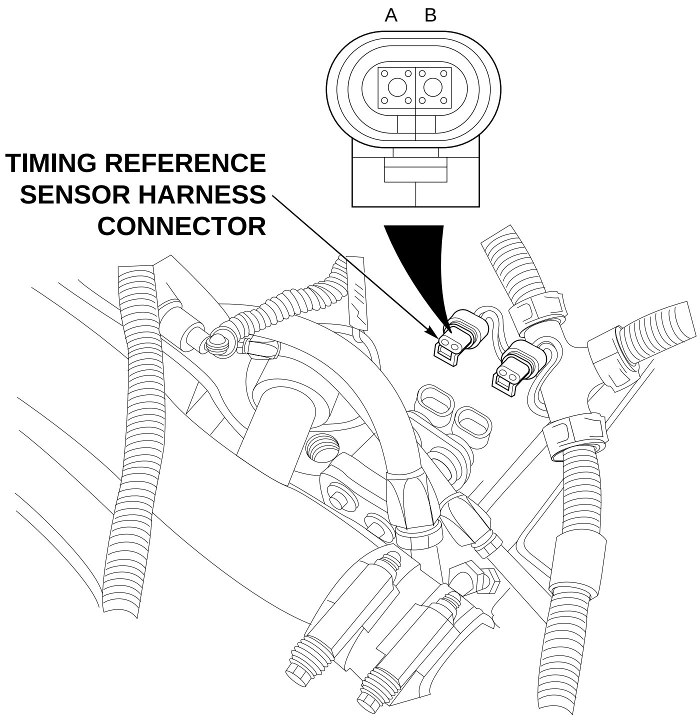

PULSE WHEEL TOOTH
TIMING REFERENCE SENSOR
CAMSHAFT PULLEY

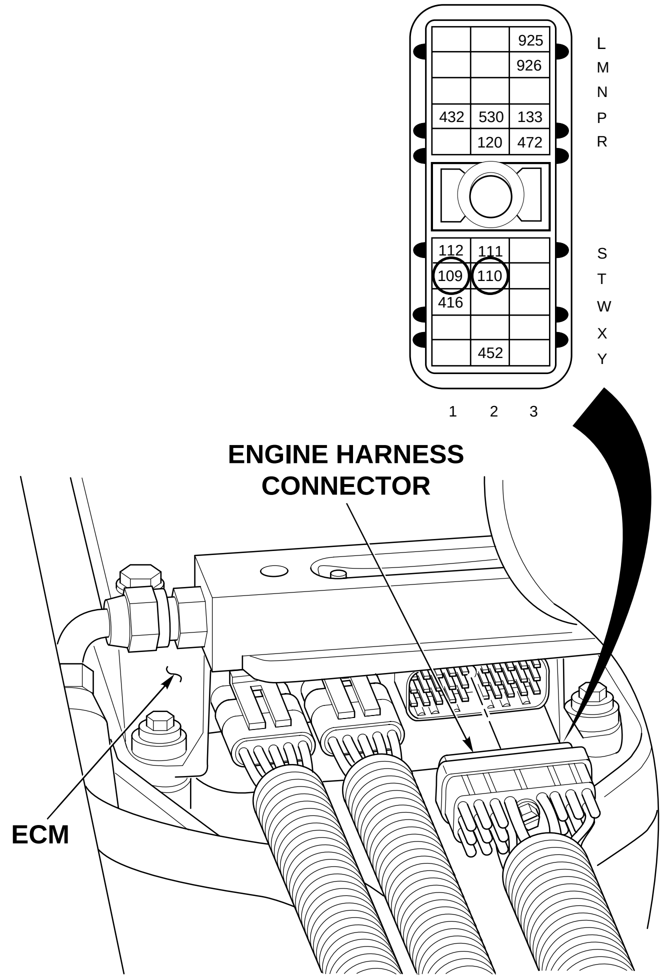

ENGINE HARNESS CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3

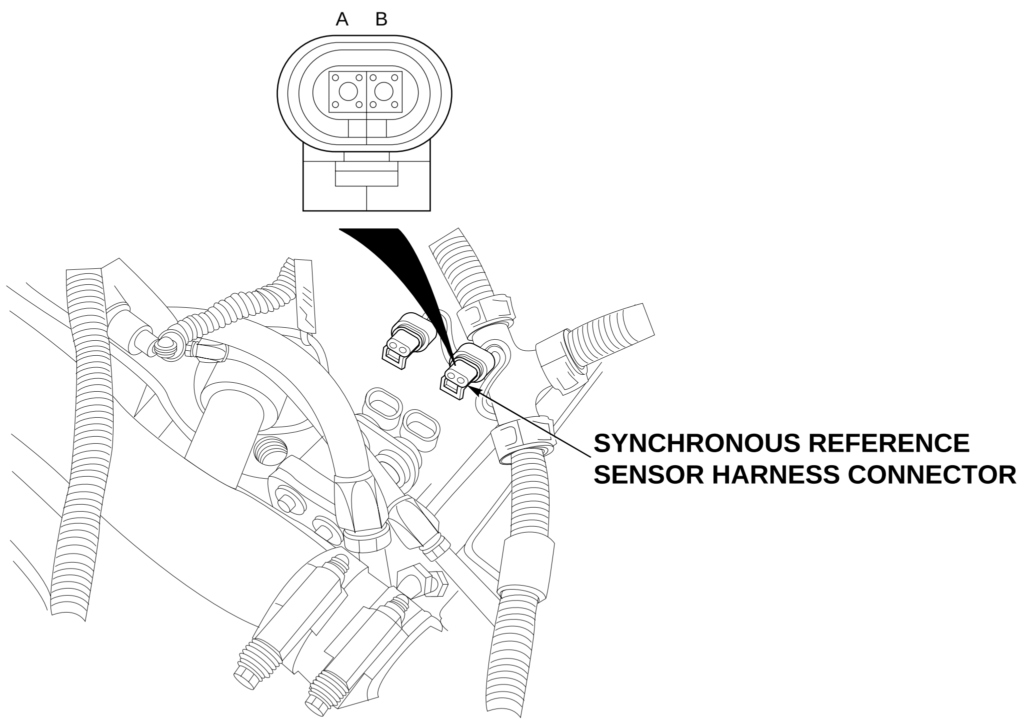
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 42
J1587 CODE: S21 1 - TOO FEW SRS (MISSING SRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
42-5 Check TRS/SRS Gap		
• Turn camshaft counterclockwise until TRS is over a TRS "tooth" of pulse wheel. • Tap the front of camshaft rearward with a soft hammer (to remove camshaft end play). • Using a feeler gauge check gap between the pulse wheel teeth and TRS (nominal gap 0.020" or 0.5 mm).	Incorrect gap.	Loosen the screw at top of TRS/SRS mounting bracket. (Don't touch the two screws that go into block front end plate -they will affect engine timing.) Adjust the TRS/SRS until gap setting is correct. Tighten screw. (If problem returns, pulse wheel may be loose or bad, notify supervisor). Then go to 42-30.
	Gap setting is correct.	Go to 42-6.
42-6 Check for TRS Code		
• Was there also a Code 21/0?	Yes.	Go to 42-8.
	No.	Go to 42-7.
42-7 Check ECM Connectors		
• Check terminals at engine harness connector (both ECM and harness side) for damage, corrosion, and unseated pins or sockets.	Terminals and connectors are okay.	Then go to 42-15.
	Problem found.	Repair terminals/connectors (para 7-101). Then go to 42-30.
42-8 TRS Resistance Check		
• Read resistance between sockets T1 and T2 on engine harness connector.	Less than or equal to 200 ohms.	Go to 42-9.
	Greater than 200 ohms or open.	Go to 42-10.


A B
TIMING REFERENCE
SENSOR HARNESS
CONNECTOR

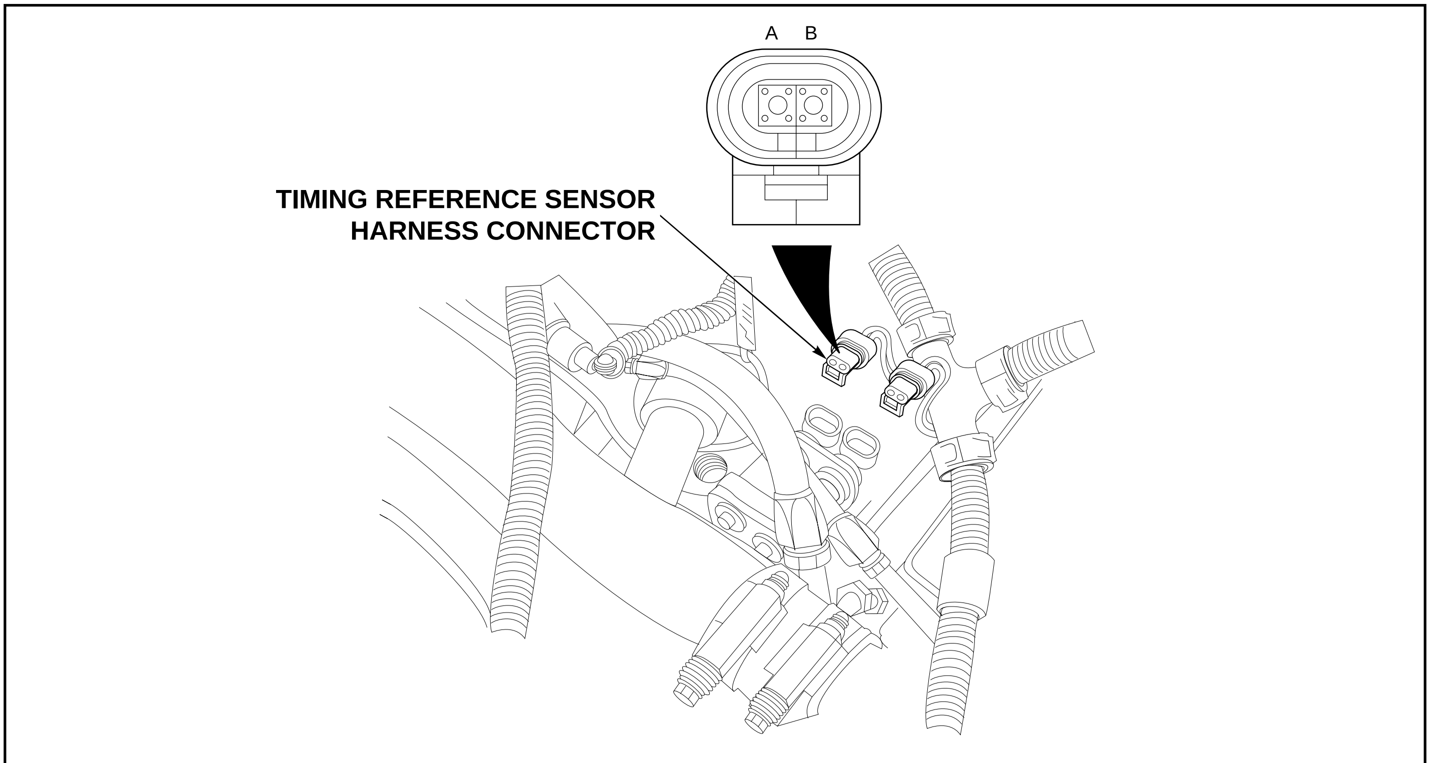

925
926
432 530 133
120 472
112 111
109 110
416
452
L M N P R S T W X Y
1 2 3
ENGINE HARNESS
CONNECTOR
ECM

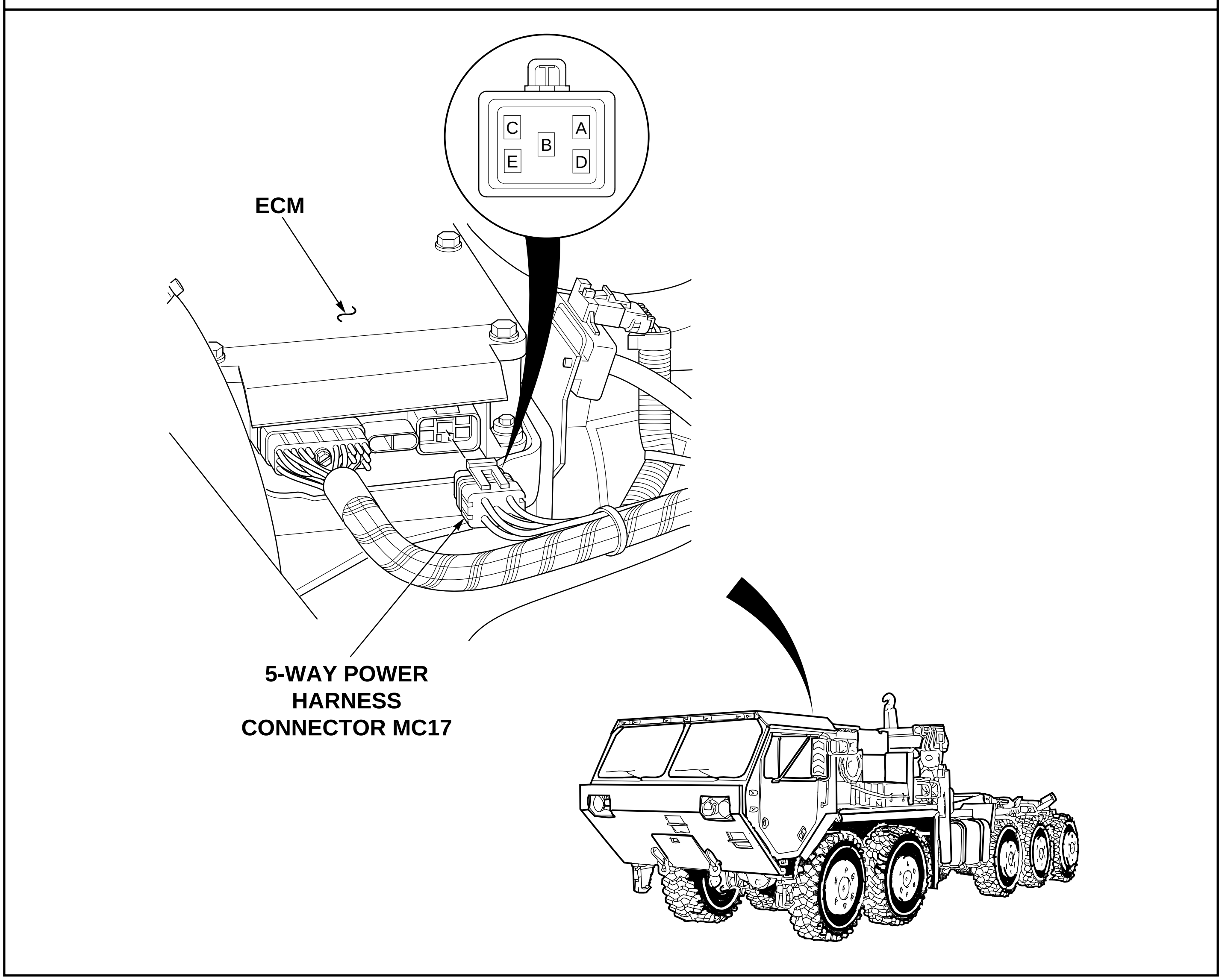

A B
SYNCHRONOUS REFERENCE
SENSOR HARNESS CONNECTOR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 42
J1587 CODE: S21 1 - TOO FEW SRS (MISSING SRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
42-9 Check for Short		
• Disconnect TRS connector. • Read resistance between sockets T1 and T2 on engine harness connector.	Less than or equal to 10,000 ohms. →	Signal line (ckt #110) is shorted to return line (ckt #109). Repair short. Then go to 42-30.
	Greater than 10,000 ohms or open. →	Go to 42-11.
42-10 Open TRS Line Check		
• Install a jumper wire between sockets A and B of TRS connector. • Read resistance between sockets T1 and T2 of engine harness connector.	Less than or equal to 5 ohms. →	Go to 42-11.
	Greater than 5 ohms or open. →	Signal line (ckt #110) or return line (ckt #109) is open. Repair open. Then go to 42-30.
42-11 TRS Test		
• Read resistance of TRS across sensor connector pins A and B.	Less than or 100 ohms. →	Go to 42-13.
	From 100 to 200 ohms. →	Go to 42-7.
	Greater than 200 ohms. →	Go to 42-13.
42-12 Check SRS Connectors		
• Check connectors at SRS (both harness side and SRS side) for corrosion, damaged or unseated pins or sockets, or bad contacts.	Connectors are okay. →	SRS requires replacement. Notify supervisor. Then go to 42-14.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 42-30.

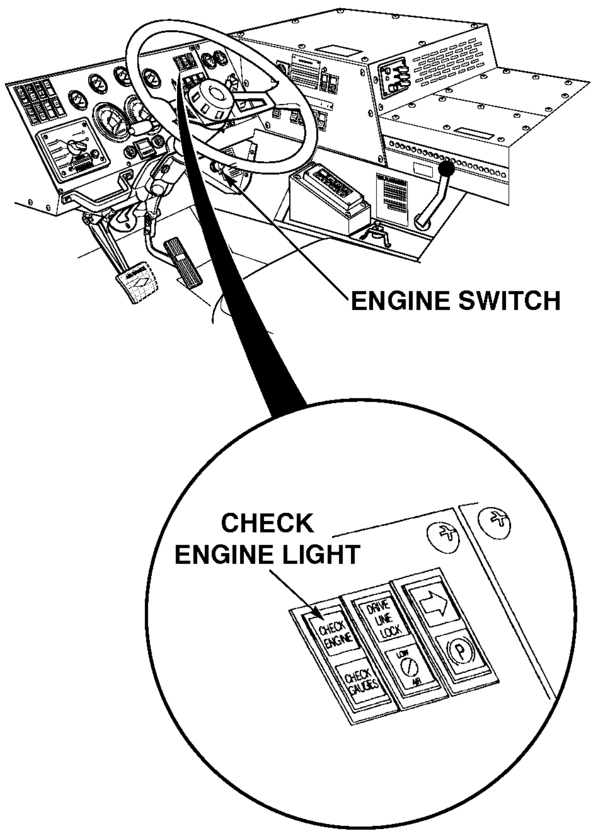

A
B
TIMING REFERENCE SENSOR
HARNESS CONNECTOR


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 42
J1587 CODE: S21 1 - TOO MANY SRS (MISSING SRS)

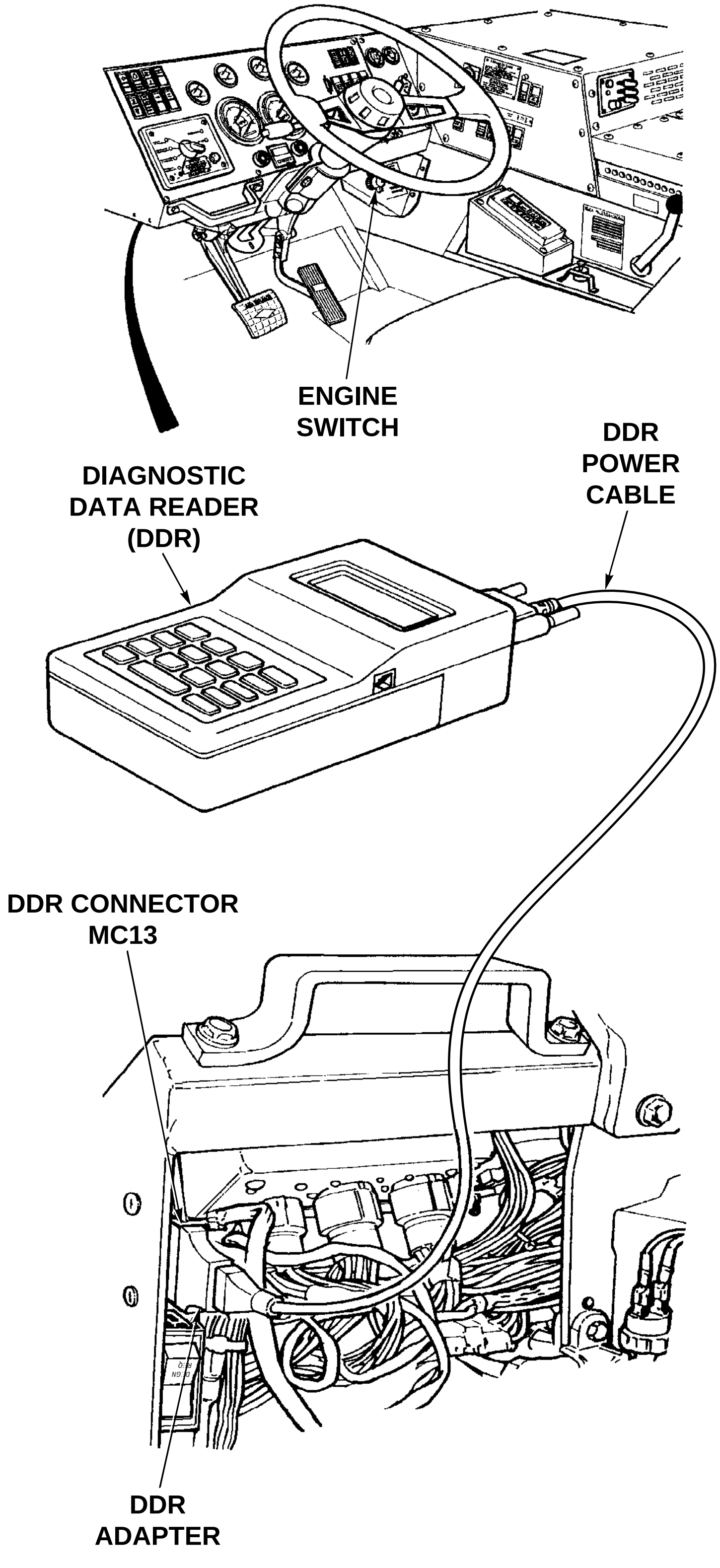
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
42-13 Check TRS Connectors		
• Check connectors at TRS (both harness side and sensor side) for damage; bent, corroded or unseated pins or sockets, or bad contracts.	Connectors are okay. →	TRS requires replacement. Notify supervisor. Then go to 42-14.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 42-30.
42-14 Verify TRS/SRS		
• Turn ignition off. • Reconnect all connectors. • Clear codes. • Start and run (TM 9-2320-364-10) engine until “Check Engine” light comes on or for 1 minute. • Stop engine. • Read inactive codes.	No Codes. →	Repairs are complete.
	Code 21/1 reappears (and any other codes.) →	If TRS was just replaced, go to 42-7. If the TRS was not replaced, go to 42-6.
	Code(s) other than Code 21/1 received. →	Go to START-1, pg 2-539, to service other codes.
42-15 Verify Cranking Voltage		
• Turn ignition off. • Connect all connectors. • Fabricate temporary jumper harness per instructions in Appendix D, Figure D-14. • Connect jumper harness to fully charged battery (12 volt). • Connect jumper harness to ECM. • Try to start engine.	Engine starts. →	Service discharged battery (TM 9-6140-200-14). Then go to 42-30.
	Engine does not start. →	Replace ECM (para 7-57). Then go to 42-30.


ENGINE SWITCH
CHECK ENGINE LIGHT
CHECK ENGINE
CHECK GAUGES
DRIVE LINE LOCK
LOW AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 42
J1587 CODE: S21 1 - TOO FEW SRS (MISSING SRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
42-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or for 1 minute. • Stop engine. • Read inactive codes.	No Codes. →	Repairs are complete.
	Code 21/1 (and any other codes). →	All system diagnostics are complete. Please review this section from start to find error.
	Any other codes except Code 21/1. →	Go to START-1, pg 2-539, to service other codes.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

2-14. DDEC III TROUBLESHOOTING (CONT).

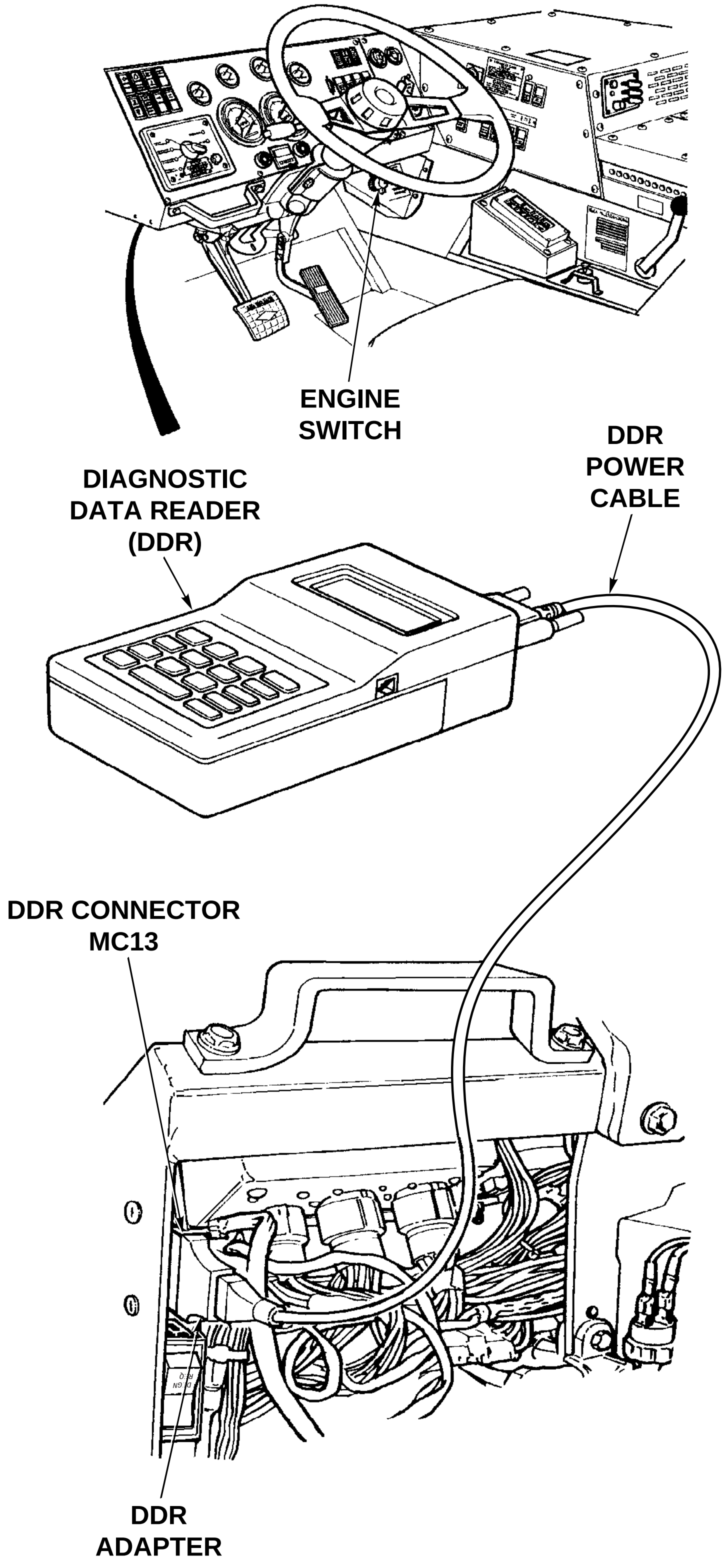
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 44
J1587 CODE: P110 0 - COOLANT TEMPERATURE HIGH OR
P175 0 - OIL TEMPERATURE HIGH

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

When (Inactive Codes) are displayed on DDR, additional audit trail information is also shown. For an understanding of this information refer to the example given in the Code 85 chart.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
44-1 Multiple Code Check		
• Were there any other codes besides 110/0 or 175/0?	Yes.	Service other codes first.
• Plug in reader and determine if code is for high coolant temperature or high oil temperature.	No.	This fault codes indicates oil or coolant temperature was higher than it should have been. Refer to Chapter 2, Vehicle Troubleshooting, to determine potential causes for high oil or coolant temperatures.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

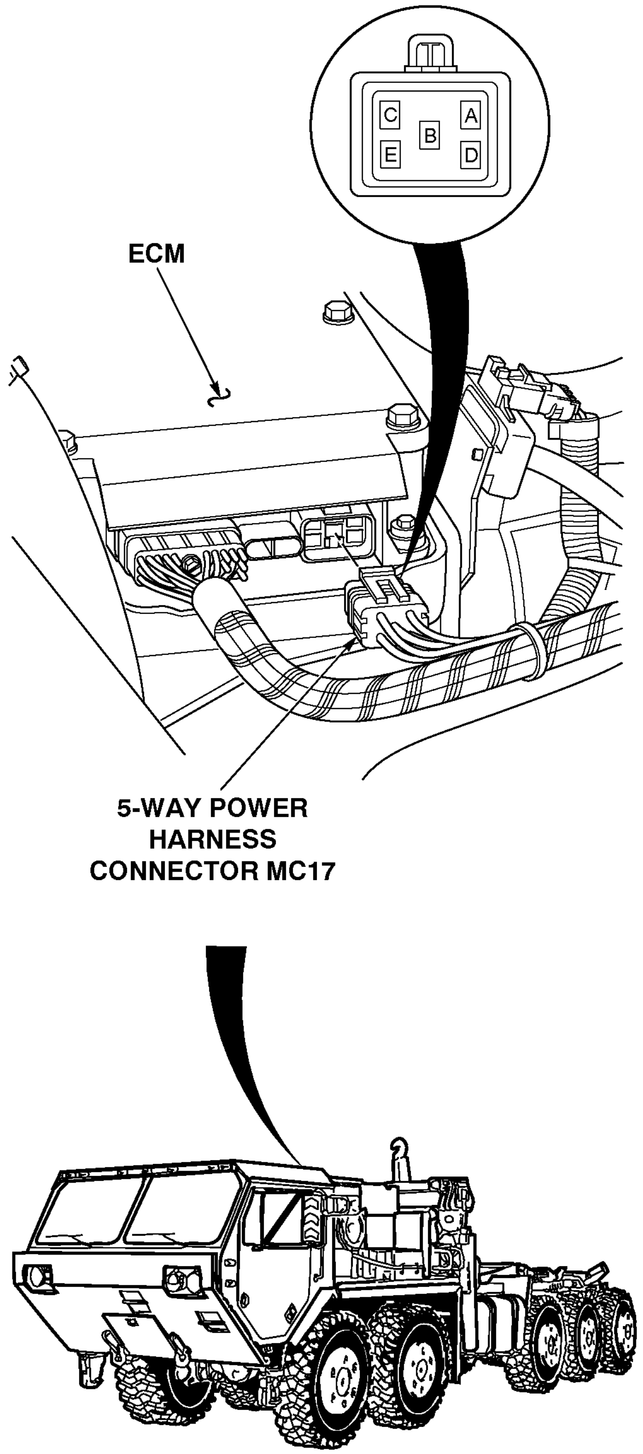
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 45
J1587 CODE: P100 1 - OIL PRESSURE LOW

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
45-1 Multiple Code Check		
• Were there any other codes besides 100/1?	Yes. →	Service other codes first.
	No. →	This code indicates that there was an engine running condition at which oil pressure was lower than it should have been. Refer to Chapter 2, Vehicle Troubleshooting, to determine potential causes for low oil pressure.


C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

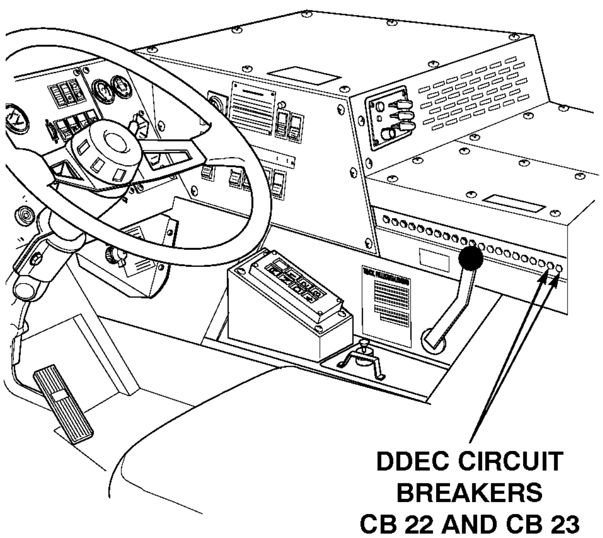
2-14. DDEC III TROUBLESHOOTING (CONT).

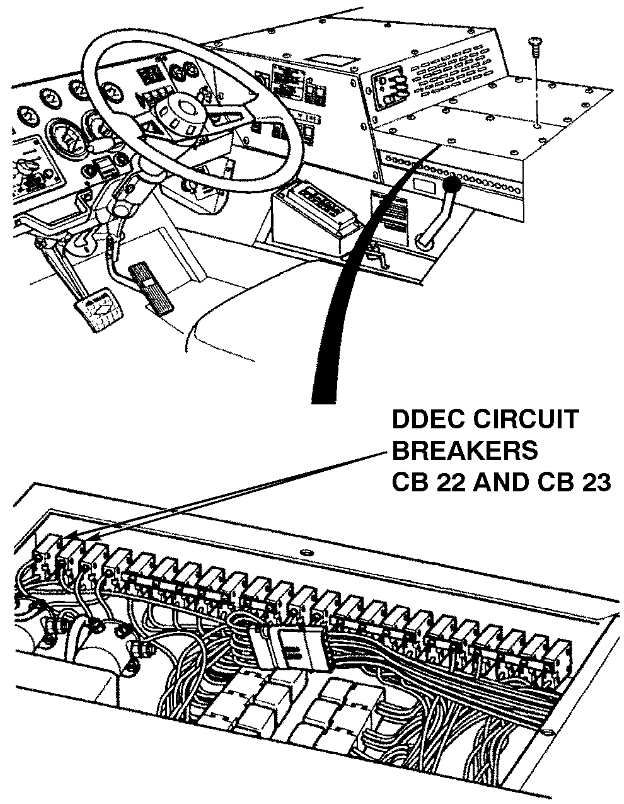
Section IV. TROUBLESHOOTING CHARTS (Cont.)

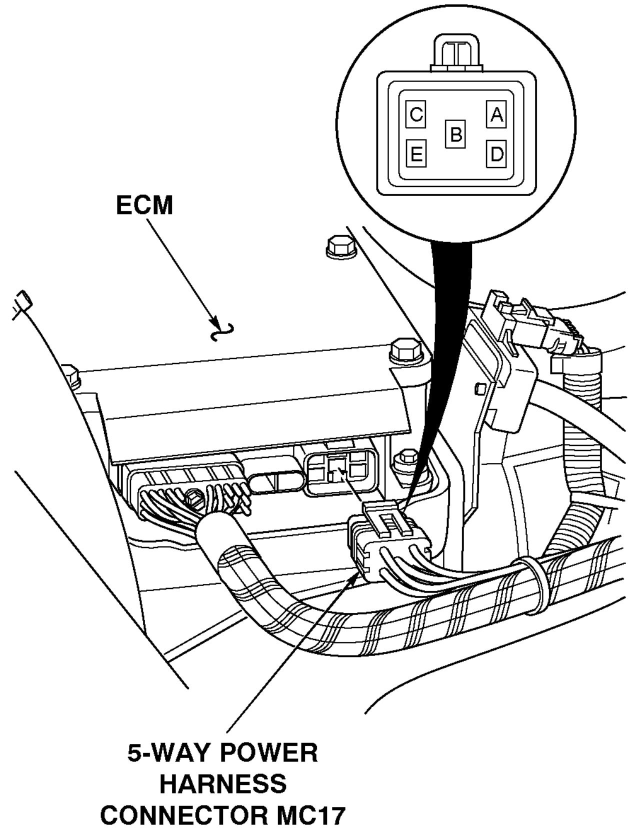
E. FLASH CODE: 46
J1587 CODE: P168 1 - BATTERY VOLTAGE LOW

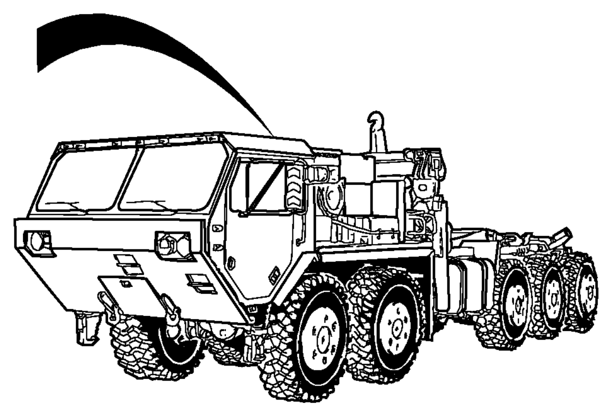
NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
46-1 Battery Check		
• Start and run (TM 9-2320-364-10) engine for 1 minute. • Measure voltage on Battery + terminal (red lead) to Battery – terminal (black lead).	Engine does not start. →	Determine cause for no-start. Start with an inspection of the battery (possibly discharged) and/or starting/charging system. Refer to Chart 2, page 2-557, as a further aid in no-start diagnosis if battery and starting/charging system are okay.
	Less than or equal to 10.0 volts. →	Service discharged battery (TM 9-6140-200-14) and/or starting/charging system.
	Greater than 10.0 volts. →	Go to 46-2.
46-2 Voltage Check at ECM		
• Keep engine running. • Select ECM VOLTS on DDR for display. • Observe ECM voltage reading on DDR.	Less than or equal to 10.0 volts. →	Go to 46-3.
	Greater than 10.0 volts. →	Go to 46-5.
46-3 Voltage Check at ECM		
• Turn ignition off. • Disconnect 5-way power harness connector at the ECM. • Read voltage from socket A and C of 5-way power harness connector and a good battery ground (black lead). Don't use (ckt #150) as ground reference.	Less than or equal to 11.5 volts. →	Go to 46-4.
	Greater than 11.5 volts. →	Go to 46-5.


DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23


DDEC CIRCUIT
BREAKERS
CB 22 AND CB 23

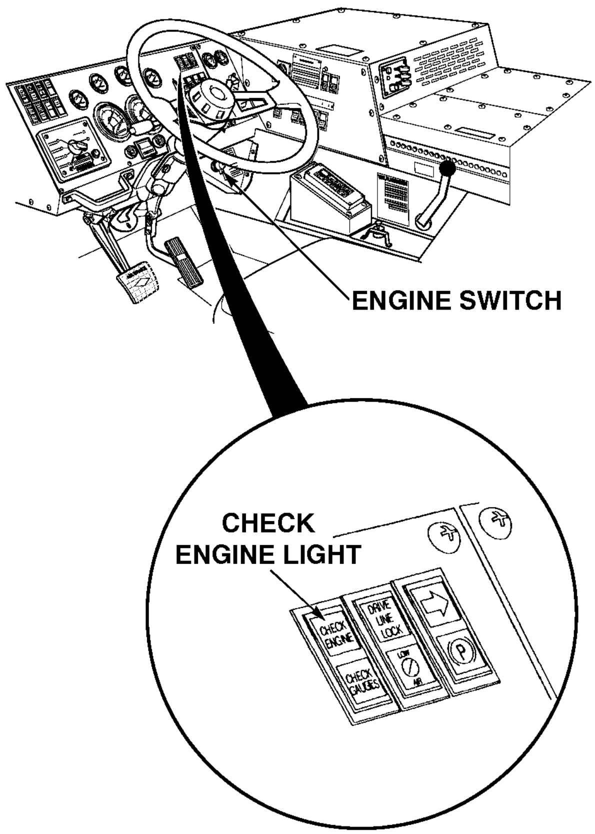

C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17



Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 46
J1587 CODE: P168 1 - BATTERY VOLTAGE LOW

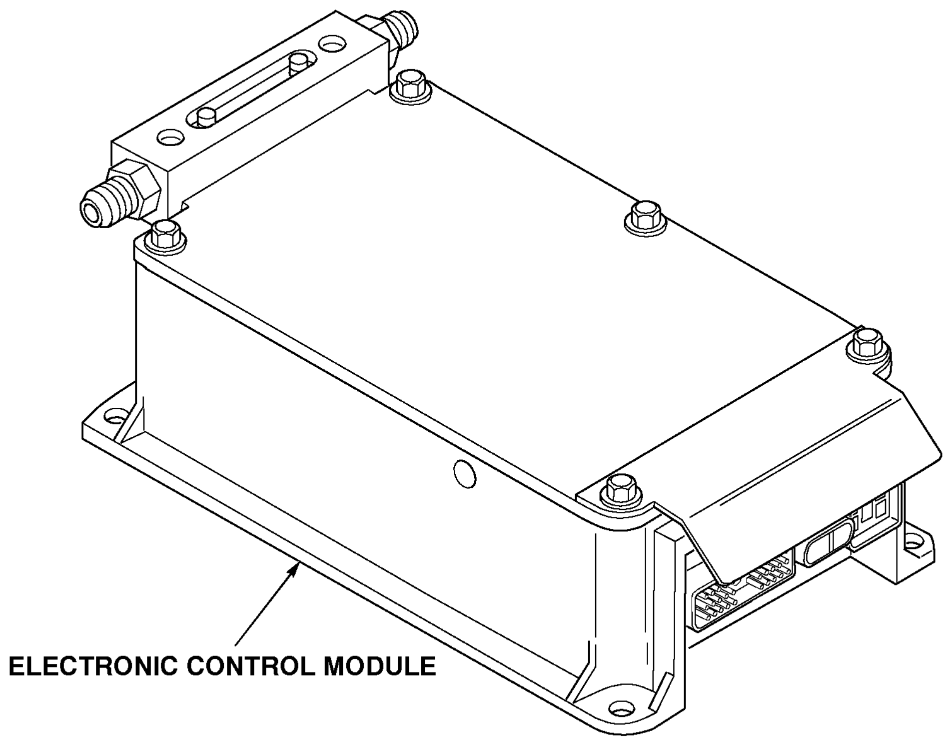
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
46-4 Check for Bad Battery + Line		
• Pull out both DDEC circuit breaker buttons (CB22 and CB23). • Read voltage between battery side (hot side) of DDEC circuit breaker CB22 (red lead) and good ground (black lead). • Repeat voltage reading at other DDEC circuit breaker CB23.	Less than or equal to 11.5 volts on either reading. →	The Battery + line near Battery is open, or a corroded connection exists at Battery + terminal. Repair problem. Then go to 46-30.
	Greater than 11.5 volts on both readings. →	The Battery + line between the DDEC circuit breaker and ECM has an open, or 5-way power harness connector has a corroded connection. Repair problem. Then go to 46-30.
46-5 Ground Check at ECM		
• Disconnect the 5-way power harness connector at ECM (if you have not previously done so). • Read voltage on socket C of 5-way power harness connector (red lead) to socket (black lead). • Also read voltage on socket A (red lead) to socket D (black lead).	Less than or equal to 11.5 volts on either reading. →	The ground wire (ckt #150) is open or has a corroded connection. Repair ground wire. Then go to 46-30.
	Greater than 11.5 volts on both readings. →	Go to 46-6.
46-6 Check ECM Connectors		
• Check terminals at 5-way power harness connector (both the ECM and harness side) for damage; bent, corroded, and unseated pins or sockets.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to 46-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to 46-30.


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

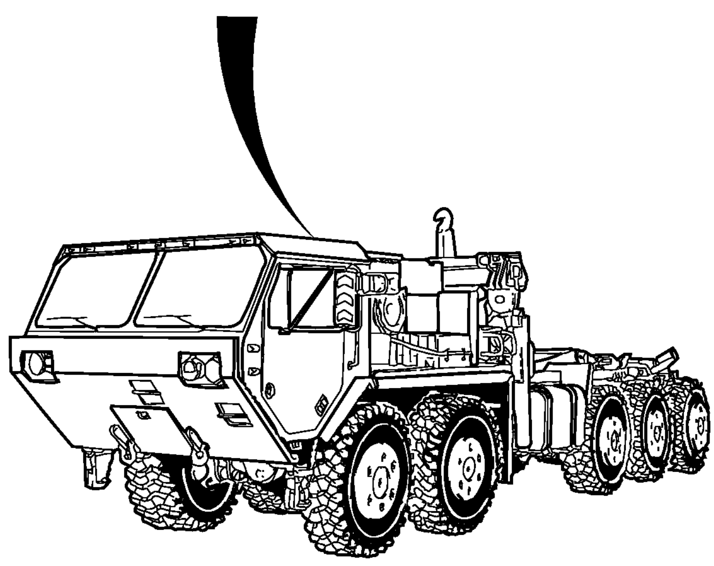
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 46
J1587 CODE: P168 1 - BATTERY VOLTAGE LOW

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
46-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • Note status of "Check Engine" light. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) until "Check Engine" light comes on or for 1 minute. • Stop engine. • Read inactive codes.	No Codes. →	Repairs are complete.
	Code 168/1 (and any other codes). →	All system diagnostics are complete. Please review this section from start to find error.
	Any other codes except Code 168/1. →	Go to START-1, pg 2-539, to service other codes.



ECM SHOWN REMOVED FOR CLARITY



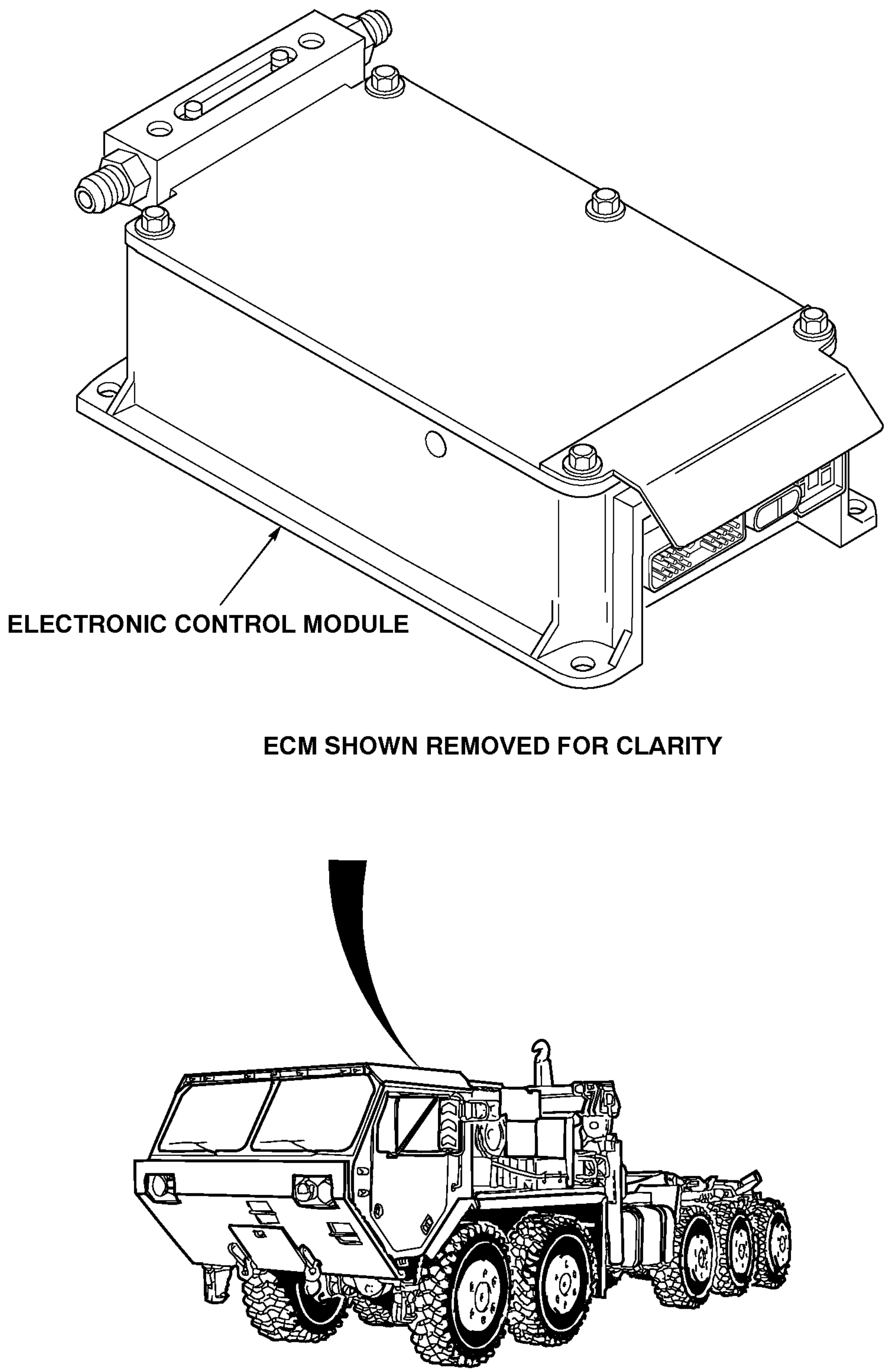
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 52
J1587 CODE: S254 12 ANALOG TO DIGITAL (A/D) CONVERSION FAILURE

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
52-1 Multiple Code Check		
• Were there any other codes besides 254/12?	Yes. →	Service other codes first.
	No. →	Replace ECM (para 7-57). Then go to START-1, pg 2-539.


ELECTRONIC CONTROL MODULE
ECM SHOWN REMOVED FOR CLARITY

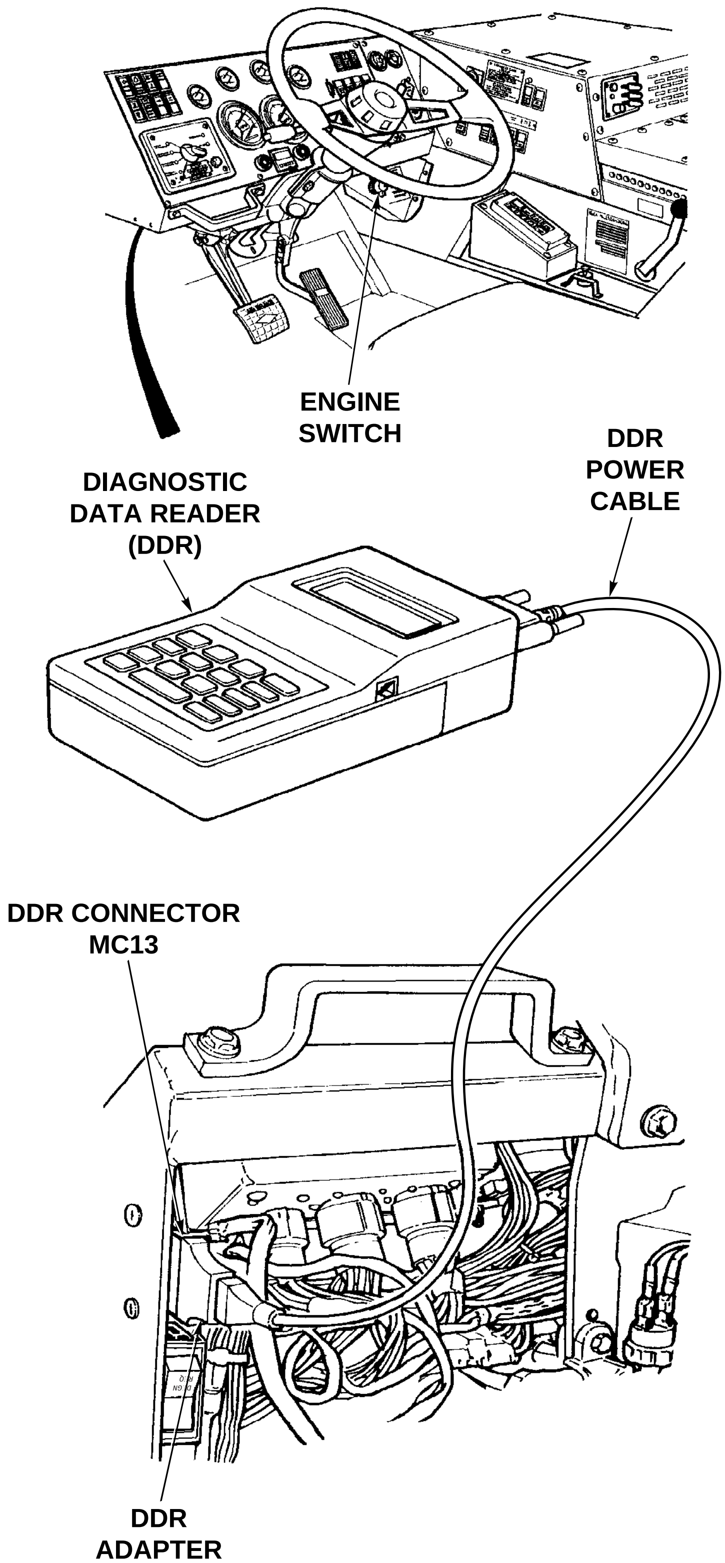
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 53
J1587 CODE: S253 12 NONVOLATILE MEMORY FAILURE

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
53-1 Replace ECM		
• An error has been detected in EEPROM in the ECM which will cause it to not log codes correctly or at all.		Replace ECM (para 7-57).


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

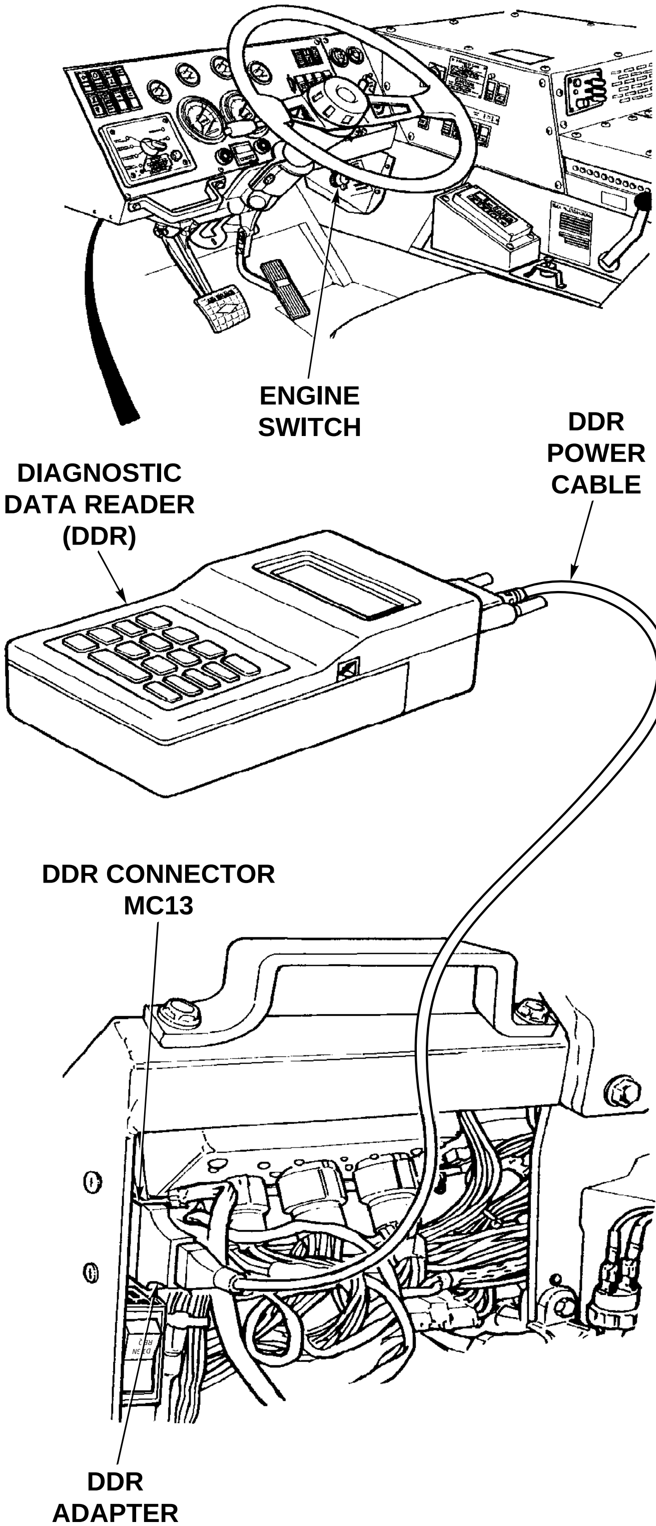
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

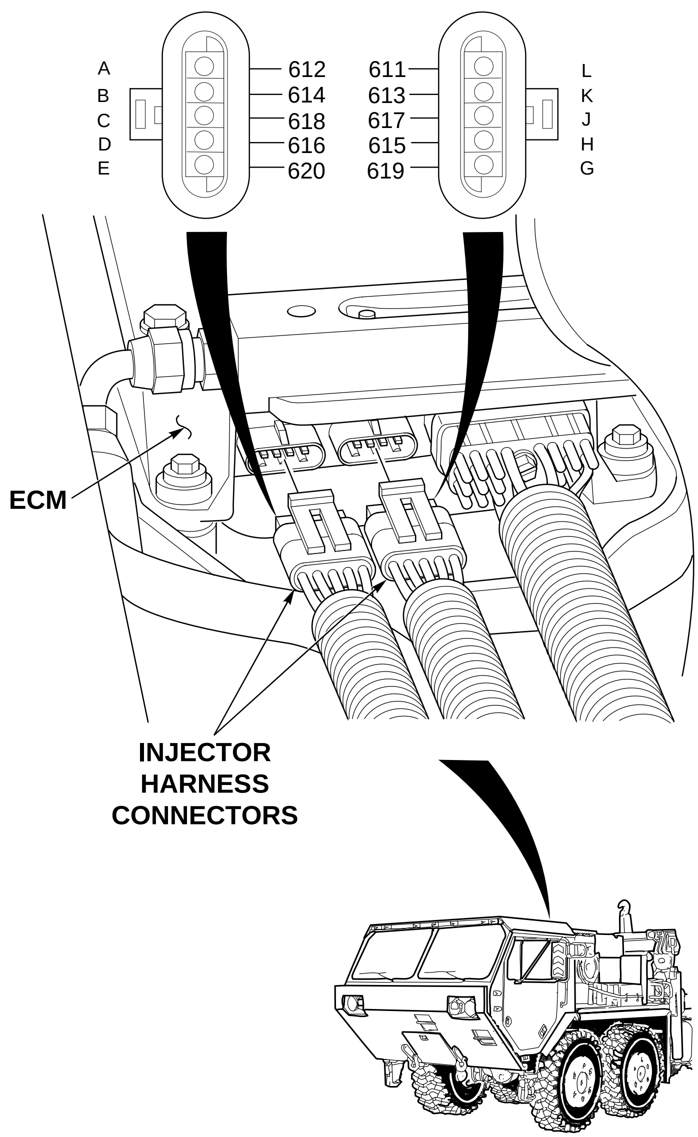
E. FLASH CODE: 56
J1587 CODE: S250 12 - J1587 DATA LINK FAULT

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
56-1 Check for Codes		
• Plug in DDR. • Turn ignition on. • Read codes.	No Data Received. → Code 250/12 only. → Any other codes present? →	Go to C 7-1. Go to 56-2. Service other codes first.
56-2 Clear Codes		
• Clear codes. • Start and run engine (TM 9-2320-364-10) observe CEL code.	CEL on w/code 250/12. → No CEL code. →	Replace ECM (para 7-57). Then go to 56-30. Go to 56-30.
56-30 Verify Repairs		
• Turn ignition off. • Turn ignition on and observe “Check Engine” light.	“Check Engine” light comes on for 5 seconds and goes out. → “Check Engine” light comes on and stays on. →	Repairs are complete. All system diagnostics are complete. Please review this section to find the error.



Injector Identification Table		
Code	Firing Order	Cylinder
61	1	3 Right
62	2	3 Left
63	3	4 Right
64	4	4 Left
65	5	2 Right
66	6	2 Left
67	7	1 Right
68	8	1 Left



2-14. DDEC III TROUBLESHOOTING (CONT).

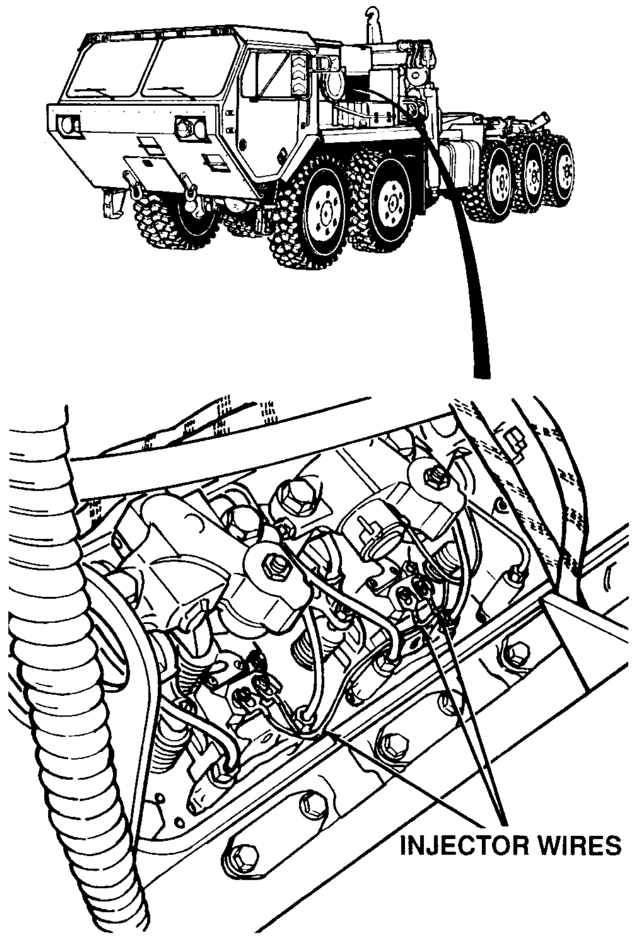
Section IV. TROUBLESHOOTING CHARTS (Cont.)

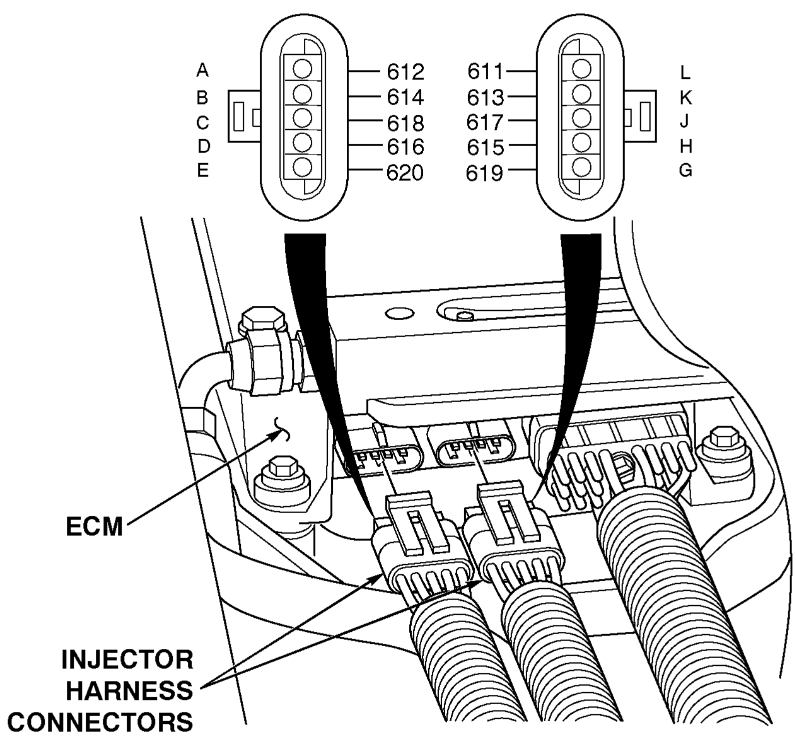
E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-1 DDR Test		
• Connect DDR to DDL connector MC13. • Turn ON ENGINE switch (TM 9-2320-364-10). • Read active codes using DDR.	Other codes displayed. →	Service other codes first. Go to START-1, page 2-539.
	No other codes displayed. →	Go to 61–2.
61-2 DDR Test		
• Start engine (TM 9-2320-364-10) and warm to operating temperature 180°F to 190°F (82°C to 88°C). • Select RESPONSE TIMES on DDR. • Read DDR display of injector response time (in firing order) through several cycles. Note response time(s) of cylinder by number in fault code. • Refer to Injector Identification Table for the firing sequence in relation to the code received. • Turn OFF ENGINE switch.	Injector response times for codes received equal 0.80. →	Go to step 61-3.
	Injector repsonse times for codes received are not equal to 0.80. →	Check for the following: Air in fuel (Refer to fuel system troubleshooting, para 2-17). Low battery charge (Refer to electrical system troubleshooting, para 2-20). Problems in the charging system (Loose alternator belt, bad grounds,etc.). (Refer to electrical system troubleshooting, para 2-20). Signs of insulation wear on injector harness (Remove rocker arm cover para 3-4 or 3-5). If problem has not been corrected, notify DS maintenance.
61-3 DDR Test		
• Turn ON ENGINE switch (TM 9-2320-364-10). • Select CLEAR CODES on DDR, and clear codes. • Select ACTIVE CODES on DDR. • Read displayed codes. • Turn OFF ENGINE switch (TM 9-2320-364-10). • Disconnect DDR from DDL connector MC13.	One code (61) displayed on DDR. →	Go to 61-4.
	More than one code. →	All codes (61), go to 61-9. All left bank or all right bank codes, go to 61-11.

Injector Harness Connector Terminal Identification Table		
DDEC Code No.	Injector Harness Connector Terminal No.	Injector Harness Connector Terminal No.
61	A	E
62	K	G
63	B	E
64	H	G
65	D	E
66	J	E
67	C	E
68	L	G



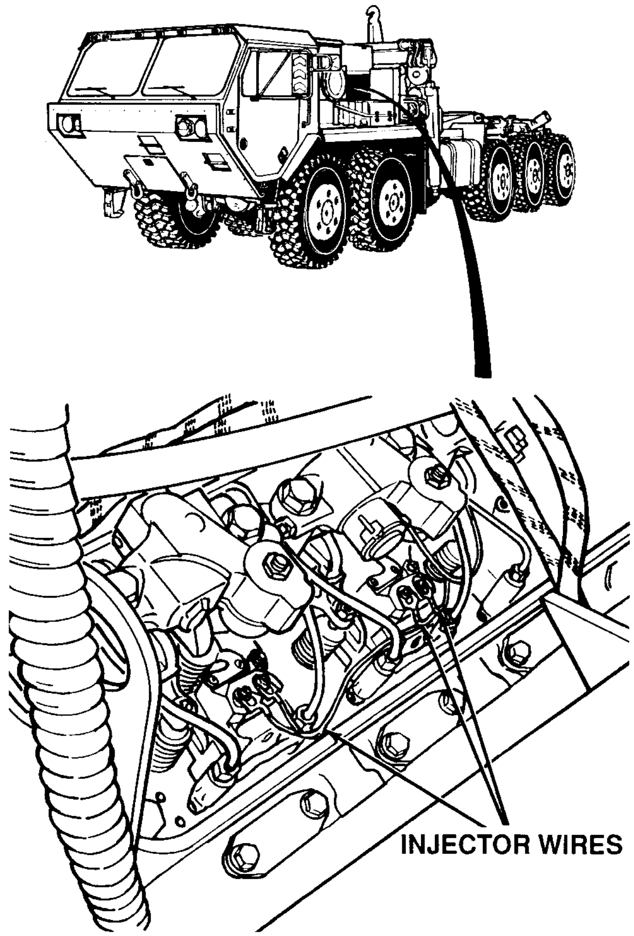


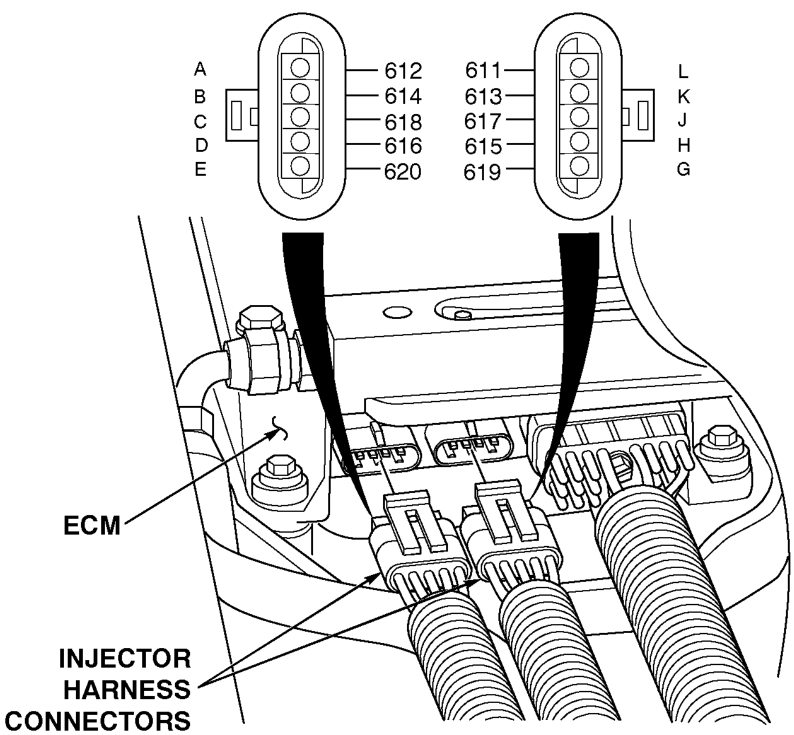
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-4 Resistance Test		
WARNING • **Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry or tools contact positive electrical circuits, a direct short may result. Damage to equipment, injury, or death to personnel may occur.** • **Allow engine to cool before performing troubleshooting maintenance. If necessary use insulated pads and gloves. Hot engine components will burn and cause personnel injury.** • Disconnect both injector harness connectors at the DDEC ECM. • Is there more than 1 ohm present between injector harness connector terminals when Code 61 is received. (Example: read resistance between terminal G and L for Code 61). • Refer to Injector Harness Connector Terminal Identification Table.	Injector resistance (at connectors) is more than 1 ohm. →	Go to 61-5.
	Injector resistance (at connector) is 1 ohm or less. →	Go to 61-6.
61-5 Resistance Test		
• Remove rocker arm cover (para 3-4 or 3-5) corresponding to injector identified by Injector Identification Table. • Disconnect the two wires of the injector identified. • Short these two wires together. • Referring to Injector Harness Connector Terminal Identification Table, measure the resistance between the injector harness connector terminals associated with the faulty injector.	1 ohm or less at injector harness connector. →	Install rocker arm cover (para 3-4 or 3-5). Notify supervisor.
	More than 1 ohm. →	Repair connector or notify supervisor. Install rocker arm cover (para 3-4 or 3-5). Then go to 61-30.

Injector Harness Connector Terminal Identification Table		
DDEC Code No.	Injector Harness Connector Terminal No.	Injector Harness Connector Terminal No.
61	A	E
62	K	G
63	B	E
64	H	G
65	D	E
66	J	E
67	C	E
68	L	G

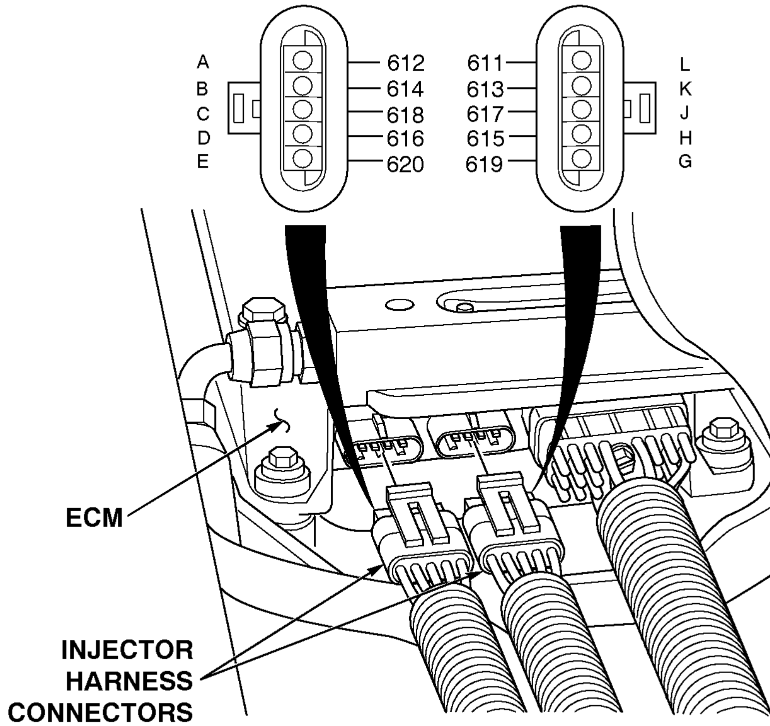


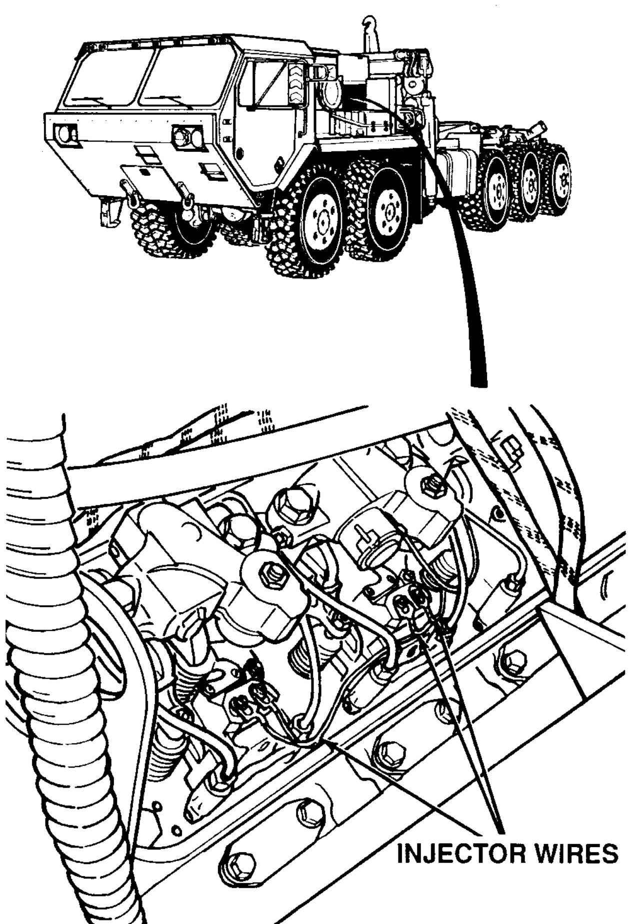


Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-6 Resistance Test		
• Remove rocker arm cover (para 3-4 or 3-5) corresponding to injector identified by Injector Identification Table. • Disconnect two wires of the injector indicated. • Measure resistance at the injector harness connector terminals associated with the faulty injector.	More than or equal to 10,000 ohms or an open circuit measured at injector harness connector.	Go to 61-7.
	Less than 10,000 ohms present.	Repair wire or notify supervisor. Then go to 61-30.
61-7 Resistance Test		
NOTE Injector drive wires are numbered 611 through 618 and injector return wires are numbered 619 and 620 on the DDEC Injector Harness Wiring Schematic (Fig 2-4). • Check for short to ground, working with injector that has its two wires disconnected. • Measure resistance between injector drive wire and a known good ground. – If there are less than 10,000 ohms present, repair wires tested (see schematic Fig 2-4) or notify DS Maintenance.	More than or equal to 10,000 ohms or an open circuit measured between injector drive wire and a known good ground.	Go to 61–8.
– If there are more than 10,000 ohms present, perform the step below. • Measure resistance between one of the terminals of the injector (injector with disconnected wires) and a known good ground.	Less than 10,000 ohms present.	Repair drive wire and/or ground or notify supervisor. Then go to 61-30.

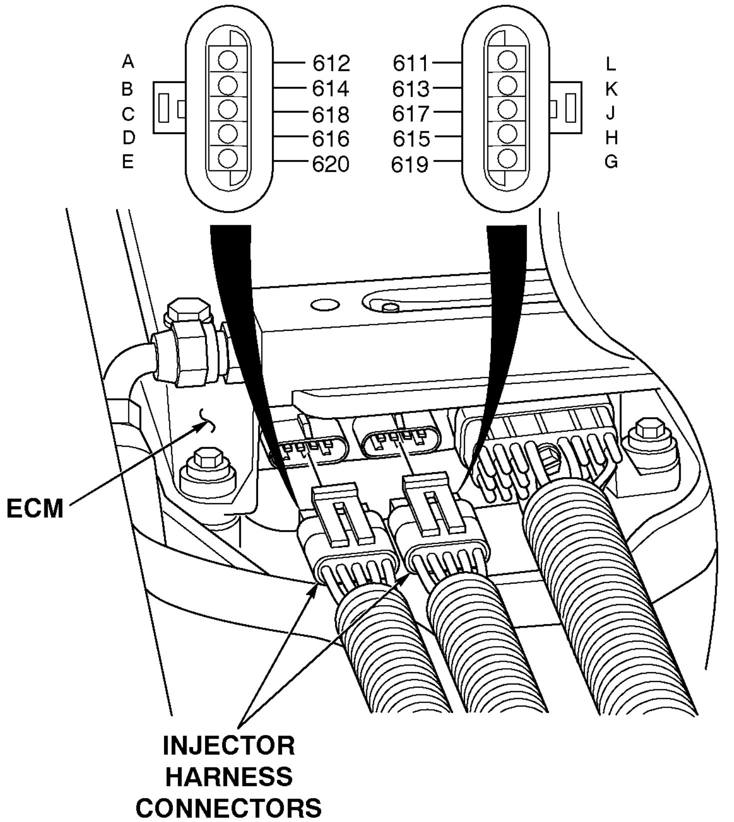

A
B
C
D
E
612
614
618
616
620
611
613
617
615
619
L
K
J
H
G
ECM
INJECTOR
HARNESS
CONNECTORS

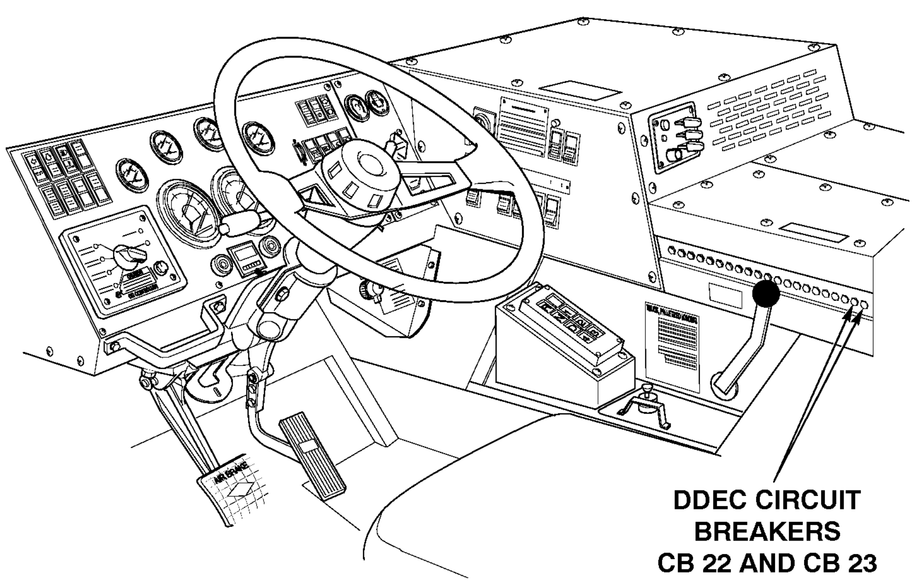

INJECTOR WIRES

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-8 Signal Test		
• Connect two injector harness connectors to DDEC III ECM. • Looking at injector with disconnected wires, reattach injector drive wire (Fig 2-4). • Connect one lead of test light to the common side of the injector. • Connect the second test light lead to a known good ground. • While an assistant cranks the engine (TM 9-2320-364-10), observe the test light. • Turn OFF ENGINE switch. • Connect wire 619 or wire 620 to injector.	Test light fails to illuminate while engine is being cranked. Test light illuminates.	Go to 61-9. Faulty injector. Notify supervisor.
61-9 Visual Inspection		
• Disconnect both injector harness connectors. • Check terminals at both harness connectors (harness and DDEC III ECM sides) for damage; bent, corroded and unseated pins or terminals. • Connect both injector harnesses connectors.	DDEC ECM terminals and connectors are free from damage. Damaged terminals or connectors.	Go to 61-10. Repair connectors (para 7-101) or replace DDEC III ECM (para 7-57). Then go to 61-30.

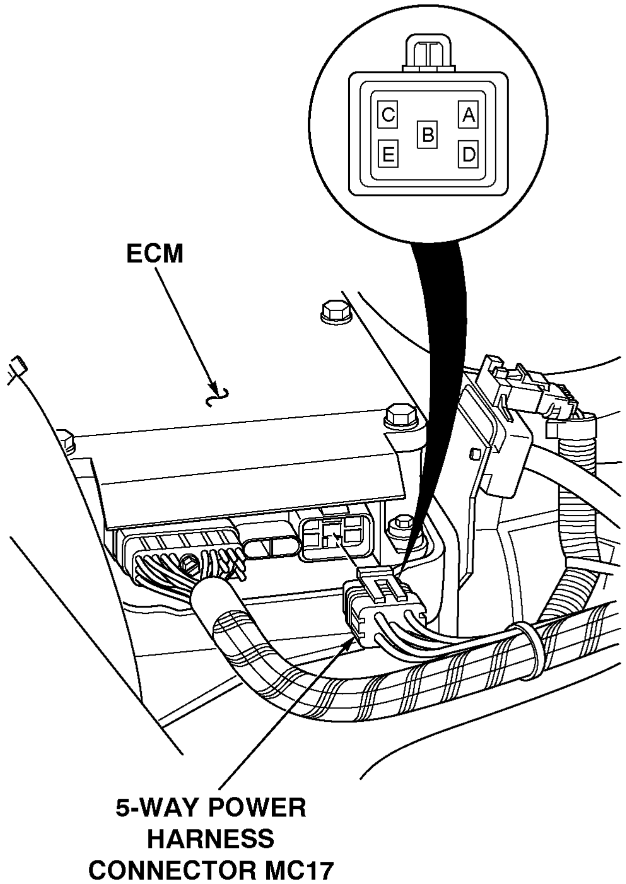

A
B
C
D
E
612
614
618
616
620
611
613
617
615
619
L
K
J
H
G
ECM
INJECTOR HARNESS CONNECTORS

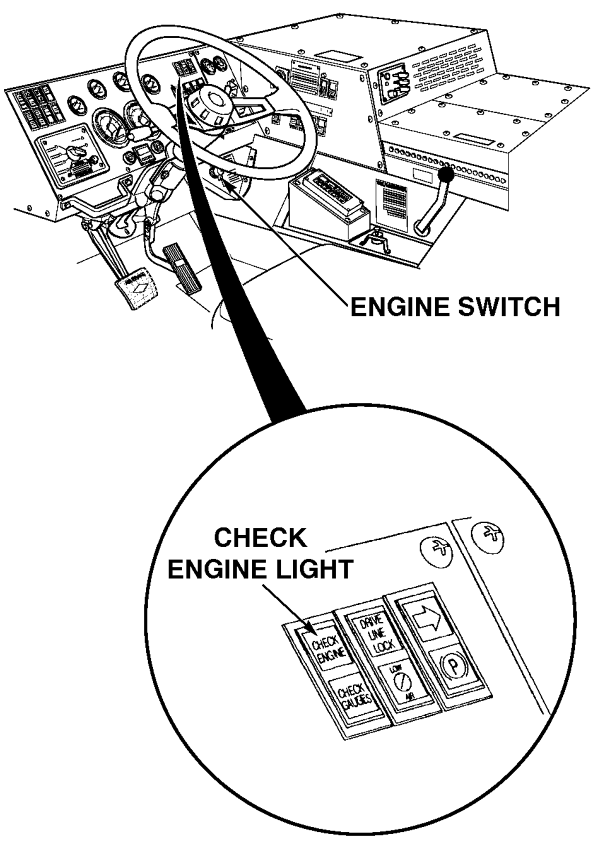

DDEC CIRCUIT BREAKERS CB 22 AND CB 23

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-10 Visual Inspection		
• Check for and correct any of the following problems: – Air in fuel (Refer to fuel system troubleshooting - para 2-17). – Low battery charge (Refer to electrical system troubleshooting - para 2-20). – Problems in the charging system (Loose alternator belt, bad grounds, etc.). (Refer to electrical system troubleshooting - para 2-20). – Signs of insulation wear on injector harness (Remove rocker arm cover para 3-4 or 3-5).	No problems. → Yes, problems exist. →	Replace DDEC III ECM (para 7-57) Verify repair, go to 61-11. Correct problem or notify supervisor. Then go to 61-30.
61-11 Visual Inspection		
• Check DDEC circuit breakers CB22 and CB23.	DDEC circuit breakers CB22 and CB23 set. → Circuit breakers not set. →	Go to 61-12. Reset circuit breakers. Go to 61-30.

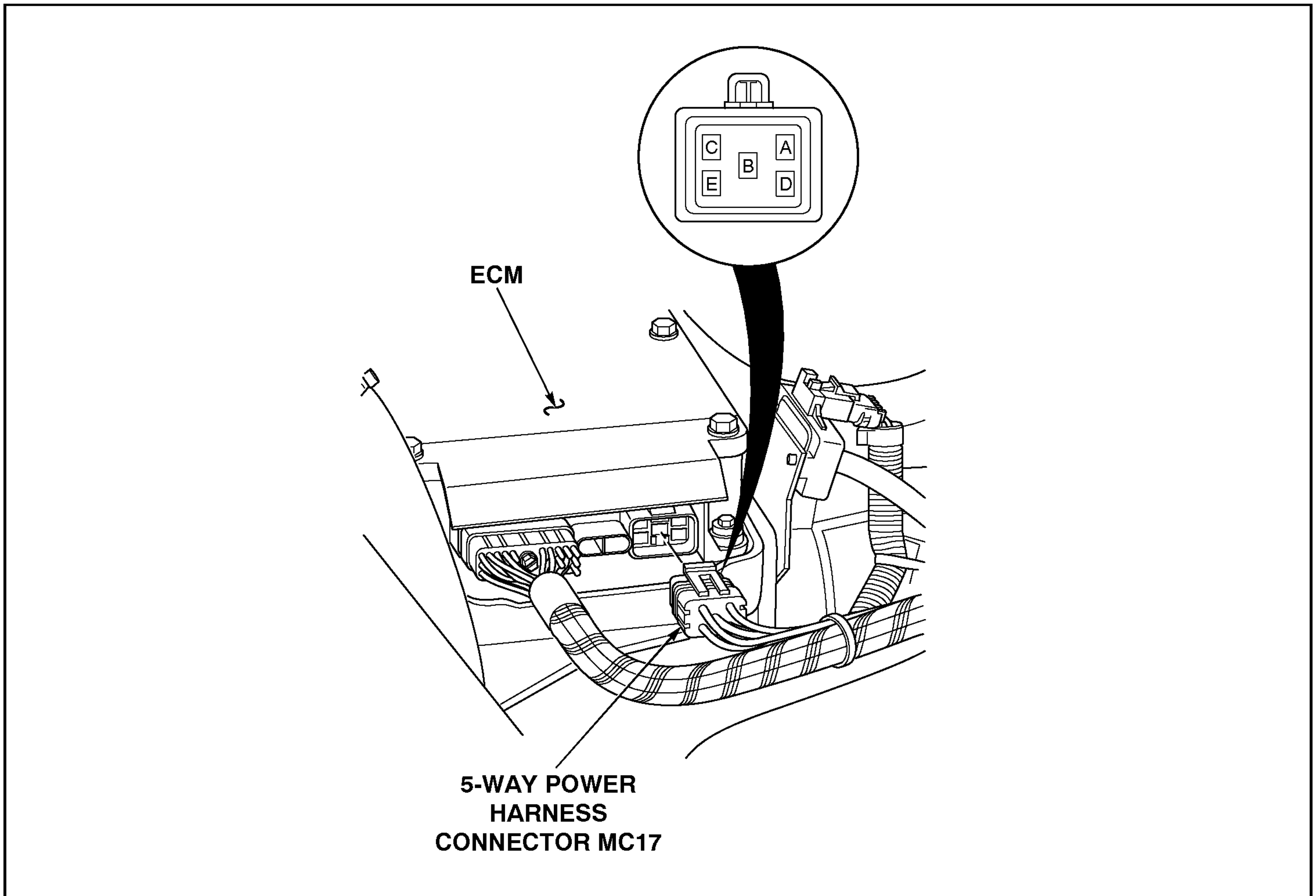

C
A
B
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17

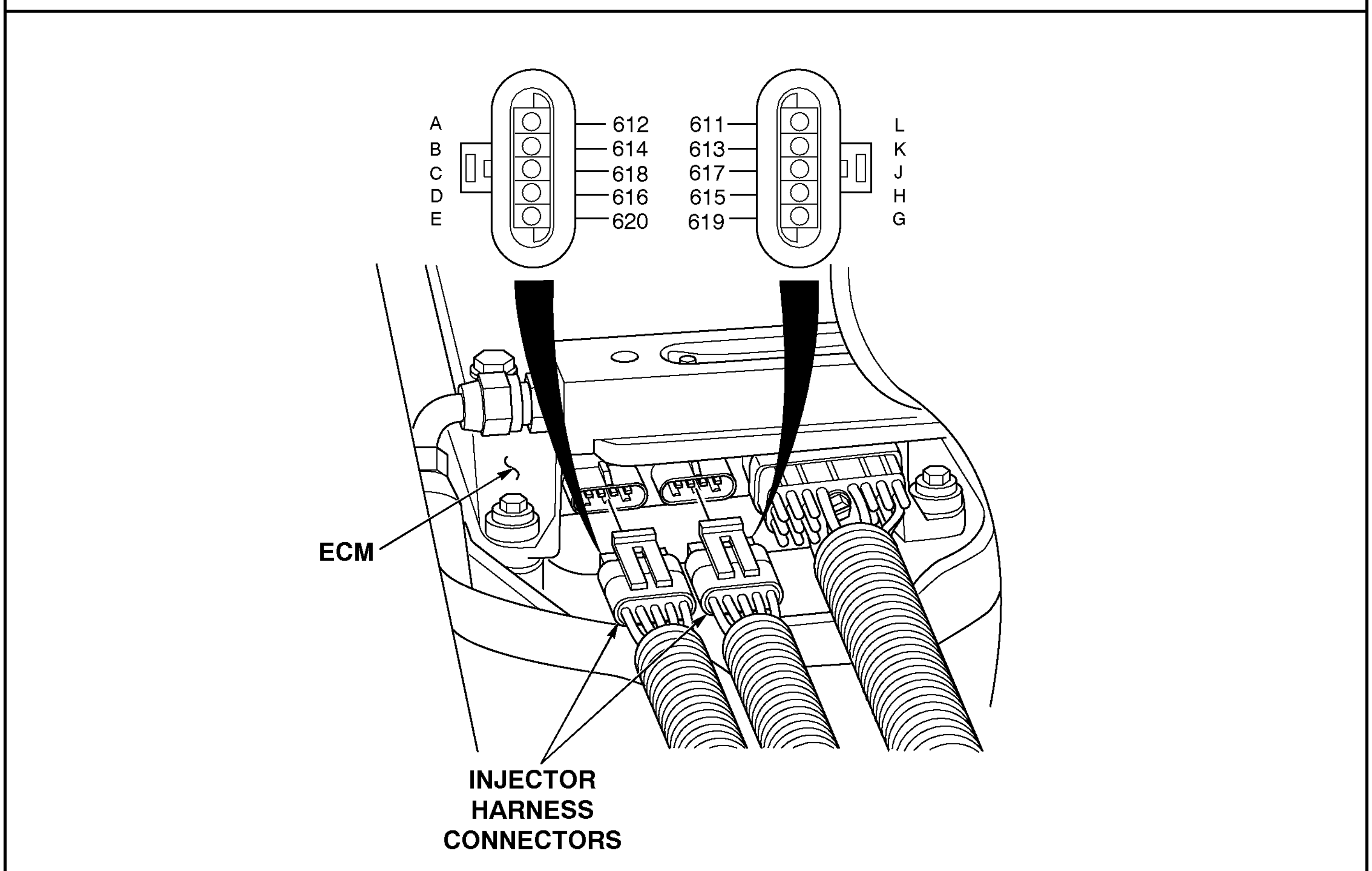

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES
LOW AIR
P

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-12 Voltage Test		
• Disconnect 5-way power harness connector. • Set multimeter select switch to volts dc. • Connect positive (+) multimeter lead to 5-way power harness connector, terminals A and C. • Connect negative (–) multimeter lead to a known good ground. • Turn ON ENGINE switch (TM 9-2320-364-10).	Wires 241 and 240 between 5-way power harness connector, terminals A and C and a good ground measure 10 to 14 vdc.	Turn OFF ENGINE switch. Go to 61-13.
	Less than 10 vdc present.	Turn OFF ENGINE switch. Repair wires 240 and/or 241 or notify supervisor. Go to 61-30.
61-13 Voltage Test		
• Connect positive (+) multimeter lead to 5-way power harness connector, terminals A and C one at a time. • Connect negative (–) multimeter lead to a known good ground. • Turn ON ENGINE switch (TM 9-2320-364-10).	Wires 240 and 241 of 5-way power harness connector, terminals A and C and a good ground measure 10 to 14 vdc.	Turn OFF ENGINE switch. Go to 61-14.
	Less than 10 vdc present.	Turn OFF ENGINE switch. Repair wires 240 and/or 241 or notify supervisor. Go to 61-30.

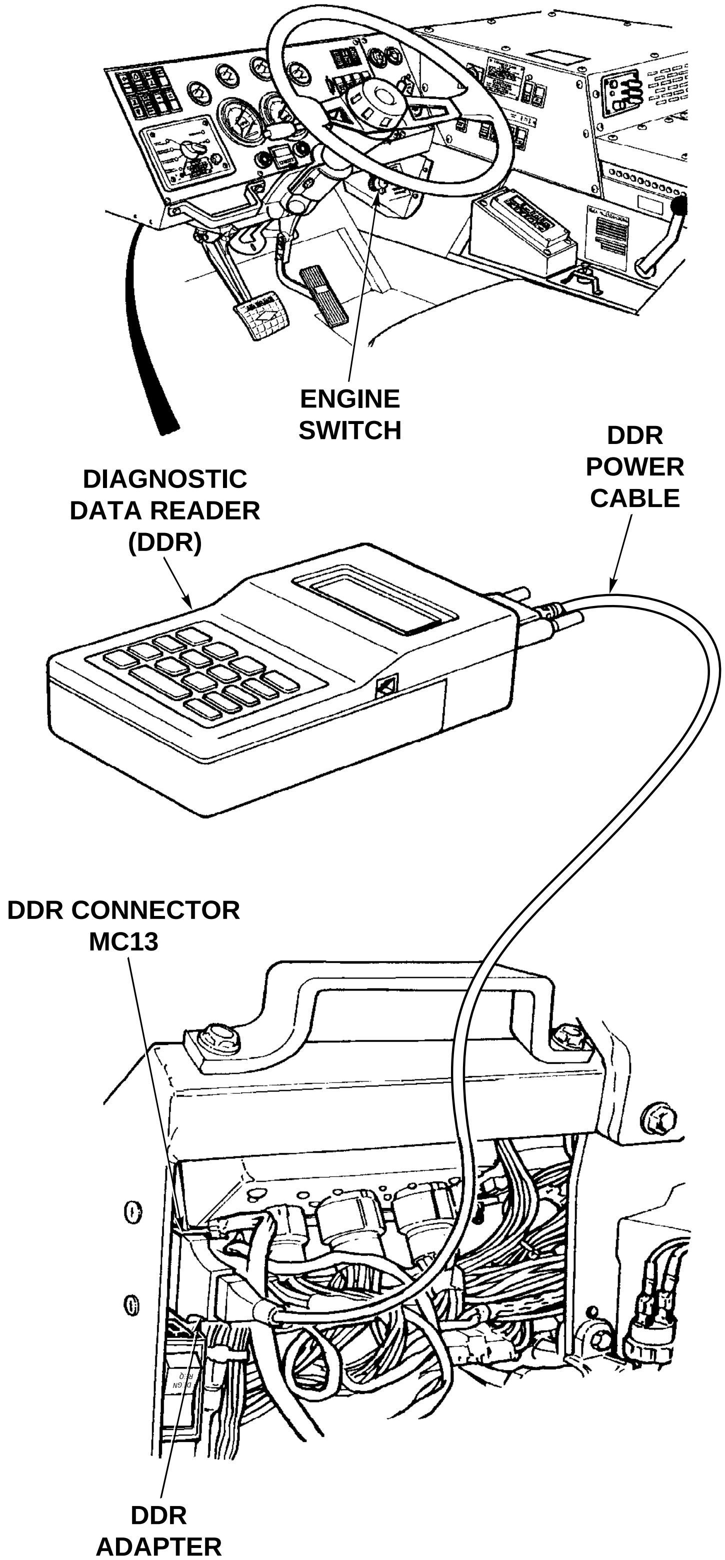

C
B
A
E
D
ECM
5-WAY POWER
HARNESS
CONNECTOR MC17


A
B
C
D
E
612
614
618
616
620
611
613
617
615
619
L
K
J
H
G
ECM
INJECTOR
HARNESS
CONNECTORS

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

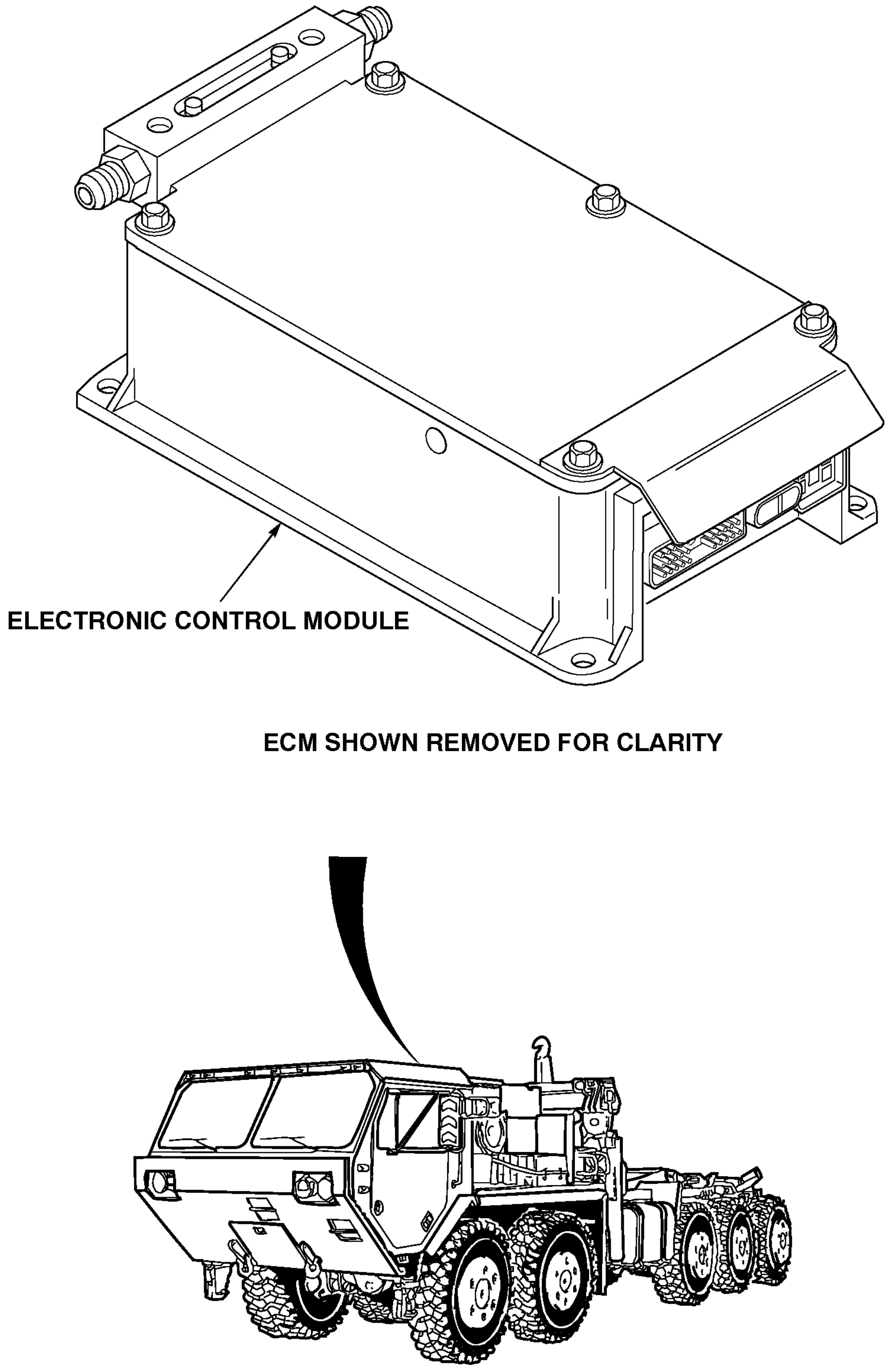
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-14 Resistance Test		
• Set multimeter select switch to ohms. • Read resistance between wire 150 at 5-way power harness connector, terminal D and a known good ground. • Read resistance between wire 150 at 5-way power harness connector, terminal E and a known good ground.	Wire 150 at 5-way power harness connector, terminals D and E, and a a known good ground measure 5 ohms or less. →	Go to 61-15.
	More than 5 ohms. →	Repair wire 150 or notify supervisor. Go to 61-30.
61-15 Resistance Test		
• Disconnect both injector harness connectors at ECM. • Read resistance between wires 619 and 611 at injector harness connector, terminals G and L. – If more than 5 ohms are present, repair wire 619 (see schematic Fig 2-4) or notify DS Maintenance and perform the steps below. – If less than 5 ohms are present, wire 619 is OK. • Read resistance between wires 620 and 612 at injector harness connector, terminals E and A. • Connect 5-way power harness connector to ECM. • Connect both injector harness connectors to ECM. • Install rocker arm covers (para 3-4 and/or 3-5).	Wires 619 and 611 at injector harness connector, terminals G and L and wires 620 and 612 at injector harness connector, terminals E and A measure 5 ohms or less. →	Both readings less than or equal to 5 ohms, go to 61-9.
	More than 5 ohms. →	Repair wires 619 and/or 620 or notify supervisor. Go to 61-30.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 61
J1587 CODE: Sxxx 0 - INJECTOR RESPONSE TIME LONG

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
61-30 Verfiy Repair		
• Turn ON ENGINE switch (TM 9-2320-364-10). • Clear codes on DDR. • If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. • Turn OFF ENGINE switch. • Disconnect DDR from DDL connector MC13.	CEL stays ON longer than 5 seconds.	Go to START-1, pg 2-539.
	CEL comes on for about 5 seconds and then goes off.	Fault corrected.


ELECTRONIC CONTROL MODULE
ECM SHOWN REMOVED FOR CLARITY

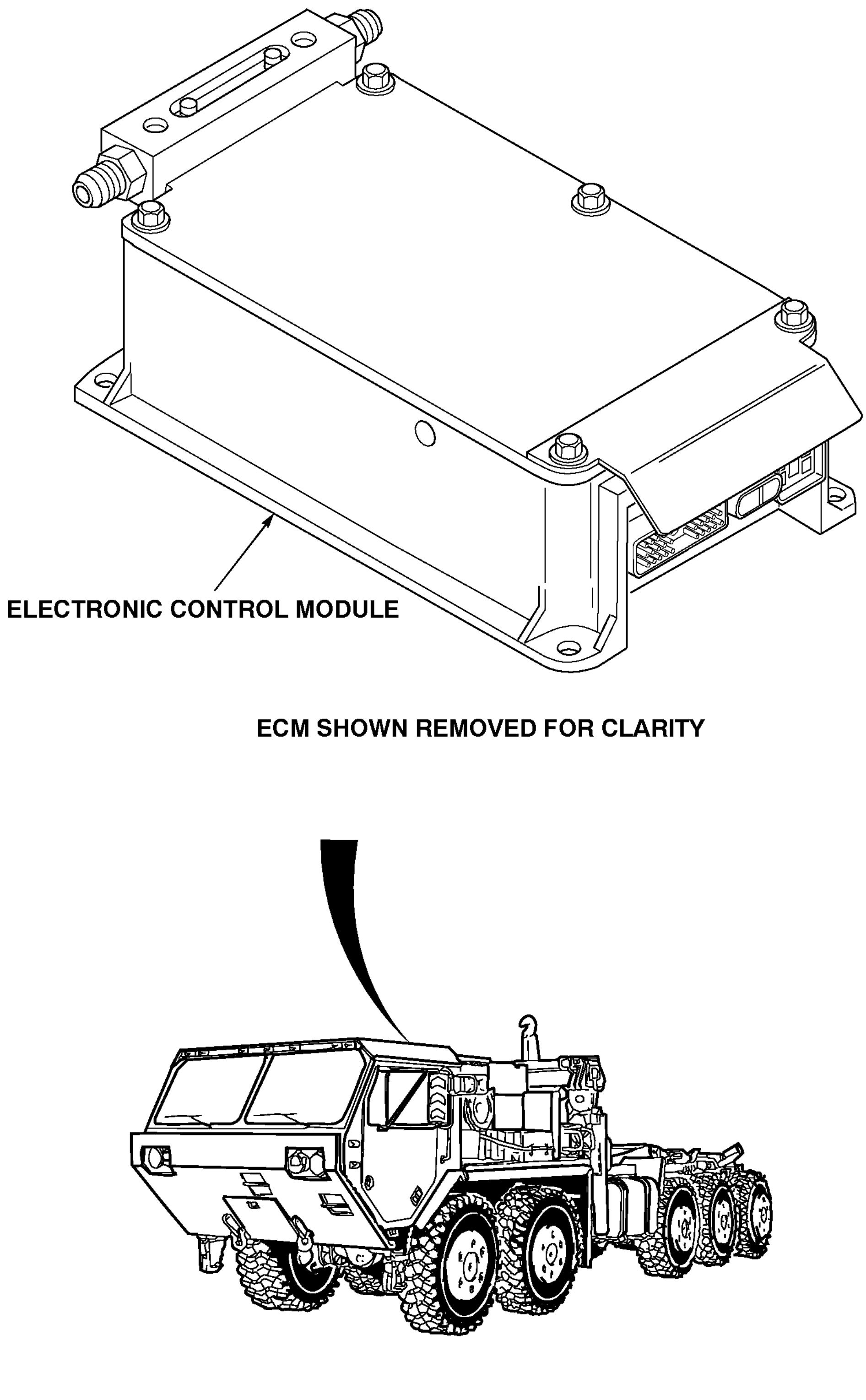
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 62
J1587 CODE: S026 3/4 - AUXILIARY OUTPUT SHORT TO BATTERY, AUXILIARY OUTPUT OPEN CIRCUIT

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE		
62-1 Determine SAE Codes		
• 26-3	Auxiliary ouput	#1 short to battery (ckt 988).
• 26-4	Auxiliary ouput	#1 open circuit (ckt 988).


ELECTRONIC CONTROL MODULE
ECM SHOWN REMOVED FOR CLARITY

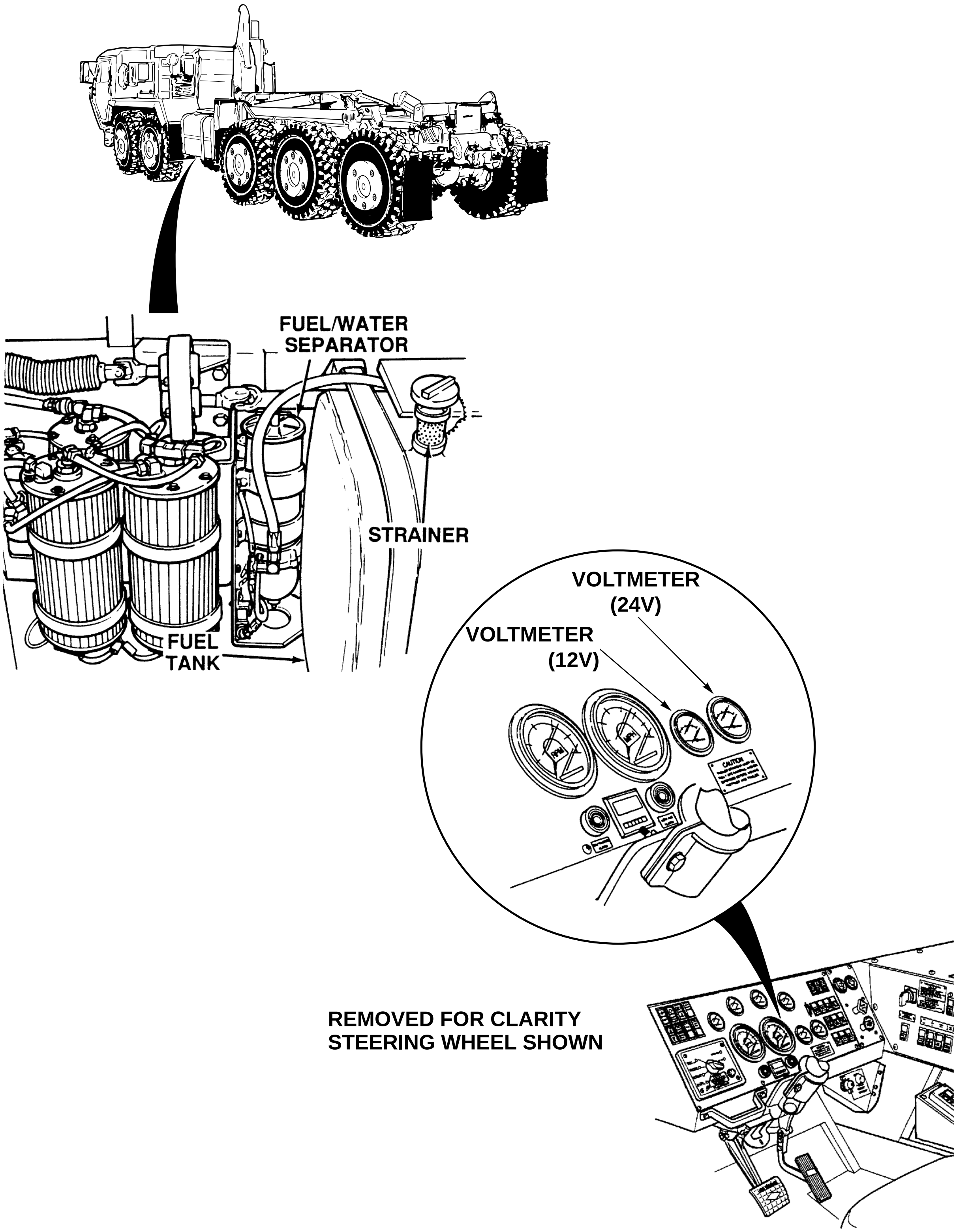
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 63
J1587 CODE: S057 3/4 - PWM SHORT TO BATTERY/PWM OPEN CIRCUIT

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE		
63 Determine SAE Codes		
• 57-3	PWM #1	Short to battery (ckt 908).
• 57-4	PWM #1	Open circuit (ckt 908).


FUEL/WATER
SEPARATOR
STRAINER
FUEL
TANK
VOLTMETER
(24V)
VOLTMETER
(12V)
REMOVED FOR CLARITY
STEERING WHEEL SHOWN

2-14. DDEC III TROUBLESHOOTING (CONT).

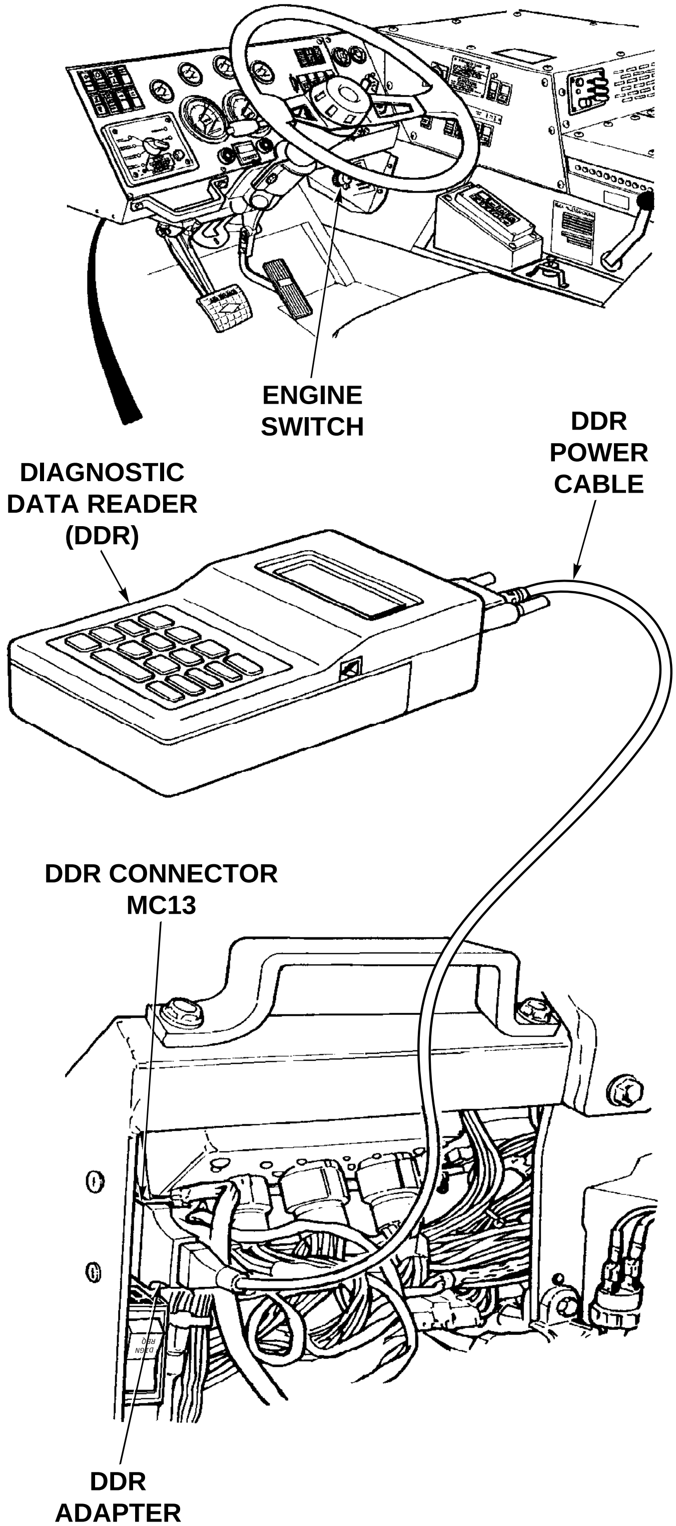
Section IV. TROUBLESHOOTING CHARTS (Cont.)

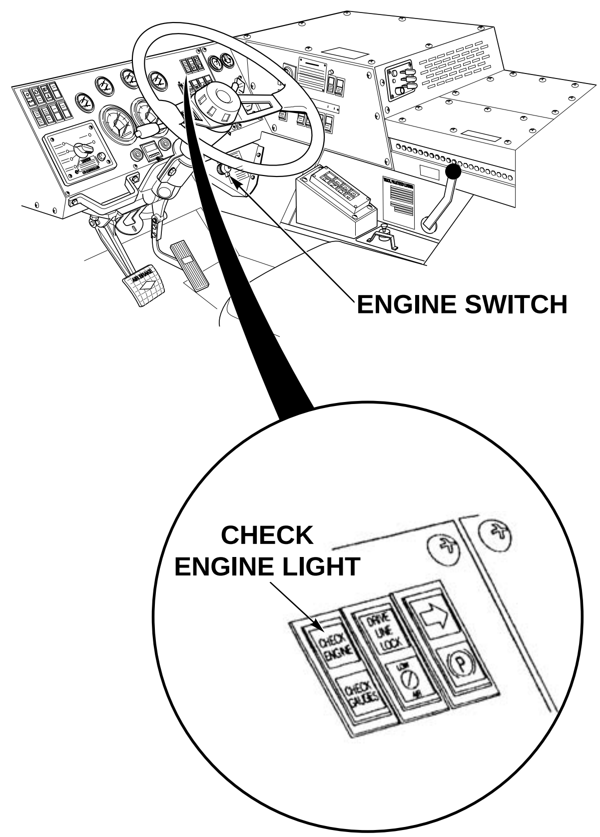
E. FLASH CODE: 71
J1587 CODE: Sxxx 1 - INJECTOR RESPONSE TIME SHORT

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

NOTE – Troubleshooting procedures for Code 71 is the same for Code 61.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
71-1 Visual Inspection		
• Check for fuel/water separator for water and/or oil in the fuel according to Preventive Maintenance Checks and Services (TM 9-2320-364-10). • Remove fuel tank cap and check fuel strainer for debris.	Fuel system is free of aerated fuel and/or contamination. →	Go to 71-2.
	Fuel system is not free of aerated fuel and/or contamination. →	If there is water in fuel, drain water and fuel/water separator. If there is debris in fuel strainer, clean and fill fuel tank (para 4-8). Refer to fuel system troubleshooting (para 2-17) Then go to 71-30.
71-2 Alternator Test		
• Start engine (TM 9-2320-364-10). – If 10 to 14 vdc are not indicated on the 12V voltmeter and 22 to 28 vdc are not indicated on the 24V voltmeter, turn OFF ENGINE switch and go to electrical system troubleshooting (para 2-19). – If 10 to 14 vdc are indicated on the 12V voltmeter and 22 to 28 vdc are indicated on the 24V voltmeter, alternator is ok. • Turn OFF ENGINE switch.	Alternator or electrical charging system is operating properly. →	Go to 71-3.
	Alternator or electrical charging system is not operating properly. →	Refer to electrical troubleshooting (para 2-20, table 2-38). Then go to 71-30.

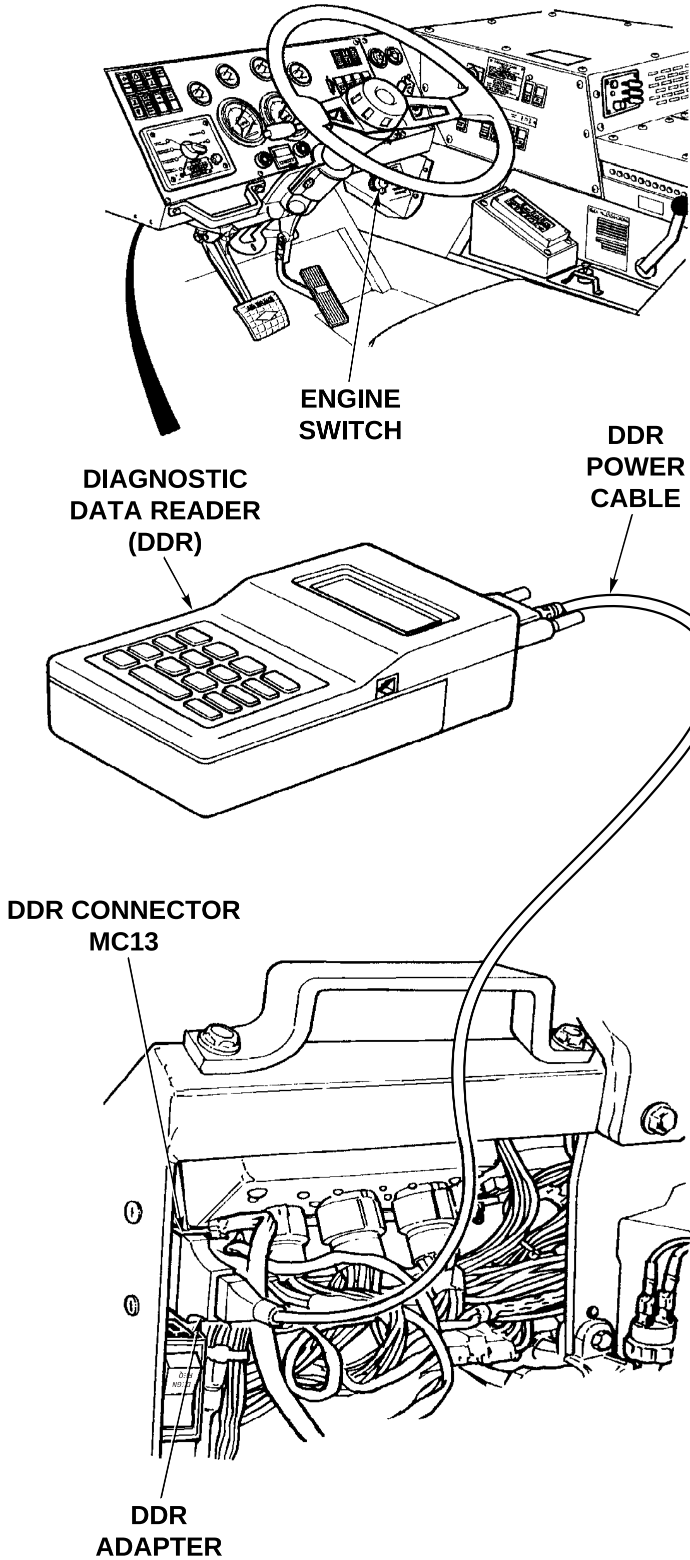

ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK ENGINE
DRIVE LINE LOCK
CHECK GAUGES

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 71
J1587 CODE: Sxxx 1 - INJECTOR RESPONSE TIME SHORT

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
71-3 DDR Test		
• Connect DDR to connector MC13. • Turn ON ENGINE switch (TM 9-2320-364-10). • Select ACTIVE CODES on DDR.	Code 71 is the only code displayed. →	Turn OFF ENGINE switch. Go to Code 61-2. Then go to 71-30.
	Other codes displayed. →	Turn OFF ENGINE switch. Service other codes first. Go to START-1, pg 2-539.
71-30 Verify Repair		
• Turn ON ENGINE switch (TM 9-2320-364-10). • Clear codes. • If CEL does not stay ON, start engine and run for 8 minutes or until CEL comes ON. • Turn OFF ENGINE switch. • Disconnect DDR from DDL connector MC13.	CEL stays on longer than 5 seconds. →	Go to START-1, pg 2-539, to service other codes.
	CEL does not stay ON longer than 5 seconds. →	Repairs are complete.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

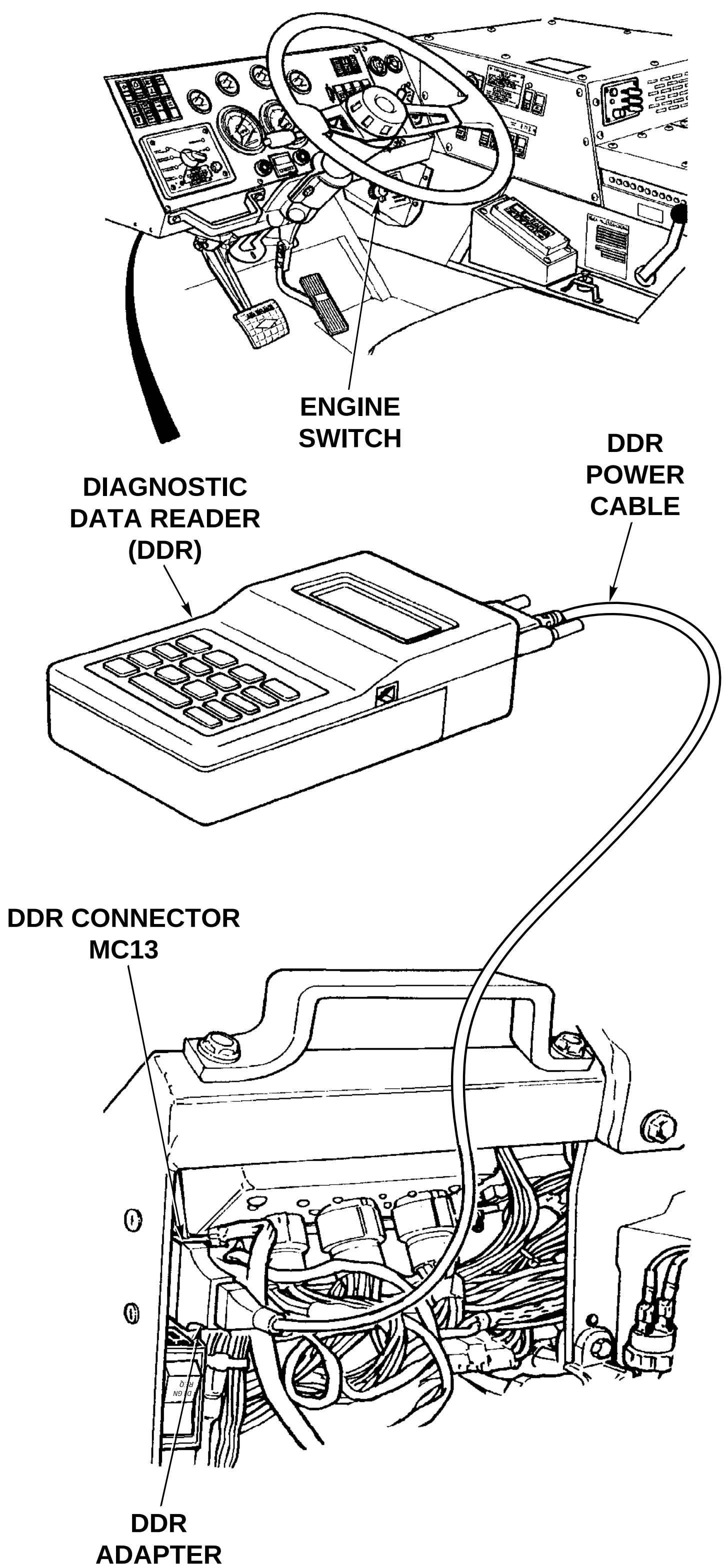
2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 75
J1587 CODE: P168 0 - BATTERY VOLTAGE HIGH

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
75-1 High Voltage		
• Turn ignition on. • Plug in DDR. • Read codes.	Any code(s) other than 168/0. →	Service other codes first.
	Code 168/0. →	Code 168/0 indicates voltage is too high to the ECM. Check batteries and/or vehicle charging system.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 76
J1587 CODE: P121 0 - ENGINE OVERSPEED WITH ENGINE BRAKE

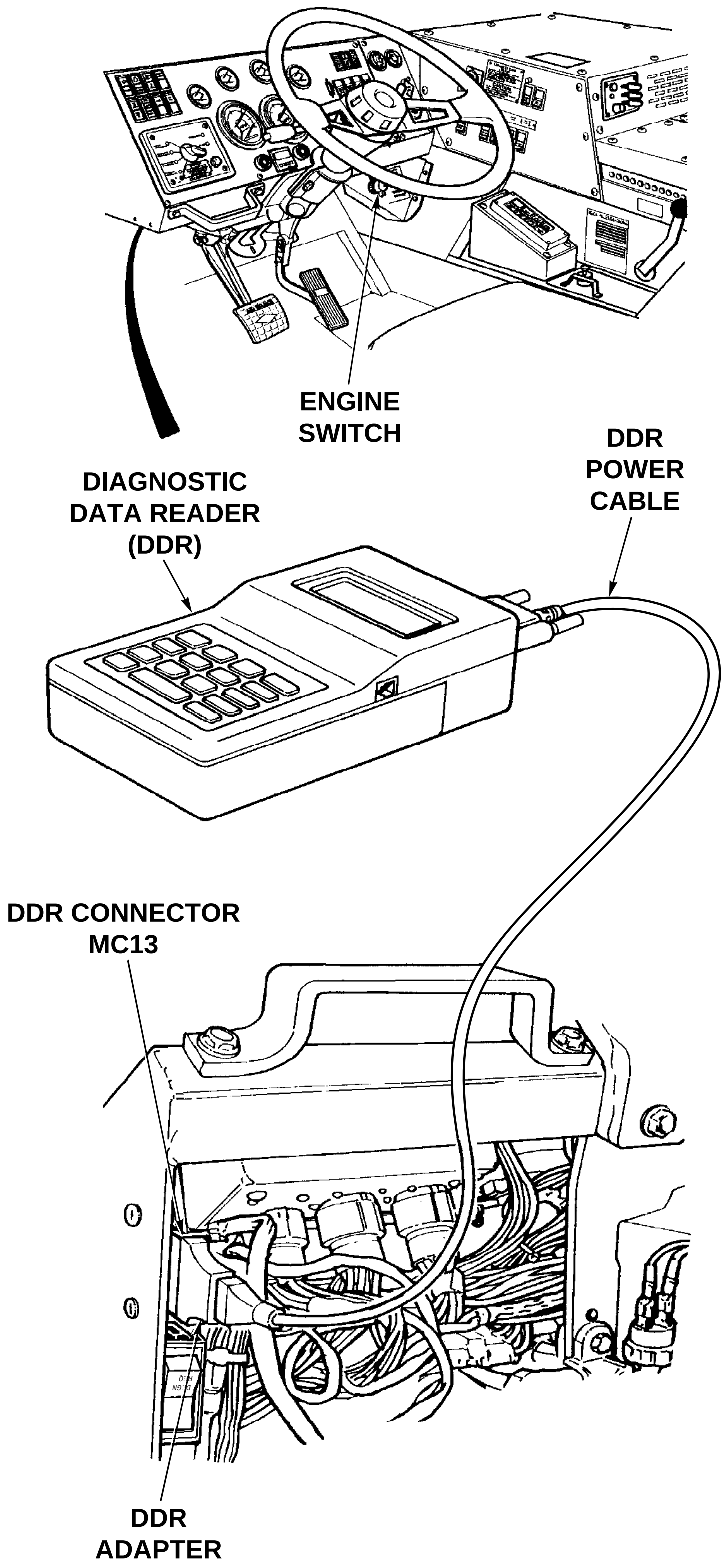
NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

76-1 Code Information	

This code is for information purposes only. It is logged whenever the engine has been operating over 2500 rpm for at least 2 seconds with engine brake operation. To get complete information, do the following.

- Turn ignition on.
- Plug in DDR.
- Select INACTIVE CODES.
- At least part of the display will look like the following example:

  First Occurrence
  Last Occurrence
  Total Number
  Total Time
  (For some) Min/Max Value that caused the code to be logged.


ENGINE
SWITCH
DDR
POWER
CABLE
DIAGNOSTIC
DATA READER
(DDR)
DDR CONNECTOR
MC13
DDR
ADAPTER

2-14. DDEC III TROUBLESHOOTING (CONT).

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. FLASH CODE: 85
J1587 CODE: P190 0 - ENGINE OVERSPEED

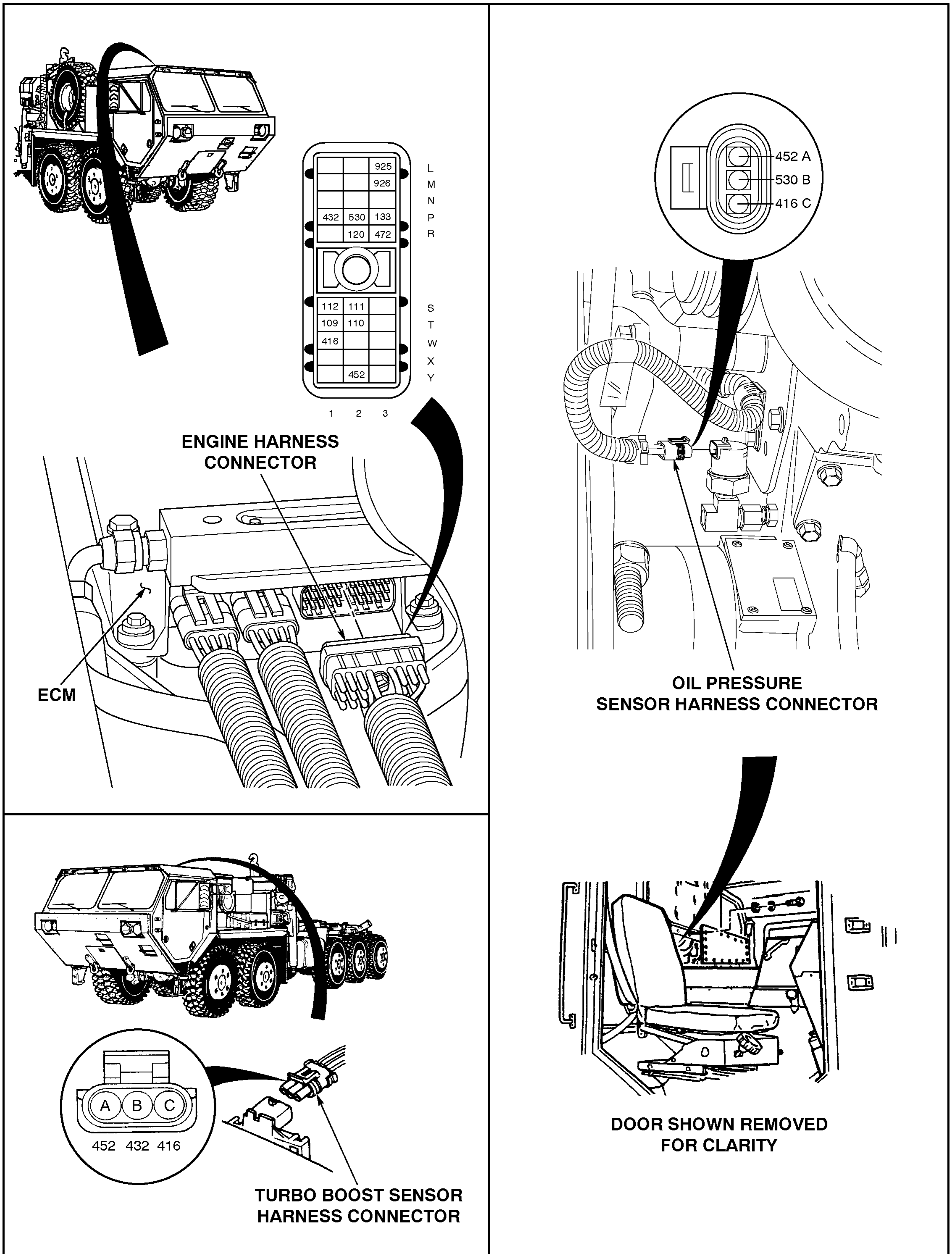
NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

85-1 Code Information	

This code is for information purposes only. It is logged whenever the engine has been operating over 2500 rpm for at least 2 seconds. To get complete information, do the following.

- Turn ignition on.
- Plug in DDR.
- Select INACTIVE CODES.
- At least part of the display will look like the following example:

  First Occurrence
  Last Occurrence
  Total Number
  Total Time
  (For some) Min/Max Value that caused the code to be logged.


925
926
432 530 133
120 472
112 111
109 110
416
452
L
M
N
P
R
S
T
W
X
Y
1 2 3
ENGINE HARNESS CONNECTOR
ECM
452 A
530 B
416 C
OIL PRESSURE SENSOR HARNESS CONNECTOR
A B C
452 432 416
TURBO BOOST SENSOR HARNESS CONNECTOR
DOOR SHOWN REMOVED FOR CLARITY

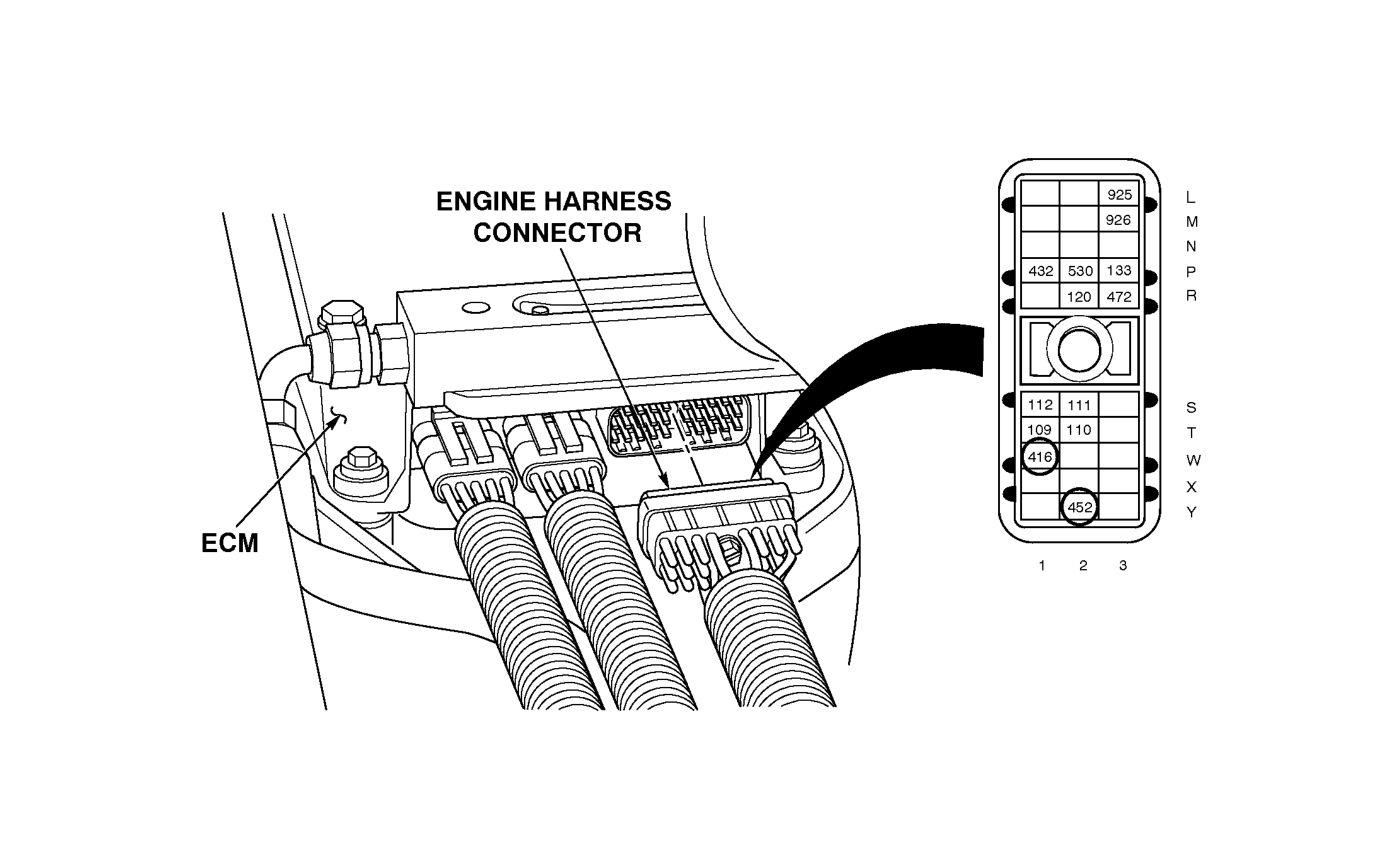
2-14. DDEC III TROUBLESHOOTING (CONT).

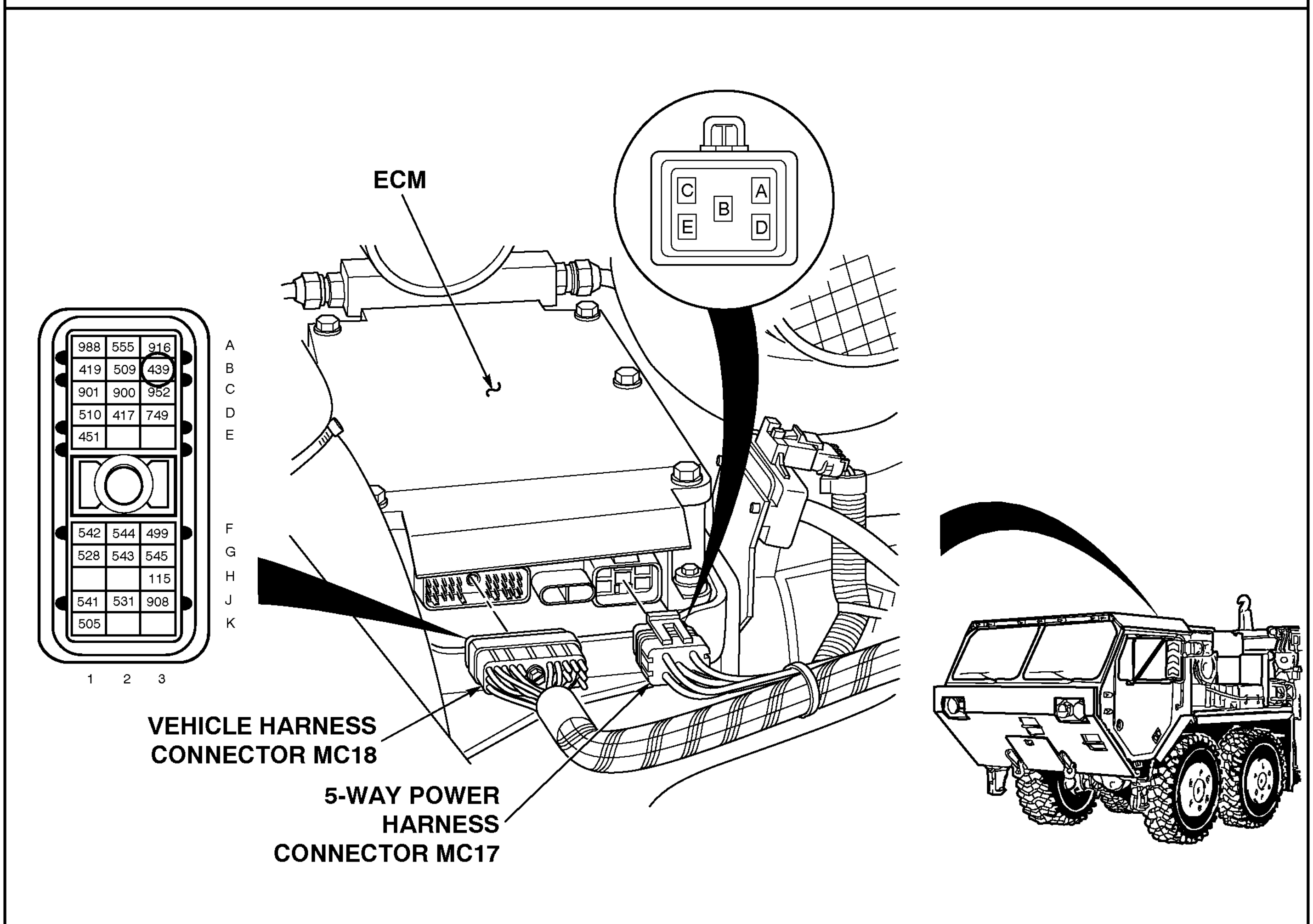
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. ENG5V - ENGINE HARNESS +5 VOLTS SUPPLY

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
ENG5V-1 Check for Low Battery Voltage		
• Was there also a Code 168/1?	Yes.	Go to 46-1 (page 2-719).
	No.	Go to ENG5V-2.
ENG5V-2 Check for + 5 Volts		
• Turn ignition off. • Disconnect the Oil Pressure Sensor (OPS) (para 7-68) and Turbo Boost Sensor (TBS) (para 7-63) connectors. • Turn ignition on. At each sensors harness connector, read voltage between socket C (red lead) and sockets A (black lead).	Between 4.7 and 5.2 volts.	Voltage reading is correct. Check voltage at next connector. If all connector voltage readings are correct, go to ENG5V-3.
	Less than 4.7 volts at any or all connectors.	Go to ENG5V-4.
	Greater than 5.2 volts at all connectors.	Go to ENG5V-6.
ENG5V-3 Check ECM Connectors		
• Check terminals at the engine harness connector (both the ECM and harness side) for damaged, bent, corroded and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM (para 7-57). Then go to ENG5V-30.
	Problems found.	Repair terminals/connectors (para 7-101). Then go to ENG5V-30.

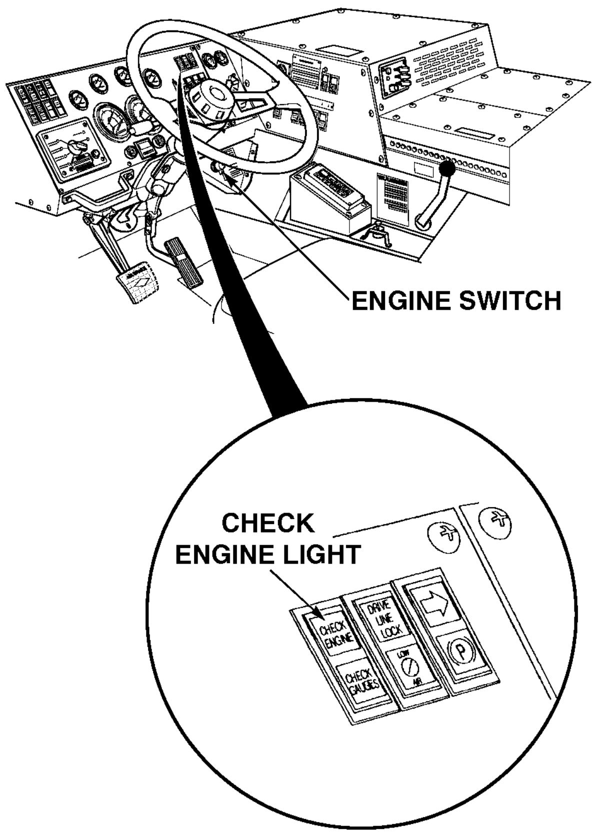

ENGINE HARNESS
CONNECTOR
ECM
925
926
432
530
133
120
472
112
111
109
110
416
452
L
M
N
P
R
S
T
W
X
Y
1
2
3


ECM
C
A
B
E
D
988
555
916
419
509
439
901
900
952
510
417
749
451
542
544
499
528
543
545
115
541
531
908
505
A
B
C
D
E
F
G
H
J
K
1
2
3
VEHICLE HARNESS
CONNECTOR MC18
5-WAY POWER
HARNESS
CONNECTOR MC17

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. ENG5V - ENGINE HARNESS +5 VOLTS SUPPLY (CONT'D)

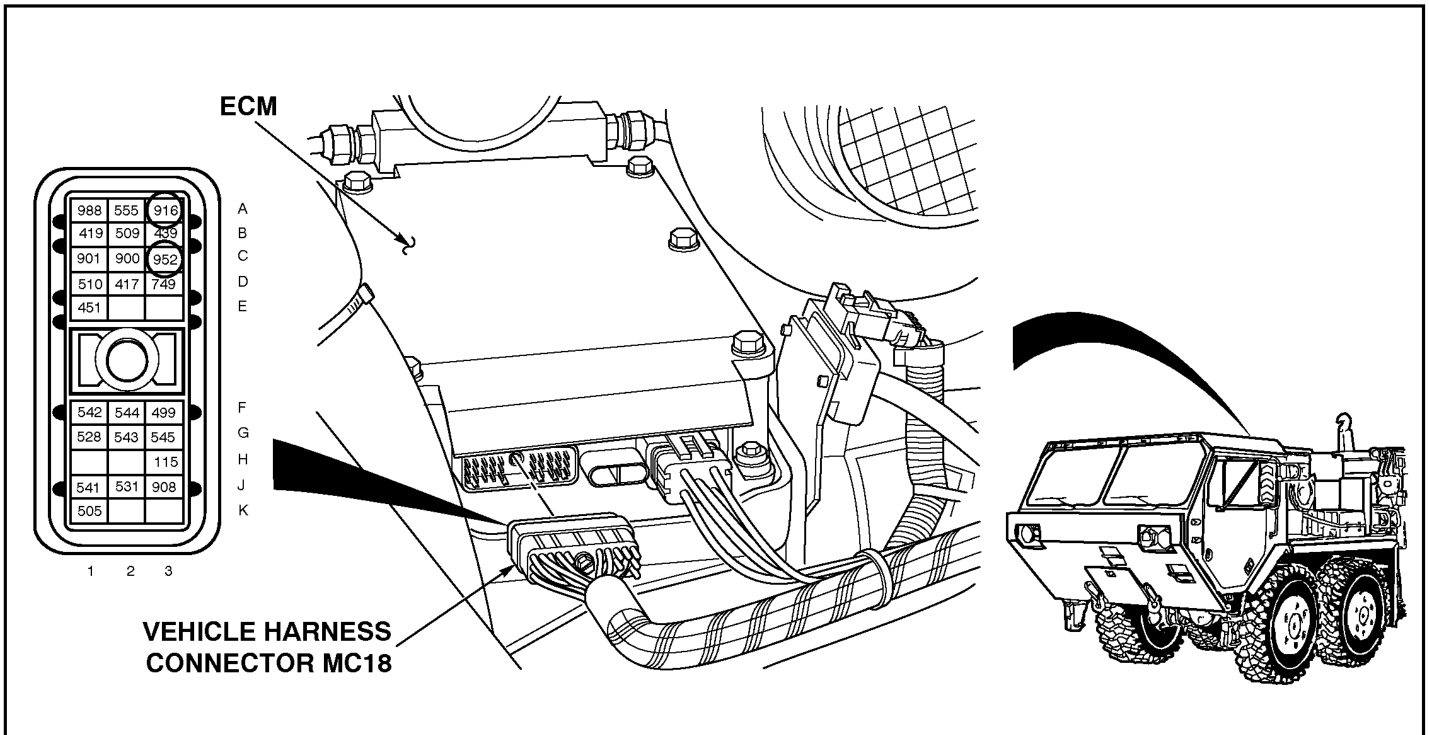
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
ENG5V-4 Check for +5 Volts or Return Open		
• Turn ignition off. • Disconnect the engine harness connector at the ECM. • Install a jumper wire between sockets A and C of any sensor connector that reads less than 4.7 volts in Step ENG5V-2. • Read resistance between sockets W1 and Y2 of the engine harness connector.	Less than or equal to 5 ohms. →	Go to ENG5V-5.
	Greater than 5 ohms or open. →	Either the engine +5 volt line (ckt #416) or the sensor return line (ckt #452) is open. Repair open. Then go to ENG5V-30.
ENG5V-5 Check for Short to Ground		
• Turn ignition off. • Remove jumper wire. • Read resistance between sockets A and C of the sensor connector. • Also read resistance between socket C of the sensor connector and a good ground.	Both readings are greater than 10,000 ohms or open. →	Go to ENG5V-3.
	Either reading is less than or equal to 10,000 ohms. →	The engine +5 volt line (ckt #416) is shorted to either the sensor return line (ckt #452) or to chassis ground. Repair short. Then go to ENG5V-30.
ENG5V-6 Check for Short to Battery +		
• Turn ignition off. • Disconnect batteries (para 7-87). • Disconnect all six connectors at the ECM. • Read resistance between socket W1 on the engine harness connector and B3 on the vehicle harness connector. • Also read resistance between socket W1 on the engine harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open. →	Go to ENG5V-3.
	Any reading is less than or equal to 10,000 ohms. →	A short exists between sockets where less than 10,000 ohms resistance was read. Repair short. Then go to ENG5V-30.

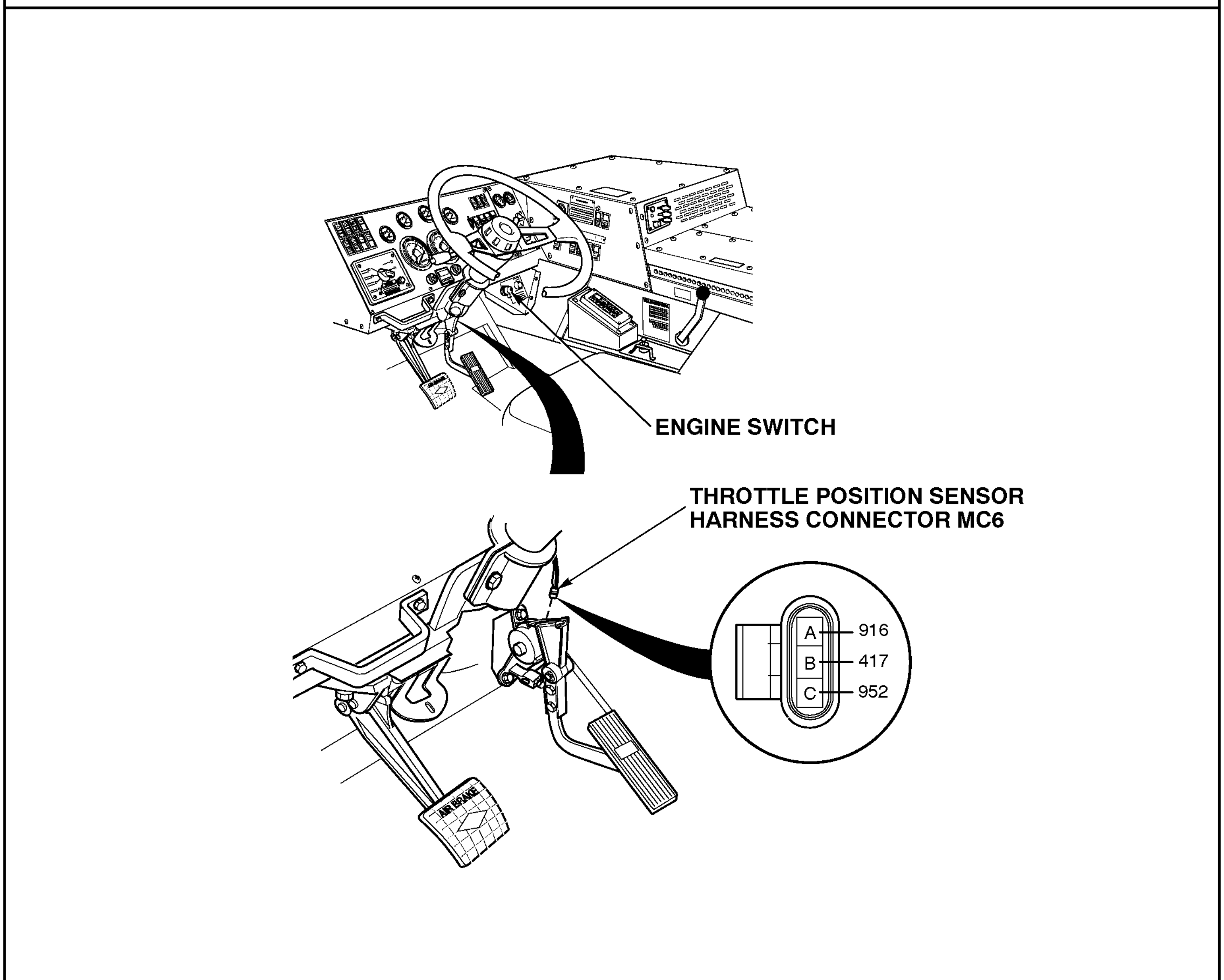

ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
CHECK
GAUGES
DRIVE
LINE
LOCK
LOW
AIR

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. ENG5V - ENGINE HARNESS +5 VOLTS SUPPLY (CONT'D)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
ENG5V-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) for 1 minute or until "Check Engine" light comes on. • Stop engine. • Read inactive codes.	No codes.	Repairs are complete.
	Codes which brought you to Chart ENG5V are still there.	Go to VEH5V-1, page 2-767.
	Any codes except those which brought you to Chart ENG5V.	Go to START-1, page 2-539, to service other codes.


ECM
988 555 916 A
419 509 439 B
901 900 952 C
510 417 749 D
451 E
542 544 499 F
528 543 545 G
115 H
541 531 908 J
505 K
1 2 3
VEHICLE HARNESS
CONNECTOR MC18


ENGINE SWITCH
THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952

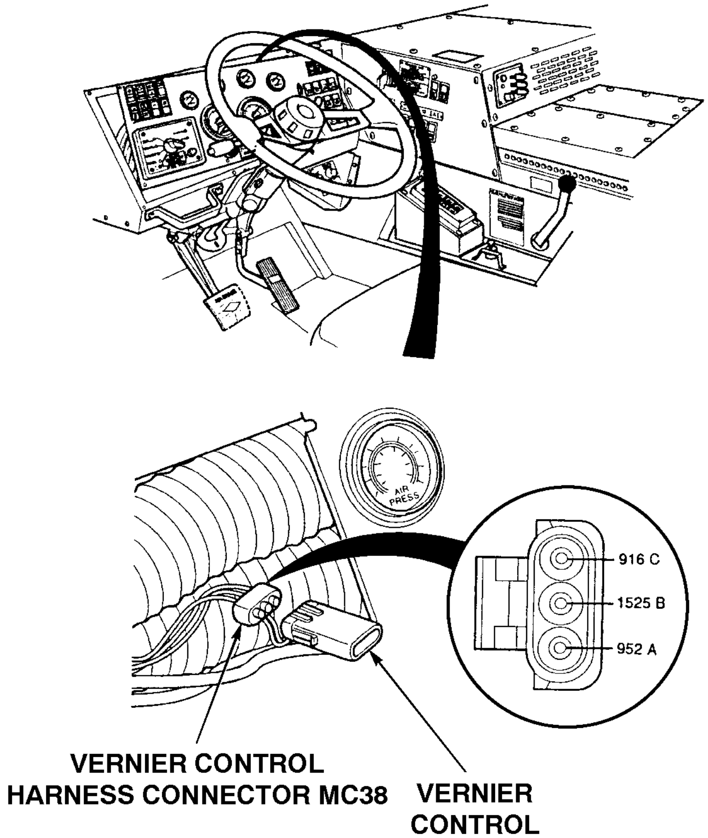
2-14. DDEC III TROUBLESHOOTING (CONT).

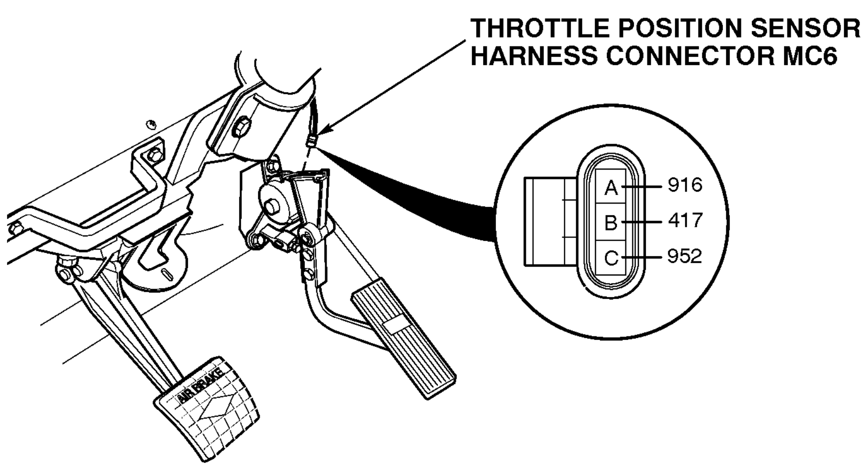
Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. VEH5V – VEHICLE HARNESS +5 VOLTS SUPPLY

NOTE – This chart is only to be used if:
1) All basic mechanical checks and physical inspections have been performed with no problem found, and
2) Diagnosis of DDEC-III was started at step START-1, pg 2-539 and you have now been referred here.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
VEH5V-1 Check for Low Battery Voltage		
• Was there also a Code 168/1?	Yes. →	Go to 46-1 (page 2-719).
	No. →	Go to VEH5V-2.
VEH5V-2 Check for +5 Volts at TPS		
• Turn ignition off. • Disconnect the Throttle Position Sensor (TPS) connector. • Turn ignition on. • Read voltage on the TPS connector, pin C (red lead) to pin A (black lead).	Less than 4.7 volts. →	Go to VEH5V-3.
	Greater than 5.2 volts. →	Go to VEH5V-11.
	Between 4.7 and 5.2 volts. →	Go to VEH5V-8.
VEH5V-3 Check for +5 Volts or Return Open		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM. • Install a jumper wire between pins A and C of the TPS connector. • Read resistance between sockets A3 and C3 of the vehicle harness connector.	Less than or equal to 5 ohms. →	Go to VEH5V-4.
	Greater than 5 ohms or open. →	Either the engine +5 volt line (ckt #916) or the sensor return line (ckt #952) is open. Repair open. Then go to VEH5V-30.

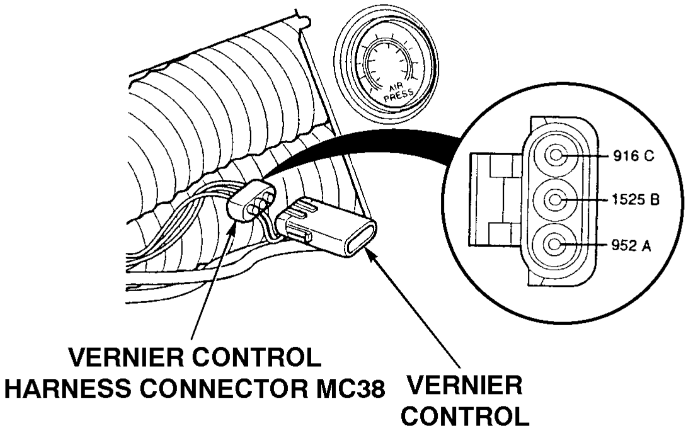

916 C
1525 B
952 A
AIR PRESS
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

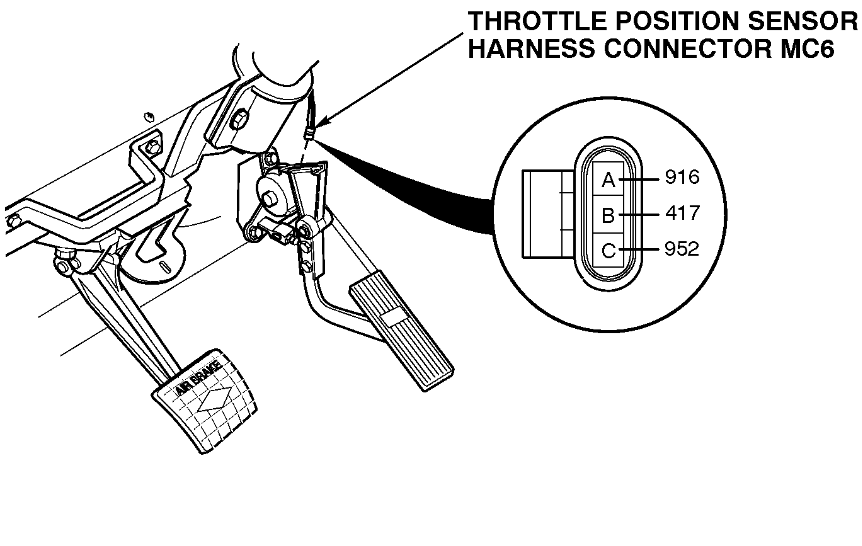

THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952
AIR BRAKE

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. VEH5V - VEHICLE HARNESS +5 VOLTS SUPPLY (CONT'D)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
VEH5V-4 Check for +5 Volt Short Ground		
• Remove jumper wire. • Disconnect vernier control (para 7-100). • Read resistance between pins A and C of the TPS connector. • Also read resistance between pin C or the TPS connector and a good ground.	Both readings are greater than 10,000 ohms or open. →	Go to VEH5V-10.
	Either reading is less than or equal to 10,000 ohms. →	Go to VEH5V-6.
VEH5V-5 (Deleted)		
VEH5V-6 +5 Volts Check Using the Vernier Control		
• Turn ignition on. • Read voltage on the vernier control connector, socket C (red lead) to socket A (black lead).	Less than 4.7 volts. →	The engine +5 volt line (ckt #916) is shorted to either the sensor return line (ckt #952) or to chassis ground. Repair short. Then go to VEH5V-30.
	Greater than or equal to 4.7 volts. →	Go to VEH5V-12.

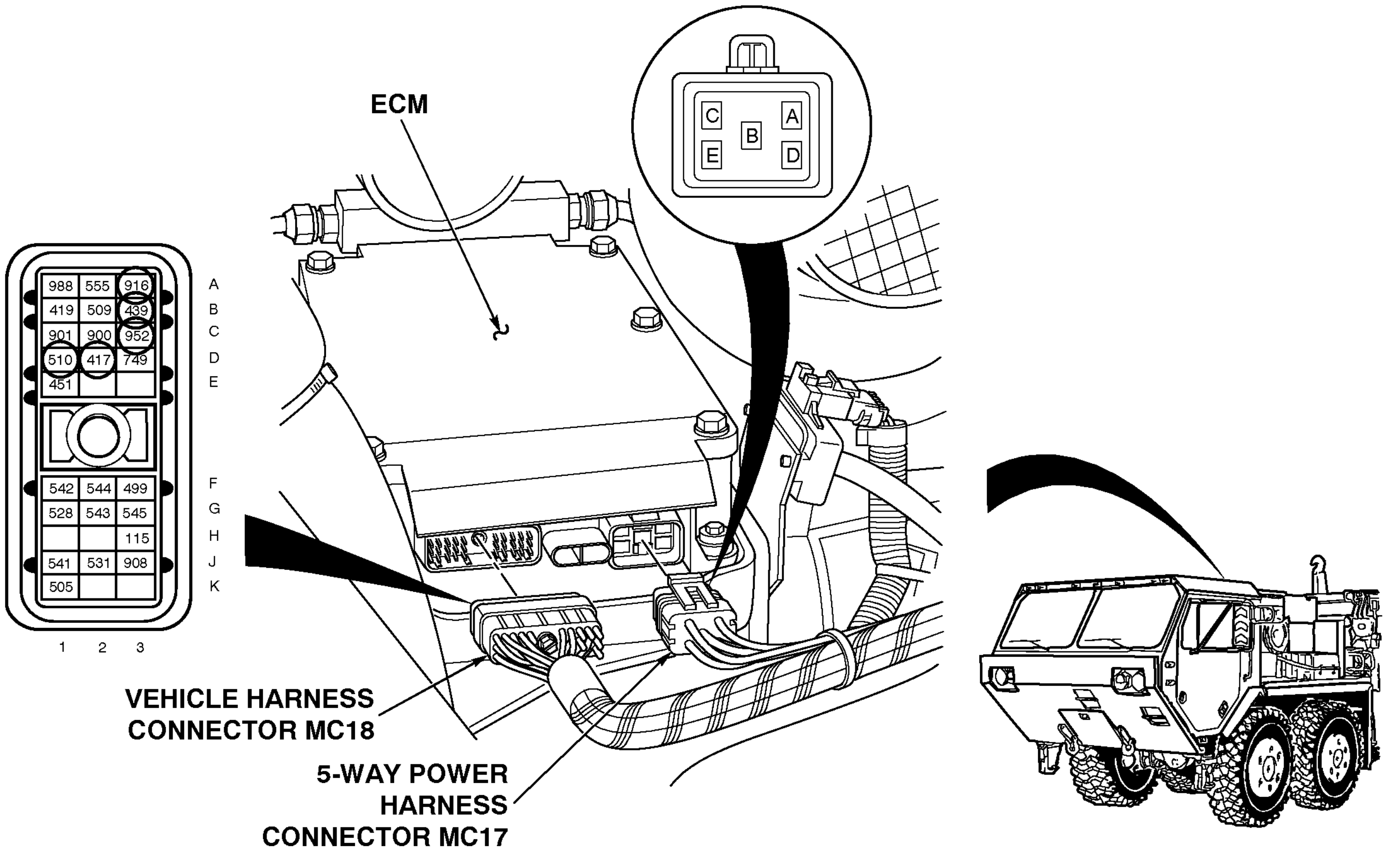

AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

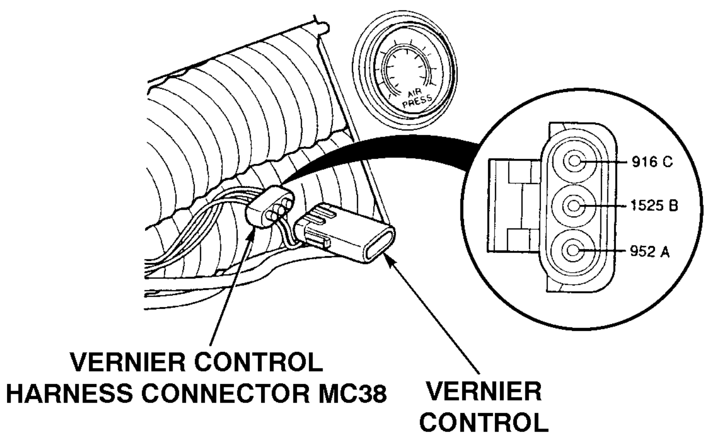

THROTTLE POSITION SENSOR
HARNESS CONNECTOR MC6
A 916
B 417
C 952
AIR BRAKE

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. VEH5V - VEHICLE HARNESS +5 VOLTS SUPPLY (CONT'D)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
VEH5V-7 Check Vernier Control Sensor Connectors		
• Inspect terminals at the vernier control connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay. →	Replace vernier control (para 7-100). Then go to VEH5V-30.
	Problem found. →	Repair terminals/connectors (para 7-101).Then go to VEH5V-30.
VEH5V-8 Check TPS		
• Turn ignition off. • Reconnect the Throttle Position Sensor (TPS) connector. • Turn ignition on. • Select TPS CNTS for display on the DDR. • Observe throttle counts at both no throttle and full throttle (engine not running).	Getting 64-205 counts at no throttle and no more than 968 counts at full throttle. →	Go to VEH5V-10.
	Not getting the above readings. →	Go to VEH5V-9.
VEH5V-9 Check TPS Connectors		
• Turn ignition off. • Disconnect the Throttle Position Sensor (TPS) connector. • Inspect terminals at the TPS connectors (sensor side and harness side) for damage; bent, corroded and unseated pins or sockets.	Terminals and connectors are okay. →	Replace TPS (para 7-58). Then go to VEH5V-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to VEH5V-30.

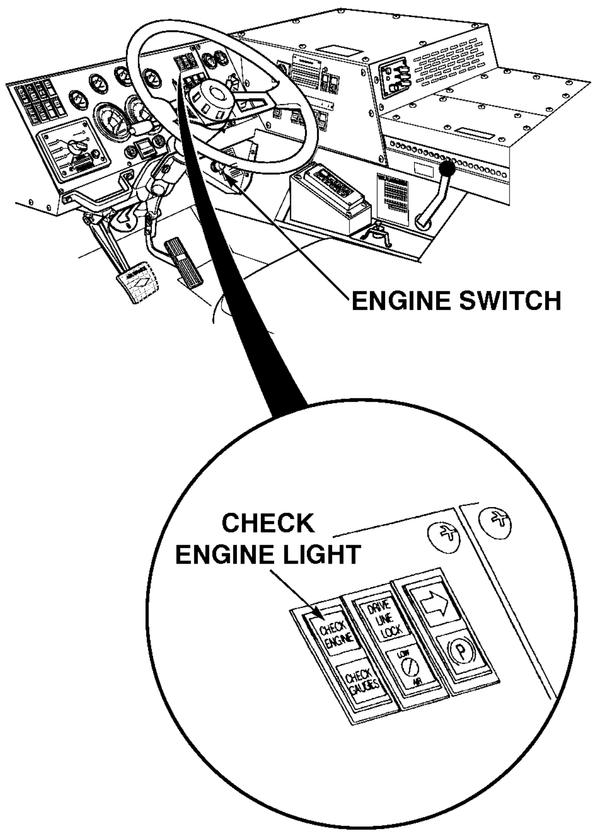

ECM
C
A
B
E
D
988
555
916
A
419
509
439
B
901
900
952
C
510
417
749
D
451
E
542
544
499
F
528
543
545
G
115
H
541
531
908
J
505
K
1
2
3
VEHICLE HARNESS
CONNECTOR MC18
5-WAY POWER
HARNESS
CONNECTOR MC17


AIR PRESS
916 C
1525 B
952 A
VERNIER CONTROL
HARNESS CONNECTOR MC38
VERNIER
CONTROL

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. VEH5V - VEHICLE HARNESS +5 VOLTS SUPPLY (CONT'D)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
VEH5V-10 Check ECM Connectors		
• Turn ignition off. • Disconnect the vehicle harness connector at the ECM (if not already disconnected). • Check terminals at the vehicle harness connector (both the ECM and harness side) for damage; bent, corroded and unseated pins or sockets. Especially terminals #952, #916, #417, and #510. Install new terminal if in doubt.	Terminals and connectors are okay. →	Replace ECM (para 7-57). Then go to VEH5V-30.
	Problem found. →	Repair terminals/connectors (para 7-101). Then go to VEH5V-30.
VEH5V-11 Check for Short to Battery +		
• Turn ignition off. • Disconnect batteries (para 7-90). • Disconnect the vehicle harness and 5-way power harness connectors at the ECM. • Read resistance between sockets A3 and B3 on the vehicle harness connector. • Also read resistance between socket A3 on the vehicle harness connector and the following sockets on the 5-way power harness connector: A and C.	All readings are greater than 10,000 ohms or open. →	Go to VEH5V-10.
	Any reading is less than 10,000 ohms. →	A short exists between the engine +5 volt line (ckt #916) and the line(s) where less than 10,000 ohms was read (either: ckt #240, #241, or #439). Repair short. Then go to VEH5V-30.
VEH5V-12 Open Check		
• Connect TPS connector. • Turn ignition on. • Read voltage on vernier control connector, socket C (red lead) and a good battery ground. • Repeat above only place red lead is socket A of the vernier control connector.	Both 4.7 to 5.2 volts. →	Repair open from ckt #952 to ECM. (Look at ECM terminal.) Repair open, then go to VEH5V-30.
	Pin C greater than 4.7 volts and pin A is zero volts. →	Go to VEH5V-7.


ENGINE SWITCH
CHECK
ENGINE LIGHT
CHECK
ENGINE
DRIVE
LINE
LOCK
LOW
AIR
CHECK
GAUGES

Section IV. TROUBLESHOOTING CHARTS (Cont.)

E. VEH5V - VEHICLE HARNESS +5 VOLTS SUPPLY (CONT'D)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
VEH5V-30 Verify Repairs		
• Turn ignition off. • Reconnect all connectors. • Turn ignition on. • Clear codes. • If "Check Engine" light does not stay on, start engine and run (TM 9-2320-364-10) for 1 minute or until "Check Engine" light comes on. • Stop engine. • Read inactive codes.	No codes. →	Repairs are complete.
	Codes which brought you to Chart VEH5V are still there. →	Go to ENG5V-1, page 2-761.
	Any codes except those which brought you to Chart VEH5V. →	Go to START-1, pg 2-539, to service other codes.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION

This section describes the DDEC III information available through the use of the MPSI Pro-Link 9000 Diagnostic Data Reader (DDR). Pro-Link menu diagrams and parameter definitions are provided.

Engine Menu Selections and sub menus are defined as follows:

A. ENGINE DATA LIST

B. DIAGNOSTIC CODES

– Active Codes
– Inactive Codes
– Clear Codes
– Change Code Description

C. VIEW CALIBRATION CONFIGURATION SELECTIONS

– Engine Configuration
– VSG Configuration
– Engine Protection Configuration
– ECM Input and Output Configuration

D. FUEL INJECTOR INFORMATION

– Cylinder Cutout
– Response Times
– View Injector Calibration
– Upate Injector Calibration

E. SWITCH/LIGHT STATUS

F. MID MESSAGES BEING RECEIVED

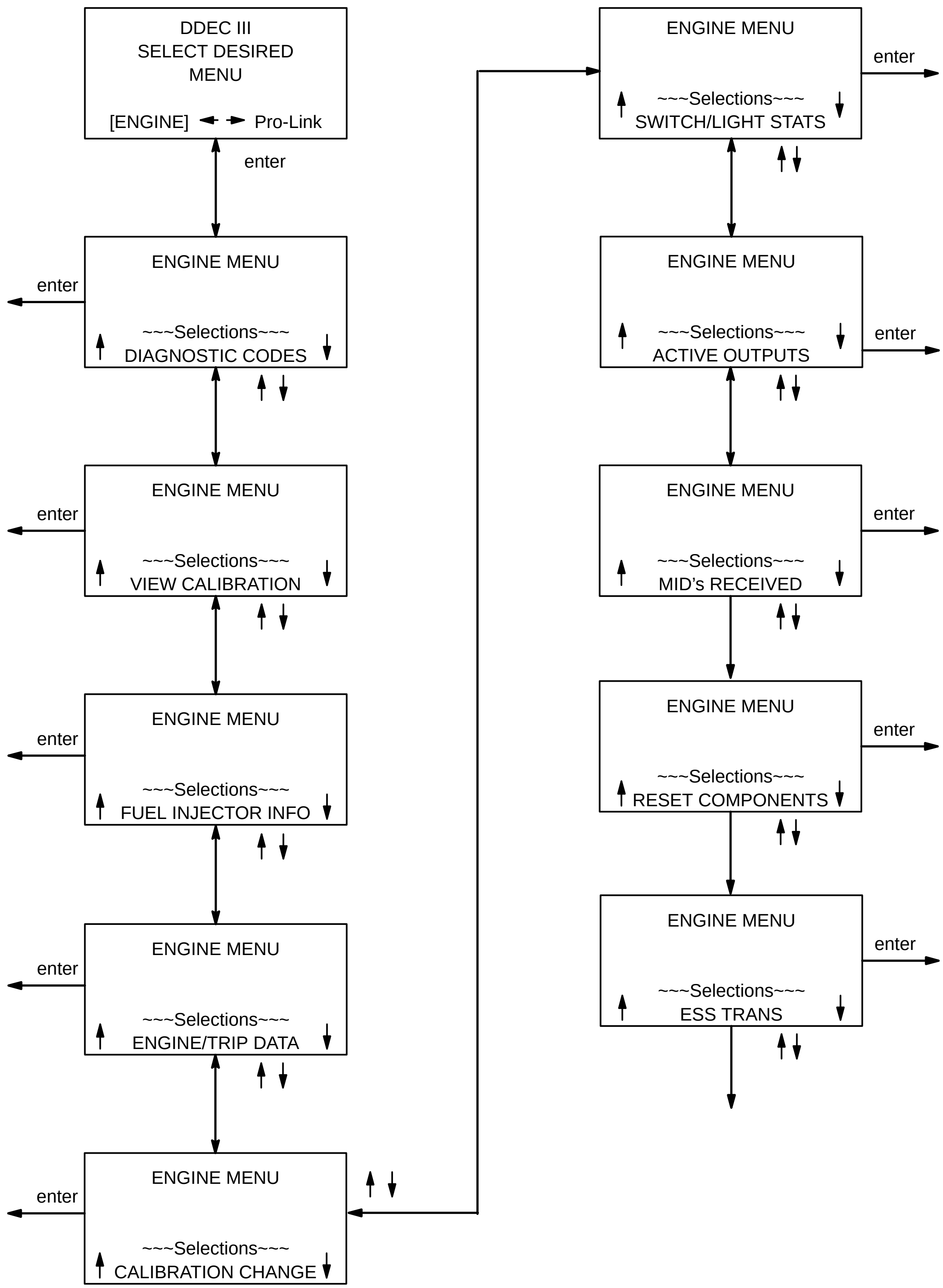

DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link
enter
ENGINE MENU
~~~Selections~~~
DIAGNOSTIC CODES
ENGINE MENU
~~~Selections~~~
VIEW CALIBRATION
ENGINE MENU
~~~Selections~~~
FUEL INJECTOR INFO
ENGINE MENU
~~~Selections~~~
ENGINE/TRIP DATA
ENGINE MENU
~~~Selections~~~
CALIBRATION CHANGE
ENGINE MENU
~~~Selections~~~
SWITCH/LIGHT STATS
ENGINE MENU
~~~Selections~~~
ACTIVE OUTPUTS
ENGINE MENU
~~~Selections~~~
MID's RECEIVED
ENGINE MENU
~~~Selections~~~
RESET COMPONENTS
ENGINE MENU
~~~Selections~~~
ESS TRANS
enter

FIGURE 2-5

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

A. ENGINE DATA LIST

The Engine Data List menu selection displays the set of DDEC III data that pertain to the operation of the engine and vehicle.

NOTES:

(1) Engine data list values that are displayed as 'N/A' (not available) typically indicate that the sensor(s) and/or function is not part of the engine configuration, or the data is not being transmitted by the DDEC III ECM. These are not included in the following lists.

(2) Engine sensor values that are displayed as 'FAIL' is an indication that a FMI 3 (Sensor Voltage High) or a FMI 4 (Sensor Voltage Low) diagnostic condition is currently active for that sensor(s).

ACTIVE CODES
Definition: Indicates the presence of a condition(s) that causes the check engine light to be on.
Typical Range: YES or NO

INACTIVE CODES
Definition: Indication that past active codes have been stored in the ECM memory.
Typical Range: YES or NO

ENGINE RPM
Definition: Indicates engine RPM as determined by the Timing Reference Sensor (TRS).
Typical Range: 0 to 2500 RPM

PULSEWIDTH
Definition: Fuel Pulse Width – Number of degrees crankshaft rotation that the EUI's control valve is closed and fuel is entering the cylinder
Typical Range: 0.0 to 25.5 Degrees

BOOST PSI
Definition: Boost Pressure – Pressure of air measured by the Turbo Boost Sensor (TBS) downstream on the compressor discharge side of the turbocharger.
Typical Range: (0.0 to 43.5 PSI) or (0 to 305 KPa)

ENG LOAD PCT
Definition: Indicates the percent engine load calculated from engine speed and torque.
Typical Range: 0 to 100%

TORQUE LB-FT or **N•M**
Definition: Indicates the amount of torque available at the engine flywheel. Negative torque values will be displayed with a minus sign in front of the value.
Typical Range: –9999 to 9999 LB-FT / –9999 to 9999 N•M

TPS CNTS
Definition: Throttle Position Sensor (TPS) Counts (CNTS). Indicates the analog to digital (A/D) conversion of (0 to 5 volts) from the TPS to (0 to 1024 counts) that the ECM uses to compute the percent throttle opening.
Typical Range: (0 to 1024 Counts) or N/A

TPS PCT
Definition: Indicates the percent opening of the Throttle Position Sensor (TPS).
Typical Range: 0 to 100%

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

VSG CNTS

Definition: Variable Speed Governor (VSG) – A/D Counts. Indicates the analog to digital (A/D) conversion of (0 to 5 volts) from the VSG to (0 to 1024 counts) that the ECM uses to compute the VSG set RPM.
Typical Range: (0 to 1024 Counts) or N/A

VSG SETRPM

Definition: Indicates the engine set speed for the Variable Speed Governor.
Typical Range: (0 to 2500 RPM) or N/A

BOI

Definition: Beginning of Injection – Specifies the timing of the injection event as the number of degrees crankshaft rotation before piston TDC. This data is available for engineering purposes only.
Typical Range: (0.0 to 25.5 Degrees) or N/A

OIL TEMP

Definition: Indicates the temperature of the engine oil that is measured by the Oil Temperature Sensor (OTS) in degrees Fahrenheit or Celsius.
Typical Range: (–40 to 327 deg F) or (–40 to 150 deg C)

COOLANT TEMP

Definition: Indicates the temperature of the engine coolant that is measured by the Coolant Temperature Sensor (CTS) in degrees Fahrenheit or Celsius.
Typical Range: (–40 to 327 deg F) or (–40 to 150 deg C)

FUEL TEMP

Definition: Indicates the temperature of the engine fuel that is measured by the Fuel Temperature Sensor (FTS) in degrees Fahrenheit or Celsius.
Typical Range: (–40 to 214 deg F) or (–40 to 87 deg C)

AMB AIR TEMP

Definition:
Typical Range:

AIR INLET TEMP

Definition: Indicates the temperature of the air entering the engine air induction system that is measured by the Air Temperature Sensor (ATS) in degrees Fahrenheit or Celsius.
Typical Range: (–40 to 214 deg F) or (–40 to 87 deg C)

OIL PRS PSI

Definition: Indicates the engine oil pressure that is measured by the Oil Pressure Sensor (OPS) in PSI or KPa.
Typical Range: (0.0 to 64.0 PSI) or (0 to 448 KPa)

BARO PRS PSI

Definition: Barometric Pressure – Indicates the atmospheric pressure in PSI or KPa.
Typical Range: (0.0 to 999.9 PSI) or (0 to 9999 KPa)

ECM VOLTS

Definition: Indicates the battery voltage available to the ECM
Typical Range: 0.0 to 32.0 Volts

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

SRS RECEIVED
Definition: Indicates that the ECM has received a signal from the Synchronous Reference Sensor (SRS) during this ignition cycle.
Typical Range: YES or NO

IDLE SPD RPM
Definition: Indicates the current engine idle speed in RPM.
Typical Range: 0 to 1000 RPM

ENG GOVR
Definition: Indicates which DDEC governor is currently active.
Typical Range: NONE, IDLE, HIGH SPD, CRUISE, ROAD SPD, CRUZ VSG, H20 PGS

HALF ENGINE
Definition: Indicates the active/inactive status of the Half Engine Mode.
Typical Range: YES or NO

ENG BRAKE
Definition: Indicates the active/inactive status of the engine brake.
Typical Range: LOW, MED, HIGH or OFF

%TQ LIMIT
Definition: Torque Reduction Factor – Indicates the ratio of current output torque allowed (due to adverse operating conditions) to maximum torque available at current engine speed (under normal operating conditions).
Typical Range: 0 to 100%

FUEL RATE GHR
Definition: Indicates the amount of fuel consumed by the engine per unit time.
Typical Range: 0.0 to 999.9 GPH / 0.0 to 999.9 LPH

FUEL MPG or **L/100km**
Definition: Indicates the current fuel economy at the current vehicle velocity.
Typical Range: 0.0 to 99.9 MPG / 0.0 to 99.9 L/100km

VEHICLE SPD MPH or **KPH**
Definition: Indicates the vehicle road speed in MPH or KPH.
Typical Range: (0 to 999 MPH / 0 to 999 KPH) or N/A

PWM DRIVE #1
Definition: Indicates the active duty cycle of the Pulse Width Modulated (PWM) port #1.
Typical Range: 0 to 100%

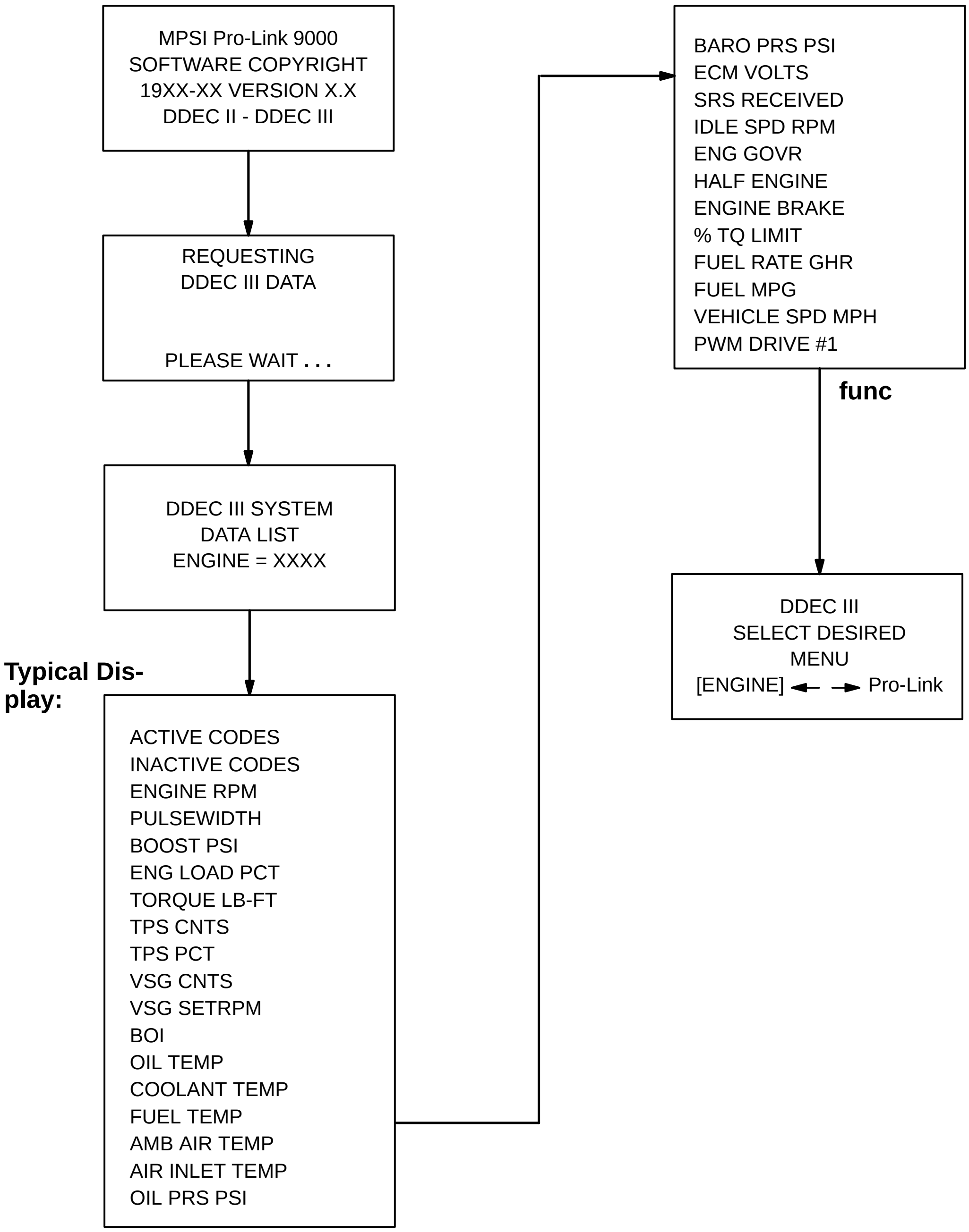

MPSI Pro-Link 9000
SOFTWARE COPYRIGHT
19XX-XX VERSION X.X
DDEC II - DDEC III
REQUESTING
DDEC III DATA
PLEASE WAIT . . .
DDEC III SYSTEM
DATA LIST
ENGINE = XXXX
Typical Display:
ACTIVE CODES
INACTIVE CODES
ENGINE RPM
PULSEWIDTH
BOOST PSI
ENG LOAD PCT
TORQUE LB-FT
TPS CNTS
TPS PCT
VSG CNTS
VSG SETRPM
BOI
OIL TEMP
COOLANT TEMP
FUEL TEMP
AMB AIR TEMP
AIR INLET TEMP
OIL PRS PSI
BARO PRS PSI
ECM VOLTS
SRS RECEIVED
IDLE SPD RPM
ENG GOVR
HALF ENGINE
ENGINE BRAKE
% TQ LIMIT
FUEL RATE GHR
FUEL MPG
VEHICLE SPD MPH
PWM DRIVE #1
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] ← → Pro-Link

FIGURE 2-6

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

B. DIAGNOSTIC CODES

The Diagnostic Code Menu Selections are defined as follows:

– Active Codes
– Inactive Codes
– Clear Codes
– Change Code Description

MID Descriptions

MID: 128 ENGINE Single ECM applications

Diagnostic Codes with Subsystem Identification Characters (SIDs) reference DDEC III Auxiliary Output #'s 1 – 8 (SIDs: 26) and use the looked-up parameter text description in TABLE 2-22 page 2-798 to identify the function assigned to the auxiliary output channel.

Injector Response Time Codes Long and Injector Response Time Codes Short will use TABLE 2-25 (Injector Numbering) page 2-799 to identify the appropriate engine cylinder number.

B.1 ACTIVE CODES

Active Codes are conditions that are presently occurring and causing the Check Engine Light (CEL) to be illuminated. The display for each code is as follows:

Line 1: MID:XXX ENGINE XX
Line 2: PID Description
Line 3: FMI Description
Line 4: ↑A## PID:XXX FMI:XX↓

NOTES:

(1) MID: Message Identification Character
(2) PID: Parameter Identification Character
(3) FMI: Failure Mode Identifer
(4) A##: Numerical Count of Active Codes
(5) ↑↓: Indicates additional codes are stored in ECM memory

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

B.2 INACTIVE CODES

Inactive Codes are faults that have occurred previously. The display for each code is as follows:

SCREEN #1	SCREEN #2
Line 1: MID:XXX ENGINE XX	Line 5: 1st: Last:
Line 2: PID Description	Line 6: Total#:
Line 3: FMI Description	Line 7: Total Time:
Line 4: ↑I## PID:XXX FMI:XX↓	Line 8: Min/Max:

NOTES:

(1) I##:	Numerical Count of Inactive Codes
(2) 1st:	First occurrence of the diagnostic code in engine hours
(3) Last:	Last occurrence of the diagnostic code in engine hours
(4) Total#:	Total number of occurrences
(5) Total Time:	Total engine seconds that the diagnostic code was active
(6) Min/Max:	Minimum/Maximum value recorded during diagnostic condition

B.3 CLEAR CODES

This function allows diagnostic codes stored in the ECM(s) to be erased. An audit trail of when the codes were last erased in engine hours will be displayed.

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

B.4 CHANGE CODE DESCRIPTION

This function allows the user to specify the type of diagnostic code description by selecting either DDEC or J1587. With J1587 selected, the codes are identified according to the J1587 specification developed by the Society of Automotive Engineers (SAE) and the American Trucking Association (ATA).

If you are using J-1587 code description, the readout resembles this:

ENGINE
ENGINE OIL PRESSURE
VOLTAGE LOW
↑ A1 PID:100 FM1:4 ↓

If you are using DDEC code description, the readout resembles this:

36 MID:128 ENGINE
OIL PRESSURE SENSOR
INPUT VOLTAGE LOW
↑ A1 PID:100 FM1:4 ↓

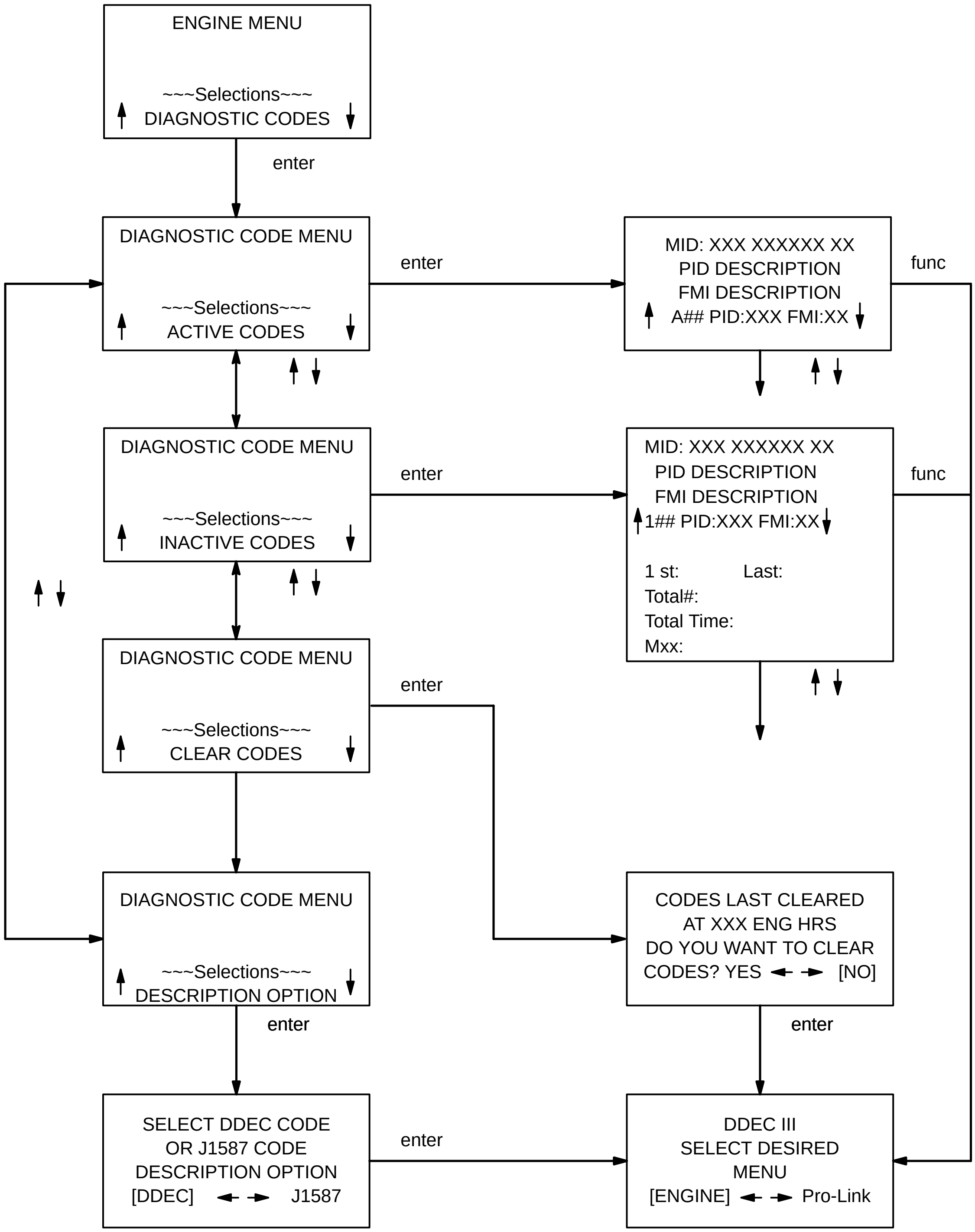

ENGINE MENU
~~~Selections~~~
DIAGNOSTIC CODES
enter
DIAGNOSTIC CODE MENU
~~~Selections~~~
ACTIVE CODES
enter
MID: XXX XXXXXX XX
PID DESCRIPTION
FMI DESCRIPTION
A## PID:XXX FMI:XX
func
DIAGNOSTIC CODE MENU
~~~Selections~~~
INACTIVE CODES
enter
MID: XXX XXXXXX XX
PID DESCRIPTION
FMI DESCRIPTION
1## PID:XXX FMI:XX
1 st: Last:
Total#:
Total Time:
Mxx:
func
DIAGNOSTIC CODE MENU
~~~Selections~~~
CLEAR CODES
enter
DIAGNOSTIC CODE MENU
~~~Selections~~~
DESCRIPTION OPTION
enter
CODES LAST CLEARED
AT XXX ENG HRS
DO YOU WANT TO CLEAR
CODES? YES [NO]
enter
SELECT DDEC CODE
OR J1587 CODE
DESCRIPTION OPTION
[DDEC] J1587
enter
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-7
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

C. VIEW CALIBRATION CONFIGURATION SELECTIONS

The View Calibration Configuration Menus are a set of selections that allow the viewing of engine and vehicle operating parameters that are stored in the DDEC III Electrically Eraseable Programmable Read Only Memory (EEPROM). These values are typically refered to as the DDEC ECM calibration parameters.

NOTES:

(1) Menu items that are not applicable (N/A) to PLS are not shown in the following charts.

View Calibration Configuration Menu Selections are defined as follows:

– Engine Configuration
– VSG Configuration
– Engine Protection
– ECM Input and Output Configuration

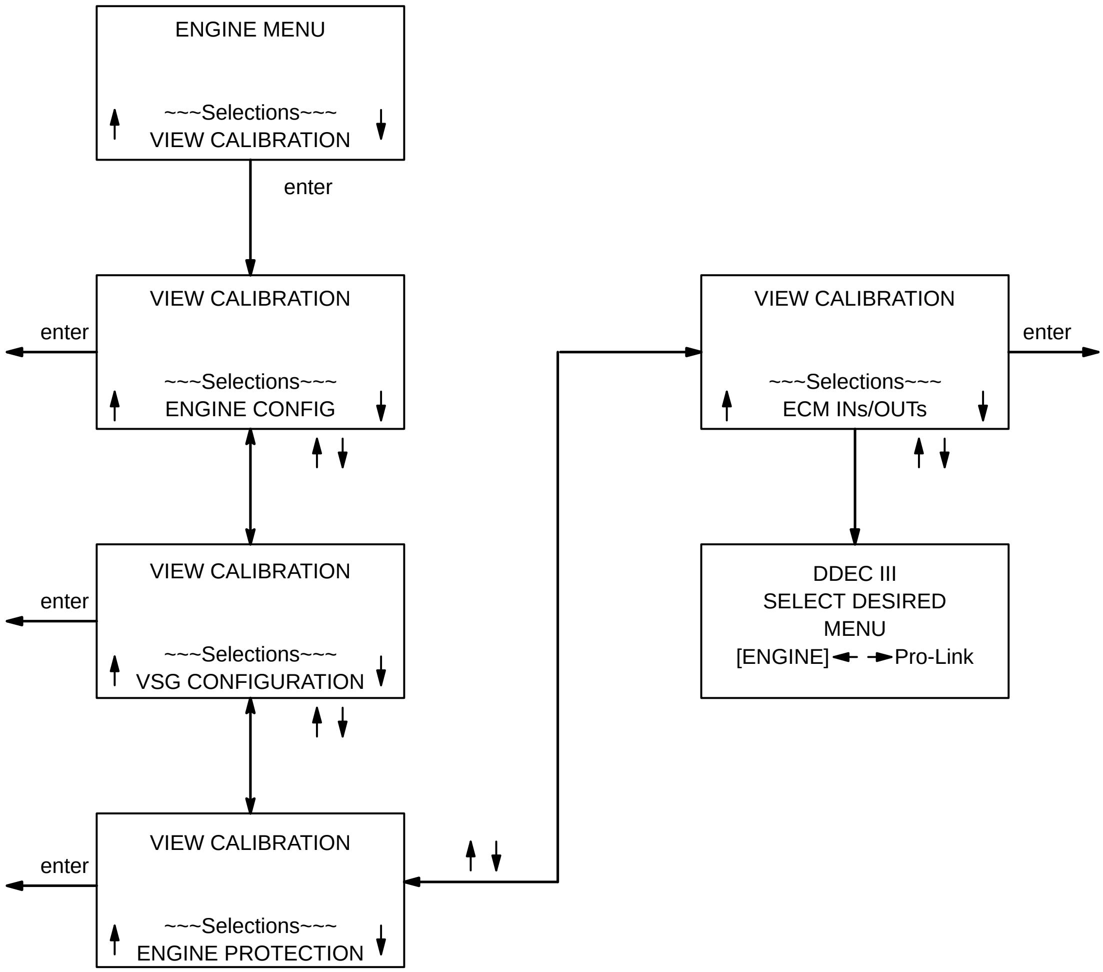

ENGINE MENU
~~~Selections~~~
VIEW CALIBRATION
enter
VIEW CALIBRATION
enter
~~~Selections~~~
ENGINE CONFIG
VIEW CALIBRATION
enter
~~~Selections~~~
VSG CONFIGURATION
VIEW CALIBRATION
enter
~~~Selections~~~
ENGINE PROTECTION
VIEW CALIBRATION
enter
~~~Selections~~~
ECM INs/OUTs
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-8
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

C.1 ENGINE CONFIGURATION

The view Engine Configuration menu selection displays the list that describes engine identification, application and rating information that is currently programmed in the calibration. DDEC III ECM identification and software information is also provided.

NOTES:

(1) Menu items that are not applicable (N/A) to PLS are not shown in the following charts.

ENGINE MODEL#
Definition: Indicates the Detroit Diesel Corporation engine model number.
Typical Range: 8 Characters

6N4M#
Definition: Indicates the engine rating group designation.
Typical Range: 1 to 9999

6N4D#
Definition: Indicates the engine rating family designation.
Typical Range: 1 to 9999

6N4C#
Definition: Indicates the engine application group designation.
Typical Range: 1 to 9999

UNIT#
Definition:
Typical Range:

V
Definition: Indicates the vehicle identification number.
Typical Range: 17 Characters

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

ENGINE SN
Definition: Indicates the engine serial number.
Typical Range: 10 Characters

ECM SN
Definition: Indicates the ECM serial number.
Typical Range: 8 Characters ASCII

SOFTWARE LVL
Definition: Indicates the DDEC ECM software version. The software level is incremented after every revision.
Typical Range: 0.00 to 999.99

EPA CERT#
Definition: Indicates the EPA engine certification number.
Typical Range: 1 to 999

ENG SERIES
Definition: Indicates the DDEC engine type.
Typical Range:

ENG BHP or **KW**
Definition: Indicates the active engine rated horse power.
Typical Range: 0 to 9999 BHP / 0 to 9999 KW

ENG RATED RPM
Definition: Indicates the rated speed.
Typical Range: 0 to 9999 RPM

LSG DROOP RPM
Definition: Indicates the engine rated speed governor droop.
Typical Range: 0 to 999 RPM

PEAK TRQ LB-FT or **N•M**
Definition: Indicates the engine peak operating torque.
Typical Range: 0 to 9999 FT-LB / 0 to 9999 N•M

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

PEAK TRQ RPM
Definition: Indicates the engine RPM at peak torque.
Typical Range: 0 to 2500 RPM

IDLE SPEED RPM
Definition: Indicates the WARM engine idle speed.
Typical Range: 0 to 1000 RPM

IDLE ADJUST
Definition: Indicates the idle RPM adjustment.
Typical Range: –25 to 150 RPM

TRANS ALLISON ELECT

J1922 ABS ENAB

J1922 TRN ENAB

FUEL ECON INCENTIVE

MINIMUM MPG (7.0)

SCALER MPH/MPG (5.0)

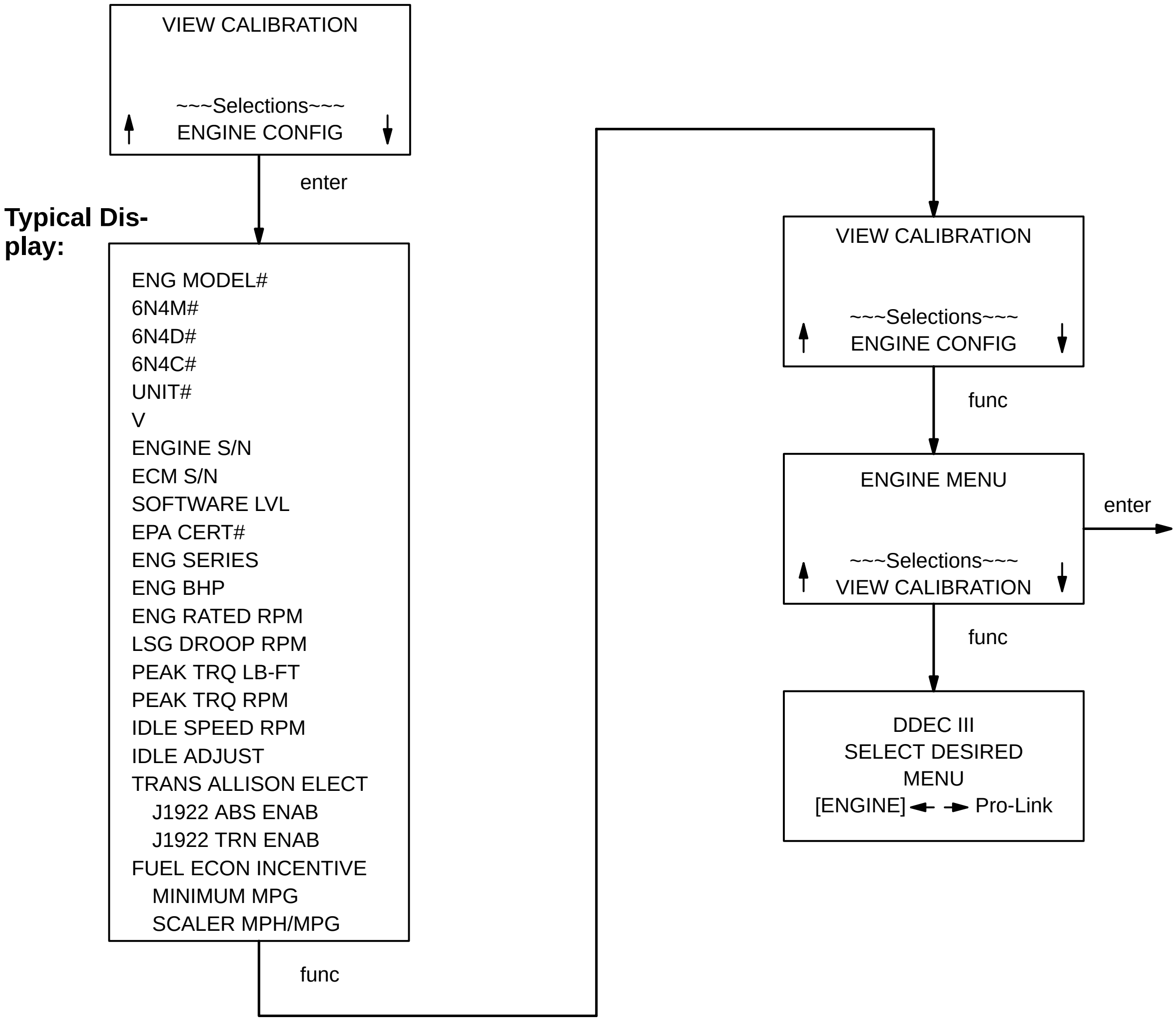

VIEW CALIBRATION
~~~Selections~~~
ENGINE CONFIG
enter
Typical Display:
ENG MODEL#
6N4M#
6N4D#
6N4C#
UNIT#
V
ENGINE S/N
ECM S/N
SOFTWARE LVL
EPA CERT#
ENG SERIES
ENG BHP
ENG RATED RPM
LSG DROOP RPM
PEAK TRQ LB-FT
PEAK TRQ RPM
IDLE SPEED RPM
IDLE ADJUST
TRANS ALLISON ELECT
J1922 ABS ENAB
J1922 TRN ENAB
FUEL ECON INCENTIVE
MINIMUM MPG
SCALER MPH/MPG
func
VIEW CALIBRATION
~~~Selections~~~
ENGINE CONFIG
func
ENGINE MENU
~~~Selections~~~
VIEW CALIBRATION
enter
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-9
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

C.2 VSG CONFIGURATION

The view VSG Configuration selection is the set of DDEC III data that identifies the Variable Speed Governor (VSG) configuration that is currently programmed in the DDEC III calibration.

VSG DROOP RPM
Definition: Indicates the variable speed governor droop in RPM.
Typical Range: 0 to 300 RPM

VSG MIN RPM
Definition: Indicates the minimum variable speed governor RPM.
Typical Range: (“IDLE” to “VSG MAX RPM”) “IDLE” = DDEC Unique ID 218 – Byte a

VSG MAX RPM
Definition: Indicates the maximum variable speed governor RPM.
Typical Range: (“VSG MIN RPM” to “RATED”) RPM

ALT VSG MIN
Definition: Indicates the alternate variable speed governor minimum RPM. ‘N/A’ will be displayed if (Function #16 — ALT VSG MIN) is not configured as a vehicle input switch.
Typical Range: (“VSG MIN RPM” to “VSG MAX RPM”) RPM, or N/A.

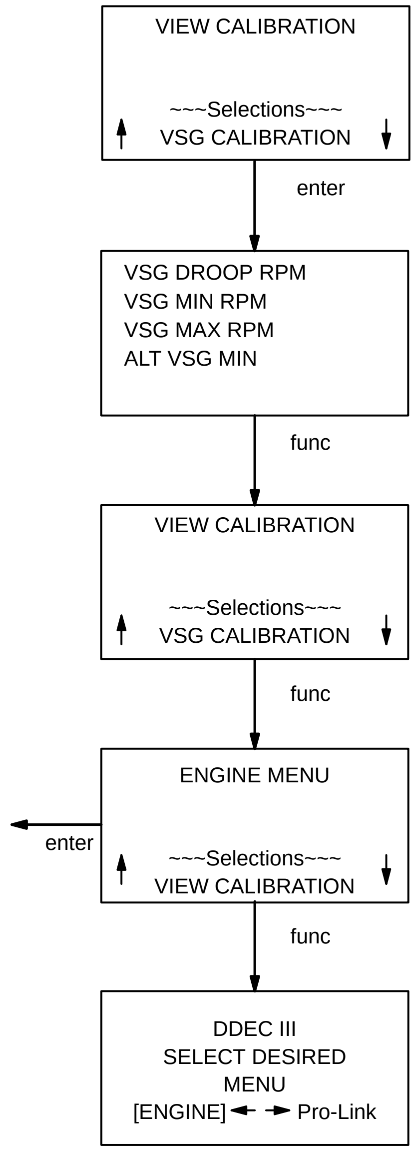

VIEW CALIBRATION
~~~Selections~~~
VSG CALIBRATION
enter
VSG DROOP RPM
VSG MIN RPM
VSG MAX RPM
ALT VSG MIN
func
VIEW CALIBRATION
~~~Selections~~~
VSG CALIBRATION
func
ENGINE MENU
enter
~~~Selections~~~
VIEW CALIBRATION
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-10
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

C.3 ENGINE PROTECTION CONFIGURATION

The view Engine Protection Configuration selection is the set of DDEC III data that identifies to the type of engine protection configuration that is currently programmed in the DDEC III calibration.

NOTES:

(1) Engine protection values that are displayed as 'N/A' (not available) typically indicate that the sensor(s) and/or function is not part of the engine configuration. These are not listed on the following charts.

OIL TEMP
Definition: Indication of the type of engine protection based on high engine oil temp.
Typical Range: Warn, Ramp, Shtdwn

COOLANT TMP
Definition: Indication of the type of engine protection based on high engine coolant temp.
Typical Range: Warn, Ramp, Shtdwn

OIL PRS
Definition: Indication of the type of engine protection based on low engine oil pressure.
Typical Range: Warn, Ramp, Shtdwn

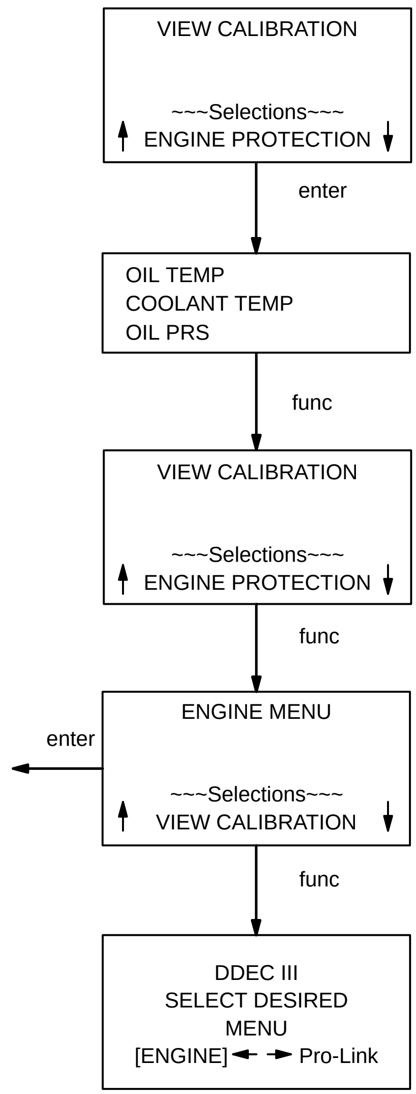

VIEW CALIBRATION
~~~Selections~~~
ENGINE PROTECTION
enter
OIL TEMP
COOLANT TEMP
OIL PRS
func
VIEW CALIBRATION
~~~Selections~~~
ENGINE PROTECTION
func
ENGINE MENU
enter
~~~Selections~~~
VIEW CALIBRATION
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-11
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

C.4 ECM INPUT AND OUTPUT CONFIGURATION

The view ECM Input and Output Configuration selection is the set of DDEC III data that describe the functions assigned to the ECM input and output connector terminals that is currently programmed in the DDEC III calibration.

NOTES:

(1) The connector cavity designations describe the physical locations of the assigned functions.

(2) The DDR displays the assigned function text as described in Table 2-21 (Vehicle Switch Input Options) and Table 2-22 (ECM Output Options) on page 2-798.

(3) ‘N/A’ will be displayed if a function number of (0 = NONE) has been assigned to any of the connector cavities.

(4) Menu items that are not applicable (N/A) to PLS are not shown in the following charts.

G1 DIAG REQUEST
Definition: Indicates the functional configuration of the switch input at connector cavity G1 (diagnostic request switch).

A1 EXT BRK ENAB
Definition: Indicates the functional configuration of the output at connector cavity A1 (engine brake enable).

J3 PWR TRAIN DEMAND
Definition: Indicates the functional configuration of the PWM output at connector cavity J3 (power train demand).

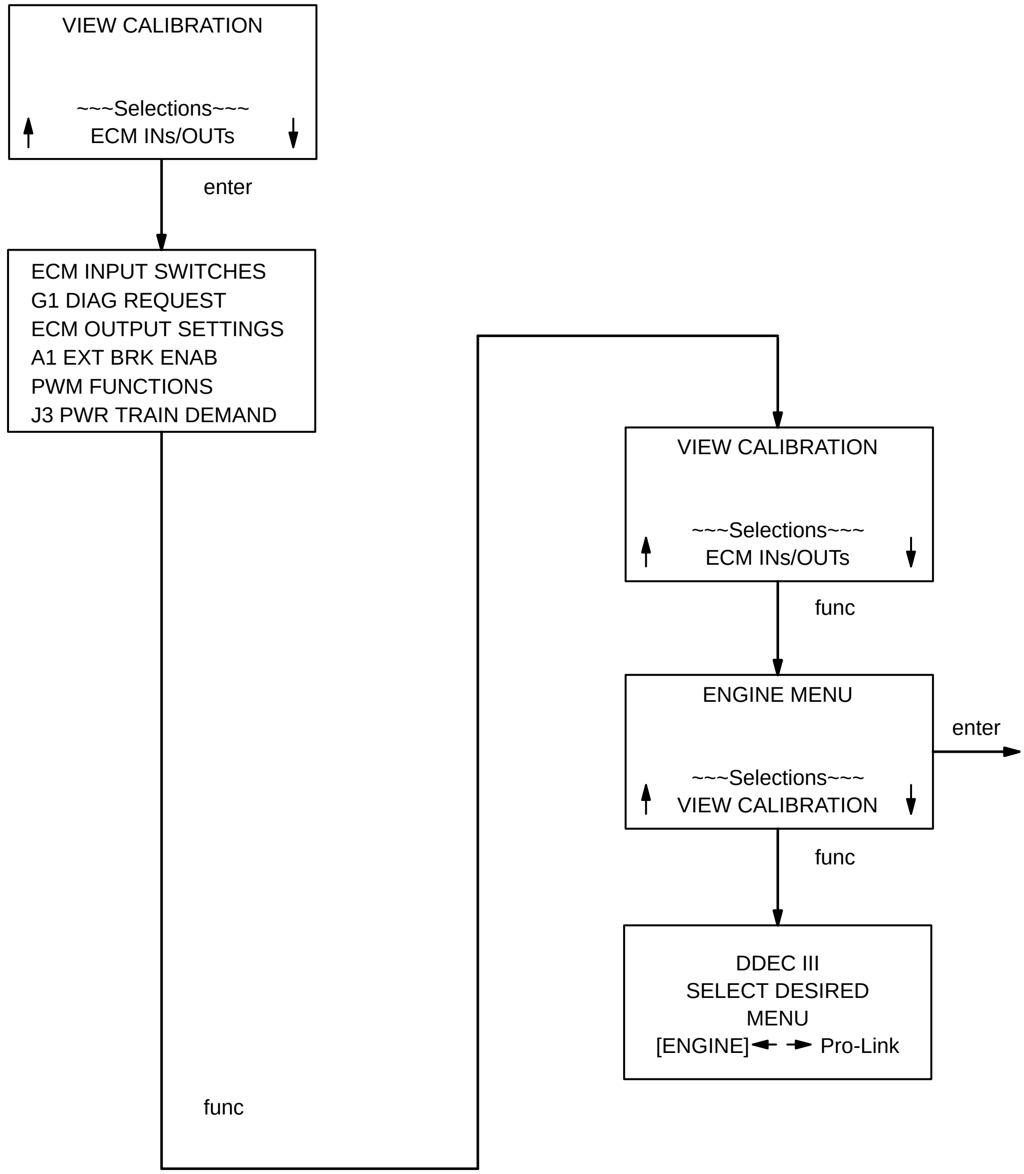

VIEW CALIBRATION
~~~Selections~~~
ECM INs/OUTs
enter
ECM INPUT SWITCHES
G1 DIAG REQUEST
ECM OUTPUT SETTINGS
A1 EXT BRK ENAB
PWM FUNCTIONS
J3 PWR TRAIN DEMAND
func
VIEW CALIBRATION
~~~Selections~~~
ECM INs/OUTs
func
ENGINE MENU
~~~Selections~~~
VIEW CALIBRATION
enter
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-12
~~~

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

TABLE 2-21

Vehicle Switch Input Options

#	12345678901234567890	#	12345678901234567890
0	XX NONE	1	XX ENGINE BRK LOW
2	XX ENGINE BRK MED	3	XX AUX SHTDWN#1
4	XX AUX SHTDWN#2	5	XX PARK BRK/ISD
6	XX IDLE VALID	7	XX N/A
8	XX PRS/RPM MODE	9	XX TPS INHIBIT
10	XX RPM SYNC	11	XX RPM FREEZE
12	XX ENGINE RATE SW1	13	XX ENGINE RATE SW2
14	XX 2ND TQ CURVE	15	XX DIAG REQUEST
16	XX ALT MIN VSG	17	XX SERV BRK REL
18	XX CLUTCH REL	19	XX SET/COASTOFF
20	XX SET/COAST ON	21	XX RES/ACCELOFF
22	XX RES/ACCEL ON	23	XX CRUZ ENABLE
24	XX PGS SYS ENAB	25	XX SEO/DIAG REQ
26	XX ENGINE BRK DISA	27	XX N/A
28	XX DUAL THROTT	29	XX A/C PRESSURE
30	XX N/A	31	XX AUX CLS
32	XX FAN OVERRIDE		

TABLE 2-22

ECM Output Options

#	12345678901234567890	#	12345678901234567890
0	XX NONE	1	XX ENGINE BRK LOW
2	XX ENGINE BRK MED	3	XX LO DDEC VOLT
4	XX RPM SYNC LT	5	XX PGS ACTIVE
6	XX VEH PWR DOWN	7	XX STRT LOCKOUT
8	XX EXT ENGINE BRK	9	XX TRANS RET
10	XX COOL LOW LT	11	XX CRUZ ACTIVE
12	XX N/A	13	XX FAN CNTRL#1
14	XX FAN CNTRL#2	15	XX DECEL LT
16	XX ENGINE BRK ACT	17	XX VSG ACTIVE

TABLE 2-23

Transmission Options

#	12345678901234567890	#	12345678901234567890
0	J3 MANUAL	1	J3 ALLISON HYD
2	J3 N/A	3	J3 VOITH AUTO
4	J3 Z–F ECOMAT	5	J3 CEEMAT
6	J3 RENK	7	J3 N/A
8	J3 ELECTRIC DRIVE	9	3 ALLISON ELECT
10	J3 MARINE GEAR	11	J3 NO TRANSMISSION
12	J3 ALLISION WT	13	J3 N/A
14	J3 AUTOMATIC		

TABLE 2-24

PWM Function Options

#	12345678901234567890	#	12345678901234567890
0	XX NONE	1	XX BYPASS BLOWER
2	XX GLOW PLUGS	3	XX THROTTLE POS
4	XX FINAL TORQUE	5	XX PWR TRAIN DEMAND
6	XX FAN CONTROL		

TABLE 2-25

Injector Numbering

SIDS	FIRING ORDER	CYLINDER
S001	1	3 Right
S002	2	3 Left
S003	3	4 Right
S004	4	4 Left
S005	5	2 Right
S006	6	2 Left
S007	7	1 Right
S008	8	1 Left

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

D. FUEL INJECTOR INFORMATION

Fuel Injector Menu Selections are defined as follows:

– Cylinder Cutout
– Response Times
– View Injector Calibration
– Update Injector Calibration

D.1 CYLINDER CUTOUT

The cylinder cutout function provides a test method to locate a injector whose pulse width output is different from the others. This is done by cutting out one injector at a time and comparing the resulting injector pulse width with the no cut-out pulse width established before the first cylinder was cutout.

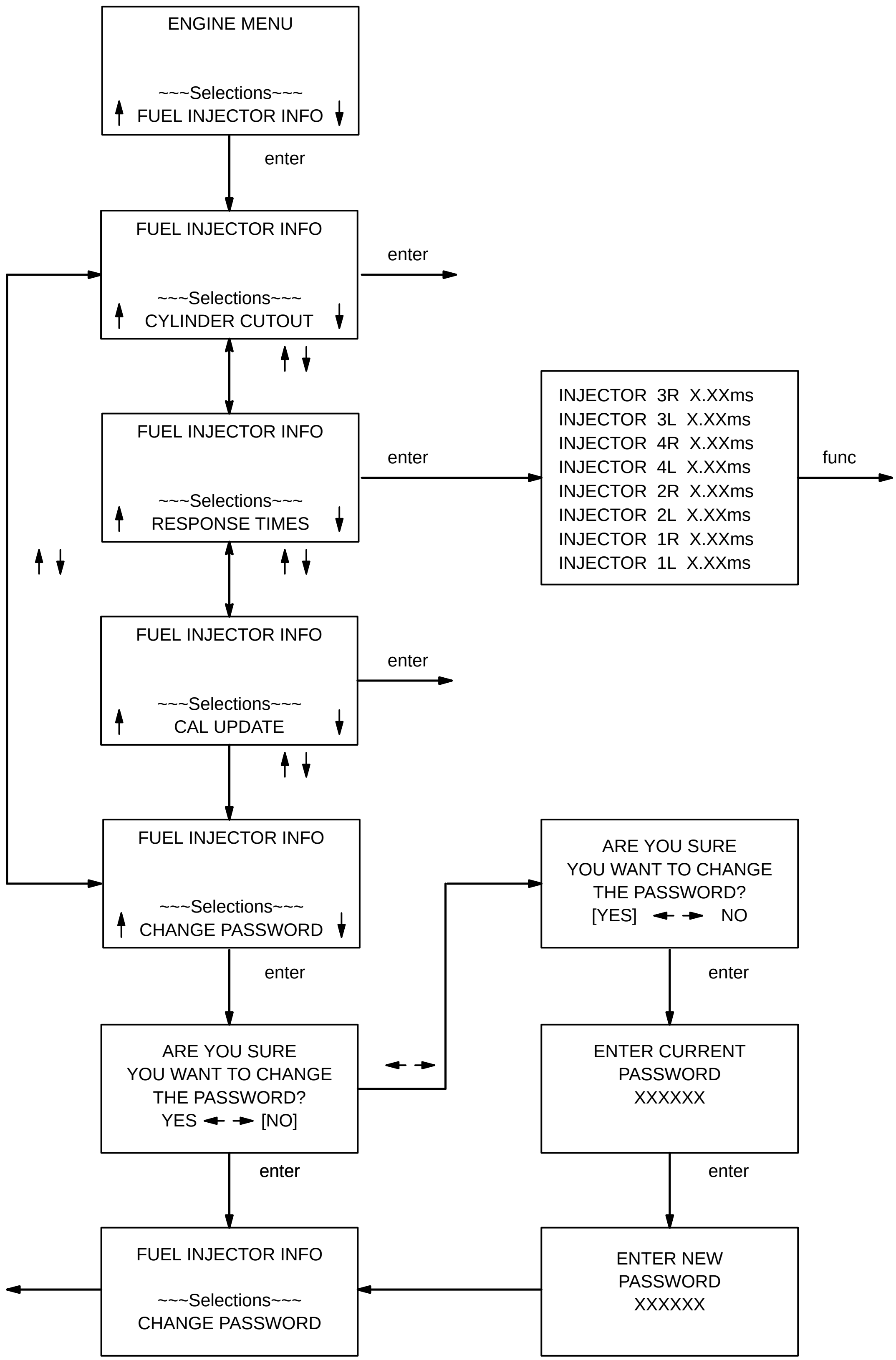
Cylinder cutout test options:

(1) Run New Test or Review Last Results
(2) Select RPM Setting: IDLE or 1000 RPM
(3) Automatic Test or Manual Test

D.2 RESPONSE TIMES

The injector solenoid response times are defined as the time it takes from when the DDEC III ECM requests an injector be turned on to when the injector solenoid valve actually closes.

Injector response times generally increase with low battery supply voltage and decrease with high battery supply voltage. Although injector response times vary from injector to injector at a given RPM, each individual injector response time should remain relatively consistent from one firing to the next. Wide variations in response time (typically +/– 0.2 msec) for one injector at a steady RPM may indicate an electrical problem (faulty alternator or voltage regulator, poor or broken ground cables, etc.).



ENGINE MENU
~~~Selections~~~
FUEL INJECTOR INFO
enter
FUEL INJECTOR INFO
~~~Selections~~~
CYLINDER CUTOUT
enter
FUEL INJECTOR INFO
~~~Selections~~~
RESPONSE TIMES
enter
INJECTOR 3R X.XXms
INJECTOR 3L X.XXms
INJECTOR 4R X.XXms
INJECTOR 4L X.XXms
INJECTOR 2R X.XXms
INJECTOR 2L X.XXms
INJECTOR 1R X.XXms
INJECTOR 1L X.XXms
func
FUEL INJECTOR INFO
~~~Selections~~~
CAL UPDATE
enter
FUEL INJECTOR INFO
~~~Selections~~~
CHANGE PASSWORD
ARE YOU SURE
YOU WANT TO CHANGE
THE PASSWORD?
[YES] NO
enter
ARE YOU SURE
YOU WANT TO CHANGE
THE PASSWORD?
YES [NO]
ENTER CURRENT
PASSWORD
XXXXXX
enter
enter
FUEL INJECTOR INFO
~~~Selections~~~
CHANGE PASSWORD
ENTER NEW
PASSWORD
XXXXXX

FIGURE 2-13

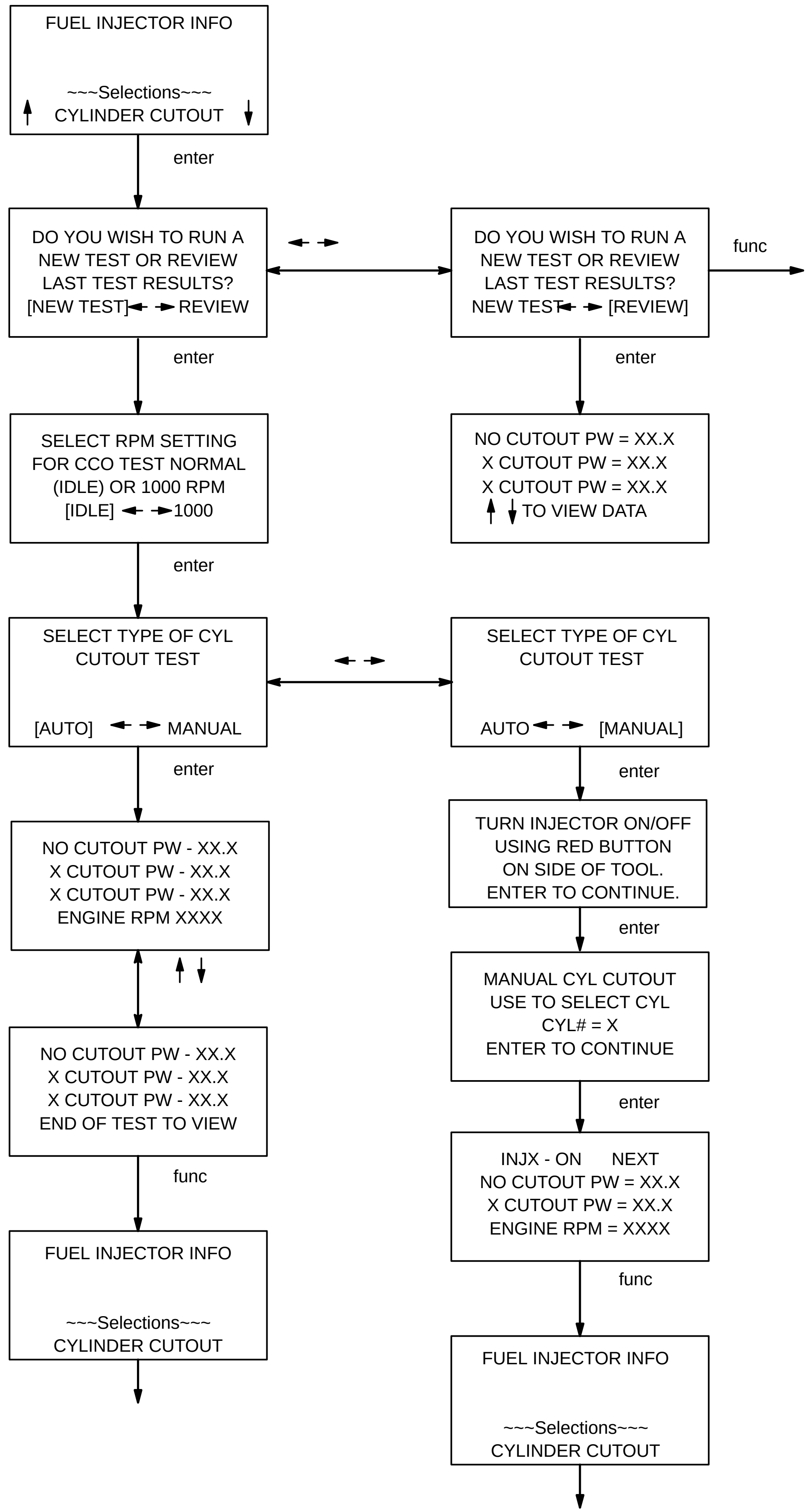

FUEL INJECTOR INFO
~~~Selections~~~
CYLINDER CUTOUT
enter
DO YOU WISH TO RUN A NEW TEST OR REVIEW LAST TEST RESULTS?
[NEW TEST] REVIEW
DO YOU WISH TO RUN A NEW TEST OR REVIEW LAST TEST RESULTS?
NEW TEST [REVIEW]
func
enter
enter
SELECT RPM SETTING FOR CCO TEST NORMAL (IDLE) OR 1000 RPM
[IDLE] 1000
NO CUTOUT PW = XX.X
X CUTOUT PW = XX.X
X CUTOUT PW = XX.X
TO VIEW DATA
enter
SELECT TYPE OF CYL CUTOUT TEST
[AUTO] MANUAL
SELECT TYPE OF CYL CUTOUT TEST
AUTO [MANUAL]
enter
enter
NO CUTOUT PW - XX.X
X CUTOUT PW - XX.X
X CUTOUT PW - XX.X
ENGINE RPM XXXX
TURN INJECTOR ON/OFF USING RED BUTTON ON SIDE OF TOOL. ENTER TO CONTINUE.
enter
MANUAL CYL CUTOUT USE TO SELECT CYL
CYL# = X
ENTER TO CONTINUE
NO CUTOUT PW - XX.X
X CUTOUT PW - XX.X
X CUTOUT PW - XX.X
END OF TEST TO VIEW
enter
INJX - ON NEXT
NO CUTOUT PW = XX.X
X CUTOUT PW = XX.X
ENGINE RPM = XXXX
func
func
FUEL INJECTOR INFO
~~~Selections~~~
CYLINDER CUTOUT
FUEL INJECTOR INFO
~~~Selections~~~
CYLINDER CUTOUT

FIGURE 2-14
~~~

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont'd)

D.3 VIEW INJECTOR CALIBRATION

The injector calibration codes are used by the DDEC III ECM to equalize the engine injector outputs. This compensation, obtained from properly programmed calibration codes, allows the DDEC III ECM to perform optimum cylinder to cylinder power balancing.

NOTES:

(1) The engine cylinder numbers use TABLE 2-25 (Injector Numbering) page 2-799 to identify the appropriate injector cylinder calibration code.

(2) Each injector typically has a unique calibration code which is physically indicated on the injector label.

INJECTOR CAL CODE: – CYL #XXX CAL XX
Definition: Indicates the injector calibration that is currently programmed in the ECM.
Typical Range: CYL(#1 to # of cylinders) / CAL(0 to 99)

LAST UPDATE:
Definition: Indicates the engine hours of the last injector calibration update.
Typical Range: 0 to 65000 Hours

TOOL ID#:
Definition: Indicates the tool indentification number used for last injector cal update.
Typical Range: 8 ASCII Characters

 # OF CHANGES:
Definition: Indicates the total number of injector calibration updates.
Typical Range: 0 to 255

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

D.4 UPDATE INJECTOR CALIBRATION

The Update Calibration selection allows the reprogramming of the injector calibration codes.

NOTES:

(1) The engine cylinder numbers use TABLE 2-25 (Injector Numbering) page 2-799 to identify the appropriate injector cylinder calibration code.

(2) Each injector typically has a unique calibration code which is physically indicated on the injector label.

REPROGRAM INJ CAL: – CYL #XXX CAL XX
Typical Range: CYL(#1 to # of cylinders) CAL(0 TO 99)

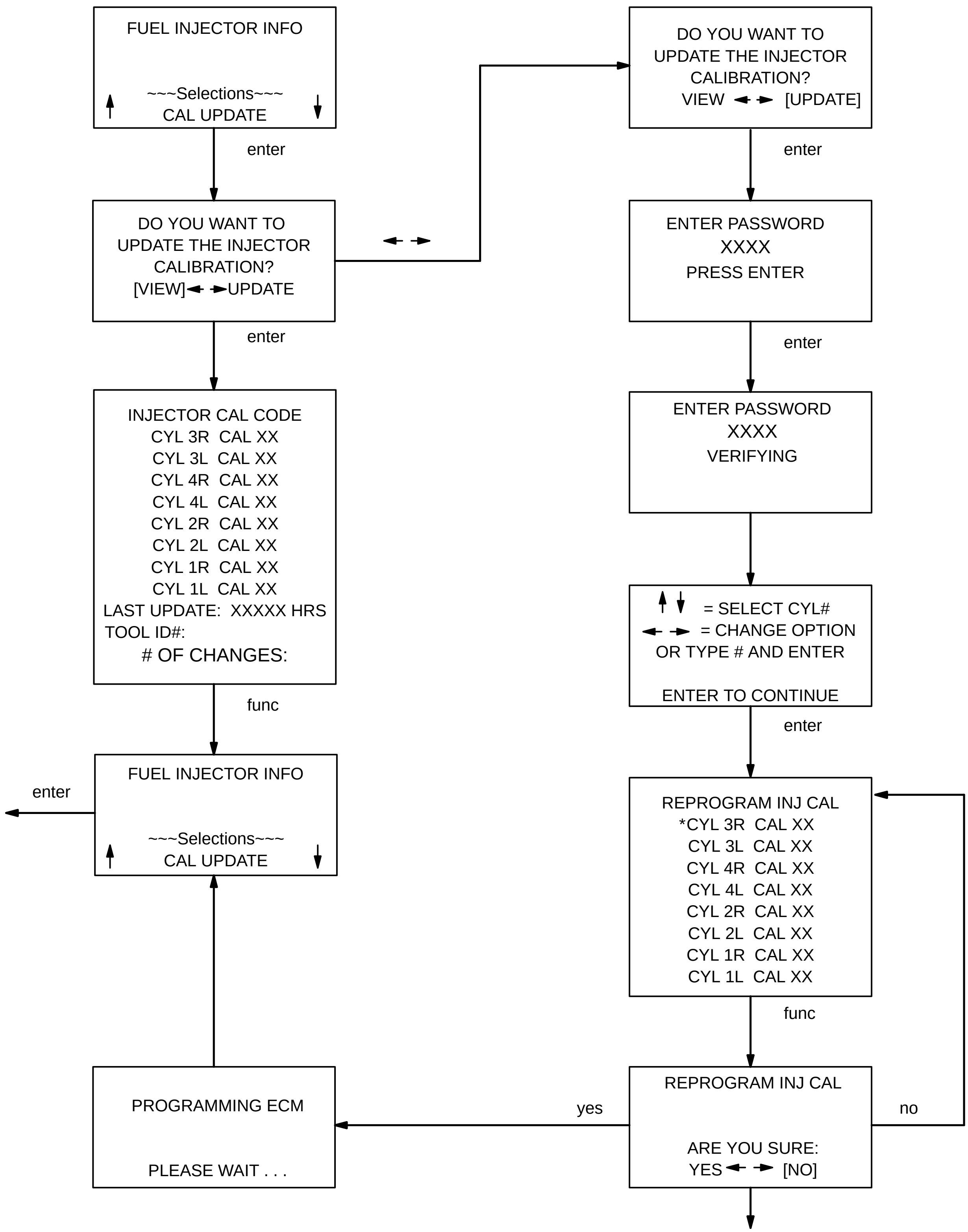

FUEL INJECTOR INFO
~~~Selections~~~
CAL UPDATE
enter
DO YOU WANT TO
UPDATE THE INJECTOR
CALIBRATION?
[VIEW] UPDATE
enter
INJECTOR CAL CODE
CYL 3R CAL XX
CYL 3L CAL XX
CYL 4R CAL XX
CYL 4L CAL XX
CYL 2R CAL XX
CYL 2L CAL XX
CYL 1R CAL XX
CYL 1L CAL XX
LAST UPDATE: XXXXX HRS
TOOL ID#:
OF CHANGES:
func
FUEL INJECTOR INFO
~~~Selections~~~
CAL UPDATE
enter
PROGRAMMING ECM
PLEASE WAIT . . .
DO YOU WANT TO
UPDATE THE INJECTOR
CALIBRATION?
VIEW [UPDATE]
enter
ENTER PASSWORD
XXXX
PRESS ENTER
enter
ENTER PASSWORD
XXXX
VERIFYING
= SELECT CYL#
= CHANGE OPTION
OR TYPE # AND ENTER
ENTER TO CONTINUE
enter
REPROGRAM INJ CAL
*CYL 3R CAL XX
CYL 3L CAL XX
CYL 4R CAL XX
CYL 4L CAL XX
CYL 2R CAL XX
CYL 2L CAL XX
CYL 1R CAL XX
CYL 1L CAL XX
func
REPROGRAM INJ CAL
ARE YOU SURE:
YES [NO]
yes
no

FIGURE 2-15

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

E. SWITCH/LIGHT STATUS

The Switch/Light Status Menu is the set of DDEC III data that describe the operational (ON/OFF) status of the functions assigned to the ECM input and output connector terminals.

NOTES:

(1) The connector cavity designations describe the physical locations of the assigned functions.

(2) The DDR displays the assigned function text as described in Table 2-21 (Vehicle Switch Input Options) and Table 2-22 (ECM Output Options) on page 2-798.

(3) 'N/A' will be displayed if a function number of (0 = NONE) has been assigned to any of the connector cavities.

(4) 'ON' indicates that the input switch or output function is active.

(5) Menu items that are not applicable (N/A) to PLS are not shown in the following charts.

ECM INPUT SWITCHES

G1 DIAG REQUEST
Definition: Indicates the operational status of the switch input at vehicle connector cavity G1 (diagnostic request switch).
Typical Range: ON or OFF

ECM OUTPUTS STATUS

CHECK ENG LT
Definition: Indicates the operational status of the **check engine** light.
Typical Range: ON or OFF

STOP ENG LT
Definition: Indicates the operational status of the **check gauges** light.
Typical Range: ON or OFF

A1 EXT BRK ENAB
Definition: Indicates the operational status of the output at the vehicle connector cavity A1 (engine brake enable).
Typical Range: ON or OFF

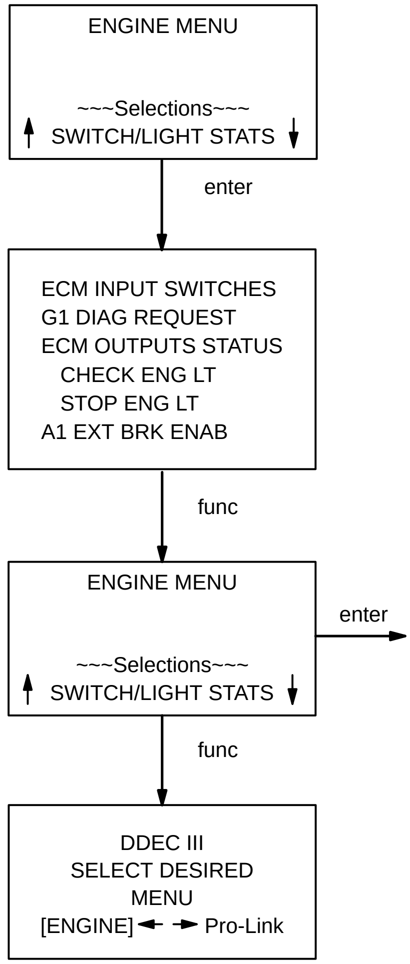

ENGINE MENU
~~~Selections~~~
SWITCH/LIGHT STATS
enter
ECM INPUT SWITCHES
G1 DIAG REQUEST
ECM OUTPUTS STATUS
CHECK ENG LT
STOP ENG LT
A1 EXT BRK ENAB
func
ENGINE MENU
enter
~~~Selections~~~
SWITCH/LIGHT STATS
func
DDEC III
SELECT DESIRED
MENU
[ENGINE] Pro-Link

FIGURE 2-16

2-14. DDEC III TROUBLESHOOTING (CONT).

Section V. DIAGNOSTIC DATA READER INFORMATION (Cont.)

F. MID MESSAGES BEING RECEIVED

This menu selection indicates the Message IDentifiers (MIDs) that the DDEC III has acknowledged as received.

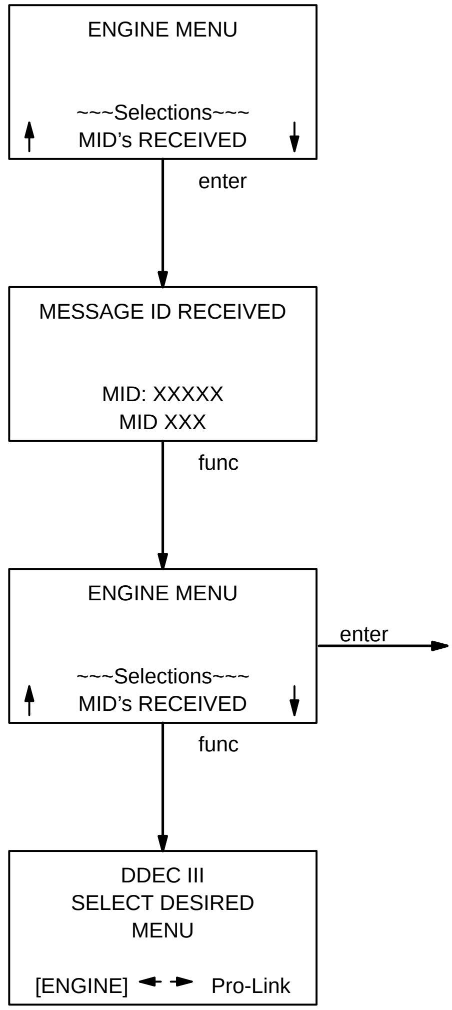

ENGINE MENU
~~~Selections~~~
MID's RECEIVED
enter
MESSAGE ID RECEIVED
MID: XXXXX
MID XXX
func
ENGINE MENU
~~~Selections~~~
MID's RECEIVED
enter
func
DDEC III
SELECT DESIRED
MENU
[ENGINE]
Pro-Link

FIGURE 2-17

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9911810

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE
1 Centimeter=10 Millimeters=0.01 Meters=0.3937 Inches
1 Meter=100 Centimeters=1000 Millimeters=39.37 Inches
1 Kilometer=1000 Meters=0.621 Miles

WEIGHTS
1 Gram=0.001 Kilograms=1000 Milligrams=0.035 Ounces
1 Kilogram=1000 Grams=2.2 Lb
1 Metric Ton=1000 Kilograms=1 Megagram=1.1 Short Tons

LIQUID MEASURE
1 Milliliter=0.001 Liters=0.0338 Fluid Ounces
1 Liter=1000 Milliliters=33.82 Fluid Ounces

SQUARE MEASURE
1 Sq Centimeter=100 Sq Millimeters=0.155 Sq Inches
1 Sq Meter=10,000 Sq Centimeters=10.76 Sq Feet
1 Sq Kilometer=1,000,000 Sq Meters=0.386 Sq Miles

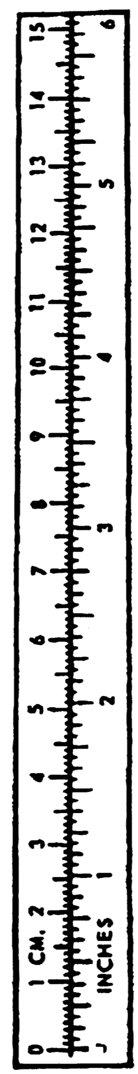
CUBIC MEASURE
1 Cu Centimeter=1000 Cu Millimeters=0.06 Cu Inches
1 Cu Meter=1,000,000 Cu Centimeters=35.31 Cu Feet

TEMPERATURE
5/9 (°F − 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° + 32 = F°

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds/Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Km per Liter	Miles per Gallon	2.354
Km per Hour	Miles per Hour	0.621



PIN: 072628-000