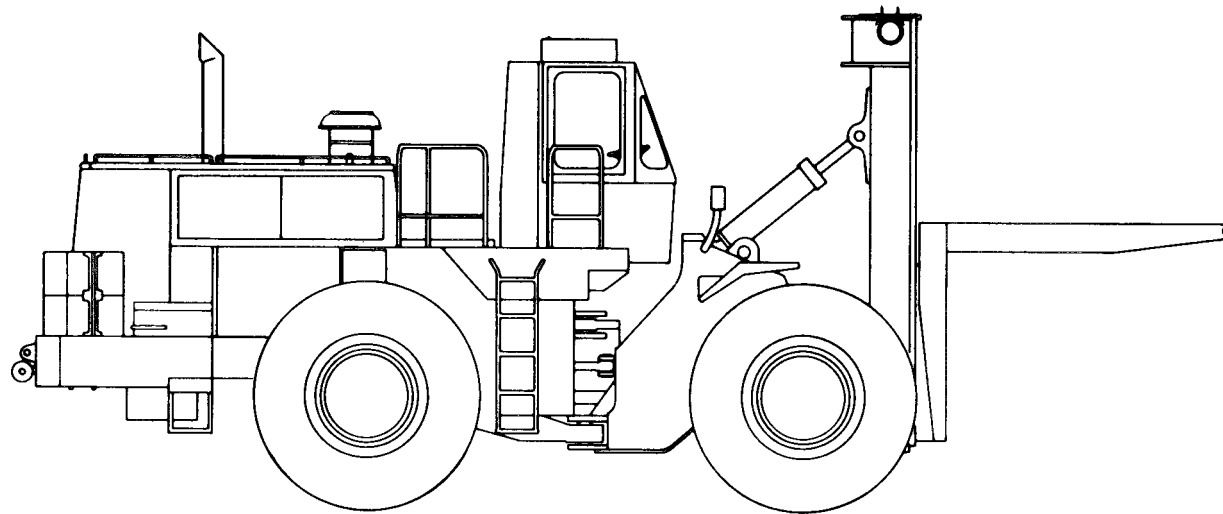


TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL



**TRUCK, CONTAINER HANDLER
ROUGH TERRAIN, 50,000 LB CAPACITY
DED, PT, NSN 3930-01-082-3758
WITH TOPHANDLER(S)**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1981

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 18 July 1989

ORGANIZATIONAL MAINTENANCE MANUAL

**TRUCK, CONTAINER HANDLER: ROUGH TERRAIN
50,000 LB CAPACITY, DED, PT
NSN 3930-01-082-3758 WITH TOPHANDLER(S)**

TM 10-3930-641-20, 26 June 1981, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page and by a vertical bar adjacent to the TA number.

Remove pages

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1-1 and 1-2
2-3 and 2-4
2-11 and 2-12
2-23 and 2-24
2-391 and 2-392
None
2-513 and 2-514
A-1 and A-2
B-17 through B-20
B-25 and B-26
INDEX-5 and INDEX-6

Insert pages

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2-23 and 2-24
2-391 and 2-392
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2-513 and 2-514
A-1 and A-2
B-17 through B-20
B-25 and B-26
INDEX-5 and INDEX-6

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

CARL E. VUONO
General, United States Army
Chief of Staff

Distribution:

To be distributed in accordance with D.A Form 12-25F, Unit maintenance requirements for Truck, Container Handler, 50,000 LB capacity, Rough Terrain.

WARNING

If you sustain any injuries, no matter how slight, follow the first aid procedures outlined in FM 21-11.

WARNING**CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU**

Carbon monoxide is without color or smell, but can kill you. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no air movement. Precautions must be followed to insure crew safety when the personnel heater, main or auxiliary engine of any vehicle is operated for any purpose.

1. DO NOT operate personnel heater or engine of vehicle in a closed place unless the place is well-ventilated.
2. DO NOT idle engine for long periods.
3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purpose.
4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE personnel compartment. If symptoms persist, remove affected person to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration.

FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

5. BE AWARE: the field protective mask for nuclear-biological-chemical (NBC) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

Go on to Sheet 2

WARNING

Use caution when removing radiator filler cap. Steam can cause injury. Do not allow inhibitor to contact skin or eyes. It contains alkali.

Clear area of personnel, obstructions before activating vehicle.

Brake system is under pressure. Relieve pressure before loosening lines. Stop vehicle on level ground. Apply parking brake and shut off engine. Pump brake pedal several times until no pressure remains. This will relieve pressure in brake lines.

Hydraulic system is under pressure. Release pressure by lowering mast and moving hydraulic levers. Remove oil filler cap slowly. Release hydraulic pressure before loosening hydraulic lines.

Use extreme caution when installing jacking device. Do not let jack, beam, or engine slip. Serious injury could result.

Use solvents only in well ventilated areas. Fumes may be dangerous.

WARNING

Do not smoke or have open flames or sparks around fuel lines.

Do not smoke or have open flame or sparks near batteries. Sparks can cause battery gases to explode.

Be careful when working around an engine that is running. Do not touch hot exhaust system components.

Wear face shield and protective clothing to prevent injury when using pressure air or water. Use 30 psi (207 kPa) maximum for cleaning.

Be certain ether starting aid cannister is removed from vehicle before shipment or storage.

Be careful not to drip electrolyte on you or equipment. If electrolyte spills on you, splash affected areas with water to flush electrolyte. Get medical attention at once.

When jacking, be sure the vehicle is on level ground. Put blocks in front of and behind each wheel so vehicle does not move.

Stand behind vehicle when inflating tires. Use self-attaching air chuck.

End

b

TECHNICAL MANUAL }
NO.10-3930-641-20 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 26 June 1981

ORGANIZATIONAL MAINTENANCE MANUAL

TRUCK, CONTAINER HANDLER: ROUGH TERRAIN
50,000 LB CAPACITY, DED PT
NSN 3930-01-082-3758 WITH TOPHANDLER(S)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and *Blank Forms*), or DA Form 2028-2, located in the back of this manual, direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

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CHAPTER 1

Section I. GENERAL INFORMATION

SCOPE

This manual is for your use in performing organizational maintenance of the Rough Terrain Container Handler (RTCH).

MAINTENANCE FORMS, RECORDS AND REPORTS

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

REPORTING OF EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

EIR can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply tell why the design is unfavorable or why a procedure is difficult. EIR may be submitted on SF 368 (Quality Deficiency Report). Mail directly to Commander, U.S. Army Tank-Automotive Command, Warren, MI 48397-5000, ATTN: AMSTA-QRD. We'll send you a reply.

WARRANTY INFORMATION

The Rough Terrain Container Handler is warranted by Caterpillar Tractor Co. for 15 months or 1500 hours of operation, whichever comes first. Warranty starts on the date found on DA Form 2408-9 in the log book. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

PREPARATION FOR STORAGE OR SHIPMENT

Refer to Chapter 2, Section VII of this manual for requirements for storage or shipment, including administrative storage.

Section II. EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES

(Sheet 1 of 1)

PURPOSE

1. Handles ISO (International Standards Organization) designation 1A or IC cargo containers or Sealand Containers.
2. Handles and stacks containers.
3. Loads and unloads flatbed trailers and rail cars.
4. Makes over-the-shore landings.

CAPABILITIES AND FEATURES

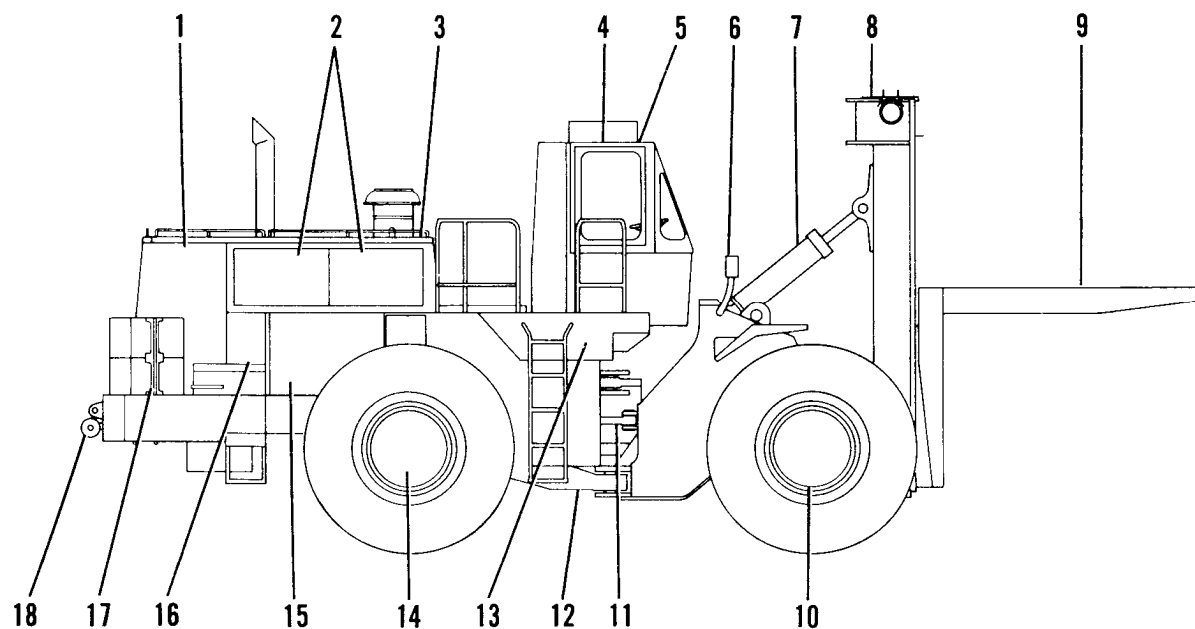
1. Operates over rough terrain - including beaches, snow, mud and cross country.
2. Fords up to 60 inches (152 cm) of salt water.
3. Comes with a 20 ft (6.1 m) tophandler and may also have a 35 ft (10.6 m) or 40 ft (12.2 m) tophandler.
4. Raises, lowers, tilts forward or backward, sideshifts or sidetilts a container load.
5. Lifts a load from 12 in. (30 cm) below ground level to 118 in. (300 cm) above ground level (measured to bottom of container)
6. Articulated (bends in center) for easy load handling.

End

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

(Sheet 1 of 3)

1. RADIATOR - For cooling system. Grille faces rear.
2. UPPER ENGINE ACCESS PANELS - Two on each side. Hinged for easy access.
3. HOOD - Two-piece, can be removed.
4. OPERATOR'S CAB - Equipped with rollover protective structure (ROPS).
5. AUXILIARY HEADLIGHT - One on each side of cab.
6. LIGHTS - High beam and low beam on each side of cab.
7. TILT CYLINDER - One on each side. Tilts the mast forward and backward.
8. MAST - Moves to position the container w,
9. FORKS - Mount and secure the tophandlers.
10. FRONT WHEELS, AXLES AND FINAL DRIVES.
11. STEERING CYLINDER - One on each side.
12. HITCH - Articulated for easy steering maneuverability.



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Go on to Sheet 2

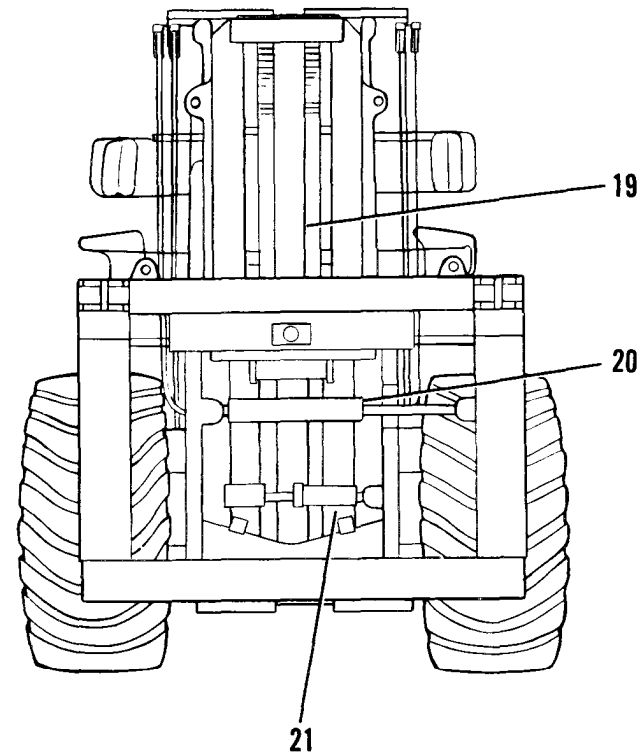
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

(Sheet 2 of 3)

- 13. HYDRAULIC TANK (SEE p. 1-4) - On right side of vehicle
or
FUEL TANK - On left side of vehicle.
- 14. REAR WHEELS, FINAL DRIVES AND AXLES.
- 15. LOWER ENGINE ACCESS PANELS - one on each side of engine. Remove for access.

- 16. BATTERY BOX - Two batteries cm each side of vehicle.
- 17. COUNTERWEIGHT - Provides stability when handling load.
- 18. TOWING PINTLE - For towing operations.

- 19. LIFT CYLINDER - Raises and lowers the mast.
- 20. SIDE SHIFT CYLINDER - Shifts forks and tophandler to the side.
- 21. SIDE TILT CYLINDER - Rotates forks and tophandler.



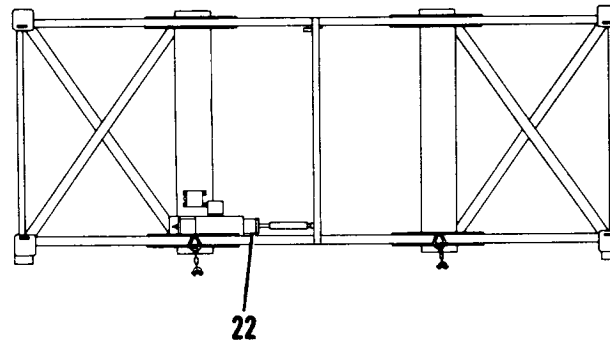
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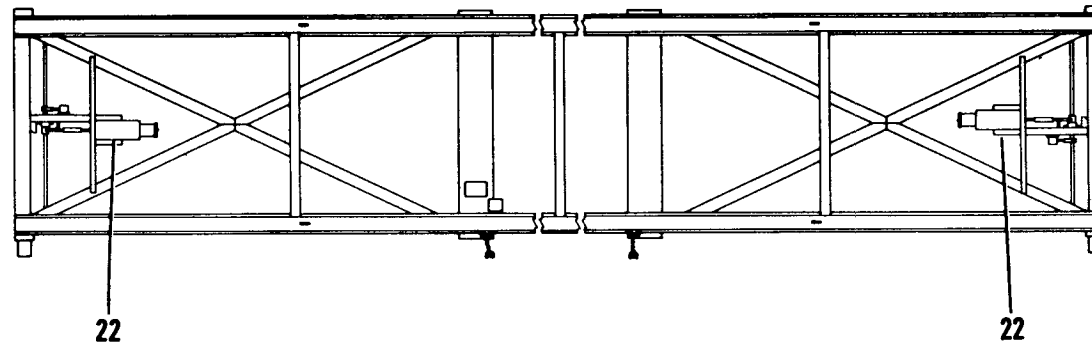
22. CONTAINER LOCK CYLINDER -

- 1 on 20 ft (6 m) tophandler,
- 2 on 35 ft (10.7 m) and 40 ft (12 m) tophandler.

Rotates locks to secure container to tophandler.



20 FT TOPHANDLER



35 FT OR 40 FT TOPHANDLER

PERFORMANCE DATA

(Sheet 1 of 3)

ENGINE

Model Caterpillar Model 3408T
 Type IX.rectinjection 65° V-8 turbo diesel
 Flywheel horsepower @ 2100 rpm 393
 Kilowatts @ 100 rpm 293
 Torque @1300 rpm 1210 lb-ft
 Engine low idle speed (foot off accelerator) 700 rpm
 Engine high idle speed (accelerator held to floor) 2320 rpm
 Engine operating range Full
 Ignition Type Compression
 Injector timing 28°(BTC)
 Bore 5.4" (137mm)
 Stroke 6" (152mm)
 Displacement 1099 cid (181liters)
 Compression ratio 14-5:1
 Firing order 1-8-4-3-6-5-7-2
 Fuel Diesel No.2
 Weight 3200 lbs(1450 kg)

HYDRAULIC SYSTEM

Type **Closed with vacuum relief**
Pump Single stage
 Type/Output Gear/71 gpm
 Relief valve setting 2500 psi
 Operating pressure 2500 psi
 Weight 107 lbs(49kg)
 Cylinders
 Lift (bore x stroke)10" x 69"
 Tilt (bore x stroke) 7" x 19.25
 Sideshift (bore x stroke) 6" x 24"
 Sidetilt (bore x stroke) ; **6" x 6.5"**
Brakes **All wheel disc**
 Type Full hydraulic oil bath disc
 Braking surface 2300 sq. in. x 4
 Pump type Gear
 Output 28 gpm @1000 psi
 Relief valve setting 2200 psi
 Weight 70 lbs (31.752 kg)

Go onto Sheet 2

PERFORMANCE DATA (CONT)

(Sheet 2 of 3)

Steering Center point frame articulation
 Type Full hydraulic
 Steering angle (each direction) 27°
 Pump type Gear
 Output 101 gpm @ 1000 psi
 Relief valve setting 2500 psi
 Operating pressure 2500 psi
 Weight 107 lbs (49kg)

Electrical
 Batteries Lead-acid
 Quantity 4
 Type 8D
 Voltage (nominal) 24V
 Alternator Integral regulator
 Type Solid state
 Amperage 50A

Transmission and Powertrain
 Type Power shift planetary
 Transmission reduction ratio

	Forward	Reverse
First	5.6049	4.9043
Second	3.1429	2.7500
Third	1.7751	1.5532
Fourth	1.0000	0.8750
Weight	1756 lbs (796 Kg)	

Transfer case reduction ratio
 Input 1.0256
 Output 1.1795
 Weight 1080 lbs (490 Kg)
 Final drive reduction ratio 5.0526
 Bevel gear reduction ratio 3.7500
 Axle oscillation
 Front Fixed
 Rear ±13°

Go on to Sheet 3

PERFORMANCE DATA (CONT)

(Sheet 3 of 3)

Tires

Type Radial
 Size 35/65-R33
 Inflation pressure
 Front 70 psi
 Rear 40 psi
 Weight (tire and rim) 3000 lbs. (1361 Kg)

General

Shipping weight
 Operational weight 105,120lbs (47,680 Kg)
 Without container handler 103,230 lbs (46,830 Kg)
 With 20' container handler 107,030 lbs (48,550 Kg)
 With 35' container handler 112,350lbs (50,960 Kg)
 With 40' container handler 113,160 lbs (51,330 Kg)

Performance

Maximum speed	Forward	Reverse
With rated load	14.5 mph	14.9 mph
Without rated load	18.5 mph	19.4 mph

Towing 5 mph for 10 miles maximum
 Maximum grade* 25% @ 2 mph
 Maximum fording depth* 60"
 Maximum side slope* 15°
 Maximum breakover angle* 148°
 Maximum approach angle* 25°
 Maximum departure angle* 20°
 Maximum ground clearance* 16"
 Curb circle clearance 70"
 Tilt cycling time (each direction)* 9 seconds
 Lifting capacity 50,000 lbs. (22,700 Kg)

*Tophandler raised 1 foot. Full back tilt

REFILL CAPACITIES (Approximate)

COMPARTMENT OR SYSTEM	U.S. MEASURE	METRIC MEASURE
Engine Crankcase	11 gal.	42 liters
Hydraulic Tank	78 gal.	295 liters
Transmission	17.5 gal.	66 liters
Differential and Final Drives Front	27 gal.	102 liters
Rear	27 ml.	102 liters
Cooling System	28 gal.	106 liters
Fuel Tank	165 gal.	625 liters

End

Section III. TECHNICAL PRINCIPLES OF OPERATION

This section contains a functional description of operation of these vehicle systems:

Engine lubrication system

Cooling system

Fuel system

Air inlet and exhaust system

Electrical system

Drive system

Brake system

Steering system

Mast hydraulic system

Transmission hydraulic system

The purpose of this section is to provide enough information to allow a maintenance technician to do the job properly.

ENGINE LUBRICATION SYSTEM DESCRIPTION

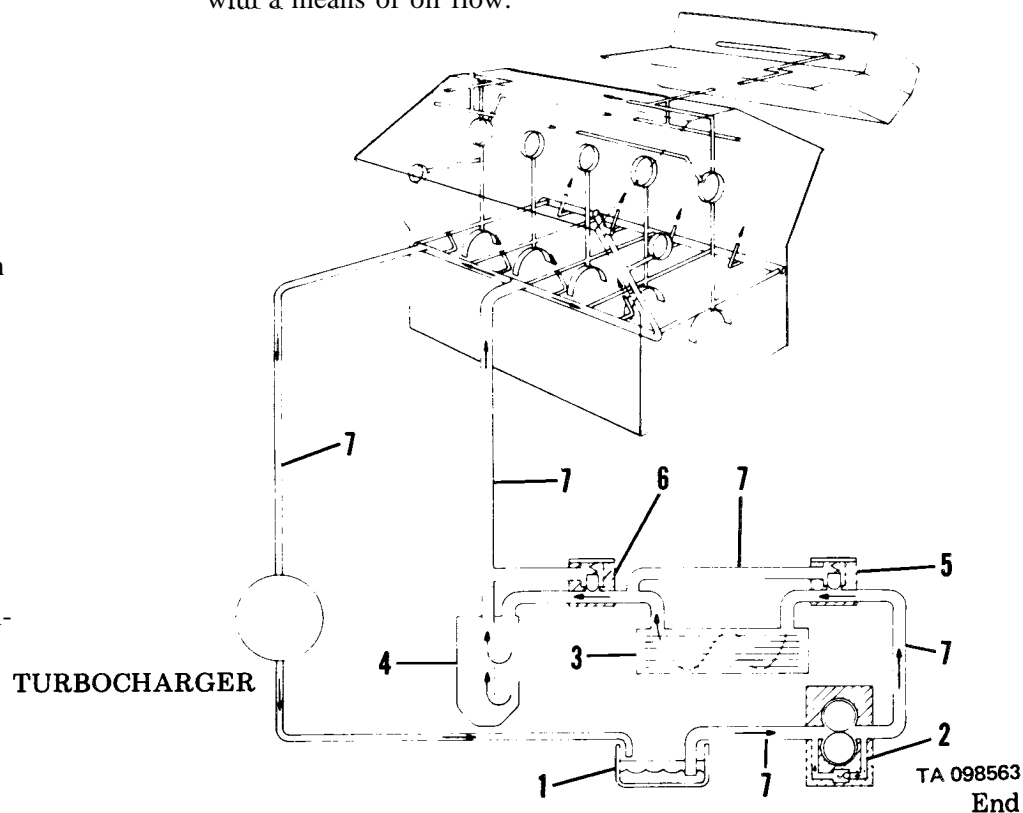
(Sheet 1 of 1)

Engine lubrication system consists ofl

1. Oil pan
2. Oil pump
3. Oil cooler
4. Oil filters
5. Oil cooler bypass valve
6. Oil filter bypass valve
7. Oil lines and passages

5. OIL COOLER BYPASS VALVE. Provides immediate lubrication to the engine when the engine is cold. The valve also provides for continuous lubrication if the oil cooler has a restriction in it.
6. OIL FILTER BYPASS VALVE. Provides immediate lubrication to the engine, for a few seconds, when the engine is started cold. The valve also provides the engine with continuous lubrication when the filters are plugged.
7. OIL LINES AND PASSAGES. Provide the lubrication system with a means of oil flow.

1. OIL PAN. Seals the bottom of the engine and functions as a reservoir for storing engine lubricating oil. A plug is provided in the bottom for draining engine oil.
2. OIL PUMP. A gear-type driven by a gear on the engine crankshaft. The pump's function is to supply the engine lubrication system with oil flow. Oil is pulled from the oil pan and sent to the oil cooler.
3. OIL COOLER. Reduces the temperature of the engine lubricating oil by transferring the heat of the oil to the engine cooling system.
4. OIL FILTERS. Remove foreign particles from the engine lubricating oil.



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End

COOLING SYSTEM DESCRIPTION

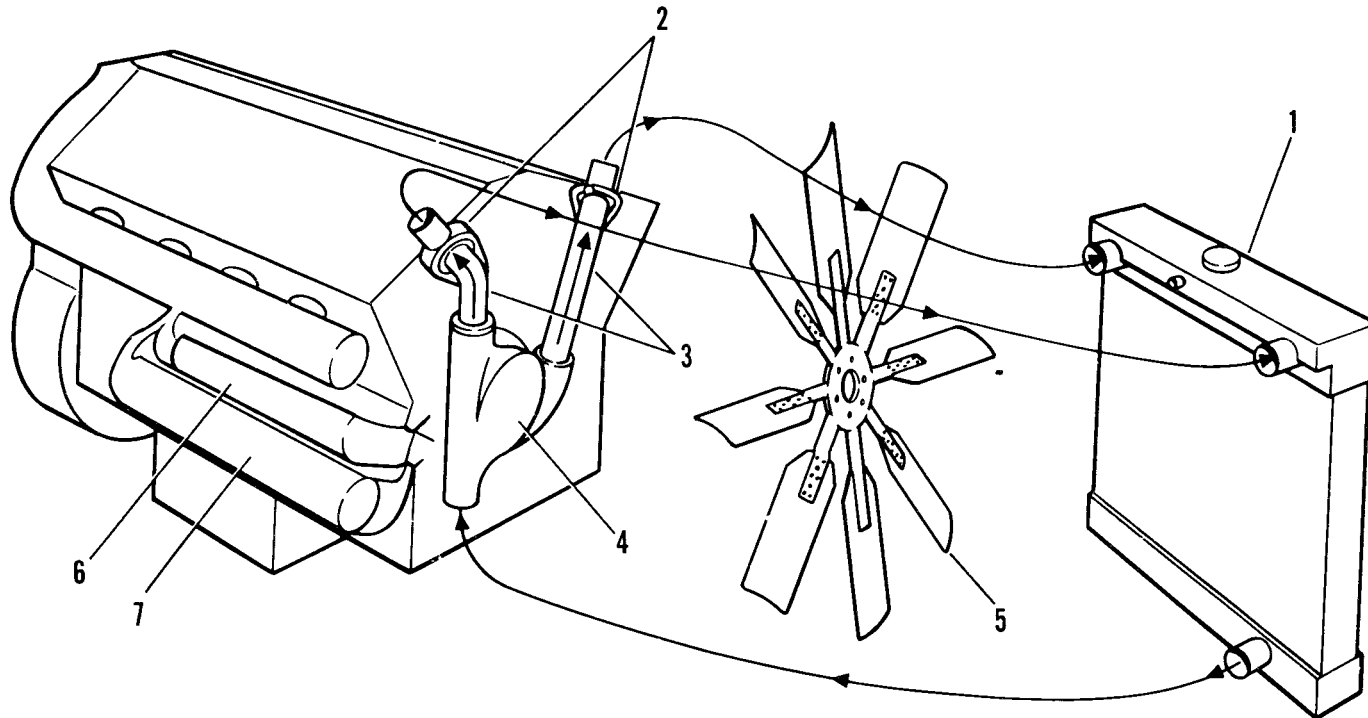
Cooling system components are:

1. Radiator
2. Water temperature regulators
3. Radiator bypass lines
4. Water pump
5. Fan
6. Engine oil cooler
7. Transmission oil cooler

3. RADIATOR BYPASS LINES. Allow the coolant to circulate through the engine block, without going to the radiator.
4. WATER PUMP. Pumps the coolant through the cooling system.
5. FAN. Draws air through the radiator core to remove heat from the coolant.
6. ENGINE OIL COOLER. Cools the engine oil.
7. TRANSMISSION OIL COOLER. Cools the transmission oil.

1. RADIATOR. The radiator is a sealed pressure type radiator. Coolant flows through the inside of the core and is cooled by the action of air flowing through the outside of the core and around the fins.
2. WATER TEMPERATURE REGULATORS. Control the temperature of the coolant by restricting the amount of coolant flow to the radiator. When the engine is cold, the regulators will stop the flow of coolant to the radiator and allow the coolant to recirculate in the cylinder block until it is warm. When the coolant is warm enough the regulators will begin to open, allowing it to flow through the radiator. When the engine is completely warmed up the regulators will allow a full flow of coolant through the radiator to maintain the engine operating temperature.

Go on to Sheet 2



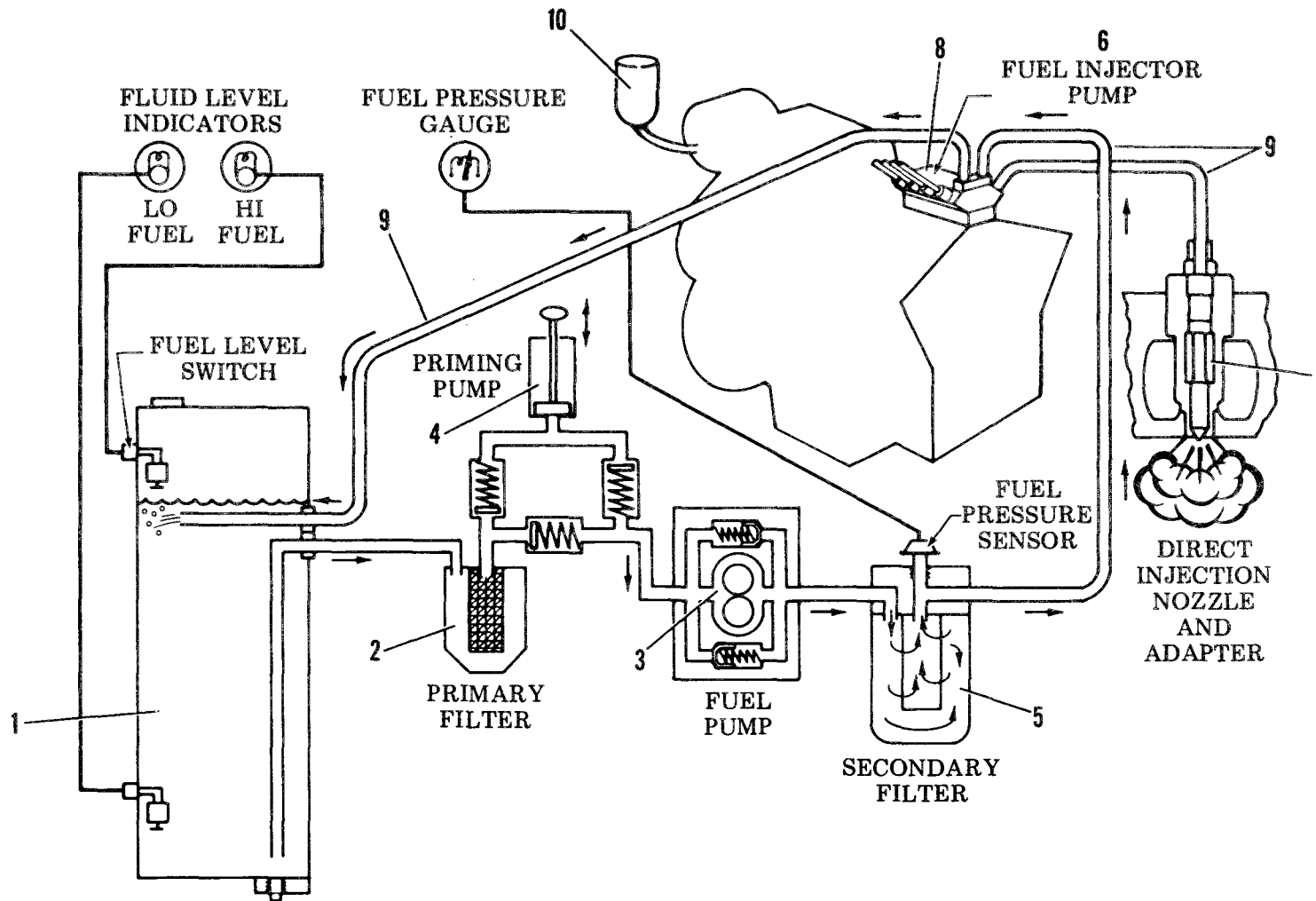
FUEL SYSTEM DESCRIPTION

(Sheet 1 of 2)

The direct injection fuel system consists of:

1. Fuel tank
 2. Primary fuel filter
 3. Transfer pump
 4. Priming pump
 5. Secondary fuel filter
 6. Injection pump
 7. Injection nozzles
 8. Governor
 9. Fuel lines
 10. Ether starting aid
1. FUEL TANK. Located next to the cab on the left side of the vehicle. The capacity of the tank is 165 gal. (625 liters). The tank has a drain valve and drain plug at the bottom and a filler screen and cap at the top.
 2. PRIMARY FUEL FILTER. Filters all fuel coming from the fuel tank before the fuel enters the transfer pump.
 3. TRANSFER PUMP. Sends the fuel to the priming pump, secondary filter and the injection pump.
 4. PRIMING PUMP. Used to prime fuel system on initial startup or after changing fuel filters. The priming pump also removes air from the fuel system.
 5. SECONDARY FUEL FILTER. A final filter before fuel enters injection pump.
 6. INJECTION PUMP. Provides the injection nozzles with a metered, high pressure charge of fuel at a precise time.
 7. INJECTION NOZZLES. Spray the metered amount of fuel from the injection pump into the cylinder for combustion.
 8. GOVERNOR. Controls the amount of fuel needed to keep the desired engine speed. The governor is controlled by the accelerator pedal.
 9. FUEL LINES. Carry fuel from the tank to various components of the fuel system and provide return routes for unused fuel.
 10. ETHER STARTING AID. Delivers a measured amount of ether into the turbocharger inlet for ease in cold weather starting. The ether is stored under pressure in a cylinder and the amount to be sprayed into the inlet is controlled by an electrically activated valve.

Go on to Sheet 2



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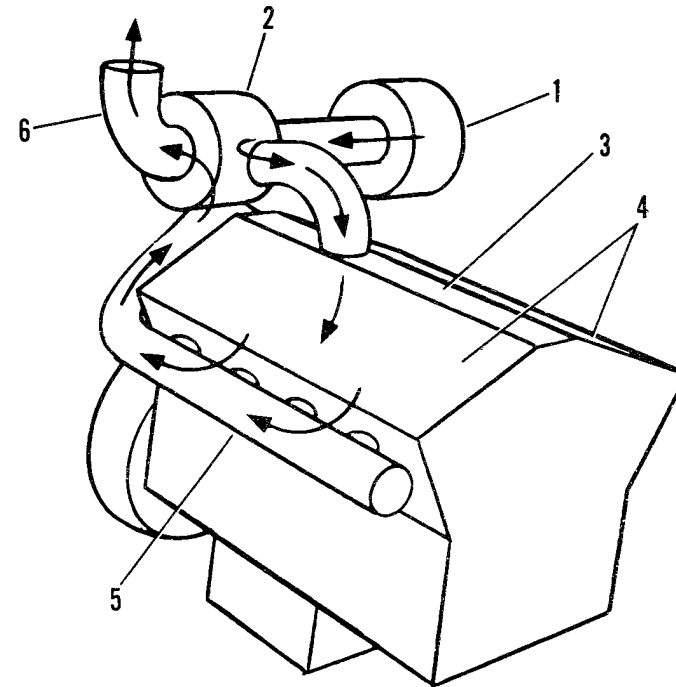
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1-15

AIR INLET AND EXHAUST SYSTEM DESCRIPTION

Air inlet and exhaust system components are:

1. Air cleaner
 2. Turbocharger
 3. Inlet manifold
 4. Cylinder heads
 5. Exhaust manifolds
 6. Exhaust pipe and muffler
1. **AIR CLEANER.** A dual element, dry type. Outside air is drawn through the filter elements by a vacuum created in the turbocharger. When one, or both, of the elements get clogged, a "high vacuum" switch in the air cleaner housing turns on the PLUGGED AIR FILTER indicator on the instrument panel.
 2. **TURBOCHARGER.** Pulls in the clean air from the air cleaner and compresses it. The turbocharger is driven by the engine exhaust gases; the exhaust gases turn the turbine wheel, which causes the compressor wheel to turn. The compressed air then goes to the inlet manifold of the engine.
 3. **INLET MANIFOLD.** The system of passages inside the engine used to guide the compressed air to the cylinders.
 4. **CYLINDER HEADS.** Contain the valves and valve system components which control the flow of inlet air and exhaust gases into and out of the cylinder during engine operation.
 5. **EXHAUST MANIFOLDS.** Carry the exhaust gases from the cylinders to the turbocharger.
 6. **MUFFLER AND EXHAUST PIPE.** Reduces engine noise and carries exhaust gases away from engine compartment.

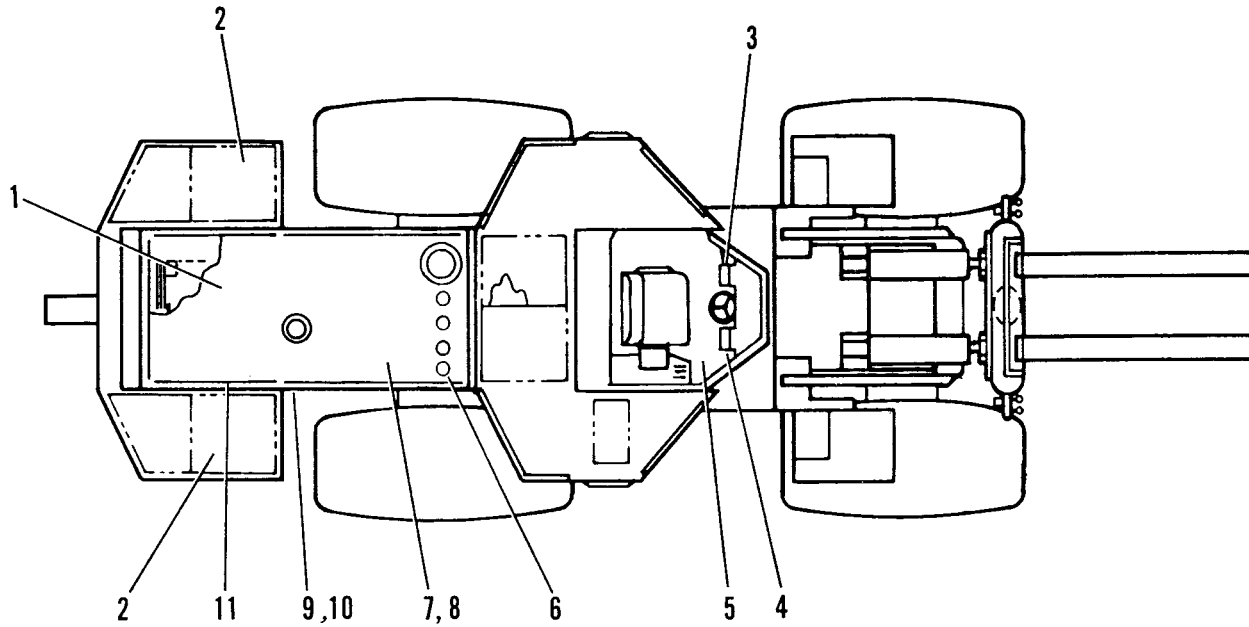


ELECTRICAL SYSTEM DESCRIPTION

The major components of the electrical system are:

1. Engine stop solenoid
 2. Batteries (4)
 3. Left hand instrument panel
 4. Right hand instrument panel
 5. Container lock indicator panel
 6. Ether aid solenoid
 7. Starting motor
 8. Starter solenoid
 9. Engine relay panel
 10. Main disconnect switch
 11. Alternator
 12. Wiring harness.
-
1. ENGINE STOP SOLENOID. Closes the fuel supply to the fuel injection pump when the POWER switch is turned to OFF which stops the engine.
 2. BATTERIES (4). Two sets of 12-volt batteries, one set on each side of the engine near the radiator, are connected in a series-parallel arrangement to provide 24 volts dc to the vehicle electrical system.
 3. LEFT HAND INSTRUMENT PANEL. Contains lights which illuminate to provide visual indication of vehicle operating condition. Also contains light switches, service meter, wiper/washer switch and fuses.
 4. RIGHT HAND INSTRUMENT PANEL. Contains gauges to indicate vehicle operating conditions. Also contains POWER switch and fuses.
 5. CONTAINER LOCK INDICATOR PANEL. contains lights which indicate top handler locked/unlocked condition.
 6. ETHER AID SOLENOID. Opens to allow ether to enter the turbocharger outlet when the START AID switch is pushed during cold weather starting. The ether aid solenoid will not activate if temperature is above 80°F (26.7°C).
 7. STARTING MOTOR. Used to turn the engine fast enough to get the engine running. It is activated only when the starter solenoid contacts are closed.
 8. STARTER SOLENOID. Engages the starter pinion with the flywheel ring gear and closes the starting motor circuit. This happens only when the POWER, switch is turned to START and the transmission is in NEUTRAL.
 9. ENGINE RELAY PANEL. Contains engine harness connectors, engine relays, diodes and circuit breakers in one easily accessed location.

Go on to Sheet 2



12. WIRING HARNESSSES
(NOT SHOWN)

ELECTRICAL SYSTEM DESCRIPTION

(Sheet 3 of 3)

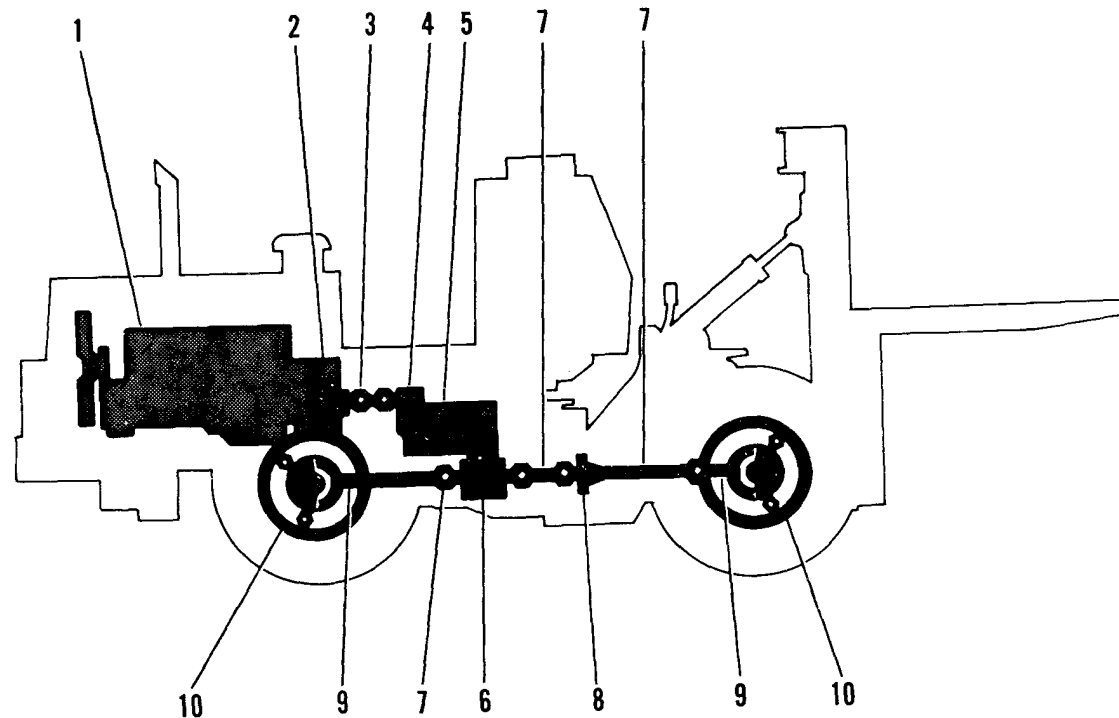
10. **MAIN DISCONNECT SWITCH.** Disconnects the batteries from the rest of the electrical system.
11. **ALTERNATOR.** Makes electricity for the charging circuit. A built-in voltage regulator controls the electrical output to keep the batteries at full charge.
12. **WIRING HARNESS.** Provide a patch for current flow from the batteries through the various components of the electrical system. (Not called out on illustration.)

End

DRIVE SYSTEM DESCRIPTION

Drive system transfers power from the engine to drive the wheels and consists of:

1. Diesel engine
2. Torque converter
3. Upper drive shaft
4. Input transfer gears
5. Transmission
6. Output transfer gears
7. Drive shafts
8. Bearing cage
9. Differential
10. Final drive



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Go on to Sheet 2

DRIVE SYSTEM DESCRIPTION (CONT)

(Sheet 2 of 2)

1. DIESEL ENGINE. Provides mechanical power necessary for drive train. Power is transmitted from engine flywheel to torque converter.
2. TORQUE CONVERTER. Connects the engine power to the drive train, similar to a mechanical clutch.
3. UPPER DRIVE SHAFT. Transmits power from torque converter to the input transfer gears.
4. INPUT TRANSFER GEARS. A system of gears which provides a speed reduction between torque converter and transmission. The output gear of the transfer gears turns the input shaft of the transmission.
5. TRANSMISSION. A hydraulically activated (automatic) type. The transmission has four speed ranges FORWARD and four speed ranges in REVERSE. Both speed and direction are manually selected.
6. OUTPUT TRANSFER GEARS. A system of gears at the output side of the transmission which transmits power from the transmission to the drive shafts.
7. DRIVE SHAFTS (3). A means of transmitting power from:
 - (A) Output transfer gears to the rear differential.
 - (B) Output transfer gears to the bearing cage.
 - (C) Bearing cage to the front differential.
8. BEARING CAGE. Supports the extra universal joint and drive shafts required for articulated steering. Also, it transmits power between drive shafts (2) and (3).
9. DIFFERENTIAL. A gear arrangement that connects and divides the power from the drive shaft to the axle shafts. Dividing the power causes the outside wheel to turn faster than the inside when making a turn. This vehicle is equipped with a front and rear differential; both function in the same manner.
10. FINAL DRIVE. A gear arrangement that causes the last speed reduction and torque increase in the power train. Input power for the final drive is from the axle shaft and the output is the road wheel. There are four final drives on this vehicle, one for each wheel.

End

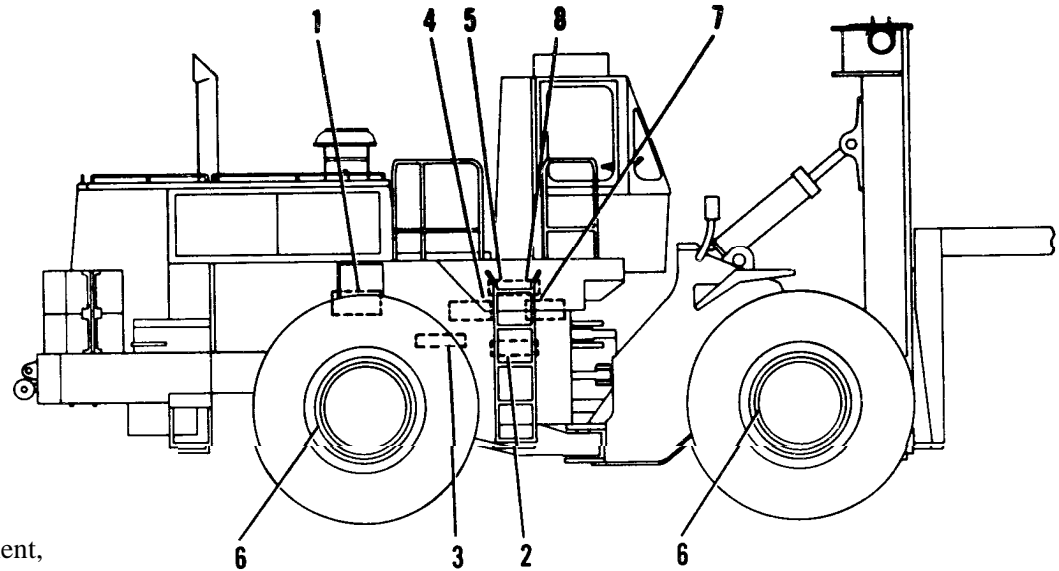
1-21

BRAKE SYSTEM DESCRIPTION

(Sheet 1 of 2)

Brake system consists of:

1. Hydraulic pump (small section)
2. Accumulator charging valve
3. Accumulator
4. Brake control valve
5. Transmission neutralizer control valve
6. Service brakes
7. Emergency and parking brake
8. Emergency and parking brake control valve



1. **HYDRAULIC PUMP (Smaller Section).** Positive displacement, gear-type. Pump driven by the engine, supplies oil to operate brake and implement pilot oil systems. Oil is pumped from hydraulic tank to accumulator charging valve for distribution to the two systems.
2. **ACCUMULATOR CHARGING VALVE.** Distributes flow of oil, from pump, to brake and implement pilot control systems. Contains a check valve and a pressure relief valve. Check valve keeps pressure in accumulator in a constant range of 1950 PSI (137.1 kg/cm²) maximum to 1450 PSI (101.9 kg/cm²) minimum. Pressure relief valve controls maximum oil pressure in accumulator if accumulator charging valve malfunctions.
3. **ACCUMULATOR.** A cylinder which stores pressurized hydraulic oil for brake system. A part in accumulator allows oil to go to brake control valve when either brake pedal is pushed.
4. **BRAKE CONTROL VALVE.** Regulates amount of high pressure oil from the accumulator required to obtain a specific pressure at the wheel brakes. Specific-pressure required is determined by position of either brake pedal.
5. **TRANSMISSION NEUTRALIZER CONTROL VALVE.** Causes transmission to shift into neutral when left brake pedal is pushed. This provides for full engine power to hydraulic system.
6. **SERVICE BRAKES (4).** Oil activated, disc-type. Pushing either brake pedal sends pressurized oil from brake control valve to push against discs and plates in the brake housing, causing friction. This friction causes wheels to turn slower or stop.

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Go on to Sheet 2

7. EMERGENCY AND PARKING BRAKE. (See page 1-22) A spring activated, disc-type. Brake is mounted on the output transfer case. When activated, it prevents output transfer gears from turning. Brake is released by high pressure accumulator oil.

NOTE

If, due to a malfunction in accumulator charging circuit, pressure drops below 700 PSI (49.2 kg/cm²), the brake will automatically be activated.

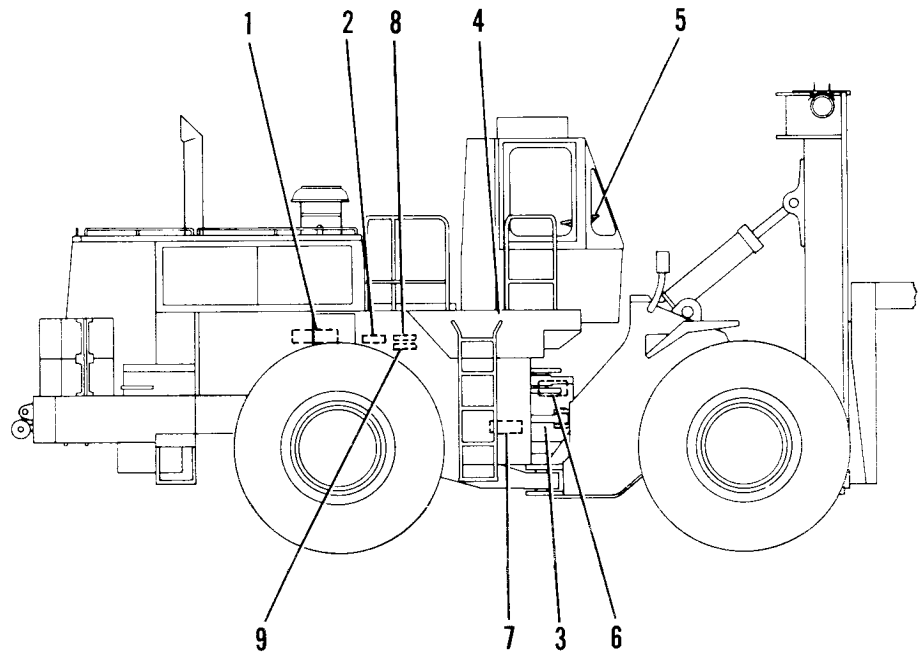
8. EMERGENCY AND PARKING BRAKE CONTROL VALVE. Controls oil flow from accumulator to emergency and parking brake. Valve is manually activated by the operator. Pulling out on parking brake control knob, on right side of steering column, causes brake to be applied. Pushing in cm knob causes brake to release.

STEERING SYSTEM DESCRIPTION

Steering system can be divided into three groups: steering group, pilot group, and supplemental steering group.

A. STEERING GROUP COMPONENTS

1. HYDRAULIC PUMP (Larger Section). A gear-type, driven by the engine. The pump is used to supply hydraulic oil to the steering system. The oil is pulled from the hydraulic tank and pumped to the diverter valve.
9. STEERING CONTROL VALVE. Directs the high pressure oil to one of the two steering cylinders depending on which direction the steering wheel is turned. The control valve is hydraulically activated by the neutralizer valves.
3. STEERING CYLINDERS (2). Are activated by high pressure hydraulic oil from the control valve. When a left turn is being made, the right steering cylinder is activated; when a right turn is being made, the left cylinder is activated.
4. HYDRAULIC TANK. The storage reservoir for all of the hydraulic oil used in the machine except for the transmission and torque converter. An inlet strainer provides filtering when adding or replacing oil to the tank. Also, a filter is built into the tank for filtering all of the oil returning from the hydraulic system.
5. STEERING WHEEL AND COLUMN. Adjustable to eight different positions. Seven of the positions are for operator comfort, while the eighth and most forward is for storing and locking the wheel when not in use. Pushing the wheel into the store position also moves the transmission control lever to NEUTRAL.



6. NEUTRALIZER VALVES (2) Stop the flow of pilot oil to the steering control valve at the end of a complete turn in either direction. This stops the steering action before the machine turns against the frame stops. The valves are normally open, allowing flow through them.

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B. SUPPLEMENTAL STEERING COMPONENTS (See page 1-24)

The supplemental steering system has two purposes:

To give an oil supply for the steering system if there is a failure of the primary system or if the engine stops when the machine is moving.

To add oil to the primary oil flow when the engine rpm is less than 1170 to 1300 rpm and the machine is moving.

7. **SUPPLEMENTAL STEERING PUMP.** A ground driven, gear-type pump. Ground driven means that the pump turns as long as

the machine moves. The pump gets its power from the output transfer gears of the transmission. Its function is to supply oil to the steering system when there is a failure of the primary pump or when the engine stops and the machine is still moving. It also adds oil to the primary oil flow when the engine is turning at less than 1170 to 1300 rpm and the machine is moving.

8. **DIVERTER VALVE.** Senses the pressure and controls the flow direction of the oil from the primary and supplemental pumps.

9. **FLOW SWITCH.** Warns the operator of a failure of the primary pump or lines.

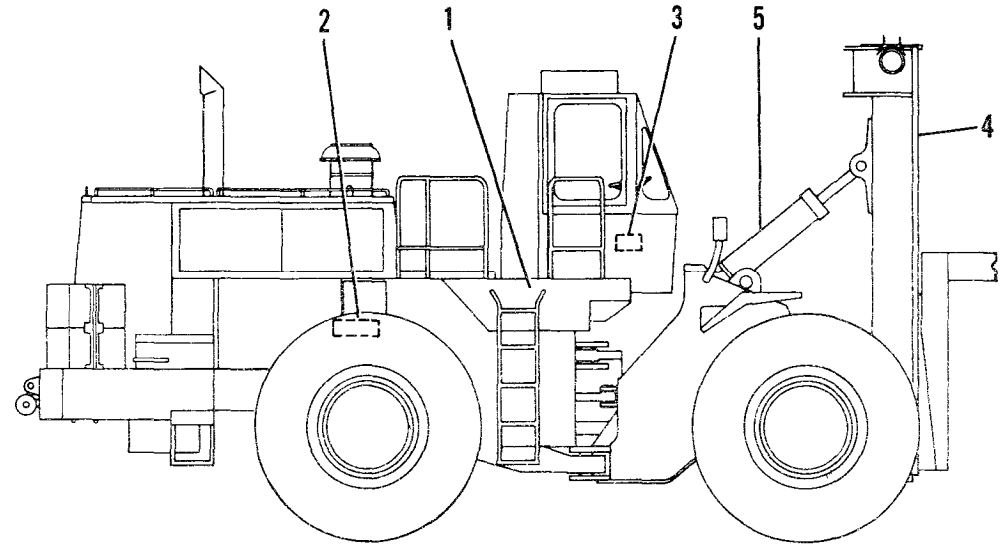
End**1-25**

HYDRAULIC SYSTEM DESCRIPTION

(Sheet 1 of 2)

High pressure mast hydraulic system consists of:

1. Hydraulic tank
2. Hydraulic pump
3. Control valve
4. Lift cylinder
5. Tilt cylinders
6. Side shift cylinder
7. Side tilt cylinder
8. Container lock cylinders



Oil flows from hydraulic tank (1) to hydraulic pump (2) then to control valve (3). The control levers are moved to let oil go through the control valve to lift cylinder (4), tilt cylinders (5), side shift cylinder (6), side tilt cylinder (7) or container lock cylinders (8). Oil returns from the cylinders through the control valve and back to the tank.

1. **HYDRAULIC TANK.** The storage reservoir for all of the hydraulic oil used in the machine except for the transmission and torque converter. Equipped with an inlet strainer for filtering oil when added. A filter is built into the tank for filtering oil returning from the hydraulic system.
2. **HYDRAULIC PUMP.** A gear-type, driven by the engine. Supplies oil to the control valve for distribution to the hydraulic system.
3. **CONTROL VALVE.** Directs high pressure oil to hydraulic cylinders, depending on the position of hydraulic control lever.

Contains an oil pressure relief valve to return extra oil pressure back to the hydraulic tank when the mast is fully tilted, fully raised, fully shifted or fully rotated.

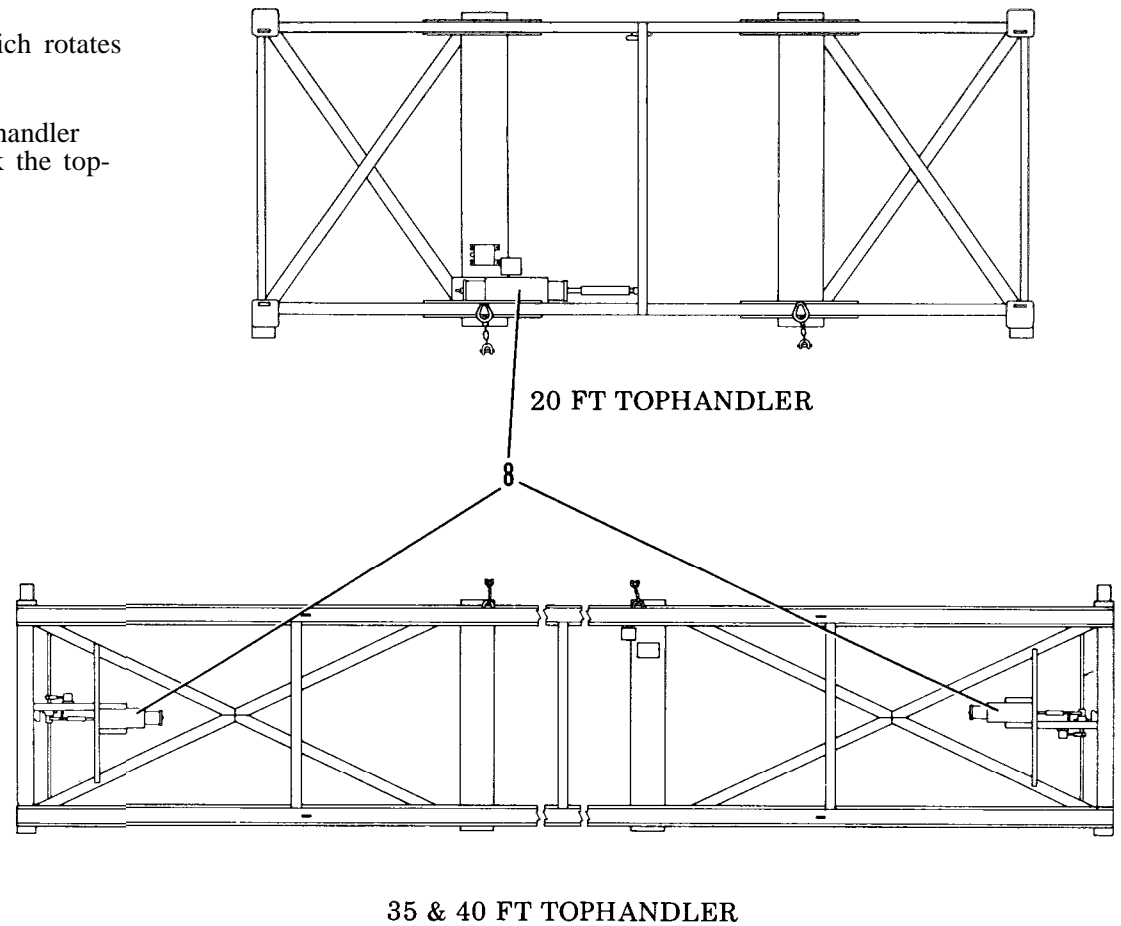
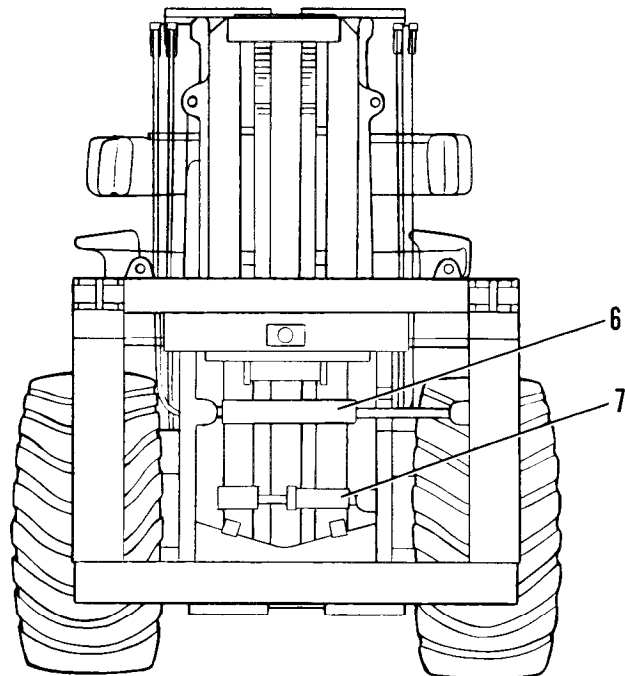
4. **LIFT CYLINDER.** A ram-type cylinder which moves up by hydraulic oil pressure and moves down by gravity. The extended part of the cylinder is completely filled with oil.
5. **TILT CYLINDERS (2).** Double acting cylinders which extend by hydraulic pressure and retract by hydraulic pressure. Control the forward-backward tilt angle of the mast.

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Go on to Sheet 2

HYDRAULIC SYSTEM DESCRIPTION (CONT)

6. SIDE SHIFT CYLINDER. A double acting cylinder which controls the side shift of the forks and tophandler with respect to the center line of the vehicle.
7. SIDE TILT CYLINDER. A double acting cylinder which rotates the forks and tophandler.
8. CONTAINER LOCK CYLINDERS. One on 20 ft tophandler and two on 35 ft and 40 ft tophandlers. Extend to lock the tophandler to the container.



TRANSMISSION HYDRAULIC SYSTEM DESCRIPTION

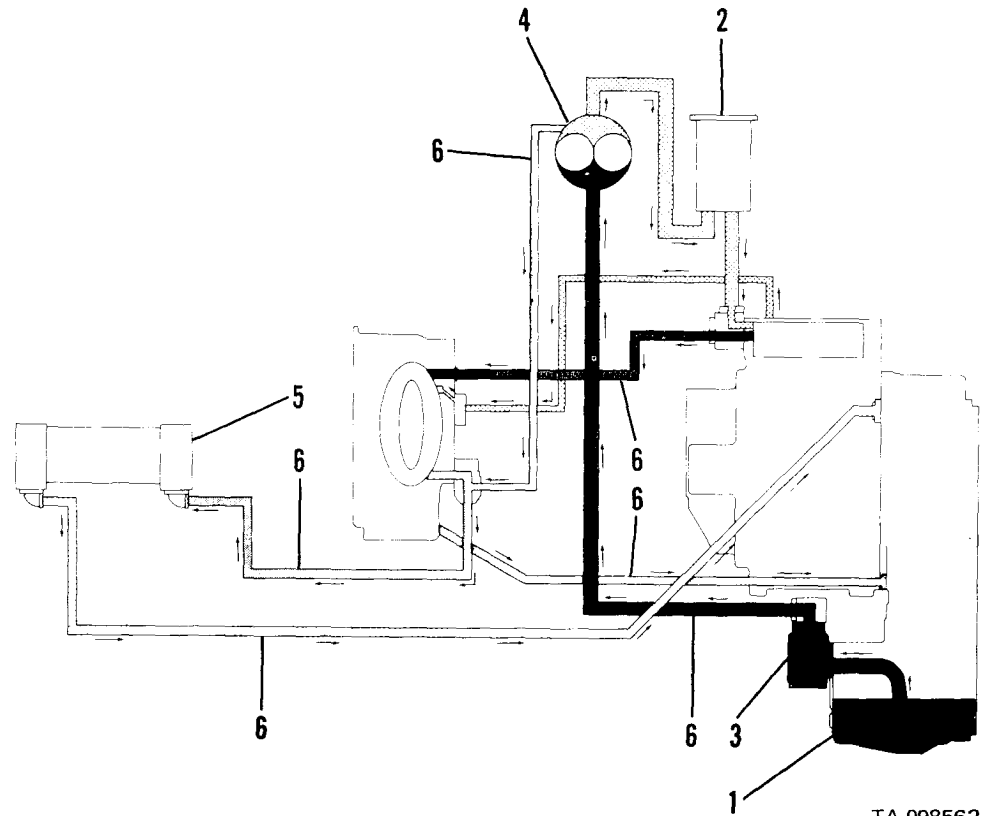
(Sheet 1 of 1)

Transmission hydraulic system consists of:

1. Oil reservok
2. Oil filter
3. Magnetic screen
4. Oil pump
5. Oil cooler
6. Connecting lines

1. **OIL RESERVOIR.** The lower portion of the output transfer gear case serves as a reservoir for the transfer gear and transmission. A drain plug is located in the bottom of the case for draining transmission system oil.
2. **OIL FILTER.** Removes debris from the hydraulic oil. The filter is located in the compartment behind the cab.
3. **MAGNETIC SCREEN.** Removes metal particles and other debris before the oil goes to the oil pump. The screen is fastened to the output transfer gear case.
4. **OIL PUMP.** A gear-type pump, driven by the engine. Oil is pulled from the reservoir, through the magnetic screen and pumped to the oil filter.

5. **OIL COOLER.** Removes heat from the transmission system hydraulic oil. High temperature oil comes from the torque converter and passes through the oil cooler. The heat of the oil is transferred to the engine cooling system and the cooler oil returns to the transmission.
6. **CONNECTING LINES.** Carry oil to and from the oil filter and oil cooler.



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End

CHAPTER 2
 ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

COMMON TOOLS AND EQUIPMENT

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

SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

Refer to TM 10-3930-641-20P for special tools and TMDE you will need in maintaining the vehicle. No support equipment is required.

REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, TM 10-3930-641-20P, covering organizational maintenance for this equipment.

Section II. SERVICE UPON RECEIPT

INSPECTING AND SERVICING PRESERVED VEHICLES

Do the following if the vehicle you receive has been stored:

1. Remove any tape or seals installed to protect openings.
2. Remove the covering from over the windshield, windows, rear view mirrors, and lights.
3. Remove the covering from the operator's seat.
4. Remove the plastic covering from the instrument panel and steering column.
5. Fill the fuel tank. Refer to TM 10-3930-641-10.
6. Check tire pressure and inflate to the right pressure. See page 2-397.
7. Check coolant in the radiator. The radiator is filled with antifreeze and water. Drain coolant and refill. See page 2-214.
8. Wipe preservative from all exposed metal surfaces.
9. Check for damage.
10. Clean all exterior surfaces. Touch up paint scratches.
11. Do the before operation (B) preventive maintenance checks and services. Refer to TM 10-3930-641-10.
12. Do the lubrication specified in LO 10-3930-641-12.
13. Check batteries for charge. See page 2-268.
14. Make sure the vehicle is ready for operation. Then remove all warning tags.

INSPECTING AND SERVICING NON-PRESERVED VEHICLES

1. Do the before operation (B) preventive maintenance checks and services. See TM10-3930-641-10.
2. Do the lubrication specified in LO 10-3930-641-12.
3. Report any deficiencies or damage in accordance with DA Pam 738-750. Report to Commander, U.S. Army Tank-Automotive Command, Warren, MI 48397-5000, ATTN: AMSTA-M.
4. Check tires, fill fuel tanks and check coolant.

INSTALLATION

Depending on the way the vehicle was shipped, components may have been removed. Install as required.

Component

Mast	Contact Direct Support
Rollover protective structure (ROPS)	Contact Direct Support
Exhaust pipe	Page 2-211
Cab	Contact Direct Support

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

To make sure that your vehicle is ready for operation at all times, inspect it systematically so you can discover any defects and have them corrected before they result in serious damage or failure. The charts on the next few pages contain your organizational PMCS. The item numbers indicate the sequence of minimum inspection requirements. If you're operating the vehicle and notice something wrong which could damage the equipment if you continue operation, stop operation immediately.

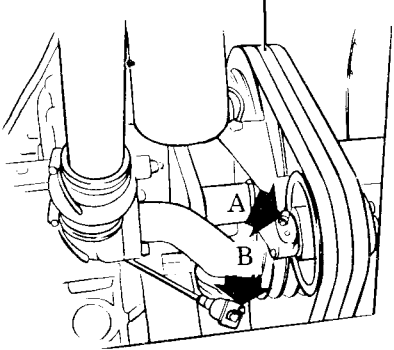
Record all deficiencies and shortcomings, along with the correct action taken on DA Form 2404.



ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

(Sheet 1 of 19)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

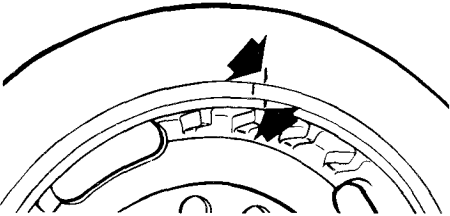
ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
1							<p style="text-align: center;">NOTE</p> <p style="text-align: center;">PERFORM OPERATOR/CREW PMCS BEFORE OR IN CONJUNCTION WITH ORGANIZATIONAL PMCS IF:</p> <p>a. There is a delay between the daily operation of the equipment and the organizational PMCS.</p> <p>b. Regular operator is not assisting/participating.</p> <p><u>ENGINE V-BELTS</u></p> <p>a. Inspect fan drive belt, alternator belt. Adjust tension to 9/16-13/16 deflection with 25 lb. pressure on belt midway between pulleys. Replace belts if worn or cracked. (See pages 2-229 and 2-252.)</p> <p>b. Lubricate 2 fittings (A, B) on pulley assemblies. See LO 10-3930-641-12.</p>
					250		<p><u>SUPPORTS</u></p> <p>Inspect front and rear engine supports for cracks, damage.</p>
2					500		<p style="text-align: right;">FAN DRIVE BELTS</p> 

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Go on to Sheet 2

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
3					2000		<p><u>DAMPER PULLEY</u></p> <p>Inspect damper. Marks on damper hub and ring should align. If not, replace damper. (See page 2-155.)</p> 
4					1000		<p><u>OIL BREATHERS</u></p> <p>Clean breathers (see page 2-158).</p>
5					250		<p><u>CRANKCASE</u></p> <p>Change oil. (See page 2-152.) While oil is drained, test function of LOW ENGINE OIL indicator by turning POWER switch to ON position. Indicator will light. Fill crankcase then run engine for 5 minutes. Measure oil level with engine running at low idle. Oil level should be between LOW and FULL marks on the LOW IDLE side of the dipstick, add oil if necessary. See LO 10-3930-641-12.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Change oil with vehicle on level ground.</p>

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Go on to Sheet 3

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
6					250		<u>OIL FILTERS</u> Change oil filters elements. (See page 2-152.) Check oil filter lines.
7					500		<u>FUEL TANK</u> a. Service fuel tank filler cap by cleaning screen and element. Replace gasket if necessary. b. Drain water from fuel tank by: (See page 2-193.) 1. Open valve on bottom of tank. 2. Drain into suitable container. 3. Close valve.
8					250		<u>FUEL LINES</u> Inspect fuel lines for leaks. Replace as needed. (See page 2-173.)
9					250		<u>FUEL INJECTION LINES</u> Inspect fuel injection lines for leaks, damage. (See page 2-170.)

Go on to Sheet 4

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM No.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
10					250		<u>FUEL TRANSFER PUMP</u> Inspect pump for leaks and proper operation. Replace if necessary. (See page 2-177.)
11					250		<u>FUEL PRIMING PUMP</u> Inspect pump for leaks and proper operation. Replace if necessary. (See page 2-179.)
12		•					<u>PRIMARY FUEL FILTER</u> Clean filter element twice yearly or as needed. Inspect gasket; replace as needed. (See page 2-183.)
13		•					<u>SECONDARY FUEL FILTER</u> Replace filter twice yearly or when fuel pressure needle is in RED range with engine running at high idle. (See page 2-186.)
14					500		<u>TURBOCHARGER AIR LINES</u> Inspect turbocharger air lines (seals and gaskets) for leaks.

Go onto Sheet 5

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

(Sheet 5 of 19)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
15					250		<u>TURBOCHARGER OIL LINES</u> Inspect turbocharger oil lines for leaks. Replace if necessary. (Notify Direct Support.)
16					250		<u>ETHER STARTING AID</u> Replace ether supply as needed. Inspect lines and fittings. Replace as necessary. (Notify Direct Support.)
17					250		<u>PRIMARY AIR CLEANER ELEMENT</u> Clean primary element when amber light comes on with engine running. Replace element after six cleanings, or once a year. (See page 2-198.)
18		•					<u>SECONDARY AIR CLEANER ELEMENT</u> Replace after cleaning or replacing primary element 3rd time, or if PLUGGED FILTER indicator remains on after cleaning primary filter. (See page 2-198.)
19					1000		<u>DUST EJECTOR</u> Remove and clean ejector. Inspect hose and replace if needed. (See page 2-198.)

Go on to Sheet 6

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM No.	INTERVAL						ITEM TO BE INSPECTED
	Q	S	A	B	H	M	
20					250		<u>MUFFLER</u> Inspect muffler for leaks, damage. Replace if necessary. (See page 2-211.)
21					250		<u>EXHAUST PIPE AND MANIFOLD</u> Inspect exhaust pipe for damage. Replace if necessary. (See page 2-211.) Inspect for loose, missing or damaged exhaust manifold taperlock studs. Notify Direct Support maintenance if these conditions exist. <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> WARNING </div> Use caution when removing radiator filler cap. Steam can cause injury. Do not allow inhibitor to contact skin or eyes. It contains alkali.
22					2000		<u>RADIATOR</u> Change antifreeze solution. (See page 2-215.)
23					250		<u>COOLANT FILTER</u> Replace corrosion inhibitor canister. (See page 2-244.)

Go on to Sheet 7

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
24					250		<u>HOSES AND LINES</u> Inspect radiator hoses and water lines for leaks, damage. Replace as necessary. (See page 2-247.)
25					500		<u>WATER PUMP</u> Inspect water pump for leaks, proper functioning. Replace if necessary. (See page 2-225.)
26					250		<u>BATTERY</u> Clean corrosion from battery tops, terminals. (See page 2-272.)
27					250		<u>TRANSMISSION OIL LINES</u> Inspect lines for leaks, damage. Replace as needed. (Notify Direct Support.)
28					250		<u>TRANSMISSION AND TORQUE CONVERTER CONTROLS, LINKAGE</u> Inspect linkage, controls for proper adjustment, damage. Adjust if necessary (See page 2-407.)
29					500		<u>TRANSMISSION OIL FILTER</u> Replace transmission oil filter element. (See page 2-402.)

Go on to Sheet 8

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
30					1000		<u>TRANSMISSION BREATHER</u> Replace breather. (See page 2-402.)
31					1000		<u>TORQUE CONVERTER BREATHER</u> Replace breather. (See page 2-402.)
32					1000		<u>MAGNETIC STRAINER ASSEMBLY</u> Clean assembly. Install magnets with poles opposing each other. (See page 2-402.)
33					1000		<u>TRANSMISSION OIL</u> Change transmission oil. (See page 2-402.)
34					1000		<u>UPPER DRIVE SHAFT</u> a. Lower rear of front crankcase guard. (See page 2-483.) b. Inspect shaft and universal joints for wear, damage. Replace if necessary. (See page 2-377.) c. Lubricate 2 fittings. (See page 2-377 and LO 10-3930-641-12.)

Go onto Sheet 9

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

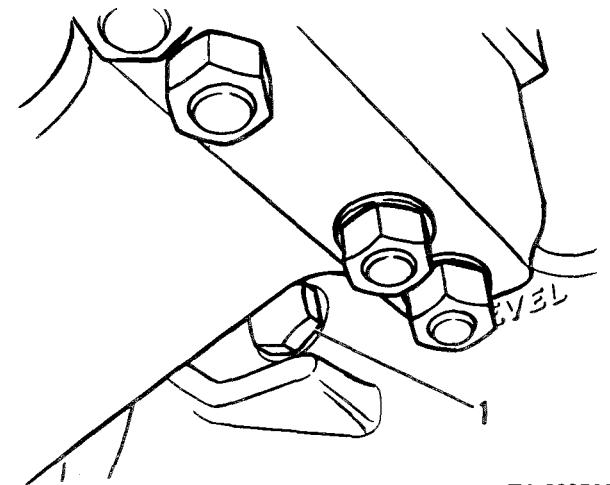
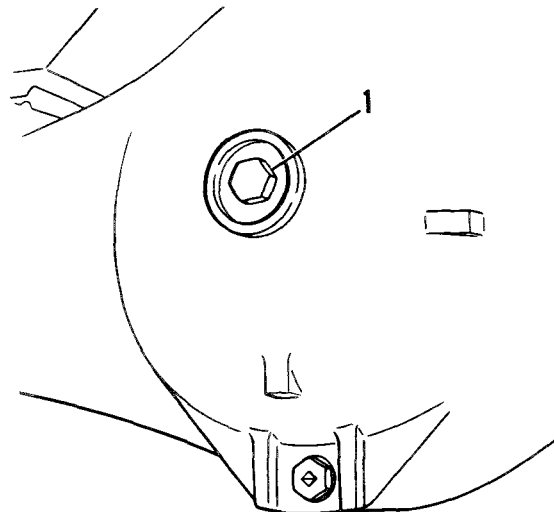
ITEM NO.	INTERVAL						ITEM TO BE INSPECTED
	Q	S	A	B	H	M	
35					2000		<p><u>LOWER DRIVE SHAFT GROUP</u></p> <p>a. Lower rear of front crankcase guard. (See page 2-483.)</p> <p>b. Inspect rear shaft and universal joints for wear, damage. Replace if necessary. Lubricate 2 fittings on rear drive shaft. (See page 2-380.)</p> <p>c. Inspect center shaft and universal joints for wear, damage. Replace if necessary, Lubricate 2 fittings on center drive shaft. (See page 2-380.)</p> <p>d. Inspect front drive shaft for wear, damage. Replace if necessary. Lubricate 1 fitting on front drive shaft. (See page 2-380.)</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Clear area of personnel, obstructions before activating machine. Stop engine after turning.</p> <div style="text-align: center; border: 2px dashed black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>CAUTION</p> </div> <p style="text-align: center;">Articulate machine full right or left before lubricating spline to prevent damage to seal.</p> <p>e. Lubricate fitting for center drive shaft spline. (See LO 10-3930-641-12.)</p>
					250		

Go onto Sheet 10

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
36					1000		<p><u>DRIVE SHAFT SUPPORT BEARING</u></p> <p>Inspect bearing cage for leaks. Lubricate 1 fitting on drive shaft support bearing. (See page 2-380.)</p>
37					250 2000		<p><u>FRONT AND REAR DIFFERENTIALS</u></p> <p>a. Check oil level at level plugs (1). (See page 2-392.)</p> <p>b. Change oil. (See page 2-392.)</p>



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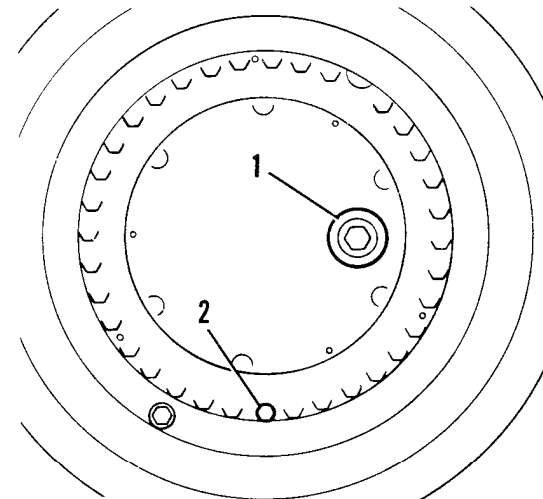
Go on to Sheet 11

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

(Sheet 11 of 19)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED
	2	S	A	B	H	M	
38					250		<p><u>FINAL DRIVES</u></p> <p>a. Check oil level. Be sure fill plug (1) is horizontal to axle. (See page 2-392.)</p> <p>b. Change oil. Be sure drain plug (2) is at the bottom. (See page 2-392.)</p>
					2000		
39					250		<p><u>REAR AXLE TRUNNION BEARINGS</u></p> <p>Lubricate 2 fittings. Check grease lines for damage; replace if necessary. (See page 2-479.)</p>



TA 088570

Go on to Sheet 12

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
40					250		<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p>Brake system is under pressure. Relieve pressure before loosening lines. Stop vehicle on level ground. Apply parking brake and shut off engine. Pump brake pedal several times until no pressure remains. This will relieve pressure in brake lines.</p> <p><u>SERVICE BRAKES</u></p> <p>a. Inspect brake control valve, accumulator, transmission neutralizer valve, brake lines and hoses for leaks, damage. Replace lines if necessary. (See page 2-342.)</p> <p>b. Test service brakes for proper functioning. (See TM 10-3930-641-10.)</p> <p>c. Adjust brake pedal and linkage as required. (See page 2-366.)</p>
					250		
41					250		<p><u>PARKING BRAKES</u></p> <p>a. Inspect parking brake control valve and brake lines for leaks, damage. (See page 2-363.) Replace damaged lines. (Notify Direct Support.)</p> <p>b. Test parking brake and indicator light for proper functioning. (See TM 10-3930-641-10.)</p> <p>c. Adjust linkage as required. (See page 2-358.)</p>
					250		

Go on to Sheet 13

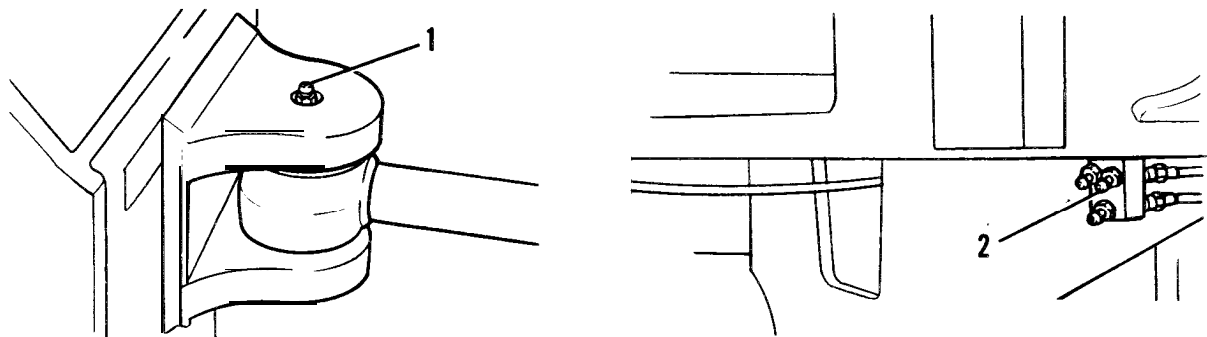
ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
42					250		<u>STEERING VALVES</u> Inspect steering control valve, diverter valve, right and left neutralizer valves for leaks, damage.
43					250		<u>STEERING LINES</u> Inspect steering hydraulic lines for leaks, damage. Replace if necessary. (Notify Direct Support.)
44					250		<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> WARNING </div> <p style="text-align: center;">Hydraulic system is under pressure. Remove oil filler cap slowly.</p> <u>STEERING HYDRAULICS</u> <ol style="list-style-type: none"> a. Check for air, foreign material in hydraulic oil. See page 2-417. b. Test steering time. See page 2-417. c. Test steering slip. See page 2-417.

Go on to Sheet 14

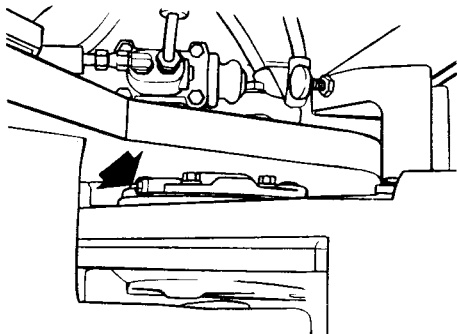
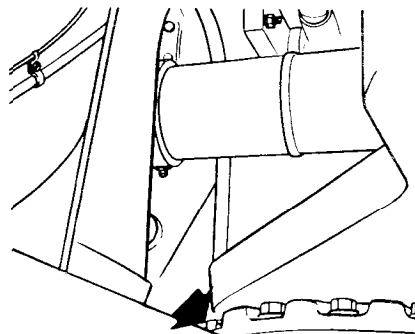
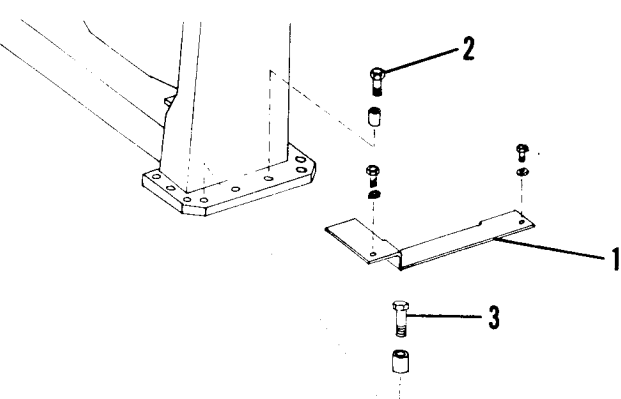
Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM No.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
45					250		<p><u>STEERING CYLINDERS</u></p> <ol style="list-style-type: none"> Check steering cylinders for leaks, damage. Lubricate 1 fitting (1) in eye of each cylinder rod. Lubricate 1 remote fitting (2) for head end of each cylinder. Check grease lines for damage. Replace if necessary. (See page 2-479.) 

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Go on to Sheet 15

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
46					1000		<p><u>UPPER AND LOWER PIVOT BEARINGS</u></p> <p>Lubricate 1 fitting on each pivot. (See LO 10-3930-641-12.)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>UPPER PIVOT</p>  </div> <div style="text-align: center;"> <p>LOWER PIVOT</p>  </div> </div>
47					1000		<p><u>ROLLOVER PROTECTION SYSTEM (ROPS)</u></p> <ol style="list-style-type: none"> Remove covers (1). Torque two 1 inch bolts (2) on each side to 640 ± 80 lb. ft. (875 ± 100 N•m). Torque eight 1-1/8" bolts (3) on each side to 800 ± 100 lb. ft. (1100 ± 150 N•m). <div style="text-align: right;">  </div>

Go on to Sheet 16

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M -Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
48					250		<u>LIFT CYLINDER</u> Inspect lift cylinder for leaks, damage.
49					250		<u>TILT CYLINDERS</u> a. Inspect tilt cylinders for leaks, damage.
					500		b. Test cylinder extension. Tilt mast as far as possible and watch that cylinders stop at the same time, See page 2-493. If not, notify Direct Support.
					500		c. Lubricate one fitting on each pivot eye and on each cylinder head end. (See LO 10-3930-641-12.)
50					250		<u>SIDE TILT CYLINDER</u> a. Inspect rotation cylinder for leaks, damage.
					500		b. Lubricate one fitting on each end of cylinder. (See LO 10-3930-641-12.)
51					250		<u>SIDE SHIFT CYLINDER</u> a. Inspect cylinder for leaks, damage.
					500		b. Lubricate one fitting on each end of cylinder. (See LO 10-3930-641-12.)

Go on to Sheet 17

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

ITEM NO.	INTERVAL						ITEM TO BE INSPECTED
	Q	S	A	B	H	M	
52					250		<p><u>LINES, HOSES, FITTINGS</u></p> <p>Inspect hydraulic lift lines, fittings, hoses for leaks, damage. Replace damaged parts. (Notify Direct Support.)</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>WARNING</p> </div> <p>Release hydraulic pressure before loosening hydraulic lines.</p>
							<p><u>MAST AND ROLLERS</u></p> <p>a. Inspect mast and rollers for damage, wear.</p> <p>b. Check tightness of mast mounting bolts. Tighten to 1000 ± 120 lb. ft. (1400 ± 160 N•m).</p> <p>c. Lubricate 6 fittings on mast and rollers. (See LO 10-3930-641-12.)</p>
54					500		<p><u>FORKS</u></p> <p>Check mounting of forks.</p>
55					250		<p><u>MAST SLIDE BLOCKS</u></p> <p>Lubricate mast slide blocks. Raise inner channel 2 feet (60 cm). Apply lubricant to slides. Lower and raise carriage a few times to spread lubricant.</p>

Go on to Sheet 18

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours M - Miles

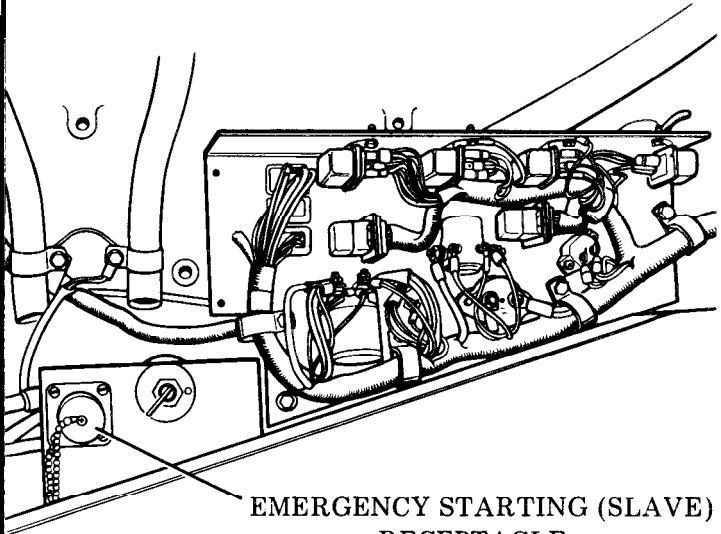
ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
56					250		<u>LIFT CHAINS</u> a. Inspect lift chains for wear, damage.
					250		b. Lubricate lift chains.
					1000		c. Adjust lift chains to equal tension by tightening or loosening adjustment nuts as required.
57							<u>TOPHANDLERS (20 ft., 35 ft., 40 ft.)</u> a. Inspect tophandlers, hoses, lines, fittings for leaks, damage. Replace damaged parts.
					250		b. Lubricate twist locks, operating shaft bearings, and force limiter, and guide rods. Coat sliding surfaces of guide rods with light coat of grease.
58					250		<u>HYDRAULIC PUMPS</u> a. Inspect hydraulic pump for leaks.
					250		b. Inspect supplemental hydraulic pump for leaks.
59							WARNING Release hydraulic system pressure before loosening lines.
					250		<u>HYDRAULIC HOSES, LINES, FITTINGS</u> Inspect hydraulic hoses, lines, fittings for leaks, damage. Notify Direct Support.

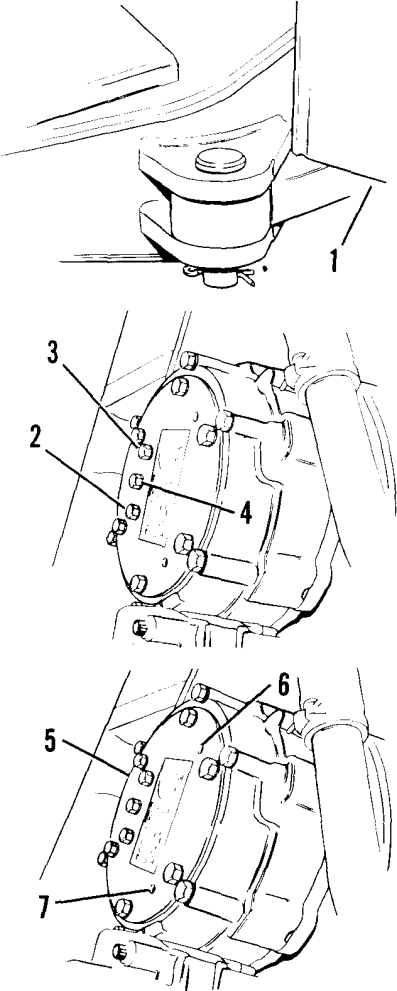
ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (CONT)

Q - Quarterly S - Semiannually A - Annually B - Biennially H - Hours - M - Miles

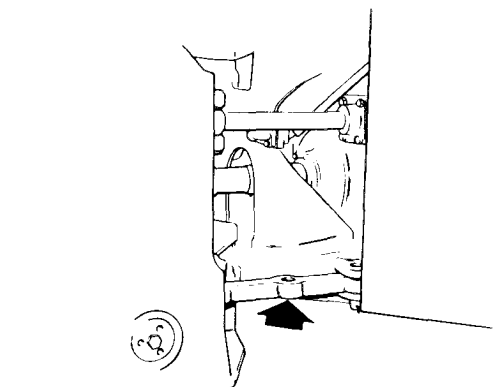
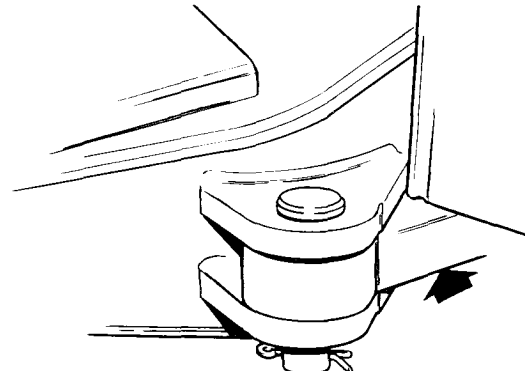
ITEM NO.	INTERVAL						ITEM TO BE INSPECTED PROCEDURE: Check for and repair, fill or adjust as needed.
	Q	S	A	B	H	M	
60					250		<u>VALVES</u> Inspect hydraulic control valve, brake control valve, accumulator charging valve, relief valves for leaks, damage. (See pages 1-22, 1-26.)
61					2000		<u>HYDRAULIC OIL</u> Change hydraulic oil. (See page 2-490.)
62					500		<u>BRAKE HYDRAULIC SYSTEM AND IMPLEMENT FILTERS</u> a. Replace filter elements. (See page 2-487.) b. Replace filters. (See page 2-487.) Drain and refill system.
					2000		
63					2000		<u>FILLER SCREEN</u> Clean hydraulic oil filler screen. (See page 2-487.)
64					250		<u>TIRES</u> Check for correct air pressure (70 psi front and 40 psi rear). (See page 2-397.)
65					2000		Inspect front and rear frames for damage, misalignment, cracks or broken welds. Notify Direct Support.

End

LOCATION/ITEM	ACTION	REMARKS
<p>1. Starting cable</p>	<p style="text-align: center;">CAUTION</p> <p>Be sure main disconnect switch and POWER switch are off and keys removed before you connect slave cable to your vehicle.</p> <p>Connect to emergency starting (slave) receptacle.</p>	 <p style="text-align: center;">EMERGENCY STARTING (SLAVE) RECEPTACLE</p>
<p>2. Engine</p>	<p>Start.</p> <p style="text-align: center;">NOTE</p> <p>To use the emergency starting receptacle, use jumper cable with a plug to mate with receptacle. Connect external starting source first, then insert plug into receptacle of vehicle to be started. After engine starts, remove plug from receptacle.</p>	<p>See TM 10-3930-641-10.</p>

LOCATION/ITEM	ACTION	REMARKS
<p>1. Wheels</p> <p>2. Shipping link (1) at bottom of articulated (steering) joint, left side of vehicle.</p> <p>3. Capscrews (2, 3, 4) on cover of parking/emergency brake. Parking brake is mounted on front of transmission housing.</p> <p>4. Capscrews</p>	<p>Do manually release parking brake, do the following:</p> <p>Block. This will keep the vehicle from rolling when parking brake is released.</p> <p>Connect to front and rear frames. (See page 2-27.)</p> <p>Remove from storage holes in cover.</p> <p>a. Install capscrews in forcing holes (5, 6, 7) in cover of emergency/parking brake.</p> <p>b. Tighten until there is solid resistance.</p> <p style="text-align: center;">CAUTION</p> <p>After repairs have been made and before operating the vehicle, disconnect shipping link (1), remove capscrews from forcing holes. Install capscrews in storage holes.</p>	

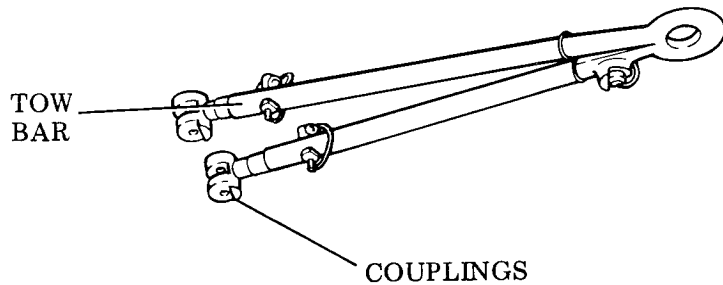
TA 098576
End

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">INSTALLATION</p> <p>Shipping link</p>	<p>Install shipping link between front and rear frames to keep vehicle in straight-ahead position when vehicle is being:</p> <ol style="list-style-type: none"> a. Lifted. b. Transported. c. Serviced near its center. 	<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Do not tow with shipping link installed.</p> 
<p style="text-align: center;">STORAGE</p> <p>Shipping link</p>	<ol style="list-style-type: none"> a. POSITION between frames. b. SECURE with pins and cotter pins. <ol style="list-style-type: none"> a. REMOVE from frames. b. SECURE to retaining plates with pins. 	

TOWING

WARNING

Never use a tow line. Always use a medium duty tow bar.
(See MS500048.)



NOTE

Tow with engine running to control operable steering and brakes.

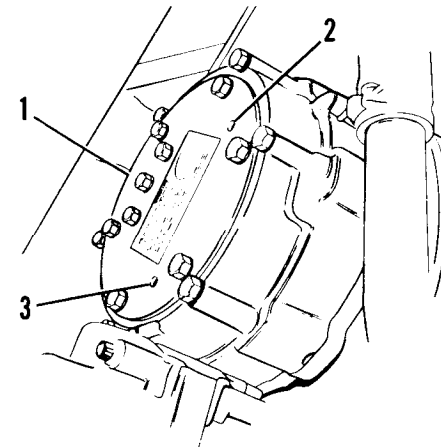
Do not tow vehicle faster than 5 MPH (8 km/hr) or farther than 10 miles (16 km).

1. Put tension on tow bar and check that couplings are attached properly.
2. You must be in the vehicle to steer it while it is being towed.
3. If you think there is an engine or transmission failure, tell direct support. They will have to remove the axle shafts and the transmission input drive shaft before towing.

WARNING

There is no emergency brake if all four axle shafts or front and rear drive shafts are removed.

4. Install capscrews in forcing holes (1, 2, 3). Tighten until there is solid resistance.
5. Reverse steering cylinder hoses on one cylinder only, so steering cylinders can move freely.
6. Inspect the vehicle for powertrain damage. If there is damage, remove all four axle shafts.



TA 098578

End

2-28

Section IV. TROUBLESHOOTING

The symptoms index for organizational maintenance starts on page 2-30. It lists the malfunctions (symptoms), tests or inspections and corrective actions that the organization can ordinarily perform. It also lists the malfunctions which have to be referred to higher maintenance levels.

The troubleshooting table starts on page 2-34. In an emergency where immediate corrective action must be taken to operate the vehicle, you may have to perform actions which are ordinarily beyond your responsibility.

Bear in mind that it is not possible to list all the malfunctions which might develop. If you have a problem that is not included in the table, notify your supervisor.



NOTE

Before you begin troubleshooting, be sure you have performed all applicable operating checks.

	Troubleshooting Procedure Page
BRAKE SYSTEM	
Brakes are slow to stop vehicle	2-34
Brakes do not release	2-34
Brakes do not stop vehicle	2-34
Brakes release slowly	2-35
Emergency brake doesn't disengage	2-35
Emergency brake doesn't work	2-35
Transmission doesn't disengage when left brake pedal is pushed	2-35
ENGINE	
Alternator indicator light comes on - alternator is not charging	2-36
Alternator is noisy	2-36
Black or graysmoke from exhaust	2-36
Coolant in lube oil	2-36
Engine cranks, but will not start or is hard to start	2-37
Engine does not develop full power	2-37

Go on to Sheet 2

Troubleshooting Procedure Page

ENGINE (CONT)

Engine knocks 2-38

Engineoverheats 2-38

Engine misfires or runs rough. 2-39

Engine stalls at lowRPM 2-39

Engine will not crank when ignition switch is in start position 2-39

Exhaust smoke is hot and thick 2-40

Low engine oil pressure 2-40

Oil in cooling system 2-40

Starting motor does not turn over 2-41

Sudden large increase in fuel use 2-41

Unusual engine vibrations 2-41

White or blue smoke from exhaust 2-42

HYDRAULIC SYSTEM

“Bouncy” action or no movement of hydraulic system when trying to lift a load 2-42

Carriage will not lower correctly 2-42

Hydraulic system will not hold a load 2-42

Go on to Sheet 3

	Troubleshooting Procedure Page
HYDRAULIC SYSTEM (CONT)	
Hydraulic system won't lift load	2-43
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Mast tilts too slowly	2-43
Noisy hydraulic pump	2-43
Oil temperature too high-hydraulic oil temperature needle is in red area	2-44
TORQUE CONVERTER	
Torque converter overheats - needle of torque converter oil temperature gage is in red area	2-44
TRANSFER CASES AND DRIVELINE COMPONENTS	
Final drive is locked	2-45
Front or rear differentials inoperative	2-45
Noisy transfer gears	2-45
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TRANSMISSION	
Back-up warning alarm does not sound when transmission selection lever is put in reverse	2-46
Transmission doesn't work when speed selection lever is placed in any speed	2-46
Transmission oil indicator light comes on during operation.	2-46

Go on to Sheet 4

Troubleshooting
Procedure
Page

TRANSMISSION (CONT)

Transmission overheats - torque converter oil temperature gage is in red area 2-46

Transmission will not shift from one direction to another 2-47

Transmission will not shift from one speed to another 2-47

Transmission speed ranges engage very suddenly 2-47

Transmission shifts slowly 2-47

Warning alarm horn does not sound when transmission direction selection lever is moved from neutral while engine is running and parking brake is on 2-47

Transmission does network in any forward or reverse speeds 2-48

Vehicle moves when selection lever is in neutral 2-48

STEERING SYSTEM

Steering wheel can still be tuned when vehicle is at full turn 2-48

Steering wheel is hard to turn 2-48

Vehicle doesn't turn when steering wheel is tuned 2-48

ELECTRICAL SYSTEM

2-49

End

TROUBLESHOOTING

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

BRAKE SYSTEM

1. BRAKES ARE SLOW TO STOP VEHICLE

- Step 1. Check brake pedal travel.
Adjust pedal travel. (See page 2-369.)
- Step 2. Inspect for leaking lines or fittings.
Tighten/replace.
- Step 3. Inspect lines for kinks.
Straighten or replace.

BRAKES DO NOT RELEASE

- Inspect brake control linkage for binding.
Replace/adjust. (See page 2-353.)

3. BRAKES DO NOT STOP VEHICLE

- Step 1. Inspect hydraulic reservoir fluid level.
Add fluid. (See LO 10-3930-641-12.)
- Step 2. Inspect brake pedal travel.
Adjust pedal travel. (See page 2-369.)
- Step 3. Inspect brake linkage.
Adjust. (See page 2-366.)
- Step 4. Inspect brake lines for kinks.
Straighten or replace.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

BRAKE SYSTEM (CONT)

4. BRAKES RELEASE SLOWLY

Step 1. Inspect brake control linkage adjustment.
Adjust linkage. (See page 2-366.)

Step 2. Check lines for restrictions,
Clean lines.

5. EMERGENCY PARKING BRAKE DOESN'T DISENGAGE

Step 1. Inspect lines for restrictions.
Clean lines.

Step 2. Inspect for loose fittings.
Tighten fittings.

Step 3. Inspect control valve linkage for proper adjustment.
Adjust linkage. (See page 2-358.)

6. EMERGENCY PARKING BRAKE DOESN'T WORK

Inspect parking brake control valve linkage for adjustment or defective parts.
Adjust/replace. (See page 2-358.)

7. TRANSMISSION DOES NOT DISENGAGE WHEN LEFT BRAKE PEDAL IS PUSHED

Inspect adjustment of brake control linkage.
Adjust. (See page 2-366.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE

1. ALTERNATOR INDICATOR LIGHT COMES ON - ALTERNATOR IS NOT CHARGING

Step 1. Inspect drive belt.
Adjust/replace. (See page 2-252.)

Step 2. Check battery connections.
Clean/tighten. (See page 2-272.)

2. ALTERNATOR IS NOISY

Step 1. Inspect drive belt for damage or wear.
Replace. (See page 2-252.)

Step 2. Inspect alternator drive pulley keyway.
Replace drive pulley if keyway is worn and pulley is loose. (See page 2-252.)

Step 3. Check alinement of pulley and drive belt.
Aline. (See page 2-252.)

3. BLACK OR GRAY SMOKE FROM EXHAUST

Inspect cleaner for obstructions.
Service. (See page 2-198.)

4. COOLANT IN LUBE OIL

Inspect engine oil cooler.
Notify direct support.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE (CONT)

5. ENGINE CRANKS BUT WILL NOT START OR IS HARD TO START

Step 1. Inspect fuel level.

Add fuel. (See page 2-193.)

Step 2. Inspect fuel filters.

Clean/replace. (See pages 2-183 and 2-186.)

Step 3. Check for bad quality fuel. (Drain small amount and visually check for particles.)

Replace fuel. (See page 2-193.)

Replace fuel filter element. (See pages 2-183 and 2-186.)

Step 4. Check exhaust for white smoke.

Use ether as required.

Check ether system for proper operation.

6. ENGINE DOES NOT DEVELOP FULL POWER

Step 1. See if quality of fuel is bad. (Drain small amount and visually check for particles.)

Replace fuel. (See page 2-193.)

Replace fuel filter element. (See pages 2-183 and 2-186.)

Step 2. Inspect for restriction of air inlet filter.

Replace air filter elements. (See page 2-198.)

Step 3. Inspect for low fuel pressure.

Check fuel filters - clean/replace. (See pages 2-183 and 2-186.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE (CONT)

7. ENGINE KNOCKS

- See if fuel quality is bad. (Drain small amount and check for particles.)
 - Replace fuel. (See page 2-193.)
 - Replace fuel filter elements. (See pages 2-183 and 2-186.)

8. ENGINE OVERHEATS

- Step 1. Check coolant level. Coolant level should be within 1/2" of bottom of fill pipe.
 - Add coolant. (See page 2-215.)
- Step 2. Inspect radiator core for debris.
 - Clean radiator core.
- Step 3. Inspect engine oil level.
 - Add oil to specified level. (See page 2-152.)
- Step 4. Inspect radiator pressure cap for defects.
 - Replace cap.
- Step 5. Inspect transmission oil level.
 - Add oil if necessary. (See page 2-402.)
- Step 6. Determine if the vehicle is being continuously overloaded.
 - Direct operator not to exceed rated load capacity.

NOTE

RTCH is rated to carry 50,000 lb. load. Do not exceed capacity.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION
CORRECTIVE ACTION

ENGINE (CONT)

9. ENGINE MISFIRES OR RUNS ROUGH

- Step 1. Inspect fuel level.
Add fuel. (See page 2-193.)
- Step 2. Check exhaust for white smoke.
Use ether as required.
- Step 3. Inspect fuel lines between fuel tank and fuel transfer pump for crimps, leaks, and bends.
Replace fuel lines. (See page 2-173.)
- Step 4. Check fuel pressure.
Replace fuel filter (secondary). (See page 2-186.)
Clean primary fuel filter. (See page 2-183.)

10. ENGINE STALLS AT LOW RPM

- Inspect fuel lines between fuel tank and fuel transfer pump for crimps, leaks, and bends.
Replace fuel lines. (See page 2-173.)

11. ENGINE WILL NOT CRANK WHEN IGNITION SWITCH IS IN START POSITION

- Step 1. Inspect main disconnect switch.
Turn to ON position. (See TM 10-3930-641-10.)
- Step 2. Inspect batteries.
Charge/replace. (See page 2-277.)
- Step 3. Inspect starting motor for damage.
Replace. (See page 2-258.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE (CONT)

12. EXHAUST SMOKE IS HOT AND THICK

Step 1. Check for restrictions in exhaust system.
Remove restrictions.

Step 2. Inspect air filter elements.
Replace. (See page 2-198.)

13. LOW ENGINE OIL PRESSURE

Step 1. Check oil level.
Add oil if necessary. (See page 2-152.)

Step 2. Inspect engine oil filter elements.
Replace. (See page 2-152.)

Step 3. Inspect engine oil cooler.
Notify direct support.

14. OIL IN COOLING SYSTEM

Step 1. Inspect engine oil cooler for defects.
Notify direct support.

Step 2. Inspect transmission oil cooler for defects.
Notify direct support.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE (CONT)

15. STARTING MOTOR DOES NOT TURN OVER

Step 1. Inspect batteries.
Recharge/replace. (See page 2-277.)

Step 2. Inspect battery connections.
Clean and tighten.

Step 3. Check electrical starting circuit. (See page 2-74.)

Step 4. Test solenoid.
Replace. (See page 2-261.)

Step 5. Inspect starting motor.
Replace. (See page 2-258.)

16. SUDDEN LARGE INCREASE IN FUEL USE

Inspect fuel lines and fittings for leaks.
Replace. (See page 2-173.)

17. UNUSUAL ENGINE VIBRATIONS

Step 1. Test fan assembly for fan blade out of balance.
Remove fan belts (see page 2-229) and operate engine at speed that had vibration. If there is no vibration, replace fan assembly. (See page 2-236.)

Step 2. Check fan drive pulley for loose capscrews.
Tighten capscrews. (See page 2-155.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

ENGINE (CONT)

18. WHITE OR BLUE SMOKE FROM EXHAUST

Step 1. Inspect for engine oil past specified level.
 Drain engine oil to specified level.

Step 2. Excessive oil consumption caused by engine running rough or misfiring.
 Inspect air cleaner for obstructions.
 Service. (See page 2-198.)

HYDRAULIC SYSTEM

1. BOUNCY ACTION OR NO MOVEMENT OF HYDRAULIC SYSTEM WHEN TRYING TO LIFT A LOAD

Test for air in hydraulic system.
 Bleed air from system by using bleed screw at top of lift cylinder. (See page 2-496.)

2. CARRIAGE WILL NOT LOWER CORRECTLY

Step 1. Inspect mast sliding blocks, rollers, and chains for correct lubrication.
 Lubricate components as necessary. (See LO 10-3930-641-12.)

Step 2. Inspect lift line for restrictions.
 Clean/replace.

Step 3. Check control linkage for proper adjustment. (See page 2-497.)

3. HYDRAULIC SYSTEM WILL NOT HOLD A LOAD

Inspect lines and fittings for leaks.
 Tighten.

TROUBLESHOOTING (CONT)

MALFUNCTION**TEST OR INSPECTION****CORRECTIVE ACTION**

HYDRAULIC SYSTEM (CONT)

4. HYDRAULIC SYSTEM WILL NOT LIFT LOAD

Step 1. Inspect lines and fittings for leaks.
Replace/tighten.

Step 2. Inspect mast sliding blocks, rollers, and chains for correct lubrication.
Lubricate components as necessary. (See LO 10-3930-641-12.)

Step 3. Check control linkage for proper adjustment. (See page 2-502.)

5. LIFT OR TILT CYLINDERS DO NOT HOLD POSITION WITH HYDRAULIC CONTROL LEVERS IN NEUTRAL CONDITION

Inspect lines and fittings for leaks.
Tighten.

6. MAST TILTS TOO SLOWLY

Step 1. Inspect tilt cylinder packing nut for tightness.
Loosen nut.

Step 2. Check control linkage for proper adjustment. (See page 2-497.)

7. NOISY HYDRAULIC PUMP

Step 1. Inspect oil level.
Add oil. (See LO 10-3930-641-12.)

Step 2. Inspect filter for dirt.
Replace filter. (See page 2-487.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

HYDRAULIC SYSTEM (CONT)

8. OIL TEMPERATURE TOO HIGH - HYDRAULIC OIL TEMPERATURE NEEDLE IS IN RED AREA

- Step 1. Inspect oil level.
Add oil. (See LO 10-3930-641-12.)
- Step 2. Inspect hydraulic oil cooler core for debris.
Clean core.
- Step 3. Inspect oil lines for restrictions.
Clean oil lines.
- Step 4. Decide if system has been continuously overloaded.

NOTE

RTCH is rated to carry 50,000 lb. loads. Do not exceed capacity.

TORQUE CONVERTER

TORQUE CONVERTER OVERHEATS – NEEDLE OF TORQUE CONVERTER OIL TEMPERATURE GAGE IS IN RED AREA

- Step 1. Check transmission oil level.
Add oil. (See LO 10-3930-641-12.)
- Step 2. Check coolant level in engine radiator.
Fill to 1/2” below bottom of fill pipe. (See page 2-214.)
- Step 3. See if vehicle has been operated continuously at overload capacity.

NOTE

RTCH has rated load capacity of 50,000 lb. Tell operator not to exceed rated load capacity.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

TRANSFER CASES AND DRIVE LINE COMPONENTS

1. FINAL DRIVE IS LOCKED

Inspect oil levels.

Add oil. (See LO 10-3930-641-12.)

Replace breather if plugged. (See page 2-392.)

2. FRONT OR REAR DIFFERENTIALS IN OPERATIVE

Inspect oil levels.

Add oil. (See LO 10-3930-641-12.)

Replace breather if plugged. (See page 2-392.)

3. NOISY TRANSFER GEARS

Step 1. Check transmission oil.

Add oil. (See LO 10-3930-641-12.)

Step 2. Inspect main drive shaft universal points.

Tighten capscrews. (See page 2-377.)

4. SYSTEM LOSES OIL

Step 1. Check drain plug.

Tighten/replace.

Step 2. Inspect all lines and fittings.

Tighten/replace.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION
CORRECTIVE ACTION

TRANSMISSION

1. BACKUP WARNING ALARM DOES NOT SOUND WHEN TRANSMISSION SELECTION LEVER IS PUT IN REVERSE.

Step 1. Inspect direction control linkage for defects or incorrect adjustment.
Replace defective parts. (See page 2-412.)
Adjust linkage. (See page 2-407.)

Step 2. Test warning switch. (See page 2-334.)
Replace.

Step 3. Test backup warning alarm. (See page 2-334.)
Replace.

2. TRANSMISSION DOESN'T WORK WHEN SPEED SELECTION LEVER IS PLACED IN ANY SPEED.

Step 1. Inspect transmission oil level.
Add oil. (See LO 10-3930-641-12.)

Step 2. Inspect speed control linkage for incorrect adjustment and broken or defective parts.
Replace broken or defective parts. (See page 2-412.)
Adjust linkage. (See page 2-407.)

3. TRANSMISSION OIL INDICATOR LIGHT COMES ON DURING OPERATION

Step 1. Inspect oil filter.
Replace oil filter element. (See page 2-402.)

Step 2. Check transmission oil. (See page 2-402.)

4. TRANSMISSION OVERHEATS - TORQUE CONVERTER OIL TEMPERATURE GAGE NEEDLE IS IN RED AREA.

Step 1. Inspect transmission oil level.
Add oil. (See LO 10-3930-641-12.)

Step 2. Inspect magnetic strainer in output transfer gear case.
Clean. (See page 2-403.)

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

TRANSMISSION (CONT)

5. TRANSMISSION WILL NOT SHIFT FROM ONE DIRECTION TO ANOTHER

Inspect direction control linkage for incorrect adjustment and broken or defective parts.
 Replace defective parts. (See page 2-412.)
 Adjust linkage. (See page 2-407.)

6. TRANSMISSION WILL NOT SHIFT FROM ONE SPEED TO ANOTHER

Inspect speed control linkage for incorrect adjustment and broken or defective parts.
 Replace broken or defective parts. (See page 2-412.)
 Adjust linkage. (See page 2-407.)

7. TRANSMISSION SHIFTS ROUGHLY – SPEED RANGES ENGAGE VERY SUDDENLY

Inspect adjustment of control linkages.
 Adjust. (See page 2-407.)

8. TRANSMISSION SHIFTS SLOWLY

Inspection transmission oil level.
 Add oil. (See LO 10-3930-641-12.)

9. WARNING ALARM DOES NOT SOUND WHEN TRANSMISSION DIRECTION SELECTION LEVER IS MOVED FROM NEUTRAL WHILE ENGINE IS RUNNING AND PARKING BRAKE IS ON

Step 1. Inspect direction control linkage for incorrect adjustment or defects.
 Adjust linkage. (See page 2-407.)
 Replace defective parts. (See page 2-412.)

Step 2. Test warning switch. (See page 2-334.)
 Replace warning switch.

Step 3. Test backup warning alarm. (See page 2-334.)
 Replace alarm.

TROUBLESHOOTING (CONT)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

TRANSMISSION (CONT)

10. TRANSMISSION DOES NOT WORK IN ANY FORWARD SPEED OR ANY REVERSE SPEED

Step 1. Inspect adjustment of direction control linkage.
Adjust. (see page 2-407.)

Step 2. Inspect oil pump.
Replace. Notify Direct Support.

11. VEHICLE MOVES WHEN SELECTION LEVER IS IN NEUTRAL

Inspect direction control linkage for correct adjustment or damaged parts.
Replace damaged parts. (See page 2-412.)
Adjust linkage. (See page 2-407.)

STEERING SYSTEM

1. STEERING WHEEL CAN STILL BE TURNED WHEN VEHICLE IS AT FULL TURN

Inspect adjustment of striker assembly for neutralizer valve.
Notify direct support.

2. STEERING WHEEL IS HARD TO TURN

Step 1. Allow hydraulic oil to warm up to normal operating temperatures.
Step 2. Inspect lines of hand metering unit for restrictions.
Clean/replace lines.

3. VEHICLE DOESN'T TURN WHEN STEERING WHEEL IS TURNED

Step 1. Check shipping link.
Disconnect shipping link. (See page 2-27.)
Step 2. Inspect hydraulic oil reservoir.
Add oil. (See LO 10-3930-641-12.)
Step 3. Check steering lines for restriction.
Clean lines.
Step 4. Inspect steering pump for damage.
Notify Direct Support.

ELECTRICAL SYSTEM TROUBLESHOOTING

GENERAL

This section contains troubleshooting information for isolating most electrical problems to an individual circuit and in most cases to an individual component. Replacement of the component is, in most cases, referenced to another section unless only basic knowledge is required to perform the task.

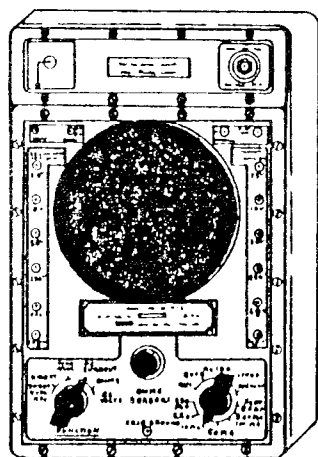
This manual cannot cover all possible problems, however, the most likely to occur are mentioned. In general, a switch or sending unit is more likely to be defective than a gage or indicator. The least likely cause of a problem would be in the wires or harnesses.

TROUBLESHOOTING

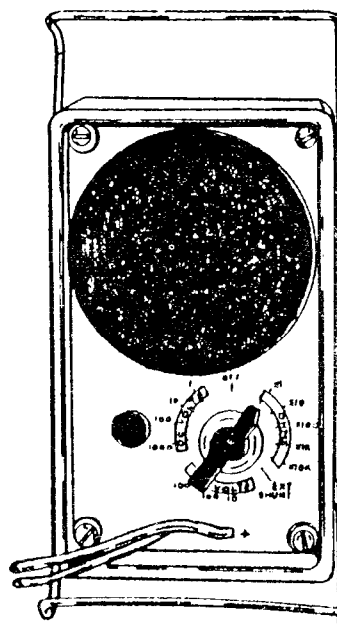
To use the QUICK GUIDE (pages 2-71 through 2-73): determine which system, engine, alternator, etc., the PROBLEM occurs in, then go down list of PROBLEMS until problem is found. Refer to page under REFERENCE column. Read QUESTION for each STEP. If answer to QUESTION is YES, go to STEP number shown under YES; if answer is NO, go to STEP number shown under NO.

GENERAL

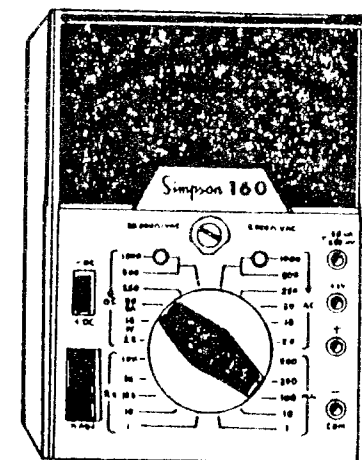
All needed electrical testing can be done using a multimeter. This section shows how to use a multimeter for finding the causes of electrical problems which may develop in the vehicle. The TS-352 B/U, the AN/URM-105, and the Simpson 160 are the models you can get in organizational maintenance automotive shop sets. They all do the same job. This section shows how to set up, zero, and do testing with any of the three multimeters. The ohms scale is used for continuity, shorts, and resistance testing. AC/DC voltages can also be measured using the multimeter.



TS-352 B/U



AN/URM-105



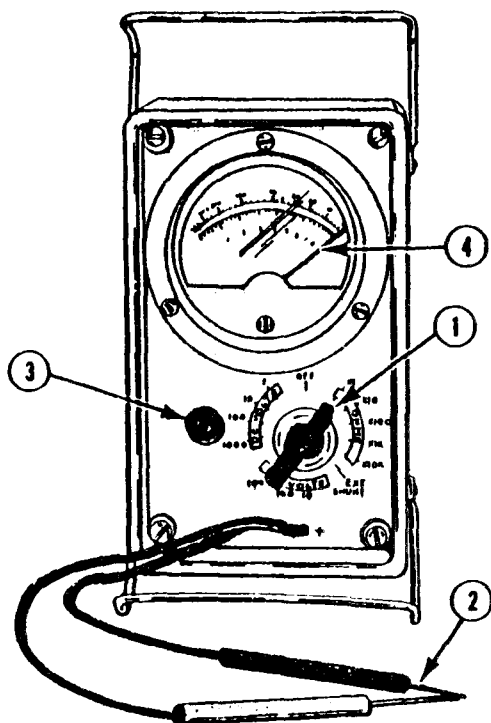
SIMPSON 160

TA 098579

Go on to Sheet 2

OHMS SCALE

USING THE OHMS SCALE



The ohms (Ω) scale is used to make tests for continuity, shorts, and resistance.

NOTE

Proper operation of electrical components depends upon proper grounding. In all troubleshooting procedures of devices which depend on screws or physical contact for their electrical ground (lamp sockets, sending units, batteries, etc), use a jumper wire from the device to the truck frame to check grounding.

The multimeter must be set up and zeroed before making these tests. Perform the following steps for the multimeter you are using.

AN/URM-105

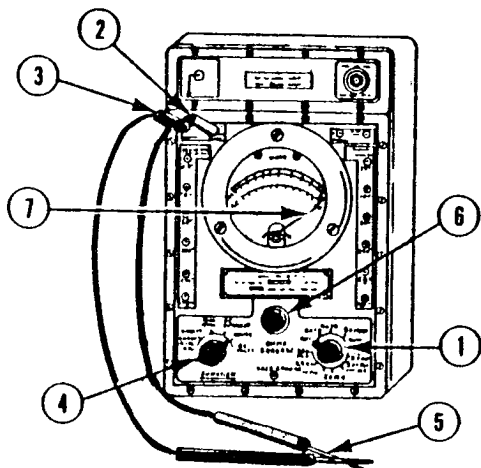
- A Set selector switch (1) to X1 ohms position.
- B Now zero the meter. Touch the two probes (2) together while turning ohms adj knob (3) until needle (4) is over 0 on the top scale.
- C If needle will not zero, replace the batteries. If needle still will not zero after replacing the batteries, turn in the multimeter for repair.

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Go on to Sheet 3

OHMS SCALE (CONT)

USING THE OHMS SCALE (CONT)



TS-352 B/U

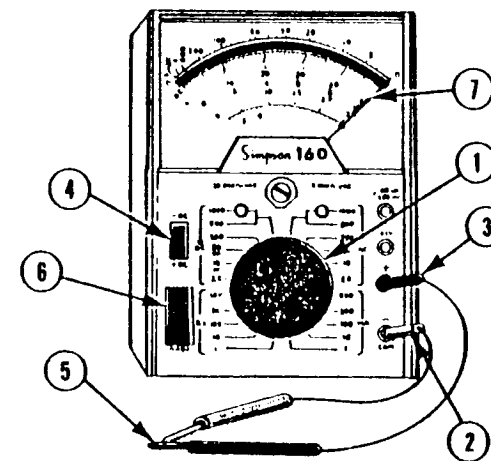
- A Set RANGE switch (1) to RX1.
- B Put black (-) lead (2) into the OHMS -DC ± AC jack.
- C Put red (+) lead (3) in the upper left OHMS jack.
- D Turn FUNCTION switch (4) to OHMS.
- E Touch the two probes (5) together.

- F Zero meter by turning the OHMS ZERO ADJ (6) knob until needle (7) is over 0 on top scale.
- G If needle will not zero, replace the batteries. If needle still will not zero after replacing the batteries, turn in the multimeter for repair.

SIMPSON 160

- A Set selector switch (1) on RX1.
- B Put black (-) lead (2) in COM-jack.
- C Put red (+) lead (3) in + jack.
- D Set polarity reversing switch (4) on +DC.
- E Touch the two probes (5) together.

- F Zero meter by turning the OHMS ZERO ADJ (6) knob until needle (7) is over 0 on top scale.
- G If needle will not zero, replace the batteries. If needle still will not zero after replacing the batteries, turn in the multimeter for repair.

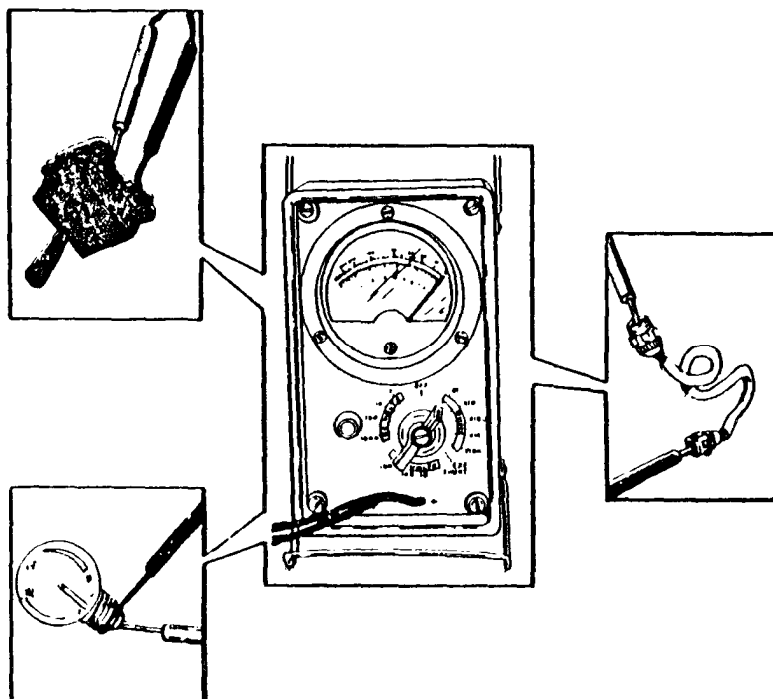


TA 098581

Go on to Sheet 4

OHMS SCALE (CONT)

TESTING FOR CONTINUITY



Continuity tests are made to check for breaks in a circuit, such as the switch, light bulb, or electrical cable as shown. To make a continuity check, do the following steps:

- A Set up and zero the multimeter.

CAUTION

Failure to do the following step can damage the multimeter.

- B Disconnect the circuit being tested. To be safe, disconnect the battery ground strap.
- C Connect the meter probes to both terminals of the circuit being tested. (The AN/ URM-105 is illustrated, but the probes are connected to the circuit the same way with all three multimeters.)
- D Observe needle movement.

If the needle swings to the far right over the 0 on the top scale, the circuit has continuity.

If the needle doesn't move, the circuit is open (broken).

If the needle jumps or flickers, there is a loose connection in the circuit being tested.

OHMS SCALE (CONT)

TESTING FOR SHORT CIRCUITS

A short or short circuit occurs when two circuits that should not be connected have contact with each other. A short also occurs when a circuit that should not touch ground has contact with ground. To check for shorts, do the following steps:

- A Set up and zero the multimeter.



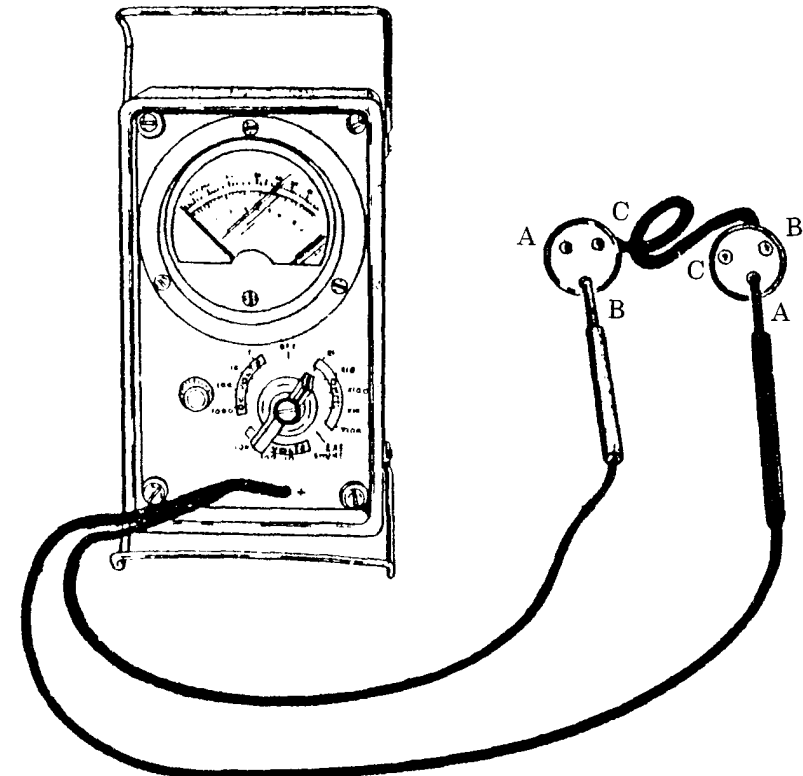
Failure to do the following step can damage the multimeter.

- B Disconnect the circuit being tested. To be safe, disconnect the battery ground strap.
- C Connect one probe to one circuit and the other probe to the other circuit or ground (if checking for a short to ground). The example shows a check to see if wire A is shorted to wire B in the wiring harness.
- D Observe needle movement.

If the needle swings to the far right over the 0 on the top scale, the circuits are short circuited.

If the needle doesn't move, the circuits are not short circuited.

If needle jumps or flickers, the circuits are intermittently short circuited.



TA 098583

Go on to Sheet 6

OHMS SCALE (CONT)

MEASURING RESISTANCE

To measure resistance, do the following steps:

A Setup and zero the multimeter.



Failure to do the following step can damage the multimeter.

B Disconnect the circuit being tested. To be safe, disconnect the battery ground strap.

NOTE

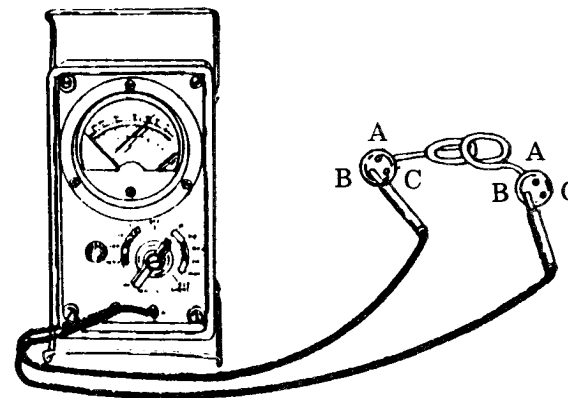
Zero the meter every time you change ranges.

C If the test calls for an ohms range different than RX1 or XI, set the selector switch to that range (like RX10 or X10).

D Connect the probes across the circuit or item to be measured. The example shows measuring the resistance of one wire in a three-wire cable.

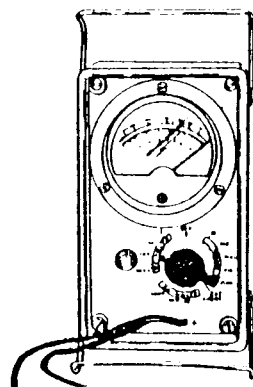
E Read the meter. If the meter switch is on the RX1 or XI range, the reading is taken directly from the top scale. If the meter switch is on a different range, multiply the reading on the scale according to the table below.

OHMS SWITCH SETTING	SCALE
X1 or RX1	Read number on scale
X10 or RX10	Multiply reading by 10
X100 or RX100	Multiply reading by 100
X1K or RX1K	Multiply reading by 1000
X10K or RX10K	Multiply reading by 10,000

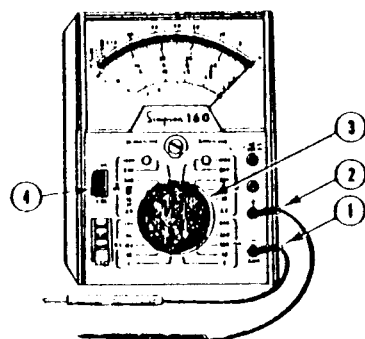


DC VOLTS SCALE

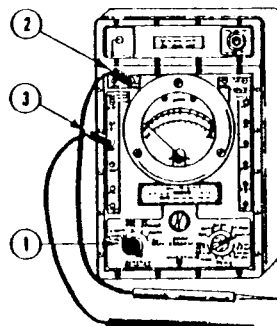
USING THE DC VOLTS SCALE



AN/URM-105



SIMPSON 160



TS-352 B/U

SETTING UP THE METER

Before using the multimeter to measure DC volts, do the following steps pertaining to the multimeter you have.

AN/URM-105

Set meter switch to DC volts range. (To measure 24 volts DC, set switch on 100 DC VOLTS range.)

TS-352 B/U

A Set FUNCTION switch (1) to DIRECT.

B Put black lead (2) in OHMS-DC/±AC jack.

C To measure 24 volts DC, plug red lead (3) into 50V jack on left side of meter. (If measuring less than 10 volts DC, use 10V jack. If measuring less than 2.5 volts DC, use 2.5V jack.)

SIMPSON 160

A Connect black lead (1) to COM-jack.

B Connect red lead (2) to + jack.

C To measure volts DC, set selector switch (3) to VDC 50 position. (If measuring less than 10 volts DC, set selector switch to VDC 10 position. If measuring less than 2.5 volts DC, set selector switch to VDC 2.5 position.)

D Set polarity reversing switch (4) to +DC.

TA 098585

Go on to Sheet 8

DC VOLTS SCALE (CONT)

MEASURING DC VOLTS

To measure DC voltage, do the following steps:

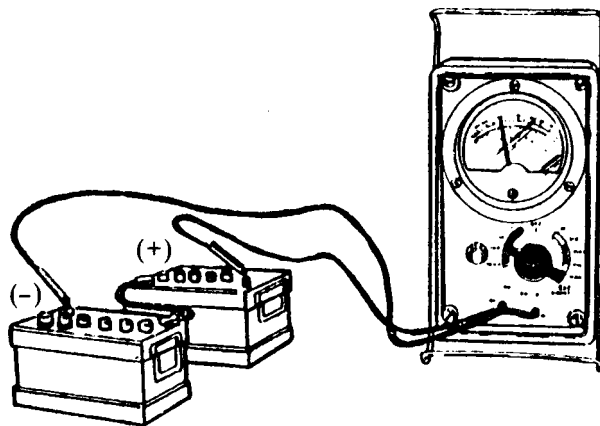
- A Set up and zero multimeter.



If you are unsure of the voltage to be measured on the vehicle, always start on the highest range. This will protect the meter.

- B Connect the red probe to the positive (+) side of the circuit and the black probe to the negative (-) side. The example shows 24 volts DC being measured across the batteries.

- C Read the meter. If the needle moves off scale to the left, reverse the probes on the circuit.



NOTE

The following examples show how to read all three multi-meters.

AN/URM-105

Read the DC volts scale for the range at which the selector switch is set.

SWITCH SETTING	SCALE
1000 DC VOLTS	0-10 (and multiply by 100)
100 DC VOLTS	0-10 (and multiply by 10)
10 DC VOLTS	0-10
1 DC VOLT	0-10 (and divide by 10)

TS-352 B/U

Read the DC volts scale for the range at which the red lead is plugged.

RANGE	SCALE
50V	0-5 (and multiply by 10)
10V	0-10 (and multiply by 4)
2.5V	0-2.5

SIMPSON 160

Read the DC volts scale for the range at which the selector switch is set.

SWITCH SETTING	SCALE
VDC 50	0-50
VDC 10	0-10
VDC 2.5	0-25 (and divide by 10)

TA 098586

End

ELECTRICAL SYSTEM TROUBLESHOOTING (CONT)

CODES, ABBREVIATIONS AND SYMBOLS

(Sheet 1 of 3)

COLOR CODE

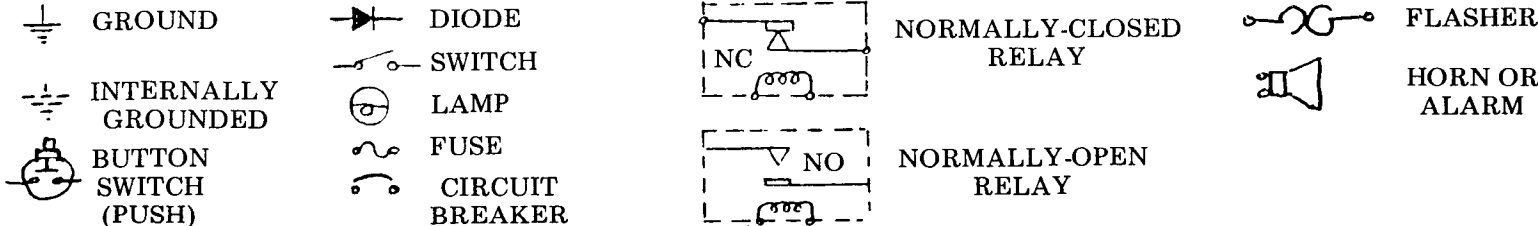
Wire and connector colors are shown according to the following color code:

<u>Abbreviation</u>	<u>Color</u>	<u>Abbreviation</u>	<u>Color</u>
R	Red	GY	Gray
W	White	PR	Purple
O	Orange	BR	Brown
Y	Yellow	DK G	Dark Green
T	Tan	DK BL	Dark Blue
PK	Pink	LT G	Light Green
BK	Black	LT BL	Light Blue
G	Green		

Two colors separated by a slash mark indicate a wire with a stripe - for example, R/LT G is a red wire with a light green stripe. Note the correct codes for colors often confused:

BK is black, BL is blue, PK is pink, PR is purple.

SYMBOLS



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Go on to Sheet 2

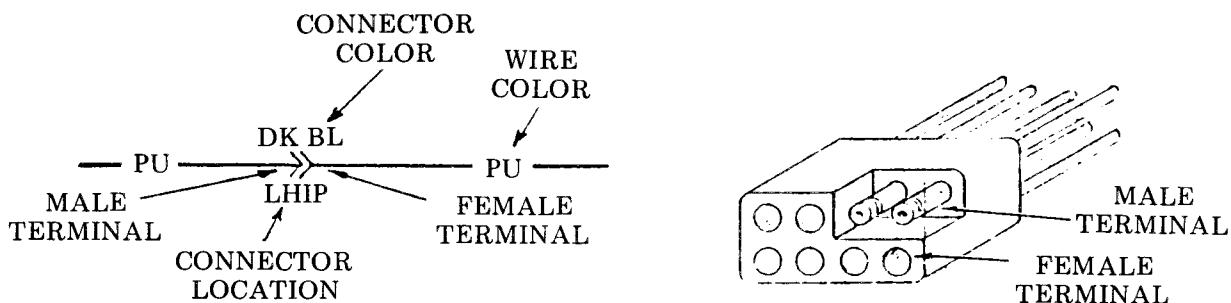
ELECTRICAL SYSTEM TROUBLESHOOTING (CONT)

CODES AND ABBREVIATIONS (CONT)

(Sheet 2 of 3)

WIRE HARNESS CONNECTORS

Harnesses are connected together by molded multiple-bullet connectors, some of which are color-coded for easy identification. On these schematics, connector color and location are shown as follows:



Connector locations: (see page 2-60, sheet 3)

- LHIP - Behind LH instrument panel
- RHIP - Behind RH instrument panel
- Rear of cab - Behind cover below rear window
- RH side of cab - Behind cover below RH window
- Engine panel - Behind right rear wheel and engine access panel
- Near Trans. - Under trap doors behind cab
- Front Corm. - On loader frame
- Rear Corm. - Behind radiator
- Service Center - Behind service center doors

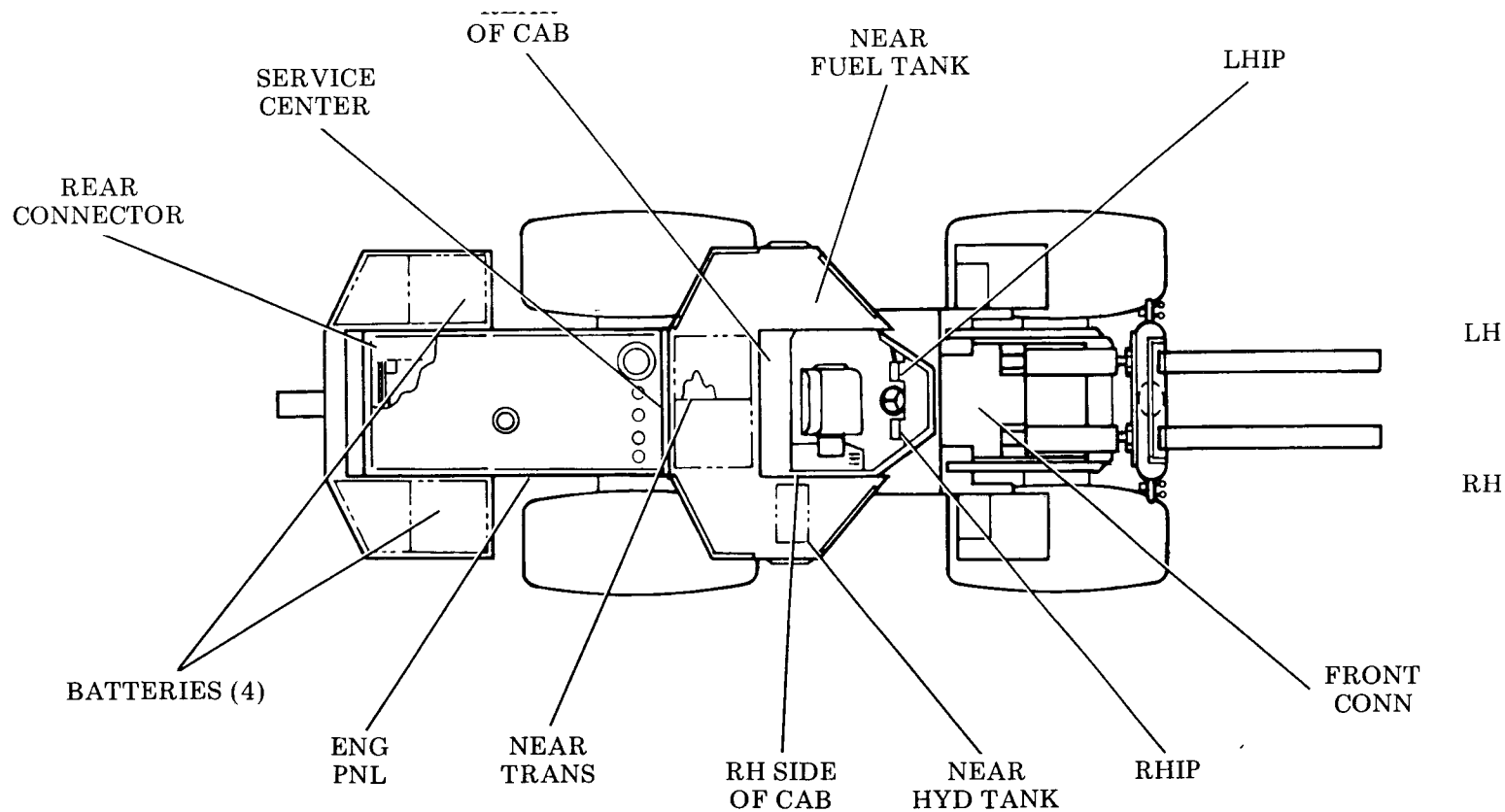
TA 098588

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

CODES AND ABBREVIATIONS (CONT)

(Sheet 3 of 3)



HARNESS CONNECTOR LOCATIONS

TA 098589

End

2-60

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE LIST

(Sheet 1 of 5)

All wires are 16 gage (AWG) except those listed below. If uncertain of a wire gage, look down the column designated COLOR until you find the color code for your wire. If under the FROM / TO columns, your wire is not listed, use 16 gage wire, otherwise use gage size as listed under column AWG.

WIRE		FROM	TO
COLOR	AWG		
BK	14	Ceiling heater blower motor	Ground
BK	18	VOLTMETER - term GRD	ALTERNATOR indicator
BK	18	ALTERNATOR indicator	Panel light RHIP
BK	18	POWER switch - term GRD	PANEL TEST switch - term 5
BR/BK	18	LOW HYD OIL LEVEL indicator	LOW ENGINE OIL LEVEL indicator
BR/BK	18	LOW ENGINE OIL LEVEL indicator	HIGH FUEL LEVEL indicator
DK BL	12	DK G connector at LHIP (for FLOOD LIGHTS)	BK connector at rear of cab
DK BL	12	BK connector at rear of cab	DK G connector at rear of cab

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE LIST (CONT)

(Sheet 2 of 5)

WIRE		FROM	TO
COLOR	AWG		
G	14	Ceiling heater blower switch (MED SPD)	Ceiling heater blower motor
GY	18	Splice near voltmeter in RHIP harness	Lamp sockets on all gage lights (five wires total)
LT BL	14	Fuse 6 RHIP	DK G connector at RHIP
LT BL	14	DK G connector at RHIP	Cab floor heater blower motor
LT BL	14	Ceiling heater switch (LOW SPD)	Ceiling heater blower motor
LT G	14	Splice in front harness	LH warning horn
LT G	14	Splice in front harness	RH warning horn

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE LIST (CONT)

(Sheet 3 of 5)

WIRE		FROM	To
COLOR	AWG		
0	10	Alternator-term+	Main power relay (2 separate wires required)
0	10	Main power relay	60-amp circuit breaker (2 separate wires required)
0	10	60-amp circuit breaker	Panel fuse holder no. 5 in LHIP and to splice in cab harness (NOTE: 2 separate wires are required, but they are spliced together in cab harness, see schematic)
0	12	Splice in cab harness	Fuse holder no. 9 in RHIP
0	12	Fuse holder no. 9 in RHIP	Fuse holder no. 8 in RHIP
0	12	Fuse holder no. 8 in RHIP	Fuse holder no. 7 in RHIP
0	12	Fuse holder no. 7 in RHIP	Fuse holder no. 6 in RHIP
0	12	Fuse holder no. 5 in LHIP	Fuse holder no. 4 in LHIP
0	12	Fuse holder no. 4 in LHIP	Fuse holder no. 3 in LHIP
0	12	Fuse holder no. 3 in LHIP	Fuse holder no. 2 in LHIP
0	12	Fuse holder no. 2 in LHIP	Fuse holder no. 1 in LHIP
0	14	Main power relay	15-amp circuit breaker
0	14	Ceiling heater switch (HI SPD)	Ceiling heater blower motor

Go on to Sheet 4

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE LIST (CONT)

(Sheet 4 of 5)

WIRE		FROM	TO
COLOR	AWG		
R	8	Main power relay	Starter relay
R	10	Main power relay	Starter solenoid - term BATT (2 separate wires required)
R	10	Alternator - term + (Pos)	Radio interference capacitor on alternator
R	10	Operator warning horn - term where PR/Y wire connects	Radio interference capacitor on operator warning horn (behind driver's seat)
R	10	Ceiling heater fan switch - term where R wires connect	Radio interference capacitor on heater housing
R	10	Capacitor on ceiling heater housing	Ground on heater housing
R	10	Windshield wiper switch - term B (inserted between term B and O wire)	Radio interference capacitor mounted on LHIP housing
R	12	Splice into LT BL wire in heater switch	Radio interference capacitor on heater housing
W	10	Starter relay	Starter solenoid - term SOL
W	18	Indicator light sockets on LHIP	Diode board assembly on LHIP (NOTE: 13 separator wires required)

Go on to Sheet 5

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE LIST (CONT)

(Sheet 5 of 5)

WIRE		FROM	TO
COLOR	AWG		
Y	12	DK G connector at LHIP	Loose connector coming from B connector at rear of cab (Wire comes from AUX switch on LHIP and can be used to power external source with 24 vdc)
Y/BK	14	15-amp circuit breaker on engine relay panel	Ceiling heater switch
Y/BR	18	Fuse holder no. 1 in LHIP	All indicator lamp sockets in LHIP (NOTE: from NO COOLANT FLOW indicator lamp socket to DK G connector is 16 gage Y/BR wire)
Y/BR	18	Fuse holder no. 9 in RHIP	All gages in RHIP

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

WIRE AND HARNESS TESTING

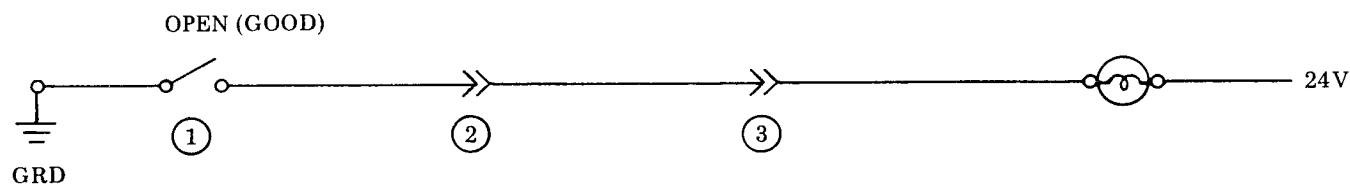
(Sheet 1 of 1)

Because of the numerous wires, harnesses and connectors which interconnect components in this system, tracing of individual wires is left up to you. Use the mini-schematic diagram accompanying each PROBLEM to determine the wire color, termination and connector locations. Use the schematic illustrations at the rear of this manual to determine pin and socket locations and overall view. Also, see WIRE LIST, page 2-61.

TIPS

Shorts usually are determined by a light, etc. remaining ON when it should be OFF. After determining that the switch is working properly, do the following:

- a. Reconnect wire at switch (1).
- b. Unplug connector at next connection (2). If light goes out, short is between (1) and (2). If light remains ON, reconnect (2) and disconnect (3) etc. until last connector. If light remains ON, short is between last connector (3) and lamp socket.



- c. If short cannot be repaired, notify Direct Support to replace harness unless you are authorized to do so.

TA 098590

End

2-66

DIODE TESTING

This task covers: Testing diodes for shorts or opens.

INITIAL SETUP

Test Equipment

Multimeter

Materials/Parts

Diode

Troubleshooting Reference

Page 2-71

Equipment Condition

Item removed from equipment

Special Tools

None

Personnel Required

One mechanic

References

None

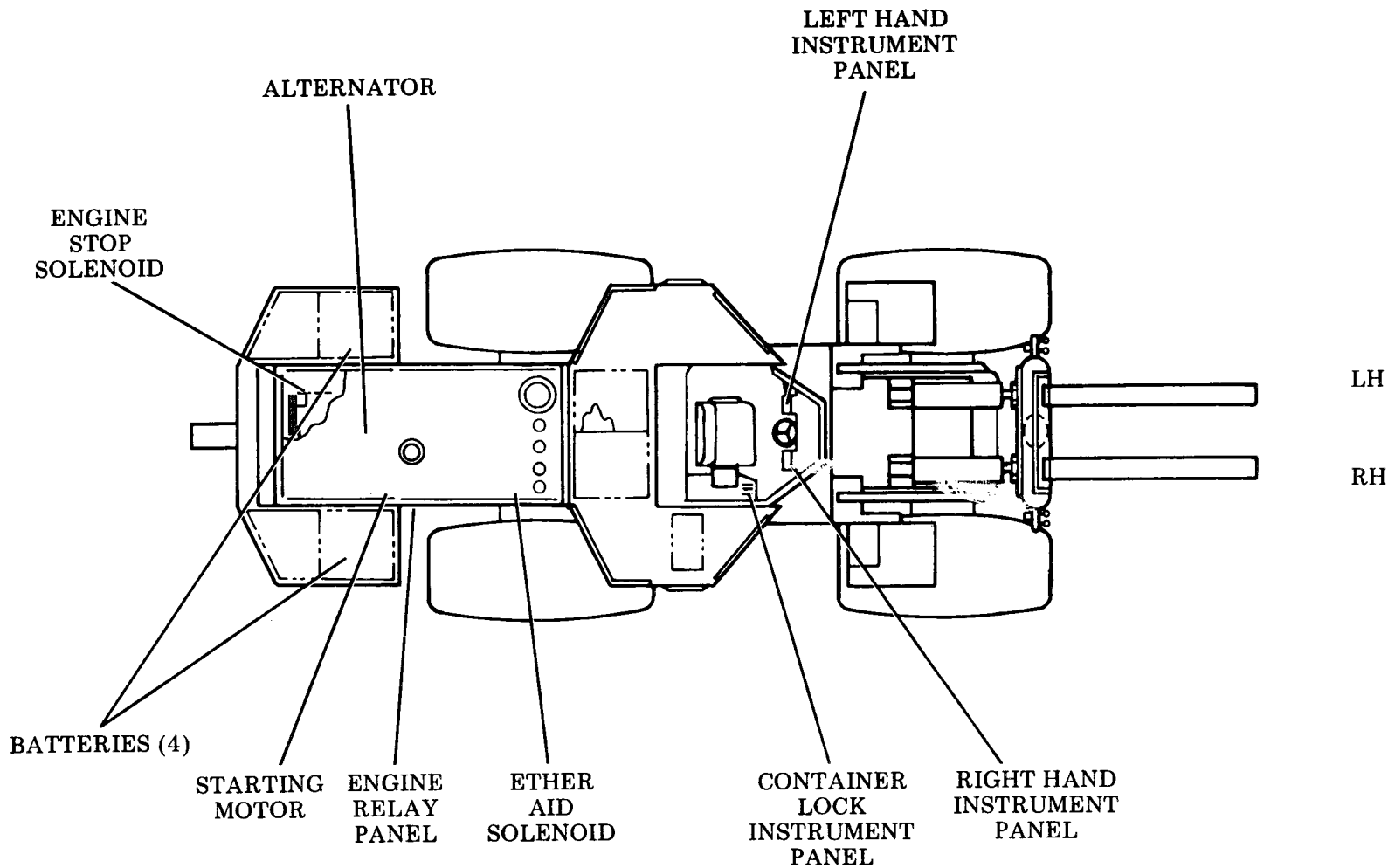
General Safety Instructions

None

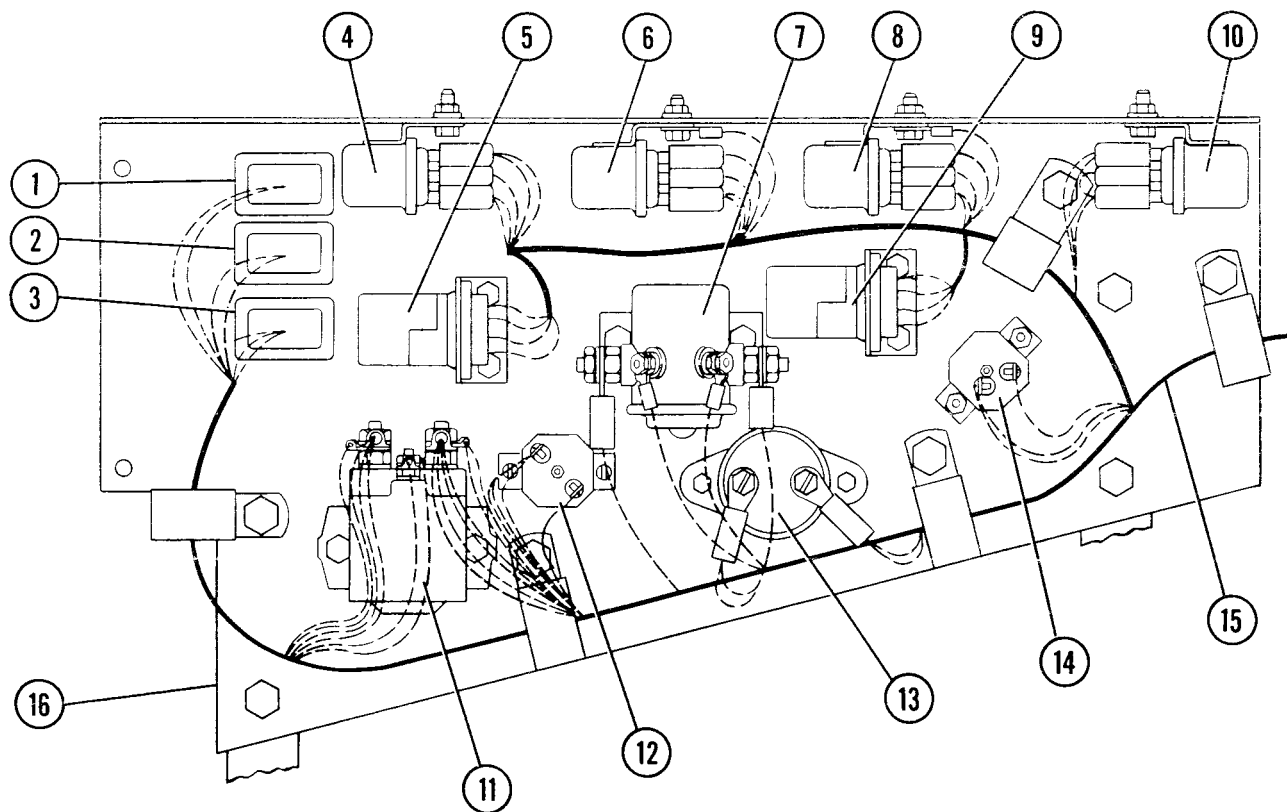
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
Multimeter	<ul style="list-style-type: none"> a. Set up, using RX10 scale, and zero. b. Connect meter probes across diode. c. Reverse probes. 	<p>Observe reading.</p> <p>Again observe reading.</p> <p>Good diode will have lower (near zero) reading in one direction and a higher (near infinity) in the other direction. Replace diode assembly if both readings are low or both are high.</p>

End



MAJOR ELECTRICAL COMPONENTS LOCATIONS



- | | |
|---|------------------------------|
| 1. Rear harness to engine harness connector (BLACK) | 9. Plug-in diode assembly #4 |
| 2. Rear harness to engine harness connector (RED) | 10. Start interlock relay |
| 3. Rear harness to engine harness connector (DARK BLUE) | 11. Main power relay |
| 4. Alternator relay | 12. 15-amp circuit breaker |
| 5. Plug-in diode assembly #3 | 13. 60-amp circuit breaker |
| 6. Engine stop relay | 14. 8-amp circuit breaker |
| 7. Starter relay | 15. Rear wiring harness |
| 8. Warning horn relay | 16. Engine relay panel |

ENGINE RELAY PANEL

TA 098592

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

ELECTRICAL TROUBLESHOOTING QUICK GUIDE

(Sheet 1 of 3)

ITEM	PROBLEM	REFERENCE
ENGINE	1. WILL NOT CRANK	See page 2-74.
	2. CRANKS SLOWLY	See page 2-80.
	3. CRANKS, BUT WILL NOT START	See page 2-81.
ALTERNATOR	4. CHARGES TOO MUCH OR NOT ENOUGH	See ALTERNATOR TESTING/ ADJUSTING, page 2-255.
STARTING AID	5. COLD WEATHER STARTING AID DOES NOT WORK	See page 2-86.
CAB	6. NO POWER TO INDICATOR LIGHTS, SERVICE LIGHTS, ETC.	See page 2-90.
HEATERS	7. FLOOR HEATER BLOWER MOTOR DOES NOT WORK	See page 2-92.
	8. CEILING HEATER/DEFROSTER BLOWER MOTOR DOES NOT WORK	See page 2-94.
HORNS	9. FRONT WARNING HORNS DO NOT WORK	See page 2-95.
	10. OPERATOR AUDIBLE WARNING HORN DOES NOT WORK	See page 2-96.

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

ELECTRICAL TROUBLESHOOTING QUICK GUIDE (CONT)

(Sheet 2 of 3)

ITEM	PROBLEM	REFERENCE
INDICATOR LIGHTS	11. ONE DOES NOT WORK	See page 2-97.
	12. ALL DO NOT WORK	See page 2-98.
	13. PRESTART AND ALTERNATOR REMAIN ON AFTER ENGINE STARTS	See page 2-101.
	14. HI FUEL LEVER REMAINS ON	See page 2-104.
	15. LOW HYD OIL LEVEL REMAINS ON	See page 2-106.
	16. LOW ENG OIL LEVEL REMAINS ON	See page 2-108.
	17. LOW FUEL LEVEL REMAINS ON	See page 2-110.
	18. IMPLEMENT, TRANS, AIR OR PILOT REMAINS ON	See page 2-112.
	19. NO COOLANT FLOW REMAINS ON	See page 2-114.
	20. SUPP STER REMAINS ON	See page 2-117.
21. HI TEMP HYD OIL REMAINS ON	See page 2-118.	

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

ELECTRICAL TROUBLESHOOTING QUICK GUIDE (CONT)

(Sheet 3 of 3)

ITEM	PROBLEM	REFERENCE
INDICATOR LIGHTS (CONT)	22. LOW PRESS BRAKE REMAINS ON	See page 2-120.
	23. PARK BRAKE ON REMAINS ON	See page 2-122.
	24. CONTAINER LOCK LIGHTS DO NOT WORK	See page 2-124.
SERVICE LIGHTS	25. TAIL/PANEL, HEAD, FLOOD OR AUX FLOOD LIGHTS DO NOT WORK	See page 2-126.
	26. STOP LIGHTS DO NOT WORK	See page 2-133.
	27. DOME LIGHT DOES NOT WORK	See page 2-136.
GAGES	28. DO NOT WORK	See page 2-138.
SERVICE METER	29. DOES NOT WORK	See page 2-141.
ALARM	30. BACKUP ALARM DOES NOT WORK WHEN TRANSMISSION SELECTOR IS IN REVERSE	See page 2-143.
	31. BACKUP ALARM WORKS WHEN TRANSMISSION SELECTOR IS IN FORWARD OR NEUTRAL	See BACK UP ALARM SWITCH TESTING/ADJUSTMENT, page 2-334.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 1

(Sheet 1 of 6)

ENGINE

WILL NOT CRANK

Batteries fully charged. See page 2-269.
Cables good and installed correctly. See page 2-279.
Connectors clean and tight on posts.
Gages, lights, etc. work with POWER switch in ON position (see NOTE A).

NOTE A: If gages, lights, etc. do not work, see PROBLEM 6.

TROUBLESHOOT STARTING CIRCUIT

For battery power to turn the starting motor in this system, five switches must be closed.

Three of these are magnetic switches which are electrically activated:

- A. Starter solenoid located on the starting motor.
- B. Starter relay located on the engine relay panel, see page 2-60.
- C. Start interlock relay located on the engine relay panel, see page 2-60.

The other two are manually activated switches:

- D. Main disconnect located near engine relay panel.
- E. POWER key switch at START position located on Right Hand Instrument Panel.

The main disconnect switch (D) should always be closed except when working on the starting system components. The POWER switch (E) connects battery power to the starting circuit to energize the coil on the starter relay (B). However, the coil can only be energized if the current can flow to ground. The start interlock relay (C) provides the ground path as long as it is closed. (NOTE: This relay is normally closed and opens when the alternator starts up. This prevents the starter relay from closing if the power switch is accidentally turned to START while the engine is running.) When the coil on the starter relay (B) is energized, power goes from the battery to the start solenoid (A) which closes the circuit to the starting motor.

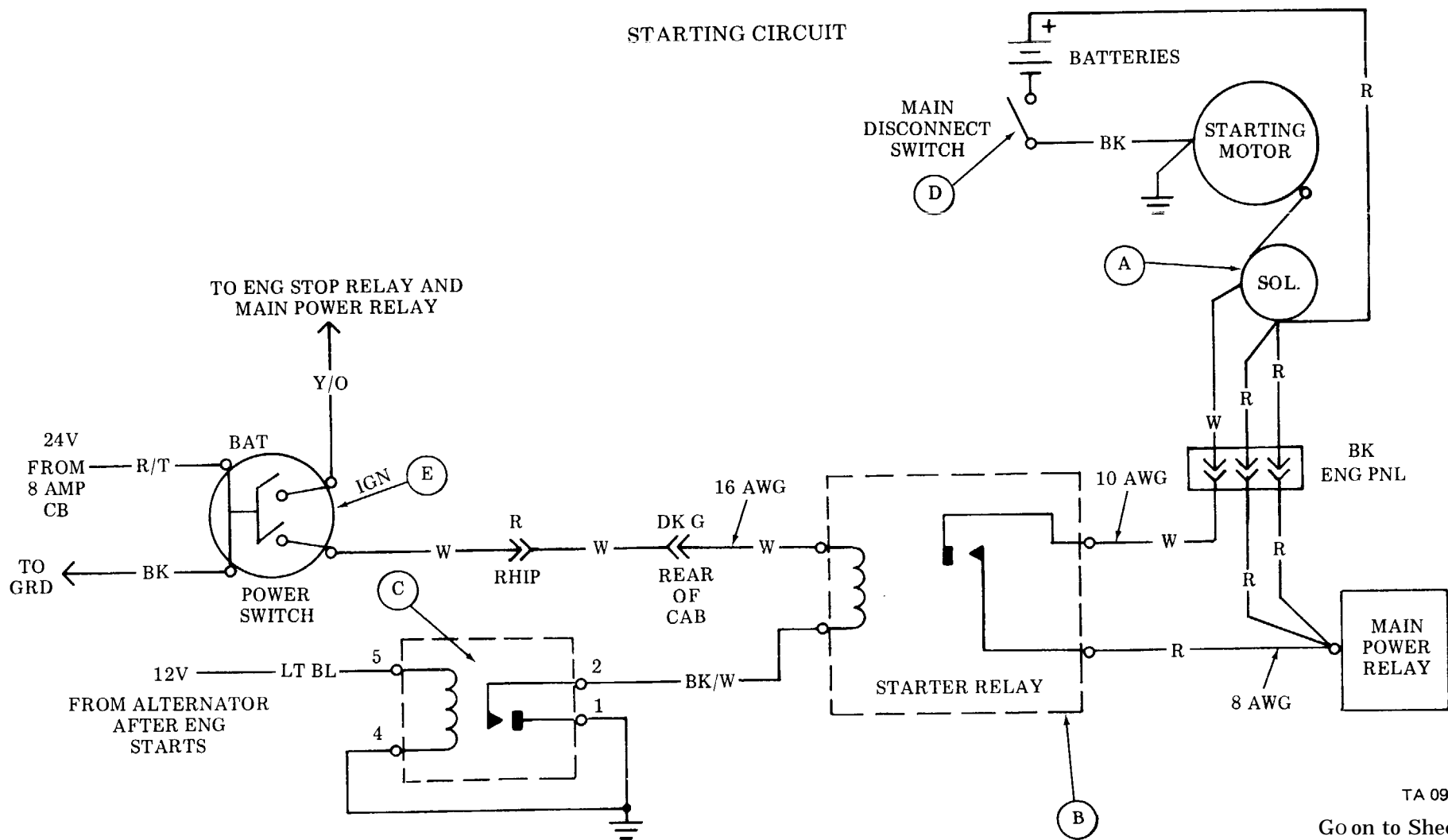
Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 1 (CONT)

(Sheet 2 of 6)

STARTING CIRCUIT



TA 098593

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)


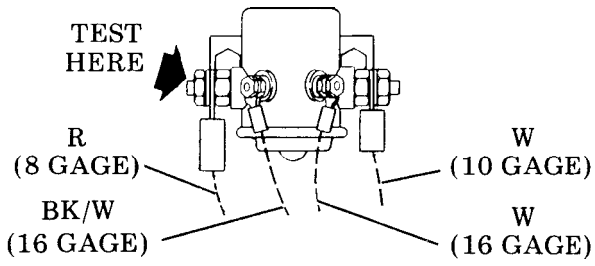
PROBLEM NO. 1 (CONT)

(Sheet 3 of 6)

NOTE 1: When testing for voltage, negative lead from your multimeter should be to ground (machine frame). See page 2-56.

NOTE 2: An assistant is required to turn and hold POWER switch in the START position.

NOTE 3: Start engine to ensure that repair/replacement has solved problem.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Before you begin, check battery (see page 2-268), then remove engine's lower right front access door and gain access to rear of Right Hand Instrument Panel. Turn POWER switch to START. Test for voltage present (NOTES 1 and 2) at terminal S where W wire connects to POWER switch. Is battery voltage present?	3	2	 TEST HERE POWER SWITCH
2	Turn main disconnect switch to OFF. Replace POWER switch. NOTE 3.	—	—	See page 2-305.
3	Test for voltage present at large terminal on starter relay (7, page 2-70) where R wire connects. Is battery voltage present?	5	4	 TEST HERE R (8 GAGE) W (10 GAGE) BK/W (16 GAGE) W (16 GAGE) STARTER RELAY
4	Repair/replace R wire from starter relay (7) to main power relay (11, page 2-70). (NOTE: R wire must be 8 gage.)	—	—	

TA 098594

Go on to Sheet 4

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 1 (CONT)

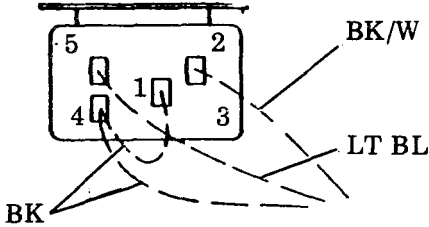
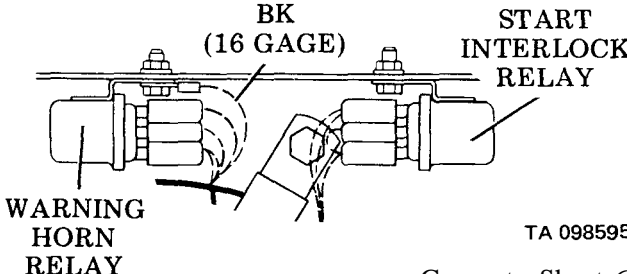
(Sheet 4 of 6)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS	
		YES	NO		
NOTE 2					
5	Is battery voltage (24 V) present at starter relay terminal where: (a.) 10 ga. W wire connects? (b.) 16 ga. W wire connects? (c.) 16 ga. BK/W wire connects?	12 5 8	(b) 6 7		
6	Test for open in W wire from POWER switch to starter relay.	—	—		See page 2-53.
7	Replace starter relay. Main disconnect switch OFF.	—	—		

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 1 (CONT)

(Sheet 5 of 6)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
NOTE 2				
8	Is battery voltage present at start interlock relay (10, page 2-70)?			
	a. 2 - where BK/W wire connects?	8b.	9	
	b. 4 - where BK ground wires connect?	11	10	
				 <p>START INTERLOCK RELAY</p>
9	Replace/repair BK/W wire from starter relay to start interlock relay.	—	—	10 gage wire
10	Replace start interlock relay. POWER switch OFF.	—	—	See page 2-337.
11	Replace/repair BK ground wire from start interlock relay terminal 4 to connector at warning horn relay (8, page 2-70) mounting screw.	—	—	
				 <p>WARNING HORN RELAY BK (16 GAGE) START INTERLOCK RELAY</p>

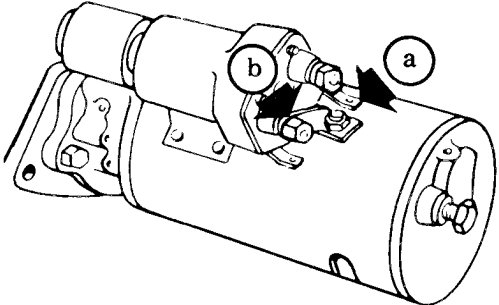
TA 098595

Go on to Sheet 6

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 1 (CONT)

(Sheet 6 of 6)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
NOTE 2				
12	Is battery voltage present at starter solenoid terminal:			
	a. SOL - where 10 gage W wire connects?	12	b 13	
	b. Where solenoid connects to starting motor frame?	15	14	
				 <p>STARTING MOTOR AND SOLENOID</p>
13	Repair/replace W, 10 gage wire from starter relay to starter solenoid. Main disconnect switch OFF.	—	—	NOTE 3
14	Replace starter solenoid.	—	—	See page 2-261. NOTE 3
15	Replace starting motor. Main disconnect switch OFF.	—	—	See page 2-258. NOTE 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 2(Sheet 1 of 1)

ENGINE

CRANKS SLOWLY

1. Test voltage potential on four batteries, see page 2-269.
2. If batteries are good, check battery cables for proper size, freedom from corrosion and proper installation, see page 2-279.
3. If batteries are fully charged, battery cables and connectors are good, and all mechanical systems work properly, inform Direct Support to test starting motor current draw.

NOTE

If ambient temperature is below 32°F (0°C) check that engine oil and diesel fuel ratings are correct.
If cold weather starting aid is being used and everything else is proper, see PROBLEM 5.

End

2-80

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 3

(Sheet 1 of 4)

ENGINE

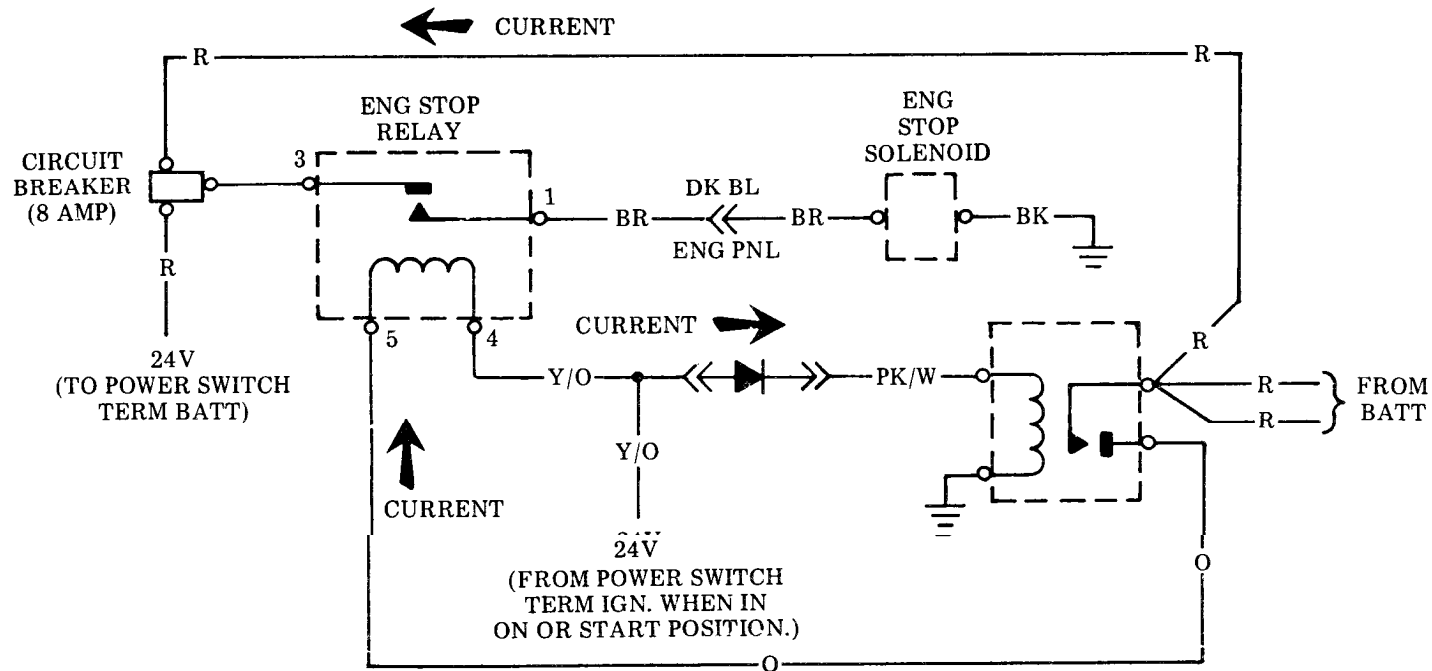
CRANKS, BUT WILL NOT START

TROUBLESHOOT ENGINE STOP CIRCUIT

NOTE

This engine must crank fast enough to obtain heat of compression for ignition.
If cranking speed is slow, see PROBLEM 2.

ENGINE STOP CIRCUIT



Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

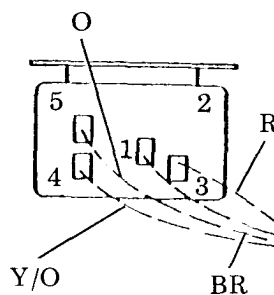
PROBLEM NO. 3 (CONT)

(Sheet 2 of 4)

NOTE 1: When testing for voltage, negative lead from your multimeter should be to ground (machine frame, etc.). See page 2-56.

NOTE 2: Always replace a wire with the same size (gage).

NOTE 3: Start engine after repair/replacement to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	Gain access to right side of engine.			
1	Place transmission gear selector in reverse. With POWER switch in ON position does back-up alarm sound?	3	2	If YES, main power relay circuit is working.
2	See PROBLEM 6, page 2-90.	—	—	
3	Turn POWER switch to ON. Test for voltage present (NOTE 1) at engine stop relay (6, page 2-70) terminals. Is battery voltage present at terminal:			
	a. 1 - Where BR wire connects?	4	3 (b)	
	b. 3 - Where R wire connects?	3 (c)	10	
	c. 5 - Where O wire connects?	3 (d)	11	
	d. 4 - Where Y/O wire connects?	12	13	
				 <p>The diagram shows a rectangular relay box with five terminals labeled 1, 2, 3, 4, and 5. Terminal 1 is at the top center, 2 is at the top right, 3 is at the middle right, 4 is at the middle left, and 5 is at the top left. Wires are connected to these terminals: wire 'O' connects to terminal 5, wire 'R' connects to terminal 3, wire 'Y/O' connects to terminal 4, and wire 'BR' connects to terminal 1. Terminal 2 is also shown but has no wire connected to it.</p>
4	Is battery voltage present at engine stop solenoid terminal where BR wire connects?	7	5	Stop solenoid is located at governor on top of engine.

TA 098598

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 3 (CONT)

(Sheet 3 of 4)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
5	Make sure DK BL connector (3, page 2-70) is properly seated and recheck for voltage present at engine stop solenoid. Is battery voltage now present at BR wire terminal?	—	6	If YES, engine should start. Hit does not, go to step 7.
6	16 gage BR wire from stop relay to solenoid is open. NOTES 2 and 3.	—	—	See page 2-53.
7	Is battery voltage present at BK ground wire terminal on engine stop solenoid?	9	8	
8	Turn POWER switch to OFF. Notify direct support to replace engine stop solenoid. NOTE 3.	—	—	
9	Repair/replace 16 gage BK ground wire from solenoid to ground. NOTE 3.	—	—	Wire grounds at fuel filter mounting bracket screw.
10	16 gage R, wire from 8 amp. Circuit breaker (14, page 2-70) to engine stop relay is open. Repair or replace wire. NOTE 3.	—	—	

Go on to Sheet 4

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 3 (CONT)

(Sheet 4 of 4)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
11	16 gage O wire from main power relay (11, page 2-70) to engine stop relay is open. Repair or replace wire. NOTE 3.	—	—	
12	16 gage Y/O wire from engine stop relay to plug-in diode assembly No. 3 (5, page 2-70) is open. Repair or replace wire. NOTE 3.	—	—	
13	Replace engine stop relay. POWER switch OFF. NOTE 3.	—	—	

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 4

(Sheet 1 of 1)

ALTERNATOR

CHARGES TOO MUCH OR NOT ENOUGH

See ALTERNATOR TESTING/ADJUSTING, page 2-255.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 5

(Sheet 1 of 4)

COLD WEATHER
STARTING AID

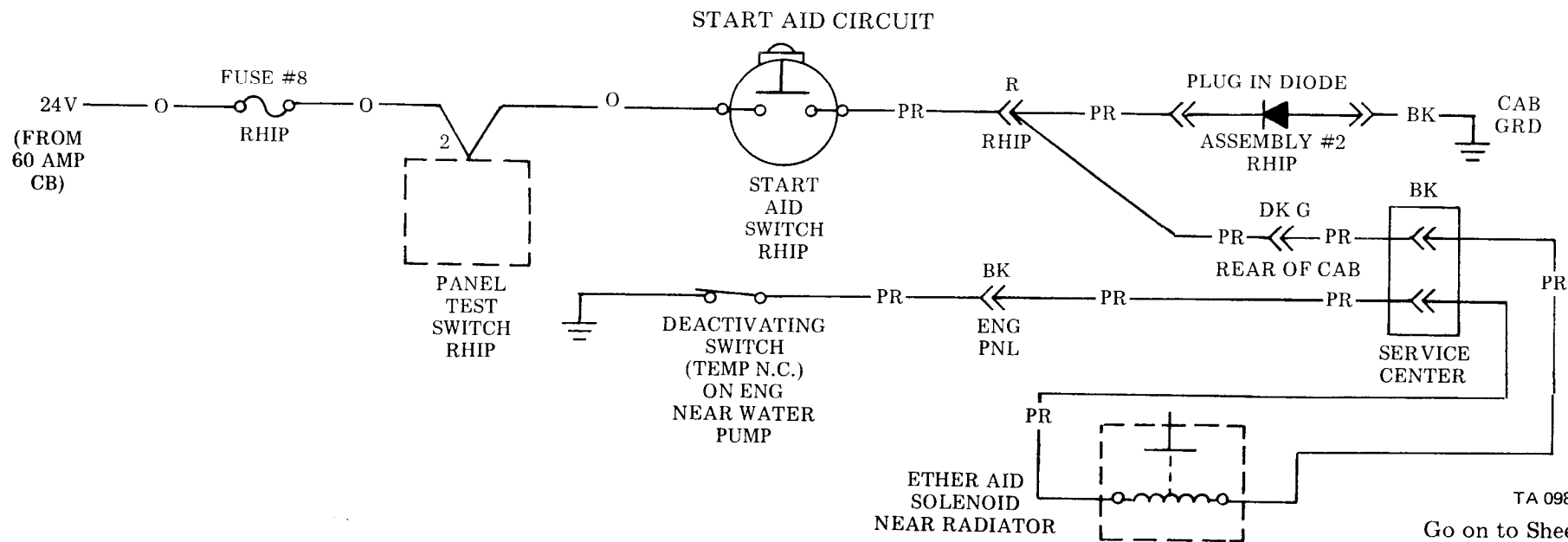
DOES NOT WORK

Engine cold (see NOTE). POWER switch ON or START.

NOTE

COOLANT TEMPERATURE MUST BE BELOW 80°F (26.7°C) TO CLOSE SWITCH!

The starting aid circuit receives its power from fuse 8. When the START AID switch is closed current flows from the fuse, through the switch, through the solenoid, through the deactivating switch and to ground. The deactivating switch must be closed. This switch opens (see NOTE above) when coolant temperature is above 100° F (37.8° C), deactivating the starting aid circuit. The diode protects the START AID switch from arcing due to induced solenoid high current.



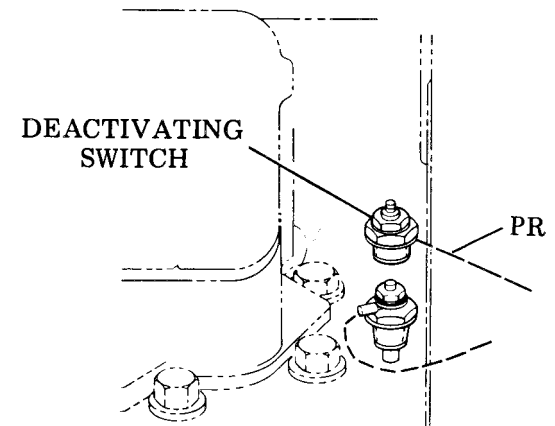
ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 5 (CONT)

(Sheet 2 of 4)

NOTE: Voltage is checked to ground, see page 2-56.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	Remove engine left rear access doors.			
1	Is fuse 8 good? If indicator lamps come on when PANEL TEST 3 switch is ON, fuse 8 is good.	2		Second fuse from right in RHIP.
2	Replace 10 amp fuse no. 8.	—	—	
3	Have an assistant push START AID switch button while you listen for clicking at ether aid solenoid. Is clicking present?	4	7	
4	With START AID switch closed, is battery voltage present at PR wire on deactivating switch?	5	6	
5	Replace deactivating switch.	—	—	See page 2-315.



TA 098600

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 5 (CONT)

(Sheet 3 of 4)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
6	16 gage PR wire from ether aid solenoid to deactivating switch is open.	—	—	See page 2-53.
7	Is battery voltage present at ether aid solenoid terminals? One or both?	8	9	
8	Replace ether aid solenoid.			See page 2-337.
9	Gain access to back of RHIP. Is battery voltage present at START AID switch where O wire connects?	11	10	
10	16 gage O wire from PANEL TEST switch to START AID switch is open, repair/replace.	—	—	
11	Is battery voltage present at START AID switch where PR wire connects?	13	12	

Go on to Sheet 4

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 5 (CONT)

(Sheet 4 of 4)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
12	Replace START AID switch.	—	—	See page 2-315.
13	16 gage PR wire from START AID switch to ether aid solenoid is open.	—	—	See page 2-53.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 6

(Sheet 1 of 2)

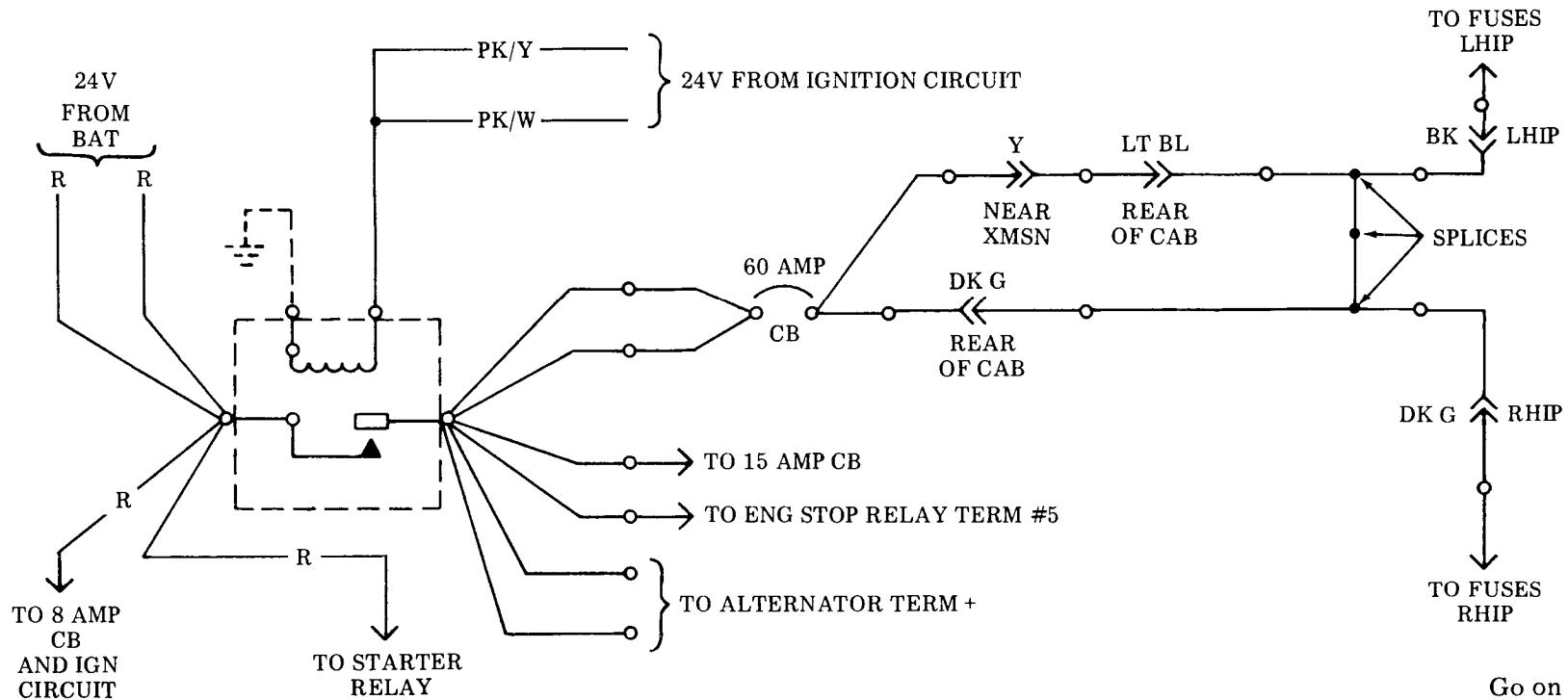
CAB

NO POWER TO INDICATOR LIGHTS, SERVICE LIGHTS, ETC.

Engine starts. Batteries fully charged.
Ceiling heater blower works.

All power to the cab, except for the ignition-start circuits, comes from the main power relay (11, page 2-70). The main power relay coil is energized by the ignition circuit which receives its power from the 8 amp circuit breaker connected directly to positive side of batteries. Go to step 1.

MAIN POWER CIRCUIT



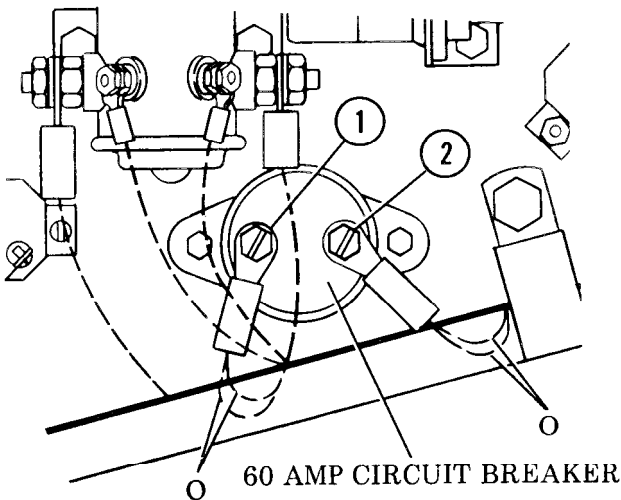
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Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 6 (CONT)

(Sheet 2 of 2)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	No	
	POWER switch ON			
	Gain access to engine relay panel.			
1	Is battery voltage present at 60 amp. circuit breaker (13, page 2-70) input terminal ① ?	2	5	 <p>60 AMP CIRCUIT BREAKER</p> <p>See page 2-53.</p>
2	Is battery voltage present at output terminal ② ?	4	3	
3	Replace 60 amp circuit breaker.	—	—	
4	10 gage O wire(s) from 60 amp. circuit breaker to splices in cab harness is open. See WIRE and HARNESS TESTING, page 2-66.	—	—	
5	10 gage O wire (O) from main power relay to 60-amp circuit breaker is open.			

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 7

(Sheet 1 of 2)

HEATERS

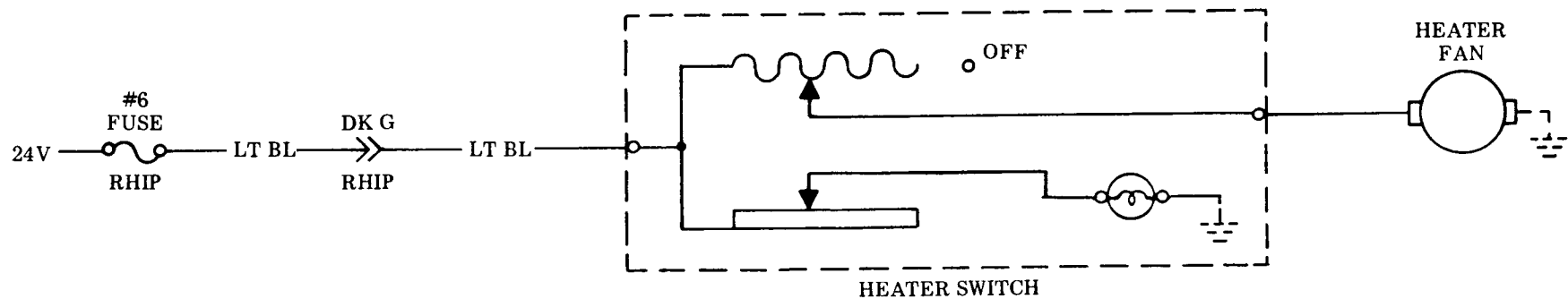
FLOOR HEATER BLOWER MOTOR DOES NOT WORK

POWER switch ON

The floor heater fan is controlled by a switch with a built-in indicator lamp. This lamp should be a 5D19 Bulb. If this bulb is burned out, it is possible that a 12 volt bulb was installed by mistake.

The floor heater receives its power from fuse 6, first fuse from left in Right Hand Instrument Panel.

FLOOR HEATER CIRCUIT



TA 098603

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 7 (CONT)

(Sheet 2 of 2)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Is fuse no. 6 good?	3	2	
2	Replace fuse no. 6.	—	—	
3	Is battery voltage present at heater switch terminal where LT BL wire connects?	4	5	See page 2-57.
4	Replace heater switch.	—	—	See page 2-315.
5	LT BL wire from fuse 6 to switch is open.	—	—	See page 2-53.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 8

(Sheet 1 of 1)

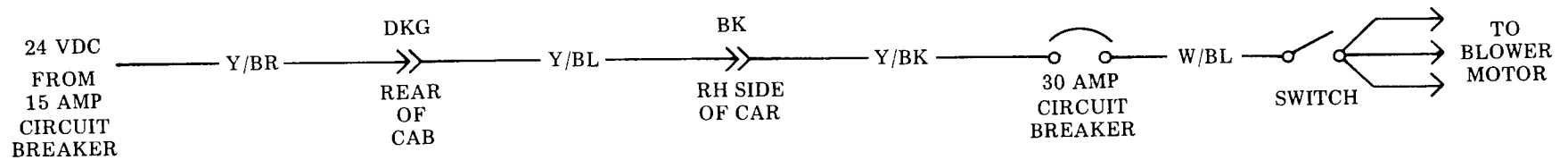
HEATERS

CEILING HEATER/DEFROSTER BLOWER MOTOR DOES NOT WORK

POWER switch ON

Blower motor receives its power from 15 amp circuit breaker on engine relay panel. If warning horn does not work, 15 amp circuit breaker is bad. If warning horn works, problem is probably at heater switch. (See page 2-315.)

CIRCUIT



TA 098604

End

2-94

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 9

(Sheet 1 of 1)

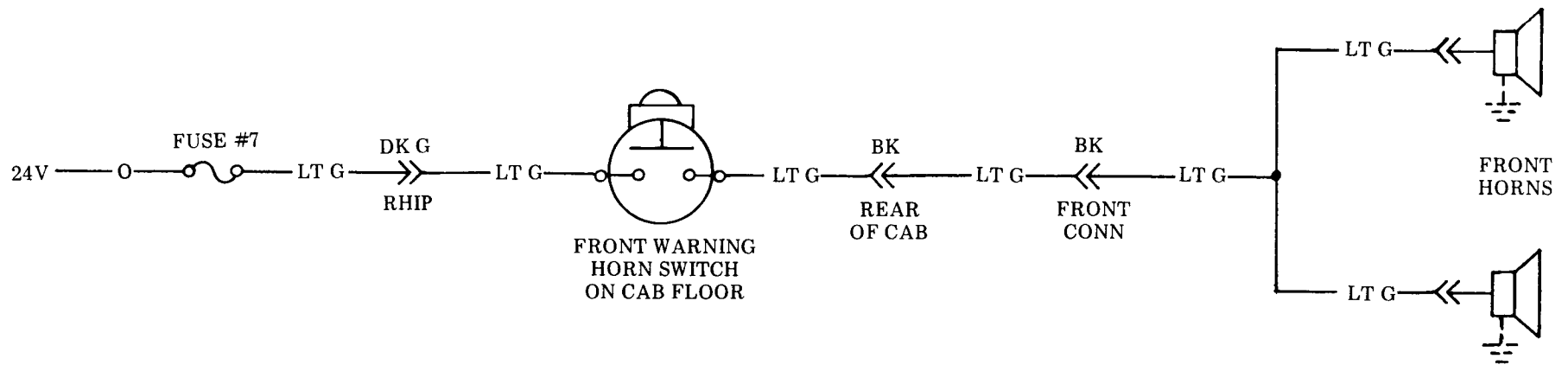
HORNS

FRONT WARNING HORN(S) DO NOT WORK

POWER switch ON. All other systems work.

The front warning horns get their power from fuse no. 7. If back horns do not work, problem is at fuse or within wiring (LT G) from fuse 7 to horns. If one horn does not work, problem is at horn or wiring from splice from front harness to horn. (Refer to page 2-327.)

FRONT WARNING HORN(S) CIRCUIT



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End

2-95

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 10

(Sheet 1 of 1)

HORNS

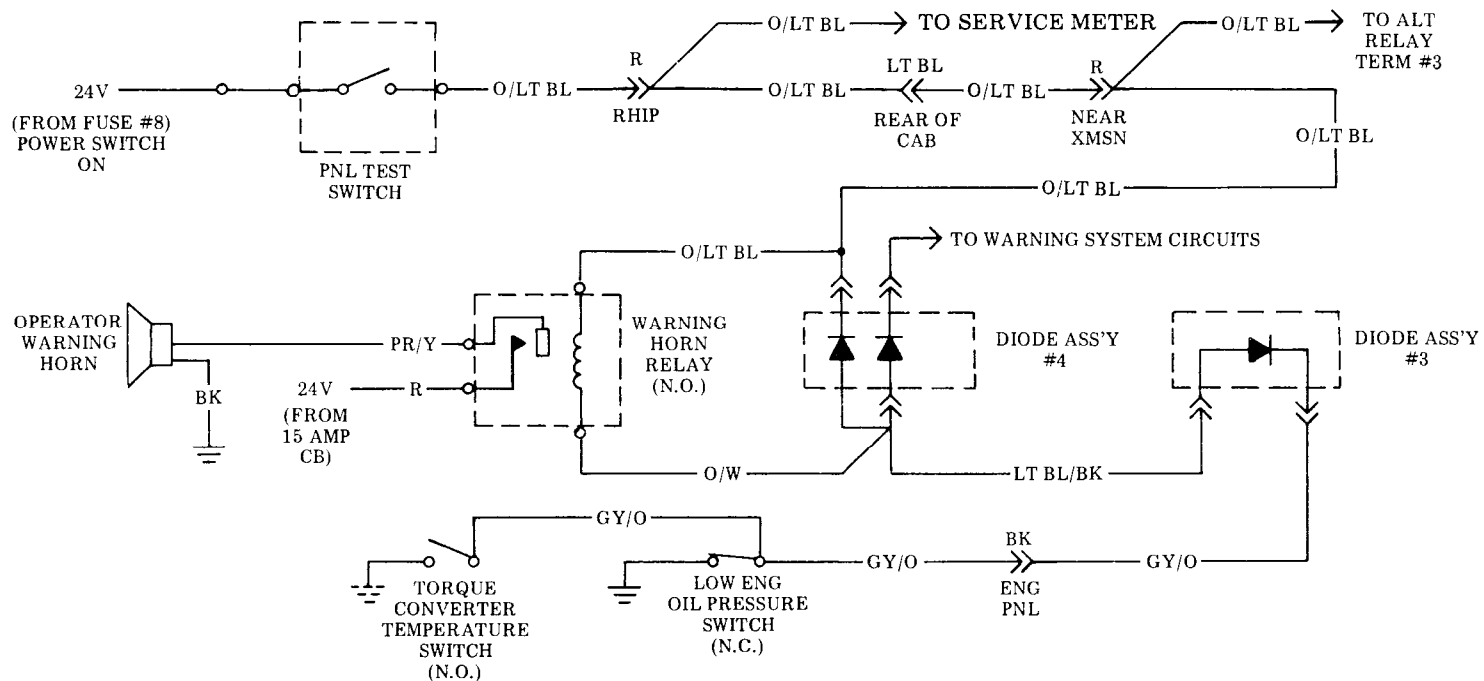
OPERATOR AUDIBLE WARNING HORN DOES NOT WORK

POWER switch ON. PANEL TEST switch ON.

TEST LOW ENGINE OIL PRESSURE SWITCH IF VOLTAGE IS PRESENT AT HORN

When the PANEL TEST switch is closed, circuit flows from PANEL TEST switch, through warning horn relay coil, through low engine oil pressure switch to ground. (See page 2-327.)

OPERATOR WARNING HORN CIRCUIT



TA 098606

End

2-96

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 11

(Sheet 1 of 1)

INDICATOR LIGHTS

ONE WILL NOT COME ON WHEN PANEL TEST SWITCH IS ON

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Test bulb for continuity, (page 2-53). Is bulb good?	2	*	*Replace bulb (24 volt only).
2	Check condition of socket and if bulb is seating correctly. Is socket good?	3	*	*Repair or replace socket, see page 2-305.
3	Gain access to rear of instrument panel. Are the wire terminals properly connected and tight? (NOTE A).	4	*	*Make proper.
4	Test individual diode for light which will not come on. Is diode good?	6	5	See diode test procedure, page 2-67.
5	Individual diodes are not serviceable, replace diode board assembly.			See page 2-337.
6	18 gage W wire from diode to lamp socket is open, repair or replace wire.	—	—	

*For LOW PRESS BRAKE indicator, test flasher for continuity, see page 2-53. Replace flasher if defective.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 12

(Sheet 1 of 3)

INDICATOR LIGHTS

ALL DO NOT WORK

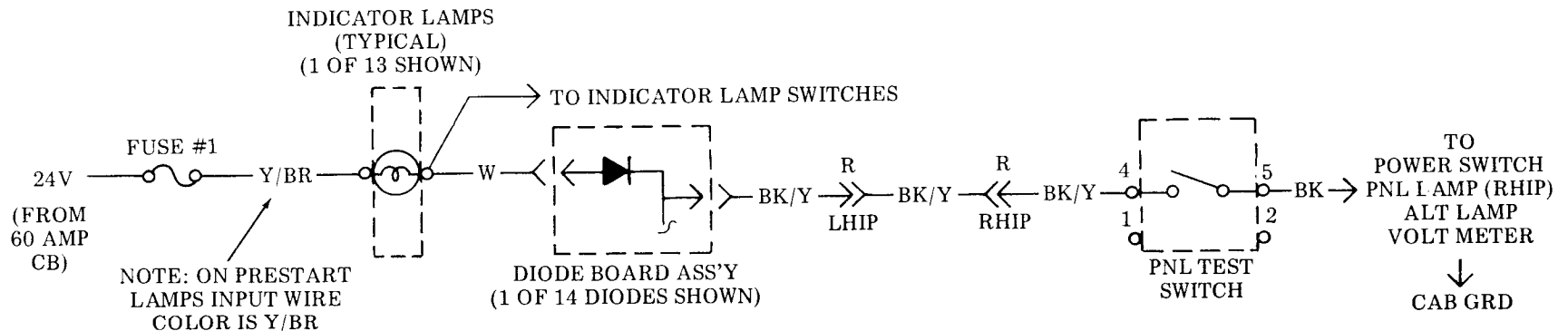
POWER switch ON. PANEL TEST switch ON.
Service lights (HEAD, FLOOD, etc.) work (see NOTE A).

NOTE A: If the service lights do not work, see PROBLEM 6, page 2-90.

TROUBLESHOOT PANEL TEST CIRCUIT

This circuit provides a means of testing the indicator lamps, service meter, and operator audible warning horn before the engine is started. Diodes are used to isolate the individual circuits from each other, yet allow one switch to test all circuits simultaneously.

PANEL TEST CIRCUIT



TA 098607

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 12 (CONT)

(Sheet 2 of 3)

NOTE 1: When testing for voltage, negative lead from your multimeter should be to ground (machine frame, etc.). See page 2-57.
 NOTE 2: Always replace a wire with the same size (gage).
 NOTE 3: After repair/replacement, turn POWER and PANEL TEST switches to ON to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER.		REMARKS
		YES	NO	
	Reach under each instrument panel and make sure harness connectors are properly seated.	—	—	Total of eight (8) connectors.
1	Place PANEL TEST switch in down, OFF, position. With POWER switch in ON position, are PRESTART and ALTERNATOR indicators lit?	6	2	
2	Is no. 1 fuse (below TAIL/PANEL switch) good?	4	3	
3	Replace fuse (10 amp). NOTE 3.	—	—	
4	Gain access to rear of Left Hand Instrument PANEL (LHIP). Is voltage present (NOTE 1) at each lamp socket and at fuseholder where Y/BR wire connects?	6	5	Wire color at PRESTART sockets is BR/B.
5	Correct opening in 18 gage Y/BR wire from lamp sockets to no. 1 fuseholder. NOTES 2 and 3.	—	—	
6	Gain access to rear of Right Hand Instrument Panel. Is voltage present at PANEL TEST switch terminal 4 where BK/Y wire connects?	7	10	

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 12 (CONT)

(Sheet 3 of 3)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
7	Place PANEL TEST switch in up, ON, position. Is voltage present at PANEL TEST switch terminal 5 where BK ground wire connects?	9	8	
8	Turn POWER switch to OFF. Replace PANEL TEST switch. NOTE 3.	--	--	See page 2-315.
9	B ground wire from PANEL TEST switch to cab ground is open. Repair/replace. NOTES 2 and 3.	--	--	
10	Is voltage present at diode board assembly (LHIP) terminal where BK/Y wire connects?	11	12	
11	16 gage BK/Y wire from diode board assembly to PANEL TEST switch is open. NOTES 2 and 3.	--	--	See page 2-53.
12	Replace diode board assembly. NOTE 3.	--	--	See page 2-337.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 13

(Sheet 1 of 3)

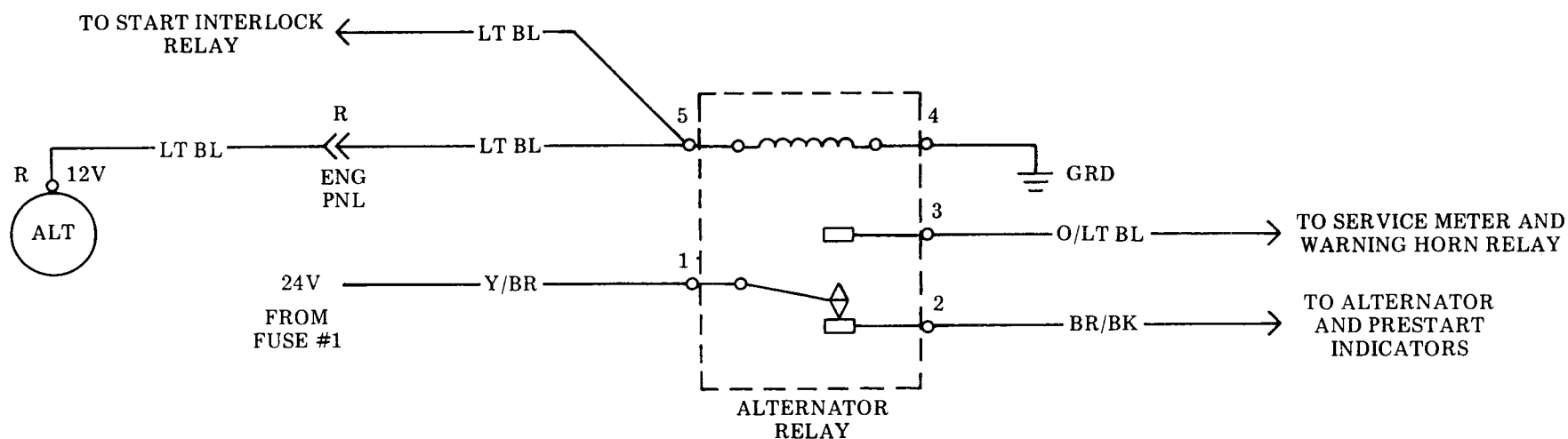
INDICATOR LIGHTS

ALTERNATOR, LOW ENG OIL LEVEL, LOW HYD OIL LEVEL AND HI FUEL LEVEL INDICATORS REMAIN ON AFTER ENGINE STARTS. (PRESTART INDICATORS)

VOLTS meter indicates normal charge.

These four circuits operate only before the engine is started. They obtain their power from the alternator relay which is supposed to open the circuits when alternator output starts up.

ALTERNATOR RELAY CIRCUIT



Go on to Sheet 2

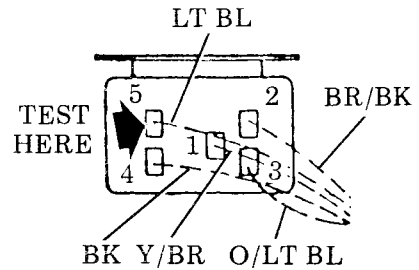
ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 13 (CONT)

(Sheet 2 of 3)

NOTE A: Voltage is checked to ground, see page 2-56.

NOTE B: After replacement, START engine to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	No	
1	<p>Engine running. Parking Brake ON.</p> <p>Remove engine lower right access covers. Test for voltage (NOTE A) present at terminal no. 5 where LT BL wire connects on alternator relay (4, page 2-70). Is voltage present? (12 volts DC).</p>	2	3	
2	Replace alternator relay. POWER switch OFF.			See page 2-352. NOTE B.
3	<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">WARNING</div> <p>Do not get any part of your body, clothing or test equipment near the alternator drive belts.</p> <p>Test for voltage present at terminal R where LT BL wire connects on alternator. Is voltage present?</p>	5	4	12 volts DC should be present.
4	Replace alternator. POWER switch OFF.	—	—	See page 2-252. NOTE B.

TA 098609

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 13 (CONT)

(Sheet 3 of 3)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
5	Test for open in LT 13L wire from alternator to alternator relay.	—	—	See page 2-53.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 14

(Sheet 1 of 2)

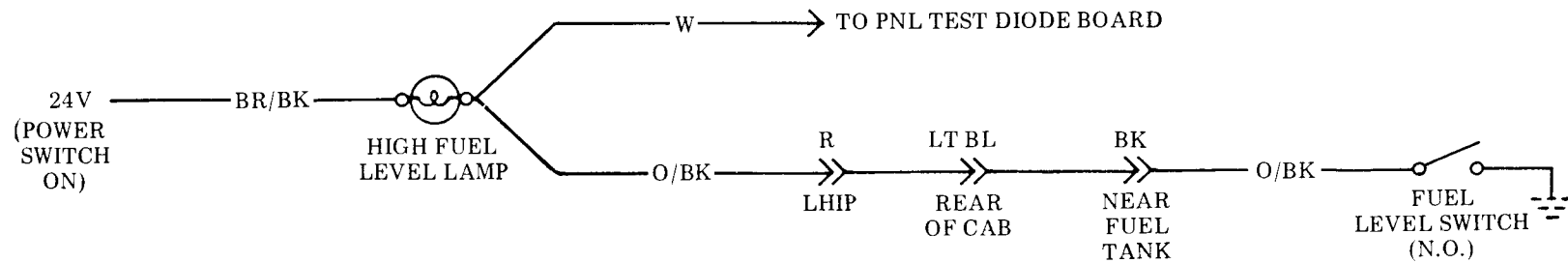
INDICATOR LIGHTS

HI FUEL LEVEL INDICATOR REMAINS ON

Engine not running. Fuel level LOW. POWER switch ON.

This circuit uses a normally-open (N.O.) magnetic float switch which will be closed if the fuel level in the tank is sufficient for a 10-hour wrmk day. Power to the circuit is supplied by the alternator relay terminal 2 when the POWER switch is in the ON position. The circuit is deactivated after the engine starts.

HIGH FUEL LEVEL INDICATOR CIRCUIT



TA 098610

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 14 (CONT)

(Sheet 2 of 2)

NOTE A: After replacement, turn POWER switch to ON to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Disconnect O/BK wire at upper fuel level switch on fuel tank. Prevent wire terminal from touching ground. Does indicator light remain ON?	5	2	
2	Turn POWER switch to OFF. Remove fuel level switch, (see page 2-315). Is float defective or incorrectly installed?	3	4	
3	Install correctly or repair/replace float, install switch, connect O/B wire and turn POWER switch to ON. Does indicator light remain ON?	4	—	See page 2-315.
4	Replace fuel level switch. POWER switch OFF. NOTE A.	—	.	See page 2-315.
5	Test for short in O/BK wire from switch to indicator lamp socket. See WIRE and HARNESS TESTING.	—	—	See page 2-66.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 15

(Sheet 1 of 2)

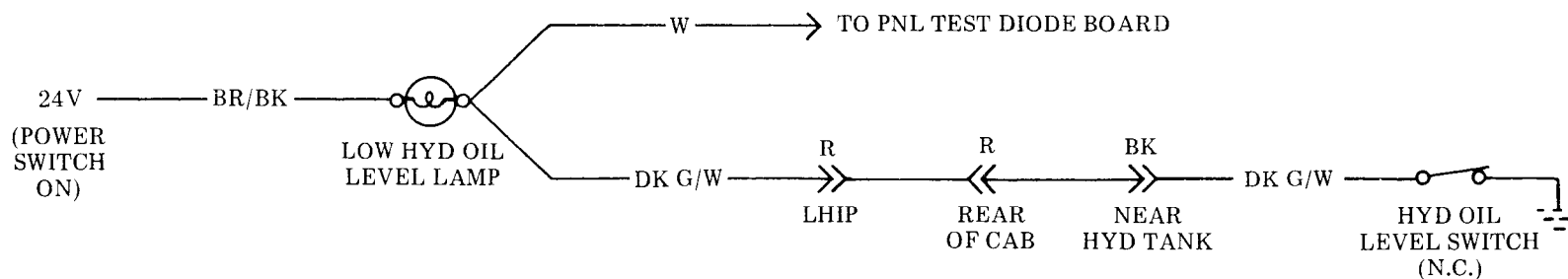
INDICATOR LIGHTS
(PRE START)

LOW HYD OIL LEVEL REMAINS ON

Engine not running. Hydraulic tank oil level normal (check sight gage on side of tank).
POWER switch ON.

This circuit uses a normally-dosed (N. C.) magnetic float switch which is open when the float is pushed up by sufficient oil in the tank. Power to the circuit is supplied from the alternator relay terminal 2 when the POWER switch is turned to ON. The circuit is deactivated after the engine starts.

LOW HYDRAULIC OIL LEVEL CIRCUIT



TA 098611

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 15 (CONT)

(Sheet 2 of 2)

NOTE A: After replacement, turn POWER switch to ON to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Disconnect DK G/W wire at hydraulic level switch on hydraulic tank. Prevent wire terminal from touching ground. Does indicator light remain ON?	5	2	
2	Turn POWER switch to OFF. Remove hydraulic oil level switch, (see page 2-3 15). Is float defective or incorrectly installed?	3	4	
3	Install correctly or repair/replace float, install switch connect DK G/W wire and turn POWER switch to ON Does indicator light remain ON?	4	—	See page 2-315.
4	Replace hydraulic oil level switch. POWER switch OFF. NOTE A.	—	—	See page 2-315.
5	Test for short in DK G/W wire from switch to indicator lamp socket. See WIRE and HARNESS TESTING.	—	—	See page 2-66.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 16

(Sheet 1 of 2)

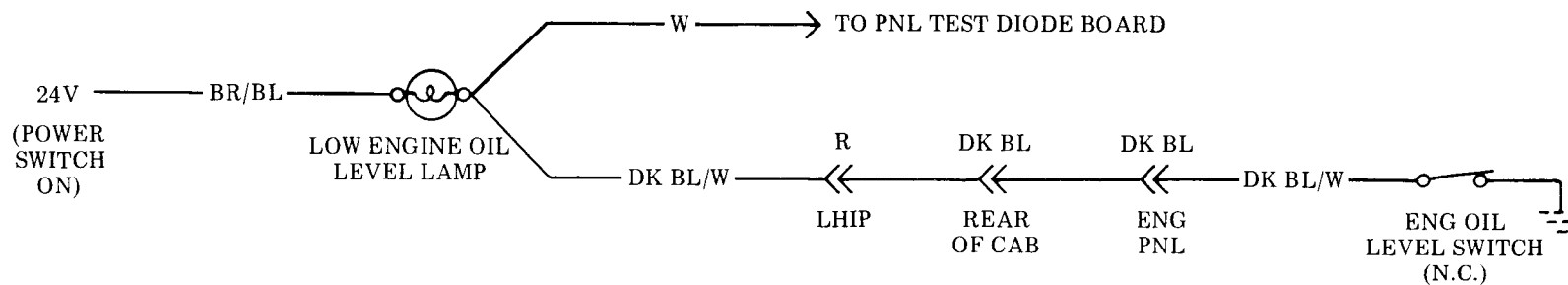
INDICATOR LIGHTS
(PRESTART)

LOW ENG OIL LEVEL INDICATOR REMAINS ON

Engine not running. Engine oil level normal. (See page 2-152.) POWER switch ON.

This circuit uses a normally-closed (N. C.) magnetic float switch which will be closed if the oil level in the engine oil pan is too low. Power to the circuit is supplied by the alternator relay terminal 2 when the POWER switch is in the ON position. The circuit is deactivated after the engine starts.

LOW ENGINE OIL LEVEL INDICATOR CIRCUIT



TA 098612

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 16 (CONT)

(Sheet 2 of 2)

NOTE A: After replacement, turn POWER switch to ON to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Disconnect DK BL/W wire at engine oil level switch on oil pan. Prevent wire terminal from touching ground. Does indicator light remain ON?	5	2	
2	Turn POWER switch to OFF. Remove engine oil level switch, see page 2-315. Is float defective or incorrectly installed?	3	4	
3	Install correctly or repair/replace float, install switch, connect DK BL/W wire and turn POWER switch to ON. Does indicator light remain ON?	4	—	See page 2-315.
4	Replace engine oil level switch. POWER switch OFF. NOTE A.	—	—	See page 2-315.
5	Test for short in DK BL/W wire from switch to indicator lamp socket. See WIRE and HARNESS TESTING.	—	—	See page 2-66.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 17

(Sheet 1 of 2)

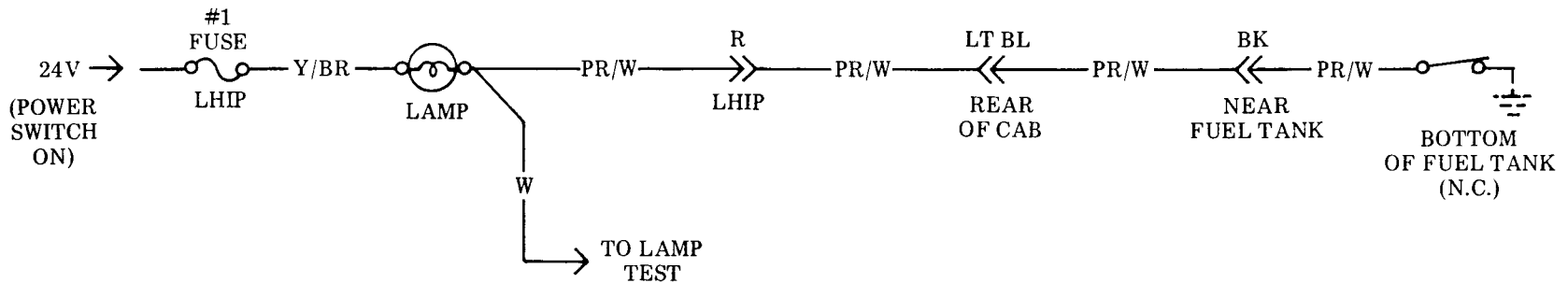
INDICATOR LIGHTS

LOW FUEL LEVEL INDICATOR REMAINS ON

POWER switch ON. Fuel tank has 16.5 gals. or more fuel in it.

This circuit uses a normally-closed (N.C.) magnetic float switch which will be open when fuel level is above 10% (16.5 gals.) of tank capacity. The circuit receives its power from the no. 1 fuse (first fuse from left in Left Hand Instrument Panel (LHIP)). POWER switch ON. Engine running or not.

LOW FUEL LEVEL INDICATOR CIRCUIT



TA 098613

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 17 (CONT)

(Sheet 2 of 2)

NOTE A: After replacement, turn POWER switch to ON to ensure problem is solved.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Disconnect PR/W wire at low fuel level switch on fuel tank. Prevent wire terminal from touching ground. Does indicator light remain ON?	5	2	Switch is at lower side of tank.
2	Turn POWER switch to OFF. Remove low fuel level switch, see page 2-315. Is float defective or incorrectly installed?	3	4	
3	Install correctly or repair/replace float, install switch, connect PR/W wire and turn POWER switch to ON. Does indicator light remain ON?	4	—	See page 2-315.
4	Replace fuel level switch, POWER switch OFF. NOTE A.	—	—	See page 2-315.
5	Test for short in PR/W wire from switch to indicator lamp socket. See WIRE and HARNESS TESTING.	—	—	See page 2-66.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 18

(Sheet 1 of 2)

INDICATOR LIGHTS
(PLUGGED FILTER)

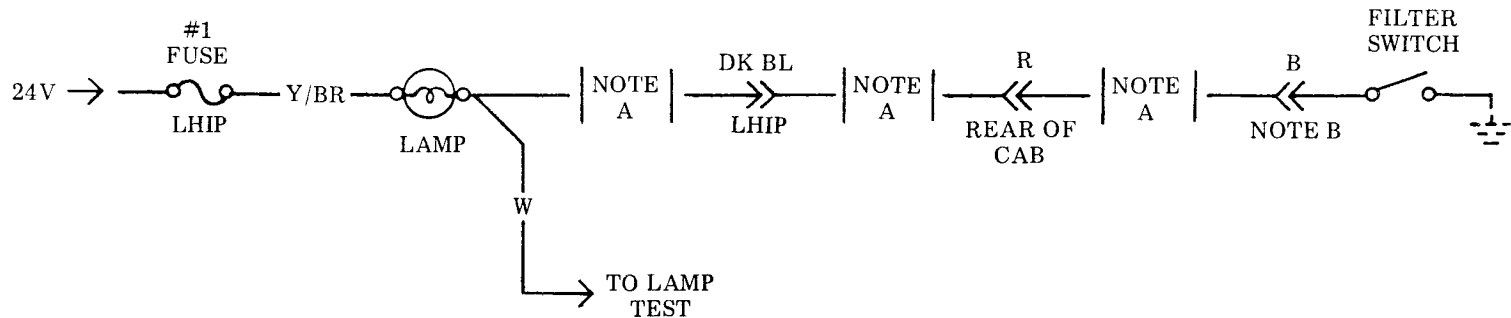
IMPLEMENT, TRANS, AIR OR PILOT INDICATOR REMAINS ON AFTER CHANGING
CORRESPONDING FILTER

POWER switch ON. Engine not running.

The individual circuits for these four indicators are identical except for the color of the wire from the lamp socket to the switch. All four circuits receive their power from the no. 1 fuse (first fuse from left in Left Hand Instrument Panel (LHIP)) when the POWER switch is ON.

All switches are normally-open type switches which close if filter pressure drop becomes excessive.

TYPICAL FILTER INDICATOR CIRCUIT



NOTE A
WIRE COLOR

NOTE B
LOCATION

IMPL.
XMSN
AIR
PILOT (BRAKE)

W/DK G
R/BK
R/W
T/W

NEAR HYD TANK
SERVICE CENTER
SERVICE CENTER
NEAR HYD TANK

TA 098614

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 18 (CONT)

(Sheet 2 of 2)

<u>Switch</u>	<u>Location</u>
NOTE C: IMPLEMENT	Top of hydraulic tank.
TRANS	Filter housing at service center behind cab.
AIR	Air filter elbow at service center behind cab.
PILOT (BRAKE)	Filter housing at service center behind cab.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
POWER switch ON				
1	Disconnect wire (NOTE A, Sheet 1) at switch for indicator that remains ON. Prevent wire terminal from touching ground.	—	—	For switch locations, see NOTE C above. Go to step 2.
2	Does indicator light remain ON?	4	3	
3	Replace switch. POWER switch OFF. NOTE D.	—	—	See page 2-305.
4	Test for short in wire (NOTE A, Sheet 1) from switch to indicator socket. See WIRE and HARNESS TESTING.	—	—	See page 2-66.

NOTE D: After replacement, turn POWER switch to ON to ensure problem is solved.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 19

(Sheet 1 of 3)

INDICATOR LIGHTS

NO COOLANT FLOW REMAINS ON

Engine running. WATER TEMP gage shows NORMAL temperature. POWER switch is ON.

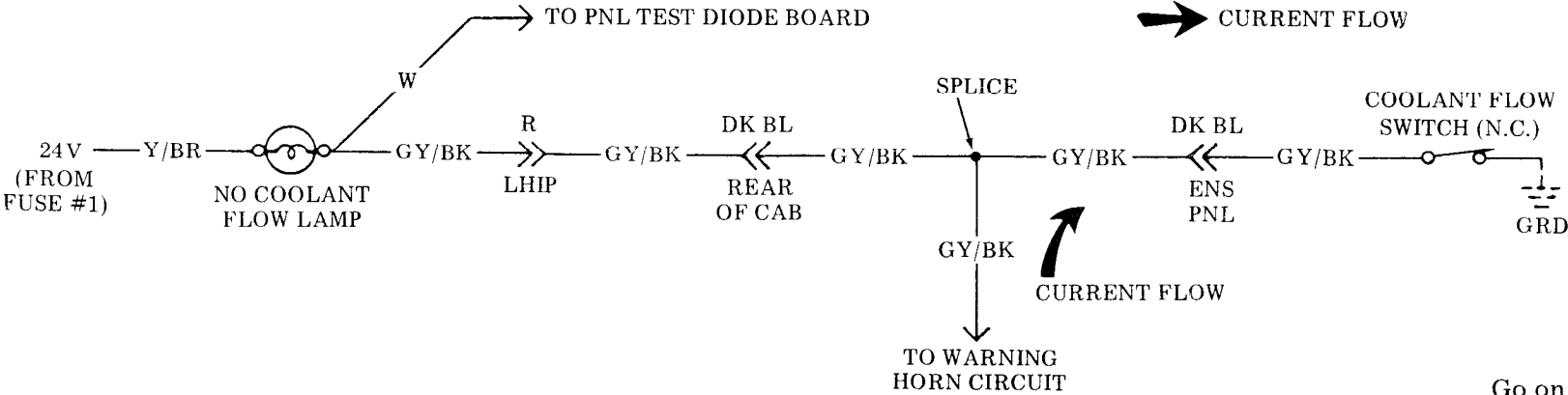
NOTE

The warning horn behind the operator's seat will be sounding, however, the problem is not in that circuit.

TROUBLESHOOT COOLANT FLOW CIRCUIT

This circuit uses a normally closed paddle switch which opens when coolant flows against the paddle. When the switch closes, the indicator light comes on and the horn blows.

NO COOLANT INDICATOR CIRCUIT



TA 098615

Go on to Sheet 2

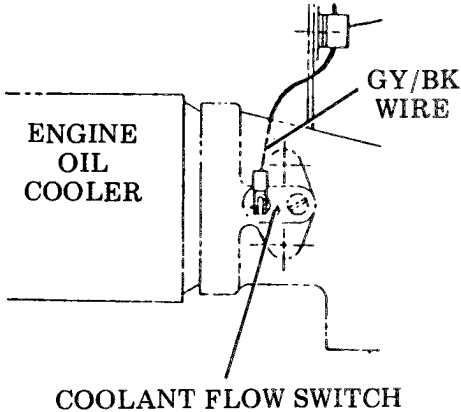
ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 19 (CONT)

(Sheet 2 of 3)

NOTE 1: DO NOT allow wire to touch ground(machine frame, etc.).

NOTE 2: START engine after replacement/repair to ensure problem is solved and reconnect PR/Y wire at warning horn relay if disconnected.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	Gain access to left rear and right front of engine. If the horn is blowing go to Step 1; if not, go to Step 2.			
1	Disconnect PR/Y wire from warning horn relay (8, page 2-70)	--	--	This will deactivate horn.
2	<p style="text-align: center;">CAUTION</p> <p>Make sure PARKING brake is engaged and transmission selector is in NEUTRAL.</p> <p>Disconnect GY/BK wire at coolant flow switch. (NOTE 1) START engine. Did NO COOLANT FLOW indicator light go off?</p>	3	4	
3	Turn POWER switch to OFF. Replace coolant flow switch. NOTE 2.	--	--	See page 2-315.

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 19 (CONT)

(Sheet 3 of 3)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
4	Turn POWER switch to OFF. Reconnect GY/BK wire at coolant flow switch. GY/BK wire from coolant flow switch is shorted, see WIRE and HARNESS TESTING, page 2-66.	—	—	NOTE 2.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 20

(Sheet 1 of 1)

INDICATOR LIGHTS

SUPP STER REMAINS ON

POWER switch ON. Engine running.
Normal steering system operating.

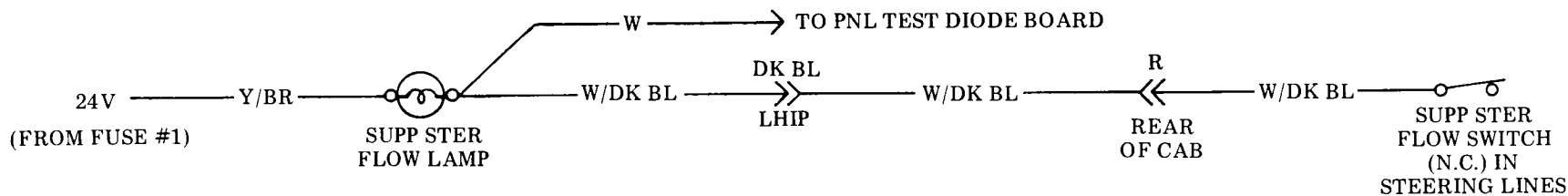
This circuit uses a normally closed paddle-type flow switch which opens when normal steering system flow occurs. When flow stops (supplemental steering takes over) the switch closes, lighting the SUPP STER lamp.

NOTE

Make sure arrow on switch points in direction of flow (away from main steering pump).

To troubleshoot: turn POWER switch to OFF, disconnect W/DK BL wire at flow switch and then START engine. If light goes out, replace flow switch, page 2-315. If light remains on, W/DK BL 16 gage wire is shorted between switch and lamp socket. See WIRE and HARNESS TESTING, page 2-66.

SUPP STER INDICATOR CIRCUIT



TA 098617

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 21

(Sheet 1 of 2)

INDICATOR LIGHTS

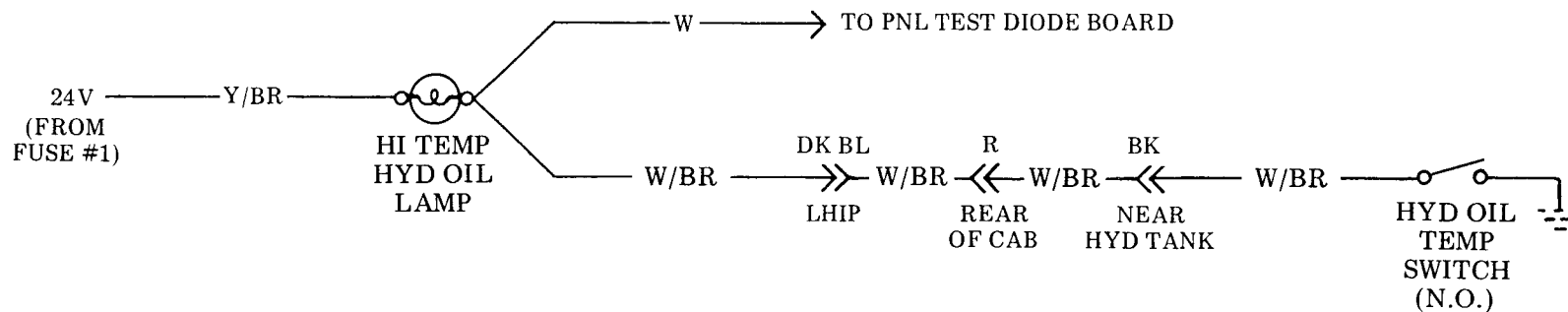
HI TEMP HYD OIL REMAINS ON AFTER HYDRAULIC OIL TEMPERATURE IS BELOW 190°F (87.8°C) (NOTE A)

POWER switch ON.

NOTE A: Lower a thermometer into the hydraulic oil tank. If hydraulic oil temperature is below 190°F (87.8°C), go to Step 1. If temperature is above 190°F (87.8°C) but below 215°F (101.7°C) wait until temperature comes down below 190°F (87.8°C), and then go to Step 1. If temperature is above 215°F (101.7°C), problem is in hydraulic system; notify Direct Support.

This circuit uses a normally open temperature switch which closes when oil temperature in hydraulic tank exceeds 215°F (101.7°C). The switch opens where oil temperature drops below 190°F (87.8°C).

HIGH TEMPERATURE HYDRAULIC OIL CIRCUIT



TA 098618

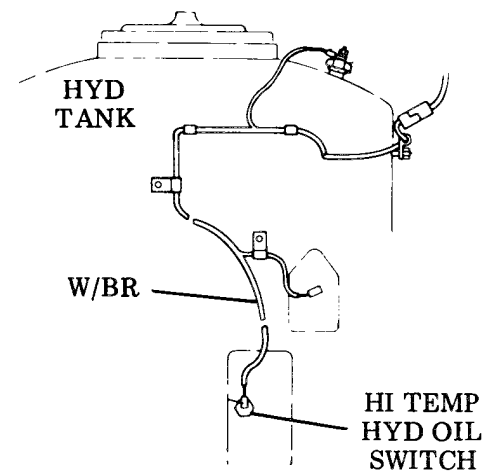
Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 21 (CONT)

(Sheet 2 of 2)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	POWER switch ON.			
1	Disconnect W/BR wire at high temperature hydraulic oil switch. Do not let it touch ground. Did HI TEMP HYD OIL light go OFF?	2	3	
2	Turn POWER switch to OFF. Replace temperature switch. See page 2-315.	—	—	
3	16 gage W/BR wire from switch is shorted. See WIRE and HARNESS TESTING, page 2-66.	—	—	



TA 098619

End

2-119

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 22

(Sheet 1 of 2)

INDICATOR LIGHTS

LOW PRESS BRAKE REMAINS ON

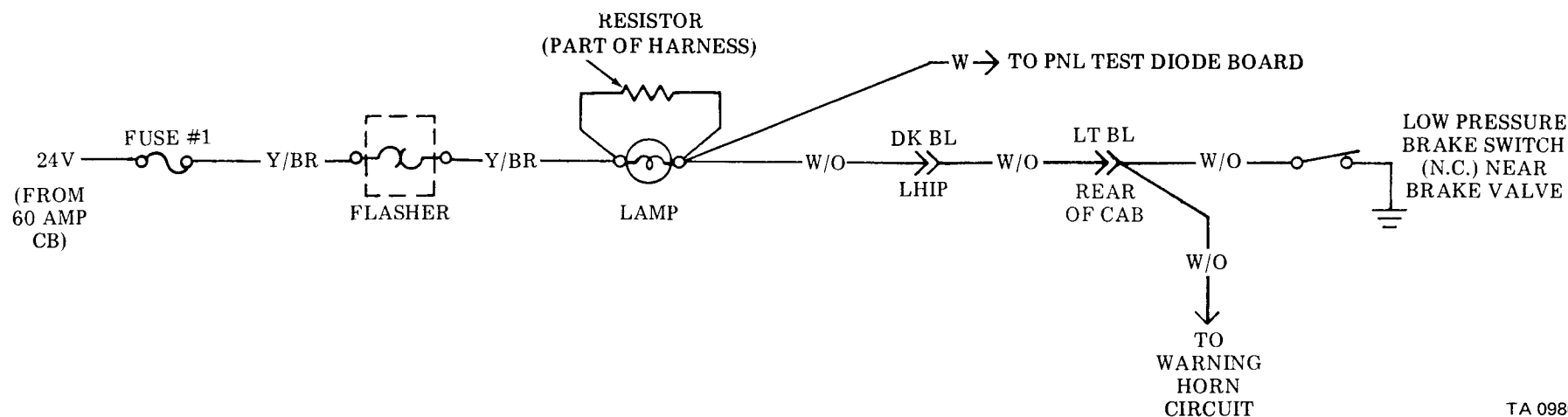
Engine running. Oil level in hydraulic tank is normal. Machine stops normally.

NOTE

The warning horn behind the operator's seat will be sounding, however, the problem is not in that circuit.

For circuit description, see Sheet 2.

LOW PRESS BRAKE INDICATOR CIRCUIT



TA 098620

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 22 (CONT)

(Sheet 2 of 2)

This circuit uses a normally closed pressure switch which opens when accumulator output pressure is about 1,100 psi (7585 kPa). If the pressure drops to $1,000 \pm 100$ psi (6900 ± 69 kPa) the switch closes and the LOW PRESS BRAKE light comes on as well as the operator warning horn. The flasher causes the light to flash on and off.

TO TROUBLESHOOT: Disconnect W/O wire from brake pressure switch (do not allow it to touch ground). With engine running; if LOW PRESS BRAKE light is now OFF, replace brake pressure switch, (see page 2-315). If light remains ON, W/O, 16 gage wire between switch and lamp socket is shorted. See WIRE and HARNESS TESTING, page 2-66.

End

2-121

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 22

(Sheet 1 of 2)

INDICATOR LIGHTS

PARK BRAKE ON - REMAINS ON

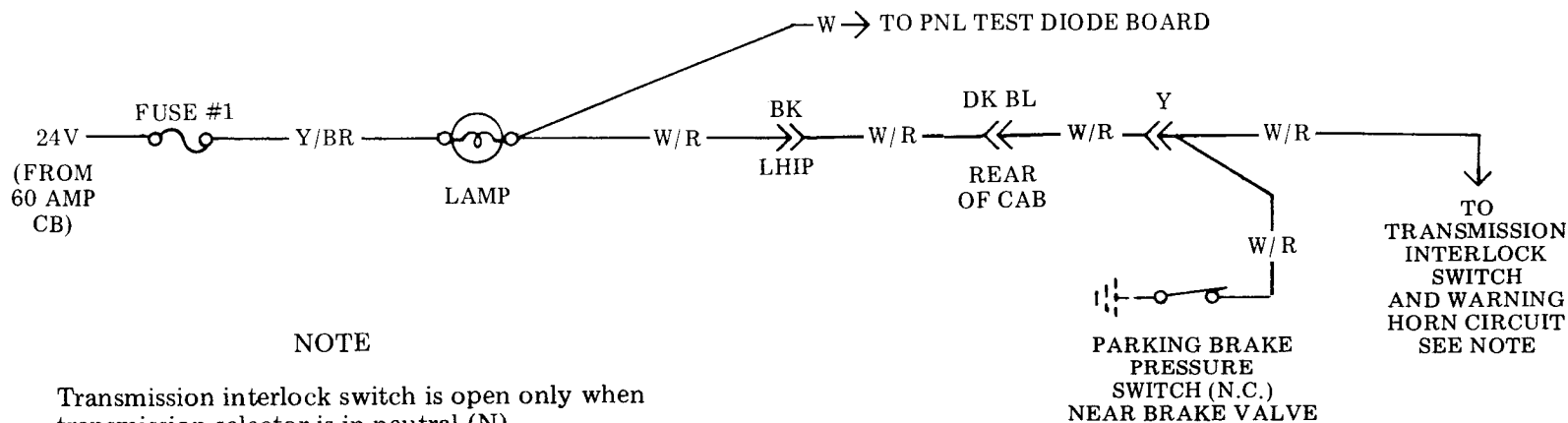
Engine running. Parking brake released. Hydraulic oil level normal. Accumulator pressure normal. Machine moves in forward and in reverse normally.

NOTE

The warning horn behind the operator's seat will be sounding, however, the problem is not in that circuit.

For circuit description, go to Sheet 2.

PARKING BRAKE ON INDICATOR CIRCUIT



NOTE

Transmission interlock switch is open only when transmission selector is in neutral (N).

TA 098621

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 23 (CONT)

(Sheet 2 of 2)

This circuit uses a normally closed pressure switch which opens when accumulator output pressure is about 1,100 psi (7585 kPa). The switch closes if parking brake release pressure falls below 900-1100 psi (6210-7585 kPa). This causes the PARK BRAKE ON light to come on and provides a path for the warning horn relay circuit, causing the horn to blow if the transmission is in FORWARD or REVERSE.

The transmission setting is sensed by a microswitch on the transmission interlock mechanism.

TO TROUBLESHOOT: Disconnect W/R wire from brake pressure switch (do not allow it to touch ground). With engine running; if PARK BRAKE ON light is now OFF, replace parking brake pressure switch, (see page 2-315). If light remains ON, W/R 16 gage wire between switch and lamp socket is shorted. See WIRE and HARNESS TESTING, page 2-66.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 24

(Sheet 1 of 2)

INDICATOR LIGHTS (CONTAINER
LOCK INSTRUMENT PANEL, CLIP)

CONTAINER LOCK LIGHTS DO NOT WORK
POWER switch ON.

NOTE A: The container lock light panel lights receive their power from fuse 5 in LHIP. This same fuse powers the dome light circuit, therefore, if the dome light works the fuse and wiring to the BLACK connector at RH side of cab are good. Problem is either in CLIP or wiring from BLACK connector to CLIP.

NOTE B: If only one lamp does not light when lens is pressed, problem is in bulb, socket or related wiring within panel.

NOTE C: If only one lamp does not light when in normal operation (see OPERATOR'S CONTROLS AND INDICATORS), problem is either in limit switch on container handler or in associated wiring. See TM 10-3930-641-10.

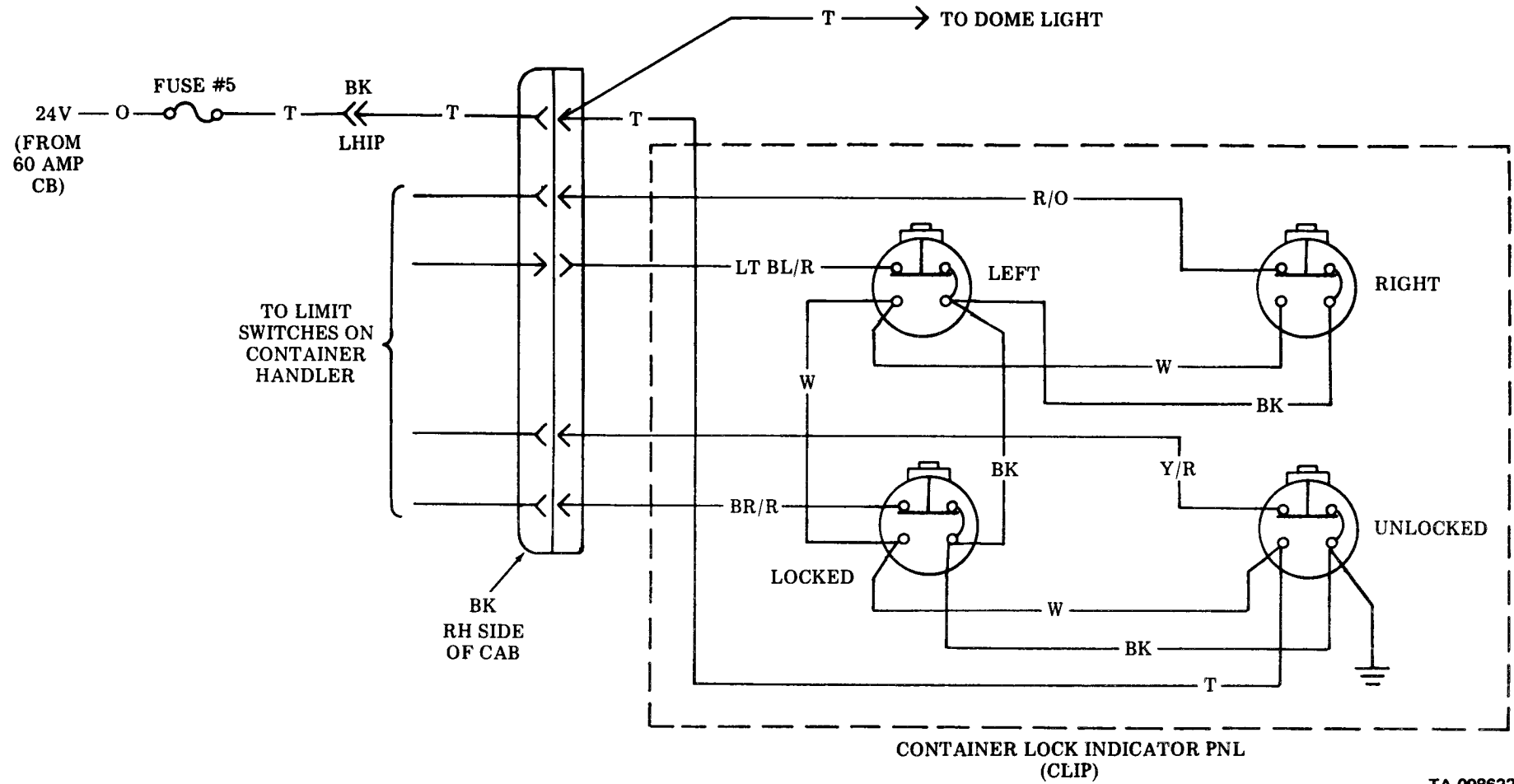
CONTAINER LOCK INDICATOR CIRCUIT (See Sheet 2)

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 24 (CONT)

(Sheet 2 of 2)



TA 098622

End

2-125

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25

(Sheet 1 of 7)

SERVICE LIGHTS

- 25 a. TAIL, Sheet 4
 - 25 b. PANEL, Sheet 5
 - 25 c. HEAD, Sheet 6
 - 25 d. FLOOD, Sheet 6
 - 25 e. AUX FLOOD, Sheet 7
-

A general procedure can be used to troubleshoot most of the service lights. This procedure is as follows:

1. Read the circuit description for the particular faulty light(s) while referring to the mini-circuit diagram below the description.
If all of the service lights do not work, see PROBLEM 6.
2. Use the following generalized tabular logic tree to isolate the problem (see Sheet 2).

NOTE A: All lamps are 24 volts.

NOTE B: Voltage checks are negative to ground. See page 2-57.

NOTE C: Continuity checks are made with item removed from system. See page 2-53.

NOTE D: If only one lamp will not come on, go to Step 8.

NOTE E: HEAD LIGHTS get power from a 15 amp circuit breaker rather than a fuse. Go to Step 3.

NOTE F: Fuse numbers are from left to right starting at LHIP.

NOTE G: Always replace or repair a wire with same size (gage). See WIRE LIST, page 2-61.

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

(Sheet 2 of 7)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	Make sure DK G wire harness connector behind LHIP is completely connected.			
1	Check fuse (NOTES E and F). Is fuse good?	3	2	Use continuity test. NOTE C.
2	Replace fuse (use 10 amp fuse only).	—	—	If new fuse blows, go to Step 3.
3	Gain access to rear of LHIP. Is voltage present (NOTE B) at switch terminal where PR wire connects?	5	4	
4	Repair/replace 16 gage PR wire from fuseholder to switch. NOTE G.	—	—	
5	Is voltage present at other wire on switch when switch is turned ON?	7	6	
6	Turn POWER switch OFF. Replace switch.	—	—	See page 2-305.

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

(Sheet 3 of 7)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	POWER switch and faulty LIGHT switch(s) ON.			
7	Is battery voltage present at lamp terminal where wire from switch connects?	8	9	
8	Replace lamp.	—	—	
9	Wire from switch to lamp is open. See WIRE AND HARNESS TESTING.	—	—	See page 2-66.

Go on to Sheet 4

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

(Sheet 4 of 7)

25 a. When the TAIL/PANEL LIGHT switch is closed, current flows from fuse 3, through the switch and through the tail lamps to ground. Current also flows to the panel light circuit, therefore, if panel lights and gages work, the problem is either at the tail lamps or in the GY wire between the DK BL connector at Right Hand Instrument Panel (RHIP) and the tail lamps.

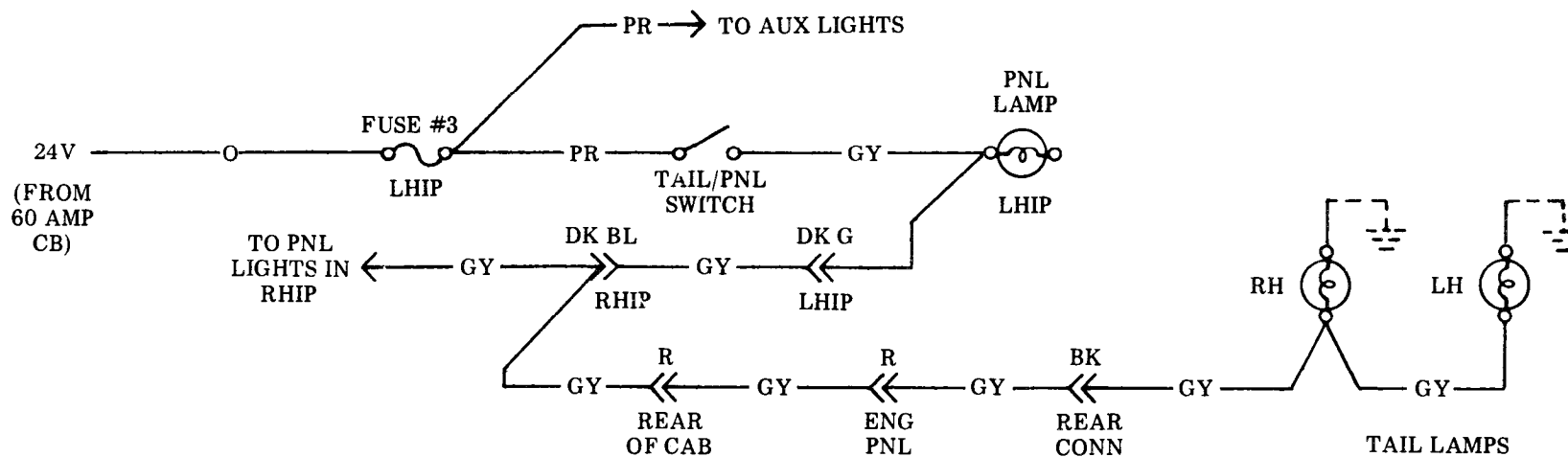
If only Right Hand (RH) tail lamp is out test bulb and check ground. If only Left Hand (LH) tail lamp is out test bulb, check ground and GY wire from RH tail lamp.

If panel lights do not come on, problem is either at fuse (see NOTE) or switch or in wiring from fuse to Left Hand Instrument Panel (LHIP) panel lamp.

NOTE

If auxiliary flood lights work, problem is not at fuse.

TAIL LIGHT CIRCUIT



TA 098623

Go on to Sheet 5

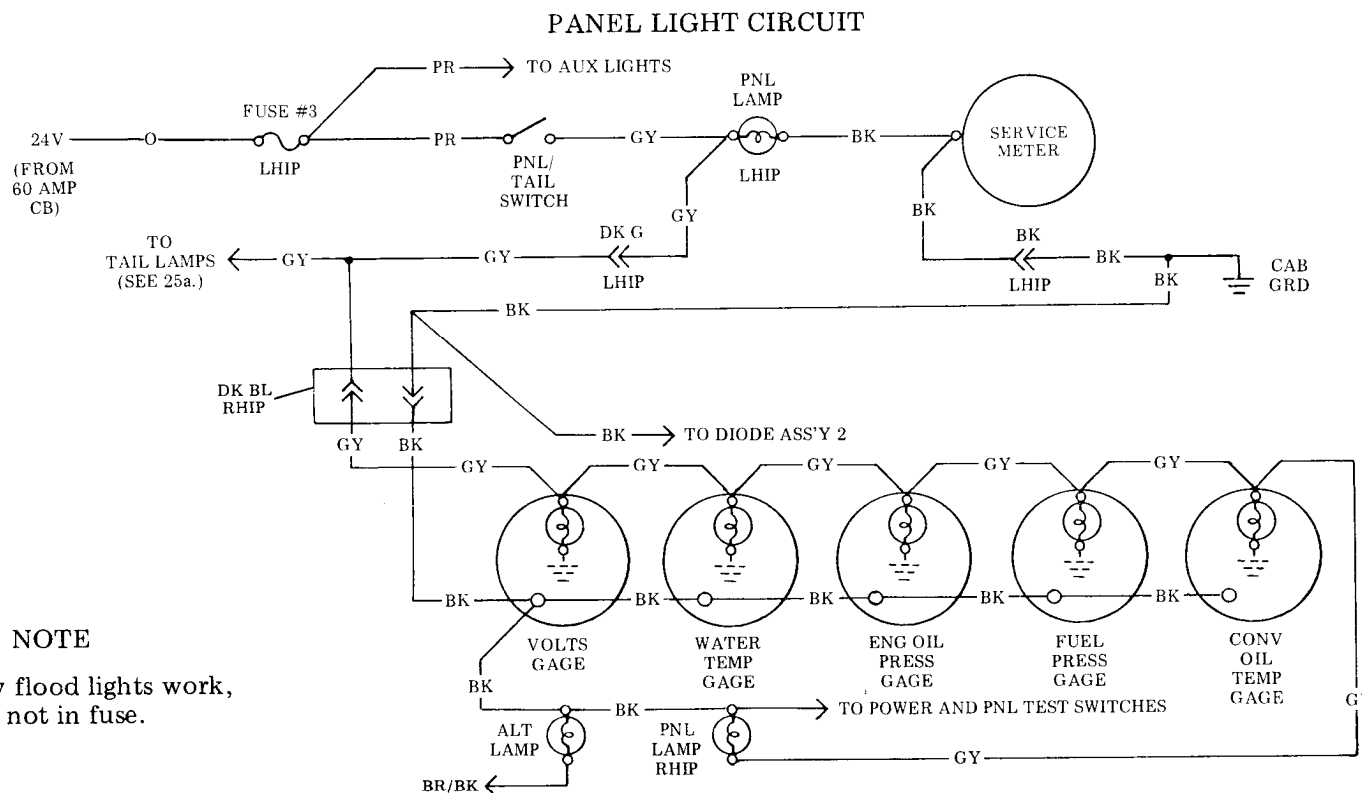
ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

(Sheet 5 of 7)

25 b. When the TAIL/PANEL LIGHT switch is closed, current flows from fuse 3, through the switch and through a.) LHIP panel lamp to ground, b.) through each gage lamp to ground and c.) through RHIP panel lamp to ground. Current also flows through the tail light circuit, therefore, if only tail lights work, the problem is in the ground circuit - check cab ground first. If the tail lights and LHIP panel light works, the problem is in the GY wire or connections between the RHIP panel light and the DK BL connector at RHIP - check for proper seating of connector first.

If only one lamp is out, check bulb and then wiring to its socket (NOTE: Gage lamps are each grounded to the case of the gage, which in turn is grounded by way of BK wires).



TA 098624

Go on to Sheet 6

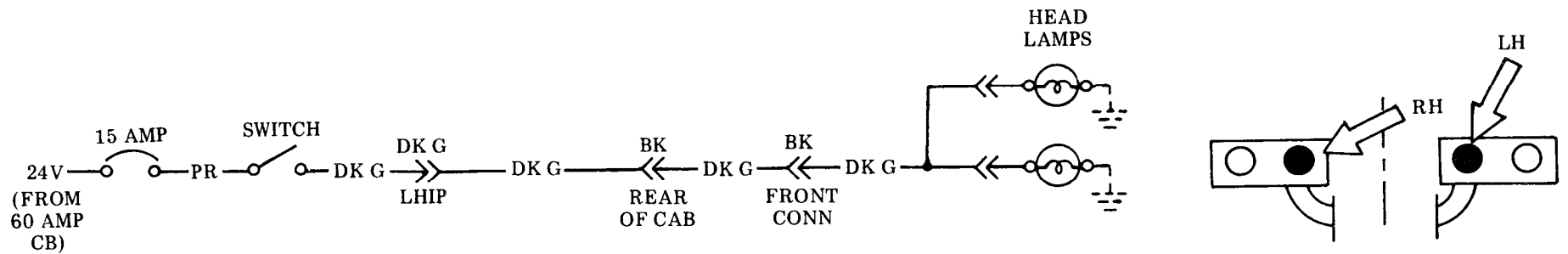
ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

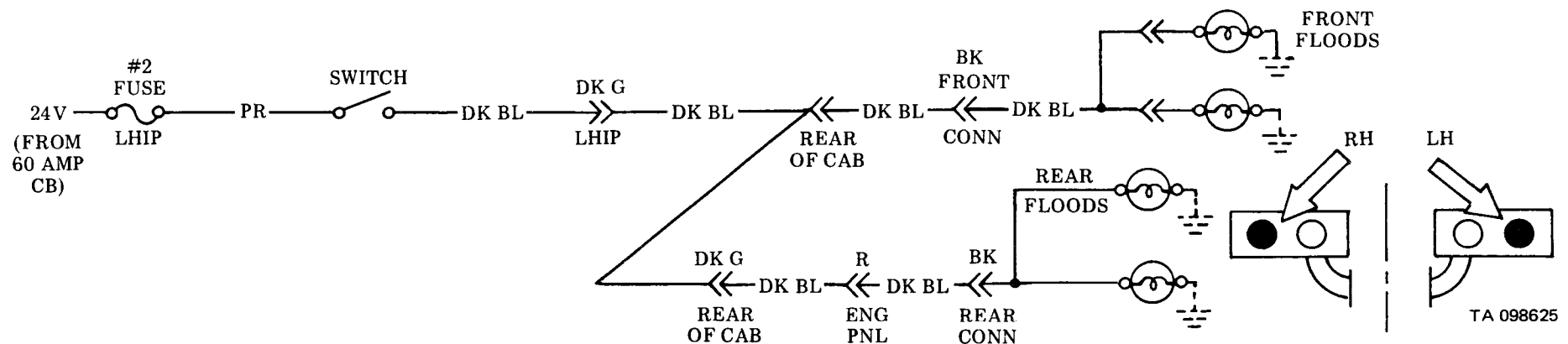
(Sheet 6 of 7)

25 c. The HEAD LAMPS obtain their power from a 15 amp automatic-resetting circuit breaker rather than from a fuse. Current flows from the circuit breaker, through the switch, and through the lamps to ground. If only one lamp is out, problem is in the lamp or interconnecting wiring.

HEAD LIGHT CIRCUIT



25 d. When the FLOOD LIGHT switch is closed, current flows from fuse 2, through all four (front and rear) flood lamps to ground. If only the front work or only the rear work, switch and fuse are good. See diagram below.



TA 098625
Go on to Sheet 7

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 25 (CONT)

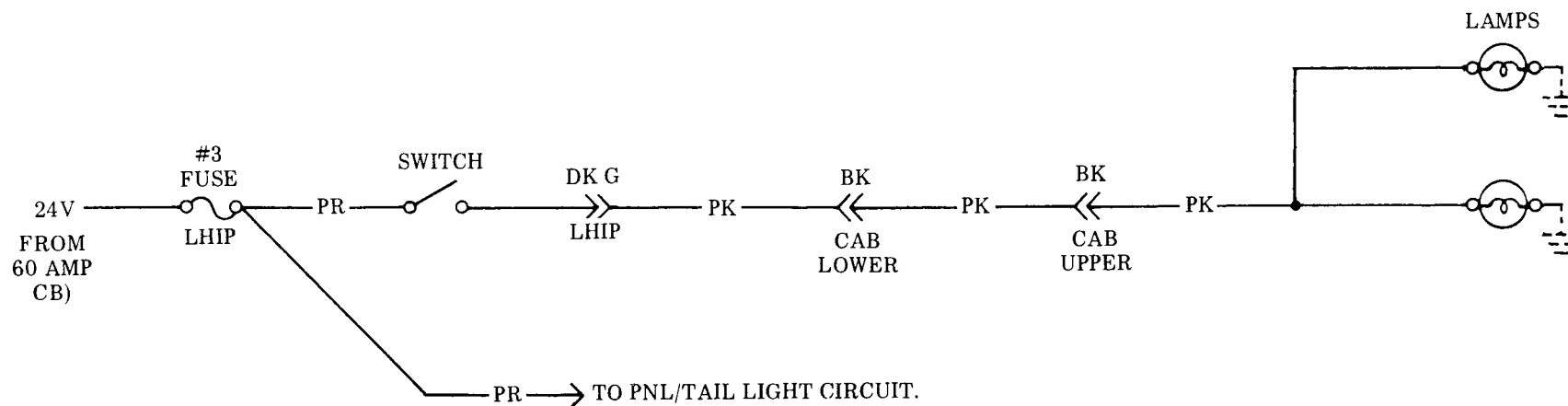
(Sheet 7 of 7)

25 e. The auxiliary flood lights are mounted on top of the cab. When the AUX FLOOD switch is closed, current flows from fuse 3 through the switch through the auxiliary flood lamps to ground.

NOTE

If PANEL/TAIL LIGHTS work, fuse 3 is good.

AUX FLOOD LIGHT CIRCUIT



TA 098626

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 26

(Sheet 1 of 3)

SERVICE LIGHTS

STOP LIGHT(S) DO NOT WORK

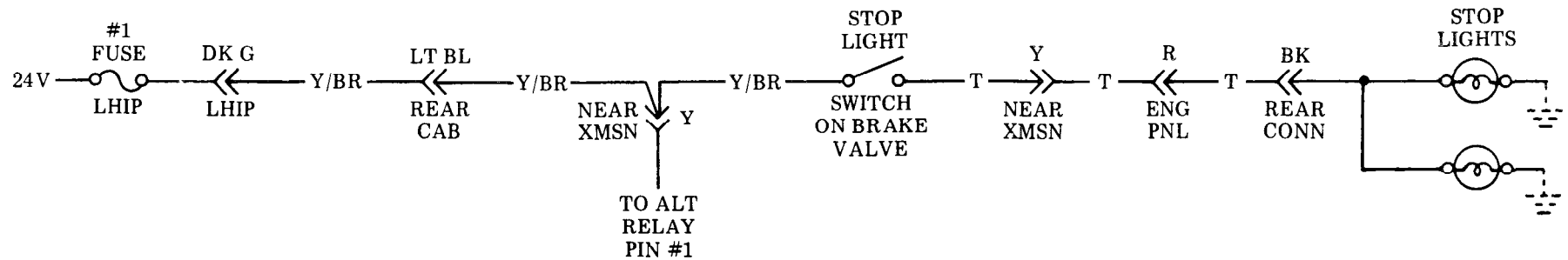
POWER switch ON. Brake pedal pressed. Indicator lights come ON when PANEL TEST switch is ON (see NOTE).

NOTE

Brake light switch receives its power from same circuit that feeds the panel test lights. If all indicator lights do not come on, see PROBLEM 12. If all indicator lights do come on, problem is between yellow connector and lamps or in the lamps.

This circuit uses a normally open pressure switch which closes when brake pedal (left or right) is pressed.

STOP LIGHT CIRCUIT



TA 098627

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 26 (CONT)

(Sheet 2 of 3)

NOTE: Battery voltage is checked to ground (see page 2-57).

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	Service brake ACTIVATED.			
1	Is battery voltage present at stop light switch terminal where Y/BR wire connects? See NOTE.	3	2	Stop light switch is on brake valve.
2	16 gage Y/BR wire from switch to yellow connector near transmission is open. Repair/replace wire. See page 2-54.	—	—	
3	Is battery voltage present at stop light switch terminal where T wire connects?	5	4	
4	Replace stop light switch.	—	—	See page 2-315.

Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 26 (CONT)

(Sheet 3 of 3)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
5	Is battery voltage present at RH stop light where T wire connects?	7	6	
6	16 gage T wire from stop light switch to RH stop lamp is open. Repair or replace wire.	—	—	See page 2-54.
7	Replace both stop lamps.	—	—	See page 2-291.

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 27

(Sheet 1 of 2)

SERVICE LIGHTS

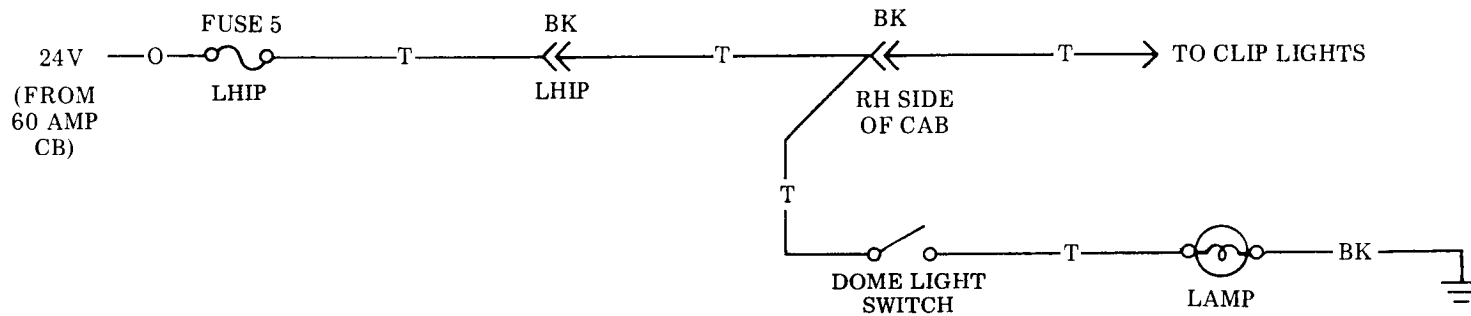
DOME LIGHT DOES NOT WORK

POWER switch ON. Remaining lights work.

TROUBLESHOOT DOME LIGHT CIRCUIT

The DOME light receives its power from fuse 5. Fuse 5 also supplies power to the Container Lock Instrument Panel (CLIP) lights. If the CLIP lights work problem is not in fuse or wiring to B connector at RH side of cab, go to Step 1.

DOME LIGHT CIRCUIT



TA 098628

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 27 (CONT)

(Sheet 2 of 2)

NOTE: Voltage is checked to ground, see page 2-57.

STEP	QUESTION OR INSTRUCTION OR BOTH	ANSWER		REMARKS
		YES	NO	
1	Is fuse 5 good?	3	2	Right most fuse in LHIP.
2	Replace 10 amp. fuse.	—	—	
3	Is bulb burned out?	4	5	
4	Replace 24 volt bulb.	—	—	
5	Is battery voltage present at T wire where it connects to lamp assembly?	6	7	
6	Replace DOME lamp assembly.	—	—	
7	Test T, 16 gage wire from dome lamp to fuseholder 5. See page 2-53.	—	—	

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 28

(Sheet 1 of 3)

GAGES

DO NOT WORK

Engine running and at normal operating temperature.

The gages receive power from fuse 9 (rightmost fuse in RHIP). If all the gages do not work, check fuse 9 first. If fuse is good, repair/replace Y/BR wire from fuseholder 9 to VOLTS gage.

In case of suspected pressure or temperature gage malfunction, test circuit as follows: Remove wire from corresponding sender, with the POWER switch ON, and note the gage reading. Then momentarily ground the wire to machine frame and note gage reading. If gage and associated wiring are good, results should be:

Gage	Gage Indication With Wire Disconnected	Gage Indication With Wire Grounded
Engine Coolant Temp.	Low	High
Converter Temp.	Low	High
Engine Oil Pressure	High	Low
Engine Fuel Pressure	High	Low

Senders are probably more likely to fail than the gages themselves.

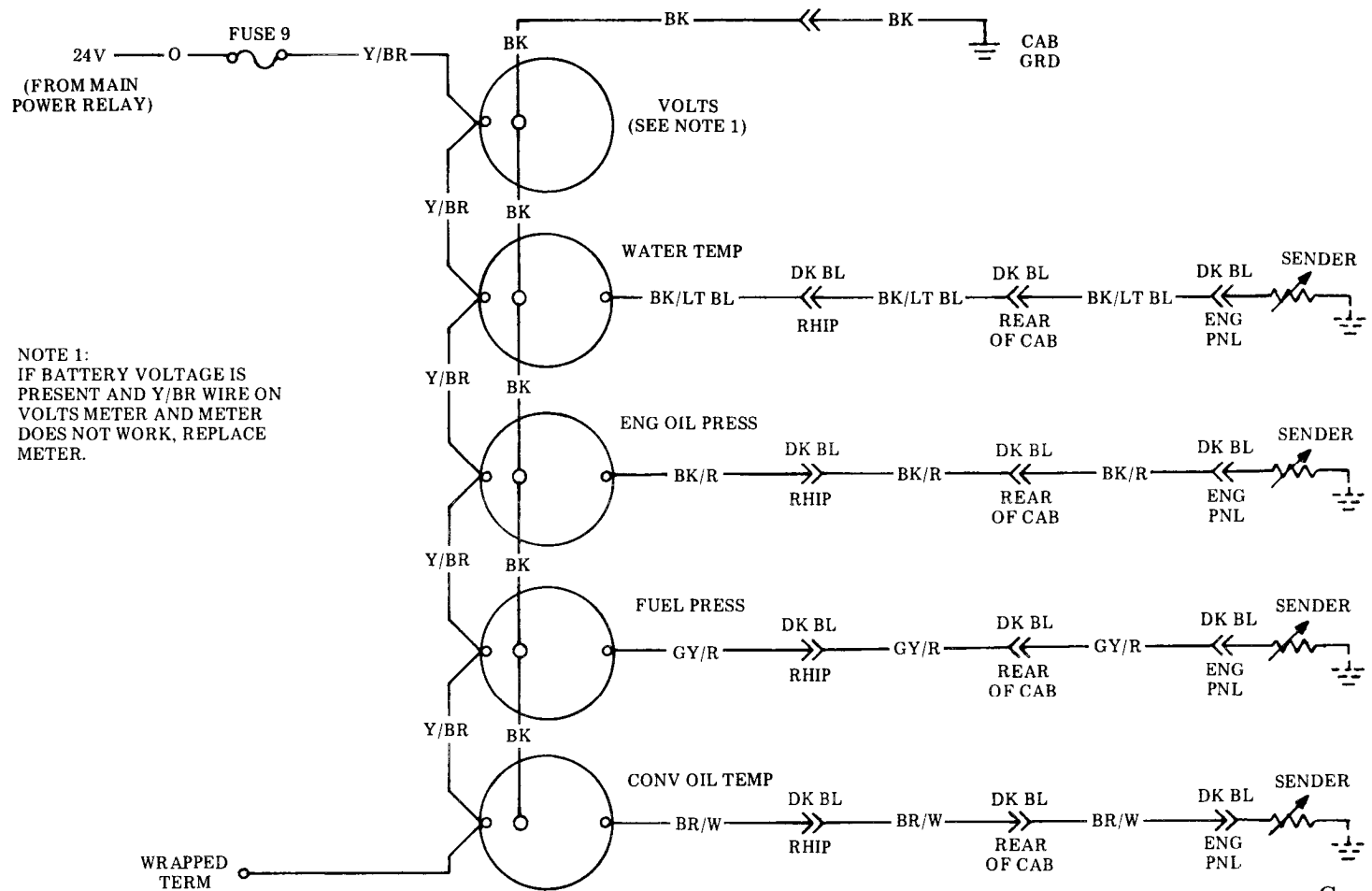
Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 28 (CONT)

(Sheet 2 of 3)

FUSE 9 POWER SCHEMATIC



NOTE 1:
IF BATTERY VOLTAGE IS PRESENT AND Y/BR WIRE ON VOLTS METER AND METER DOES NOT WORK, REPLACE METER.

TA 098629

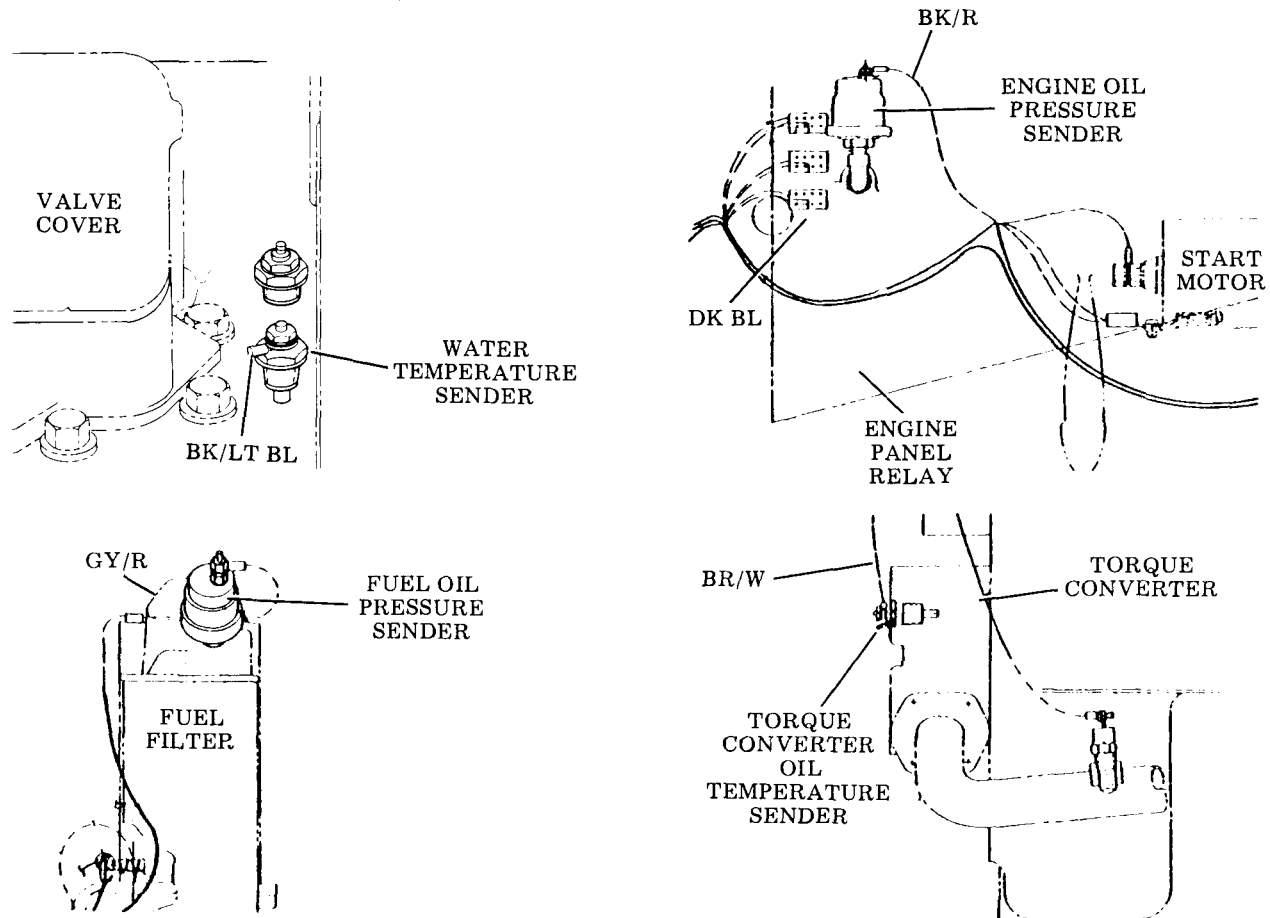
Go on to Sheet 3

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 28 (CONT)

(Sheet 3 of 3)

SENDING UNITS



TA 098630

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 29

(Sheet 1 of 2)

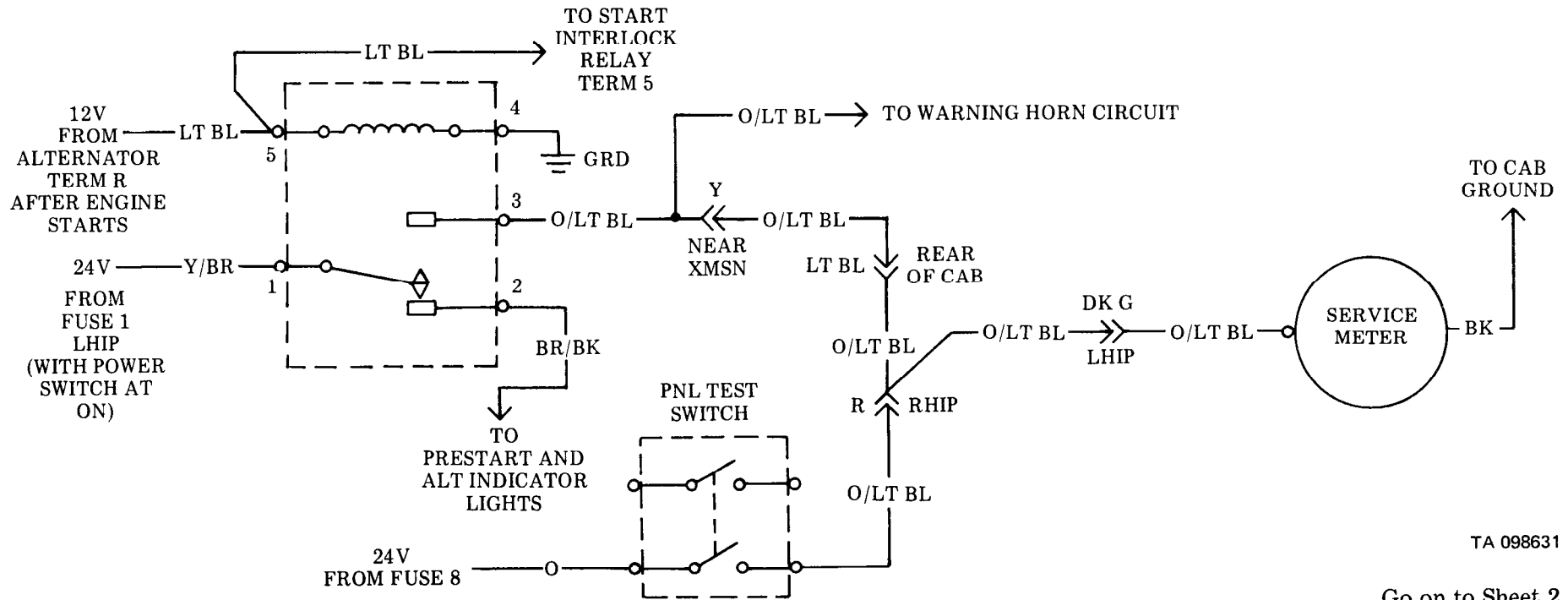
SERVICE METER

DOES NOT WORK

All other gages, lights, etc. work.

The service meter can receive its power from two sources: a. From fuse 1 when the engine is running or b. From fuse 8 when the PANEL TEST switch is closed. If service meter does not work only when PANEL TEST switch is on, replace PANEL TEST switch.

SERVICE METER CIRCUIT



TA 098631

Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

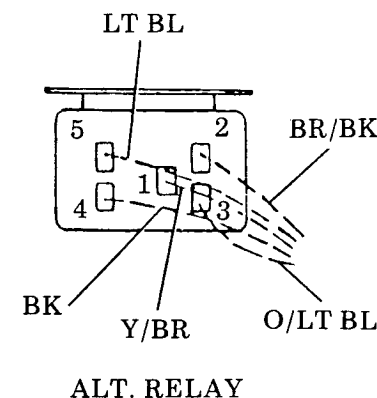
PROBLEM NO. 29 (CONT)

(Sheet 2 of 2)

NOTE 1: If service meter works (allow 1-2 minutes for warm up) when PANEL TEST switch is ON (POWER switch ON, engine not running) trouble is in alternator relay or associated wiring. Go to Step 5.

NOTE 2: Voltage is checked to ground, see page 2-57.

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
1	Gain access to rear of LHIP. START engine. Is battery voltage present at hourmeter where O/LT BL wire connects.	2		See page 2-305.
2	Is BK wire properly grounded?	4	3	
3	Repair/replace 16 gage BK wire.	—	—	
4	Replace service meter. POWER switch OFF.	—	—	See page 2-305.
5	Turn POWER switch to OFF. Place transmission selector in FORWARD or REVERSE. Does operator warning horn work?	7	6	
6	Gain access to engine relay panel. START engine. Is battery voltage present at alternator relay (4, page 2-70) terminal 3, where O/LT BL wire connects?	7	8	
7	O/LT BL 16 gage wire from Y connector near transmission to service meter is open.	—	—	See page 2-53.
8	Replace alternator relay. POWER switch OFF.	-	—	See page 2-337.



TA 098632

End

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 30

(Sheet 1 of 2)

ALARM

BACKUP ALARM DOES NOT WORK

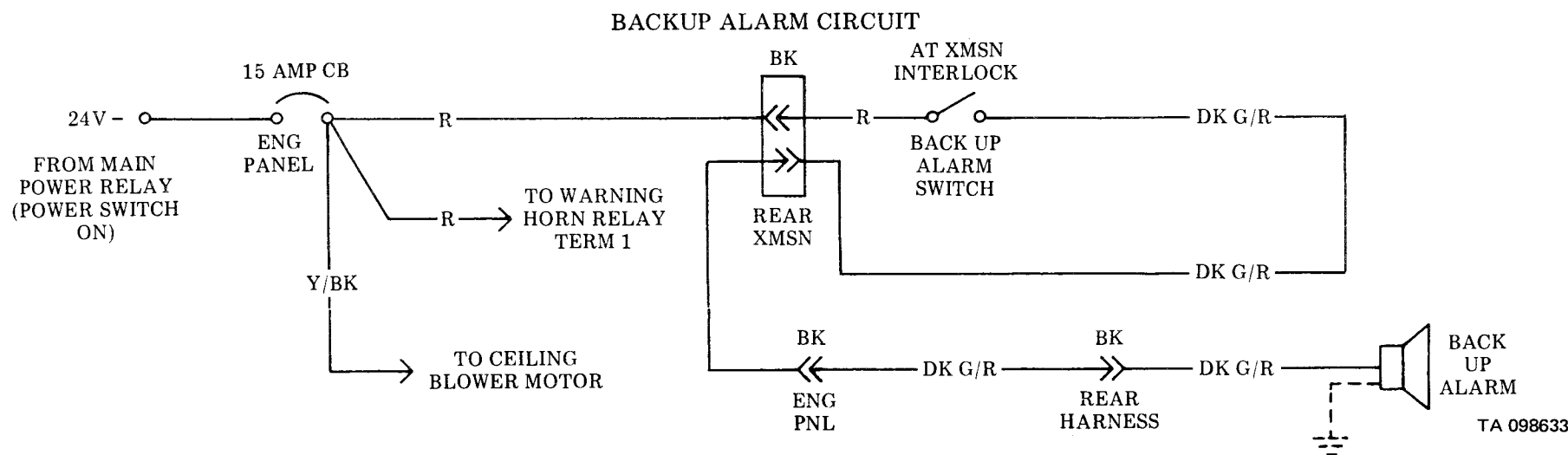
POWER switch ON. TRANSMISSION GEAR SELECTOR in REVERSE. Ceiling heater blower motor works (see NOTE).

NOTE

If ceiling blower motor does not work, problem is at 15 amp. Circuit Breaker (CB) or associated wiring.

The backup alarm receives its power from 15 amp. CB (12, page 2-70). POWER switch must be ON to energize main power relay connecting battery voltage to the 15 amp. CB.

Placing transmission selector in reverse closes micro-switch on the transmission interlock, which sounds the backup alarm.



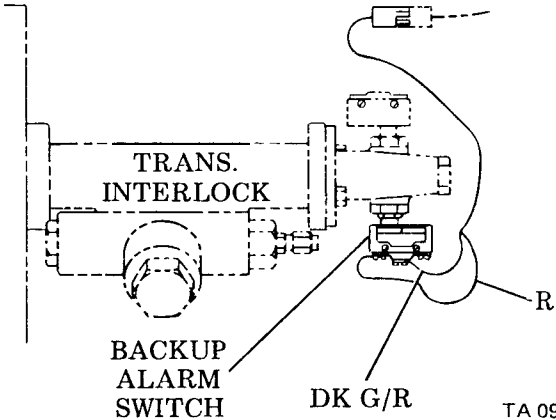
Go on to Sheet 2

ELECTRICAL SYSTEMS TROUBLESHOOTING (CONT)

PROBLEM NO. 30 (CONT)

(Sheet 2 of 2)

STEP	QUESTION OR INSTRUCTION	ANSWER		REMARKS
		YES	NO	
	POWER switch ON. TRANS. selector in REVERSE.			
1	Is battery voltage present at backup alarm where DK G/R wire connects?	2	3	
2	Replace backup alarm.	—	—	See page 2-329.
3	Is battery voltage present at backup alarm switch where DK GR/R wire connects?	4	5	Switch is on transmission interlock mechanism.
4	16 gage DK G/R wire from backup alarm to switch is open.	—	—	See page 2-53.
5	Is battery voltage present where R wire connects?	7	6	
6	16 gage R wire from switch to 15 amp CB is open. Repair/replace wire with same gage wire.	—	—	
7	See BACKUP ALARM SWITCH TESTING/ADJUSTMENT, page 2-334.	—	—	



End

Section V. MAINTENANCE

This section contains:

- a. Servicing
- b. Inspection
- c. Removal
- d. Disassembly
- e. Cleaning
- f. Repair or replacement
- g. Reassembly
- h. Installation
- i. Adjustment
- j. Test

Instructions for organizational maintenance personnel as allocated by the Maintenance Allocation Chart.



GENERAL MAINTENANCE PRACTICES

(Sheet 1 of 1)

General maintenance practices are given in this section. This information will not be repeated in any other part of this manual.

SAFETY

Safety is always the most important consideration when working on this vehicle. Understand completely the job to be done and use common sense. Don't just do the job. Do it safely. Shipping link must be installed before any maintenance.

REMOVING PARTS

Always respect the weight of a part. Use a hoist whenever necessary. Don't lift heavy parts by hand. A hoist and adjustable lifting beam or sling are needed to remove most parts. The length of chain or cable from the hoist to the part being lifted should be parallel and should be positioned directly over the center of the part. Never leave a part hoisted in mid-air.

Always use blocking to support the part that has been hoisted. If you cannot remove a part, check to see that all capscrews and attached hardware have been removed. Check to see if any parts are in the way of the part being hoisted.

CLEANING

Keep all dirt out of parts. The vehicle will perform better. Seals, filters, and covers are used in this vehicle to keep it clean. They must be kept in good shape to help the vehicle run well.

Clean and look at all parts when removing parts. Make sure all holes and passages are clean and open. After cleaning parts, be sure to cover them with a clean cloth, paper, or other clean material. Make sure the part is clean when it is installed.

Always clean around air lines, hydraulic lines, or covers before removing them. Plug, tape, or put caps on holes and openings to keep dirt out.

DISASSEMBLY AND ASSEMBLY

Always put together or take apart one part at a time. Do not work on two parts at the same time. Be sure to make all adjustments. Always check your work when you are finished. Make sure everything is done.

Check the adjustments for the last time by operating the vehicle. If all adjustments are correct, the vehicle is ready to go back to work.

End

REPAIR AND REPLACEMENT PROCEDURES

(Sheet 1 of 3)

HARDWARE AND THREADED PARTS

Install helical thread inserts when inside threads in castings are not able to withstand desired torque.

Replace capscrews, nuts, studs, washers, spacers, and small common hardware if missing or damaged in any way. Repair minor thread damage by cleaning out the threads using a tap or die.

Replace all damaged or missing lubrication fittings.

BELTS, WIRING, HOSES AND LINES

Replace belts, hoses, clamps, electrical wiring, electrical switches, circuit breakers, and fuel lines if they are broken, split or inoperative.

INSTRUMENTS AND GAGES

Replace defective or broken instruments and gages.

BALL AND ROLLER BEARINGS

Anti-friction bearings must be handled in a special way. To keep out dirt and abrasives, cover the bearings as soon as they are removed.

Wash bearings in a non-flammable cleaning solution. Knock out packed lubricant inside by tapping the bearing against a wooden block. Wash bearings again. Cover bearings with clean material, and set them down to dry.

Then coat bearings with oil. Wrap them in clean paper.

Go on to Sheet 2

Make sure the chamfered side of the bearing faces the shoulder when installing bearings against shoulders. Before pressing bearings into place, lubricate them and all metal surfaces they contact. Put pressure only on the part of the bearing that directly contacts the mating part.

Always use the proper tools and fixtures for removing and installing bearings. Special tools and fixtures that are needed are listed in the manual.

Bearings do not usually need to be removed. Remove bearings only if it is necessary.

SLEEVE BEARINGS

Do not remove a sleeve bearing unless it is damaged, very worn, or loose in its bore. If you must remove a sleeve bearing, press it out.

When pressing or driving, put pressure right in line with the bore. Use a bearing driver or a bar with a smooth flat end to drive a bearing. Never use a hammer.

If there are oil holes, make sure they are aligned.

GASKETS

Always replace used gaskets with new gaskets. Never use the same gasket twice. Make sure the gasket holes match up with holes in the mating part.

If gasket must be made, make sure to cut holes to match up with the mating part. Use material that is the right type and thickness.

Serious damage to the machine can happen if any holes on the part are blocked by the gasket.

LIP TYPE SEALS

Lip seals are usually used to seal oil or grease. To seal in oil, the lip is usually put facing toward oil to be sealed. To seal grease, the lip usually faces away from grease.

Seals should not be removed. Only remove seals to get at other parts or if the seal is damaged or worn.

Leaking oil or grease usually means that a seal is damaged and needs to be replaced. Replace leaking seals so that bearings don't overheat. If seal is removed, replace with new seal.

Soak new rawhide seals in warm oil for one-half hour before using them, if possible. Put in wiper edge seal with wiper edge turned in direction recommended. When putting seals in place, use shims around shafts and shoulders.

Go onto Sheet 3

PACKINGS

Packing seals and O-rings (preformed packings) should always be replaced if they are removed from the mated part. To prevent leaks, put a coating of the lubricant being sealed on seals before putting them on the part.

GEARS

Always use the tools listed in the manual to work on gears. Always watch for damaged or worn teeth on gears.

Burs and rough spots should be removed with a honing stone or crocus cloth before putting gear in place. Lubricate mating surfaces before pressing gears on shafts.

SHAFTS

If a shaft does not come out easily, check that all nuts and capscrews have been removed. See if other parts are in the way before using force.

Shafts fitted to tapered splines should be very tight. If shafts are not tight, disassemble and check tapered splines. Discard parts that are worn. Make sure tapered splines are clean, dry, and free of burs before putting them in place. Press mating parts together tightly.

Clean off rust compound from all machined surfaces of new parts.

PARTS REPLACEMENT

Replace worn, damaged, or defective parts with new parts.

End

CLEANING

(Sheet 1 of 1)

PARTS PROTECTION

Before cleaning, protect rubber items (hoses, boots, electrical insulation) from cleaning solutions. Protect them with a grease-proof barrier material. Remove the rubber part if it cannot be protected.

CLEANING PROCESS

Any cleaning method may be used as long as it does not damage a part. Cleaning is necessary so that parts can be checked. Rusted paint areas must be stripped to bare metal before repainting.

RUST OR CORROSION REMOVAL

Rust and corrosion can be removed with a wire brush, abrasive cloth, sand blasting, vapor blasting, or rust remover. Use buffing or a crocus cloth on highly polished parts that are rusted.

BEARINGS

Remove shields and seals from bearings before cleaning. Bearings with permanent shields and seals must not be cleaned in solution.

Clean open bearings by soaking them in a petroleum cleaning solution item 2 Appendix C. Never use a solution with chlorine in it.

Bearings should stand and dry. Do not use compressed air to dry. Do not spin bearings while they are drying.

End

ENGINE MAINTENANCE INSTRUCTIONS

This section covers removal and installation of the following engine components for Organizational Maintenance personnel:

- a. Pulley and vibration damper
- b. Engine crankcase breather
- c. Oil filter lines
- d. Engine oil filters
- e. Valve covers
- f. Tachometer drive

Also instructions for engine lubrication and oil filter replacement.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Engine lubrication.	2-152	2-38, 2-40
2	Pulley and vibration damper removal/installation.	2-155	2-41
3	Engine crankcase breather and fumes disposal assembly service.	2-158	None
4	Oil filter lines and oil filler assembly removal/installation.	2-161	None
5	Valve covers removal/installation.	2-165	None
6	Tachometer drive removal/installation.	2-167	None

End

ENGINE LUBRICATION

(Sheet 1 of 3)

This task covers: Draining and refilling crankcase with oil. Replacing engine oil filters.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Oil per LO 10-3930-641-12
 Oil filters
 Suitable oil container, capable of holding 11 gallons (42 liters) of waste oil.

Troubleshooting Reference

Pages 2-38, 2-40

Equipment Condition

Engine OFF. Parking brake control OUT.
 Power switch OFF. Vehicle level.
 Shipping link installed

Special Tools

Strap wrench

Personnel Required

Two mechanics

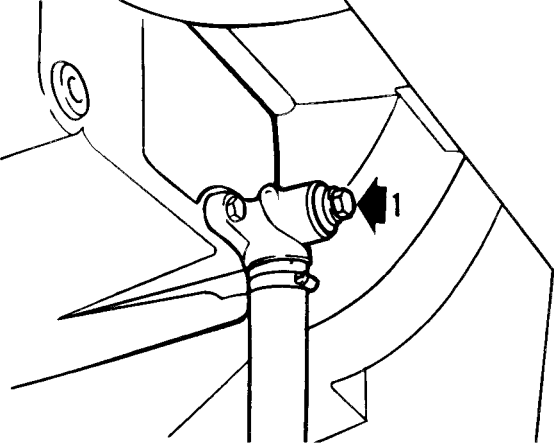
References

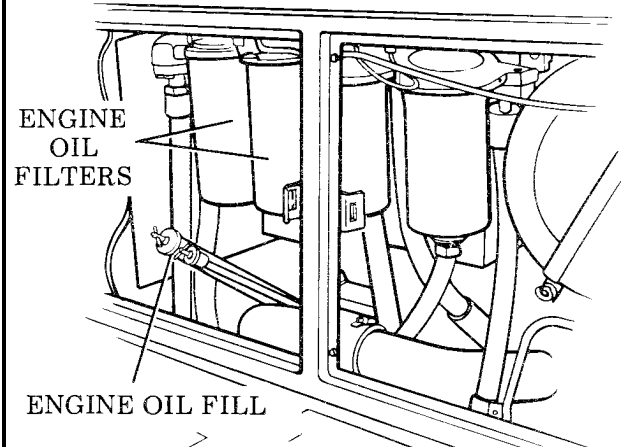
LO 10-3930-641-12
 Engine crankcase breather service, page 2-158
 Engine starting and stopping, TM 10-3930-641-10
 PMCS, page 2-5
 Shipping link removal/installation, page 2-471.

General Safety Instructions

Use caution when draining oil. Hot oil causes burns.
 Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS	
1. Drain hose	Move to position outside crankcase guard.		
2. Drain valve (1)	a. Open. b. Drain oil into suitable container. c. Close.		
3. Drain hose	Place inside crankcase guard.		
4. Crankcase breathers	Check for clogging.		See ENGINE CRANKCASE BREATHER SERVICE, page 2-158.

LOCATION/ITEM	ACTION	REMARKS
<p>5. Oil filters</p>	<p>a. Using strap wrench, remove two and discard.</p> <p>b. Clean filter mounting bases. Be sure old gaskets are completely removed.</p> <p>c. Apply film of clean engine oil to gaskets on new filters.</p> <p>d. Install filters snugly; hand tighten.</p> <p style="text-align: center;">NOTE</p> <p>One person should be in cab, while one person checks for leaks.</p>	 <p>The diagram shows two cylindrical engine oil filters mounted on a base. A label 'ENGINE OIL FILTERS' points to the filters. Below them, a dipstick is shown with a label 'ENGINE OIL FILL' pointing to the dipstick handle.</p>
<p>6. LOW ENG OIL indicator on operator's indicator panel</p>	<p>Test by turning POWER switch ON. Indicator should come ON.</p>	
<p>7. Engine crankcase</p>	<p>Fill.</p>	<p>See LO 10-3930-641-12.</p>
<p>8. Engine</p>	<p>Start and run at low idle.</p>	
<p>9. Oil filter bases</p>	<p>Check for leaks</p>	
<p>10. Oil level dipstick</p>	<p>Check oil level.</p>	
<p>11. LOW ENG OIL indicator on operator's indicator panel</p>	<p>Should be off.</p>	<p>Oil level should be between LOW and FULL marks on LOW IDLE side of dipstick. If not, add oil.</p>
<p>12. Engine</p>	<p>Shut down.</p>	

TA 098636

End

PULLEY AND VIBRATION DAMPER REMOVAL/INSTALLATION

This task covers: Removal and installation of front engine pulley and vibration damper.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-41

Equipment Condition

Engine OFF and cooled.

Parking brake control OUT.

Shipping link installed.

Hood removed.

Special Tools

Guide bolt, 5/8-18 x 7

Personnel Required

Two mechanics

References

PMCS, page 2-5

Torque limits chart, page E-1

Alternator belt adjustment, page 2-254

Hood removal/installation, page 2-452

Shipping link removal/installation, page 2-471.

General Safety Instructions

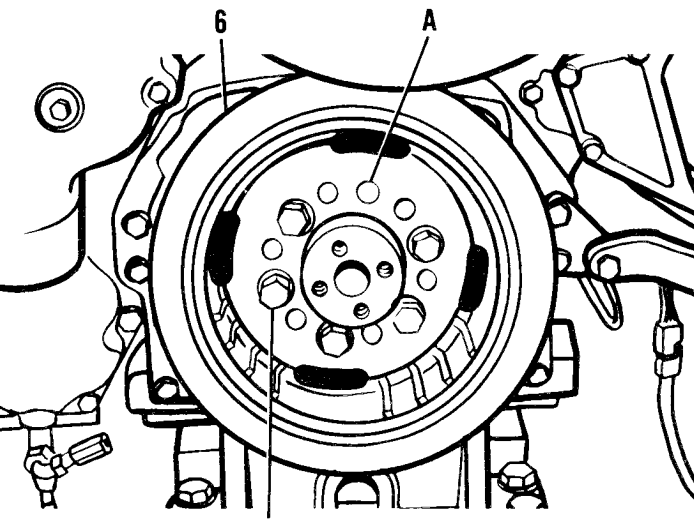
If engine is not completely cooled, parts may be hot. Handle carefully.

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>		
1. Fan drive belts	Remove from pulley (1). See page 2-229.	<p style="text-align: right;">ADJUSTMENT NUTS</p> <p style="text-align: right;">501</p> <p style="text-align: right;">TA 098637</p>
2. Belt adjustment nut	a. Loosen mounting bolts (2). b. Loosen adjustment nuts enough to remove belt.	
3. Alternator belt (3)	Remove.	
4. Capscrews (4)	Remove four from pulley.	
5. Pulley (1)	Remove.	
6. Vibration damper (6)	a. Check marks (5) for alinement.	
		If marks aline, install pulley and belts. If marks are not alined, replace vibration damper.
		<p style="text-align: right;">TA 098637</p>

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
6. Vibration damper (cont)	b. Remove one capscrew (7). Install guide bolt 5/8-18 x 7, shown at (A). c. Remove five remaining capscrews (7). d. Remove damper (6).	Impact wrench may be used. 
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Adapter may come off with damper.</p> e. Remove adapter from damper.	See TORQUE LIMITS CHART, page E-1.
1. Vibration damper (6) and adapter	a. Position on crankshaft. b. Install five capscrews (7) and tighten. c. Remove guide bolt (A). d. Install sixth capscrew (7)	See TORQUE LIMITS CHART, page E-1.
NOTE	Position on front of engine.	See ALTERNATOR BELT ADJUSTMENT, page 2-254.
Install adapter first.	Install four cap screws and tighten.	
2. Pulley (1)	Install and adjust. Tighten adjustment nuts (2). See page 2-254.	
3. CapsCrews (4)	Install. See page 2-229.	
4. Alternator belt (3)		
5. Fan drive belts		

ENGINE CRANKCASE BREATHER AND FUMES DISPOSAL ASSEMBLY SERVICE

This task covers: Removal, cleaning, and installation of crankcase breathers and fumes disposal assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Non-flammable cleaning solvent, item 2
Appendix C
Gasket

O-ring

Troubleshooting Reference

None

Equipment Condition

Engine OFF and cooled.
Mast lowered. Parking brake control OUT.
Side panel open.

Special Tools

None

Personnel Required

One mechanic

References

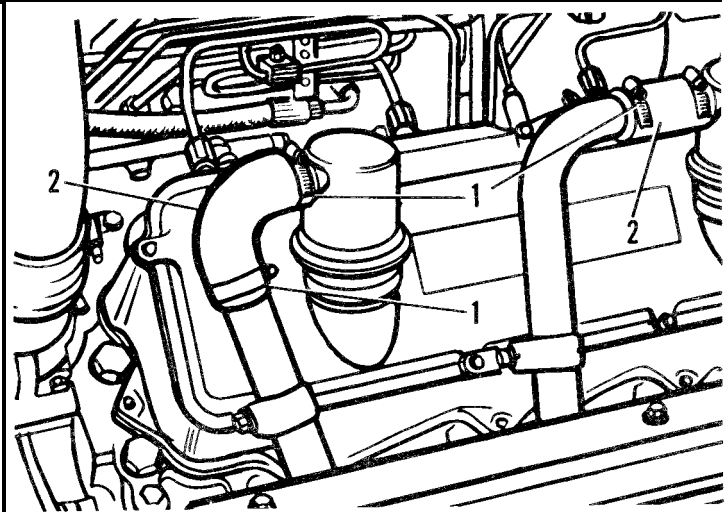
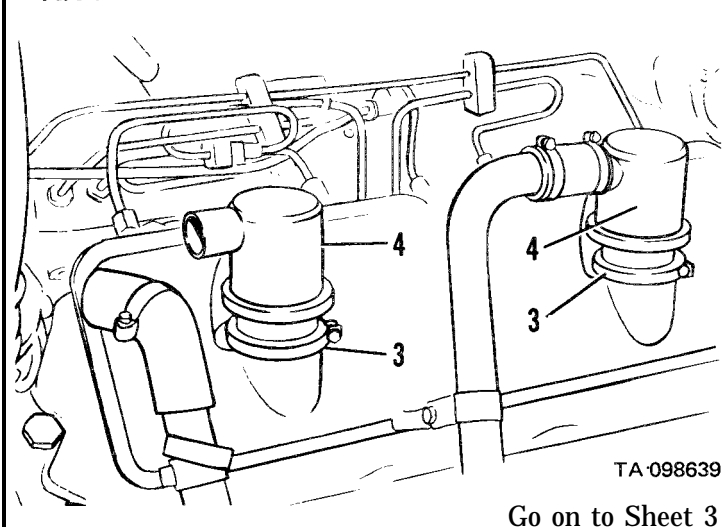
PMCS, page 2-5

General Safety Instructions

Handle lines and breathers carefully. Parts and oil may be hot. They can cause burns.

Main disconnect switch OFF.

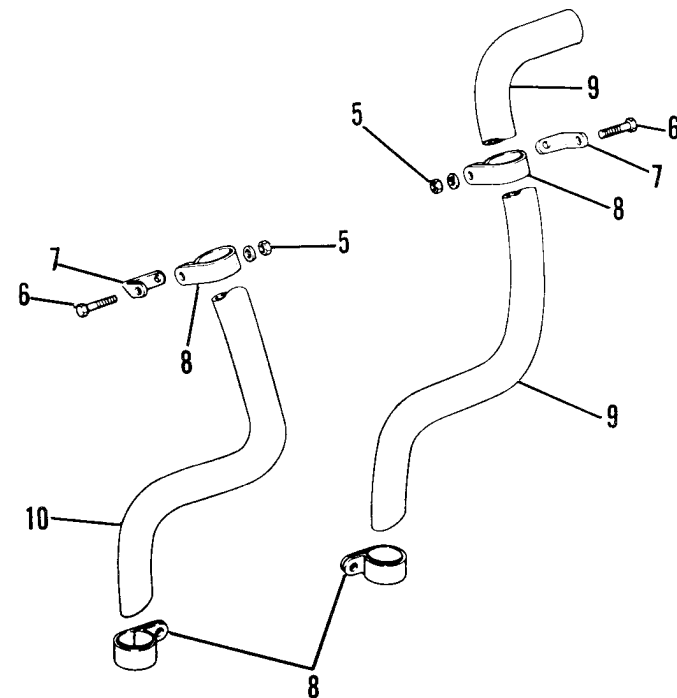
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Hose clamps (1)	Loosen.	 <p>The diagram shows the engine crankcase breather and fumes disposal assembly. Callout 1 points to the hose clamps on the breather hoses, and callout 2 points to the hoses themselves.</p>
2. Hose (2) (fumes disposal group)	Remove.	
3. Breather clamps (3)	Loosen.	
4. Breathers (4)	<p>a. Remove breathers (4).</p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;"> <p>WARNING</p> </div> <p>Use solvents only in well ventilated areas. Fumes may be dangerous.</p> <p>b. Wash breathers (4) in clean, non-flammable solvent.</p> <p>c. Allow breathers to dry.</p> <p>d. Replace O-ring inside breather.</p>	
		 <p>The diagram shows the engine crankcase breather and fumes disposal assembly. Callout 3 points to the breather clamps, and callout 4 points to the breathers.</p>

TA 098639

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
4. Breathers (4) (cont)	e. Install.	
5. Breather clamps (3)	Position and tighten.	
6. Hose (2) (fumes disposal group)	Check for damage. Replace if necessary.	
7. Capscrews (6), nuts (5) and washers securing brackets (8)	Remove.	
8. Fumes disposal group (9 and 10)	Remove.	
9. Fumes disposal group (9 and 10) and brackets (8)	Place in position and secure with cap-screws (6), nuts (5) and washers.	
10. Hose clamps (1)	Position and tighten.	



TA172221

End

2-160

OIL FILTER LINE AND OIL FILLER ASSEMBLY REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Removal and installation of engine oil filter lines and oil filler assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF and cooled.

Access panels open.

Special Tools

None

Personnel Required

One mechanic

References

Torque limits chart, page E-1

General Safety Instructions

Use caution in handling lines. Hot oil causes burns.

Protect parts of vehicle from oil spillage. Catch line oil in small pan or bucket.

Main disconnect switch OFF.

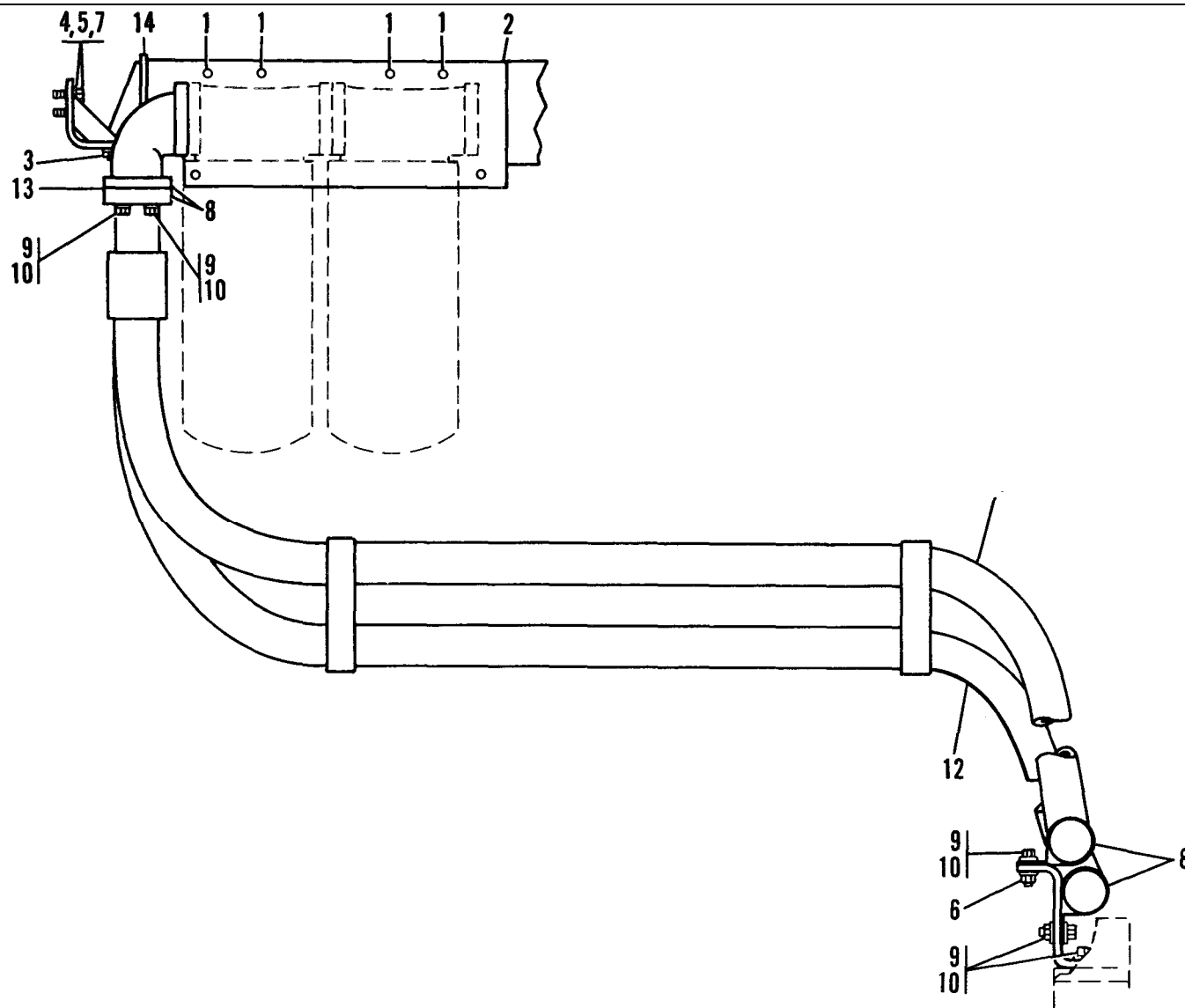
Go onto Sheet 2

OIL FILTER LINE AND OIL FILLER ASSEMBLY REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL OIL FILTER LINE		
1. Hose nut (9)	Loosen four at oil filter end of each line.	
2. Clips and straps	Remove from frame and hoses.	
3. Hose nut (9)	Loosen at oil cooler end.	
4. Hose assembly (11), (12)	Remove.	
INSTALLATION		
1. Hose assembly (11), (12)	Position in vehicle.	
2. Hose nut (9)	Tighten four at oil cooler end.	See TORQUE LIMITS CHART, page E-1.
3. Clips and straps	Install on hoses and frame.	
4. Hose nut (9)	Tighten four at oil filter end.	See TORQUE LIMITS CHART, page E-1.

Go on to Sheet 3

OIL FILTER LINE AND OIL FILLER ASSEMBLY REMOVAL/ INSTALLATION (CONT)



- 1. Capscrew
- 2. Support
- 3. Capscrew
- 4. Washer
- 5. Nut
- 6. Gasket
- 7. Capscrew
- 8. Flange
- 9. Capscrew
- 10. Washer
- 11. Hose Assembly
- 12. Hose Assembly
- 13. Seal
- 14. Adapter

TA 098640

Go on to Sheet 4

OIL FILTER LINE AND OIL FILLER ASSEMBLY REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">OIL FILLER ASSEMBLY REMOVAL</div>		
1. Plug (1)	Remove.	
2. Capscrews (5, 8, 11), washers (3) and nuts (2)	Remove.	
3. Brackets (4) and (6)	Remove.	
4. Filler assembly (7)	Remove.	
5. Preformed packing (9)	Replace.	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">INSTALLATION</div>		
1. Filler assembly (7) and brackets (6)	Place in position.	
2. Capscrews (9) and (5) and washers (3)	Install.	
3. Bracket (4)	Position on oil filler assembly (7) and dipstick tube.	
4. Bracket (4)	Secure with capscrew (11), nut (2) and washer (3).	
5. Plug (1)	Install.	

VALVE COVERS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of engine valve covers.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Gasket

Non-flammable cleaning solvent,
item 2 Appendix C

Troubleshooting Reference

None

Equipment Condition

Access panel open.

Special Tools

None

Personnel Required

One mechanic

References

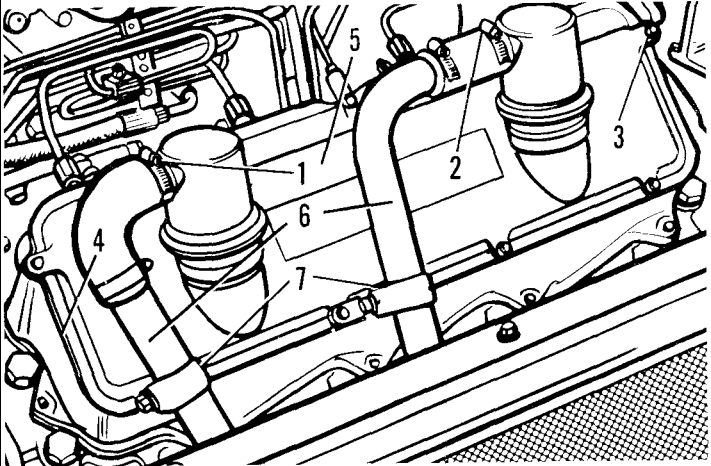
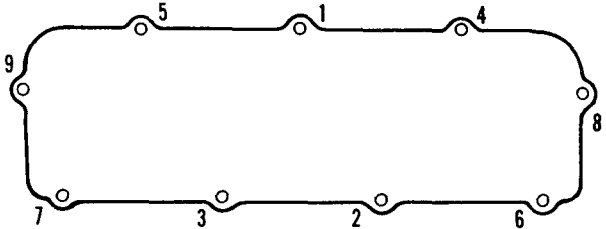
None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

VALVE COVERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Clamps (1) and (2) on breather tube connections. 2. Capscrews (3) 3. Valve cover (5) 4. Breather tubes (6) 5. Gasket (4) 	<p>Loosen. See page 2-158, Engine crankcase breather service.</p> <p style="text-align: center;">NOTE</p> <p>Step No. 1 is not necessary for right side.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove four clips (7).</p> <p>Remove and discard. Clean gasket mating surface with cleaning solvent.</p>	
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Gasket (new) 2. Valve cover (5) 3. Breather tubes (6) 4. Capscrews (3) 5. Clamps (1) and (2) 	<p>Install.</p> <p>Place in position.</p> <ol style="list-style-type: none"> a. Position tubes on engine. b. Install clips (7). <p>Torque in sequence to 13-23 lb. ft. (18-31 N•m).</p> <p>Install and tighten.</p>	

TA 098642

End

TACHOMETER DRIVE REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of the tachometer drive.

INITIAL SETUP

Test Equipment

None

Materials/Parts

O-ring

Troubleshooting Reference

None

Equipment Condition

Engine stopped.

Special Tools

None

Personnel Required

One mechanic

References

None

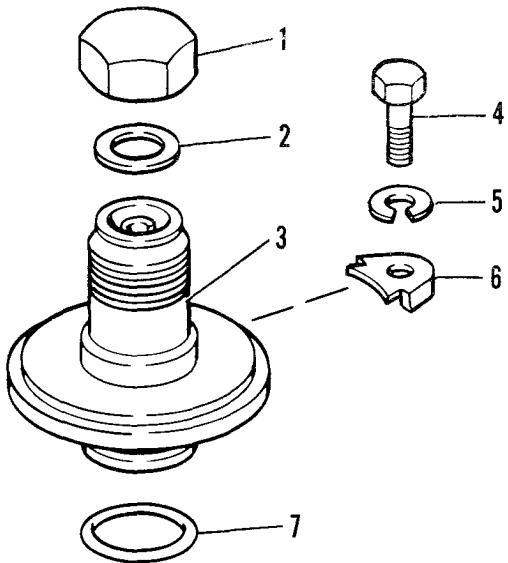
General Safety Instructions

Steering wheel tagged "DO NOT OPERATE."

Main disconnect switch OFF.

Go on to Sheet 2

TACHOMETER DRIVE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; padding: 2px;">REMOVAL</p> <ol style="list-style-type: none"> 1. Two capscrews (4), washers (5, and retainers (6) 2. Tachometer drive (3) 3. O-ring seal (7) 	<p>Remove from fuel transfer pump body.</p> <p>Remove.</p> <p>Remove.</p>	
<p style="text-align: center; border: 1px solid black; padding: 2px;">INSTALLATION</p> <ol style="list-style-type: none"> 1. O-ring seal (7) 2. Tachometer drive (3) 3. Capscrews (4), washers (5) and retainers (6) 	<p>Replace.</p> <p>Place in position on fuel transfer pump body.</p> <p>Install.</p>	<ol style="list-style-type: none"> 1. Cap 2. Washer 3. Tachometer drive 4. Capscrew 5. Lockwasher 6. Retainer 7. O-ring seal

TA 098643

End

FUEL SYSTEM MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these fuel system components for Organizational Maintenance personnel:

- a. Fuel injection lines
- b. Fuel lines
- c. Ether starting aid assembly
- d. Fuel transfer pump
- e. Fuel priming pump
- f. Fuel filters

Fuel priming procedure
 Filter servicing instructions
 Service fuel tank
 Clean fuel tank filler and cap

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Fuel injection lines removal/installation.	2-170	None
2	Fuel lines and fittings removal/installation.	2-173	2-39, 2-41
3	Fuel transfer pump removal/installation.	2-177	None
4	Fuel priming pump removal/installation.	2-179	None
5	Priming the fuel system.	2-181	None
6	Primary fuel filter service.	2-183	2-37, 2-39
7	Secondary fuel air filter service.	2-186	2-37, 2-39
8	Ether starting aid removal/installation.	2-189	None
9	Fuel tank service.	2-193	2-37, 2-39
10	Clean fuel tank filler and cap and screen.	2-195	None

End

FUEL INJECTION LINES REMOVAL AND INSTALLATION

(Sheet 1 of 3)

This task covers: Removing and installing fuel injection lines.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags

Plugs

Troubleshooting Reference

None

Equipment Condition

Engine shut down.

Hood removed.

Muffler removed.

Special Tools

5P144 Socket

Personnel Required

One mechanic

References

Hood removal, see page 2-452

Muffler removal, see page 2-211

PMCS, page 2-5

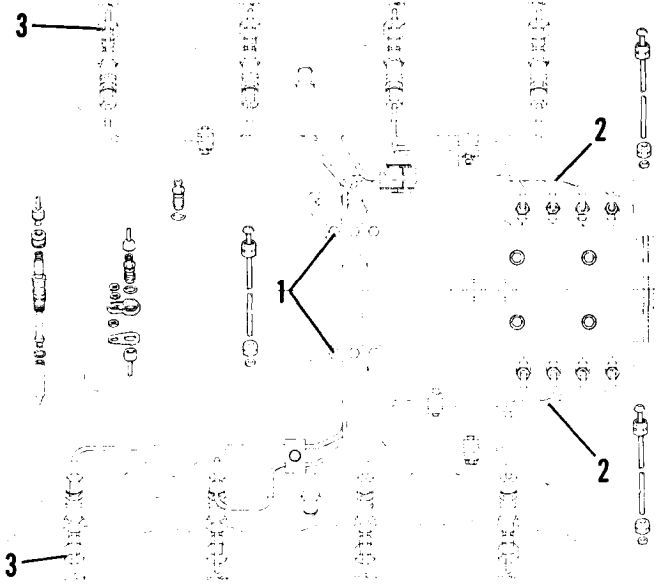
Priming the fuel system, page 2-181
(Remove air from fuel system)

General Safety Instructions

Main disconnect switch OFF.

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. CapsCrews (1) that secure injection lines to support bracket</p> <p>2. Fuel injection lines (2)</p> <p>3. Injection lines (2)</p>	<p>Remove.</p> <p style="text-align: center;">NOTE</p> <p>Remove lines as an assembly, and change bad line(s) at bench.</p> <p>a. Tag to identify location on pumps and lines.</p> <p>b. Disconnect from pumps.</p> <p>c. Plug or cap lines and pumps to keep fuel system clean.</p> <p>d. Disconnect lines from valve cover base adapters (3).</p> <p>e. Plug or cap adapters and lines.</p> <p>Remove.</p> <p style="text-align: center;">CAUTION</p> <p>Do not use bent or kinked injection lines.</p>	 <p>The diagram shows a top-down view of a fuel injection system. Callout 1 points to a central component, likely a pump or valve cover base adapter. Callout 2 points to two fuel injection lines extending from the central area. Callout 3 points to two other lines or adapters located at the bottom and left sides of the assembly.</p>

FUEL INJECTION LINES REMOVAL AND INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">INSTALLATION</p> <p>1. Fuel injection lines (2)</p> <p>2. Capscrews (1) that secure injection lines to support bracket</p> <p>3. Fuel system</p>	<p style="text-align: center;">CAUTION</p> <p>If new lines are used for replacement, then remove identification tags from lines. Tags can cause wear on injection lines.</p> <p>a. Must be clean and dry.</p> <p>b. Position on engine and connect to correct injection pumps and valve cover base adapter(s).</p> <p>c. Tighten nuts on lines to torque of 25-35 lb. ft. (34-48 N•m).</p> <p>Install.</p> <p>Remove air by operating the priming pump.</p>	<p>See page 2-181.</p>

End

FUEL LINES AND FITTINGS REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Removal and installation of fuel lines and fittings.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Preformed packings

Gaskets

Troubleshooting Reference

Pages 2-39, 2-41

Equipment Condition

Engine OFF and cooled

Access doors open

Special Tools

None

Personnel Required

One mechanic

References

TORQUE LIMITS CHART, page E-1

PMCS, page 2-5

General Safety Instructions

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Main disconnect switch OFF.

Go on to Sheet 2

FUEL LINES AND FITTINGS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 4)

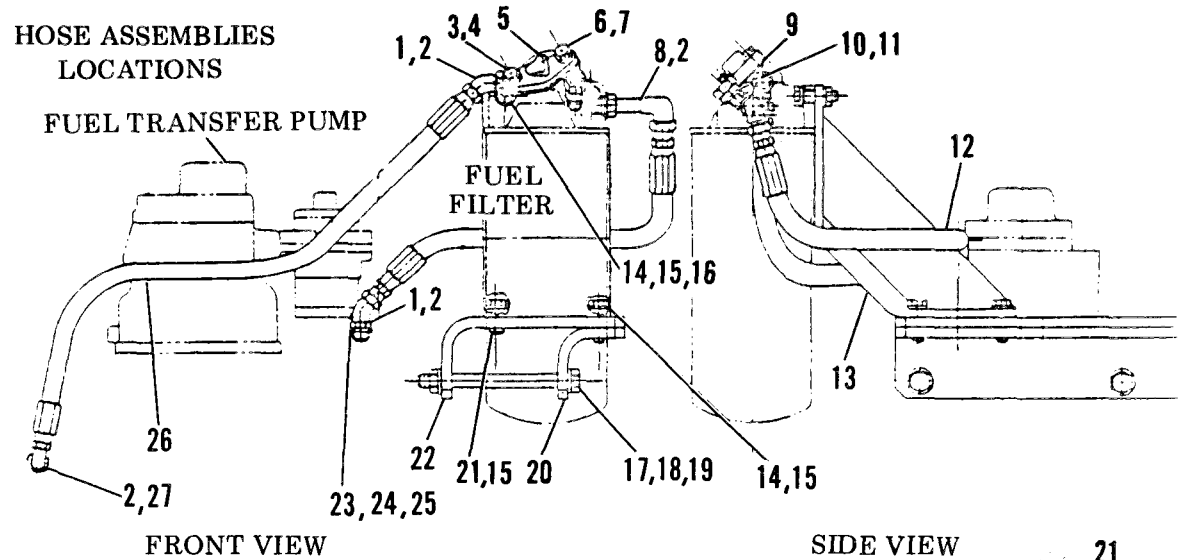
LOCATION/ITEM	ACTION	REMARKS
NOTE		
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Connector nuts 2. Lines/hoses 3. Elbow nuts 4. Elbows 5. Preformed packings 	<p>The following procedures apply to any of the fuel lines and fittings.</p> <ol style="list-style-type: none"> Loosen at both ends of fuel line. Remove. Loosen. Remove. Remove where installed. 	<p>Connector nuts are at each end of each hose or tube assembly.</p> <p>Elbow nuts hold elbows tight to the base; they are screwed in.</p>
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Preformed packings 	<ol style="list-style-type: none"> a. Coat lightly with fuel oil. b. Install. 	

Go on to Sheet 3

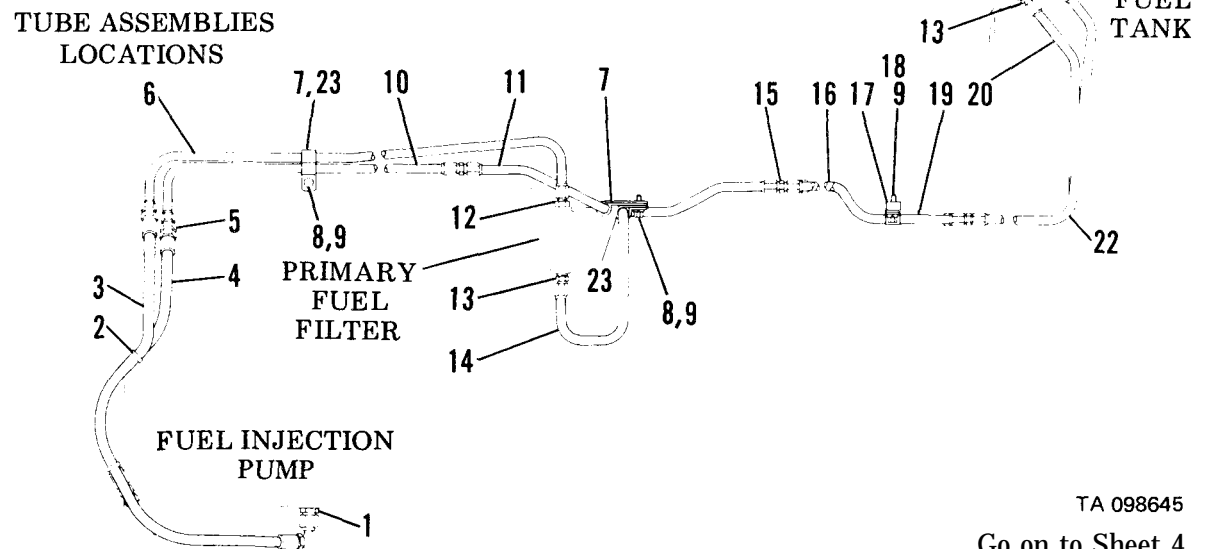
FUEL LINES AND FITTINGS REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 4)

- | | |
|----------------------------------|-------------------|
| 1. Elbow | 14. Capscrew |
| 2. Preformed packing | 15. Washer |
| 3. Washer | 16. Nut |
| 4. Capscrew | 17. Capscrew |
| 5. Fuel filter base cover | 18. Washer |
| 6. Capscrew | 19. Nut |
| 7. Washer | 20. Bracket |
| 8. Elbow | 21. Capscrew |
| 9. Gasket | 22. Bracket |
| 10. Adapter | 23. Adapter |
| 11. Preformed packing | 24. Elbow |
| 12. Hose assembly | 25. Pipe plug |
| 13. Fuel filter bracket assembly | 26. Hose assembly |
| | 27. Connector |

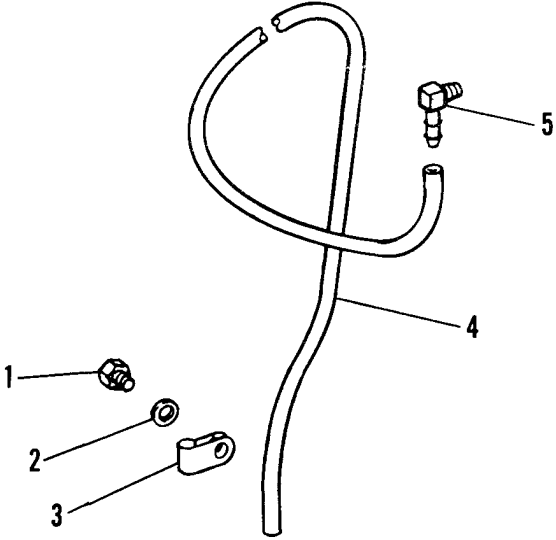


- | | |
|-------------------|--------------------|
| 1. Connector Seal | 12. Connector Seal |
| 2. Strap | 13. Connector |
| 3. Hose assembly | 14. Tube assembly |
| 4. Hose assembly | 15. Union |
| 5. Connector | 16. Tube assembly |
| 6. Tube assembly | 17. Sleeve |
| 7. Clip | 18. Bolt |
| 8. Bolt | 19. Tube assembly |
| 9. Lockwasher | 20. Tube assembly |
| 10. Tube assembly | 21. Connector |
| 11. Tube assembly | 22. Tube assembly |
| | 23. Clip |



TA 098645

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
2. Elbows 3. Elbow nuts 4. Lines/hoses 5. Connector nuts	Install. Tighten. Install. Tighten.	See TORQUE LIMITS CHART, page E-1. See TORQUE LIMITS CHART, page E-1.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">PUMP OVERFLOW LINE</div>	Remove. Slip off nipple (5) and replace. Install.	
1. Capscrew (1), washer (2), and clip (3) 2. Overflow line (4) 3. Capscrew (1), washer (2), and clip (3)		

TA 098646

End

FUEL TRANSFER PUMP REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of fuel transfer pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Gasket

O-ring seal

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Access door open.

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

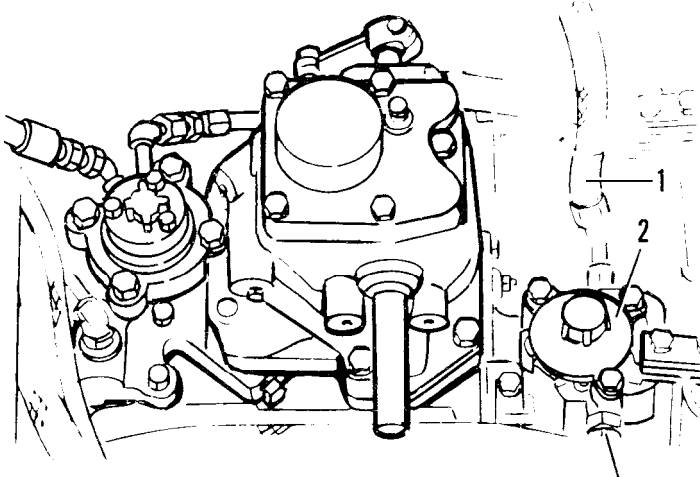
General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

FUEL TRANSFER PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Fuel lines (1) and (3) 2. Two bolts that hold fuel transfer pump to injection pump rear plate 3. Fuel transfer pump 	<p>Disconnect from fuel transfer pump (2).</p> <p>Remove.</p> <p>Remove.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Replace gasket and O-ring seal.</p>	 <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Lift transfer pump up evenly to ease removal.</p>
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Gasket and fuel transfer pump (2) 2. Fuel lines (1) and (3) 3. Two capscrews 	<ol style="list-style-type: none"> a. Install new gasket and O-ring seal. b. Place in position and rotate pump to align gears. <p>Install.</p> <p>Install.</p>	

TA 098647

End

FUEL PRIMING PUMP REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of fuel priming pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Gasket

Troubleshooting Reference

None

Equipment Condition

Engine shut down

Access door open

Special Tools

None

Personnel Required

One mechanic

References

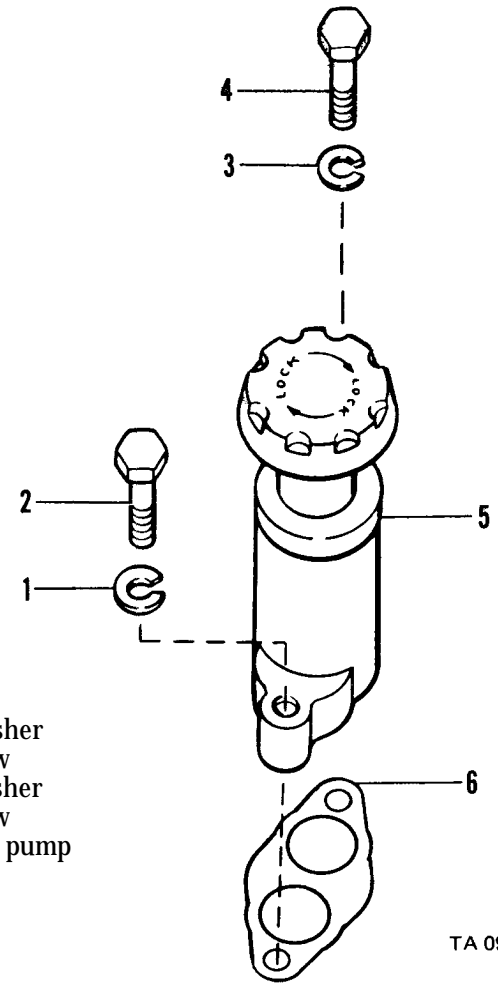
PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go onto Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Two capscrews (2) and (4) and two washers (1) and (3) 2. Priming pump (5) 3. Gasket (6) 	<p>Remove. See page 2-182 for location.</p> <p>Remove.</p> <p>Discard and replace with new gasket.</p>	
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Priming pump (5) and gasket (6) 2. Two capscrews (2) and (4) and two washers (1) and (3) 	<p>Place in position.</p> <p>Install.</p>	<ol style="list-style-type: none"> 1. Lockwasher 2. Capscrew 3. Lockwasher 4. Capscrew 5. Priming pump 6. Gasket

TA 098648

End

PRIMING THE FUEL SYSTEM

(Sheet 1 of 2)

This task covers: Using the fuel priming pump to prime the fuel system.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine shut down

Shipping link installed

Rear access door open

Special Tools

None

Personnel Required

Two mechanics

References

Shipping link removal/installation,
page 2-471

General Safety Instructions

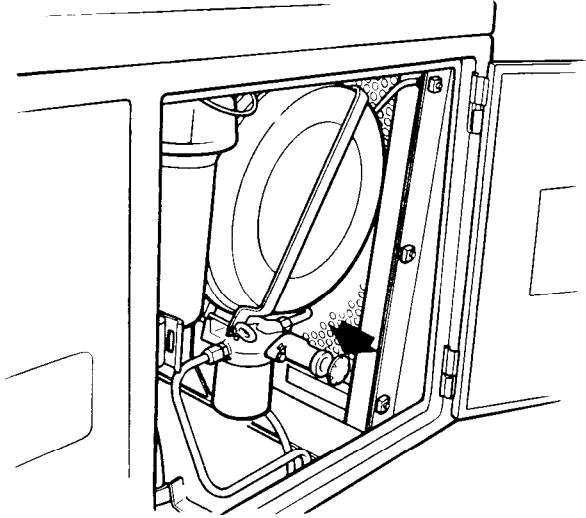
Main disconnect switch OFF

Do not make or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

PRIMING THE FUEL SYSTEM (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
1. Priming pump	Unlock (turn handle counterclockwise ½ turn) and pump until you feel resistance.	
2. Priming pump	Lock pump (turn handle clockwise until it locks).	
3. Engine	Start and check system for leaks.	

TA 098649

End

2-182

FUEL FILTER SERVICE – PRIMARY

This task covers: Removing and cleaning or replacing the primary fuel filter element.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Gasket

Element

Dry cleaning solvent, item 2
Appendix C

Troubleshooting Reference

Pages 2-37, 2-39

Equipment Condition

Engine shut down

Access door open

Special Tools

None

Personnel Required

One mechanic

References

Priming the fuel system, page 2-181

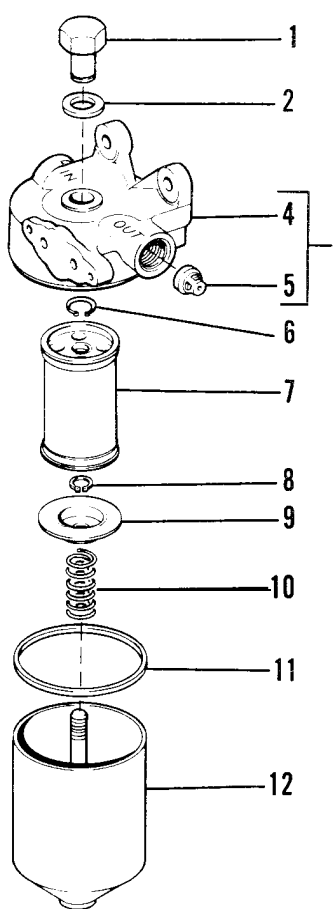
PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF

Do not smoke or have open flames around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Mounting nut (1) (Left rear of engine below air cleaner) See page 2-182 for location.</p> <p>2. Gasket (2)</p> <p>3. Case assembly (12)</p> <p>4. Element (7)</p> <p>5. Gasket (11)</p> <p>6. parts (4, 5, 8, 9, 10)</p> <p>7. Case assembly (12)</p>	<p style="text-align: center;">NOTE</p> <p>When fuel pressure gage is in RED area — engine running at high idle (accelerator held to floor), shut down vehicle and wash fuel filter.</p> <p>Loosen.</p> <p>Visually check and replace if necessary.</p> <p>Remove.</p> <p>a. Remove lock ring (6) and element (7).</p> <p>b. Wash in clean, nonflammable solvent, item 2, Appendix C.</p> <p>c. Dry, using low pressure air (30 psi max.).</p> <p>Discard and replace with new gasket.</p> <p>Remove if required.</p> <p>Clean in solvent, item 2, Appendix C.</p>	<p>1. Nut 2. Gasket 3. Base assembly 4. Base 5. Valve assembly 6. Lock ring 7. Element assembly 8. Retaining ring 9. Retainer 10. Spring 11. Gasket 12. Case assembly</p> 

TA 098650

Go on to Sheet 3

FUEL FILTER SERVICE – PRIMARY (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Parts (4, 5, 8, 9, 10)	Install if removed.	
9. Element (7)	Install in case assembly and secure with lock ring (6).	
10. New gasket (11)	Install.	
11. Case assembly (12)	Install.	
	<p>NOTE</p> <p>When changing the primary fuel filter is the only function being performed, the fuel pump must be primed before engine is started. Prime the pump while tightening the nut (1). See page 2-181.</p>	
12. Nut (1)	Tighten.	
13. Engine	<ul style="list-style-type: none"> a. Start. b. Check for fuel filter leaks. c. Shut down. 	

End

FUEL FILTER SERVICE – SECONDARY

(Sheet 1 of 3)

This task covers: Replacing the secondary fuel filter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Dry cleaning solvent, item 2
Appendix C

Troubleshooting Reference

Pages 2-37, 2-39

Equipment Condition

Engine shut down

Access door open

Special Tools

Strap wrench

Personnel Required

One mechanic

References

Torque limits chart, page E-1

Priming the fuel system, page 2-181

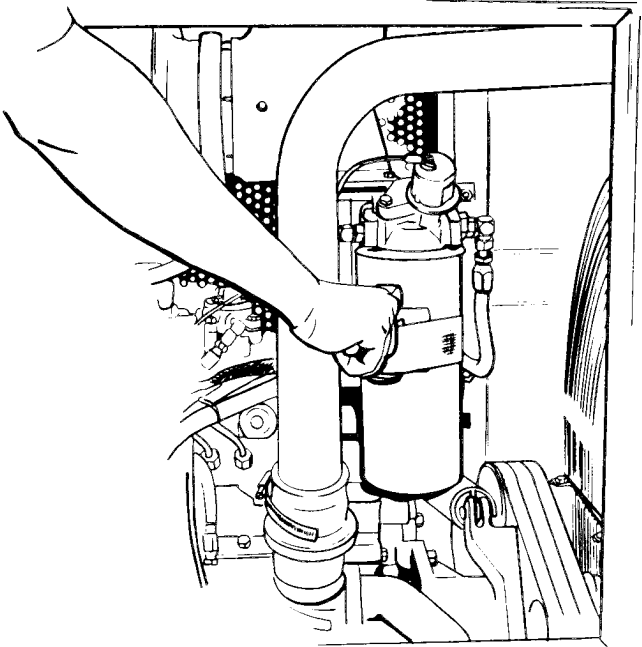
PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF

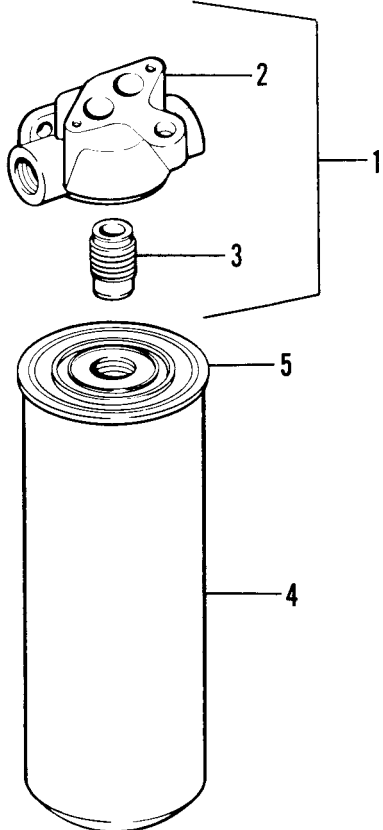
Do not smoke or have open flames around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Filter</p>	<p style="text-align: center;">NOTE</p> <p>Change filter element when fuel pressure gage reads in RED area — engine running at high idle (accelerator held to floor).</p> <p>a. Remove, using strap wrench.</p> <p>b. Discard filter.</p>	

TA 098651

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
2. Base assembly (1)	a. Clean. b. Be sure all of old gasket is removed. NOTE Replace stud (3) if necessary.	
3. Gasket (5)	a. Lubricate with diesel fuel. b. Install. NOTE Fill new filter with clean, fresh fuel. This will save time when priming the fuel system.	
4. Filter (4)	a. Install. b. Tighten until gasket contacts base. c. Tighten ½ to ¾ turn more.	
5. Priming pump	Prime fuel system. See page 2-181.	

TA 098652

End

ETHER STARTING AID REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Replacement of ether starting aid components.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine shut down

Right side access panel open

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

General Safety Instructions

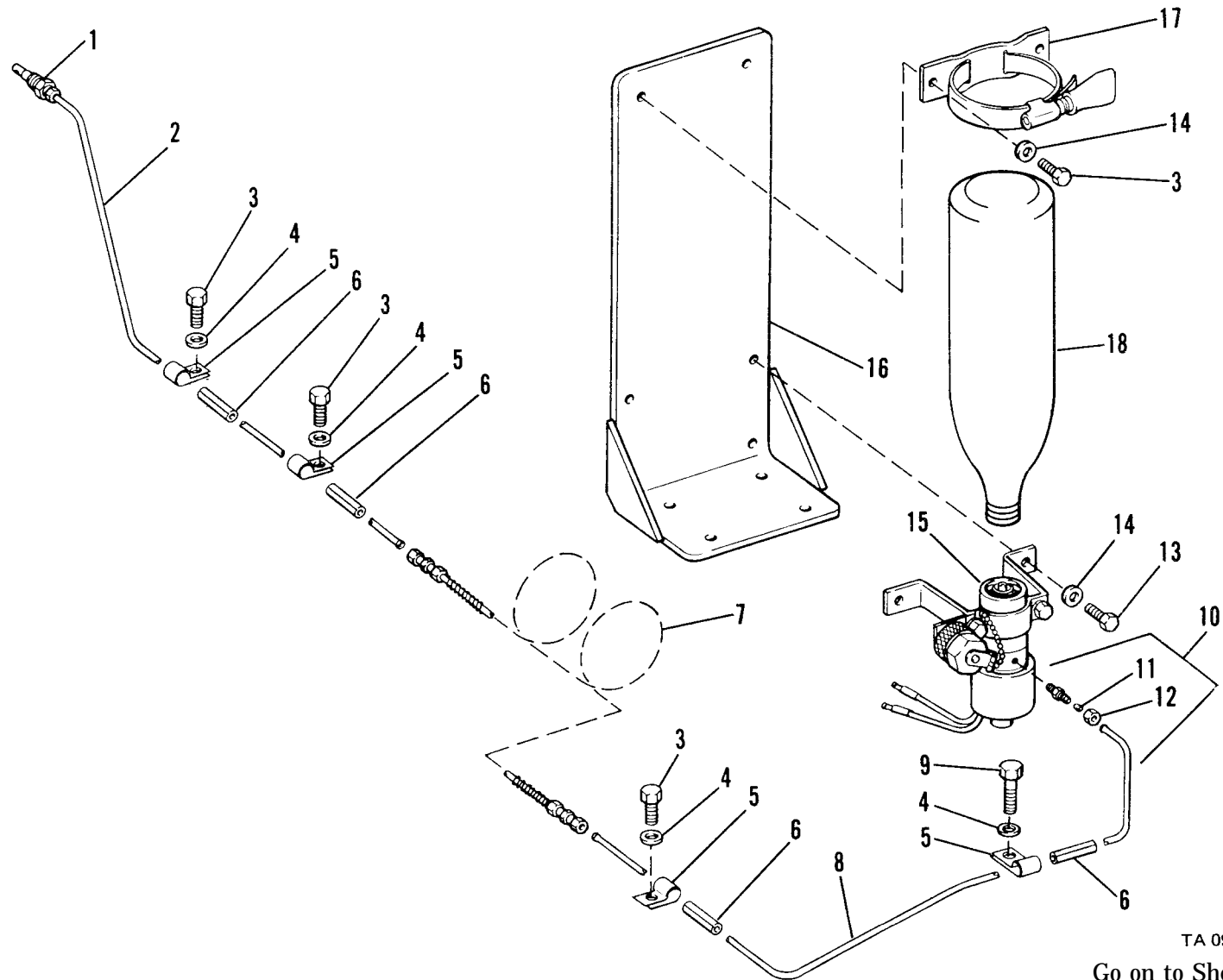
Main disconnect switch OFF

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

ETHER STARTING AID REMOVAL/INSTALLATION (CONT)

- 1. Atomizer assembly
- 2. Tube
- 3. Capscrew
- 4. Washer
- 5. Clip
- 6. Grommet
- 7. Tube assembly
- 8. Tube
- 9. Capscrew
- 10. Connector
- 11. Sleeve
- 12. Nut
- 13. Capscrew
- 14. Washer
- 15. Valve assembly
- 16. Bracket
- 17. Clamp
- 18. Canister



TA 098653

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">REMOVAL</div> 1. Ether canister (18) 2. Atomizer assembly (1) 3. Tubes (2), (7), and (8) 4. Valve assembly (15) 5. Clamp (17) 6. Bracket (16)	<p>NOTE</p> <p>Remove parts only as needed for repair or replacement.</p> <p>Remove if installed.</p> <p>Unscrew from intake manifold.</p> <p>a. Remove by removing mounting hardware and clips.</p> <p>b. Unscrew or disconnect as required</p> <p>a. Disconnect and tag wires.</p> <p>b. Disconnect tube at connector (10).</p> <p>c. Remove capscrews (13) and washers 14).</p> <p>Remove capscrews (3) and washers (14).</p> <p>Can be removed by removing remaining capscrews.</p>	

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Bracket (16)	Install if removed.	
2. Clamp (17)	a. Install. b. Install capscrews (3) and washers (14).	
3. Valve assembly (15)	a. Install. b. Secure with capscrews (13) and washers (14). c. Connect tube at connector (10). d. Connect wires.	
4. Tubes (2), (7) and (8)	a. Install — screw in or connect. b. Install mounting hardware and clips.	
5. Atomizer assembly (1)	Screw into intake manifold.	
6. Canister (18)	Install.	

End

FUEL TANK SERVICE

(Sheet 1 of 2)

This task covers: Fuel tank service.

INITIAL SETUPTest Equipment

None

Materials/Parts

Container to catch sediment and moisture

Troubleshooting Reference

Pages 2-37, 2-39

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

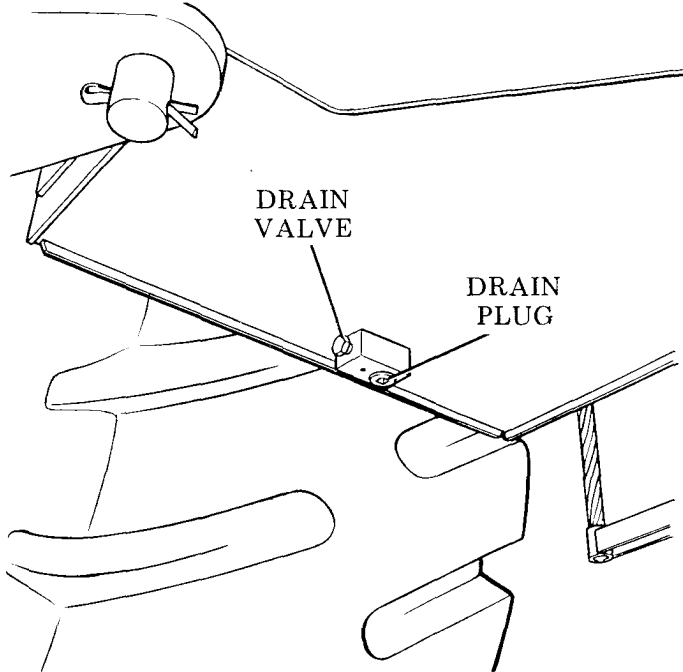
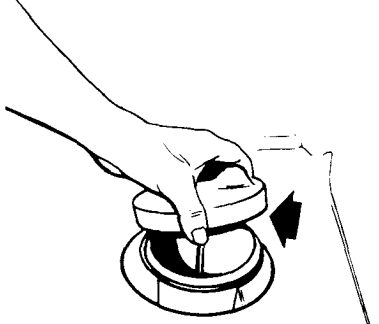
Fuel system description, page 1-14

General Safety Instructions

Main disconnect switch OFF

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Drain valve on fuel tank</p>	<p>a. Place suitable container under drain valve.</p> <p style="text-align: center;">CAUTION</p> <p>Do not remove drain plug instead of opening drain valve.</p> <p>b. Open.</p> <p>c. Allow sediment and moisture to drain.</p> <p>d. Close.</p> <p style="text-align: center;">WARNING</p> <p>Do not smoke while adding fuel. Fumes from fuel are flammable.</p>	 <p>The diagram shows a side view of a fuel tank with a drain valve and a drain plug. The drain valve is located on the top surface of the tank, and the drain plug is located on the side. Labels 'DRAIN VALVE' and 'DRAIN PLUG' point to their respective parts. A container is shown positioned under the drain valve to catch any fuel that drains out.</p>
<p>2. Fuel cap</p>	<p>a. Remove.</p> <p>b. Fill tank with DF-2 fuel oil.</p> <p>c. Install cap.</p>	 <p>The diagram shows a hand removing a fuel cap from a fuel tank. The cap is being lifted off the tank, and an arrow indicates the direction of movement.</p>

End

CLEAN FUEL TANK FILLER CAP AND SCREEN

(Sheet 1 of 2)

This task covers: Removing, inspecting, cleaning and installing the fuel tank filler cap and strainer screen.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Solvent, item 2, Appendix C

Diesel fuel, item 14, Appendix C

Gasket

Troubleshooting Reference

None

Equipment Condition

Engine stopped

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-8

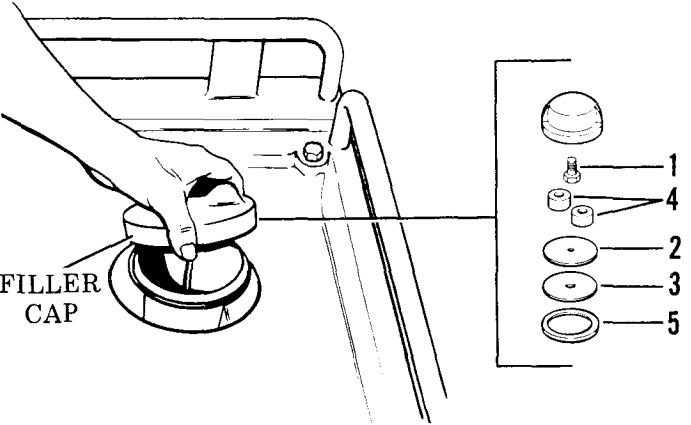
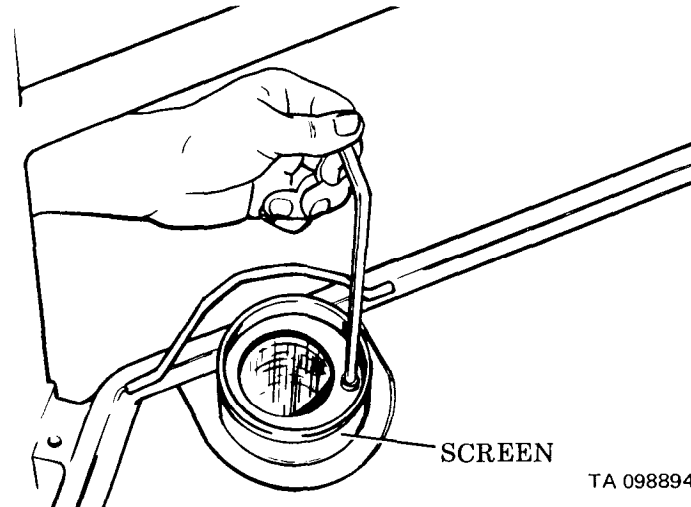
Fuel system description, page 1-14.

General Safety Instructions

Main disconnect switch OFF

Do not smoke or have open flames or sparks around fuel or lines. Fuel may catch fire and cause burns.

Go onto Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Filler cap</p>	<p>a. Remove.</p> <p>b. Disassemble.</p> <p>(1) Remove capscrew (1).</p> <p>(2) Remove gasket (2), baffle (3), two elements (4) and gasket (5).</p> <p>c. Wash cap and element in solvent.</p> <p>d. Squeeze element dry.</p> <p>e. Lightly oil element with diesel fuel.</p> <p>f. Assemble filler cap.</p> <p>(1) Put elements (4), gasket (2) and baffle (3) in place.</p> <p>(2) Fasten with capscrew (1).</p> <p>g. Replace gasket (5) if worn.</p>	
<p>2. Retaining ring and screen</p>	<p>a. Remove.</p> <p>b. Wash screen in solvent.</p>	
<p>3. Screen, retaining ring, and filler cap</p>	<p>Install.</p>	<p>TA 098894</p>

End

AIR INTAKE SYSTEM MAINTENANCE INSTRUCTIONS

This section includes organizational maintenance procedures for the air intake system as follows:

- Air cleaner replacement
- Air cleaner and dust ejector service

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Air cleaner and dust ejector service.	2-198	2-36, 2-37, 2-40, 2-42
2	Air cleaner housing and elbow removal/ installation.	2-206	None
3	Service air cleaner/precleaned.	2-208	2-36, 2-37, 2-40, 2-42

End

AIR CLEANER AND DUST EJECTOR SERVICE

This task covers: Cleaning air filter housing, air filter elements, and dust ejector.

Removal
Cleaning

Replacement
Installation

INITIAL SETUP

Test Equipment

None

Materials/Parts

Non-sudsing detergent, item 18, Appendix C

Tape, item 11, Appendix C

Secondary filter element

Gasket

Lint-free cloth, item 16, Appendix C

Troubleshooting Reference

Pages 2-36, 2-37, 2-40, 2-42

Equipment Condition

Access door open (behind cab)

Engine OFF and cooled.

Front hood removed

Special Tools

Air nozzle

Personnel Required

One mechanic

References

TORQUE LIMITS CHART, page E-1

PMCS, page 2-5

Hood removal/installation, page 2-452.

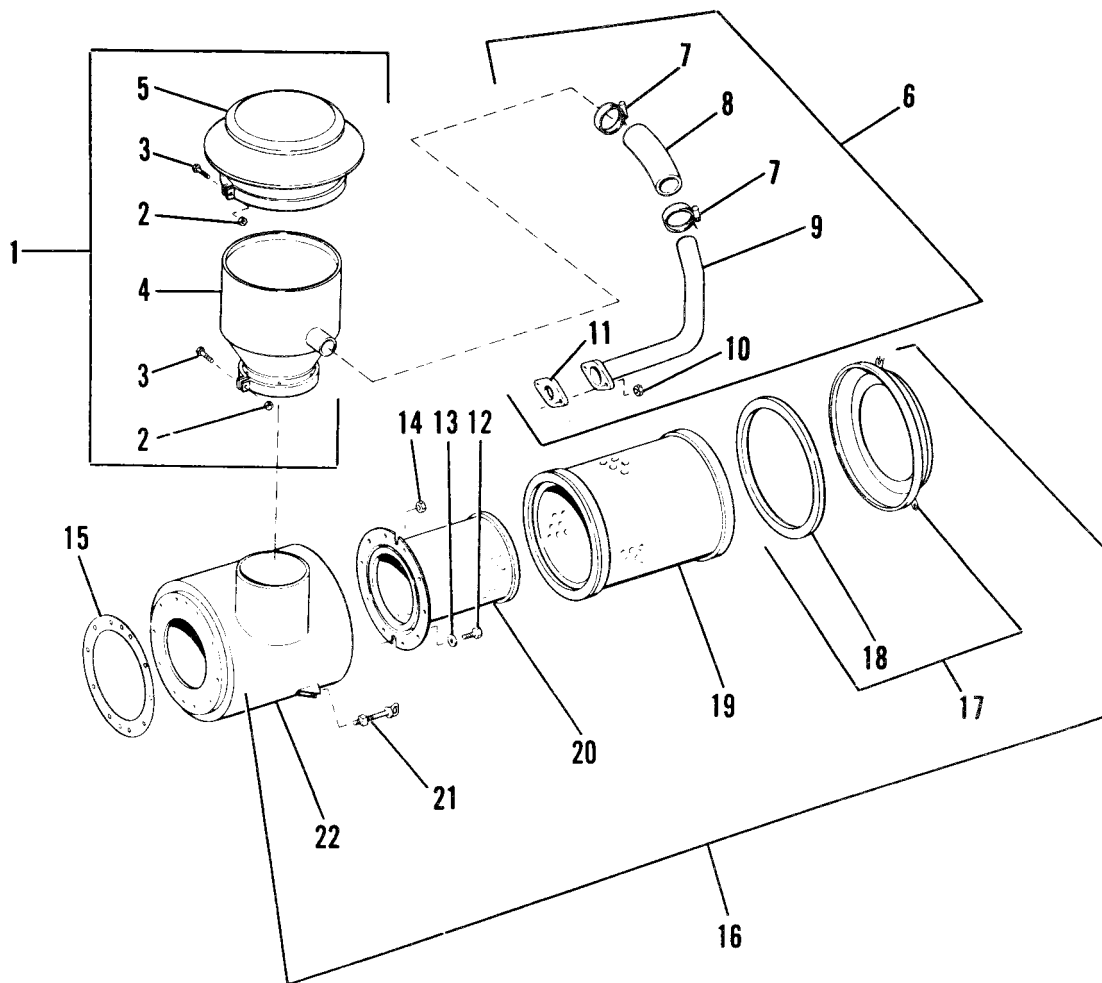
General Safety Instructions

Be careful not to allow dust into engine.
Dust will damage fuel injection unit.

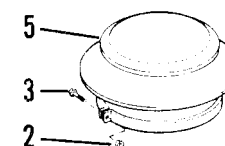
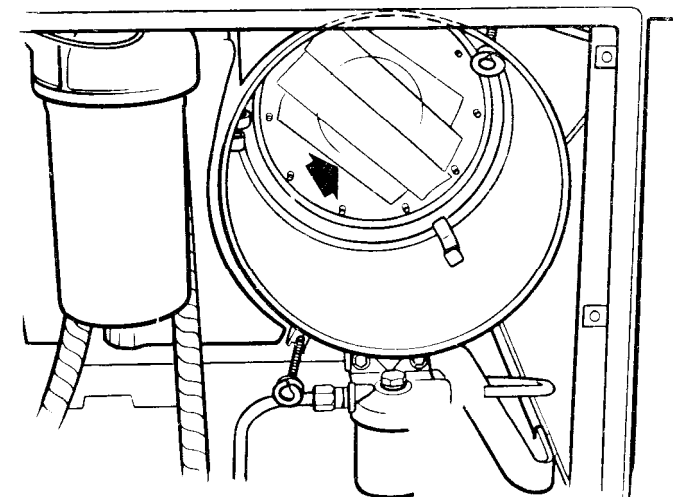
Main disconnect switch OFF.

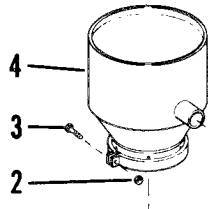
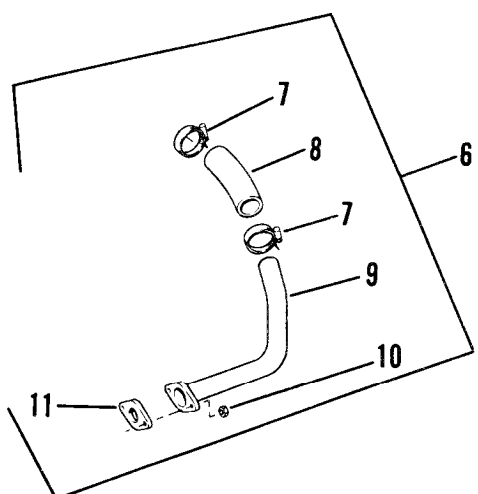
Go on to Sheet 2

1. Pre-cleaner assembly
2. Nut
3. Screw
4. Body assembly
5. Hood assembly
6. Dust ejector assembly
7. Clamp
8. Hose
9. Tube assembly
10. Nut
11. Adapter
12. Capscrew
13. Washer
14. Locknut
15. Gasket
16. Air cleaner assembly
17. Cover assembly
18. Gasket
19. Primary element
20. Secondary element
21. Rod assembly
22. Housing



LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY/CLEANING</div>		See PMCS, page 2-5 for service interval.
1. Rod assembly (21)	Loosen.	
2. Cover assembly (17)	Remove. Wipe clean with cloth, or wash in water and non-sudsing detergent.	
3. Primary element (19)	Remove.	
	<div style="border: 2px dashed black; padding: 5px; display: inline-block;">CAUTION</div>	
	Do not reuse secondary element. Loose particles could damage fuel injection unit.	
4. Secondary element (20)	Remove locknuts (14) and washers (13) from studs. Then remove secondary element.	
5. Air inlet opening (in housing 22)	Cover with tape.	
6. Screw (3)	Loosen at hood assembly (5).	
7. Hood assembly (5)	Remove. Wipe clean with cloth, or wash in water and non-sudsing detergent.	



LOCATION/ITEM	ACTION	REMARKS
8. Body assembly (4)	Wipe clean with cloth, or wash in water and non-sudsing detergent.	 <p>Replace if defective.</p>
9. Dust ejector (6)	<ul style="list-style-type: none"> a. Loosen clamps (7). b. Remove hose (8). c. Remove nuts (10). d. Remove tube (9). e. Clean tube and hose with air (30 psi max.) or water. 	
10. Gasket (15)	<ul style="list-style-type: none"> a. Inspect. If damaged: b. Remove capscrews (12) and washers (13). c. Remove housing (22). d. Replace gasket (15). e. Clean housing (22) with cloth or wash in non-sudsing detergent. f. Position housing (22) on manifold. g. Install capscrews (12) and washers (13). 	

See TORQUE LIMITS CHART, page E-1.

Go onto Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<p>11. Housing (22)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">CLEANING ELEMENT</div>	<div style="border: 1px dashed black; padding: 2px; text-align: center; margin-bottom: 10px;">CAUTION</div> <p>Do not wash housing with water or clean with pressure air when it is on manifold. Dirt particles could be forced into engine.</p> <p>Wipe clean with cloth.</p> <div style="border: 1px solid black; padding: 2px; text-align: center; margin: 10px auto;">WARNING</div> <p>Wear face shield and protective clothing to prevent injury when using pressure air or water. Use 30 psi maximum for cleaning.</p> <div style="border: 1px dashed black; padding: 2px; text-align: center; margin-bottom: 10px;">CAUTION</div> <p>Do not bump or tap element to clean. Do not use element with damaged pleats, gaskets, or seals. Discard damaged elements.</p> <p style="text-align: center;">NOTE</p> <p>Use pressure air, pressure water, or detergent as necessary to clean primary element.</p> <p>Replace primary element after six cleanings or yearly.</p>	<p style="text-align: right;">TA 098897</p>

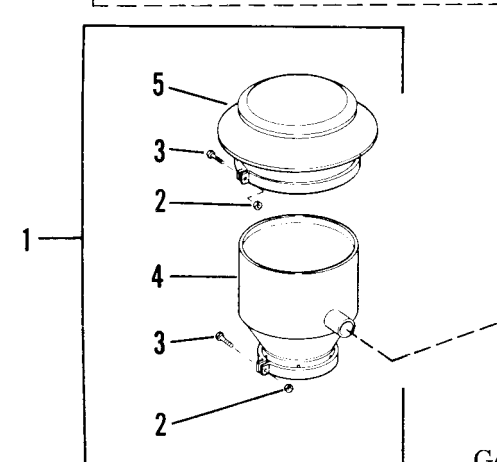
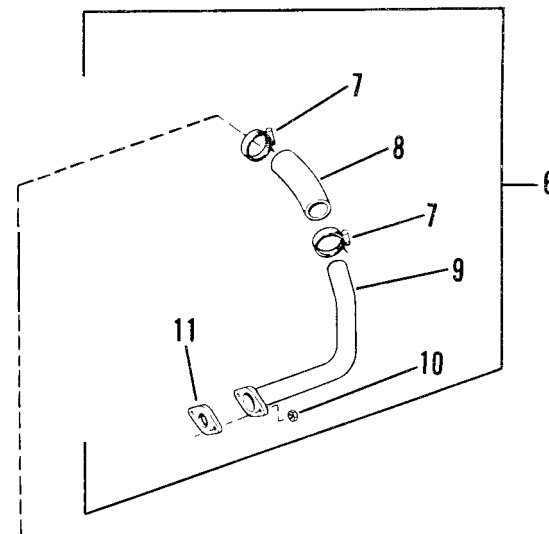
Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px; display: inline-block;">CLEANING ELEMENT</div> <p>1. Pressure air</p> <p>2. Pressure water</p> <p>3. Detergent</p>	<p>a. Direct pressure air along length of inside pleats and along length of outside pleats of element (19).</p> <p>b. Again direct air along inside pleats.</p> <p>c. Inspect element for cleanliness, rips, or tears.</p> <p>a. Direct pressure water [40 psi (280 kPa) maximum] along length of inside pleats and along length of outside pleats of element (19).</p> <p>b. Again direct water along inside pleats.</p> <p>c. Allow to dry.</p> <p>d. Inspect element for cleanliness, rips, or tears.</p> <p>a. Wash element in warm water and non-sudsing household detergent.</p> <p>b. Rinse well with clean water.</p> <p>c. Allow to dry.</p> <p>d. Inspect element for cleanliness, rips, or tears.</p>	

Go onto Sheet 7

AIR CLEANER AND DUST EJECTOR SERVICE (CONT)

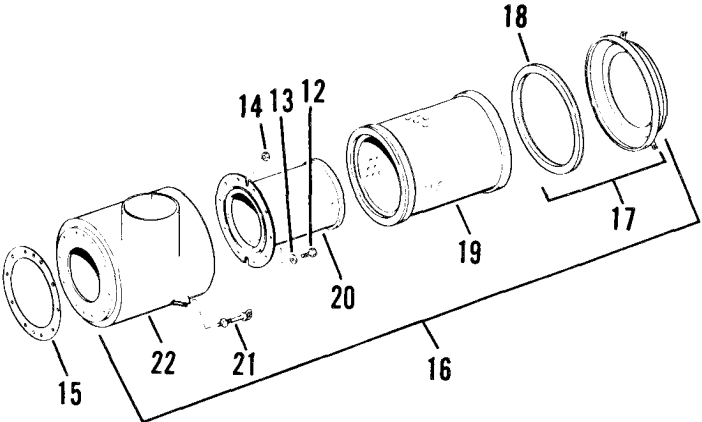
LOCATION/ITEM	ACTION	REMARKS
4. Light bulb	Insert into element when dry. If light shows through rips or tears, discard element. If light does not show through, reuse element.	
ASSEMBLY		
1. Dust ejector (6)	Position between muffler and pre-cleaner.	
2. Nuts (10)	Install.	
3. Hose (8)	Install.	
4. Clamps (7)	Tighten.	
5. Hood assembly (5)	Install.	
6. Screw (3)	Tighten.	
7. Air inlet opening	Remove tape.	



TA 098896

Go on to Sheet 8

AIR CLEANER AND DUST EJECTOR SERVICE (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Secondary element (20)	Install with washers (13) and locknuts (14).	 <p>The diagram shows an exploded view of the air cleaner assembly. Part 12 is a rod assembly with a handle. Part 13 is a washer, and part 14 is a locknut. Part 15 is a cover. Part 16 is the main housing. Part 17 is a cover with a ring. Part 18 is a ring. Part 19 is a primary element. Part 20 is a secondary element. Part 21 is a rod assembly. Part 22 is a housing component.</p>
9. Primary element (19)	Install.	
10. Cover (17)	Install.	
11. Rod assembly (21)	Tighten.	
12. POWER switch	Turn ON.	
13. Engine	Start	PLUGGED FILTER AIR indicator should remain OFF.
14. Engine	Stop.	
15. POWER switch	Turn OFF.	

AIR CLEANER HOUSING AND ELBOW REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of air cleaner housing and elbow.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Precleaner removed.

Hood removed.

Engine OFF.

Special Tools

None

Personnel Required

One mechanic

References

Torque Limits Chart, page E-1

Air Cleaner Service, page 2-198

Hood removal/installation, page 2-454.

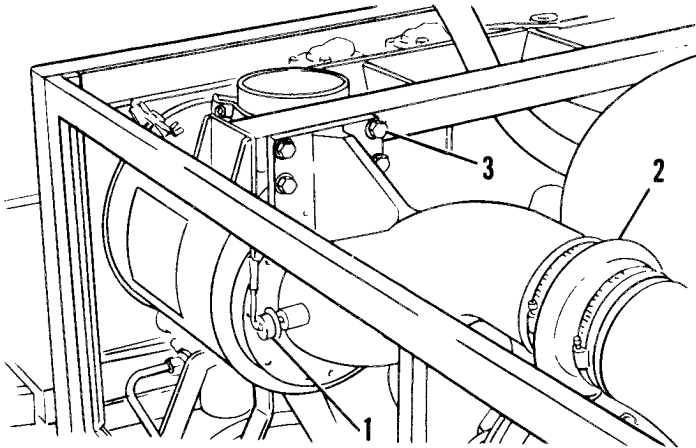
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

AIR CLEANER HOUSING AND ELBOW REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Wire assembly	Disconnect from air cleaner sensing unit (1).	
2. Clamps (2)	Loosen.	
3. Capscrews (3)	Remove.	
<p>NOTE</p> <p>Weight of air cleaner housing and elbow is 50 lb (23 kg).</p>		
4. Air cleaner housing and elbow	Remove as a unit.	If disassembly is required, see Air Cleaner Service, page 2-198.
INSTALLATION		
1. Air cleaner housing and elbow	Position in engine compartment.	See TORQUE LIMITS CHART, page E-1.
2. Capscrews (3)	Install.	
3. Clamps (2)	Tighten.	
4. Wire assembly	Connect to air cleaner sensing unit (1).	

SERVICE AIR CLEANER/PRECLEANER

(Sheet 1 of 2)

This task covers:

INITIAL SETUP

Test Equipment

None

Materials/Parts

Lint-free cloth, item 16, Appendix C

Troubleshooting Reference

Pages 2-36, 2-37, 2-40, 2-42

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

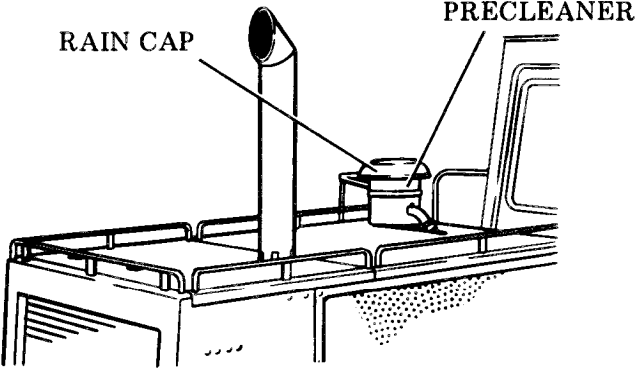
References

PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
Rain cap and screen	<ul style="list-style-type: none"> a. Remove. b. Clean rain cap, screen and precleaner housing if dirty. Use a clean rag. c. Reinstall. 	 <p>The diagram shows a side view of an air cleaner assembly. A vertical cylindrical component is labeled 'RAIN CAP'. To its right, a rectangular housing is labeled 'PRECLEANER'. The entire assembly is mounted on a metal frame. A dotted area below the precleaner housing indicates a filter or screen.</p>

EXHAUST SYSTEM MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these exhaust system components for Organizational Maintenance personnel:

- a. Muffler
- b. Exhaust pipe

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Exhaust pipe and muffler removal/installation.	2-211	None

End

EXHAUST PIPE AND MUFFLER REMOVAL/INSTALLATION

This task covers: Removal and installation of exhaust pipe and muffler.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF and cooled.

Hoods removed.

Left side access cover open.

Air cleaner and dust ejector removed.

Special Tools

Hoist

Personnel Required

One mechanic

References

TORQUE LIMITS CHART, page E-1

PMCS, page 2-5

Hood removal/installation, page 2-454.

Air cleaner and dust ejector service,
page 2-198.

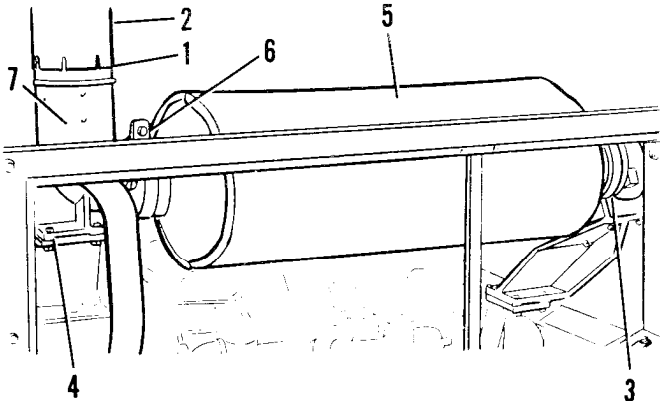
General Safety Instructions

Handle pipe and muffler carefully.
Hot parts burn.

Main disconnect switch OFF.

Go on to Sheet 2

EXHAUST PIPE AND MUFFLER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Hood	Remove.	See page 2-454.
2. Clamp (1)	Remove.	
3. Exhaust pipe (2)	Remove.	
4. Clamp (3)	Loosen.	
5. Hoist	Attach.	
6. Capscrews (4) and nuts	<p style="text-align: center;">NOTE</p> Weight of muffler is 165 lb. (75 kg). Be prepared for that weight when capscrews are removed.	

TA 098660

Go on to Sheet 3

EXHAUST PIPE AND MUFFLER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Clamp (6) 9. Elbow (7)	Loosen. Remove.	Replace parts as necessary.
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. Elbow (7)	Install.	
2. Clamp (6)	Tighten and torque to 18 ± 5 lb. ft (24 ± 7 N•m).	
3. Muffler (5)	Position in engine compartment.	
4. Capscrews (4)	Install and tighten.	See TORQUE LIMITS CHART, page E-1.
5. Clamp (3)	Tighten and torque to 18 ± 5 lb. ft. (24 ± 7 N•m).	
6. Exhaust pipe (2)	Install.	
7. Clamp (1)	Tighten and torque to 18 ± 5 lb. ft. (24 ± 7 N•m).	
8. Hood	Install.	See page 2-454.
9. Air cleaner and dust ejector.	Install	See page 2-198.

End

COOLING SYSTEM MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these cooling system components for Organizational Maintenance personnel:

- a. Water pump
- b. Fan
- c. Fan drive mechanism
- d. Fan belt tightener (tensioner)
- e. Hoses, lines and fittings
- f. Fan belts
- g. Water temperature regulators (thermostats)
- h. Coolant filter

Also instructions for draining and refilling the cooling system.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Coolant replacement.	2-215	2-38
2	Water temperature regulators (thermostats) removal/installation.	2-218	None
3	Water temperature regulators testing.	2-223	None
4	Water pump removal/installation.	2-225	None
5	Fan belt set removal/installation.	2-229	2-41
6	Fan belt tightener (tensioner) removal/installation.	2-231	None
7	Fan assembly removal/installation.	2-233	2-41
8	Fan drive mechanism removal/installation.	2-236	2-41
9	Radiator rear guard removal/repair/installation.	2-242	None
10	Coolant filter base assembly removal/installation	2-244	None
11	Hoses, lines and fittings removal/installation.	2-247	None
12	Fan guards removal/installation.	2-249	None

End

COOLANT REPLACEMENT

(Sheet 1 of 3)

This task covers: Draining and refilling cooling system with coolant.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Antifreeze solution per MIL-A-46155 (28 gal.),
item 1, Appendix C

Troubleshooting Reference

Page 2-38

Equipment Condition

Engine turned off and cooled.
Left rear access panel open.

Special Tools

None

Personnel Required

One mechanic

References

TM 750-254

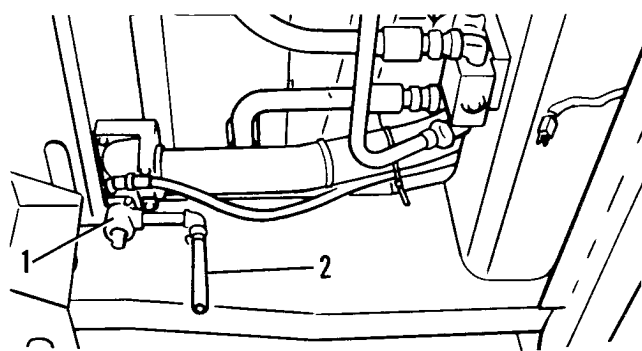
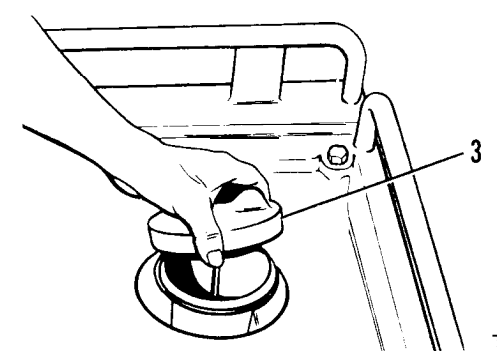
General Safety Instructions

Open radiator cap slowly to allow steam to escape.
Be careful. Steam burns.
Avoid contact with coolant.
The alkaline solution can harm skin and eyes.
Main disconnect switch OFF.

Go on to Sheet 2

COOLANT REPLACEMENT (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<p>Antifreeze</p> <p style="text-align: center;">DRAIN SYSTEM</p> <p>1. Drain valve (1)</p> <p>2. Precharge element (coolant filter canister)</p>	<p>Mix antifreeze solution to lowest expected temperature.</p> <p>Open and drain coolant into suitable container.</p> <p>Remove. (See page 2-244.)</p>	<p>MIL-A-46153.</p> <p>Be sure cooling system drain hose (2) is through hole in crankcase guard.</p> 
<p style="text-align: center;">FILL SYSTEM</p> <p>1. Antifreeze</p> <p>2. Engine</p> <p>3. Precharge element (coolant filter canister)</p>	<p>Add to fill radiator.</p> <p>Start and run with radiator cap (3) off to remove air bubbles from system.</p> <p>Replace. (See page 2-244.)</p>	 <p style="text-align: right;">TA 098661</p>

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>3. Radiator cap (3)</p>	<ul style="list-style-type: none"> a. Install. b. Operate engine for 5 minutes. c. Let engine cool. d. Recheck level of antifreeze. 	

End

WATER TEMPERATURE REGULATORS REMOVAL/INSTALLATION

(Sheet 1 of 5)

This task covers: Replacement of water temperature regulators (thermostats).

INITIAL SETUP

Test Equipment

None

Materials/Parts

Lip seals (2)

Troubleshooting Reference

None

Equipment Condition

Coolant drained to below level of water temperature regulators.

Special Tools

Seal driver

Personnel Required

One mechanic

References

Coolant replacement, page 2-215

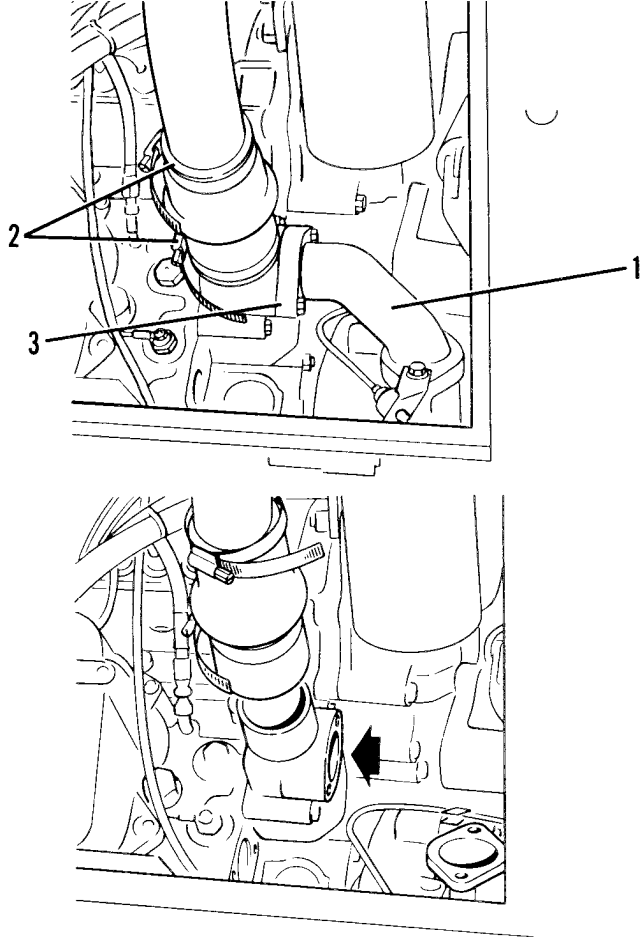
General Safety Instructions

Let engine cool.

Main disconnect switch OFF.

Go on to Sheet 2

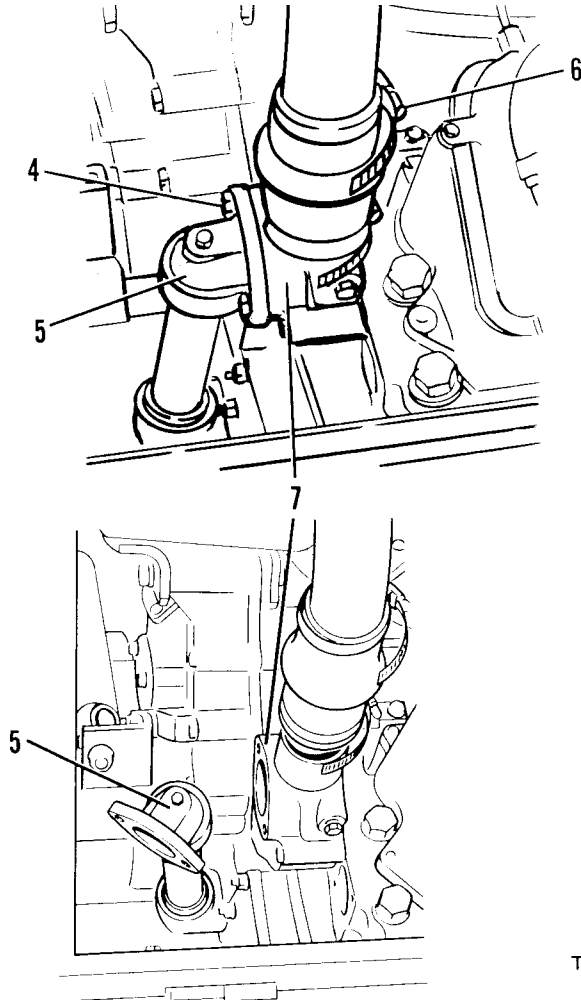
WATER TEMPERATURE REGULATORS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Coolant 2. Elbow (1) 3. Two hose clamps (2) 4. Hose 5. Cover assembly (3) 6. Water temperature regulator 7. Lip seal 	<p>Drain to level below water temperature regulators.</p> <ol style="list-style-type: none"> a. Remove capscrews and elbow. b. Remove dipstick for filter. <p>Loosen.</p> <p>Slide up on tube assembly.</p> <p>Remove.</p> <p>Remove from left cylinder head.</p> <p>Discard.</p>	

TA 098662

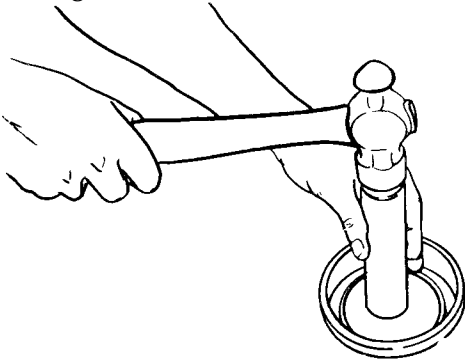
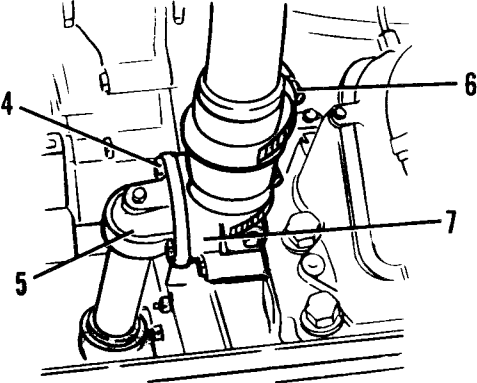
Go on to Sheet 3

WATER TEMPERATURE REGULATORS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Two bolts (4)	Remove.	
9. Tube assembly (5)	Turn away from cover assembly for water temperature regulator.	
10. Two clamps (6)	Loosen.	
11. Hose	Slide up on tube assembly.	
12. Cover assembly (7)	Remove.	
13. Water temperature regulator	Remove from right cylinder head.	
14. Lip seal	Discard.	

TA 098663

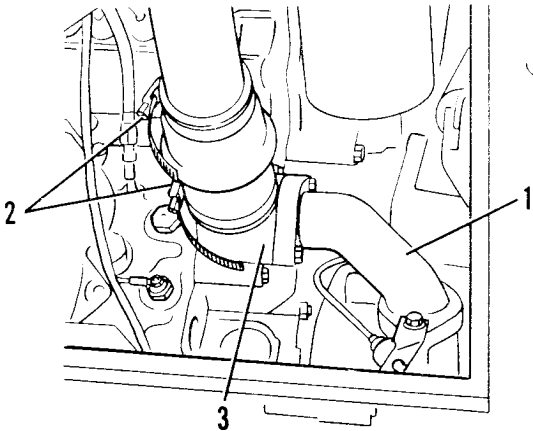
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;"> INSTALLATION </div> <ol style="list-style-type: none"> <li>1. New lip seals <li>2. Right water temperature regulator <li>3. Cover assembly (7) <li>4. Hose <li>5. Clamps (6) <li>6. Tube assembly (5) 	<p>Install using a seal driver</p> <p>Install.</p> <p>Install.</p> <p>Slide into position on cover assembly.</p> <p>Tighten.</p> <p>Connect to cover assembly.</p>	<p>Seal should make contact with counterbore. Lip of seal away from regulator.</p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div>

TA 098664

Go on to Sheet 5

WATER TEMPERATURE REGULATORS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
7. New water temperature regulator	Install.	
8. Cover assembly (3)	Install.	
9. Hose	Slide into position on cover assembly.	
10. Clamps (2)	Tighten.	
11. Elbow (1)	Install.	
12. Cooling system	Fill	

See page 2-215.

WATER TEMPERATURE REGULATOR TESTING

This task covers: Test of water temperature regulators (thermostats).

INITIAL SETUP

Test Equipment

Thermometer

Materials/Parts

Pan of water

Source of heat

Two bricks

Troubleshooting Reference

None

Equipment Condition

Temperature regulators removed from machine.

Special Tools

None

Personnel Required

One mechanic

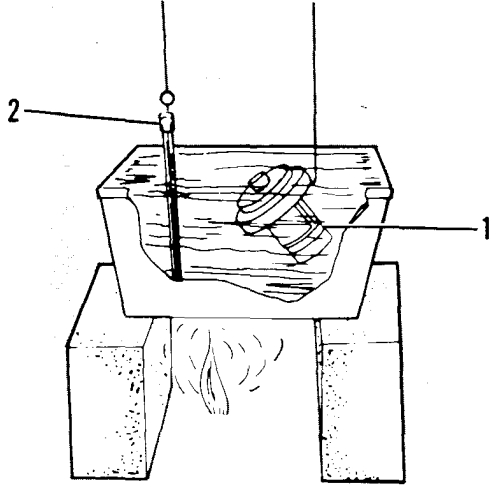
References

Water temperature regulators removal/installation, page 2-218.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">TEST</div>		
1. Temperature regulator (1)	Suspend in pan of water.	
2. Thermometer (2)	Suspend in pan of water.	
3. Water	Heat to 197°F (92°C).	
	NOTE	
	Regulator should begin to open at this point.	
4. Water	Heat until boiling.	
	NOTE	
	Regulator should open all the way. If it doesn't, discard the regulator and replace it.	

WATER PUMP REMOVAL/INSTALLATION

This task covers: Replacement of water pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Coolant drained from system.

Panel over water pump removed,
left side of vehicle.

Fan assembly and guard may be removed
if necessary.

Engine OFF and cooled.

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

Coolant replacement, page 2-215

Fan removal/installation, page 2-233

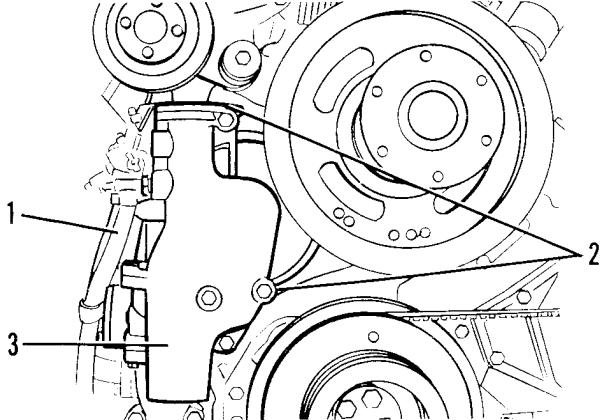
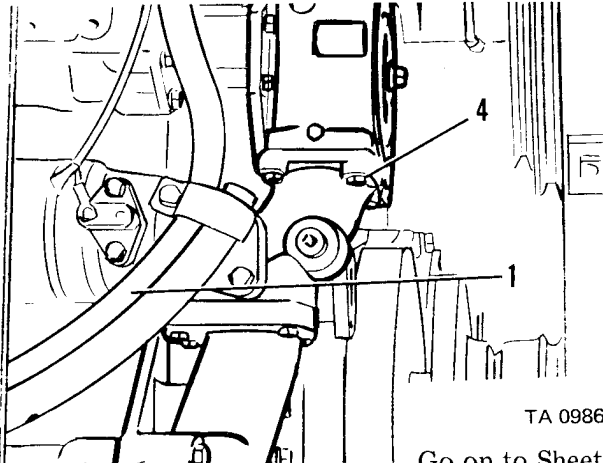
General Safety Instructions

Engine must be cool.

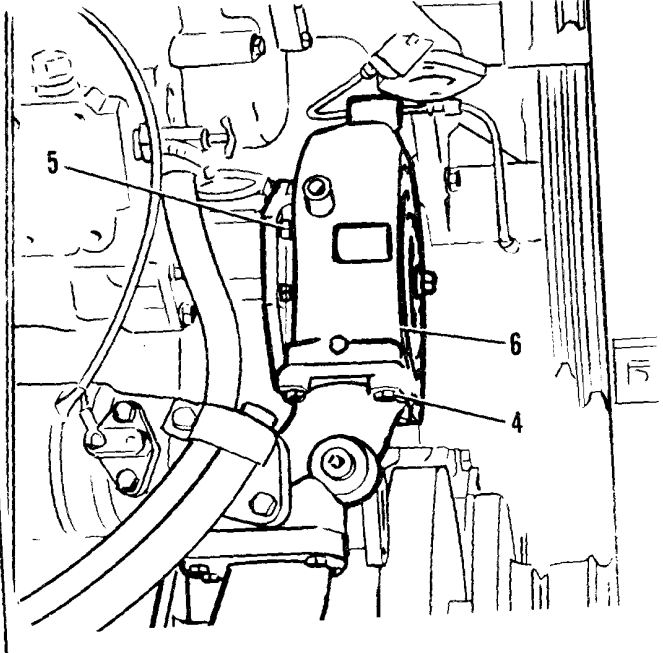
Main disconnect switch OFF.

Go on to Sheet 2

WATER PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Vee belt set <li>2. Heater hose (2 each) (1) <li>3. Clips holding hoses to water cooler <li>4. Housing assembly <li>5. Housing assembly capscrews (2) <li>6. Housing assembly (3) <li>7. Four capscrews (4) at outlet side 	<p>Remove (see page 2-229).</p> <p>Tag and disconnect from housing assembly.</p> <p>Disconnect from valve assembly.</p> <p>Disconnect hose going from housing assembly to inlet elbow on radiator.</p> <p>Remove.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Be sure all capscrews are removed.</p> <p>Remove.</p> <p>Remove.</p>	<p>This will permit belt tightener to move away from water pump.</p>   <p style="text-align: right;">TA 098667</p> <p style="text-align: right;">Go on to Sheet 3</p>

WATER PUMP REMOVAL/INSTALLATION (CONT)

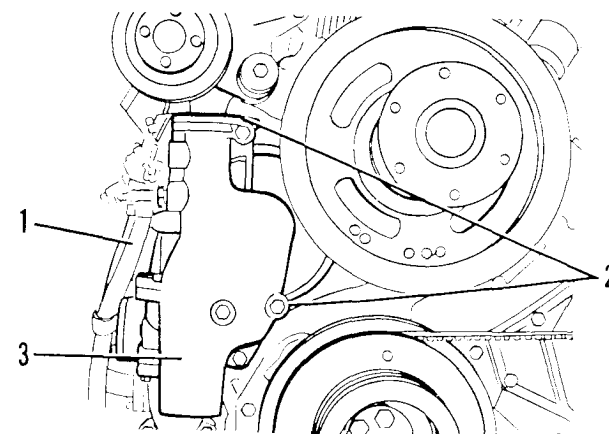
LOCATION/ITEM	ACTION	REMARKS
8. Nuts (5)	Remove from behind water pump.	
	<p style="text-align: center;">NOTE</p> <p>Be aware of capscrew in seven o'clock position. It is difficult to remove.</p>	
9. Grease line and clip at fan drive	Remove.	
10. Water pump	Remove.	
INSTALLATION		
1. Water pump (6)	Put in position.	
2. Nuts (5)	Install.	
3. Four capscrews (4) at outlet side	Install.	

TA 098668

Go on to Sheet 4

WATER PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Housing assembly (3)	Install.	
5. Capscrews (2) to hold it	Install.	
6. Hose going from water pump to inlet elbow on radiator	Install.	
7. Grease line and clip	Install.	
8. Heater hose (1)	Connect.	
9. Heater hose clips	Install on cooler.	
10. Vee belt set for fan	Install.	
11. Panel assembly over water pump	Install. The panel is located on the left side of vehicle.	
12. Cooling system	Fill with coolant.	



See page 2-229.

See page 2-215.

FAN BELT SET REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of fan belt set.

INITIAL SETUP

Test Equipment

None

Materials/Parts

One fan belt set (three belts)

Troubleshooting Reference

Page 2-41

Equipment Condition

Access panel open.

Special Tools

Pry bar

Personnel Required

One mechanic

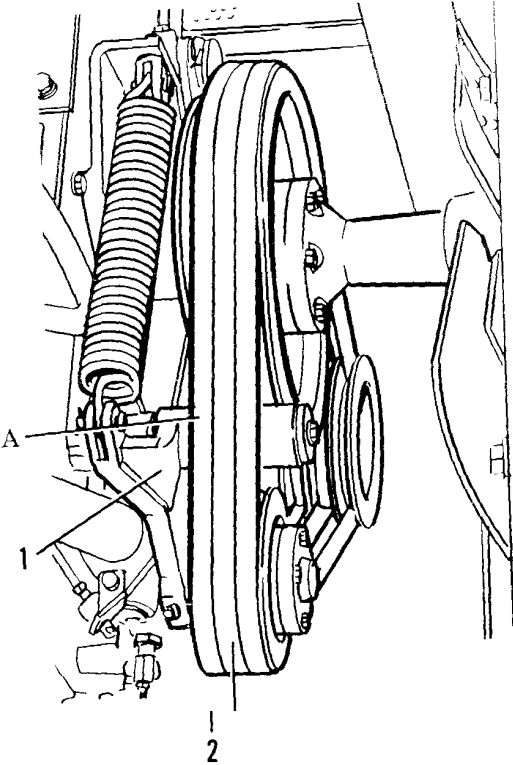
References

PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF.

FAN BELT SET REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Fan belt tightener (1)</p>	<p>Use pry bar (insert at point A) to put pressure on top of fan belt tightener, moving tightener down, and remove fan belt set (2).</p>	<p>When replacing worn or damaged fan belts, the entire set of 3 must be replaced at the same time. See TM 750-254.</p>
<p style="text-align: center;">INSTALLATION</p> <p>1. Fan belt tightener (1)</p>	<p>Put pressure on top of fan belt tightener and put on new fan belt set (2).</p>	

TA 098671

End

2-230

FAN BELT TIGHTENER REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Fan belt tightener replacement.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine shut down.

Special Tools

Pry bar

Personnel Required

One mechanic

References

LO 10-3930-641-12

Fan belt removal/installation, page 2-229

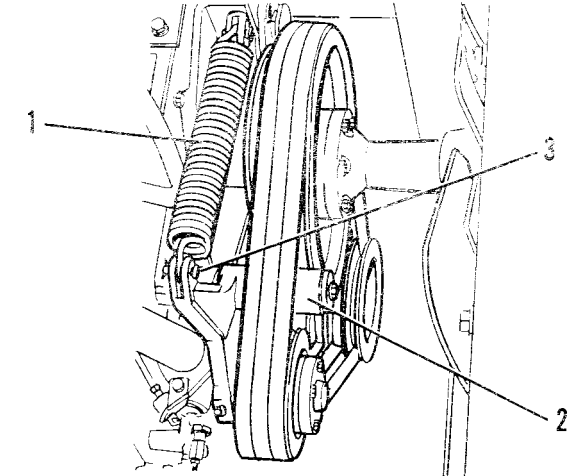
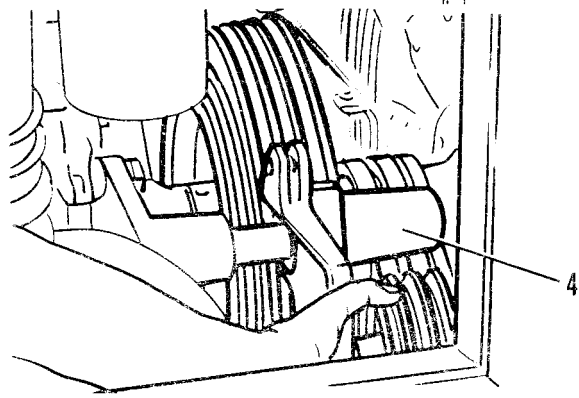
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

FAN BELT TIGHTENER REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>			
1. Three fan belts	Remove.		
2. Cotter pin and pin (3), spring (1)	Remove.		
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">WARNING</div>		
	Spring tension may be present.		
3. Plate, washer and capscrew (2)	Remove.		
4. Fan belt tightener (4)	Remove.		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>			
	1. Fan belt tightener (4)	Put in position on fan drive bracket and install plate, washer, and capscrew.	
	2. Spring (1), pin and cotter pin (3)	Install.	
	3. Three belts	Install.	
4. Fan belt tightener	Grease.		

See page 2-229.

See LO 10-3930-641-12.

TA 098672

End

2-232

FAN ASSEMBLY REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of fan assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

O-ring seal

Troubleshooting Reference

Page 2-41

Equipment Condition

Engine turned OFF.

Special Tools

Hoist

Suitable container

Personnel Required

One mechanic

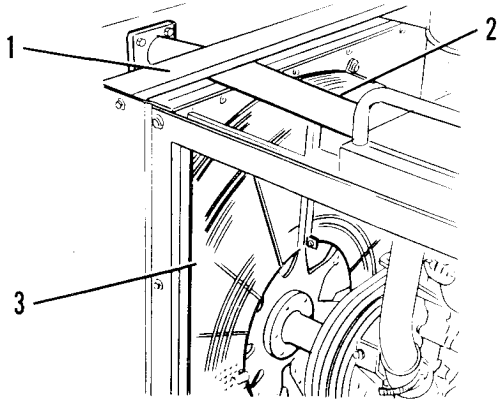
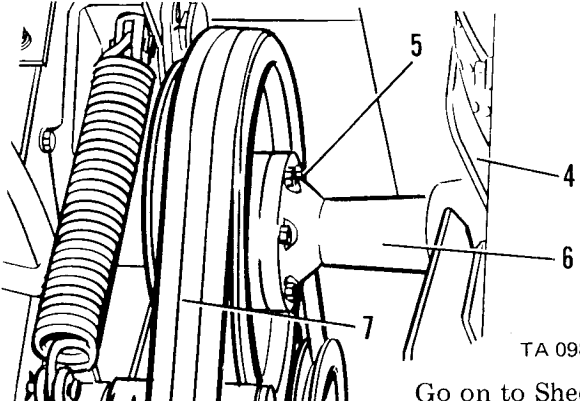
References

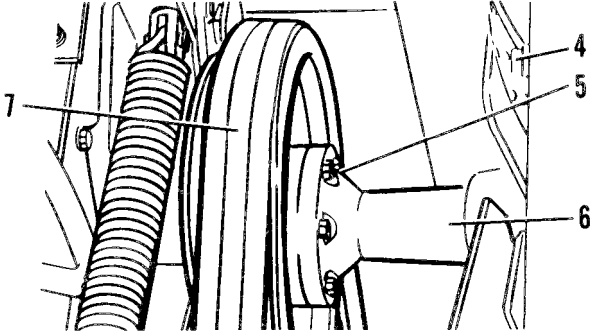
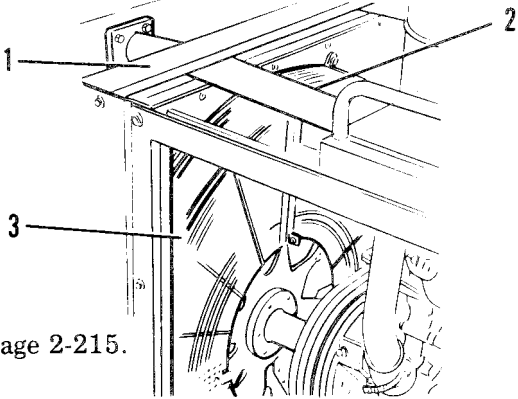
Fan guards removal/installation, page 2-249

General Safety Instructions

Use hoist to lift assembly.
Work only on cool engine.
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
<p>1. Rear hood</p> <p>2. Cooling system</p> <p>3. Channel assembly (1)</p> <p>4. Tube assemblies (2)</p> <p>5. Fan guards (3)</p>	<p>Remove.</p> <p>Drain coolant from cooling system to below level of tube assemblies. (See page 2-215.)</p> <p>a. Mark channel position.</p> <p>b. Remove.</p> <p>Remove from radiator top tank.</p> <p>Remove.</p> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;">CAUTION</div> <p style="text-align: center;">Guard will drop when last bolt is removed.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Mark guards right/left, upper/lower.</p>	<p>See page 2-454.</p>  <p>Weight of fan assembly is 95 lbs.</p>
<p>6. Fan belts (7)</p> <p>7. Hoist</p> <p>8. Nuts and bolts (5)</p> <p>9. Fan assembly</p>	<p>Remove.</p> <p>Fasten to fan assembly (4).</p> <p>Remove from adapter (6).</p> <p>a. Remove.</p> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;">CAUTION</div> <p style="text-align: center;">Don't let fan hit radiator.</p> <p>b. Discard O-ring seal on fan drive bearing.</p>	 <p style="text-align: right; font-size: small;">TA 098673</p> <p style="text-align: right;">Go on to Sheet 3</p>

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. New o-ring seal	Install on fan drive bearing.	
2. Hoist	a. Fasten to fan drive assembly. b. Position fan assembly (4).	
3. Nuts and capscrews (5)	a. Install to hold fan assembly (4) and adapter (6) in position. b. Lubricate assembly.	
4. Fan belts (7)	Install.	<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Do not let fan assembly (4) touch hydraulic oil cook core assembly. Contact can cause damage.</p>
5. Fan guards (3)	Install.	
6. Tube assemblies (2)	Install to radiator tank top. Use new gaskets.	
7. Channel assembly (1)	Install.	
8. Cooling system	Fill with coolant to correct level.	
9. Rear hood	Install.	<p>See page 2-215.</p> <p>See page 2-454.</p>

FAN DRIVE MECHANISM REMOVAL/INSTALLATION

This task covers: Replacement of fan drive mechanism.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Preformed packing

Troubleshooting Reference

Page 2-41

Equipment Condition

Rear hood removed.
Fan assembly removed.
Fan guards removed.

Special Tools

Hoist

Personnel Required

One mechanic

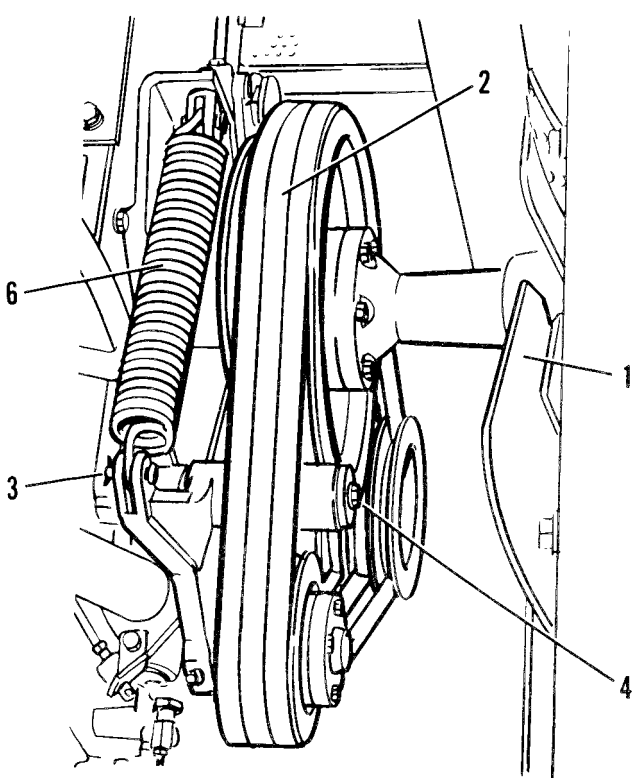
References

Hood removal, page 2-454.
Fan guards removal/installation, page 2-249.
Fan assembly removal/installation, page 2-233.
Fan belt tightener removal/installation, page 2-231.

General Safety Instructions

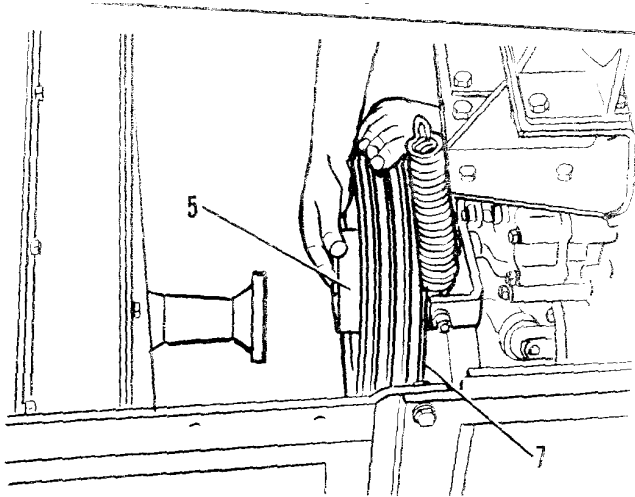
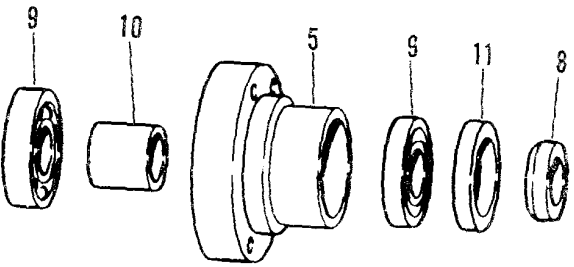
Main disconnect switch OFF.

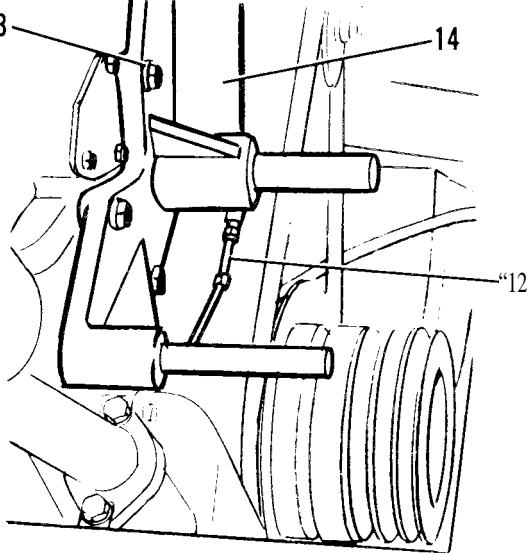
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div> <ol style="list-style-type: none"> 1. Channel assembly. 2. Fan guards 3. Hoist 4. Fan drive capscrews (4) 5. Fan assembly 6. Three belts (2) 7. Spring (6) 8. Belt tightener cotter pin (3) 	<div style="border: 2px dashed black; padding: 5px; width: fit-content; margin: 0 auto; text-align: center;">CAUTION</div> <p>In course of disassembly fan assembly will be rested against hydraulic oil cooler core. Place carefully so as not to damage core.</p> <ol style="list-style-type: none"> a. Mark channel position. b. Remove from above fan assembly. <p>Remove.</p> <p>Fasten to fan assembly (1).</p> <p>Remove.</p> <p>Remove.</p> <p>Remove from fan drive.</p> <p>Disconnect.</p> <p>Remove.</p>	<p>Fan assembly weight is 95 lbs. (43 kg)</p>  <p style="text-align: right;">TA 098675</p> <p style="text-align: right;">Go on to Sheet 3</p>

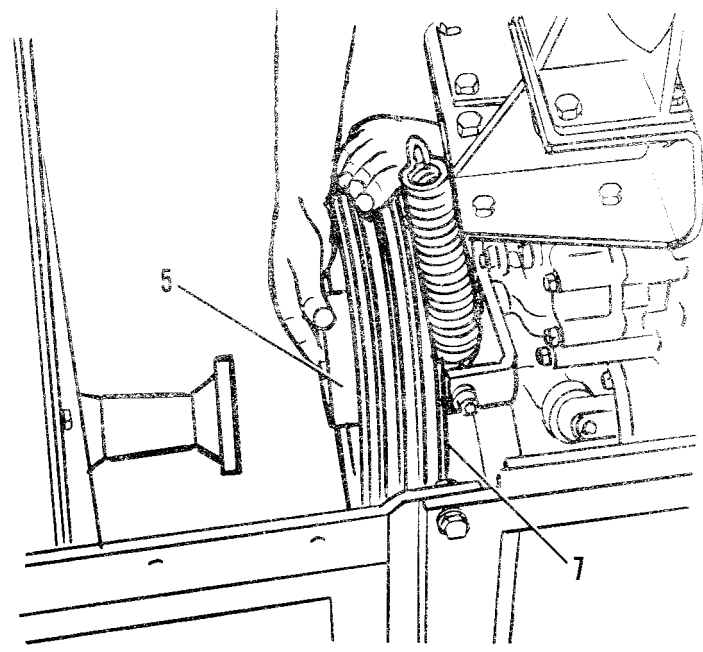
FAN DRIVE MECHANISM REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 6)

LOCATION/ITEM	ACTION	REMARKS
9. Hub assembly retainer and two cap-screws (5)	Remove	
10. Hub assembly (5)	Remove, holding pulley (7) in position.	
<p style="text-align: center;">NOTE</p> <p>Use gear puller if required (caution must be taken not to damage shaft if puller is used).</p>		
11. Pulley (7)	Remove.	
12. Spacer (8)	Remove from fan drive bracket.	
13. Preformed packings, bearings (9), spacer (10) and seal (11)	Remove from hub (5).	
14. Belt tightener	Remove.	<p>See page 2-231.</p> <p style="text-align: right;">TA 098898 Go on to Sheet 4</p>

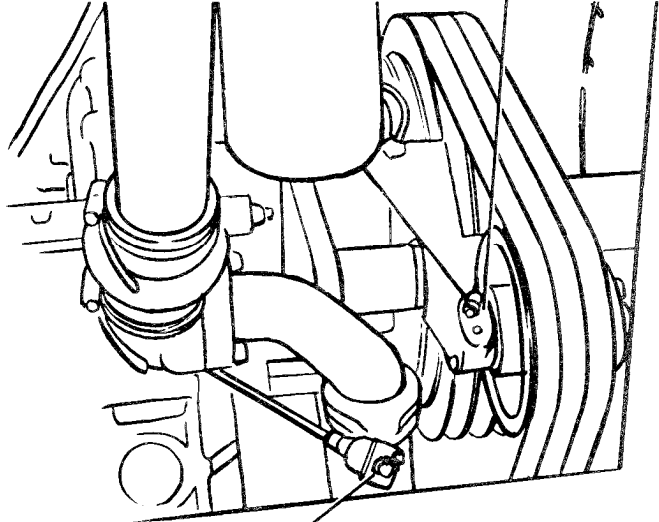
LOCATION/ITEM	ACTION	REMARKS
15. Fan drive bracket grease line (12)	a. Remove clip. b. Disconnect grease line.	 <p>The diagram shows a mechanical assembly with three callouts: 13 points to a bolt on the left side of a bracket; 14 points to the bracket itself; and 12 points to a grease line connected to the bottom of the bracket.</p>
16. Fan drive bracket bolts (13)	Remove.	
17. Fan drive bracket (14)	Remove.	
INSTALLATION	Install.	
1. Fan drive bracket (14) and bracket bolts (13)	Install.	See page 2-231.
2. Grease line (12)	a. Connect grease line, b. Attach clip.	
3. Fan belt tightener	Install.	

FAN DRIVE MECHANISM REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Seal (11)	Install in hub, lip toward the outside.	
5. Small bearing (9)	Install in hub.	
6. Spacer (10)	Install on fan drive bracket with chamfer toward radiator.	
7. Pulley (7)	Install on fan drive bracket.	
8. Inner bearing (9) and hub (5)	Install, holding pulley in position.	
9. Spacer (10), outer bearing (9) and preformed packings	Install.	
10. Hub assembly retainer and two cap-screws (5)	Install using loctite.	
11. Belt tightener spring (6)	Install, using pin and cotter pin.	
12. Three belts (2)	Install on fan drive pulley.	
13. Fan assembly (1)	Hoist into position and install.	
14. Three capscrews	Install.	

TA 098678

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
15. Fan guards	Install.	See page 2-249.
16. Channel assembly	Install and observe marking.	
17. Fan drive mechaism	Grease.	See LO 10-3930-641-12.
18. Fan belt tightener	Grease.	See LO 10-3930-641-12.
19. Rear hood	Install.	<p>See page 2-454.</p>  <p>LUBE FAN DRIVE</p> <p>LUBE BELT TIGHTENER</p>

TA 098899

End

RADIATOR REAR GUARD REMOVAL, REPAIR AND INSTALLATION

(Sheet 1 of 2)

This task covers: Removal, repair and installation of the radiator rear guard

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF.

Special Tools

None

Personnel Required

One mechanic

References

TM 9-450

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

RADIATOR REAR GUARD REMOVAL, REPAIR AND INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Capscrew (4), washer (5), spacer (6), and nut (2)</p> <p>2. Rear guard section (3), (1)</p>	<p>Remove.</p> <p>Remove.</p>	
<p style="text-align: center;">REPAIR</p> <p>1. Rear guard section (3), (1)</p>	<p>Straighten bent louvers or frame. Reweld any broken welds.</p>	
<p style="text-align: center;">INSTALLATION</p> <p>1. Rear guard section (3), (1)</p> <p>2. Capscrew (4), washer (5), spacer (6), and nut (2)</p>	<p>Position.</p> <p>Install.</p>	

TA 098679

End

COOLANT FILTER BASE ASSEMBLY REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of coolant filter base assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Coolant filter

Troubleshooting Reference

None

Equipment Condition

Engine OFF and cooled.
 Right access panel open.
 Drain coolant below level of lowest hose opening.

Special Tools

None

Personnel Required

One mechanic

References

Drain coolant. See page 2-216.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

COOLANT FILTER BASE ASSEMBLY REMOVAL/INSTALLATION (CONT)

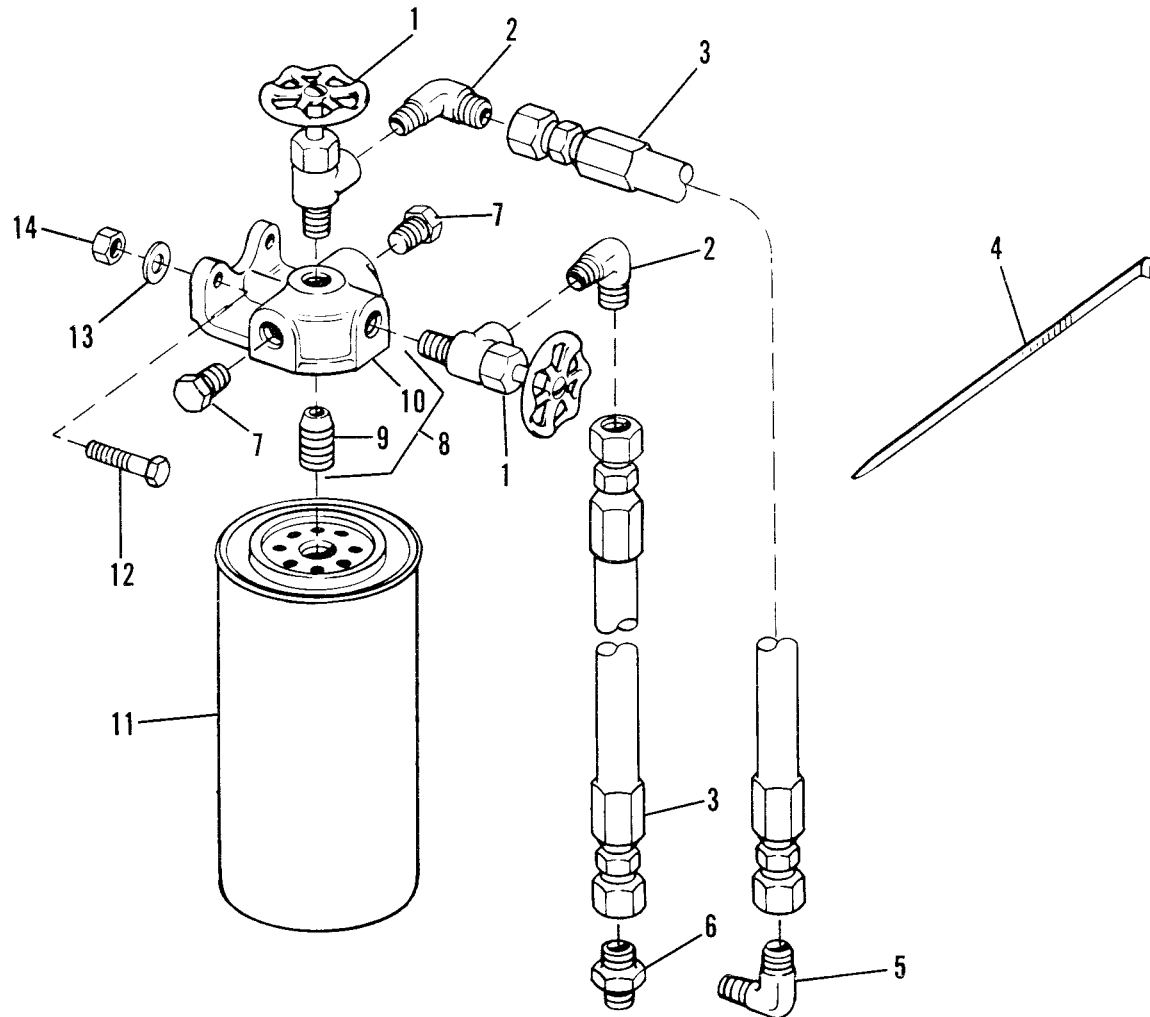
(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Coolant filter canister (11)	Remove by unscrewing counterclockwise with strap wrench.	
2. Inlet (3), outlet (3)	a. Disconnect lines at fittings (2). b. Tag for identification. c. Cap lines.	
3. Two capscrews (12), washers (13) and nuts (14)	Remove from bracket.	
INSTALLATION		
1. Two capscrews (12), washers and nuts (14)	Install in bracket.	
2. Inlet (3), outlet (3)	Connect lines at fittings (2).	
3. Coolant filter canister (11)	Install. a. Wet gasket with coolant. b. Screw canister clockwise onto base. Tighten with strap wrench.	
4. Coolant level	Check and fill as required.	See page 2-216.

Go on to Sheet 3

COOLANT FILTER BASE ASSEMBLY REMOVAL/INSTALLATION (CONT)

- 1. Valve assembly
- 2. Elbow
- 3. Hose assembly
- 4. Strap
- 5. Elbow
- 6. Connector
- 7. Pipe plug- 8. Base assembly
- 9. Stud
- 10. Base
- 11. Precharge element
- 12. Capscrew
- 13. Washer
- 14. Nut



HOSES, LINES AND FITTINGS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of hoses, lines and fittings.

INITIAL SETUPTest Equipment

None

Materials/PartsGasket
HoseTroubleshooting Reference

None

Equipment Condition

Engine OFF and cooled.

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

HOSES, LINES AND FITTINGS REPLACEMENT (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
1. Cooling system	Drain.	See page 2-216.
2. Hose, line or fitting.	Replace as required.	See page 1-12 and TM 10-3930-641-20P for parts location and identification.
3. Hose, line or fitting gasket	If gasket is on unit, always replace.	Old gasket is deformed and will not form satisfactory seal.
4. Cooling system	Fill cooling system with coolant.	See page 2-216.

End

FAN GUARDS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/instalation of the fan guards.

INITIAL SETUP

Test, Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF.

Rear hood removed.

Left, and right access panel removed.

Special Tools

None

Personnel Required

One mechanic

References

Hood removal/installation, page 2-454.

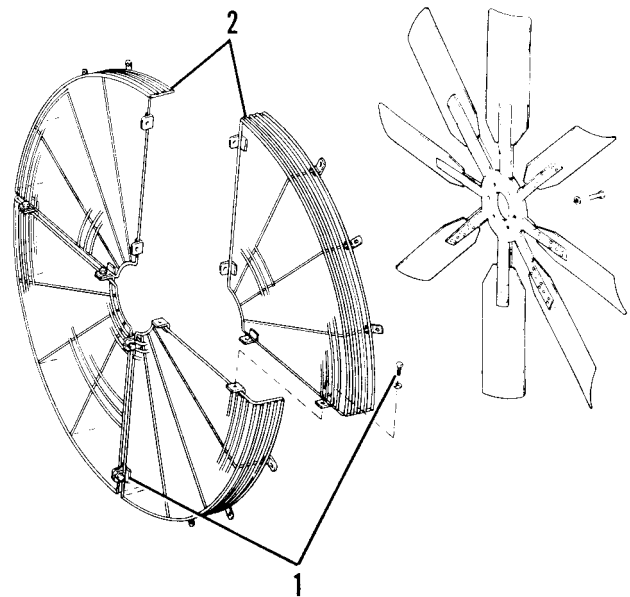
General Safety Instructicms

Main disconnect switch OFF.

Go on to Sheet 2

FAN GUARDS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Capwscrews (1) <li>2. Fan guards (2) 	<p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Fan guards (2) <li>2. CapScrews (1) 	<p>Place in position.</p> <p>Install.</p>	

ENGINE ELECTRICAL COMPONENTS MAINTENANCE

This section covers removal and installation of the following engine electrical components:

- a. Alternator
- b. Starting motor
- c. Starting solenoid
- d. Engine oil pressure sending unit
- e. Engine water temperature sending unit

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Alternator removal/installation.	2-252	2-102
2	Alternator testing/adjusting.	2-255	2-85
3	Starting motor removal/installation.	2-258	2-79
4	Starting solenoid removal/installation/ adjustment.	2-261	2-79
5	Engine oil pressure sending unit removal/ installation.	2-264	2-140
6	Engine water temperature sending unit removal/installation.	2-266	2-140

End

ALTERNATOR REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of alternator.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-102

Equipment Condition

Right rear lower side access cover removed.

Special Tools

None

Personnel Required

One mechanic

References

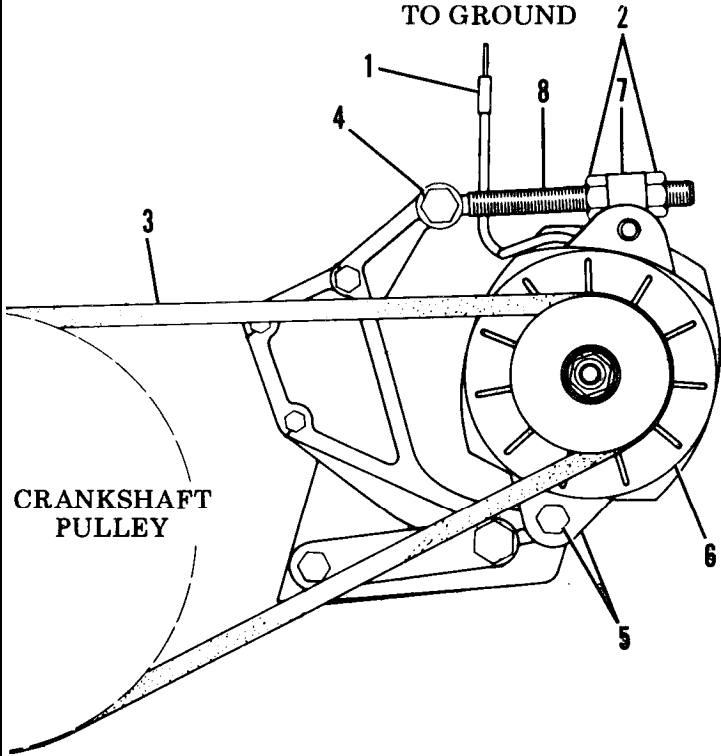
Torque Limits Chart, Page E-1.

General Safety Instructions

Turn main disconnect switch to OFF to avoid shocks.

Go on to Sheet 2

ALTERNATOR REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Wires (1) <li>2. Nuts (2) <li>3. Belt (3) <li>4. Capscrew (4) <li>5. CapScrews (5) <li>6. Alternator (6) 	<p>Mark three wires for location and disconnect. (Only ground wire is shown at right.)</p> <p>Loosen.</p> <p>Remove.</p> <p>Loosen.</p> <div style="border: 2px dashed black; padding: 5px; text-align: center; margin: 10px auto; width: fit-content;"> CAUTION </div> <p>Hold alternator to keep it from falling.</p> <p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Alternator <li>2. Capscrews (5) 	<p>Position on mounting bracket.</p> <p>Install. Tighten finger tight.</p>	

ALTERNATOR REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
3. Capscrew (4)	Install and tighten to 49-63 lb. ft. (66-85 N•m).	
4. Belt (3)	a. Install. b. Adjust by moving nuts (2) and block (7) along alternator adjustment rod (8).	Belt should deflect no more than 9/16 to 13/16 when 25 lbs. of pressure is applied midway along top of belt.
5. Capscrews (5)	Tighten to 21-27 lb. ft. (28-37 N•m).	
6. Nuts (2)	Tighten to 105-115 lb. ft. (142-156 N•m).	
7. Wires (1)	Connect. Be sure to attach in locations marked in Item 1.	Tighten output terminal to 9-11 lb. ft. (12-15 N.m).

End

ALTERNATOR TESTING/ADJUSTMENT

This task covers: Alternator voltage adjustment and operation tests.

INITIAL SETUP

Test Equipment

Multimeter

Materials/Parts

None

Troubleshooting Reference

Page 2-85

Equipment Condition

Lower right engine access cover removed.
Upper right rear engine access cover open.

Special Tools

Torque wrench

Personnel Required

One mechanic

References

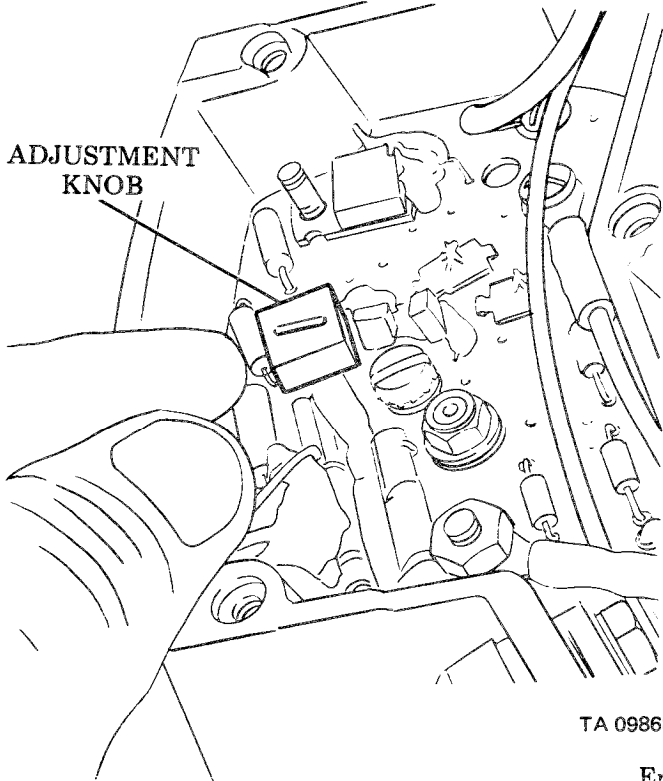
Battery testing, page 2-269.
Battery cable removal, repair and installation,
page 2-279.
Operator's cab instrument checks,
TM 10-3930-641-10.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

ALTERNATOR TESTING/ADJUSTMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
2. Alternator wires	a. Turn main disconnect to ON. b. Connect multimeter positive lead to terminal marked + where orange wires connect. Check voltage output to ground. c. Connect multimeter positive lead to terminal R where light blue wire connects.	b. Voltage should be 26-30 volts (28 V ideal). c. Voltage should be 12 volts.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ADJUSTMENT</div>	1. Access plate 2. Adjustment knob Remove. If alternator changes too much or too little, turn adjustment knob with screwdriver.	 <p style="text-align: right;">TA 098684</p>

End

STARTING MOTOR REMOVAL/INSTALLATION

This task covers: Removal and installation of starting motor.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Starting motor

Troubleshooting Reference

Pages 2-39, 2-79

Equipment Condition

Front hood and right side access cover removed.

Special Tools

Hoist

Personnel Required

One mechanic

References

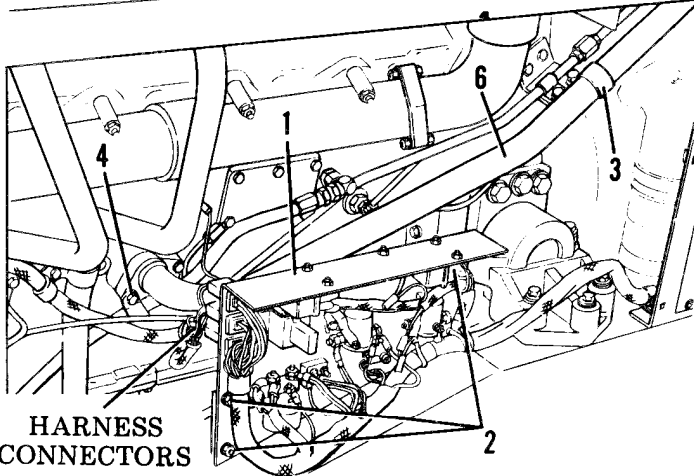
Torque Limits Chart, page E-1.

Hood removal/installation, page 2-454.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>		
1. Panel (1)	a. Tag and disconnect three wiring harnesses from back side of panel. b. Remove four screws, lockwashers, and nuts (2) which hold panel (1) to frame. c. Move panel (1) aside.	 <p style="text-align: center;">HARNESS CONNECTORS</p>
2. Capscrew, washer, and nut.	Remove from clip (3)	
3. Capscrew	Remove capscrew and upper clamp from oil filler tube (6).	
4. Capscrews (4)	Remove.	
5. Oil filler tube (6) and gasket	Loosen three capscrews (9).	
6. Motor and solenoid wires (7), (8)	Mark for location and disconnect.	
	<div style="border: 2px dashed black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Weight of starting motor is 75 lb. (34 kg). Be prepared to hold motor when capscrews are removed.</p>	
7. Capscrews (9)	Loosen three capscrews (9).	
8. Motor	Attach lifting sling.	

TA 098685

Go on to Sheet 3

STARTING MOTOR REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
9. Capscrews (9)	Remove. Remove top capscrew last.	
10. Starting motor	Lift out of vehicle.	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. Starting motor	Position motor at flywheel housing.	
2. Capscrews (9)	Install and tighten three capscrews. Start top capscrew first.	See Torque Limits Chart, page E-1.
3. Motor and solenoid wires (7), (8)	Connect. Be sure to reconnect them in the positions marked before they were disconnected.	Tighten terminal nuts to 16-30 lb. in. (2-3.5 N•m).
4. Oil filler tube (6) and gasket	Position at side of engine.	
5. Capscrews (4)	Install and tighten two screws.	See Torque Limits Chart, page E-1.
6. Capscrew and upper clamp	Install.	See Torque Limits Chart, page E-1.
7. Capscrew, washer, and nut	Install in clip (3).	
8. Panel (1)	<p>a. Position on frame.</p> <p>b. Install four capscrews, washers and nuts (2) holding panel to frame.</p> <p>c. Connect wiring harnesses to back.</p>	<p>Black - Top</p> <p>Red - Center</p> <p>Dark Blue - Lower</p>

End

STARTING SOLENOID REMOVAL/INSTALLATION/ADJUSTMENT

(Sheet 1 of 3)

This task covers: Removal, installation, and adjustment of starting solenoid.

INITIAL SETUP

Test Equipment

None.

Materials/Parts

None

Troubleshooting Reference

Page 2-79

Equipment condition

Engine shut down.
Right lower access cover removed.

Special Tools

None

Personnel Required

One mechanic

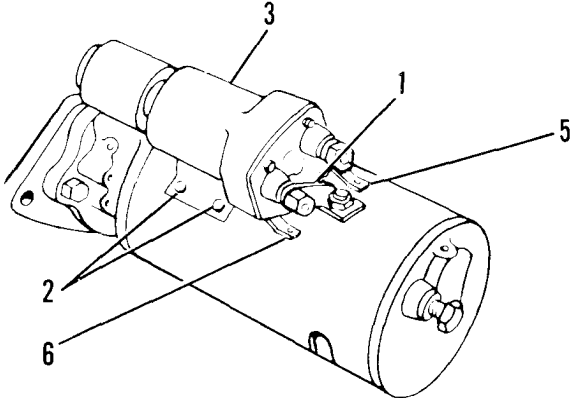
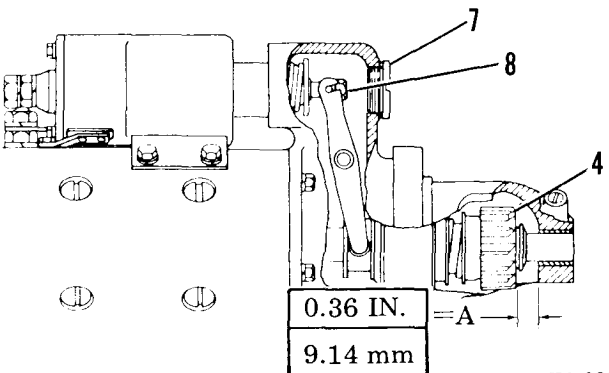
References

Torque Limits Chart, page E-1.

General Safety Instructions

Turn main disconnect switch to OFF to prevent shocks.

Go onto Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">REMOVAL</div> <ol style="list-style-type: none"> 1. Solenoid wires 2. Connector (1) 3. Capscrews (2) 4. Solenoid (3) 	<p>Mark for location and disconnect.</p> <p>Remove two nuts and remove connector.</p> <p>Remove four capscrews which hold solenoid to starting motor.</p> <p>Remove.</p>	 <p>A perspective view of a solenoid assembly. Callout 1 points to a connector on the top. Callout 2 points to two nuts on the side. Callout 3 points to the solenoid body. Callout 4 points to the mounting bracket. Callout 5 points to a terminal on the side. Callout 6 points to another terminal on the side.</p>
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Solenoid (3) 2. Capscrews (2) 3. Pinion (4) 	<p>Position on starting motor.</p> <p>Install and tighten four capscrews.</p> <p>Adjust clearance.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do not install connector (1).</p> <ol style="list-style-type: none"> a. Connect a battery positive lead to terminal (5), marked SW. b. Connect a ground to terminal (6). 	<p>See TORQUE LIMITS CHART, page E-1.</p>  <p>A side view diagram of the solenoid assembly showing the internal pinion mechanism. Callout 4 points to the pinion gear. Callout 7 points to a nut on the pinion shaft. Callout 8 points to the pinion shaft. A dimension line labeled 'A' indicates the distance from the center of the pinion to the end of the shaft. Below the dimension line, a box contains the values '0.36 IN.' and '9.14 mm'.</p>

TA 098686

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
3. Pinion(4)(Cont)	<ul style="list-style-type: none"> c. Connect a wire from solenoid terminal marked MOTOR to ground terminal (6). d. Push pinion toward starting motor to eliminate free movement. e. Remove plug (7) and turn nut (8) to adjust pinion clearance. f. Install plug. g. Release pinion. h. Disconnect battery and test wires. 	<p>Pinion (4) will move to crank position and stay there until battery is disconnected.</p> <p>Pinion clearance (Dimension A) should be 0.36 in. (9.14 mm).</p>
4. Connector(1)	<p>Install with two nuts.</p>	
5. Solenoid wires	<p>Connect. Be sure to reconnect them in the positions marked before they were disconnected.</p>	

End

ENGINE OIL PRESSURE SENDING UNIT REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of engine oil pressure sending unit.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Engine oil pressure sending limit.
Thread sealant, item 10, Appendix C.

Troubleshooting Reference

Page 2-140

Equipment Condition

Engine OFF.

Special Tools

None

Personnel Required

One mechanic

References

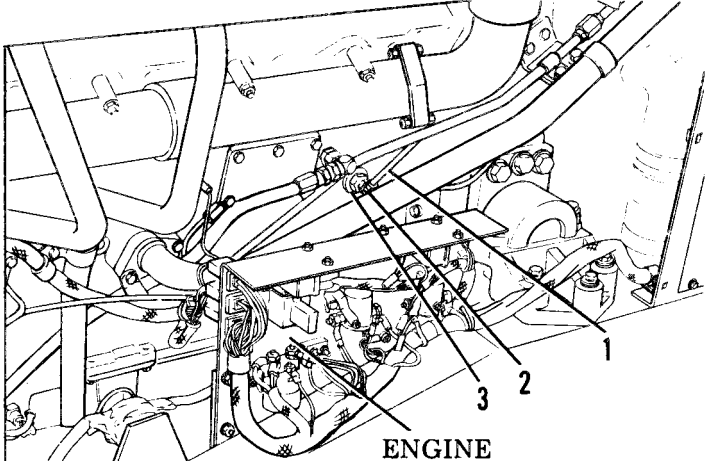
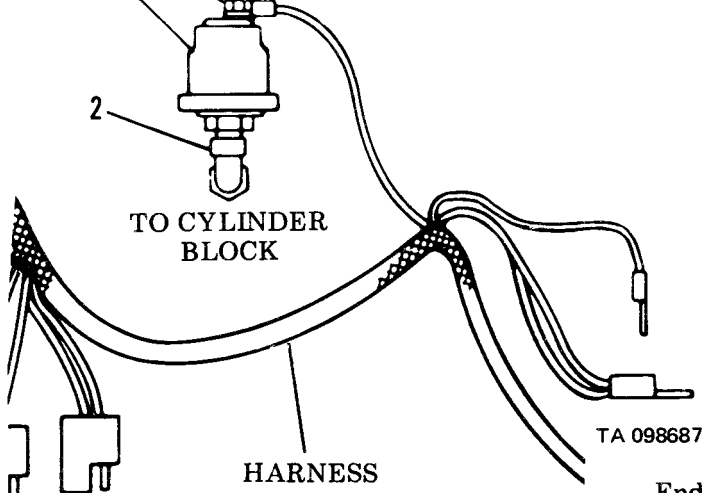
Operator's cab instrument checks,
TM 10-3930-641-10.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

ENGINE OIL PRESSURE SENDING UNIT REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Sending unit (3) 2. Terminal (1) 3. Sending unit (3) 4. Elbow fitting (2) 	<p>Locate. Behind engine relay panel and directly above engine oil filler tube.</p> <p>Disconnect.</p> <p>Remove and discard.</p> <p>Remove from sending unit.</p>	 <p style="text-align: center;">ENGINE RELAY PANEL</p>
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Elbow fitting (2) 2. Sending unit (3) 3. Terminal (1) 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Use thread sealant on threads.</p> <p>Install on engine. Open end up.</p> <p>Install on elbow fitting.</p> <p>Install.</p>	 <p style="text-align: center;">TO CYLINDER BLOCK</p> <p style="text-align: center;">HARNESS</p> <p style="text-align: right;">TA 098687</p>

End

ENGINE WATER TEMPERATURE SENDING UNIT REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of engine water temperature sending unit.

INITIAL SETUP

Test Equipment

None

Materials/Parts

One engine water temperature sending unit.

Troubleshooting Reference

Page 2-140

Equipment Condition

Radiator drained to below level of sending unit.

Left rear access panel open.

Special Tools

None

Personnel Required

One mechanic

References

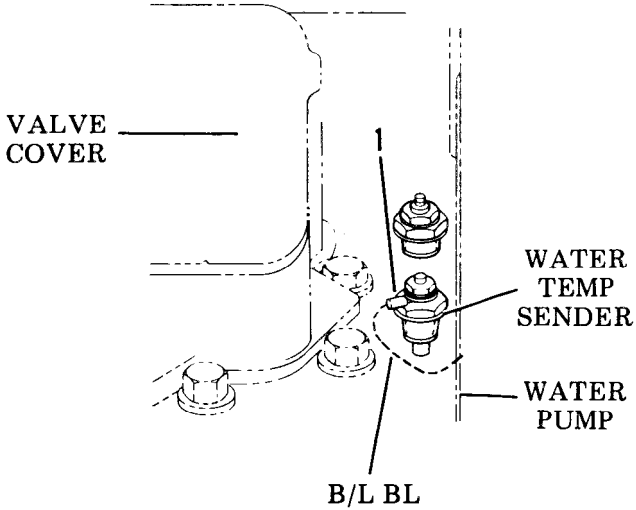
Coolant replacement, page 2-215.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

ENGINE WATER. TEMPERATURE SENDING UNIT REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Sending unit. 2. Terminals (1) 3. Water temperature sending unit 	<p>Locate on left cylinder head.</p> <p>Disconnect.</p> <p>Remove.</p> <p style="text-align: center;">NOTE</p> <p>Radiator must be drained below center line of fan.</p>	 <p>The diagram shows a cross-section of the engine block. A valve cover is on the left. A water pump is on the right. A water temperature sender is mounted on the engine block. A label 'B/L BL' points to the sender. The sender is connected to a terminal. The diagram is labeled with 'VALVE COVER', 'WATER TEMP SENDER', 'WATER PUMP', and 'B/L BL'.</p>
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Water temperature sending unit 2. Sending unit 3. Terminals (1) 	<p>Position.</p> <p>Install in engine block.</p> <p>Connect.</p>	<p style="text-align: right;">TA 098688</p> <p style="text-align: right;">End</p>

BATTERY MAINTENANCE INSTRUCTIONS

This section includes procedures for maintaining the battery and battery cables:

- a. Testing
- b. Service
- c. Battery removal and installation
- d. Battery cable removal, repair and installation

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Battery testing.	2-269	2-80
2	Battery service.	2-272	2-80
3	Battery removal/installation.	2-277	2-80
4	Battery cable removal, repair and installation.	2-279	2-80

End

BATTERY TESTING

(Sheet 1 of 3)

This task covers: a. Testing specific gravity of battery with Battery/Coolant Tester.
 b. Testing battery charge with multimeter.

INITIAL SETUP

Test Equipment

Battery/Coolant Tester
 Multimeter

Materials/Parts

None

Troubleshooting Reference

Page 2-80

Equipment Condition

Engine OFF.

Special Tools

None

Personnel Required

One mechanic

References

Battery removal/installation, page 2-277.
 TM 9-6140-200-14

General Safety Instructions

Be careful not to splash electrolyte on you or equipment. Do not smoke or have open flame or sparks near battery. Wear safety goggles and gloves.

Main disconnect switch OFF.

Go on to Sheet 2

BATTERY SERVICE

This task covers: Cleaning, checking, filling battery.

INITIAL SETUP

Test Equipment

Battery/Coolant tester
6630-00-105-1418

Materials/Parts

Distilled water, item 15, Appendix C
Baking soda, item 19, Appendix C
Coating compound 8030-00-145-0151 or
equivalent, item 10, Appendix C
GAA grease, item 4, Appendix C

Troubleshooting Reference

Page 2-80

Equipment Condition

Engine OFF

Special Tools

Terminal clamp puller
Terminal cleaning tool

Personnel Required

One mechanic

References

TM 9-6140-200-14

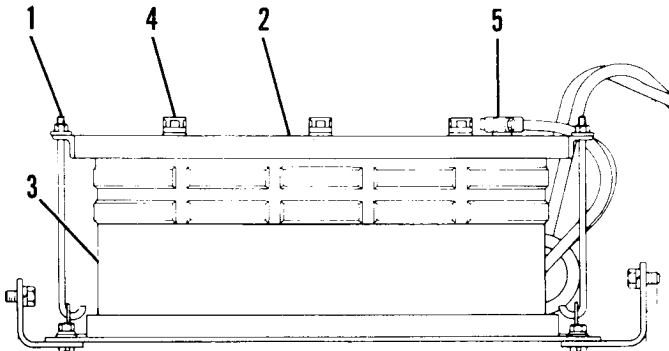
General Safety Instructions

Be careful not to splash electrolyte on you or equipment.
Do not smoke or have open flame or sparks near battery.
Wear safety goggles and gloves when servicing battery.
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Battery box cover</p>	<div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p>Do not splash electrolyte on you or equipment. Injury or damage will result. If you spill electrolyte, flood affected area with water to flush electrolyte. Get immediate medical attention.</p> <p>Do not smoke or have sparks or open flame near batteries. Battery gases could explode, causing severe injury.</p> <p>Open.</p>	
<p>2. Battery terminals</p>	<div style="text-align: center; border: 2px dashed black; padding: 2px; width: fit-content; margin: 0 auto;"> <p>CAUTION</p> </div> <p>Use small, open end wrenches to loosen terminal nuts. Large crescent wrenches may slip and damage battery or nuts.</p> <p>Do not pry off terminals or twist to remove. Terminal or posts may be damaged. Use clamp puller.</p> <ol style="list-style-type: none"> a. Loosen terminal nuts. b. Use clamp puller to remove terminals. c. Use terminal cleaning tool to clean terminals and posts. 	<p style="text-align: center;">NOTE</p> <p>Remove negative terminal first.</p>

Go onto Sheet 3

LOCATION/ITEM	ACTION	REMARKS
3. Battery holddown (2)	<ul style="list-style-type: none"> a. Remove nuts (1). b. Remove holddown (2). c. Clean well with wire brush. d. Soak in tub of water mixed with 1/2 pound soda to each gallon of water. e. Rinse with clean water and dry. f. Paint with coating compound. 	
4. Battery (3)	<ul style="list-style-type: none"> a. Check to be sure fill plugs (4) are tight. b. Remove battery from box to clean. See page 2-277. c. Use soda/water solution to clean top of battery and battery box. d. Rinse well and dry. e. Install battery. 	
5. Fill plugs (4)	<ul style="list-style-type: none"> a. Remove and check water level. b. Test battery specific gravity. <div style="border: 1px solid black; padding: 2px; text-align: center; margin: 10px 0;">WARNING</div> <p>Add distilled water only. Do not add electrolyte, except in a battery shop.</p> <ul style="list-style-type: none"> c. Add distilled water to level of ring if necessary. d. Install fill plugs. 	<p>See BATTERY TESTS, page 2-269.</p>

LOCATION/ITEM	ACTION	REMARKS
6. Cables	Check for damage. Replace if necessary.	See battery cable removal and installation, page 2-279.
7. Battery holddown (2)	a. Position on battery top. <div style="text-align: center;">CAUTION</div> Do not overtighten nuts (1). Battery case may crack. b. Install and tighten nuts (1).	
8. Battery terminals (5)	<div style="text-align: center;">CAUTION</div> Be sure polarity (+ and -) connection is correct. Alternator may be damaged if terminals are reversed. Do not use hammer to install terminals. a. Install terminals (5). b. Using small, open end wrenches, tighten terminal nuts. <div style="text-align: center;">CAUTION</div> Do not pull hard on terminals or twist with pliers.	<div style="text-align: center;">NOTE</div> Install negative terminal last.

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
8. Battery terminals (cont)	c. Check cable connections: Grip cable at terminal. Twist gently. Lift up. Push down. If terminal moves, tighten nut. d. Cover terminals with light coat of GAA grease, 1/32 to 1/8 in. (1 to 3 mm) thick. Wipe off extra grease.	
9. Battery box cover	Close.	

BATTERY REMCIVAIWW3TALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of battery.

INITIAL SETUP

Test Equipment

None

Materials/Parts

GAA grease
 Baking soda, item 19, Appendix C
 Coating compound, item 10, Appendix C

Troubleshooting Reference

Page 2-80

Equipment Condition

Engine OFF.

Special Tools

Terminal clamp puller

Personnel Required

One mechanic

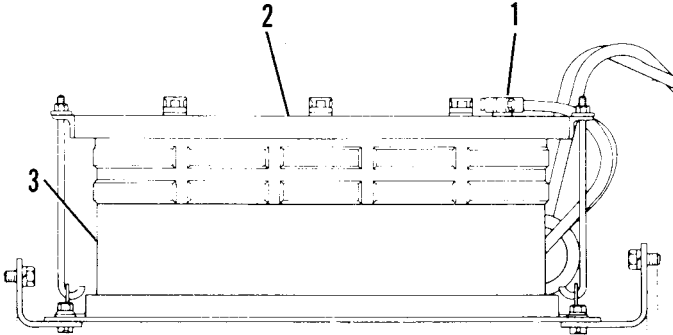
References

TM 9-6140-200-14

General Safety Instructions

Do not splash electrolyte on you or equipment. If electrolyte spills on you, flood affected area with water to flush electrolyte. Get medical attention at once. Do not smoke or have open flame or sparks near battery. Sparks can cause battery gases to explode. Main disconnect switch OFF.

Go onto Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Battery box cover 2. Battery terminals (1) 3. Battery holddown (2) 	<p style="text-align: center;">NOTE</p> <p>See TM 9-6140-200-14 for instructions on when to replace battery.</p> <p>Open.</p> <p>Remove.</p> <p>Remove.</p>	<p>See battery service, page 2-272.</p> <p>See battery service, page 2-272.</p>
<ol style="list-style-type: none"> 4. Battery (3) <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Battery (3) 2. Battery holddown (2) 3. Battery terminals (1) 4. Battery box cover. 	<div style="text-align: center; border: 2px dashed black; padding: 5px; margin-bottom: 10px;">CAUTION</div> <p>Lift battery carefully. Do not hit side of battery box. Case could crack.</p> <p>Remove and send to Direct Support Maintenance for repair.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Close.</p>	 <p>See battery service, page 2-272.</p> <p>See battery service, page 2-272.</p>

BATTERY CABLE REMOVAL, REPAIR, AND INSTALLATION

(Sheet 1 of 5)

This task covers: Removal, repair, and installation of battery cables/terminals.

INITIAL SETUP

Test Equipment

None

Materials/Parts

GAA grease

Troubleshooting Reference

Page 2-80

Equipment Condition

Battery box cover open

Special Tools

Terminal clamp puller
Crimping tool
Terminal cleaning tool

Personnel Required

One mechanic

References

None

General Safety Instructions

Remove negative battery terminals first, and install them last to prevent completed battery circuits. Do not put tools on battery top. You may damage battery or short across posts and get shocks.
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">REMOVAL</div>	<p>Use exact size wrenches to loosen terminal nuts. Large crescent wrenches may slip and damage battery or nuts.</p> <p>Do not pry terminals off posts. Use clamp puller so that posts are not damaged.</p>	

TA 098691

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>1. Battery terminals (1, 2,3,4)</p> <p>2. Terminals (9, 10,11,12, 13)</p>	<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Remove negative terminals first.</p> <p>a. Loosen battery terminal clamp nuts (5).</p> <p>b. Use terminal clamp puller to remove clamps from posts.</p> <p>c. If you are replacing battery terminals only, pull or cut them from cables. Clean cable ends, and reinstall.</p> <p>d. If you are replacing terminals and cables, pull or cut battery terminals from cables (7, 8), and go on to step 2.</p> <p>a. Remove nuts which hold terminals to studs.</p> <p>b. Remove terminals from studs.</p> <p>c. If you are replacing only terminals, pull or cut lug terminals from cables, and reinstall.</p> <p>d. If you are replacing cables, pull or cut terminals from cables, and go on to step 3.</p>	<p>When terminals (2, 3) are removed, cable (6) may be removed from vehicle.</p> <p>Cable (14) may be removed from vehicle when terminals (10, 11, 13) are removed.</p>

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS	
<p>3. Cables (6, 7,8, 14)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">REPAIR/INSTALLATION</div>	<p>a. Slide cables (7, 8) through grommet (18). b. Remove cables (7, 8) from clips (15, 16, 17). c. Remove from vehicle</p>		
<p>1. Cables (6, 7,8, 14)</p>	<p>a. Cut new cables. b. Slide cables (7, 8) through grommet (18). c. Install cables (7, 8) into clips (15, 16, 17).</p>	<p>Cable Number</p> <p style="text-align: center;">6 7 8 14</p>	<p>Length</p> <p style="text-align: center;">7.25 in. (18.4 cm) 58 in. (147 cm) 74 in. (188 cm) 15 in. (38 cm)</p>
<p>2. Terminals (9, 10, 11, 12, 13)</p>	<p>Install on cables, and crimp tight.</p>		
<p>3. Battery terminals (1, 2,3,4)</p>	<p>a. Install on cables, and crimp tight.</p> <div style="border: 2px dashed black; padding: 5px; text-align: center; margin: 10px auto;">CAUTION</div> <p>Be sure polarity (+ and -) connection is correct. Alemator may be damaged if terminals axe reversed.</p> <p>Do not hammer terminals onto posts. Posts and terminals will be damaged.</p>		

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
3. Battery terminals 1,2,3,4)(cont)	<p>b. Use temimd cleaning tool to clean posts, and install battery terminals to posts.</p> <p>c. Tighten terminal clamps with clamp nuts (5).</p> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;"> <p>CAUTION</p> </div> <p>Do not pull hard on terminals or twist with pliers. Posts and terminals will be damaged.</p> <p>d. Check terminal connections by gently lifting and twisting. If terminals move, tighten nuts (5).</p> <p>e. Cover terminals with light coat of GAA grease - 1/32 to 1/8 in. (1-3 mm).</p>	

End

VEHICLE LIGHTING SYSTEMS MAINTENANCE INSTRUCTIONS

This section includes procedures for replacing and repairing vehicle lights:

- a. All headlight sealed unit
- b. Headlight/front flood
- c. Backup light
- d. Stop and tail lamp
- e. ROPS (auxiliary) flood lights

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Headlight and backup light sealed lamp units removal/installation.	2-285	2-126
2	Headlight body removal/installation.	2-287	2-126
3	Cab dome light bulb removal/installation.	2-289	2-126
4	Combination stop and tail lamp removal/installation.	2-291	2-126, 2-135
5	Combination stop and tail lamp bulb replacement.	2-293	2-126
6	ROPS (auxiliary) lights removal/installation	2-295	2-126

End

HEAD LIGHT AND BACKUP LIGHT SEALED LAMP UNITS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacing the sealed unit of the head light assembly and backup light.

INITIAL SETUPTest Equipment

None

Materials/Parts

Head light sealed unit

Troubleshooting Reference

Page 2-126

Equipment Condition

Engine shut down

Special Tools

None

Personnel Required

One mechanic

References

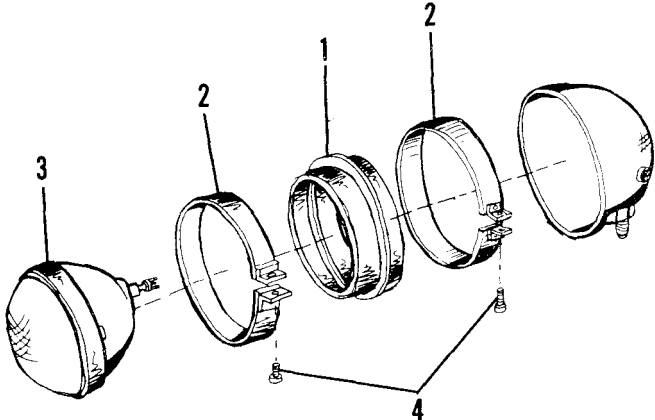
Head light body removal/installation, page 2-287

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

HEAD LIGHT AND BACKUP LIGHT SEALED LAMP UNITS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Screws (4) and moldings (2) 2. Rubber ring (1) under molding 3. Sealed unit (3) 	<p>Loosen screws and remove moldings.</p> <p>Remove.</p> <p>Disconnect, remove, and discard.</p>	 <p>The diagram shows an exploded view of a headlight assembly. Part 1 is a rubber ring. Part 2 is a molding. Part 3 is the sealed unit. Part 4 is a screw. The diagram illustrates the relationship between these parts during removal and installation.</p>
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Sealed unit (3) 2. Ring (1) under molding. 3. Molding (2) and screw (4) 	<p>Insert in body assembly and connect.</p> <p>Install.</p> <p>Reassemble. Install molding with sharp curved side toward middle of ring.</p>	

HEADLIGHT BODY REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of headlight body.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Headlight body

Troubleshooting Reference

Page 2-126

Equipment Condition

Engine shut down

Front warning horn removed, page 2-327

Special Tools

None

Personnel Required

One mechanic

References

Sealed lamp unit removal/installation, page 2-285.

Warning horn removal/installation, page 2-327.

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Warning horn 2. Wire (3) 3. Nut, inside spacer, lockwasher (1) 4. Headlight body (2) and outside spacer 	<p>Remove.</p> <p>Disconnect.</p> <p>Remove.</p> <p>Remove.</p>	<p>See page 2-327.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Outside spacer 2. Headlight (2) 3. Nut, spacer, lockwasher (1) 4. Wire (3) 5. Warning horn 	<p>Install on headlight mounting stud flat side towards light.</p> <p>Place in bracket.</p> <p>Install with flat side of spacer towards lockwasher.</p> <p>Connect.</p> <p>Install.</p>	<p>See page 2-327.</p>

CAB DOME LIGHT BULB REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of cab dome light bulb.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Cab dome light

Troubleshooting Reference

Page 2-90

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

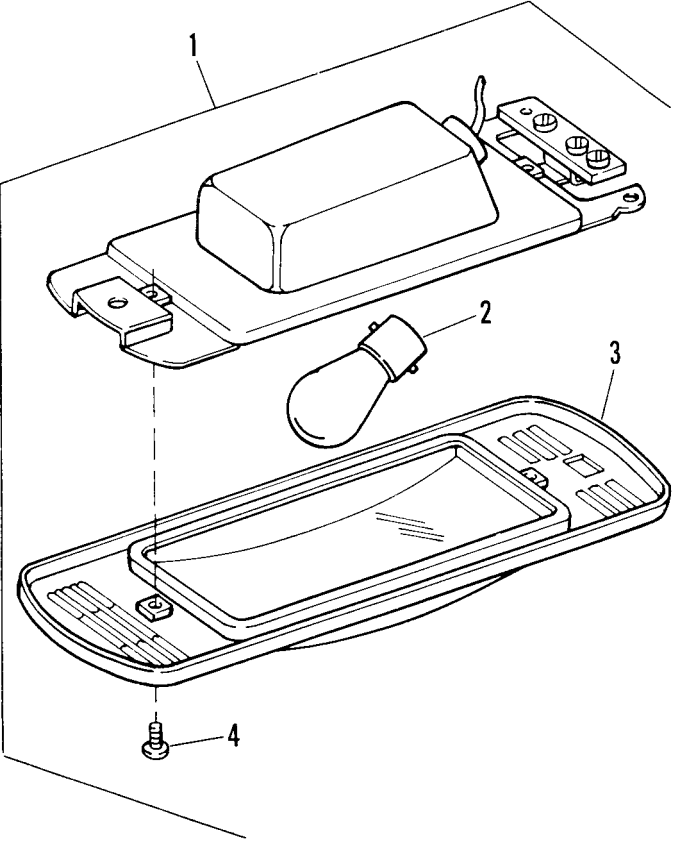
None

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

CAB DOME LIGHT BULB REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<ol style="list-style-type: none"> 1. Capscrews (4) 2. Lens (3) 3. Bulb (2) 	<p>Remove.</p> <p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>	<p>Insert.</p> <p>Place in position.</p> <p>Install.</p>	
<ol style="list-style-type: none"> 1. Bulb (2) 2. Lens (3) 3. Capscrews (4) 		

TA 098750

End

2-290

COMBINATION STOP AND TAIL LAMP REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of combination stop and tail lamp assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Combination stop and tail lamp assembly

Troubleshooting Reference

Pages 2-126, 2-135

Equipment Condition

Engine shut down

Radiator guard lower section removed

Special Tools

None

Personnel Required

One mechanic

References

Headlight sealed unit removal/installation,
page 2-285

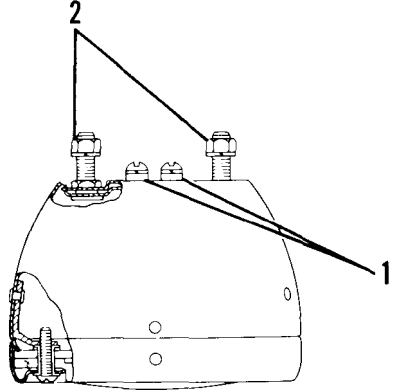
Radiator rear guard removal/installation,
page 2-242

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

COMBINATION STOP AND TAIL LAMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">REMOVAL</div> 1. Terminils (1) and wires 2. Nuts and lockwashers (2) 3. Lamp assembly	Loosen terminal screws. Tag and disconnect wires. Remove. Remove.	
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> 1. Lamp assembly 2. Nut and lockwasher (2) 3. Terminals (1)	Hold in place. Install. Reconnect wires.	

COMBINATION STOP AND TAIL LAMP – BULB REPLACEMENT

(Sheet 1 of 2)

This task covers: Replacing a burned out bulb in the stop and tail lamp assembly.

INITIAL SETUP

Test. Equipment

None

Materials/Parts

Bulb

Troubleshooting Reference

Page 2-126

Equipment Condition

Engine shut down

Special Tools

None

Personnel Required

One mechanic

References

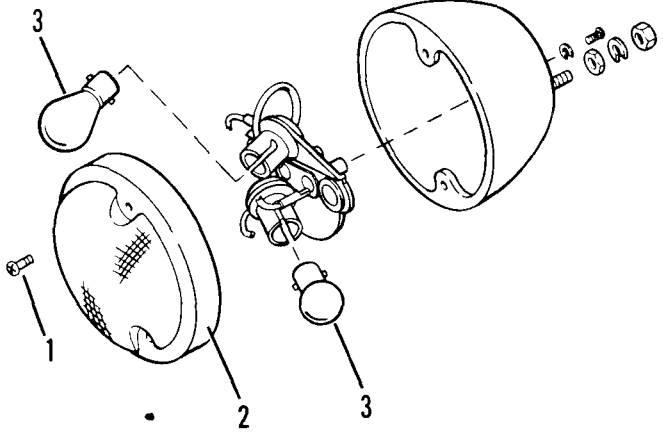
None

General Safety Instructions

Main disconnect switch in OFF

Go on to Sheet 2

COMBINATION STOP AND TAIL LAMP – BULB REPLACEMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none">1. Screws (1)2. Door assembly (2)3. Bulb (3)	<p>Loosen.</p> <p>Remove.</p> <p>Remove by pushing and turning. Discard.</p>	
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none">1. New bulb (3)2. Door assembly (2)3. Screws (1)	<p>Install.</p> <p>Install.</p> <p style="text-align: center;">NOTE</p> <p>Door assembly only goes in one way when both screws are installed.</p> <p>Tighten.</p>	

ROPS (AUXILIARY) LIGHT REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of the ROPS (auxiliary) lights.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Light assembly

Troubleshooting Reference

Page 2-126

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

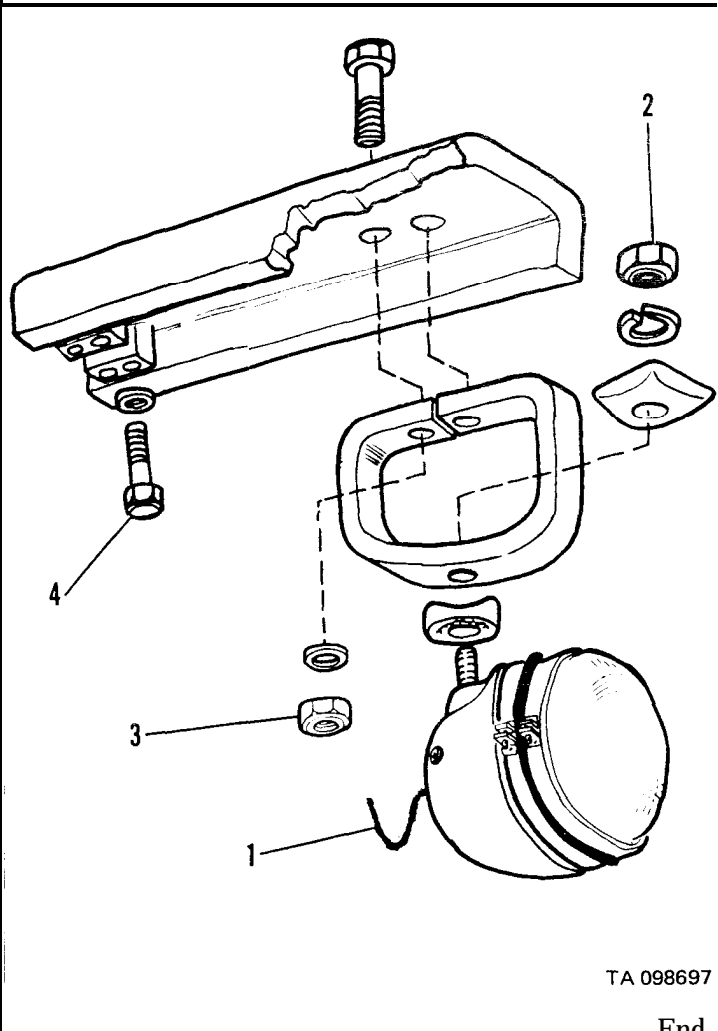
References

Sealed lamp unit removal, see page 2-285

General Safety Instructions

Main disconnect switch is OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Wire assembly (1)	Remove.	
2. Nut (2)	Remove nut (2), washer, spacer and body assembly.	
3. Capscrews, washers and nuts (3)	Remove (if necessary).	
4. Capscrews (4)	Remove (if necessary).	
INSTALLATION		
1. Capscrews (4)	Install (if removed).	
2. Capscrews, washers and nuts (3)	Install.	
3. Nut (2)	Install nut, washer, spacer and body assembly.	
4. Wire assembly (1)	Install.	

TA 098697

End

VEHICLE ELECTRICAL COMPONENTS MAINTENANCE INSTRUCTIONS

This section includes procedures for removing and installing:

- a. Main disconnect switch
- b. Container lock indicator panel
- c. Instrument panels
- d. Switches
- e. Oil level switch
- f. Radio interference suppression components
- g. Backup warning alarm and switch
- h. Vehicle horns
- i. Relays, solenoids, circuit breaker, diodes and switches and repairing wiring harnesses

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Container lock indicator panel removal/ installation	2-298	2-124
2	Main disconnect switch removal/installation	2-300	2-74
3	Container lock indicator disassembly/assembly	2-302	2-125
4	Instrument panels removal, disassembly, assembly, installation	2-305	2-113, 2-127
5	Switch removal/installation	2-315	2-87, 2-89
6	Oil level switch removal/installation	2-317	2-138
7	Radio interference suppression components removal/installation	2-319	None
8	Front warning horn removal/installation	2-327	2-95
9	Backup warning alarm and switch removal/ installation	2-329	2-143
10	Vehicle horns removal/installation	2-332	2-95
11	Backup alarm/start interlock switch testing/ adjustment	2-334	2-73, 2-144
12	Relay, solenoid, circuit breaker, diode and switch removal/installation	2-337	2-88, 2-97
13	Wiring harness repair	2-340	2-66

End

CONTAINER LOCK INDICATOR PANEL REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of container lock indicator panel.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Container lock indicator panel

Troubleshooting Reference

Page 2-124

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

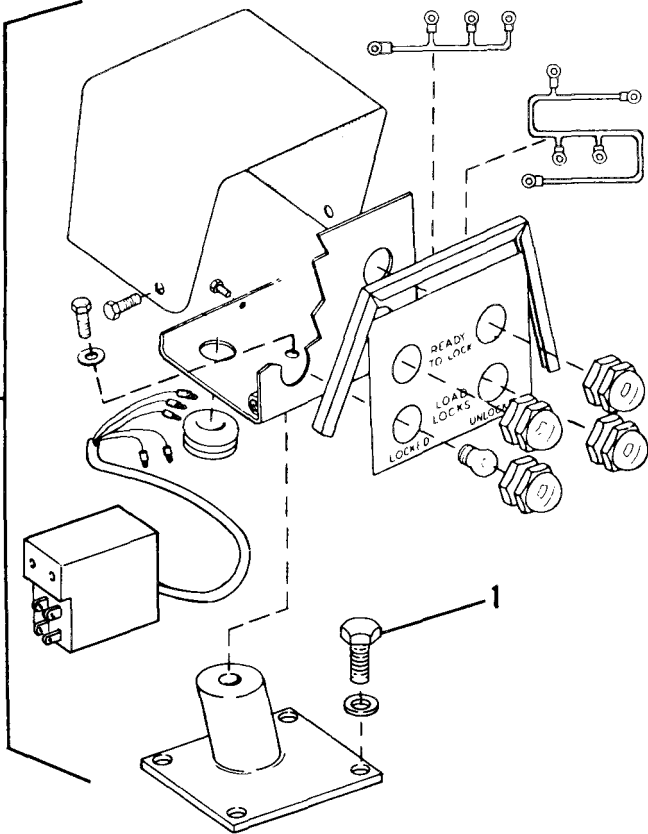
Container lock indicator disassembly/assembly,
page 2-302

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

CONTAINER LOCK INDICATOR PANEL REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>1. Capscrews and washers (1)</p> <p>2. Container lock indicator assembly (2)</p>	<p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>Container lock indicator assembly (2)</p> <p>2. Capscrews and washers (1)</p>	<p>Locate on floor heater housing.</p> <p>Install.</p>	

TA 098698

End

MAIN DISCONNECT SWITCH REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of the main disconnect switch.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Main disconnect switch

Troubleshooting Reference

Page 2-74

Equipment Condition

Engine OFF

Special Tools

Battery terminal puller

Personnel Reaquired

One mechanic

References

Battery service, page 2-272

TM 10-3930-641-10

General Safety Instructions

Batteries disconnected, see page 2-272

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Key (1) 2. Nuts (5), washers (4) and three cables (6) 3. Nut (2) and washer (3) 4. Switch (7) 	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p>Disconnect negative (black) cable from battery at each battery box.</p> <p>Turn to OFF and remove.</p> <p>Remove after tagging the three cables for location.</p> <p>Remove.</p> <p>Remove from the mounting plate.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Switch (7) 2. Washer (3) and nut (2) 3. Three cables (6), washers (4) and nuts (5) 4. Key (1) 5. Battery cables 	<p>Position through the mounting plate.</p> <p>Install and tighten.</p> <p>Install and tighten.</p> <p>Install.</p> <p>Connect.</p>	<p>Torque to 20 lb. ft. (27 N•m).</p> <p>Torque to 40 lb. ft. (54 N•m).</p> <p style="text-align: center;">NOTE</p> <p>Connect negative terminals last.</p>

TA 098699

End

CONTAINER LOCK INDICATOR DISASSEMBLY/ASSEMBLY

This task covers: Disassembly/assembly of container lock indicator.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-125

Equipment Condition

Engine OFF

Container lock indicator panel removed

Special Tools

None

Personnel Required

One mechanic

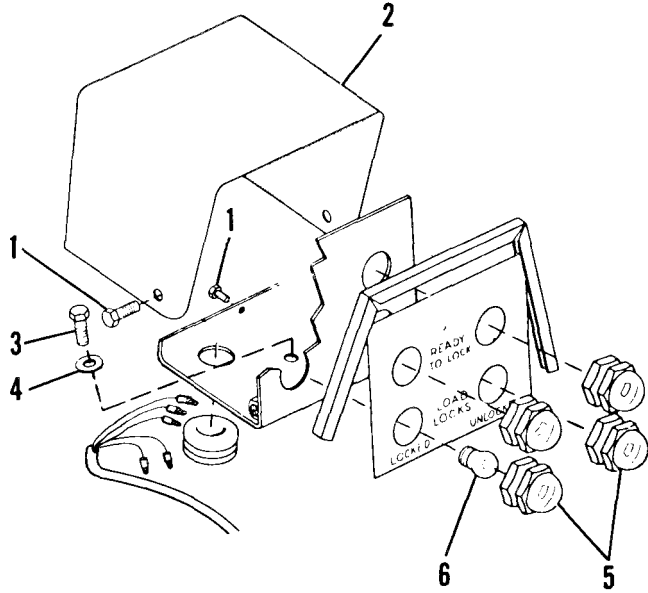
References

Container lock indicator panel removal/
installation, page 2-298

General Safety Instructions

None

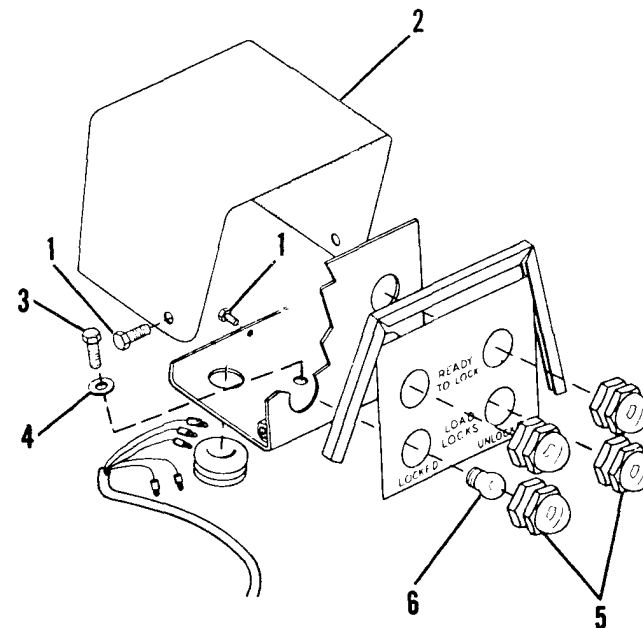
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">DISASSEMBLY</div> <ol style="list-style-type: none"> <li>1. Capscrews (1) and cover (2) <li>2. Mounting cap screw (3) and washer (4) <li>3. Screws and wires <li>4. Bulb covers (5) <li>5. Bulbs (6) 	<p>Remove.</p> <p>Remove.</p> <ol style="list-style-type: none"> <li>a. Tag wires (for reassembly) and remove. <li>b. Pull wires through grommet in plate. <p>Remove.</p> <p>Remove.</p>	

TA 098700

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Wires and screws	Pull wires through grommet and install.	
2. Washer (4) and mounting capscrew (3)	Install.	
3. Cover (2) and capscrews (1)	Install.	
4. Bulbs (6)	Install.	
5. Bulb covers (5)	Install.	



TA 098701

End

2-304

INSTRUMENT PANELS REMOVAL, DISASSEMBLY, ASSEMBLY, INSTALLATION

(Sheet 1 of 10)

This task covers: Replacement of instrument panels and components.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As needed

Troubleshooting Reference

Pages 2-113, 2-127

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

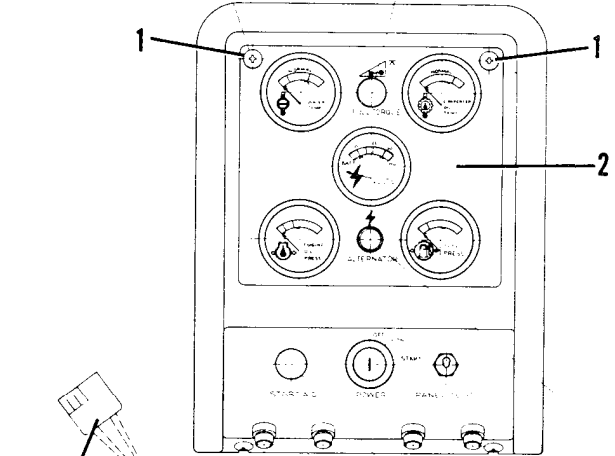
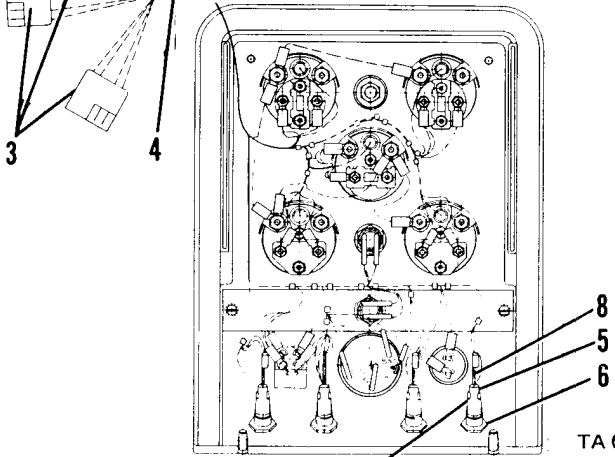
References

None

General Safety Instructions

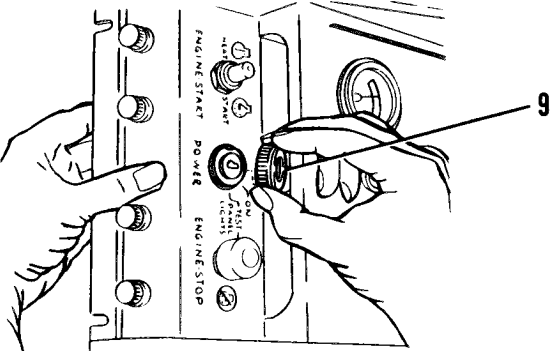
Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; padding: 5px;">REMOVAL</p> <ol style="list-style-type: none"> 1. Four screws (1) 2. Harness (4) 3. Capacitor 	<p style="text-align: center;">NOTE</p> <p>Follow the same procedure for either instrument panel.</p> <p>Remove from panel (2) and pull out panel.</p> <p>Disconnect at connectors (3). Remove panel.</p> <p>Remove from capscrew in lower right hand corner behind left instrument panel.</p>	 <p>The diagram shows the front view of the instrument panel. Callout 1 points to four screws at the top corners. Callout 2 points to the panel's frame. Callout 3 points to electrical connectors on the left side.</p>
<p style="text-align: center; border: 1px solid black; padding: 5px;">DISASSEMBLY</p> <ol style="list-style-type: none"> 1. Fuseholder (7) <ol style="list-style-type: none"> a. Two wires (8) b. Nut (6) c. Fuseholder (7) 	<p>Remove as follows:</p> <ol style="list-style-type: none"> a. Disconnect from terminal (5). b. Loosen and remove. <p style="text-align: center;">NOTE</p> <p>The slot in the nut must line up with the side terminal of fuseholder.</p> <ol style="list-style-type: none"> c. Remove through front of panel. 	 <p>The diagram shows the back view of the instrument panel. Callout 3 points to electrical connectors on the left. Callout 4 points to a terminal on the right. Callout 5 points to a wire connected to a terminal. Callout 6 points to a nut. Callout 7 points to a fuseholder. Callout 8 points to another wire.</p>

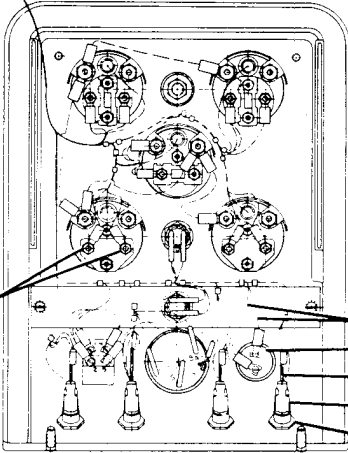
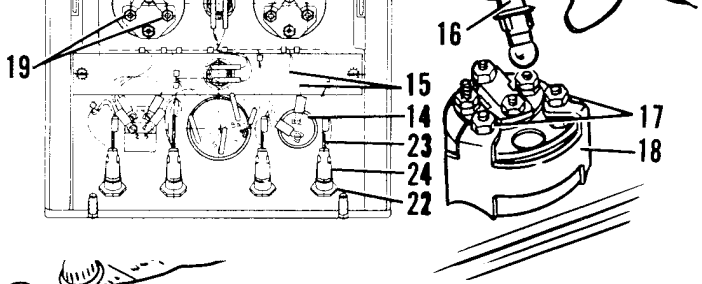
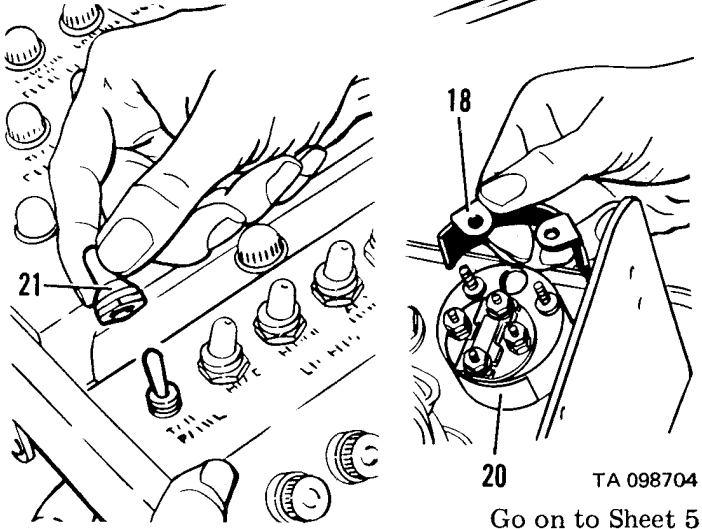
TA 098702

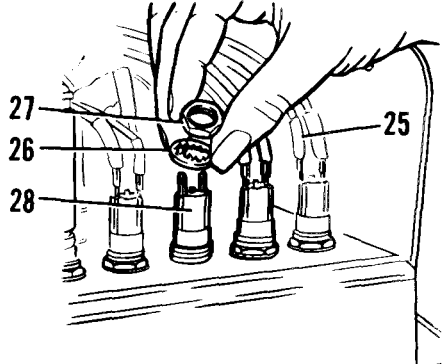
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>2. Power switch (11)</p> <p>a. Ring (9)</p> <p>b. Wires (10)</p> <p>c. Switch (11)</p>	<p>Remove as follows:</p> <p>a. Remove.</p> <p>b. Identify and disconnect.</p> <p>c. Remove from back of panel.</p>	
<p>3. Starting aid switch (14)</p> <p>a. Rubber cap (12)</p> <p>b. Nut (13)</p>	<p>Remove as follows:</p> <p>a. Turn in a counterclockwise direction to loosen and remove.</p> <p>b. Remove.</p>	

TA 098703

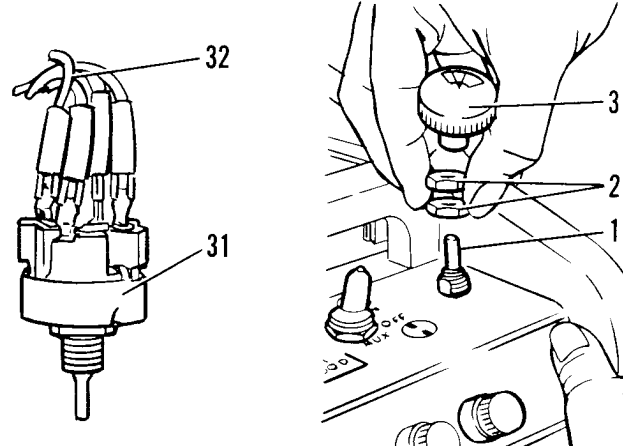
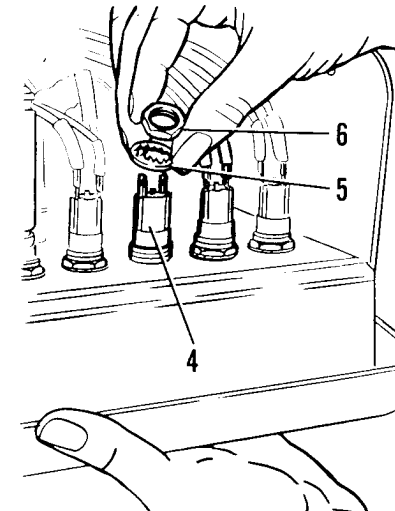
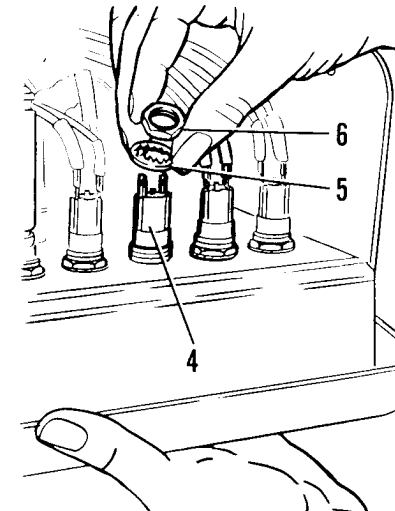
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>3. c. Two wires (15)</p> <p>d. Switch (14)</p>	<p>c. Remove from switch (14) and identify.</p> <p>d. Remove from back of panel.</p>	
<p>4. Gages (all) (20)</p> <p>a. Lamp socket (16)</p> <p>b. Two wires (19)</p> <p>c. Two nuts (17) that fasten gage to retainer (18)</p> <p>d. Gage (20)</p>	<p>Remove as follows:</p> <p>a. Remove from gage.</p> <p>b. Remove and identify.</p> <p>c. Remove. Remove retainer (18).</p> <p>d. Remove through front of panel.</p>	
<p>5. Toggle switches</p> <p>a. Nut (22) and rubber boot (21)</p>	<p>Remove as follows:</p> <p>a. Use a wrench on nut (22) and remove.</p>	 <p>TA 098704 Go on to Sheet 5</p>

LOCATION/ITEM	ACTION	REMARKS
5. b. Wires (23) c. Switch (24)	b. Disconnect and identify. c. Remove from back of panel.	
6. Indicator lights a. Wires (25) b. Nut (27) and lockwasher (26) c. Indicator light (28)	Remove as follows: a. Disconnect and identify. b. Remove. c. Remove through front of panel.	
7. Washer/wiper switch a. Knob (29) b. Locknut and nut (30)	Remove as follows: a. Pull from switch. b. Remove from switch.	

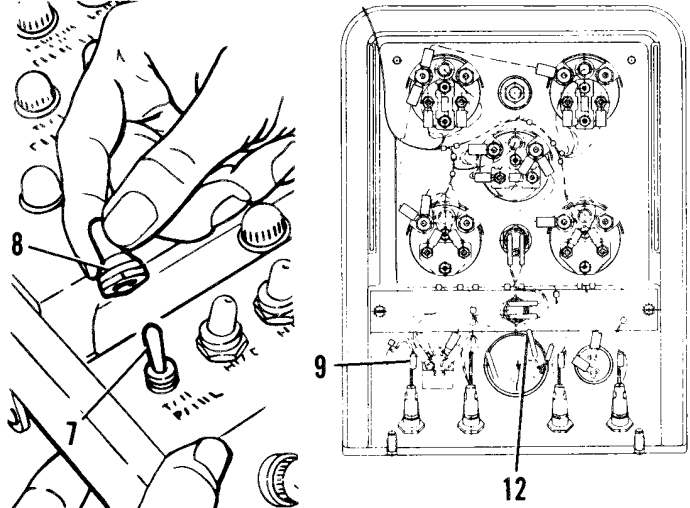
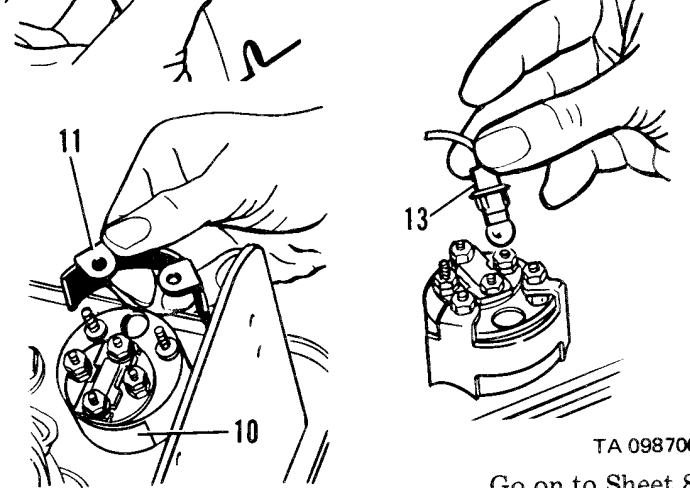
TA 098705

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
<p>8. c. Wires (32)</p> <p>d. Switch (31)</p>	<p>c. Remove from switch and identify.</p> <p>d. Remove from back of panel.</p>	
<p>ASSEMBLY</p>		
<p>1. Washer/wiper switch (1)</p> <p>a. Switch (1)</p> <p>b. Nut and locknut (2)</p> <p>c. Knob (3)</p> <p>d. Wires (32)</p>	<p>Install as follows:</p> <p>a. Put through rear of panel with flat part of shaft toward the TOP of the panel.</p> <p>b. Install.</p> <p>c. Install by pushing on to shaft.</p> <p>d. Install.</p>	
<p>2. Indicator lights</p> <p>a. Indicator socket (4)</p> <p>b. Lockwasher (5) and nut (6)</p> <p>c. Two wires</p>	<p>Install as follows:</p> <p>a. Install through front of panel.</p> <p>b. Install on indicator.</p> <p>c. Connect.</p>	

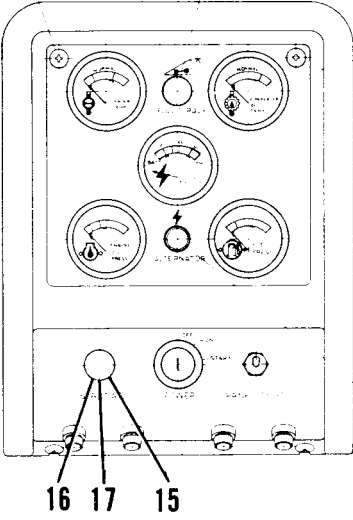
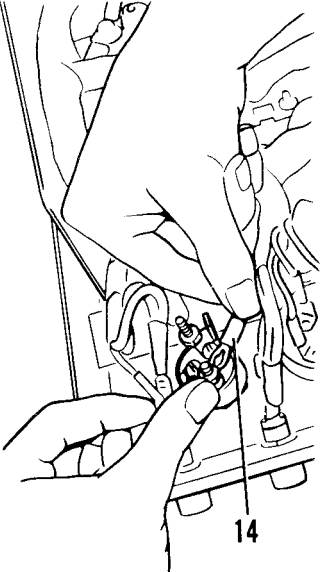
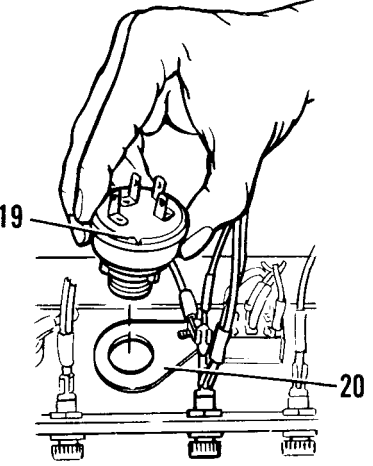
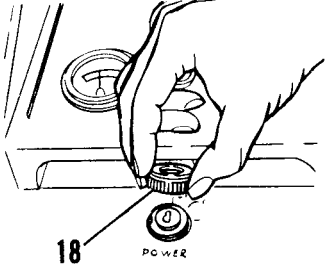
TA 098900

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
<p>3. Toggle switches (7)</p> <p>a. Switch (7)</p> <p>b. Boot (8) and nut</p> <p>c. Two wires (9)</p>	<p>Install as follows:</p> <p>a. Install from back of panel.</p> <p>b. Install.</p> <p style="text-align: center;">NOTE</p> <p>The groove in the switch must lineup with the tab in the panel.</p> <p>c. Connect to the terminals.</p>	
<p>4. Gages (all) (10)</p> <p>a. Gage (10)</p> <p>b. Retainer (11)</p> <p>c. Wires (12)</p> <p>d. Lamp socket (13)</p>	<p>Install as follows:</p> <p>a. Install through front of panel.</p> <p>b. Install and fasten to gage with two lock-washers and two nuts.</p> <p>c. Connect.</p> <p>d. Install in gage.</p>	

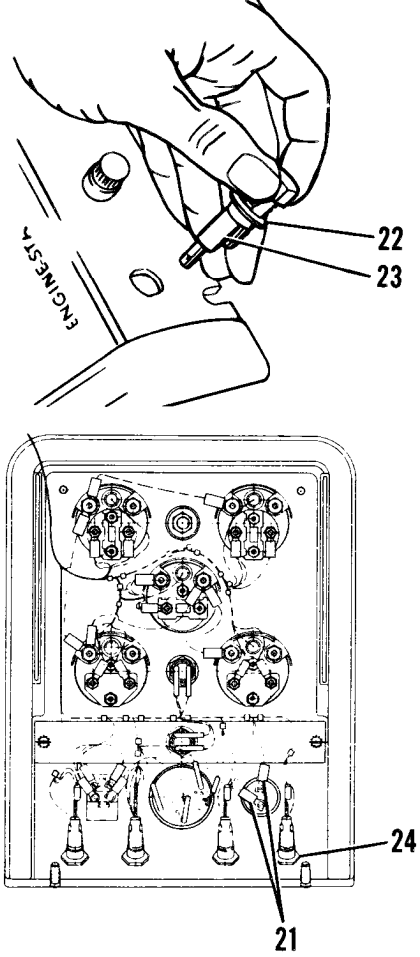
TA 098706

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
<p>5. Stinting aid switch</p> <p>a. Switch (15)</p> <p>b. Nut (16) and cap (17)</p> <p>c. Two wires (14)</p>	<p>Install as follows:</p> <p>a. Install through back of panel.</p> <p>b. Install on switch (15).</p> <p>c. Connect to back of switch (15).</p>	 
<p>6. Ignition switch (19)</p> <p>a. Switch (19)</p> <p>b. Ring (18)</p> <p>c. Three wires</p>	<p>Install as follows:</p> <p>a. Install through tab (20) and put switch through back of panel.</p> <p>b. Install on switch and hand-tighten.</p> <p>c. Connect.</p>	 

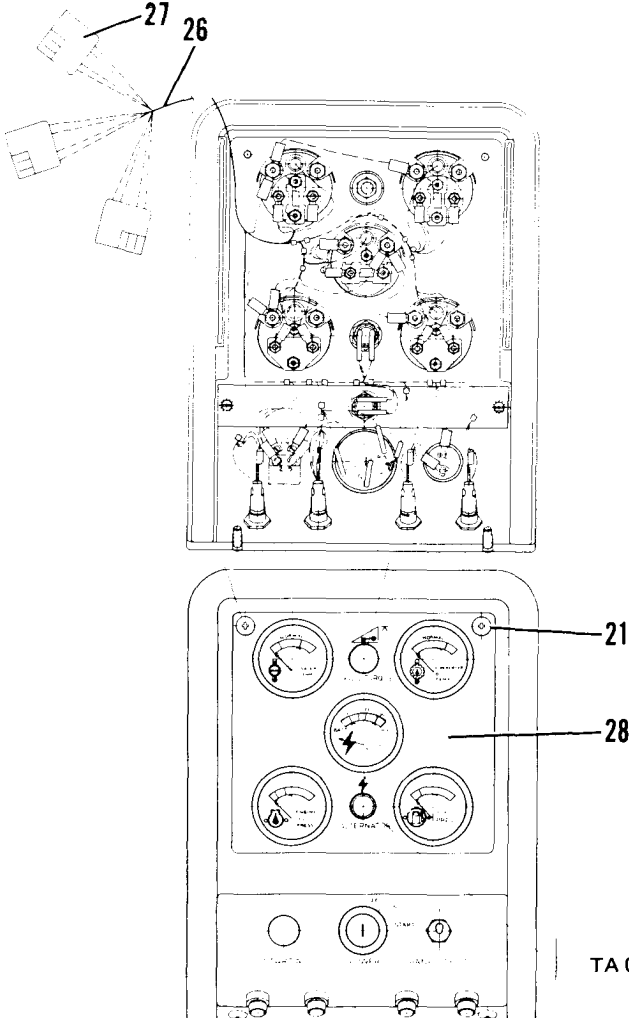
TA 098707

Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
7. Fuseholder (23)	Install as follows:	
a. Seal (22)	a. Install on fuseholder (23).	
b. Fuseholder (23)	b. Install through front of the panel.	
c. Nut (24)	c. Install on fuseholder.	
d. Wires (21)	d. Connect.	
<p style="text-align: center;">NOTE</p> <p>The slot in the nut (24) must lineup with the side terminal of the fuseholder.</p>		

TA 098708

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">INSTALLATION</div> <p>1. Harness (26)</p> <p>2. Capacitor</p> <p>3. Panel (28)</p>	<p>Connect to connectors (27).</p> <p>Connect to lower right hand corner of left panel behind wiper switch using nut and capscrew. See page 2-320.</p> <p>Install, using four screws (21).</p>	 <p>The top diagram illustrates the connection of a harness (26) to the back of the instrument panel. The harness has several connectors (27) that are shown being plugged into the back of the panel's internal components.</p> <p>The bottom diagram shows the front view of the instrument panel (28). It features several gauges and a central wiper switch. Four screws (21) are shown being used to secure the panel to the underlying structure.</p>

TA 098709

End

SWITCH REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of all switches.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Switch

Troubleshooting Reference

Pages 2-87, 2-89

Equipment Condition

System drained to below level of switch

Special Tools

None

Personnel Required

One mechanic

References

Engine oil pressure sending unit removal/
installation, page 2-264.

Engine water temperature sending unit removal/
installation, page 2-266.

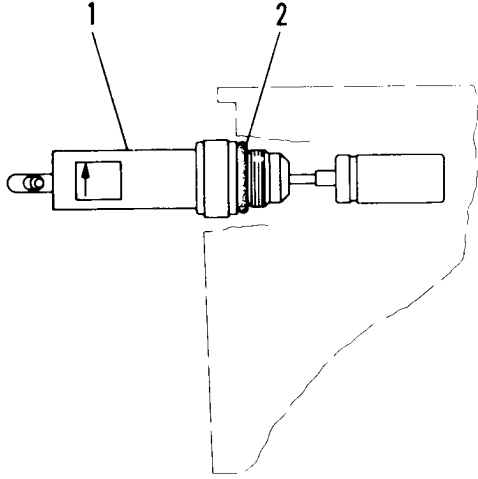
Instrument panels removal, disassembly, assembly,
installation, page 2-305.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

SWITCH REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS	
REMOVAL			
1. Terminals	Mark for identification.		
2. Nuts and lockwashers holding terminals in place on the switch (1)	Remove.		
3. Fastening capscrews (2) holding switch in place.	Remove (or unscrew switch, depending on type).	 <p style="text-align: center;">TYPICAL SWITCH</p>	
4. Switch (1)	Remove.		
INSTALLATION			
1. Switch (1)	Place in position on machine.		
2. Fastening capscrews (2) to hold switch in place	Install.		
3. Terminals	Place in position.		
4. Nuts and lockwashers	Install.		

TA 098901

End

OIL LEVEL SWITCH REMOVAL/INSTALLATION

This task covers: Removal and installation of oil level switch.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Switch

Gasket

Troubleshooting Reference

Page 2-138

Equipment Condition

Engine oil is to be drained

Special Tools

None

Personnel Required

One mechanic

References

Engine oil pressure sending unit removal/
installation, page 2-264

Switch removal/installation, page 2-315

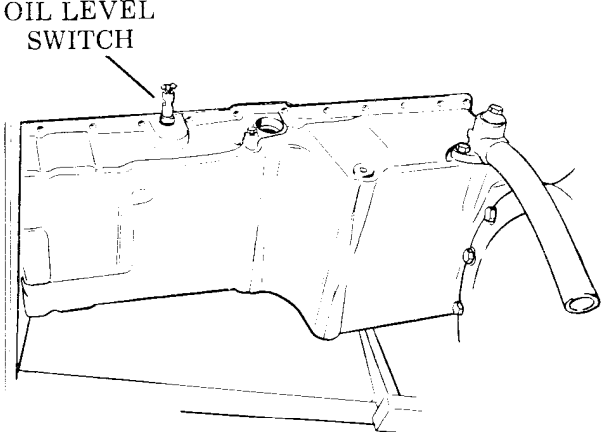
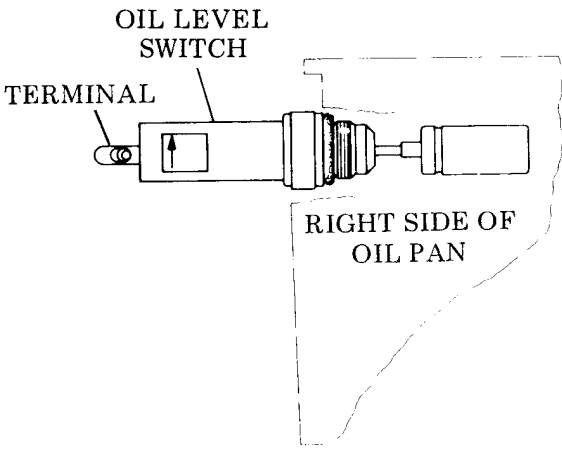
LO 10-3930-641-12

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

OIL LEVEL SWITCH REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div> <ol style="list-style-type: none"> 1. Terminal wire 2. Oil level switch 	<p>Remove from end of switch.</p> <p>Remove. (Unscrew from oil pan.)</p>	 <p>OIL LEVEL SWITCH</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Oil level switch 2. Terminal wire 	<p>Install with a new gasket.</p> <p>Install on end of switch.</p>	 <p>OIL LEVEL SWITCH</p> <p>TERMINAL</p> <p>RIGHT SIDE OF OIL PAN</p>

TA 098710

End

RADIO INTERFERENCE SUPPRESSION COMPONENTS REMOVAL/INSTALLATION

(Sheet 1 of 8)

This task covers: Removal and installation of radio interference suppression components.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As needed

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

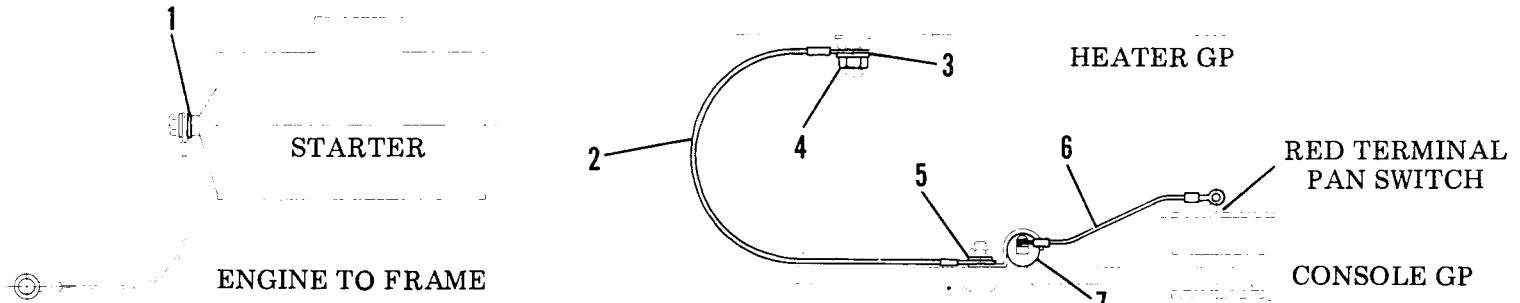
Radio interference suppression,
page 2-510.

General Safety Instructions

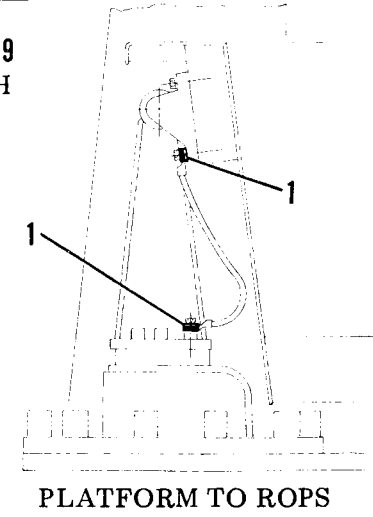
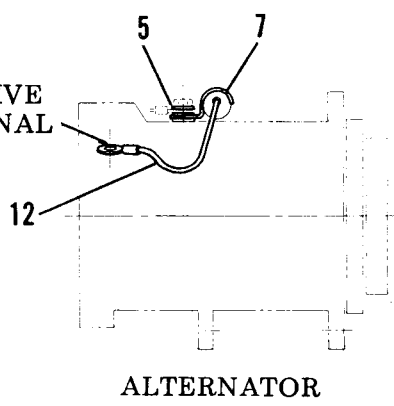
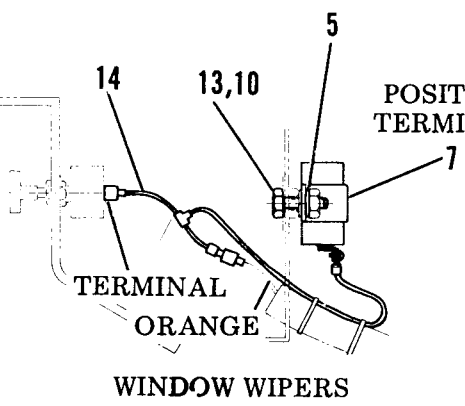
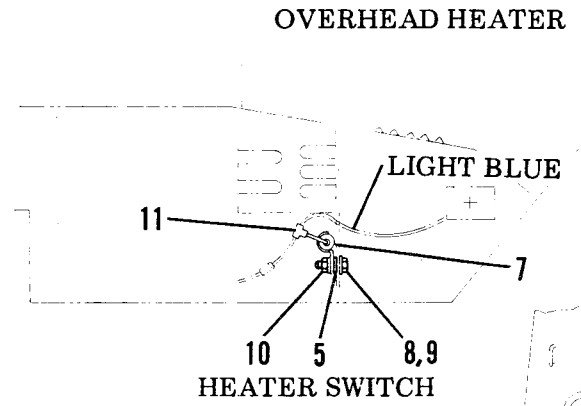
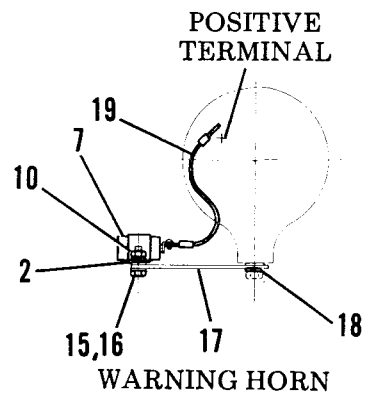
Main disconnect switch OFF

Go on to Sheet 2

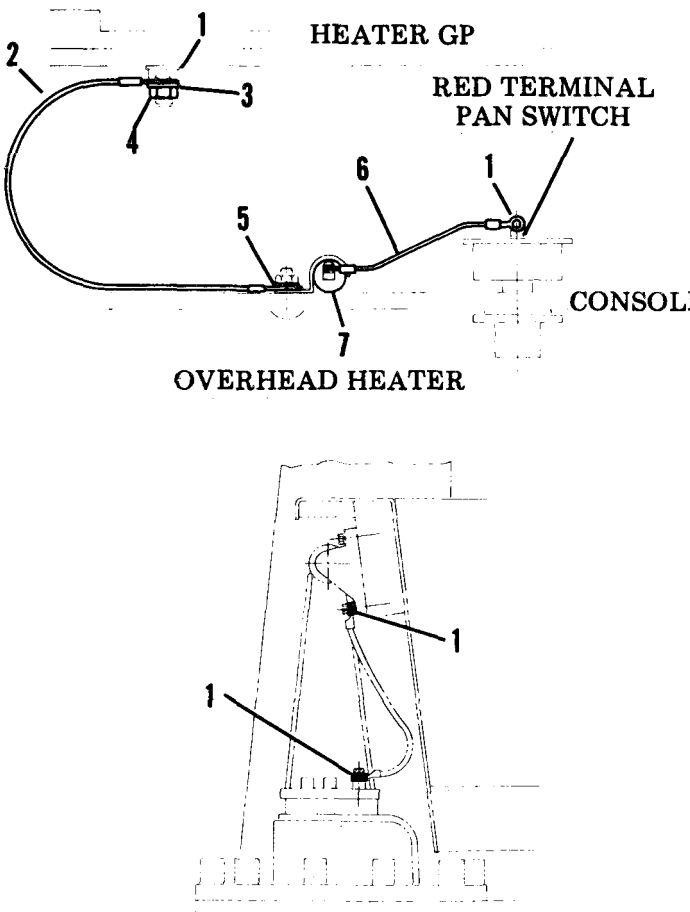
RADIO INTERFERENCE SUPPRESSION COMPONENTS REMOVAL/INSTALLATION (CONT)



- 1. Terminal
- 2. Wire
- 3. Washer
- 4. Nut
- 5. Washer
- 6. Wire
- 7. Capacitor
- 8. Washer
- 9. Capscrew
- 10. Capscrew
- 11. Clip
- 12. Wire
- 13. Washer
- 14. Wire
- 15. Washer
- 16. Capscrew
- 17. Plate
- 18. Washer

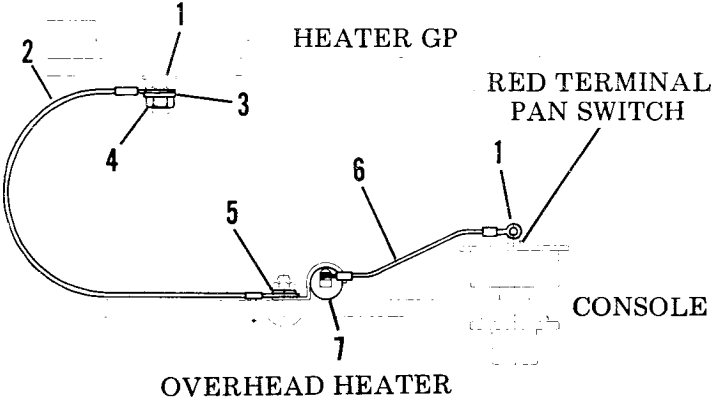
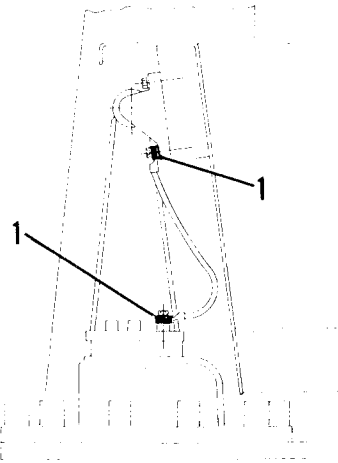


TA 098711
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; padding: 5px;">REMOVAL</p> <p>1. Electrical terminals (1)</p> <p>2. Shield wire (2), (6)</p>	<p style="text-align: center;">NOTE</p> <p>Determine where the wire is routed and make note.</p> <p>The shield wire may be in a harness. If so, it will be necessary to cut the wrapping to remove it. Make sure it gets rewrapped when it is installed.</p> <p>Remove.</p> <p>Remove.</p>	 <p>The diagram consists of two parts. The upper part shows a wiring harness labeled 'HEATER GP' connected to a 'RED TERMINAL PAN SWITCH' and an 'OVERHEAD HEATER'. Callouts 1, 2, 3, 4, 5, 6, and 7 point to various electrical terminals and wires. The lower part shows a 'PLATFORM TO ROPS' with callouts 1 pointing to wires routed through the structure.</p>

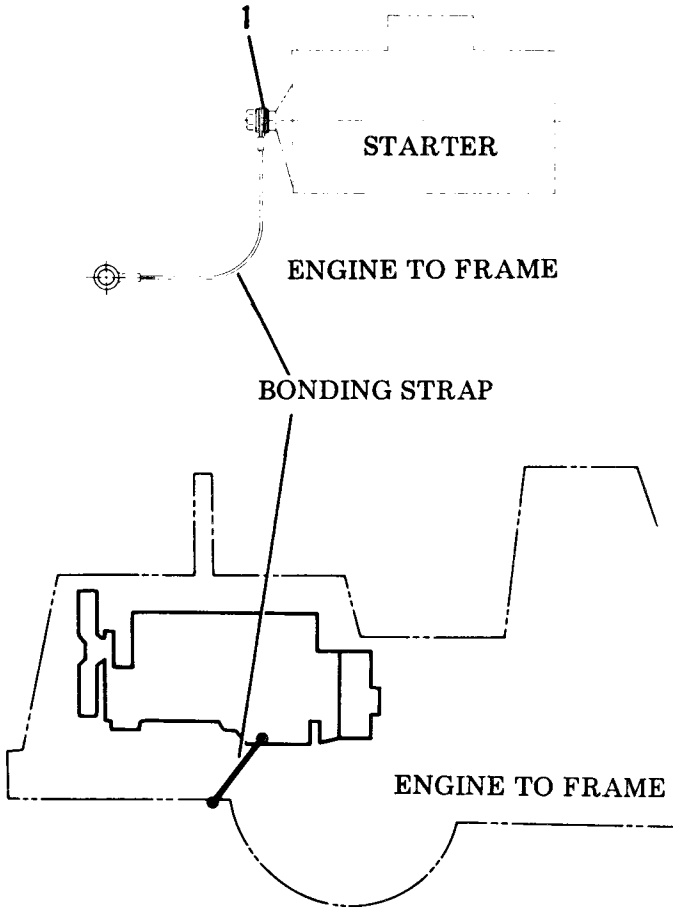
TA 098902

Go onto Sheet 4

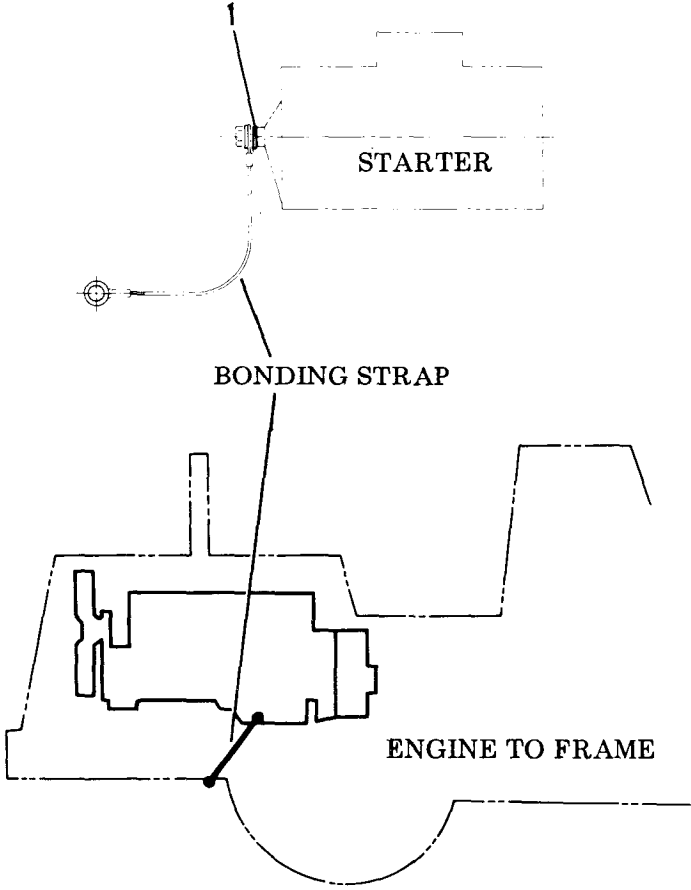
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">INSTALLATION</div> <p>1. Shield wire</p> <p>2. Electrical connectors</p>	<p style="text-align: center;">NOTE</p> <p>Determine where the wire is routed and make note.</p> <p>The shield wire may be in a harness. If so, it will be necessary to cut the wrapping to remove it. Make sure it gets rewrapped when it is installed.</p> <p>Route wire in the original way.</p> <p>Install.</p>	 <p>HEATER GP</p> <p>RED TERMINAL PAN SWITCH</p> <p>CONSOLE</p> <p>OVERHEAD HEATER</p>  <p>PLATFORM TO ROPS</p>

TA 098903

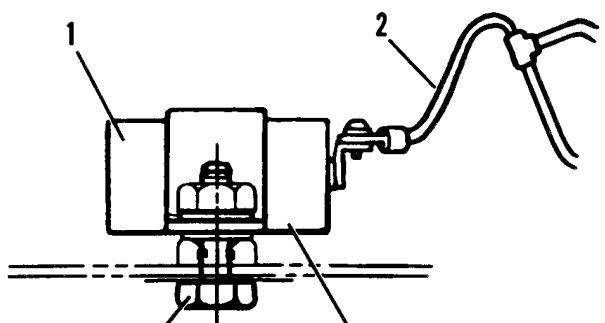
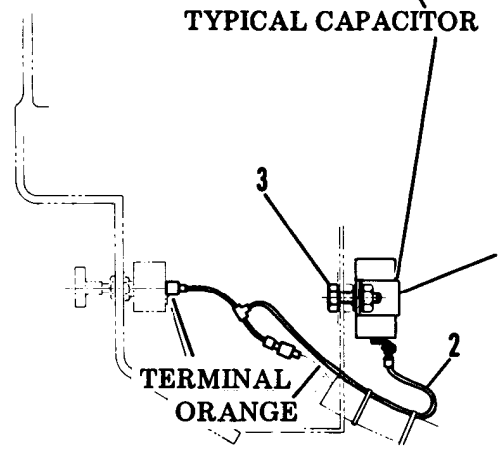
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">REMOVAL</div> <p>1. Bonding strap</p> <p>2. Terminals (1)</p> <p>3. Bonding strap</p>	<p>Locate.</p> <p>Remove.</p> <p>Remove.</p>	 <p>The diagram illustrates the location of a bonding strap. A circled '1' points to a terminal on the starter. A line labeled 'BONDING STRAP' connects a terminal on the engine to a terminal on the frame labeled 'ENGINE TO FRAME'. Another terminal on the engine is labeled 'ENGINE TO FRAME'.</p>

TA 098904
Go on to Sheet 6

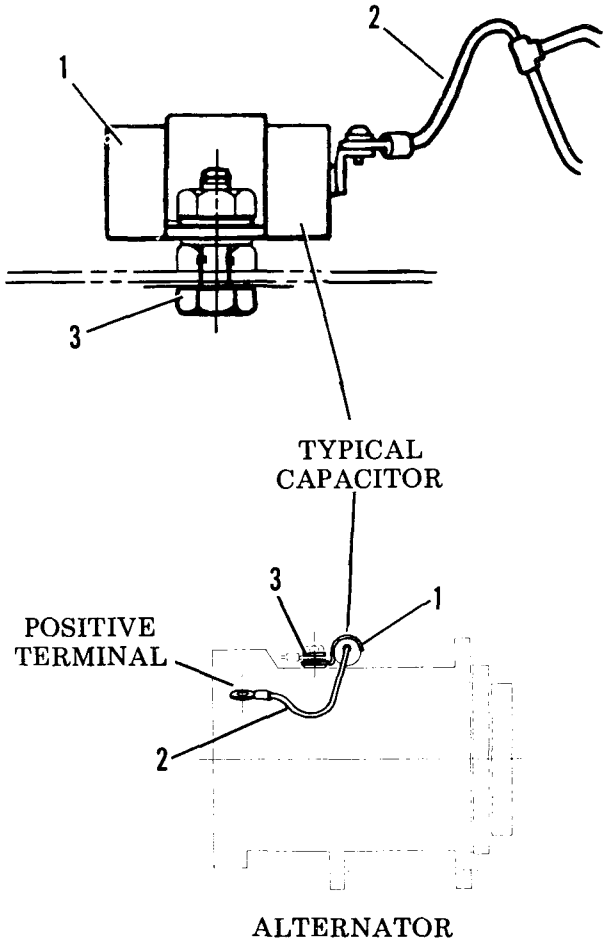
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">INSTALLATION</div> <p>1. Bonding strap</p> <p>2. Terminals (1)</p>	<p>Locate on mounting holes.</p> <p>Install.</p>	 <p>The diagram illustrates the installation of a bonding strap. At the top, a dashed outline represents the 'STARTER'. A terminal, indicated by a circle with a crosshair, is connected to the starter. A solid line representing the 'BONDING STRAP' runs from this terminal down to a terminal on the 'ENGINE TO FRAME' assembly, which is also shown as a dashed outline. A small number '1' with a pointer indicates the location of the bonding strap on the starter.</p>

TA 098905
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div> <p>1. Capacitor (1)</p> <p>2. Wire (2)</p> <p>3. Fastener (3)</p> <p>4. Capacitor</p>	Locate.	 <p style="text-align: center;">TYPICAL CAPACITOR</p>
	Remove.	 <p style="text-align: center;">WINDOW WIPERS</p>
	Remove.	
	Remove.	

TA 098712

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <div>1. Capacitor (1)</div> <div>2. Fasteners (3)</div> <div>3. Wire (2)</div>	<div>Locate on mounting holes.</div> <div>Install.</div> <div>Install.</div>	 <p>The diagram illustrates the installation of a radio interference suppression capacitor on an alternator. It is divided into two parts. The upper part shows a perspective view of the capacitor (1) being mounted onto the alternator's housing using three fasteners (3). A wire (2) is connected to the capacitor. The lower part shows a top-down view of the capacitor (1) mounted on the alternator (ALTERNATOR). The capacitor is connected to the positive terminal (POSITIVE TERMINAL) of the alternator. The wire (2) is also connected to the positive terminal. The fasteners (3) are used to secure the capacitor to the alternator housing.</p>

End

FRONT WARNING HORN REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of either front warning horn.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-95

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

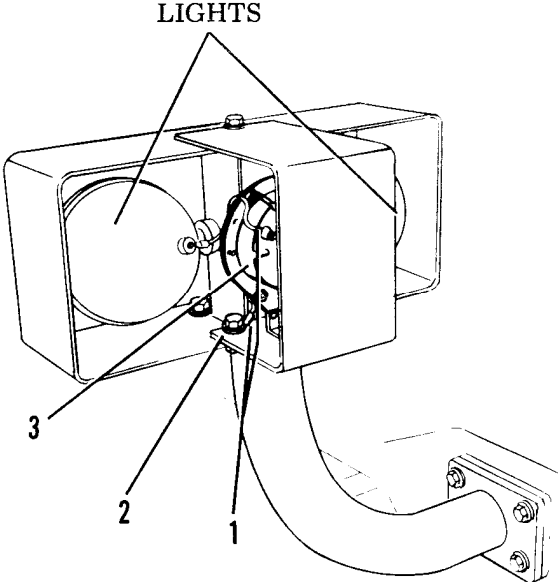
None

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

FRONT WARNING HORN REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Wires (1) <li>2. Capscrews, nuts and washers (2) <li>3. Horn (3) 	<p>Tag wires for identification and disconnect.</p> <p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Horn (3) <li>2. Capscrews, nuts and washers (2) <li>3. Wires (1) 	<p>Locate on mounting hole.</p> <p>Install.</p> <p>Connect to horn.</p>	

BACKUP WARNING ALARM AND SWITCH REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of backup warning alarm and switch.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-143

Equipment Condition

Radiator rear guard lower section removed

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

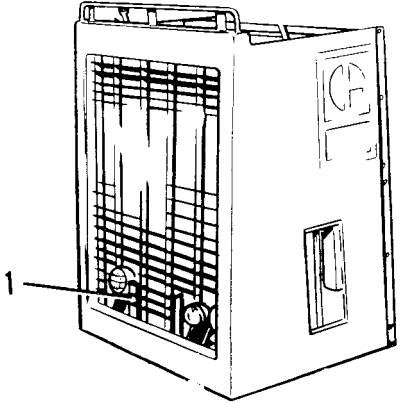
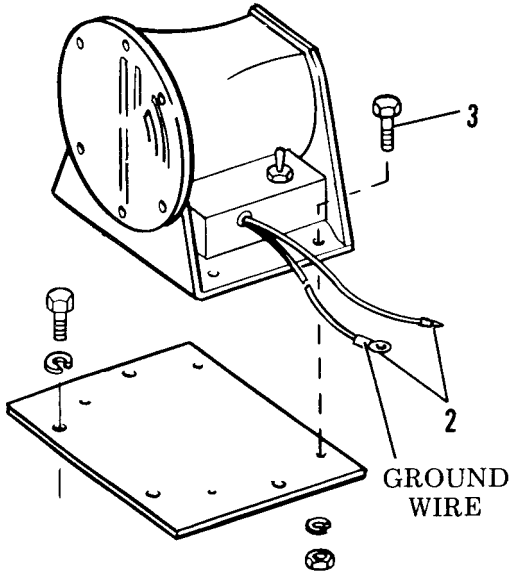
Radiator rear guard removal/installation, page 2-242

Backup alarm/start interlock switch testing/adjustment, page 2-334

General Safety Instructions

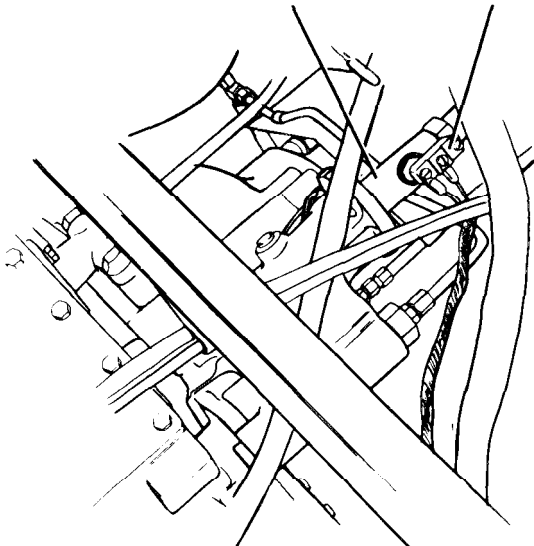
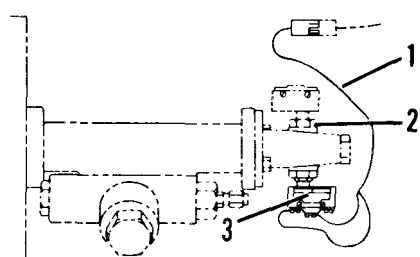
Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">ALARM REMOVAL</div> <ol style="list-style-type: none"> 1. Wires (2) 2. Nuts, washers and bolts (3) 3. Alarm (1) 	<p>Tag and disconnect.</p> <p>Remove two.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">ALARM INSTALLATION</div> <ol style="list-style-type: none"> 1. Alarm (1) 2. Bolts (3), washers and nuts 3. Wires (2) 	<p>Locate on mounting holes.</p> <p>Install. Ground wire must be under nut.</p> <p>Connect.</p>	

TA 098714

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">SWITCH REMOVAL</p> <ol style="list-style-type: none"> 1. Wire (1) 2. Nut (2) 3. Switch (3) 	<p>Unplug.</p> <p>Remove.</p> <p>Remove.</p>	<p style="text-align: center;">TRANSMISSION INTERLOCK SWITCH</p> 
<p style="text-align: center;">SWITCH INSTALLATION</p> <ol style="list-style-type: none"> 1. Switch (3) 2. Nut (2) 3. Wire (1) 	<p>Place in mounting hole.</p> <p>Install.</p> <p>Plug in.</p>	<p>Adjust switch travel. See page 2-334.</p> 

VEHICLE HORNS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of vehicle horns.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-95

Equipment Condition

Engine OFF-

Special Tools

None

Personnel Required

One mechanic

References

None

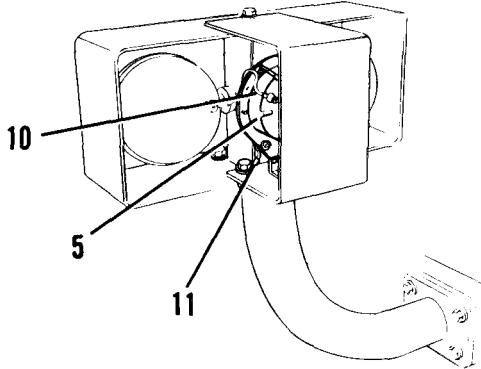
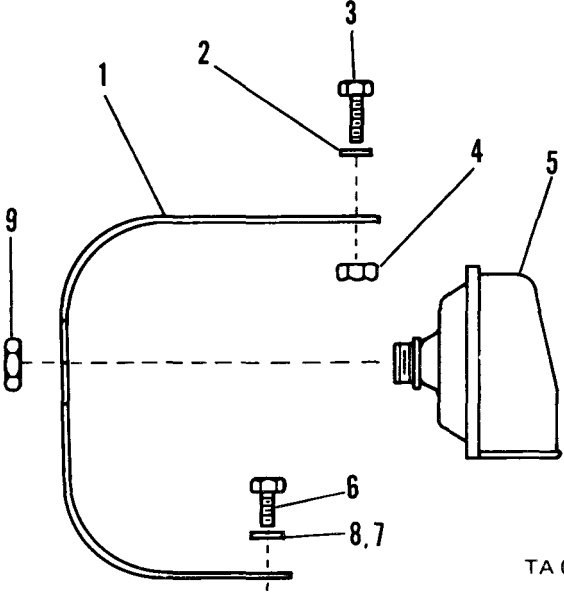
General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

VEHICLE HORNS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Capscrews (3 and 6), nut (4) and washers (2 and 7)	Remove from bracket (1).	
2. Hex nut (9)	Remove from bracket (1).	
3. Horn (5)	Remove.	
4. Electrical connector (10)	Disconnect.	
5. Ground cable (11)	Disconnect.	
INSTALLATION		
1. Electrical connector (10)	Connect.	
2. Horn (5)	Install.	
3. Hex nut (10)	Install.	
4. Ground cable (11)	Connect.	
5. Capscrews (3 and 6), washers (2 and 7) and nuts (4)	Install.	

TA 098716

End

BACKUP ALARM/START INTERLOCK SWITCH TESTING/ADJUSTMENT

(Sheet 1 of 3)

This task covers: Testing and adjusting of backup alarm or start interlock micro switches.

INITIAL SETUP

Test Equipment

Multimeter

Materials/Parts

None

Troubleshooting Reference

Pages 2-73, 2-144

Equipment Condition

Engine OFF

Soecial Tools

None

Personnel Required

One mechanic

References

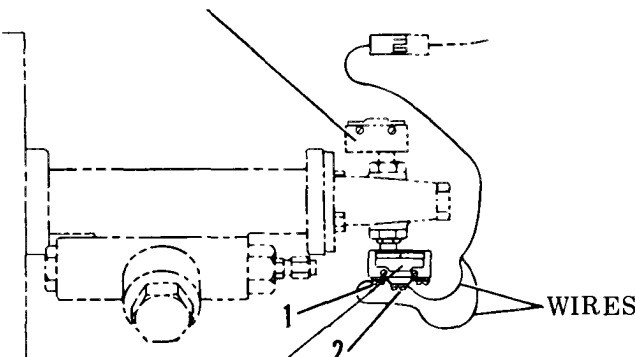
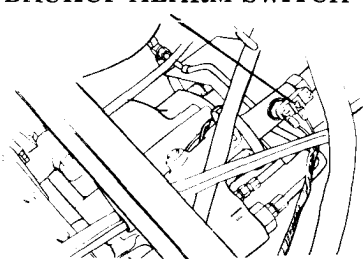
None

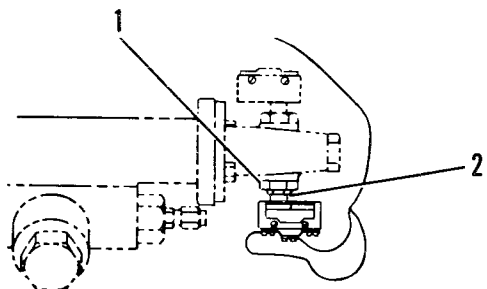
General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

BACKUP ALARM/START INTERLOCK SWITCH TESTING/ADJUSTMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; padding: 5px;">TESTING</p> <p>1. Transmission interlock or backup alarm micro switch terminals</p>	<p>a. Tag and disconnect both wires.</p> <p>b. With your multimeter set to read ohms, connect one lead to terminal (1) and connect other lead to terminal (2).</p>	<p style="text-align: center;">START INTERLOCK SWITCH</p>  <p style="text-align: center;">BACKUP ALARM SWITCH</p> 
<p>2. Transmission gear selector</p>	<p>a. Place in REVERSE.</p> <p>b. Place in NEUTRAL.</p> <p>c. Place transmission selector in FORWARD.</p>	<p>Multimeter should read ZERO (switch closed).</p> <p>Multimeter should read ∞ (switch open).</p> <p>For start interlock switch, multimeter should read ZERO; for backup alarm switch, multimeter should read ∞.</p>

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ADJUSTMENT</div> 1. Actuator jam nut (1) 2. Transmission gear selector. 3. Actuator body (2) 4. Actuator jam nut (1)	Multimeter connected as in TESTING. Loosen. Put in REVERSE. a. Turn in or out just until ohms scale reads ZERO, switch closes. b. Turn (2) one additional turn in. Tighten.	 If ohms scale remains ∞ ohms, replace switch and actuator assembly. Repeat adjustment. Go to TESTING, Step 1.

RELAY, SOLENOID, CIRCUIT BREAKER, DIODE AND SWITCH REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of any relay, solenoid, circuit breaker, diode and switch.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Pages 2-88, 2-97

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Schematics, page FO-1

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

RELAY, SOLENOID, CIRCUIT BREAKER, DIODE AND SWITCH REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">REMOVAL</div> <p>1. Wires</p> <p>2. Nuts, bolts or screws</p> <p>3. Relay, solenoid, circuit breaker, diode or switch</p>	<p>Locate, tag and remove all wires connected to the part being replaced.</p> <p>Remove the fastener holding the part on.</p> <p>Remove.</p>	<p>See schematics, page FO-1.</p>

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;"> INSTALLATION </div> <p>1. Relay, solenoid, circuit breaker, diode or switch</p> <p>2. Bolts, nuts or screws</p> <p>3. Electrical wires</p>	<p>Position on mounting holes.</p> <p>Install.</p> <p>Install per tagging.</p>	

End

WIRING HARNESS REPAIR

(Sheet 1 of 2)

This task covers: Repairing wiring harness.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wire that is the correct gage

Troubleshooting Reference

Page 2-66

Equipment Condition

Harness removed from vehicle

Engine OFF

Special Tools

Electrical crimper

Soldering gun

Personnel Required

One mechanic

References

Electrical schematics, page FO-1

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Wires	<p>If wires of a harness are found defective they may be replaced. Sometimes it may be necessary to cut open the wrapping with a sharp knife. After replacing the wire(s) you should rewrap the group of wires with electrical tape. At this time it will be necessary to replace the connectors. See Step 2.</p>	<p>Do not try to replace a wire with a gage different than that of the original wire.</p> <p>Try to replace the wire with the same color so it will be color coded to the manual.</p>
2. Connector	<p>There is a large variety of connectors available. Determine which type to use from the old connector. The connector may be fastened by soldering or crimping with an electrical crimper.</p>	<p>If you splice wires be sure you insulate the connection with electrical tape.</p>

End

BRAKE SYSTEM MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these brake system components for Organizational Maintenance personnel:

- a. Parking brake linkage
- b. Brake pedal
- c. Service brake linkages

Also instructions for:

- a. Adjusting parking brake linkage
- b. Bleeding parking brake
- c. Adjusting service brake linkage
- d. Adjusting service brake pedal
- e. Bleeding service brake

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Parking brake control linkage removal/installation.	2-343	None
2	Service brake pedals removal/installation.	2-346	None
3	Brake pedal linkages disassembly/assembly.	2-353	2-34
4	Parking brake linkage adjustment.	2-358	2-35
5	Parking brake bleeding.	2-360	None
6	Parking brake lines and fittings inspection/removal/installation.	2-363	2-34
7	Service brake control linkage adjustment.	2-366	2-34, 2-35
8	Service brake pedals adjustment.	2-369	2-34
9	Service brake system bleeding.	2-371	None

End

PARKING BRAKE CONTROL LINKAGE REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of parking brake linkage.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Wheels blocked

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

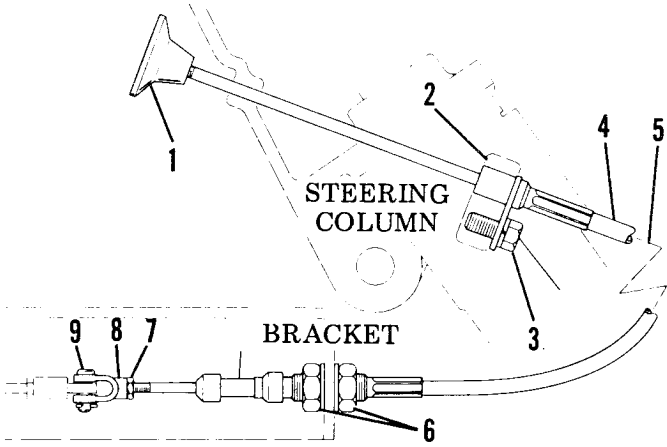
Parking brake linkage adjustment, page 2-358

General Safety Instructions

Block front and rear tires

Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <p>1. Nut (7)</p> <p>2. Pin (9), cotter pin and clevis (8)</p> <p>3. Cable (5)</p> <p>4. Nuts (6)</p> <p>5. Capscrew (3) and clip (2)</p> <p>6. Knob (1), stem, cable housing (4) and cable (5)</p> <p>7. Knob, stem and cable (5)</p>	<p style="text-align: center;">NOTE</p> <p>Make sure all oil pressure is relieved from brake system before disassembly. Turn off engine and relieve pressure by pressing a brake pedal repeatedly until ail brake oil pressure is relieved.</p> <p>Loosen.</p> <p>Remove from parking brake valve.</p> <p>Disengage from clevis (8).</p> <p>Loosen completely.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove from cable housing (4).</p>	 <p style="text-align: center;">TO PARKING BRAKE VALVE</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>1. Knob</p> <p>2. Clip</p> <p>3. Capscrew</p> <p>4. Cable housing</p> <p>5. Cable</p> </div> <div style="width: 45%;"> <p>6. Nut</p> <p>7. Nut</p> <p>8. Clevis</p> <p>9. Pin</p> </div> </div>

TA 098719

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
8. Knob (1), stern and cable (5)	Insert in cable housing (4).	
9. Capscrew (3) and Clip (2)	Install to secure cable housing.	
10. Nuts (6)	Tighten.	
11. Pin (9), cotter pin and clevis (8)	Install.	
12. Nut (7)	a. Tighten. b. Adjust cable tension.	See page 2-358.

End

SERVICE BRAKE PEDALS REMOVAL/INSTALLATION

(Sheet 1 of 7)

This task covers: Removal and installation of service brake pedal components.

INITIAL SETUP

Test Equipment

None

Materials/Pints

Multipurpose grease, item 3, Appendix C

Troubleshooting Reference

None

Equipment Condition

Engine shut down

Vehicle parked on level surface

Special Tools

Seal driver

Level rule

Personnel Required

One mechanic

References

Service brake pedal adjustment, page 2-369

PMCS, page 2-5

General Safety Instructions

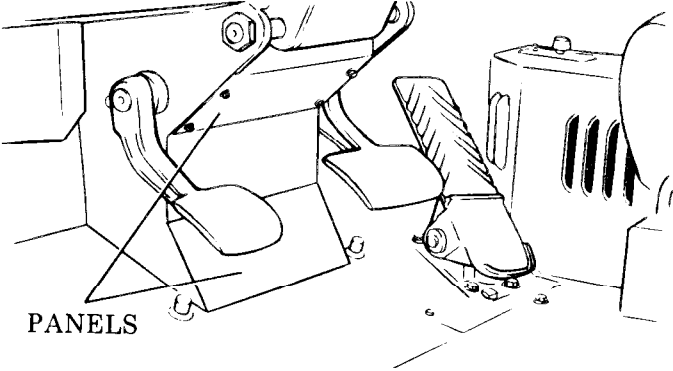
Apply parking brake and block tires before performing the procedure.

Main disconnect switch OFF.

Go on to Sheet 2

SERVICE BRAKE PEDALS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 7)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Two panels that cover brake pedal linkage and cables</p> <p>2. Twelve point capscrew (10)</p> <p>3. Pedal (11) and washer (3)</p> <p>4. Spring (18)</p>	<p style="text-align: center;">NOTE</p> <p>Procedure given is for right hand brake pedal. Left hand brake pedal is the same.</p> <p>Remove.</p> <p>Remove from back of pedal.</p> <p>Slide off splined shaft.</p> <p>Remove.</p>	 <p style="text-align: center;">See Sheet 4 for illustration.</p>

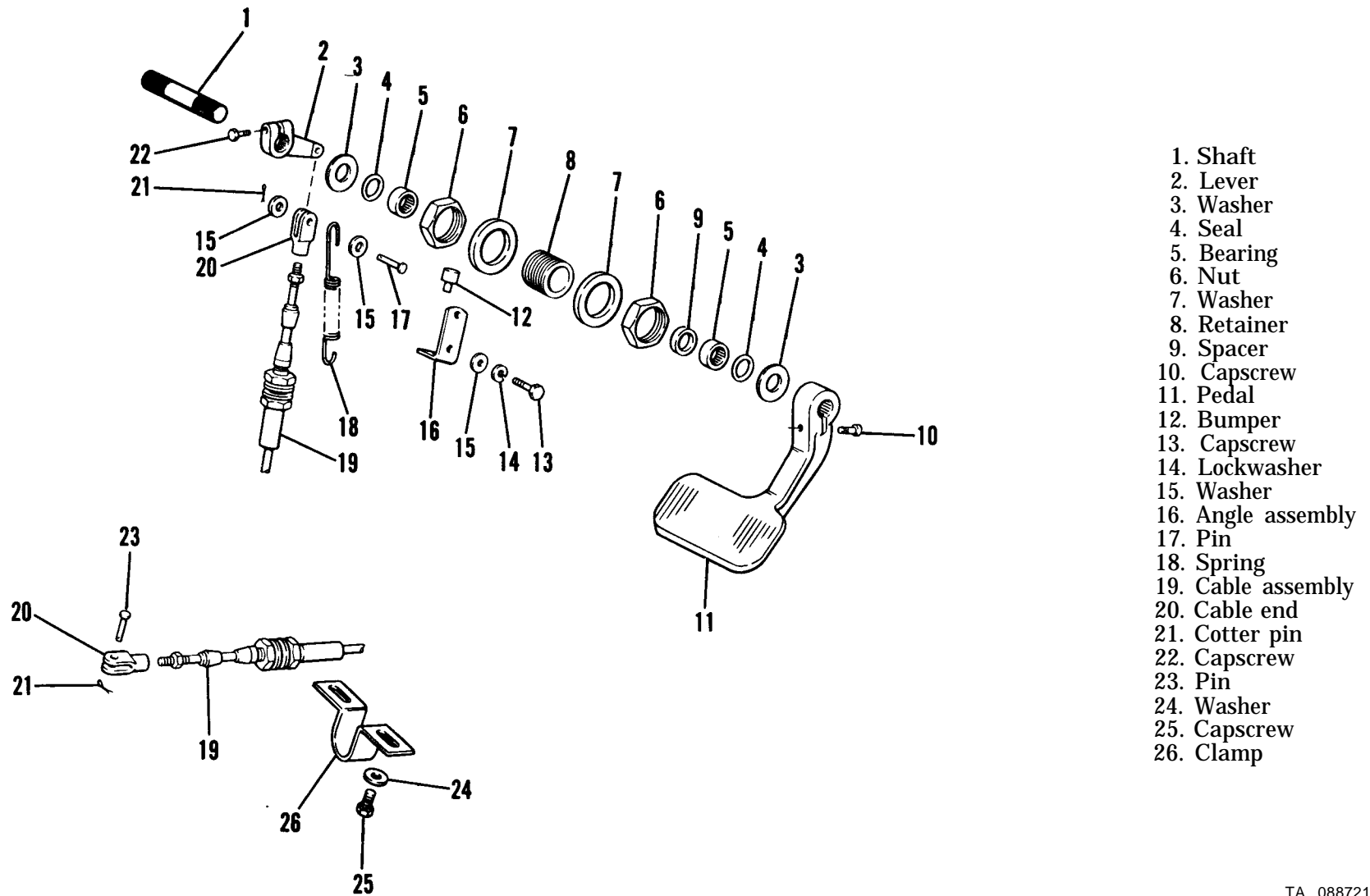
Go on to Sheet 3

SERVICE BRAKE PEDALS REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 7)

LOCATION/ITEM	ACTION	REMARKS
5. Capscrews (13). lockwashers (14). washer (15), angle assembly (16)	Remove.	
6. Cotter pin (21), two washers (15), pin (17)	Remove from lever (2) to release cable (19).	
7. Shaft (1)	Slide out of bearing (5)	
8. Capscrew (22) and shaft (1)	Remove from lever (2).	
9. Large nut (6) and washer (7) on inside of pedal	Remove from bearing retainer (8).	
10. Large nut (6) and washer (7) on outside of pedal	Remove from other side of bearing retainer (8).	

Go on to Sheet 4

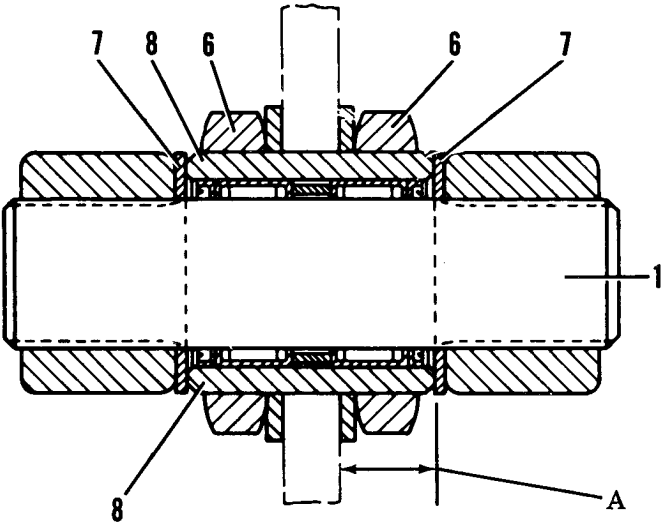


TA 088721

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
11. Seals (4)	Remove and discard.	
12. Bearings (5) and spacer (9)	Remove.	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Bearings (5)	a. Lubricate with multipurpose grease. b. Install with spacer (9) into retainer (8).	
2. Lip type seals (4)	a. Install in retainer. Seals must contact bearings. Lips of seals must be toward outside of retainer. b. Lubricate lips with multipurpose grease.	Use a seal driver to install.
3. One nut (6) and washer (7)	Install on retainer (8).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
4. Retainer (8)	Install into hole in frame.	
5. Other nut (6) and washer (7)	Install.	
6. Retainer assembly	Adjust: a. Turn nuts (6) until end of retainer (8) is 0.62 in. (15.7 mm) from side of bracket (Dimension A). b. Tighten nuts (6) to 90-110 lb. ft. (121-149 N•m).	
7. Lever (2)	a. Install on shaft (1). b. Secure with capscrew (22). c. Install assembly with washer (3) between lever and nut (6).	

SERVICE BRAKE PEDALS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Cable end (20)	Connect to lever assembly with washers (15), pin (17) and cotter pin (21).	
9. Spring (18)	Install on pin in lever assembly.	
10. Angle assembly (16)	Install against lever with two cap screws (13) and lockwashers (14) and washer (15).	
11. Pedal (11) and washer (3)	a. Install on splined shaft (1) of lever assembly so it is about 3.75 in. (95.3 mm) from floor. b. Secure with capscrew (10).	
12. Brake pedal	Adjust.	See page 2-369.
13. Floor panels	Install.	

End

BRAKE PEDAL LINKAGES DISASSEMBLY/ASSEMBLY

(Sheet 1 of 5)

This task covers: Disassembly and assembly of brake pedal linkages.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-34

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Service brake pedal adjustment, page 2-369

PMCS, page 2-5

General Safety Instructions

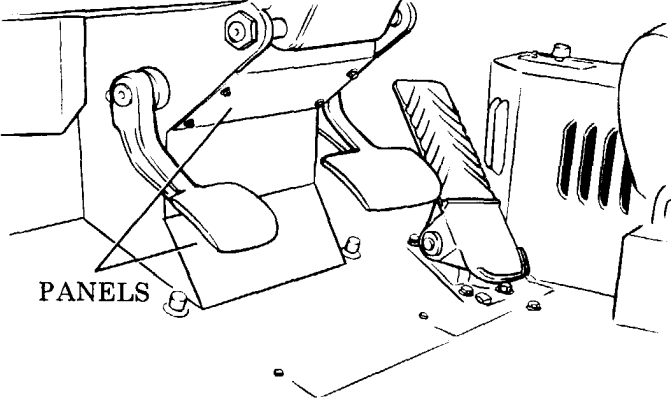
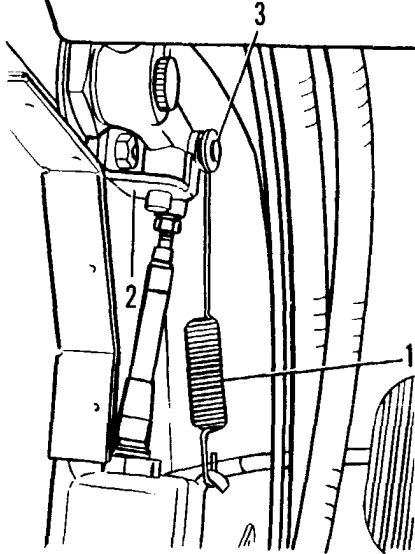
Block front and rear tires.

Main disconnect switch OFF.

Go on to Sheet 2

BRAKE PEDAL LINKAGES DISASSEMBLY/ASSEMBLY (CONT)

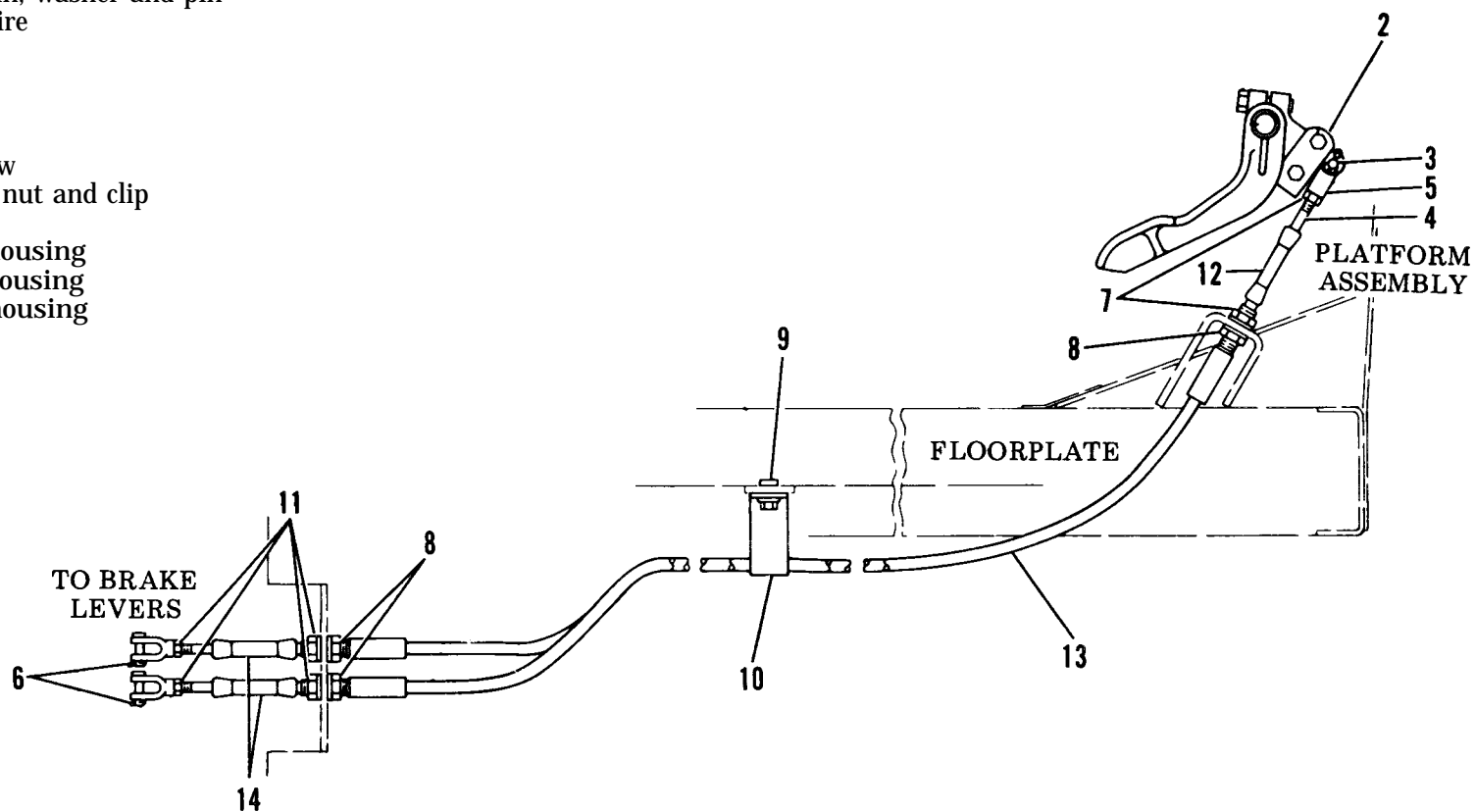
(Sheet 2 of 5)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">DISASSEMBLY</p> <ol style="list-style-type: none"> <li>1. Two panels that cover brake pedal linkage and cables <li>2. Spring (1) <li>3. Two capscrews and washers that secure angle stop (2) <li>4. Angle stop (2) <li>5. Cotter pin, two washers and pin (3) that secure cable clevis 	<p style="text-align: center;">WARNING</p> <p>Make sure all pressure in brake system is released before any lines are disconnected. With engine off, pump a brake pedal repeatedly until all pressure is relieved.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p>	 <p>PANELS</p> 

TA 098723

Go onto Sheet 3

1. Spring (shown on page 2-354)
2. Angle stop
3. Cotter pin, washer and pin
4. Cable wire
5. Clevis
6. Pin
7. Nut
8. Nut
9. Capscrew
10. Washer, nut and clip
11. Nut
12. Cable housing
13. Cable housing
14. Cable housing

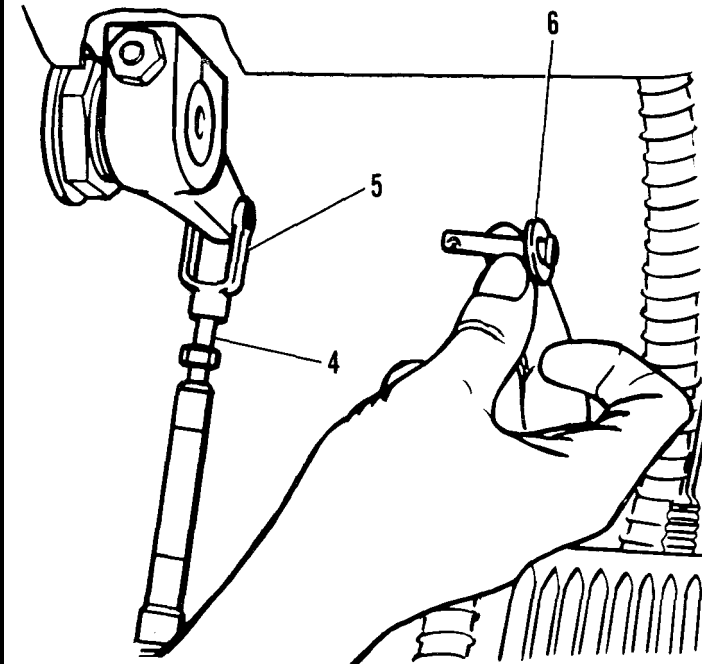


TA 098724

Go on to Sheet 4

2-355

BRAKE PEDAL LINKAGES DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS	
6. Cable wire (4)	Disconnect from clevis (5).		
7. Access door assembly over brake control valve group	Lift up and lay access door down.		
8. Pins (6) and cotter pins	Remove from clevis that secures cables to brake pedal levers.		
9. Cable wire (4)	Remove from valve group end of cable wire housing.		
10. Nuts (7) on upper cable housing (12)	Remove.		
11. Nuts (8) on middle cable housing (13)	Remove.		
12. Capscrew (9), washer, nut and clip (10)	Remove.		
13. Nuts (11) on lower cable housing (14)	Remove.		
<p style="text-align: center;">NOTE</p> <p>If only cable wire needs replacing, then follow Steps 1 thru 8, ASSEMBLY.</p>			

TA 098725

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Lower cable housings (14)	a. Install cm bracket.	See page 2-355.
	b. Secure with nuts (11).	
2. Middle cable housings (13)	a. Install on bracket and to floor plate.	
	b. Secure with nuts (8).	
3. Capscrew (9), nut., washer and clip (10)	Install.	
4. Cable wire (4)	a. Feed through cable housings from brake control valve end.	
	b. Secure to clevis.	
	c. Secure clevis to brake levers with pins (6) and cotter pins.	
5. Upper cable housings (12)	Install and feed cable wire (4) through at same time.	
6. Cable wire (4)	a. Secure to clevis.	
	b. Secure clevis to brake pedal with cotter pin, two washers, pin (3) and spring (1).	
7. Angle stop (2)	a. Install.	
	b. Adjust against brake lever pedal so that pedal is 3.25 in. (82.6 mm) above pedal stop on floor plate.	
8. Two panels that cover brake pedal linkage and cables.	Install and secure with capscrews.	

End

PARKING BRAKE LINKAGE ADJUSTMENT

This task covers: Adjustment of parking brake linkage.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-35

Equipment Condition

Engine OFF. Shipping link installed.
Wheels blocked. Parking brake control IN.

Special Tools

Steel rule

Personnel Required

One mechanic

References

Parking brake control linkage removal/
installation, page 2-343.

PMCS, page 2-5.

Shipping link removal/installation,
page 2-471.

General Safety Instructions

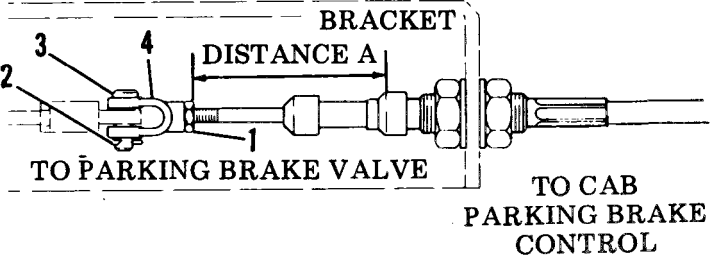
Park vehicle on level ground. Place blocks
in front of and behind each wheel to pre-
vent vehicle moving.

Main disconnect switch OFF.

Go on to Sheet 2

PARKING BRAKE LINKAGE ADJUSTMENT (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
1. Parking brake control	Push IN.	
2. Parking brake linkage (located beneath cab)	<p>a. Measure distance A.</p> <p>b. If distance A is different from the specification:</p> <p>Loosen nut (1).</p> <p>Remove cotter pin (2).</p> <p>Remove rod end pin (3).</p> <p>Turn rod end (4) to adjust distance.</p> <p>Install rod end pin (3) and cotter pin (2).</p> <p>Tighten nut (1).</p>	<p>Distance should be between 6.8 and 6.9 in. (172.7 to 175.7 mm).</p>  <p>1. Nut</p> <p>2. Cotter pin</p> <p>3. Pin</p> <p>4. Rod end</p>

TA 098726

End

PARKING BRAKE BLEEDING

This task covers: Bleeding air from parking brake system.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Hydraulic oil

Hoses

Buckets

Troubleshooting Reference

None

Equipment Condition

Parking brake control IN.

Transmission selector lever in NEUTRAL.

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12

Shipping link removal/installation,
page 2-471.

TM 10-3930-641-10

Service brake bleeding, page 2-371

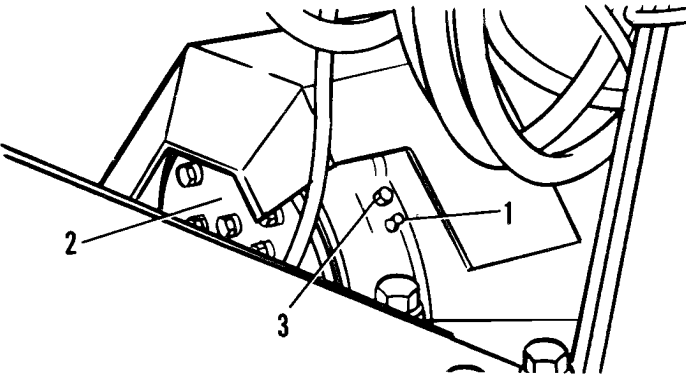
General Safety Instructions

Be sure vehicle is on level ground.

Install shipping link.

Place blocks in front of and behind wheels
to prevent vehicle movement.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Engine</p> <p>2. Parking brake control</p> <p>3. Hose</p> <p>4. Screw valve (3)</p>	<p style="text-align: center;">WARNING</p> <p>Be sure the vehicle is on level ground. Put blocks in front of and behind each wheel so vehicle does not move.</p> <p style="text-align: center;">NOTE</p> <p>Check hydraulic oil level. Fill if necessary.</p> <p>a. Start engine.</p> <p>b. Wait for LOW BRAKE PRESS indicator to go OFF.</p> <p>c. Turn engine OFF.</p> <p>Push in.</p> <p>Connect to fitting (1) on top of parking brake housing (2).</p> <p>a. Open using an open-end wrench.</p>	<p>See TM 10-3930-641-10.</p> <p>See TM 10-3930-641-10.</p>  <p style="text-align: center;">VIEWED FROM UNDER FORWARD END, LEFT SIDE OF CAB</p> <p style="text-align: right;">TA 098727</p> <p style="text-align: right;">Go on to Sheet 3</p>

PARKING BRAKE BLEEDING (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Screw valve (3) (cont)	b. Allow oil to flow through hose until there are no air bubbles in oil. c. Close valve.	
5. Hydraulic oil reservoir	<div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px auto; width: fit-content;"> WARNING </div> Remove reservoir cap slowly. Hydraulic system is under pressure, and cap could fly off if removed quickly. Check oil level. Fill as necessary.	
6. Parking brake		See TM 10-3930-641-10.

End

PARKING BRAKE LINES AND FITTINGS INSPECTION/REMOVAL/INSTALLATION

This task covers: Inspection and replacement of parking brake lines and fittings.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Hydraulic oil

Troubleshooting Reference

Page 2-34

Equipment Condition

Parking brake control IN.

Special Tools

None

Personnel Required

One mechanic

References

Torque Limits Chart, page E-1

PMCS, page 2-5

General Safety Instructions

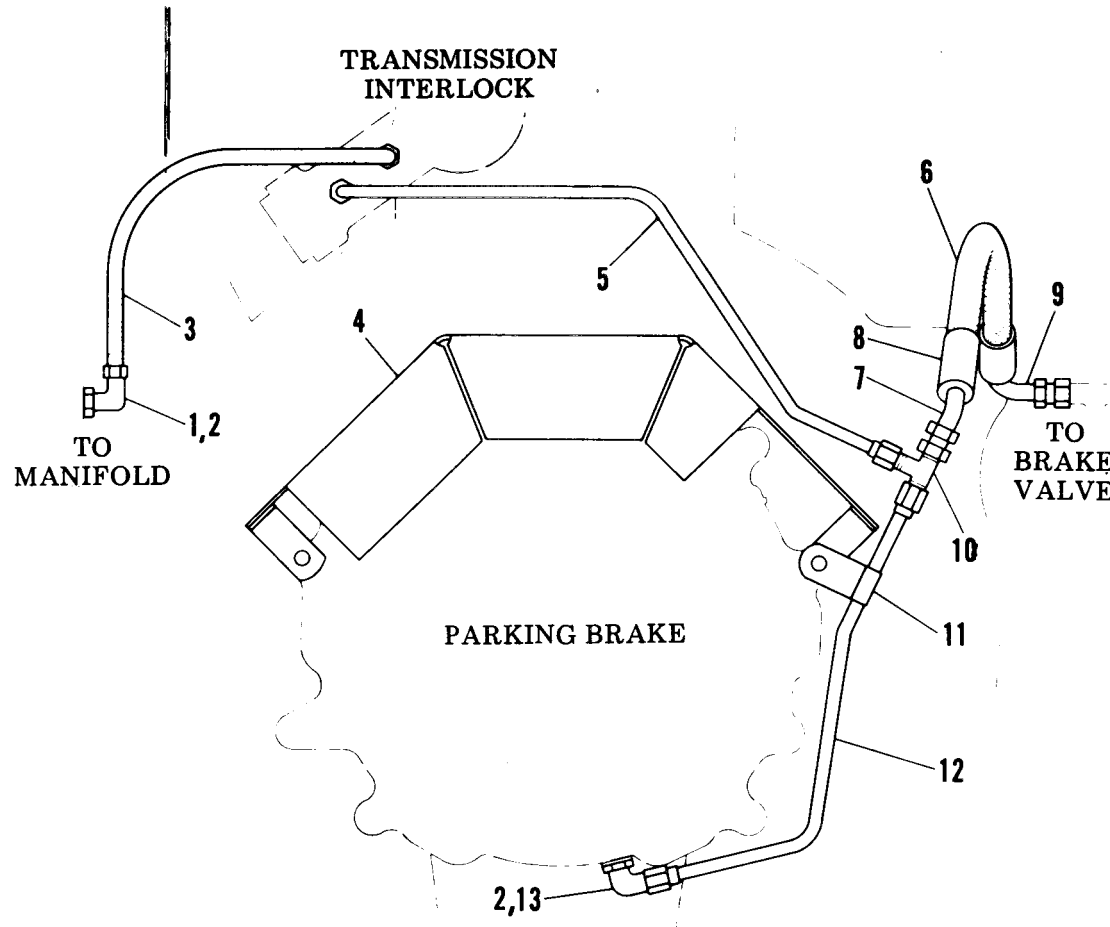
Park vehicle on level ground. Install safety link.
 Place blocks in front of and behind wheels to prevent vehicle movement.
 Release brake pressure by pumping brake pedal until resistance is gone.
 Main disconnect switch OFF.

Go on to Sheet 2

PARKING BRAKE LINES AND FITTINGS INSPECTION/REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px; text-align: center;">INSPECTION</div> <p>1. Lines (3, 5,6, 12)</p> <p>2. Elbows (1, 13)</p> <p>3. Tee (10)</p> <p>4. Preformed packing (2)</p> <p>5. Coupling (7, 9)</p>	<p>Check for damage, leaks and kinks.</p> <p>Check for damage, leaks.</p> <p>Check for damage, leaks.</p> <p>Check for damage.</p> <p>Check for leaks, damage.</p>	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px; text-align: center;">REMOVAL/INSTALLATION</div> <p>1. Lines and fittings</p>	<p>Replace if damaged or leaking:</p> <p>a. Loosen nuts on fittings.</p> <p>b. Remove darnaged part.</p> <p>c. Install new part.</p> <p>d. Tighten fittings.</p>	<p>See Torque Limits Chart, page E-1.</p>

Go on to Sheet 3



- 1. Elbow
- 2. Preformed packing
- 3. Hose assembly
- 4. Guard assembly
- 5. Tube assembly
- 6. Hose assembly
- 7. Coupling assembly
- 8. Sleeve
- 9. Coupling assembly
- 10. Tie
- 11. Clip
- 12. Tube assembly
- 13. Elbow

SERVICE BRAKE CONTROL LINKAGE ADJUSTMENT

This task covers: Adjustment of service brake control linkage.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Pages 2-34, 2-35

Equipment Condition

Engine OFF. Parking brake control OUT.

Shipping link installed.

Platform door open.

Special Tools

Steel rule

Personnel Required

One mechanic

References

PMCS, page 2-5

Parking brake control linkage removal/
installation, page 2-343

Shipping link removal/installation,
page 2-471.

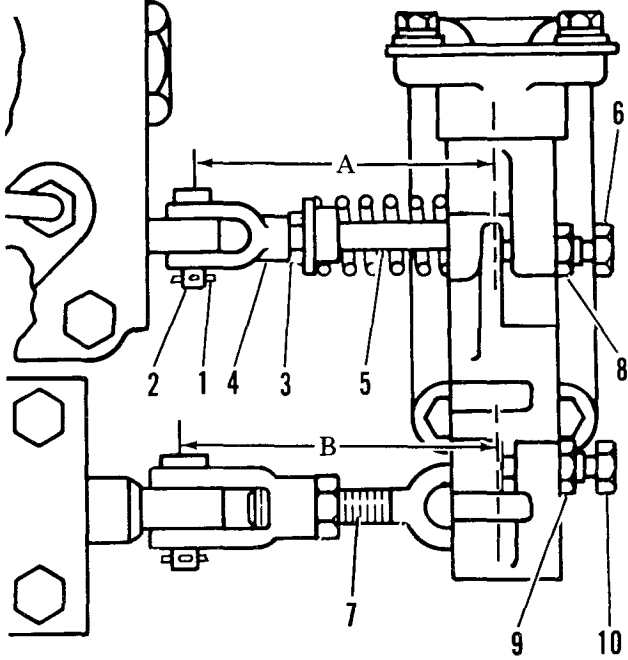
General Safety Instructions

Release brake pressure by pumping brake
pedal until there is no resistance.

Main disconnect switch OFF.

Go on to Sheet 2

SERVICE BRAKE CONTROL LINKAGE ADJUSTMENT (CONT)

LOCATION/ITENI	ACTION	REMARKS
<p>1. Rod (5) (Refer to page 2-355 for location)</p>	<p>a. Check distance A.</p> <p>b. If distance A is incorrect, adjust rod length.</p> <p>Remove cotter pin (1) from rod end pin (2).</p> <p>Remove rod end pin (2).</p> <p>Loosen nut (3).</p> <p>Adjust rod length by twisting rod end (4) in or out on rod (5).</p> <p>Replace rod end pin (2) and cotter pin (1).</p> <p>Recheck distance A.</p>	<p>Distance A should be 4.25 m. (108.0 mm).</p>  <p>The diagram shows a side view of the brake control linkage assembly. It includes a vertical rod (5) connected to a bracket (4) via a rod end pin (2) and cotter pin (1). A nut (3) is on the rod. A distance marker 'A' is shown between the bracket and a vertical surface. Another distance marker 'B' is shown between the bracket and a horizontal surface. Other parts are numbered 6, 7, 8, 9, and 10.</p>

BRAKE CONTROL LINKAGE

SERVICE BRAKE CONTROL LINKAGE ADJUSTMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
2. Rod (7)	a. Check distance B. b. If distance B is incorrect, adjust rod length as described in Item 1b on previous page.	Distance B should be 4.40 in. (111.8 mm).
3. Nut (8)	Loosen.	
4. Capscrew (6)	Adjust so that the end just touches lever.	
5. Nut (8)	Tighten.	
6. Nut (9)	Loosen.	
7. CapsCrew (10)	Adjust so that the end just touches lever.	
8. Nut (9)	Tighten.	

End

SERVICE BRAKE PEDALS ADJUSTMENT

(Sheet 1 of 2)

This task covers: Adjustment of service brake pedal travel.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-34

Equipment Condition

Engine OFF. Parking brake control OUT.

Special Tools

Steel rule

Personnel Required

One mechanic

References

PMCS, page 2-5

Service brake pedals removal/installation,
page 2-346

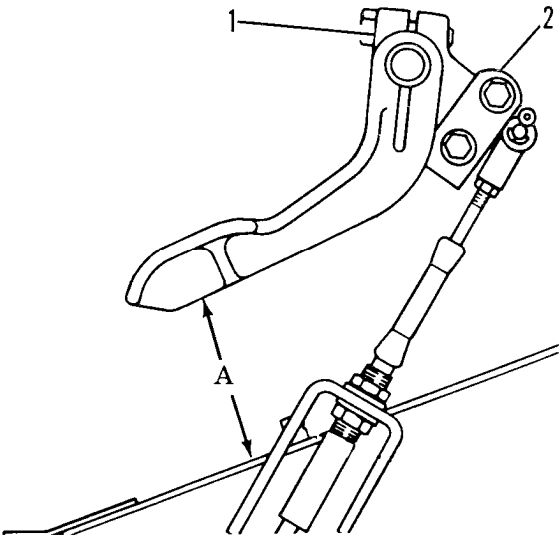
General Safety Instructions

Release brake pressure by pumping brake
pedal until resistance is gone.

Main disconnect switch OFF.

Go on to Sheet 2

SERVICE BRAKE PEDALS ADJUSTMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
1. Angle assembly (2)	Loosen two capscrews and nuts on angle assembly.	Dimension A should be 3.25 in. (82.6 mm).
2. Lever (1)	Adjust to dimension A.	
3. Angle assembly (2)	Move to hold lever (1) at dimension A. Tighten capscrews and nuts on angle assembly.	<p>ADJUSTMENT OF BRAKE PEDAL TRAVEL</p>

SERVICE BRAKE SYSTEM BLEEDING

(Sheet 1 of 5)

This task covers: Bleeding air from service brake system.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Oil; as required

Hoses

Buckets

Troubleshooting Reference

None

Equipment Condition

As described in procedure

Transmission selector lever in NEUTRAL

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12

TM 10-3930-641-10

PMCS, page 2-5

Parking brake beeding, page 2-360

Shipping link removal/installation,
page 2-471.

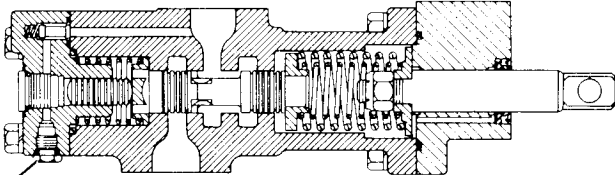
General Safety Instructions

Be sure vehicle is on level ground.

Install shipping link

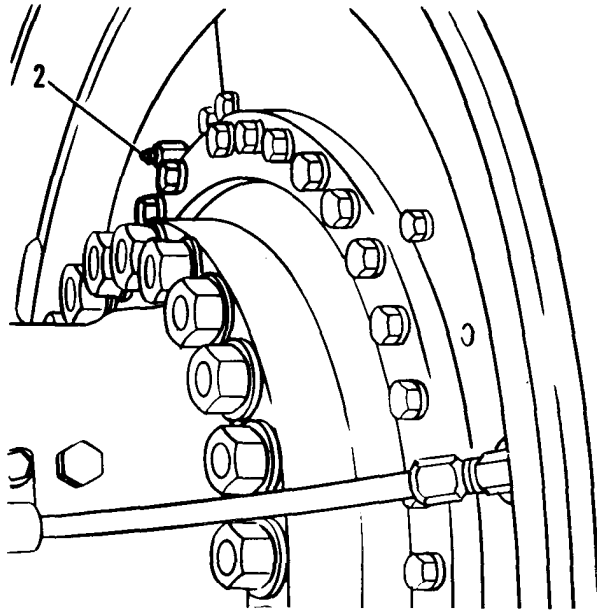
Place blocks in front of and behind wheels
to prevent vehicle movement.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
NOTE		
<p>Be sure to keep hydraulic tank full throughout this bleeding procedure. You'll have to check oil level several times.</p>		
<p>1. Engine</p>	<p>a. Start</p> <p>b. Run at low idle until LOW PRESS BRAKE light goes off.</p> <p>c. Stop.</p>	<p>See TM 10-3930-641-10.</p> <p>See TM 10-3930-641-10. See page 1-22, BRAKE SYSTEM DESCRIPTION, Step 4.</p>
<p>2. Brake control valve plug (1)</p>	<p>Open (turn counterclockwise).</p>	<p>See SYSTEM DESCRIPTIONS, page 1-22 for location.</p>
<p>3. Brake pedal</p>	<p>Push and hold until oil flowing from plug has no air (no bubbles).</p>	
<p>4. Brake control valve plug</p>	<p>Close.</p>	
<p>5. Brake pedal</p>	<p>Release.</p>	
 <p>BRAKE CONTROL VALVE</p> <p>1. Plug for removal of air</p>		

SERVICE BRAKE SYSTEM BLEEDING (CONT)

(Sheet 3 of 5)

LOCATION/ITEM	ACTION	REMARKS
6. Engine	<p>a. Start.</p> <p>b. Run at low idle until LOW PRESS BRAKE light goes off.</p> <p>c. Stop.</p>	<p>See TM 10-3930-641-10.</p> <p>See TM 10-3930-641-10.</p>
7. Brake pedal	Press 5 times to relieve oil pressure.	 <p>A technical drawing of a wheel brake assembly. It shows a curved brake drum with several bolts around its circumference. A horizontal line representing a hose or pipe is connected to a specific bolt, which is labeled with the number '2'. Below the drawing, the text 'AIR REMOVAL SCREW' is written.</p>
8. Steps 6 and 7	Do two more times.	
9. Hose	Connect to air removal screw (2) at one of the wheel brakes.	

AIR REMOVAL SCREW

TA 098733
Go on to Sheet 4

SERVICE BRAKE SYSTEM BLEEDING (CONT)

LOCATION/ITEM	ACTION	REMARKS
10. Engine	a. Start. b. Run at low idle.	See TM 10-3930-641-10.
11. Air removal screw (2)	Turn out 1/2 to 1 turn to let oil flow through hose.	
12. Brake pedal	Push several times until oil flow from the hose has no bubbles.	Flush about a half gallon of oil from the wheel brake.
13. Air removal screw (2)	Tighten.	
14. Steps 9-13	Do for remaining three wheel brakes.	

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
15. Engine	<p>a. Start.</p> <p>b. Run at low idle until LOW PRESS BRAKE light goes off.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Keep engine running.</p>	See TM 10-3930-641-10.
16. Brake pedal	<p>a. Hold down for 20 seconds.</p> <p>b. Release for 30 seconds.</p> <p>c. Do steps a. and b. 3 times.</p> <p>d. Release.</p>	
17. Air removal screws (2)	<p>a. Open all four at once.</p> <p>b. Allow oil to drain until there are no more air bubbles.</p> <p>c. Close.</p>	Do steps 15-16-17 until oil has no bubbles.
18. Hydraulic tank	Fill with oil	See LO 10-3930-641-12.

End

DRIVE SHAFTS MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these drive shaft components for Organizational Maintenance personnel:

- a. Upper drive shaft
- b. Lower drive shaft

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Upper drive shaft removal/installation.	2-377	None
2	Lower drive shaft removal/installation.	2-380	None

End

UPPER DRIVE SHAFT REMOVAL/INSTALLATION

This task covers: Replacing upper drive shaft.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

- Install safety link.
- Remove front lower drive shaft.
- Remove rear crankcase guard.

Special Tools

Floor jack

Personnel Required

Two mechanics

References

- Lower drive shaft removal/installation, page 2-380
- LO 10-3930-641-12
- PMCS, page 2-5
- Drive system description, page 1-20
- Rear crankcase guard removal/installation, page 2-483.

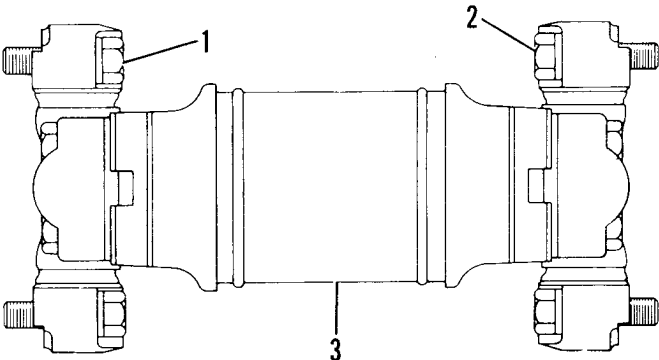
General Safety Instructions

- Block wheels.
- Female portion of drive shaft should be installed toward source of power.
- Main disconnect switch OFF.

Go on to Sheet 2

UPPER DRIVE SHAFT REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
<p>1. Four capscrews, nuts, and washers (1) on spider that faces input transfer gear</p>	<p>Remove.</p>	
<p>2. Center of shaft (3)</p>	<p>Support with hand or jack while doing next step.</p>	
<p>3. Four capscrews, nuts, and washers (2) on spider that faces torque converter</p>	<p>Remove.</p>	
<p>4. Shaft</p>	<p>Remove.</p>	

TA 098734
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center;">INSTALLATION</div> 1. Shaft with spiders 2. Four capscrews, nuts and washers (1) at transfer gearcase end 3. Four capscrews, nuts and washers (2) at torque converter end	<div style="text-align: center;">NOTE</div> <div style="text-align: center;">Use jack to support shaft.</div> Lift into place between torque converter and input transfer gear case. Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N · m). Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N · m).	

End

LOWER DRIVE SHAFT REMOVAL/INSTALLATION

This task covers: Removal and installation of lower drive shaft.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Suitable wood blocks to support drive shaft while on floor jack.

Troubleshooting Reference

None

Equipment Condition

Rear crankcase guard removed.

Install shipping link.

Special Tools

Floor jack

Personnel Required

Two mechanics

References

Upper drive shaft removal /installation, page 2-377

LO 10-3930-641-10

PMCS, page 2-5

Drive system description, page 1-20

Rear crankcase guard removal/installation, page 2-483.

General Safety Instructions

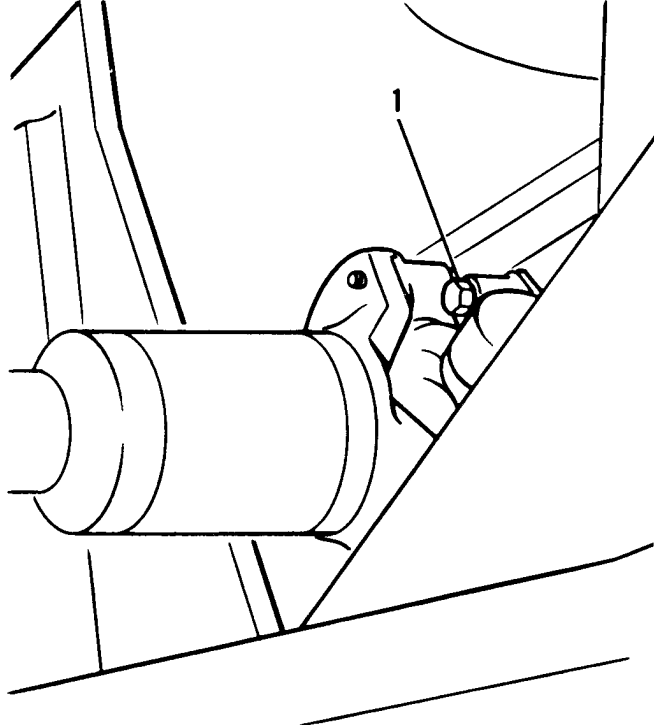
Park vehicle on level ground.

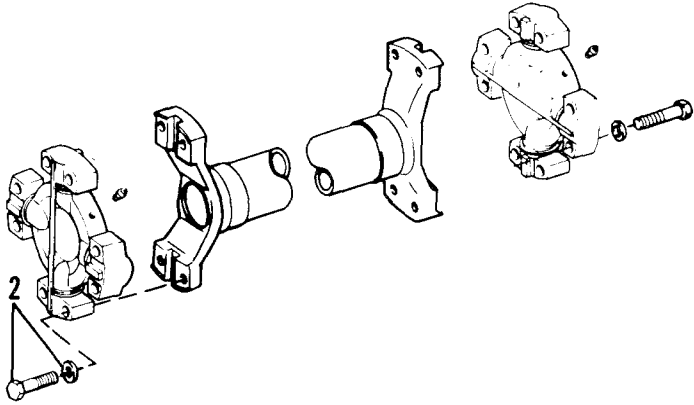
Pull parking brake control OUT to prevent vehicle movement.

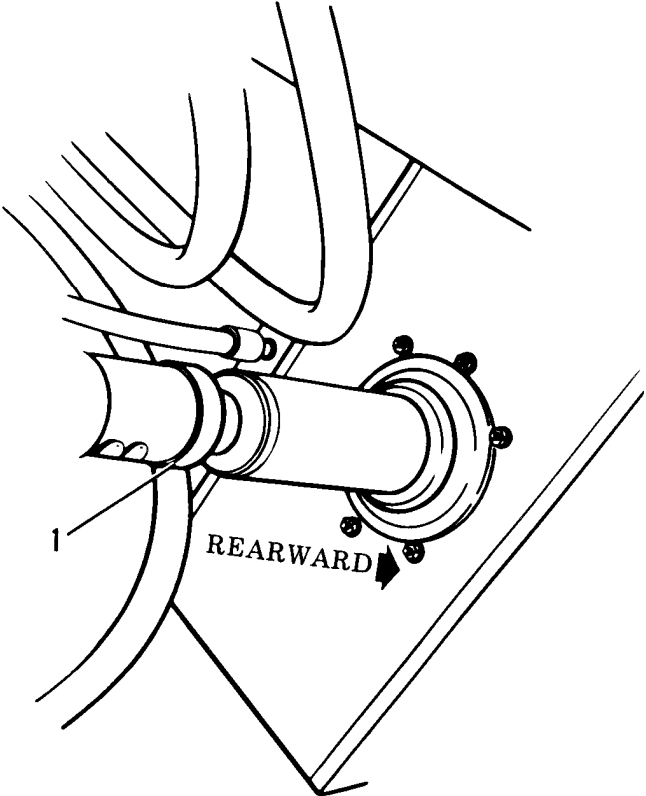
Block wheels.

Main disconnect switch OFF.

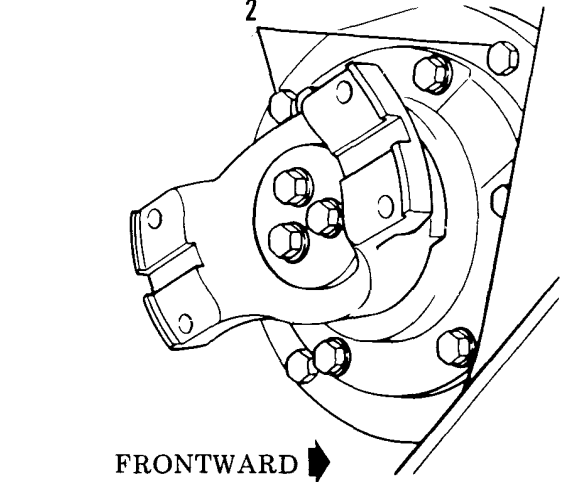
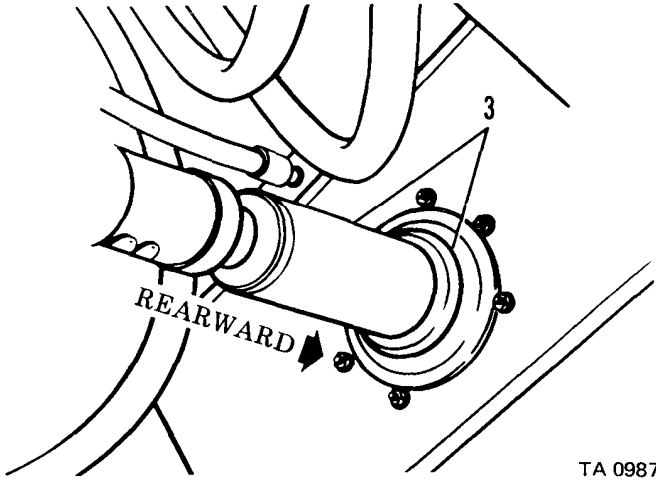
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center;"> REMOVAL OF LOWER DRIVE SHAFT, MIDDLE PIECE </div> <ol style="list-style-type: none"> <li>1. Four capscrews, nuts, and washers (1) on front spider facing bearing cage <li>2. Center of shaft 	<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;"> WARNING </div> <p>Support middle drive shaft during removal or it may fall and injure you. Two men are required for removal. Shaft weight: 86 lb. (39 kg).</p> <p>Remove.</p> <p>Support shaft with suitable jack while doing next step.</p>	

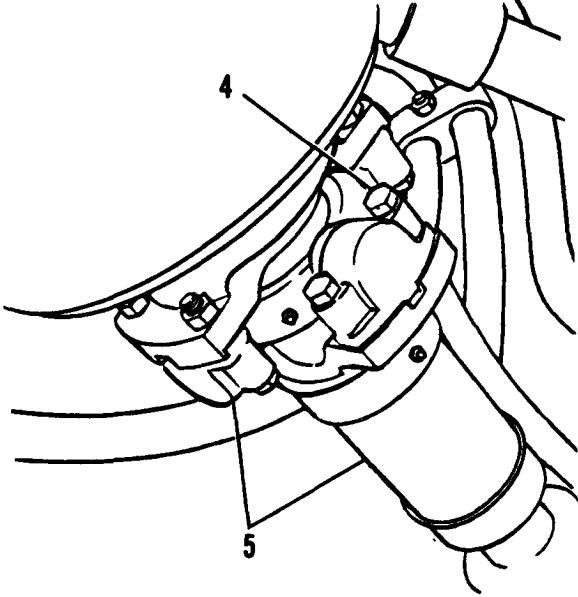
LOCATION/ITEM	ACTION	REMARKS
<p>3. Four capscrews, nuts and washers (2) on rear spider facing transfer gear case</p>	<p>Remove.</p>	<p>REAR FRONT</p>
<p>4. Shaft - with spiders</p>	<p>Carefully remove.</p>	 <p style="text-align: center;">SHAFT WITH SPIDERS</p>

LOCATION/ITEM	ACTION	REMARKS
<p style="border: 1px solid black; padding: 5px; text-align: center;">REMOVAL OF LOWER DRIVE SHAFT, FRONT PIECE</p> <p>1. Collar(1)</p>	<p style="border: 1px solid black; padding: 5px; text-align: center;">WARNING</p> <p>Support front drive shaft during removal or it may fall and injure you. Two men are required for removal. Shaft weight: 132 lb. (60 kg).</p> <p>a. Loosen. Slide to the rear.</p>	 <p>The diagram shows a cross-section of a drive shaft assembly. A collar is positioned on the shaft. An arrow labeled 'REARWARD' points to the right, indicating the direction of movement for the collar. A number '1' points to the collar. The shaft is supported by a frame structure.</p>

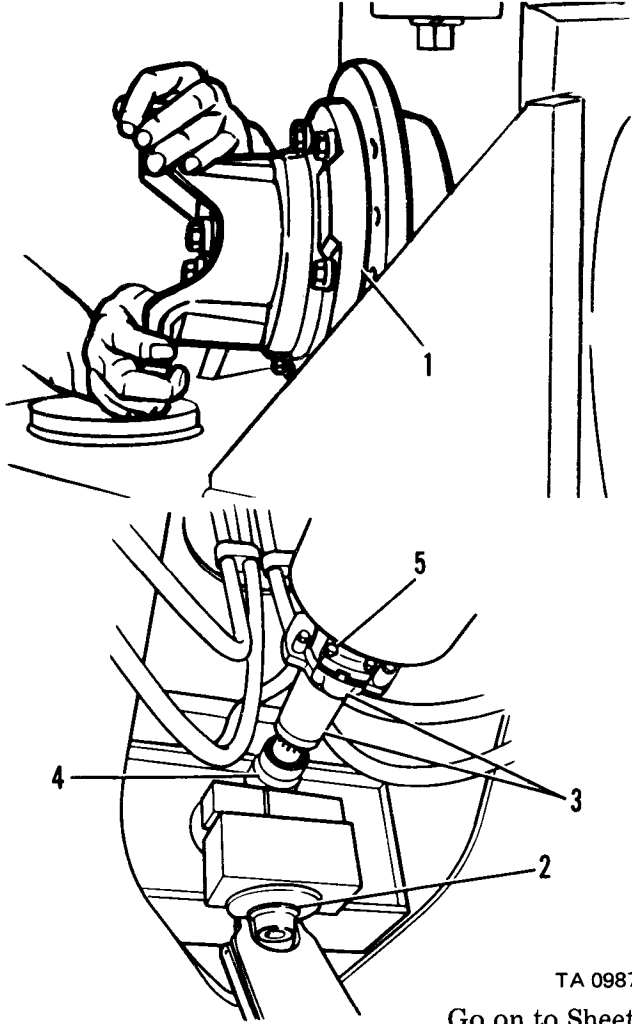
LOWER DRIVE SHAFT REMOVAL/INSTALLATION (CONT)

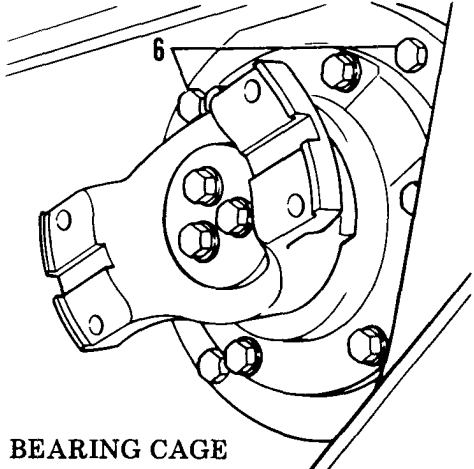
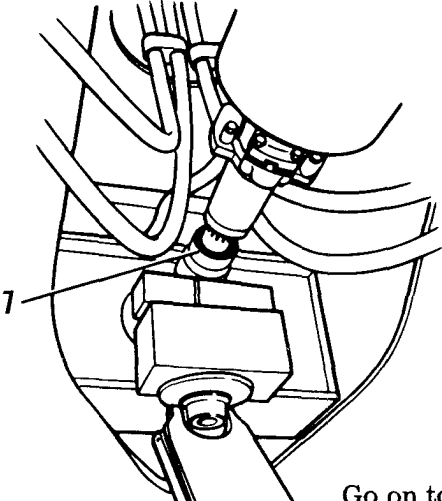
LOCATION/ITEM	ACTION	REMARKS
2. Six capscrews, nuts, and washers (2)	Remove.	
3. Shaft and bearing cage (3)	<p>a. Support shaft with suitable jack while doing next step.</p> <p>b. Pull shaft and bearing cage rearward, out of main frame.</p>	

TA 098738
Go on to Sheet 6

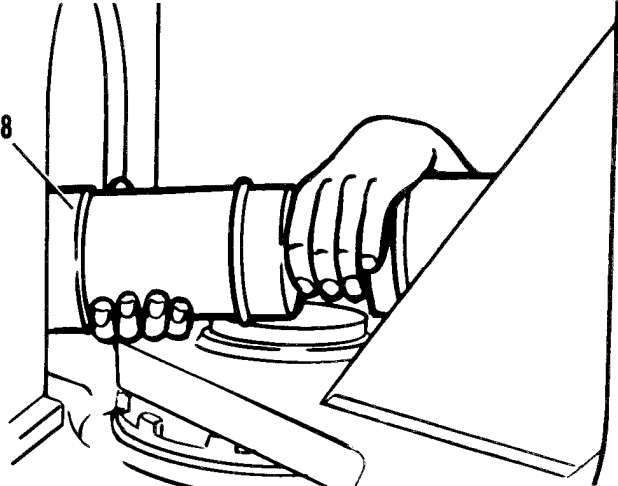
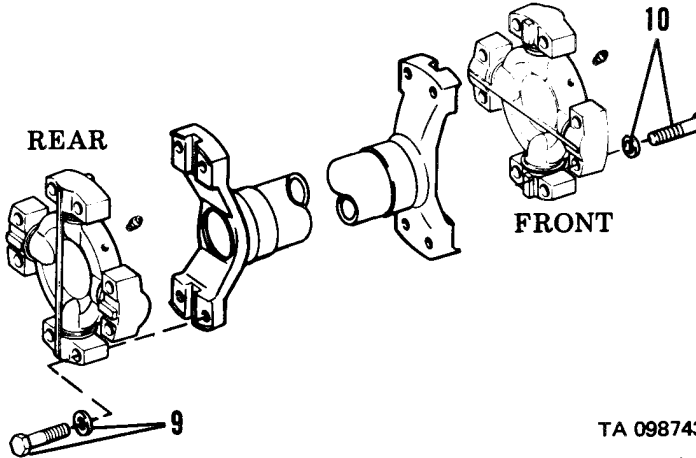
LOCATION/ITEM	ACTION	REMARKS
<p>4. Four nuts, capscrews, and washers (4)</p>	<p>a. Remove.</p> <p>b. Remove spider and front shaft yoke assembly (5).</p>	

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">REMOVAL OF LOWER DRIVE SHAFT, REAR PIECE</p> </div> <ol style="list-style-type: none"> <li>1. Four capscrews, nuts, and washers (1) <li>2. Center of shaft (3) <li>3. Four capscrews, nuts, and washers (2) <li>4. Shaft with spiders 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> <p>WARNING</p> </div> <p>Support rear drive shaft during removal or it will fall and injure you. Two men are required for removal. Shaft weight: 55 lb. (25 kg).</p> <p>Remove.</p> <p>Support shaft with hands or suitable jack while doing next step.</p> <p>Remove.</p> <p>Remove.</p>	<div style="text-align: center;"> </div> <p style="text-align: center;">VIEW FROM UNDER MACHINE</p>

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; margin: 0;">INSTALLATION OF LOWER DRIVE SHAFT, FRONT PIECE</p> </div> <p>1. Bearing cage and shaft (1)</p> <p>2. Spider and front shaft yoke (3)</p> <p>3. Four capscrews, nuts, and washers (5)</p>	<p>a. Support shaft with a floor jack (2).</p> <p>b. Push shaft partly into main frame.</p> <p>a. Slide onto splined end of front shaft (4).</p> <p>b. Aline spider with yoke of front differential.</p> <p>Install. Torque from 90 to 110 lb. ft. (122 to 149 N•m).</p>	

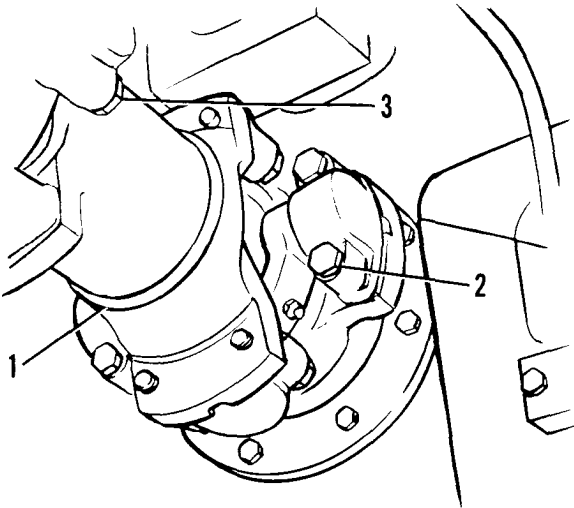
LOCATION/ITEM	ACTION	REMARKS
4. Bearing cage and shaft	Aline holes in main frame with holes in bearing cage.	 <p>Diagram showing the bearing cage assembly with six screws (6) being installed. The cage is being aligned with the main frame.</p> <p>BEARING CAGE</p>  <p>Diagram showing the collar and seal assembly (7) being slid forward and tightened onto the shaft.</p>
5. Six capscrews, nuts, and washers (6)	Install.	
6. Collar (7)	Slide collar and seal forward; tighten.	

TA 098742
Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
<p>INSTALLATION OF LOWER DRIVE SHAFT, MIDDLE PIECE</p>		
<p>1. Shaft with spiders (8)</p>	<p>a. Lift into place between frames of vehicle. b. Jack or block up shaft to keep it in place.</p>	
<p>2. Four capscrews, nuts, and washers (9)</p>	<p>Install. Torque from 90 to 110 lb. ft. (122 to 149 N•m).</p>	
<p>3. Four capscrews, nuts, and washers (10)</p>	<p>Install. Torque from 90 to 110 lb. ft. (122 to 149 N•m).</p>	

TA 098743

Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> INSTALLATION OF LOWER DRIVE SHAFT, REAR PIECE </div> <ol style="list-style-type: none"> <li>1. Shaft with spiders (1) <li>2. Four capscrews, nuts, and washers (2) <li>3. Four capscrews, nuts, and washers (3) 	<p>Lift into position.</p> <p>Install. Torque from 90 to 110 lb. ft. (122 to 149 N•m).</p> <p>Install. Torque from 90 to 110 lb. ft. (122 to 149 N•m).</p>	 <p style="text-align: center;">VIEW FROM UNDER MACHINE</p>

DIFFERENTIALS AND TIRE MAINTENANCE INSTRUCTIONS

This section covers service of these differential and tire components for Organizational Maintenance personnel:

- a. Change oil in differentials and final drive.
- b. Inspect tire pressure and add air.
- c. Tires and rims removal/installation.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Front and rear axle /final drive service.	2-392	2-45
2	Tire service.	2-397	None
3	Tires and rims removal.	2-398.1	None
4	Tires and rims installation.	2-398.3	None
5	Tire removal/installation.	2-398.5	None

End

Change 1 2-391

FRONT AND REAR AXLE/FINAL DRIVE SERVICE

This task covers: Changing oil in differentials and final drives.

INITIAL SETUP

Test Equipment

None

Materials/Parts

MIL-L-2105 lubricant (27 gal. ea.)

GO 80, 27 gallons (102 liters)
(Item 5, Appendix C)

Containers to catch waste oil

Troubleshooting Reference

Page 2-45

Equipment Condition

Shipping link installed

Vehicle tires blocked

Special Tools

None

Personnel Reauired

One mechanic

References

LO 10-3930-641-12

PMCS, page 2-5

Shipping link removal/installation,
page 2-471

General Safety Instructions

Park vehicle on level ground.

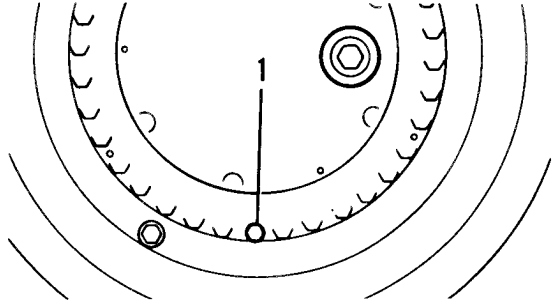
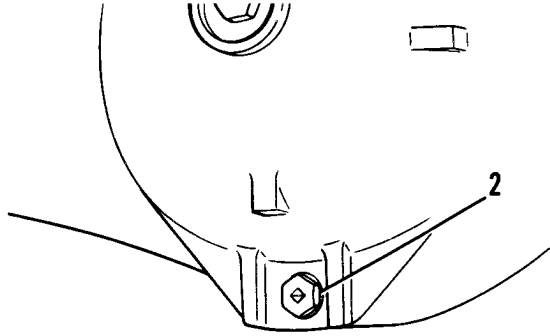
Lower mast.

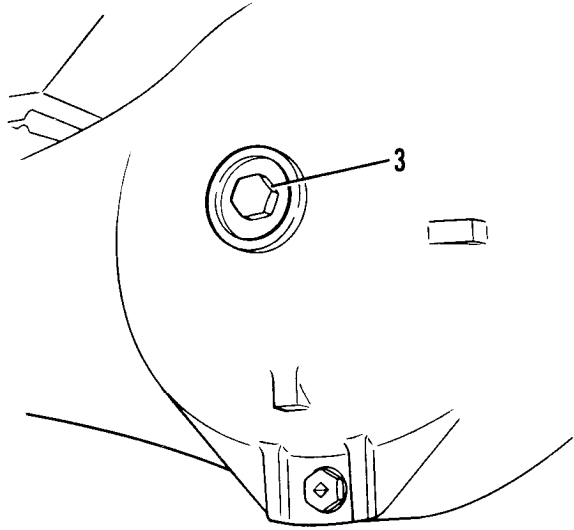
Main disconnect switch OFF.

Go on to Sheet 2

FRONT AND REAR AXLE/FINAL DRIVE SERVICE (CONT)

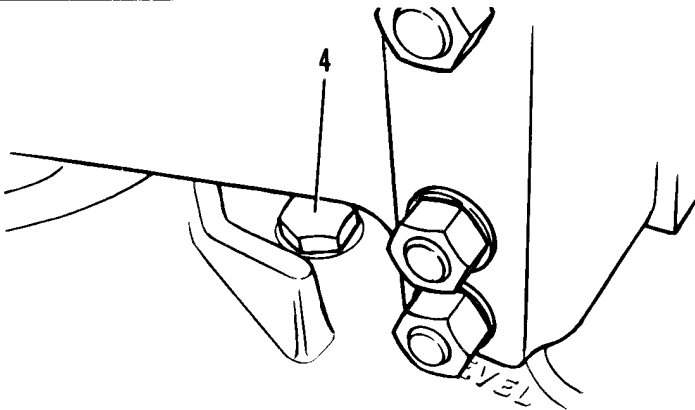
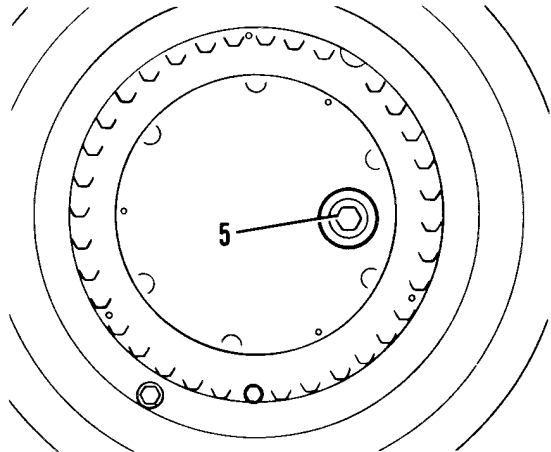
(Sheet 2 of 5)

LOCATION/ITEM	ACTION	REMARKS
<p>1. Final drive drain plugs (1)</p>	<p>a. Position each wheel, in turn, with drain plug down.</p> <p>b. Remove plug.</p> <p>c. Drain oil.</p> <p>d. Clean plugs.</p> <p>e. Install.</p>	
<p>2. Differential drain plugs (2), front and rear</p>	<p>a. Remove.</p> <p>b. Drain oil.</p> <p>c. Clean plugs.</p> <p>d. Install.</p>	

LOCATION/ITEM	ACTION	REMARKS
<p>3. Front differential fill plug (3)</p>	<p>a. Remove.</p> <p>b. Fill differential to bottom of fill plug opening.</p> <p>c. Install plug.</p>	<p>See LO 10-3930-641-12</p> 

TA 098747

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
4. Rear differential oil level plug (4)	a. Remove. b. Clean.	
5. Final drive fill plugs (5)	a. Rotate each wheel so that final drive fill plug is at the horizontal center line of the wheel. b. Remove fill plugs (5). c. Fill rear differential slowly through fill plug opening for final drive. Fill to bottom of oil level plug opening. d. Install oil level plug (4).	 <p>See LO 10-3930-641-12.</p>

FRONT AND REAR AXLE/FINAL DRIVE SERVICE (CONT)

LOCATION/ITEM	ACTION	REMARKS
5. Final drive fill plugs (cont)	<ul style="list-style-type: none"> e. Fill final drives to bottom of fill plug opening. f. Clean fill plugs. g. Install. 	See LO 10-3930-641-12.

End

TIRE SERVICE

(Sheet 1 of 2)

This task covers: Servicing tires.

INITIAL SETUP

Test Equipment

Tire pressure gage

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Parking brake control out

Engine OFF

Special Tools

Source of low pressure air, self-attaching air chucks with distant valve control.

Personnel Required

One mechanic

References

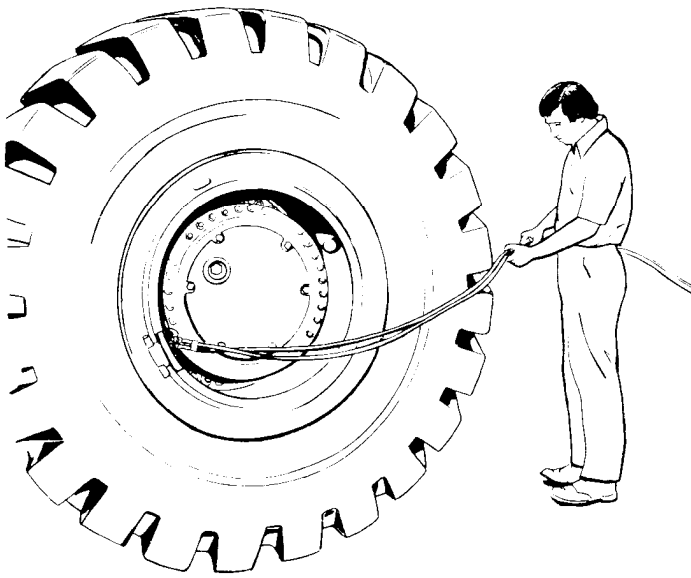
None

General Safety Instructions

Stand behind tire when inflating.

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Tire pressure	a. Check with a tire pressure gage.	Tire pressure to be 70 psi (483 KPa) (front) 40 psi (276 KPa) (rear)
	<div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px auto; width: fit-content;">WARNING</div> <p>To prevent injury while inflating tires, stand behind tire and use a self-attaching air chuck.</p>	
	b. Inflate if low. See page 2-400.	
2. Air	Bleed moisture from air source at the accumulator and through the air hose.	
3. Tire valve stem and self-attaching air chucks	Install chuck on valve stem (1).	
	<div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px auto; width: fit-content;">WARNING</div>	
	Stand behind tire when inflating. Use self-attaching air chuck.	
4. Tire	Inflate to: 70 psi (front) 40 psi (rear)	

TA 098749

End

TIRES AND RIMS REMOVAL

(Sheet 1 of 2)

This task covers: Removal of tires and rims.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wooden blocks

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Parking brake ON.

Shipping link installed

Vehicle parked on hard level ground (preferably concrete).

Special Tools

None

Personnel Required

Two mechanics

References

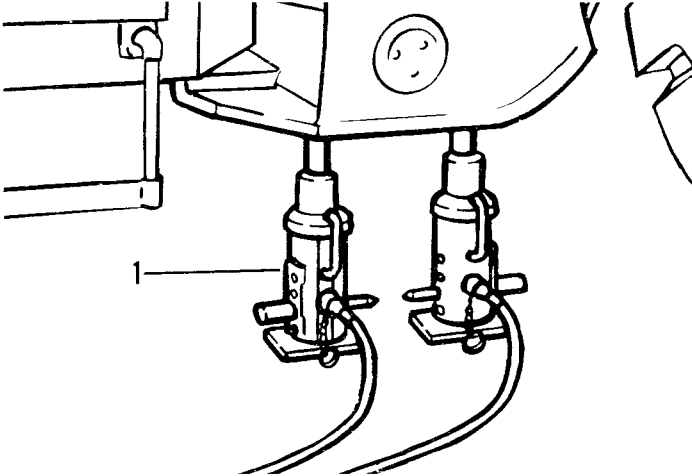
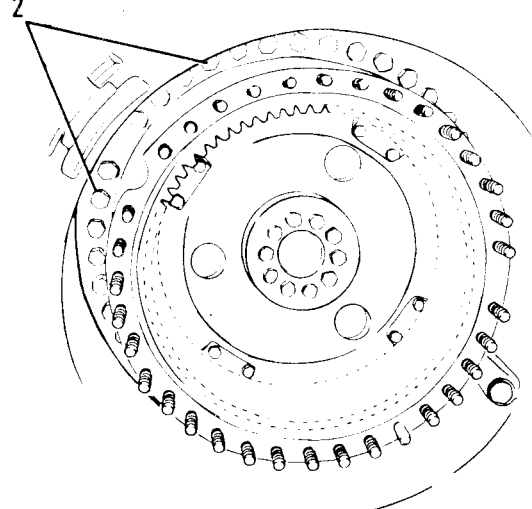
None

General Safety Instructions

Block wheels except one being removed.

Go on to Sheet 2

Change 1 2-398.1

LOCATION/ITEM	ACTION	REMARKS
1. Blocks	Block front and back tires that are not being removed.	
2. Hydraulic jacks (1)	a. Position under front main frame. b. Lift machine until forks of a lift truck can be positioned under tire. c. Place wood block under front axle housing to help hold machine up.	
3. Nuts (2) and washers that hold tire and rim	Remove.	
4. Lift truck	a. Position lift truck under tire. b. Fasten tire and rim to truck.	
5. Tire and rim	Remove. Tire and rim are 3000 lb. (1361 kg).	

TA501737

End

Change 1

2-398.2

TIRES AND RIMS INSTALLATION

This task covers: Installation of tires and rims.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF.

Parking brake ON.

Shipping link installed.

Vehicle parked on hard level ground
(preferably concrete)

Special Tools

None

Personnel Required

Two mechanics

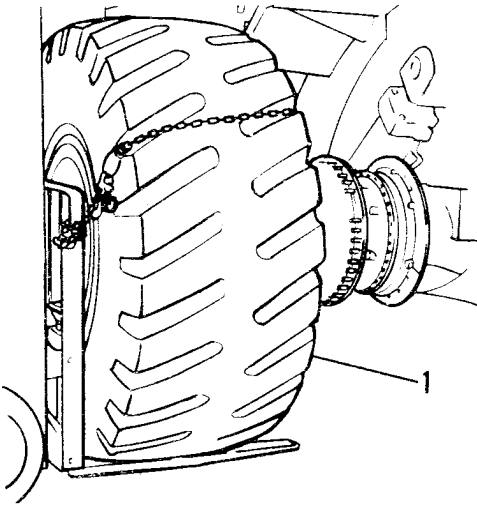
References

Tires and rim removal, page 5-80.

General Safety Instructions

Block wheels except one being installed.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Tire and rim (1)	a. Fasten to forks of lift truck. b. Position tire and rim- on wheel assembly.	
2. Four nuts and washers	a. Install to hold tire and rim to wheel assembly. b. Remove lift truck.	
3. Nuts and washers that secure tire and rim	Install. Tighten to a torque of 340-440 lb. ft. (460-596 N•m).	
4. Hydraulic jacks (2)	Lift machine and remove wood blocks from under front axle housing. Lower machine to floor.	

TA501738

End

Change 1

2-398.4

TIRE REMOVAL/INSTALLATION

(Sheet 1 of 7)

This task covers: Replacement of tire with wheel assembly on vehicle.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tire
Wooden blocks

Troubleshooting Reference

None.

Equipment Condition

Machine parked on hard level ground (preferably concrete).

Safety link installed on main frames of machine.

Special Tools

Sledge hammer

Pry bars

Bead breaking tool kit

Personnel Required

One mechanic

References

None

General Safety Instructions

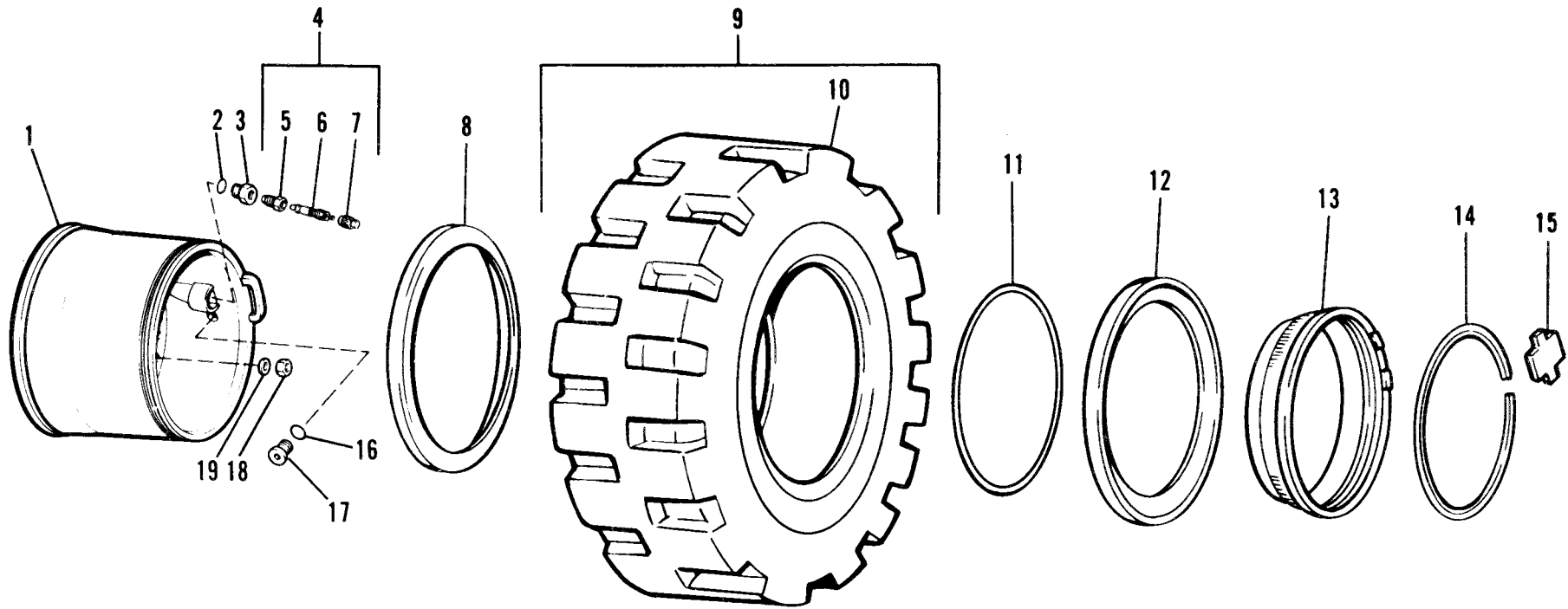
All air must be released from tire. Check valve stem by running a piece of wire through it to make sure it is not plugged. Stand to one side of tire while inflating.

Go on to Sheet 2

Change 1 2-398.5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Blocks	Block both sides of front and rear tires that are not being serviced.	
2. Tire	Raise off ground using hydraulic jack under axle housing near tire being serviced.	If not parked on concrete, place hardwood blocks under jack.
3. Blocks	Place under axle housing. Lower hydraulic jack.	
4. Valve stem cap (7)	Remove.	
5. Valve stem core (6)	Remove slowly using valve stem core removal tool.	
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">WARNING</div>	
	All air must be exhausted from tire. Check the valve stem by running a piece of wire through it to make sure it is not plugged.	

Go on to Sheet 3

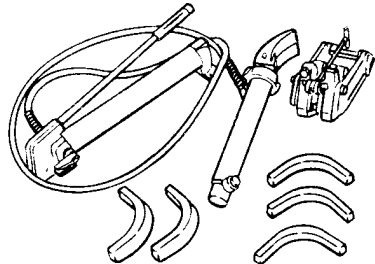
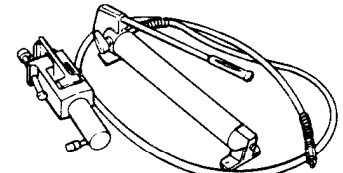
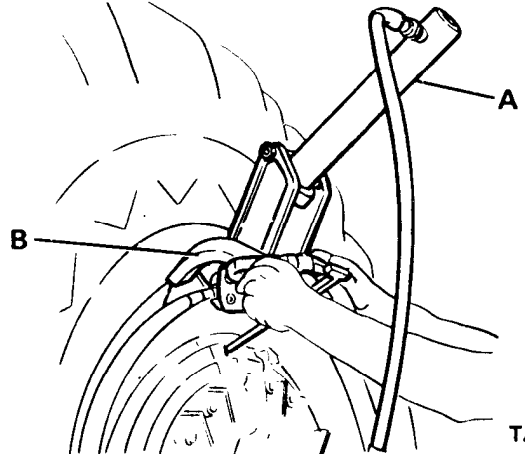


- 1. Rim
- 2. Preformed packing
- 3. Spud
- 4. Airvalve assembly
- 5. Nut
- 6. Valve stem core
- 7. Valve stem cap

- 8. Flange
- 9. Tire assembly
- 10. Tire
- 11. Preformed packing
- 12. Flange
- 13. Band
- 14. Lock ring

- 15. Driver
- 16. Preformed packing
- 17. Spud
- 18. Nut
- 19. Preformed packing

TIRE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
6. Band (13)	Drive back far enough to remove driver (15) using a sledge hammer.	  <p>TYPICAL TIRE REMOVAL TOOLS</p> 
7. Driver (15)	Remove.	
8. Lock ring (14)	Remove using hammer and pry bars.	
9. Preformed packing (11)	Remove.	
10. Bead breaking tool (A)	a. Attach to rim as shown.	
	b. Break bead and insert metal bead wedge (B).	
	c. Continue to break bead in as many places as necessary around tire.	
11. Band (13)	Remove using pry bars.	
12. Flange (12)	Remove.	

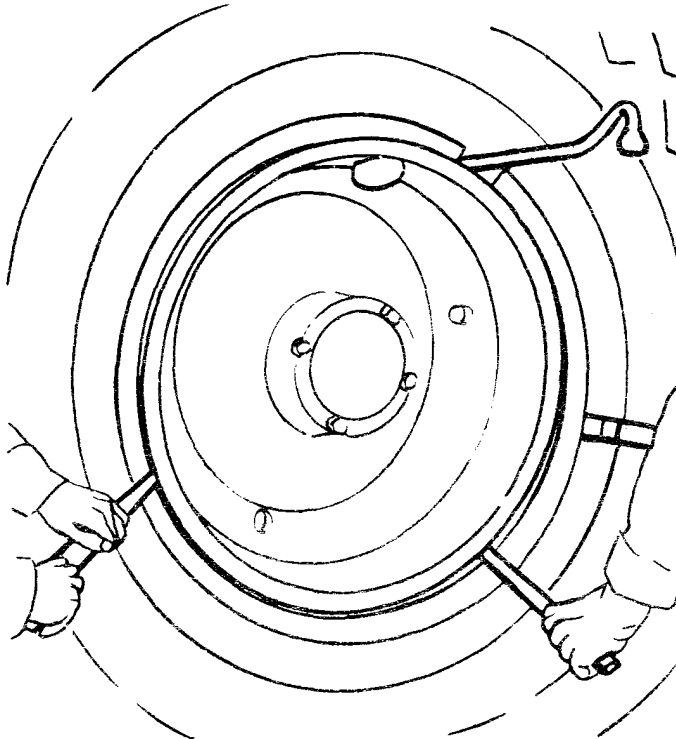
TA501740

Go on to Sheet 5

TIRE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
13. Bead breaking tool (A)	a. Attach to rear of tire. NOTE There are only two places (180° apart) where tool (A) can be attached. b. Break bead and insert metal bead wedge. c. Move 180° and break second bead.	
14. Two lifting cables	Cradle tire and attach to hoist.	
15. Tire (10)	Remove.	
16. Flange (8)	Remove.	
INSTALLATION		
1. Nut (5), spud (3) and preformed packing (2)	Remove and install using new preformed packing.	
2. Flange (8)	Install.	
3. Tire (10)	Install using lifting slings and hoist.	
4. Band (13)	Insert in flange (12) and install both on tire (10).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
5. Band (13)	Pound back far enough to expose second groove in rim.	
6. Preformed packing(11)	<ul style="list-style-type: none"> a. Lubricate with engine oil. b. Install in second groove making sure it does not get twisted or cut. c. Pull band (13) gently over preformed packing. 	
7. Lock ring (14)	Insert end as shown and turn 90°. Ring must be engaged in first groove all around rim.	
8. Drive (15)	Install.	

TA501741

Go on to Sheet 7

Change 1 2-398.10

TIRE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>9. Valve stem</p> <p>10. Axle housing</p> <p>11. Shipping link</p>	<p style="text-align: center;">NOTE</p> <p>Apply a liquid detergent solution to front and rear bead areas on tire.</p> <p>a. Attach air chuck.</p> <div style="border: 1px solid black; padding: 2px; text-align: center; margin: 10px 0;">WARNING</div> <p>Stand to one side of the tire - not in front of rim area - when inflating tire.</p> <p>b. Inflate tire to 70 psi front, 40 psi rear.</p> <p>c. Install valve cap.</p> <p>Raise with hydraulic jack, remove wood blocks and lower until tire rests on ground.</p> <p>Disconnect.</p>	<p>Use self-attaching type air chuck with valve core removed. After seal is made, install valve core.</p> <p>You may have to compress tire, using chains and cable hoist, to get beads to seal.</p>

END

TRANSMISSION MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these transmission components for Organizational Maintenance personnel:

- a. Filter
- b. Linkage

Also instructions for servicing the transmission and adjusting the control linkage.

LISTS OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Transmission oil filler assembly removal/ installation.	2-400	None
2	Transmission service.	2-402	2-44, 2-46, 2-47
3	Transmission control linkage adjustment	2-407	2-46, 2-47, 2-48
4	Transmission controls removal/installation.	2-412	2-47, 2-48

End

TRANSMISSION OIL FILLER ASSEMBLY REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of Transmission oil filler assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

TRANSMISSION OIL FILLER ASSEMBLY REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Plug (15)	Remove.	
2. Capscrews (8), (9) and washers (11), (3)	Remove.	
3. Filler tube (16)	Remove with bracket (13).	
4. Preformed packing (17)	Replace.	
INSTALLATION		
1. Filler tube (16) and bracket (13)	Place in position with preformed packing (17).	
2. Capscrews (8) and washers (11)	Install.	
3. Capscrews (9) and washers (3)	Install.	
4. Plug (15)	Install.	

TA 172222

End

TRANSMISSION SERVICE

(Sheet 1 of 5)

- This task covers:
- a. Changing transmission oil
 - b. Replacing filter
 - c. Cleaning magnetic strainer assembly
 - d. Replacing torque converter breathers
 - e. Replacing transmission breathers

INITIAL SETUP

Test Equipment

None

Materials/Parts

- Oil per LO 10-3930-641-12
- Torque converter breather
- Transmission breather
- Oil filter elements, two
- Cover gasket
- Solvent
- Cleaning compound, Item 2, Appendix C
- Container to catch waste oil
- Face shield
- Protective clothing
- Stiff brush

Troubleshooting Reference

Pages 2-44, 2-46, 2-47

Equipment Condition

- Engine OFF and cooled
- Access doors open

Special Tools

Air nozzle and source of low pressure air

Personnel Required

Two mechanics

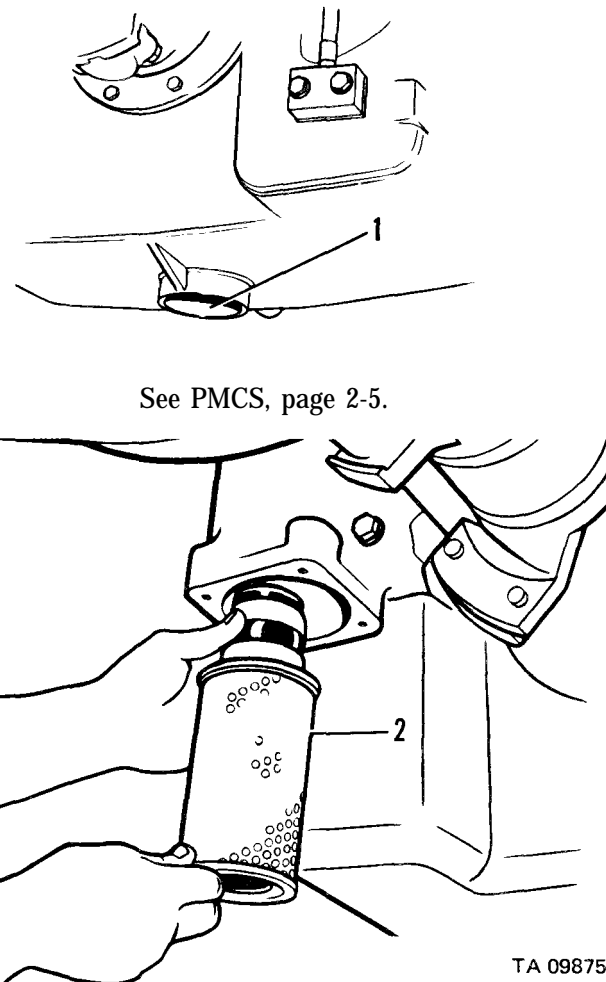
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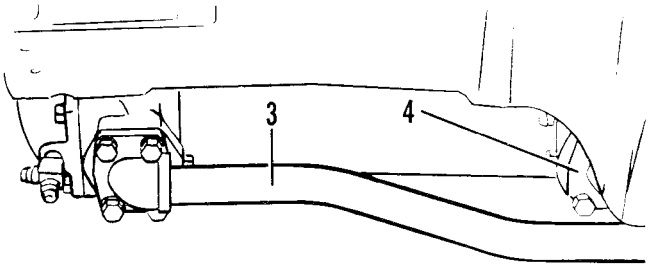
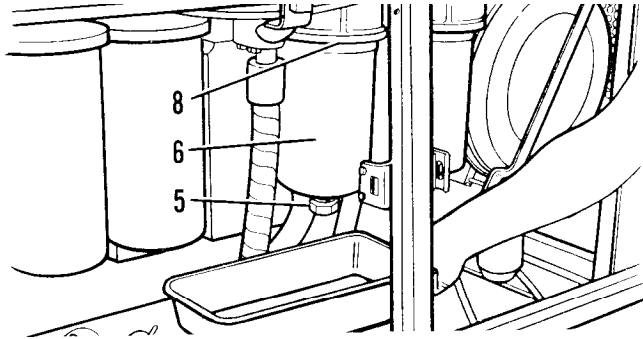

- PMCS, page 2-5
- LO 10-3930-641-12

General Safety Instructions

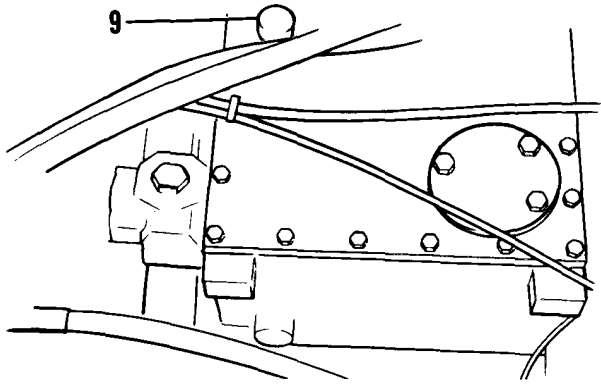
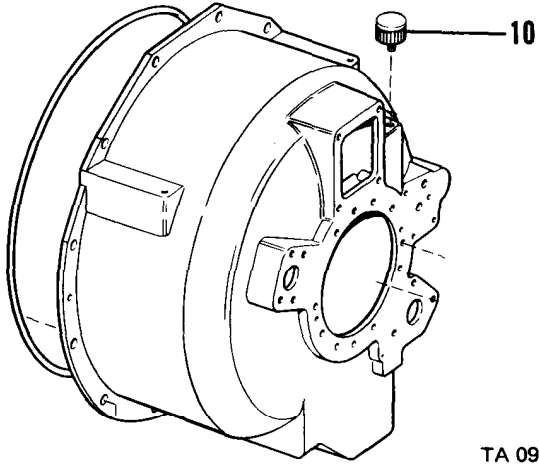
- Park the vehicle on level ground.
- Lower mast.
- Turn POWER switch to OFF.
- Hot oil and parts can cause burns. Be careful during servicing procedure not to spill hot oil on you.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Drain plug (1)</p> <p>2. Magnetic strainer (2)</p>	<p>a. Remove.</p> <p>b. Drain oil.</p> <p>c. Clean drain plug and install.</p> <p style="text-align: center;">CAUTION</p> <p>Do not drop or rap magnet against hard objects. Magnets will be damaged.</p> <p>a. Remove four capscrews and cover.</p> <p>b. Remove magnetic strainer.</p> <p>c. Wash screen and cover in clean, non-flammable solvent.</p> <p style="text-align: center;">WARNING</p> <p>When using pressure air, wear face shield and protective clothing to prevent injury. Use 30 psi maximum pressure for cleaning.</p> <p>d. Clean magnets with pressure air or stiff brush.</p>	 <p>See PMCS, page 2-5.</p>

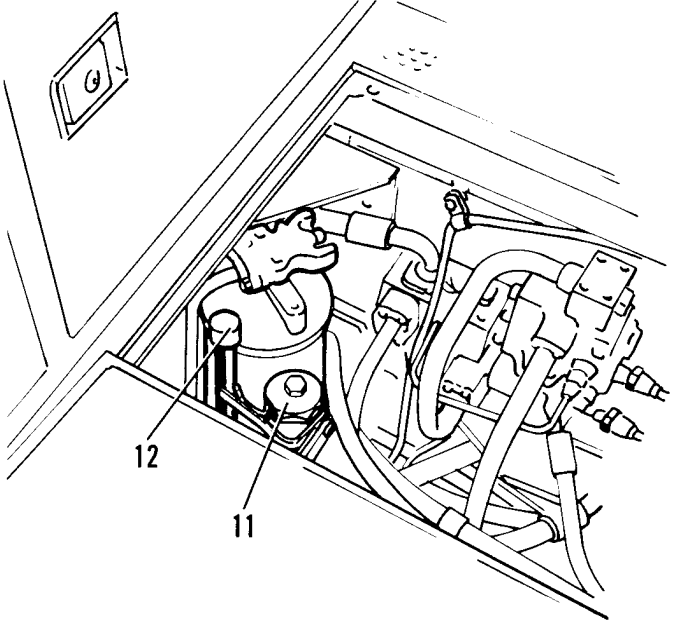
LOCATION/ITEM	ACTION	REMARKS
2. Magnetic strainer (cont)	e. Replace damaged magnets. f. Replace cover seal if damaged. g. Install strainer cover and four capscrews.	
3. Transmission oil cooler lines (3, 4)	Check for damage. Replace if necessary.	See PMCS, page 2-5.
4. Transmission oil filter	<p style="text-align: center;">NOTE</p> Place pan under filter housing to prevent spillage. a. Remove filter housing drain plug (5). b. Drain oil. c. Remove filter housing (6). d. Remove and discard filter element (7). e. Clean filter housing base (8). f. Wash filter housing in clean, non-flammable solvent.	 
<div style="border: 1px solid black; padding: 5px; display: inline-block;">WARNING</div>		<p style="text-align: right;">TA 098752 Go on to Sheet 4</p>
When using pressure air, wear face shield and protective clothing to prevent injury. Use 30 psi maximum pressure for cleaning.		

TRWSMISSION SERVICE (CONT)

LOCATION/ITEM	ACTION	REMARKS
4 . Transmission oil filter (cont)	<ul style="list-style-type: none"> g. Install new filter element in housing. h. Install filter housing. i. Clean and install drain plug. 	<p>See PMCS, page 2-5.</p> 
5. Transmission breather (9), and torque converter breather (10)	<ul style="list-style-type: none"> a. Remove and discard. b. Replace. 	

TA 098753

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
6. Transmission	Remove cap (11) and fill transmission.	<p>See LO 10-3930-641-12.</p> 
7. Engine	Start and run at low idle.	<p>See TM 10-3930-641-10.</p>
8. Dipstick (12)	Use to check oil level.	<p>Oil level should be between LOW and FULL marks on dipstick. Add oil if necessary.</p>
9. Transmission oil filter	Check seat for leaks.	
10. Engine	Stop.	

TA 098754

End

TRANSMISSION CONTROL LINKAGE ADJUSTMENT

This task covers: Adjustment of transmission control linkage.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Pages 2-46, 2-47, 2-48

Equipment Condition

Turn engine OFF while adjusting linkage so that vehicle does not slip into gear and move. Pull parking brake control OUT. Install shipping link.

Special Tools

None

Personnel Required

Two mechanics

References

PMCS, page 2-5

Transmission controls removal/installation, page 2-412.

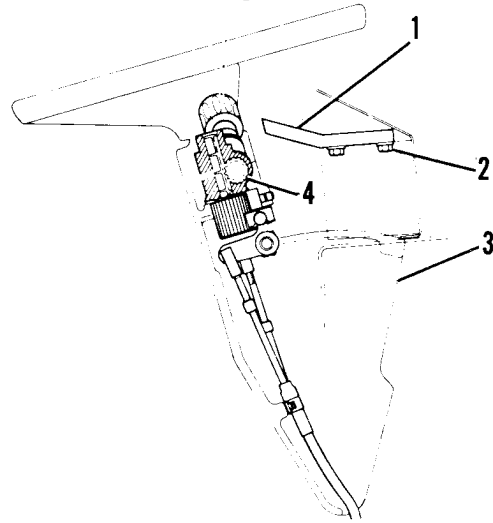
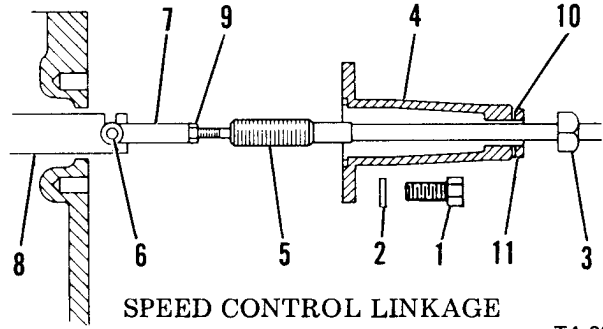
Shipping link removal/installation, page 2-471.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

TRANSMISSION CONTROL LINKAGE ADJUSTMENT (CONT)

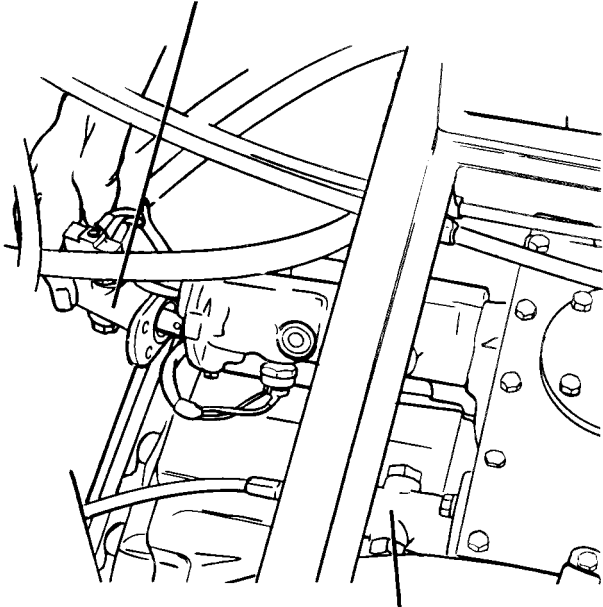
LOCATION/ITEM	ACTION	REMARKS
<p>1. Stop (1)</p>	<p>Check stop for proper adjustment. If stop is out of adjustment:</p> <ol style="list-style-type: none"> a. Put control lever in NEUTRAL. b. Move steering column (3) forward to stored position. c. Loosen capscrews (2). d. Move stop until end just touches lever assembly (4). e. Tighten capscrews (2). 	<p>Stop (1) must move lever (4) to NEUTRAL when steering column is in stored position.</p>  <p>The diagram shows a perspective view of the steering column stop assembly. It includes a steering column (3) with a lever assembly (4) attached. Two capscrews (2) are used to adjust the position of the stop (1) relative to the lever assembly.</p>
<p>2. Speed control linkage (Located on steering hydraulic controls. See page 2-409.)</p>	<p>Adjust:</p> <ol style="list-style-type: none"> a. Remove cap screws (1) and lockwashers (2). b. Loosen nut (3) from cable threads (5) and slide washer (11) and seal (10) back. c. Turn bracket (4) off threads (5). d. Lift pins (6) and yoke (7) out of slot in speed selection spool (8). 	<p>STOP ADJUSTMENT</p>  <p>The diagram is a cross-sectional view of the speed control linkage stop adjustment. It shows a cable (5) with a nut (3) and a seal (10) at the end. A bracket (4) is attached to the cable. A speed selection spool (8) has pins (6) and a yoke (7) that fit into its slot. The diagram also shows a cap screw (1) and lockwasher (2) used for adjustment.</p> <p>SPEED CONTROL LINKAGE</p>

TA 098755

Go on to Sheet 3

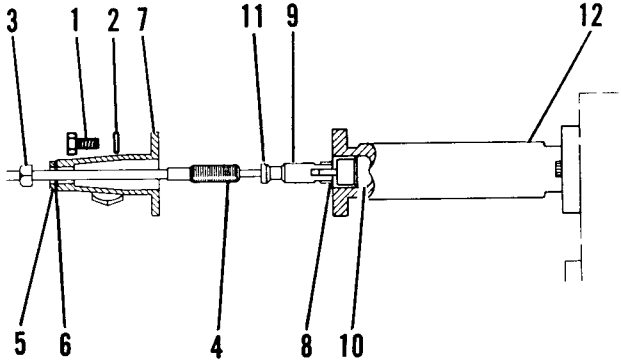
TRANSMISSION CONTROL LINKAGE ADJUSTMENT (CONT)

(Sheet 3 of 5)

LOCATION/ITEM	ACTION	REMARKS
2. Speed control linkage (cont)	<p>e. Pull speed selection spool (8) out of case until it does not move.</p> <p>f. Hold speed selection spool (8) and install pin (6) in slot of spool. If pin cannot be installed without moving spool, loosen nut (9) to adjust yoke (7). Tighten nut (9).</p> <p>g. Install bracket (4) on threads (5). Turn until it is even with face of transmission case.</p> <p>h. Install capscrews (1) and lockwashers (2) into holes in transmission case.</p> <p>i. Install seal (10), washer (11), and nut (3) against bracket (4).</p>	<p>DIRECTION CONTROL LINKAGE</p>  <p>SPEED CONTROL LINKAGE</p>

TA 098888

Go onto Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>3. Direction control linkage.</p>	<p>Adjust:</p> <p>a. Move steering column all the way forward to stored position. Control lever will be in NEUTRAL.</p> <p>b. Remove capscrews (1) and lockwashers (2).</p> <p>c. Loosen nut (3) from cable threads (4).</p> <p>d. Move washer (5) and seal (6) off threads (4).</p> <p>e. Remove bracket (7) from threads (4).</p> <p>f. Lift pins (8) and yoke (9) out of slot in rod (10).</p>	 <p>The diagram shows a side view of a steering column linkage assembly. It includes a steering column (12) on the right, connected to a rod (10). A yoke (9) is attached to the rod, and pins (8) are inserted into a slot in the rod. A bracket (7) is mounted on the rod. A nut (3) is threaded onto the rod, and a washer (5) and seal (6) are also present. A cap screw (1) and lockwasher (2) are used to secure the bracket. A pin (11) is also shown near the yoke.</p>

TA 098756
Go on to Sheet 5

TRANSMISSION CONTROL LINKAGE (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Direction control linkage (cont)</p>	<p>g. Hold rod (10) and install pin (8) into slot in rod. If pin cannot be installed without moving rod, loosen cam (11) and adjust yoke (9). Tighten cam (11).</p> <p>h. Install bracket (7) on threads (4) until it is even with face of lock group (12).</p> <p>i. Install capscrews (1) and lockwashers (2) into holes in lock group (12).</p> <p>j. Install seal (6), washer (5), and nut (3). Tighten nut against bracket.</p>	

End

TRANSMISSION CONTROLS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Replacement of transmission controls.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Pages 2-47, 2-48

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Transmission controls linkage adjustment,
page 2-407

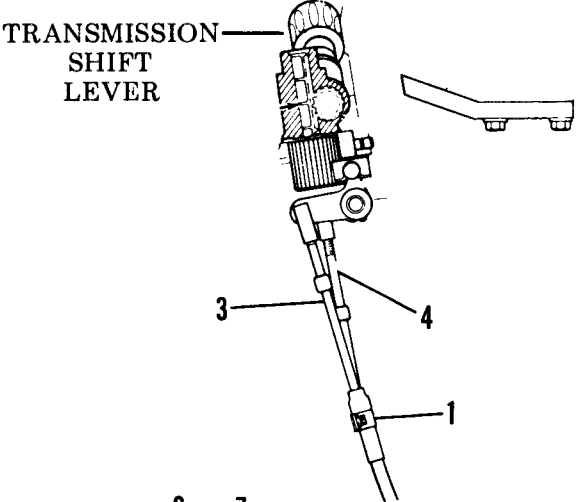
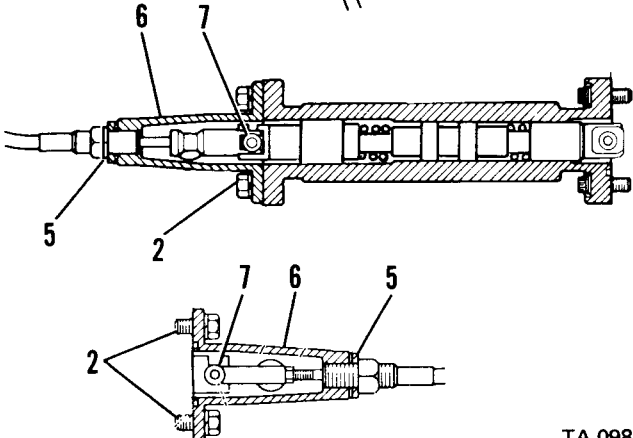
PMCS, page 2-5

Location, page 2-409

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Clamp (1) 2. Four capscrews (2) 3. Control cable assemblies (3) and (4) 4. Retaining nuts (5) 5. Bracket (6) 6. Pins (7) 7. Controls 	<p>Disconnect.</p> <p>Remove.</p> <p>Detach.</p> <p>Unscrew.</p> <p>Slide up cable.</p> <p>Lift out of slots.</p> <p>Discard.</p>	 <p>TRANSMISSION SHIFT LEVER</p>
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Controls 2. Control cable assemblies (3) and (4) 3. Capscrews (2) and clamp (1) 4. Control linkages 	<p>Place in position.</p> <p>Attach.</p> <p>Install.</p> <p>Adjust. (See page 2-407.)</p>	

STEERING SYSTEM MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these steering system components for Organizational Maintenance personnel:

- a. Steering wheel
- b. Steering filter

Also instructions for steering system tests.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Steering wheel removal/installation.	2-415	None
2	Steering system tests.	2-417	2-48
3	Steering filter service.	2-421	None

End

STEERING WHEEL REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of steering wheel.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

Steering wheel puller

Personnel Required

One mechanic

References

None

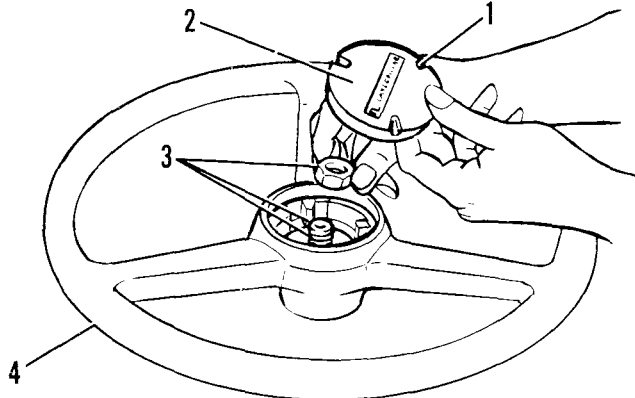
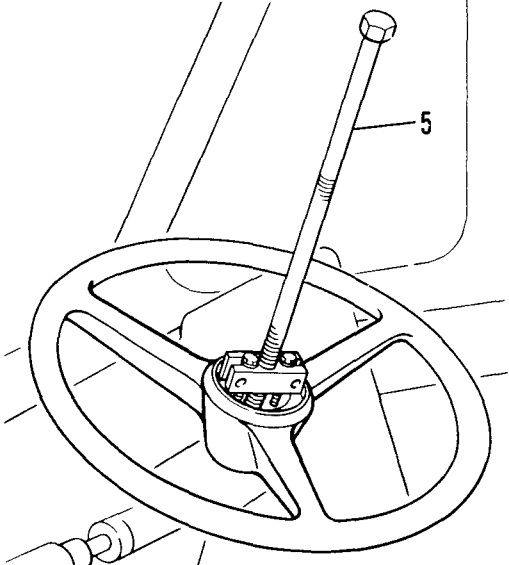
General Safety Instructions

Pull parking brake control OUT.

Main disconnect switch OFF.

Go on to Sheet 2

STEERING WHEEL REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Screws (1) 2. Cover (2) 3. Nut, lockwasher, washer (3) 4. Steering wheel (4) 	<p>Remove three from center cover (2) of steering wheel (4).</p> <p>Remove.</p> <p>Remove from steering shaft.</p> <p>Install steering wheel puller (5) and remove steering wheel.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Steering wheel (4) 2. Nut, lockwasher, washer (3) 3. Cover (2) 4. Screw (1) 	<p>Install.</p> <p>Install. Tighten nut to a torque of 34-40 lb. ft. (46-54 N•m).</p> <p>Install.</p> <p>Install three in cover.</p>	

TA 098758

End

STEERING SYSTEM TESTS

(Sheet 1 of 4)

This task covers: Check of hydraulic oil, steering time test, and steering slip test.

INITIAL SETUP

Test Equipment

Stopwatch

Magnet

Materials/Parts

Container for hydraulic fluid

Troubleshooting Reference

Page 2-48

Equipment Condition

As stated in procedure

Special Tools

None

Personnel Required

Two mechanics

References

Transmission service, page 2-402

LO 10-3930-641-12

General Safety Instructions

Remove hydraulic reservoir cap slowly. Reservoir is under pressure.

Perform operational tests in area clear of personnel and obstructions.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>HYDRAULIC OIL CHECK</p> </div> <p>1. Hydraulic oil</p> <p>2. Hydraulic reservoir</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>WARNING</p> </div> <p>Remove hydraulic reservoir cap slowly to prevent sudden release of pressure.</p> <p>Measure.</p> <p>Check hydraulic oil immediately after engine is stopped:</p> <ol style="list-style-type: none"> a. Take sample of oil in clear container. Check sample for air bubbles. If air bubbles are found, send vehicle to Direct Support Maintenance for further tests and repair. b. Remove filter elements. Check for foreign particles in oil. Use a magnet to separate iron. If foreign particles are found, send vehicle to Direct Support Maintenance for repair. 	<p>Particles may be metal from grating parts or non-metal from damaged seals, preformed packings, etc.</p> <p>See transmission service, page 2-402.</p>

Go on to Sheet 3

STEERING SYSTEM TESTS ((X-NT))

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">STEERING TIME TEST</div>	NOTE	
	Perform tests with vehicle on dry, hard surface and brake OFF.	
1. Steering wheel	With engine at high idle, turn from stop to stop and from each stop to center.	Turning time from stop to stop must be between 2.6 and 3.0 seconds. The difference between right turn and left turn time must not be more than 0.3 seconds.
2. Brakes	With engine at high idle, push brake pedal and turn steering wheel from stop to stop.	Turning time must not increase more than 0.2 seconds from time with brake OFF.
		If vehicle steering time does not meet these specifications, send vehicle to Direct Support Maintenance for adjustments and repair.
3. Carriage	Raise.	

Go on to Sheet 4

STEERING SYSTEM TESTS (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">STEERING SLIP TEST</div> <p>1. Brakes</p> <p>2. Steering wheel</p>	<p>Release.</p> <p>With engine running at low idle:</p> <p>a. Turn through one revolution in each direction.</p> <p>b. Turn slowly from stop to stop.</p> <p>c. Begin turning and release wheel.</p>	<p>Steering resistance should increase when direction is changed.</p> <p>Steering should be smooth, not jerky, and should be at constant speed without irregular motion.</p> <p>Steering wheel should stop.</p> <p>If vehicle fails these tests, send to Direct Support Maintenance for repairs.</p>

End

STEERING FILTER SERVICE

(Sheet 1 of 2)

This task covers: Steering filter service

INITIAL SETUP

Test Equipment

None

Materials/Parts

Cleaning Compound, Item 2, Appendix C

Clean lint-free rag, Item 16, Appendix C

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12

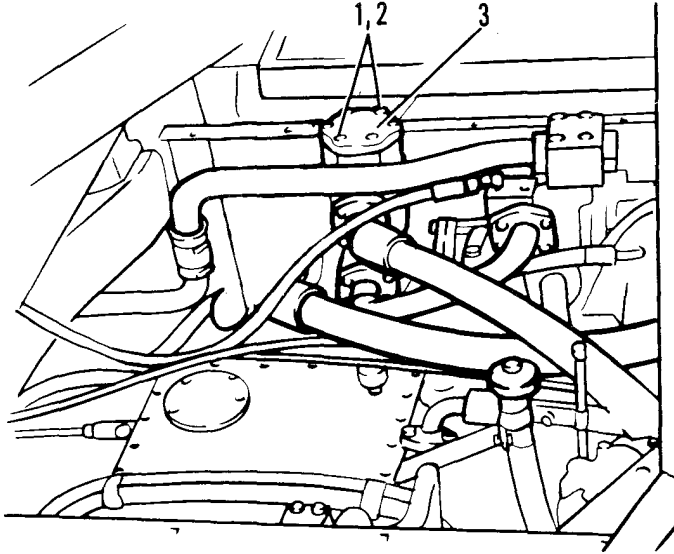
General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

STEERING FILTER SERVICE (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
1. Capscrews (1) and washers (2)	Remove.	
2. Cap (3)	Remove.	
3. Strainer	Remove and clean in cleaning solvent. Dry with clean lint-free rag.	
4. Strainer	Install.	
5. Cap (3)	Place in position.	
6. Capscrews (1) and washers (2)	Install.	

TA172223

End

2-422

BODY ACCESSORY ITEMS MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these accessory items for Organizational Maintenance personnel:

- a. Mirrors
- b. Wipers
- c. Cab heater and defroster

Also instructions for servicing cab air filters.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Mirrors removal/installation.	2-424	None
2	Windshield wiper motor and linkage removal/installation.	2-426	None
3	Cab floor heater removal/installation.	2-434	None
4	Cab heater and defroster removal/installation.	2-440	None
5	Filter for cab heater removal/installation.	2-450	None

End

MIRRORS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removing and installing the side mount mirrors.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

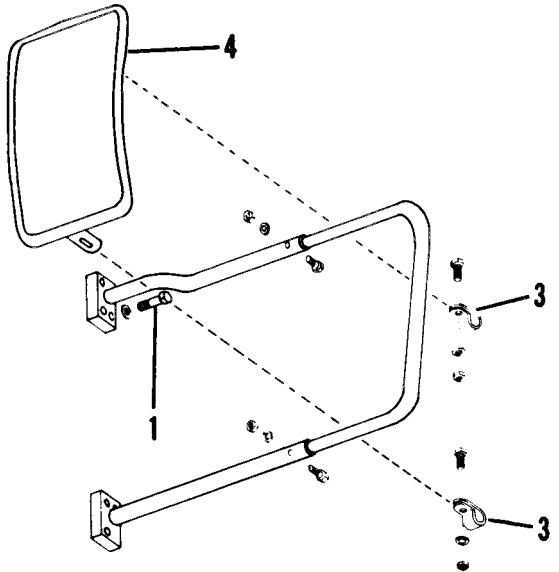

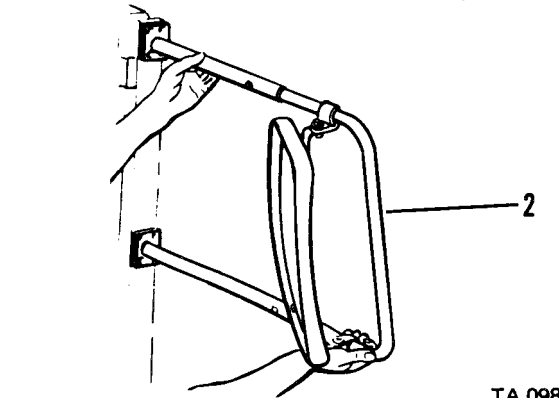
References

Torque limits chart, page E-1

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">COMPLETE ASSEMBLY</p> <p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Capscrews (1) 2. Mirror assembly (2: 	<p style="text-align: center;">NOTE</p> <p>Mirror assembly will fall when six capscrews are removed.</p> <p>Remove six.</p> <p>Remove.</p>	
<p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Mirror assembly (2) 2. Capscrews (1) 	<p>Put in position.</p> <p>Install.</p>	
<p style="text-align: center;">MIRROR ONLY</p> <p style="text-align: center;">REMOVE</p> <ol style="list-style-type: none"> 1. Clip (3), capscrews, nuts, washers 2. Mirror (4) <p style="text-align: center;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Mirror 2. Clip (3), capscrews, nuts, washers 	<p>Remove.</p> <p>Remove.</p> <p>Put in position.</p> <p>Install.</p>	

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION

(Sheet 1 of 8)

This task covers: Replacement of windshield wiper motor and linkage.

NOTE

This procedure covers both the front and rear windshield wiper motor and linkage removal and installation.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As needed

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Torque limits chart, page E-1

General Safety Instructions

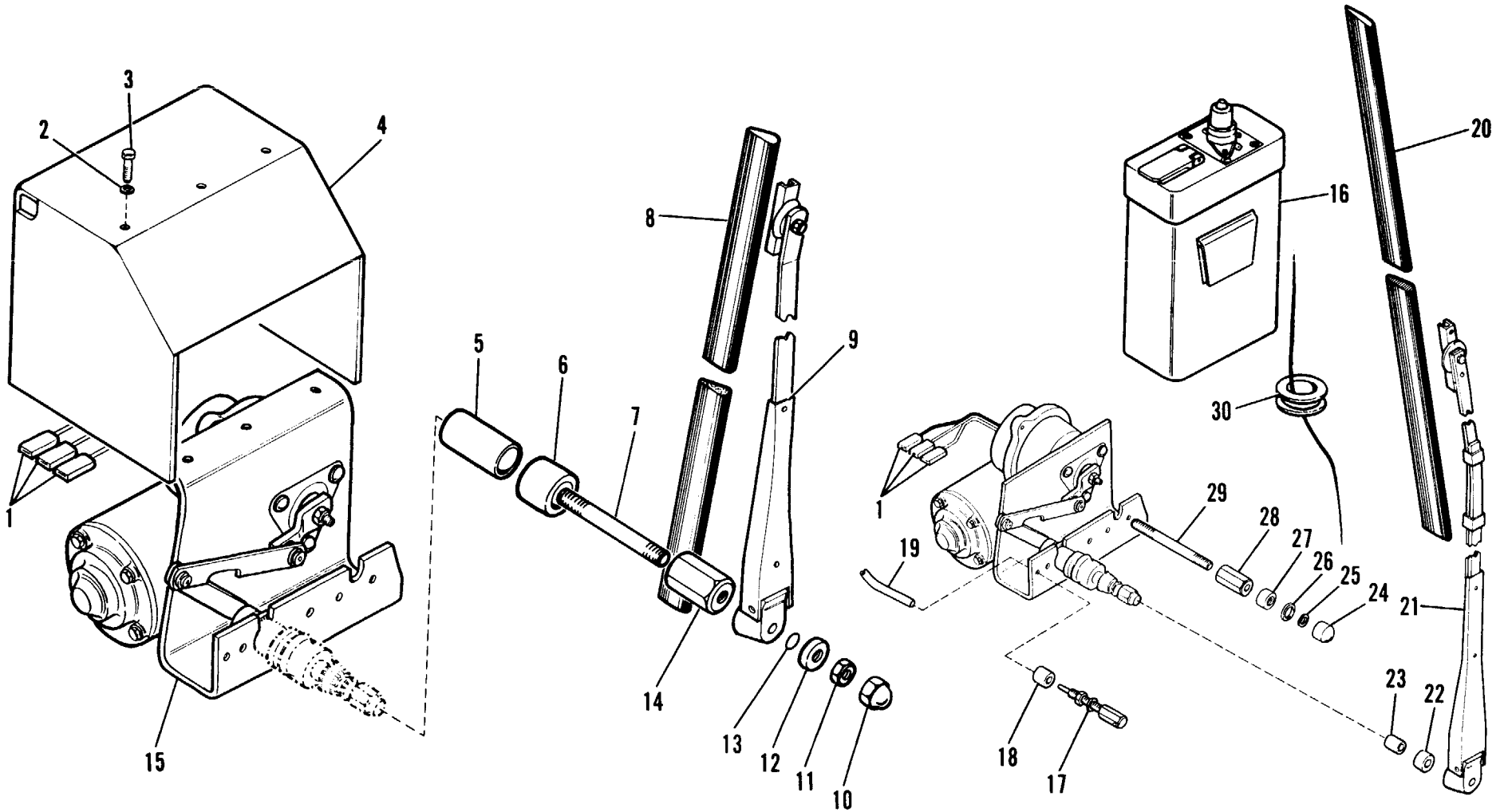
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Nut (10), lockwasher (12), jam nut (11), preformed packing (13), wiper arm assembly (9) and driver (14) 2. Cap (6) and nut behind it, spacer (5) and shaft (7) 3. Three nuts (24). Three retainers with seals (25), (26), (27) 4. Five screws and lockwashers, panel and seal of cab dashboard 5. Eight capscrews, lockwashers, washers and cover of cab dashboard 	<p>Remove from wiper arm shaft.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p>	<p>LEGEND FOR PAGE 2-428</p> <ol style="list-style-type: none"> 1. Terminal 2. Washer 3. Capscrew 4. Motor housing 5. Spacer 6. Cap 7. Shaft 8. Blade 9. Wiper arm assembly 10. Nut 11. Jam nut 12. Lockwasher 13. Preformed packing 14. Driver 15. Cover 16. Tank 17. Nozzle 18. Spacer 19. Hose 20. Blade 21. Wiper arm assembly 22. Spacer 23. Spacer 24. Nut 25. Retainer 26. Seal 27. Seal 28. Nut 29. Stud 30. Grommet

Go on to Sheet 3

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)



TA 098761

Go on to Sheet 4

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
6. Four capscrews and lockwashers	Remove from steering position bracket and remove bracket.	
7. Three terminals (1)	Disconnect and remove wiper motor and linkage.	
8. Washer nozzle (17) and spacer (18)	Remove. Remove hose (19) and nut from inside cab.	

Go on to Sheet 5

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Washer nozzle (17) and spacer 18)	Install.	
2. Nut and hose (19) from washer pump	Install on nozzle.	
3. Wiper motor and linkage	Place in position.	
4. Three terminals (1)	Connect.	

Go on to Sheet 6

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
5. Seal (25) in retainer (26), nut (24), and nut (28)	Install on stud.	
6. Spacer (5)	Install on wiper arm shaft (7).	
7. Cap (6)	Install on wiper arm shaft (7).	

Go on to Sheet 7

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Driver (14)	<p>Install on wiper arm shaft.</p> <p>Turn wiper motor ON to find correct position for wiper arm assembly. Stop motor.</p>	
9. Wiper arm assembly (9)	<p>Install on wiper arm shaft. Fine adjustments for the wiper arm at REST position can be made with capscrew on back of motor assembly gear box.</p>	
10. Lockwasher (12) and nut (10)	<p>Install on wiper arm shaft.</p>	
11. Steering positioner bracket and rack	<p>Install with four bolts, lockwashers and washers.</p>	

Go on to Sheet 8

WINDSHIELD WIPER MOTOR AND LINKAGE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
12. Cab dashboard cover	Put over steering positioner bracket and install eight bolts, lockwashers, and washer to hold it.	
13. Dashboard panel and seal	Install using five screws and lockwashers.	

End

CAB FLOOR HEATER REMOVAL/INSTALLATION

This task covers: Removal and installation of cab floor heater.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

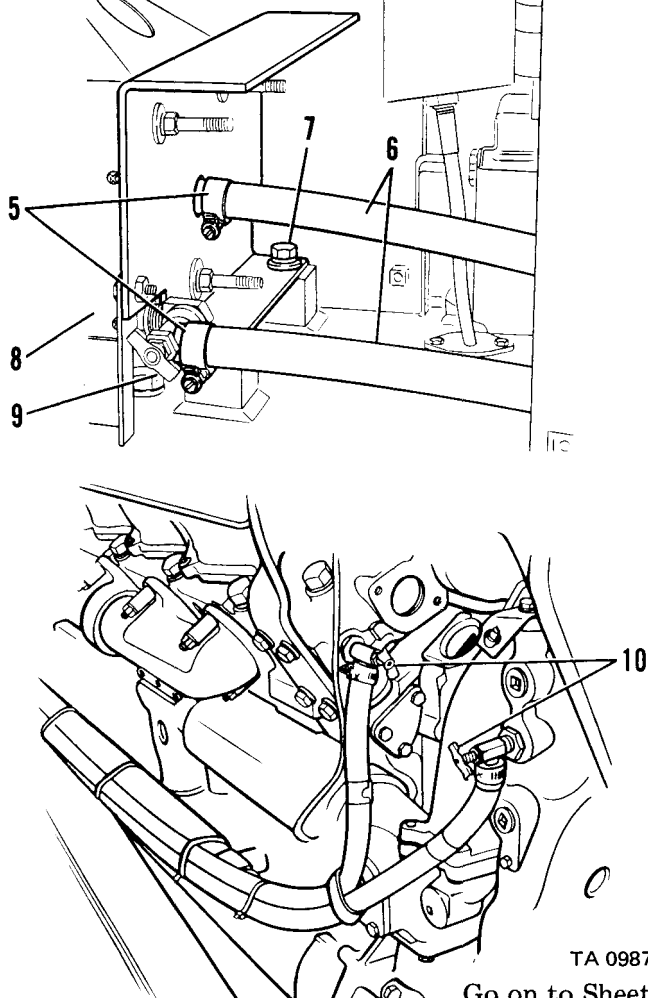
CAB FLOOR HEATER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>		
1. Container lock indicator panel	Remove. (See page 2-298.)	
2. Two capscrews and washers (1), "off-on" switch plate (2)	Remove. Lift up switch plate (2).	
3. Two wires that are connected to switch	a. Put identification on them for correct installation. b. Disconnect.	
4. Twelve capscrews and lockwashers that secure panels (3) and (4)	Remove three of each at heater panel (3); nine of each at hydraulic control console front panel.	
5. Panels (3) and (4)	Remove.	

TA 098762
Go on to Sheet 3

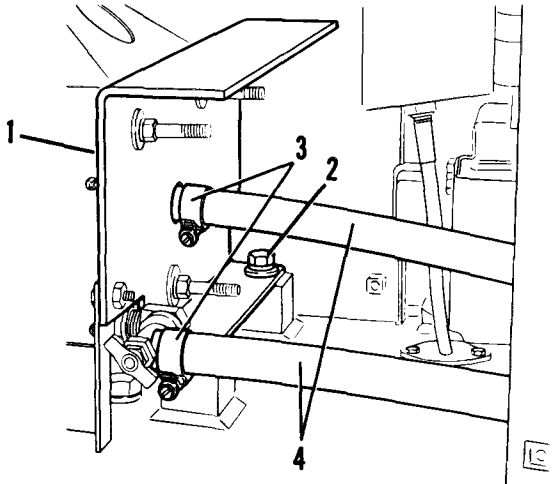
CAB FLOOR HEATER REMOVAL/INSTALLATION (CONT)

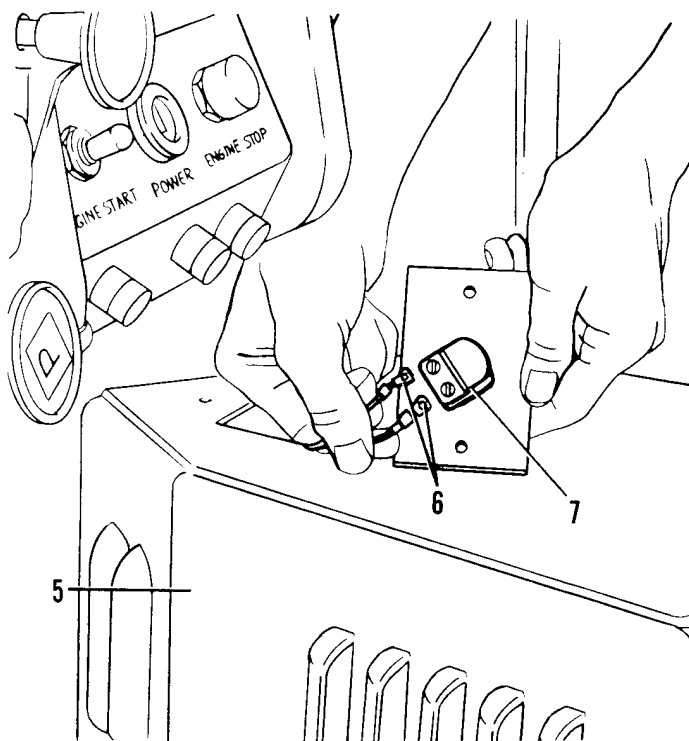
(Sheet 3 of 6)

LOCATION/ITEM	ACTION	REMARKS
6. Two heater hose shut-off valves (10) on engine	Turn clockwise to closed position.	
7. Inlet shut-off valve (9) at cab heater	Turn clockwise to closed position.	
8. Two chunps (5)	Loosen.	
9. Two hoses (6)	Tag for identification anckdisconnect horn heater assembly.	
10. Two capscrews, lockwashers, and washers (7) on heater bracket	Remove.	
11. Heater assembly and bracket (8)	Remove.	

TA 098763

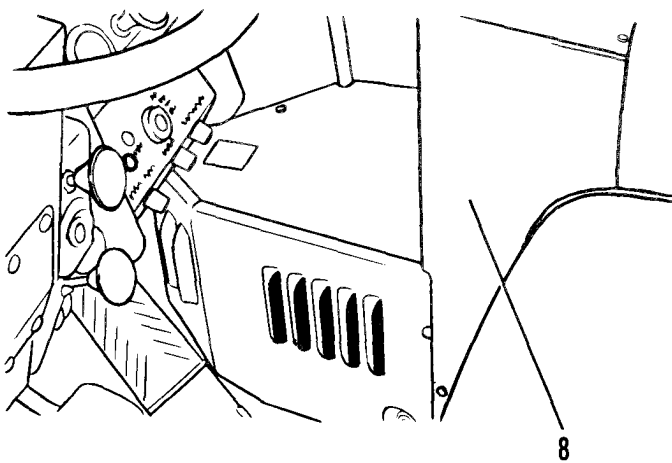
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>1. Heater assembly and bracket (1)</p> <p>2. Two capscrews, lockwashers, and washers (2)</p> <p>3. Two clamps (3) and two hoses (4)</p>	<p>Position in cab.</p> <p>Install in heater bracket.</p> <p>a. Put loosened clamps on ends of hoses.</p> <p>b. Connect hoses to proper fittings on heater.</p> <p>c. Slide clamps up and tighten them.</p>	

LOCATION/ITEM	ACTION	REMARKS
4. Heater panel (5)	a. Position over heater. b. Pull two wires (6) through hole in top of panel.	
5. Three capscrews and lockwashers that secure heater panel	Install in panel.	
6. Two wires (6) and switch plate (7)	Connect wires to correct terminals on switch.	
7. Two capscrews that secure switch plate to heater panel	Install.	

TA 098765
Go on to Sheet 6

CAB FLOOR HEATER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Hydraulic control console front panel (8)	Position in cab.	
9. Nine capscrews and lockwashers that secure hydraulic control console front panel	Install.	

CAB HEATER AND DEFROSTER REMOVAL/INSTALLATION

This task covers: Removal and installation of cab heater and filter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Main disconnect switch OFF

Special Tools

Two 1/2-13 NC forged eyebolts

Four 5/16-18 NC forged eyebolts

Hoist

Personnel Required

One mechanic

References

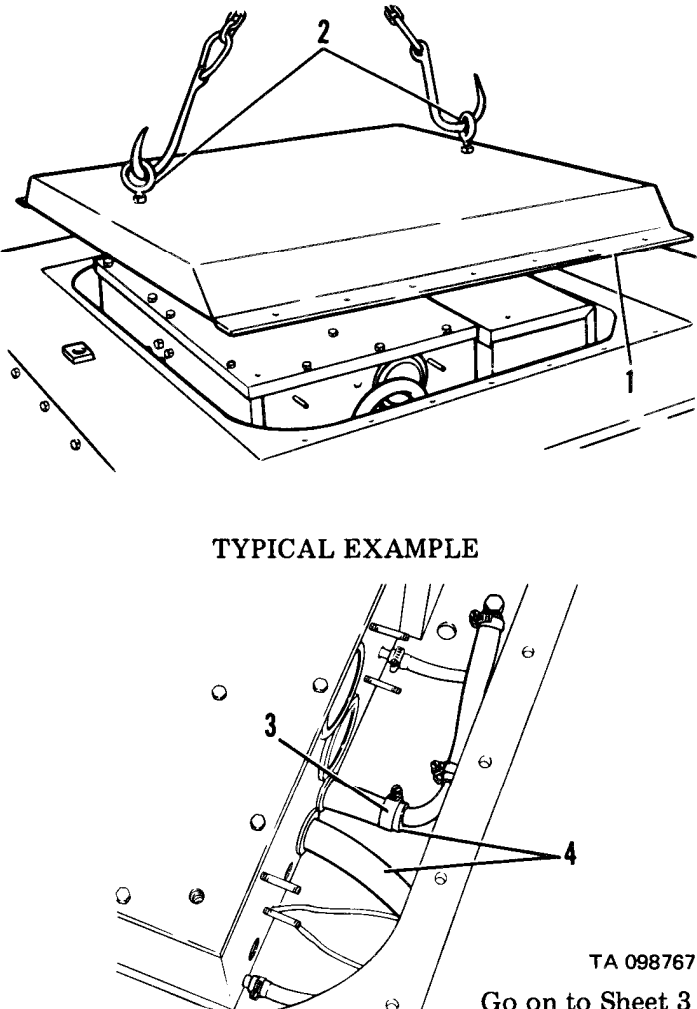
Torque limits chart, page E-1

General Safety Instructions

Vehicle engine must be off.

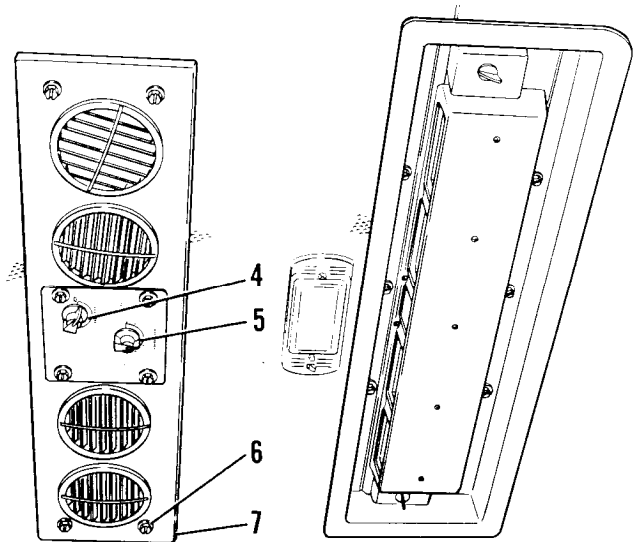
Battery must be disconnected.

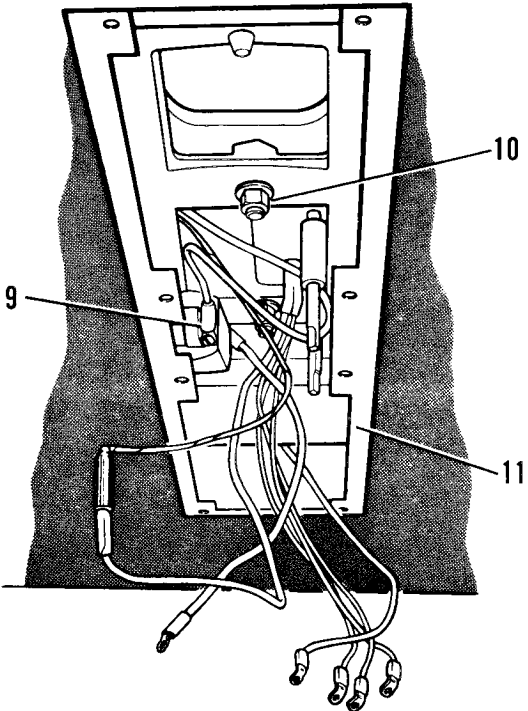
Go on to Sheet 2

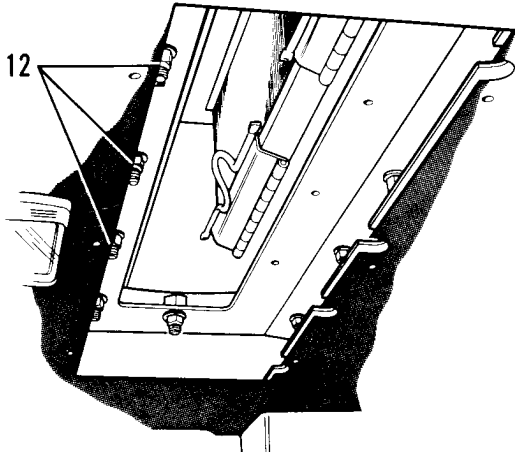
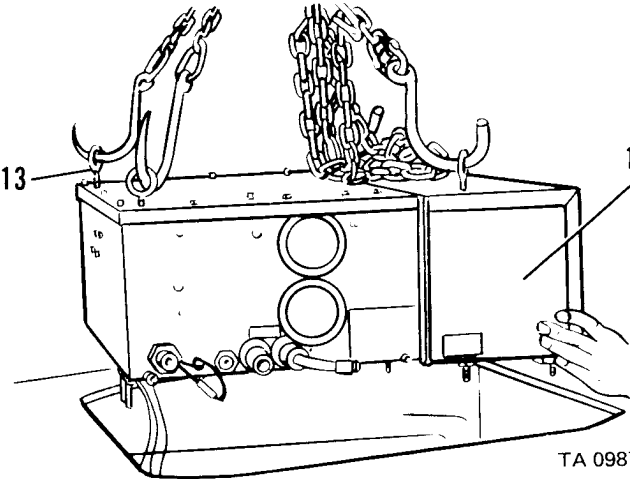
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div> <ol style="list-style-type: none"> 1. Fourteen capscrews and washers around edges of cover (1) 2. Two 1/2-13 NC forged eyebolts with nuts and washers (2) 3. Two hose clamps and two heater hoses (3) 	<p>Remove.</p> <ol style="list-style-type: none"> a. Lift one side of the cover, block it securely and install eyebolt. Repeat for other eyebolt. b. Fasten hoist to eyebolts and remove cover. Cover weighs 92 lb. (42 kg). <ol style="list-style-type: none"> a. Loosen clamps. b. Disconnect hoses (4). 	 <p style="text-align: center;">TYPICAL EXAMPLE</p>

TA 098767

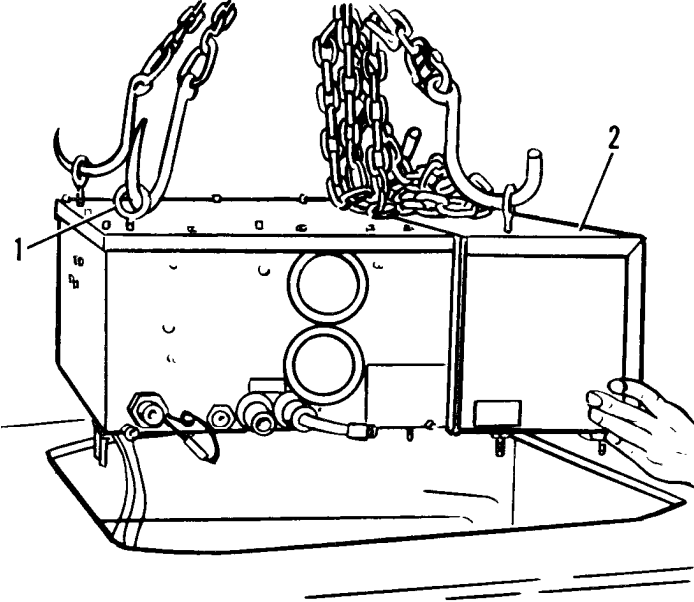
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
4. Heater temperature control knob (4)	Loosen setscrew and remove knob from control console (7).	
5. Fan speed knob (5)	Loosen setscrew and remove knob from control console (7).	
6. Eight capscrews (6)	Remove.	
7. Control console (7)	Lower.	
8. Wires at fan switch (5)	Disconnect. Put identification on wires for correct installation.	

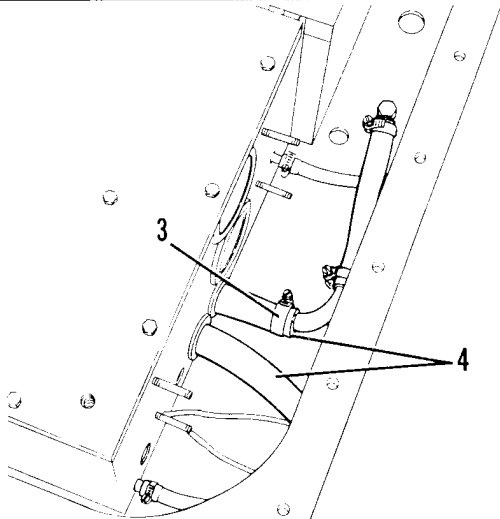
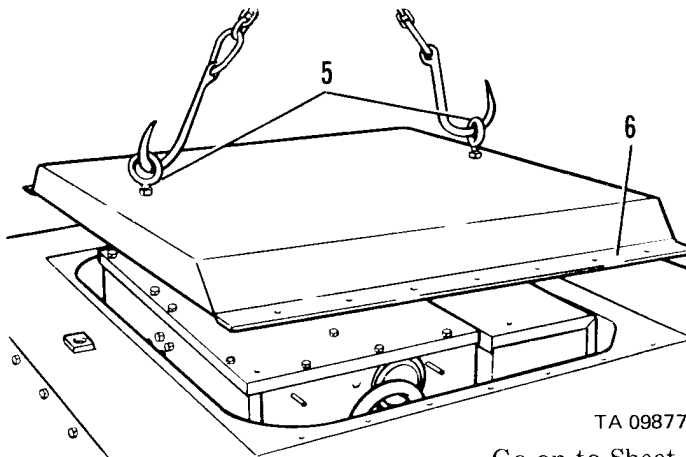
LOCATION/ITEM	ACTION	REMARKS
9. Circuit breaker terminal(9)	Disconnect white/blue wire at terminal. Put identification on wire for correct installation.	
10. Four nuts and washers (10) that hold heater unit to cab	Remove.	
11. Air duct (11)	Remove.	

LOCATION/ITEM	ACTION	REMARKS
<p>12. Ten nuts and washers (12) that hold heater unit to cab</p>	<p>Remove.</p>	
<p>13. Four 5/16-18NC forged eyebolts (13)</p>	<p>a. Install eyebolts in top of heater unit (14). b. Attach a hoist to eyebolts as shown. c. Lift heater unit from cab. Heater unit weighs 105 lb. (47.6 kg).</p>	 <p style="text-align: right;">TA 098770</p>

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION</div> <p>1. Four 5/16-18NC forged eyebolts (1)</p>	<p>a. Install on top of heater unit (2).</p> <p>b. Attach a hoist to eyebolts as shown.</p> <p>c. Lift heater unit above Roll-Over Protective Structure (ROPS).</p> <p>d. Lower heater unit into position.</p>	

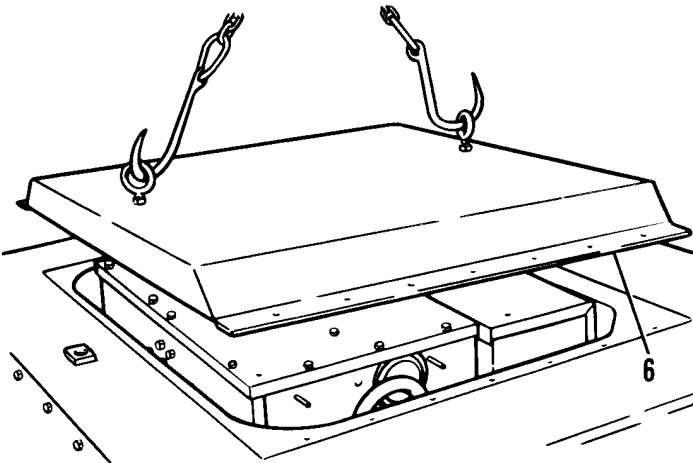
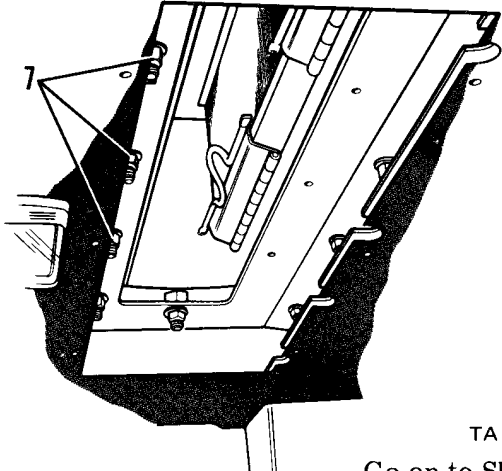
CAB HEATER AND DEFROSTER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
2. Two clamps (3)	Slide loosened clamps over ends of heater hoses (4).	
3. Two heater hoses (4)	<ol style="list-style-type: none"> a. Connect hoses to fittings on heater unit. b. Slide clamps over hose and fittings and tighten clamps. 	
4. Two 1/2-13NC forged eyebolts with nuts and washers (5)	<ol style="list-style-type: none"> a. Install on cover (6). b. Attach hoist to eyebolts as shown. c. Lift cover above Roll-Over Protective Structure (ROPS). d. Position cover on ROPS. e. Lift one side of cover, block it securely and remove eyebolt. f. Remove second eyebolt the same way. 	
5. Cover (6)	Position on ROPS.	

TA 098772
Go on to Sheet 8

CAB HEATER AND DEFROSTER REMOVAL/INSTALLATION (CONT)

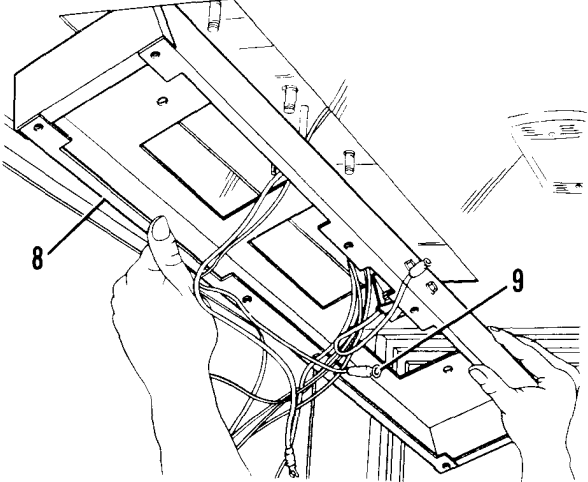
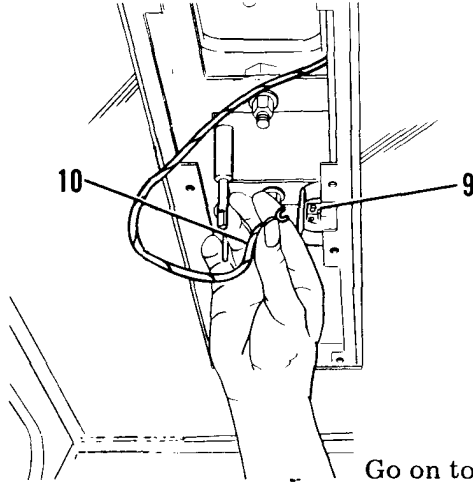
(Sheet 8 of 10)

LOCATION/ITEM	ACTION	REMARKS
<p>6. Fourteen capscrews and washers that hold cover (6) t.n ROPS.</p>	<p>Install.</p>	
<p>7. Ten nuts and washers (7) that hold heater unit to cab</p>	<p>Install. Tighten nuts to a torque of 100-180 lb. in. (11 to 30 N•m).</p>	

TA 098773

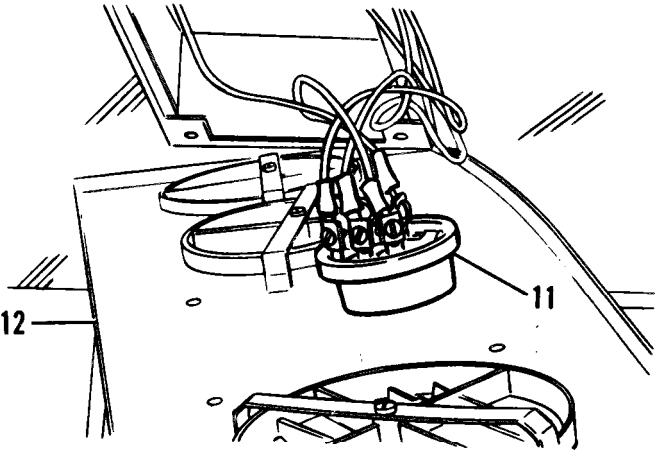
Go on to Sheet 9

CAB HEATER AND DEFROSTER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Airduct (8)	Position under four heater unit mounting nuts in front of cab. Side with circuit breaker (9) must face the rear of cab.	
9. Four nuts and washers that hold airduct bracket	Install. Tighten nuts to a torque of 100-180 lb. in. (11 to 30 N•m).	
10. Circuit breaker terminal (9)	Connect white/blue wire (10).	

TA 098774

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
11. Fan switch (11)	Connect proper wires to proper terminals on switch.	
12. Control console (12)	Position console on roof.	
13. Eight capscrews that hold control console to roof	Install.	
14. Fan speed and heater temperature knobs	<ul style="list-style-type: none"> a. Install. Tighten setscrew. b. Test for proper operation. 	

FILTER FOR CAB HEATER REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Remove, cleaning and installation of the filter for the cab heater.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Non-sudsing detergent

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

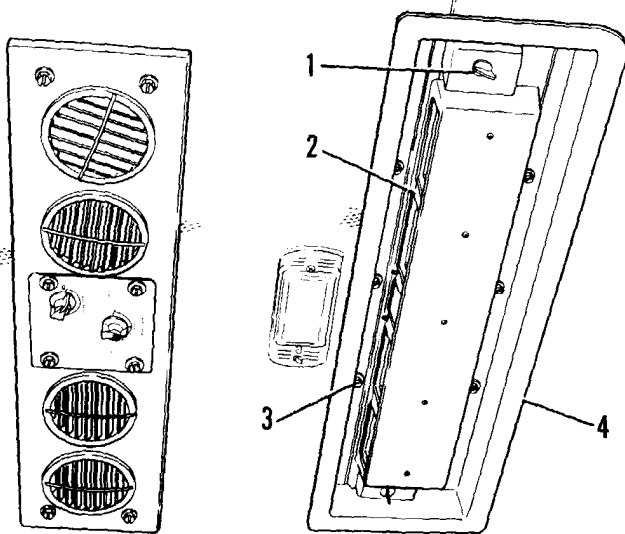
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

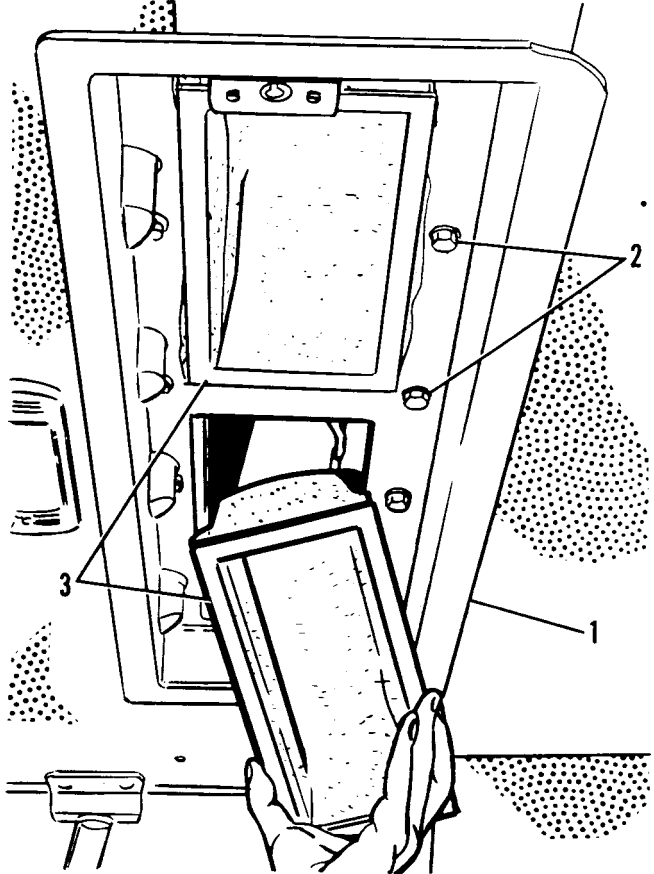
FILTER FOR CAB HEATER REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>		
1. Two thumb screws (1)	Loosen.	
2. Cover (2)	Remove.	
3. Two foam rubber filters	Remove.	
4. Eight screws (3)	Remove.	
5. Filter flange (4)	Remove.	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CLEANING</div>		
Foam rubber filters	<ol style="list-style-type: none"> a. Wash in non-sudsing detergent. b. Rinse in clean water. c. Squeeze dry. 	

TA 098776
Go on to Sheet 3

FILTER FOR CAB HEATER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"> INSTALLATION </div> <ol style="list-style-type: none"> <li>1. Filter flange (1) <li>2. Eight screws (2) <li>3. Two foam rubber filters (3) <li>4. Cover <li>5. Two thumb screws 	<p>Position on air duct.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Tighten.</p>	

TA 098777

End

BODY, CAB, AND HOOD MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these body components for Organizational Maintenance personnel:

- a. Hood
- b. Fenders
- c. seat
- d. Arm cushion
- e. Cab door and striker
- f. Handrails
- g. Ladders
- h. Shipping link
- i. Grease lines
- j. Pintle hook
- k. Rear bumper

Also instructions for striker adjustment.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Hood removal/installation.	2-454	None
2	Fenders removal/installation.	2-457	None
3	Seat removal/installation.	2-460	None
4	Seat belts removal/installation.	2-462	None
5	Arm cushion removal/installation.	2-464	None
6	Windshield wipers removal/installation.	2-466	None
7	Cab door and striker removal/installation.	2-468	None
8	Shipping link removal/installation.	2-471	None
9	Striker adjustment.	2-473	None
10	Platform handrails removal/installation.	2-475	None
11	Ladders removal/installation.	2-477	None
12	Grease lines removal/installation.	2-479	None
13	Pintle hook removal/installation.	2-481	None
14	Crankcase guard removal/installation.	2-483	None

End

HOOD REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of hood.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Shipping link installed.

Special Tools

Hoist - 150 lbs. minimum capacity

Personnel Required

One mechanic

References

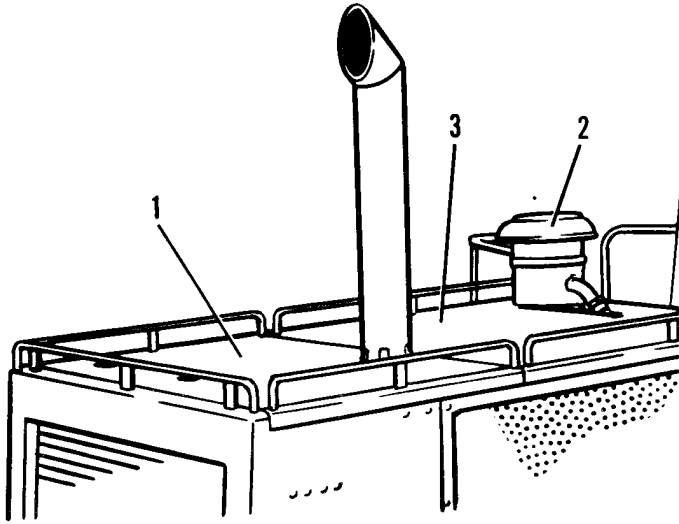
Shipping link removal/installation,
page 2-471.

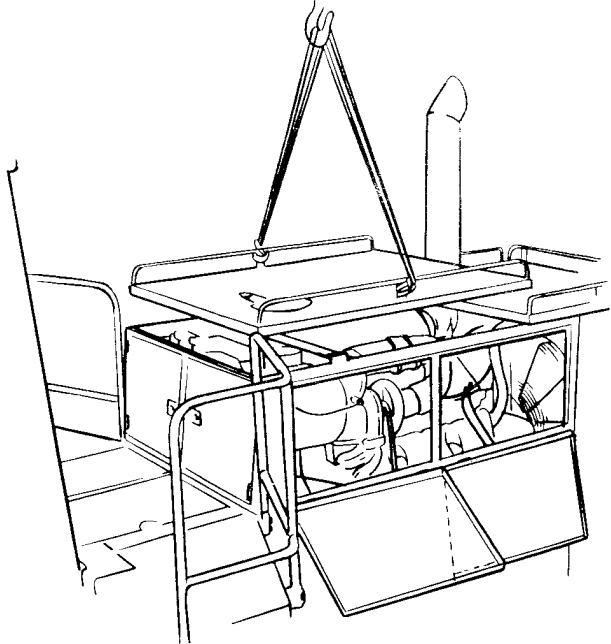
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

HOOD REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
1. Four capscrews and washers that hold rear hood (1) in position	Remove.	
2. Rear hood (1)	Fasten hoist and remove.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Weight of hood is 96 lbs. (44 kg).</p>		
3. Precleaned lid (2)	Remove.	
4. Rubber latch assemblies	Disconnect five from frame assembly.	
5. Front hood (3)	Fasten hoist and remove, guiding carefully over precleaner.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Weight of hood is 124 lbs. (56 kg).</p>		

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Front hood (3) 2. Rubber latch assemblies 3. Precleaner lid (2) 4. Nuts for precleaner lid 5. Hose clamp 6. Rear hood (1) 7. Four capscrews that hold rear hood in position 	<p>Fasten hoist and put in position.</p> <p>Fasten to frame assembly.</p> <p>Place in position and tighten clamp.</p> <p>Fasten.</p> <p>Tighten.</p> <p>Fasten hoist and put in position.</p> <p>Install. The two longer capscrews are installed toward the cab.</p>	

TA 098887

End

FENDERS REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removing and installing front and rear fenders.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

Hoist

Personnel Required

One mechanic

References

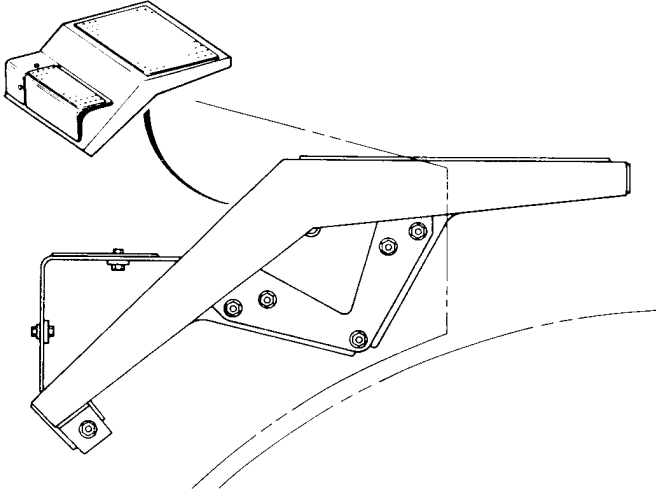
Torque limits chart, page E-1

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

FENDERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
1. Fender, front	Attach hoist.	
2. Nuts, capscrews and washers	Remove six.	
3. Fender	a. Lift and pull away from the vehicle. b. Lower to ground.	
1. Fender, front	a. Hoist into position. b. Install six nuts, capscrews and washers.	
2. Nuts, capscrews and washers	Tighten.	
3. Fender, front	Remove hoist.	

INSTALLATION

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center;">REMOVAL</div> <p>1. Fenders, rear handrail</p>	<p>a. Remove six capscrews and spacers on each side.</p> <p>b. Remove lug.</p> <p>c. Lift fender and handrail off vehicle to ground.</p>	
<div style="border: 1px solid black; padding: 2px; text-align: center;">INSTALLATION</div> <p>1. Fenders, rear handrail</p>	<p>a. Lift fender and handrail into place.</p> <p>b. Install lug, six capscrews, and washers.</p> <p>c. Install grab iron.</p>	

SEAT REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of operator's seat.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

Hoist

Personnel Required

One mechanic

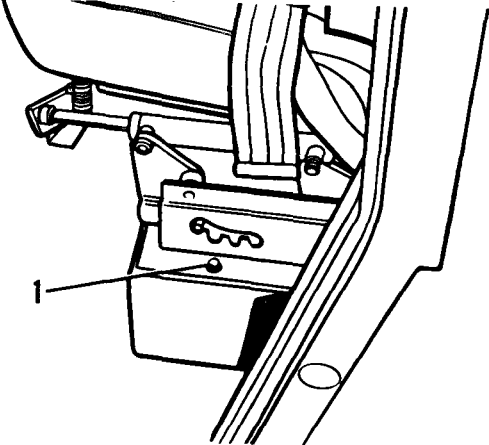
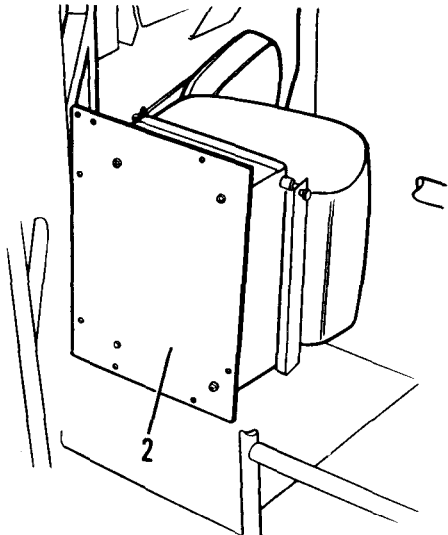
References

Torque limits chart, page E-1

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Hex head capscrews (1)</p> <p>2. Seat, plate attached (2)</p> <p>3. Plate (2)</p>	<p>Remove eight capscrews from seat platform.</p> <p>a. Place on its side.</p> <p>b. Remove from cab to vehicle platform outside.</p> <p>c. Lower seat to the ground using hoist.</p> <p>Remove four hex head capscrews and lockwashers.</p>	
<p style="text-align: center;">INSTALLATION</p> <p>1. Plate (3)</p> <p>2. Seat, plate attached</p>	<p>Install plate to bottom of seat with four capscrews and lockwashers.</p> <p>a. Raise up to outside vehicle platform.</p> <p>b. Place seat on its side. Move into cab and arrange seat upright.</p> <p>c. Aline eight holes.</p> <p>d. Install eight hex head capscrews (1).</p>	

SEAT BELTS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Seat belts removal/installation

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

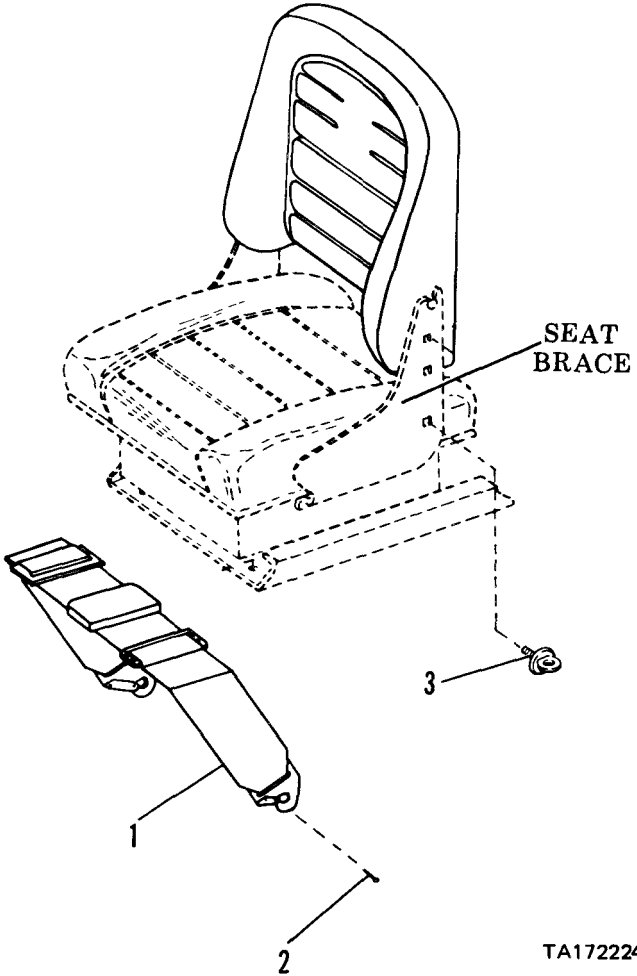
References

None

General Safety Instructions

Main disconnect switch OFF

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Nut attaching eyebolts (3) to seat brace <li>2. Eyebolts (3) <li>3. Cotter pin (2) <li>4. Seat belt (1) 	<p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove from eyebolt (3) and discard.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Seat belt (1) <li>2. Cotter pin (2) <li>3. Eyebolt (3) 	<p>Attach to eyebolt (3).</p> <p>Install.</p> <p>Install in seat brace using nut.</p>	

TA172224

End

2-463

ARM CUSHION REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of arm cushion.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

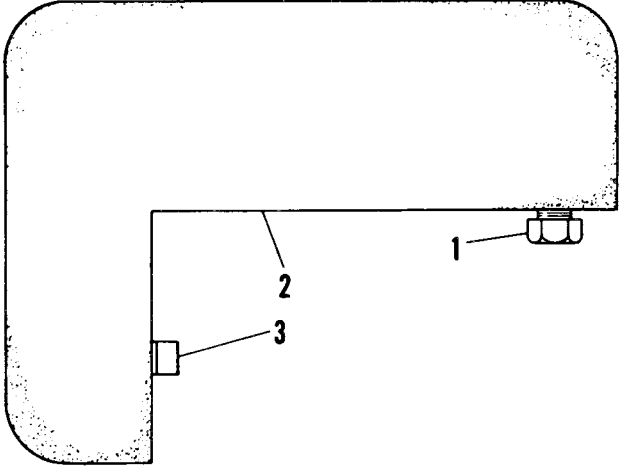
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

ARM CUSHION REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>1. Arm cushion</p>	<p>a. Remove capscrew (1).</p> <p>b. Remove cushion (2) by sliding forward to clear rod (3). Then remove cushion from cab.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>1. Arm cushion</p>	<p>a. Slide cushion (2) into place and rod (3) into proper position.</p> <p>b. Install capscrew (1).</p>	

WINDSHIELD WIPERS REMOVAL/INSTALLATION

This task covers: Windshield wipers removal /installation

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

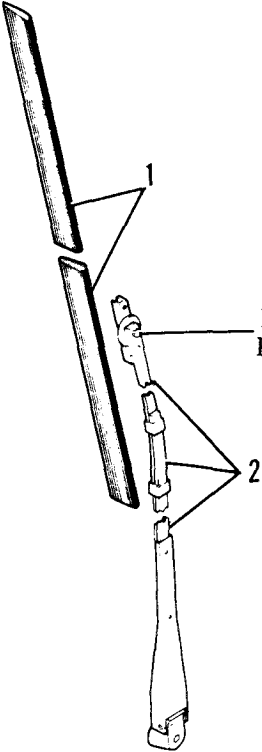
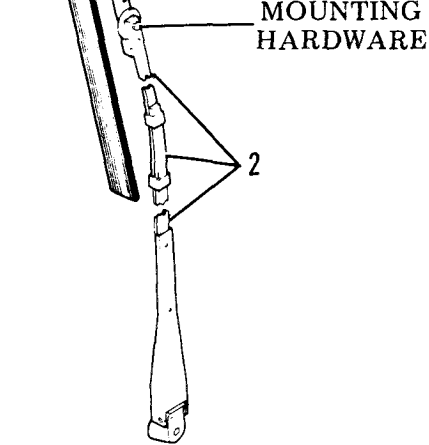
References

None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Mounting hardware <li>2. Wiper blade (1) 	<p>Detach from arm (2) and wiper blade (1).</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 2px; text-align: center;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Wiper blade (1) 	<p>Position on arm (2) and secure with mounting hardware.</p>	

CAB DOOR AND STRIKER REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removing and installing cab door and striker.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

Hoist – 150 lb. minimum lifting capacity

Personnel Required

One mechanic

References

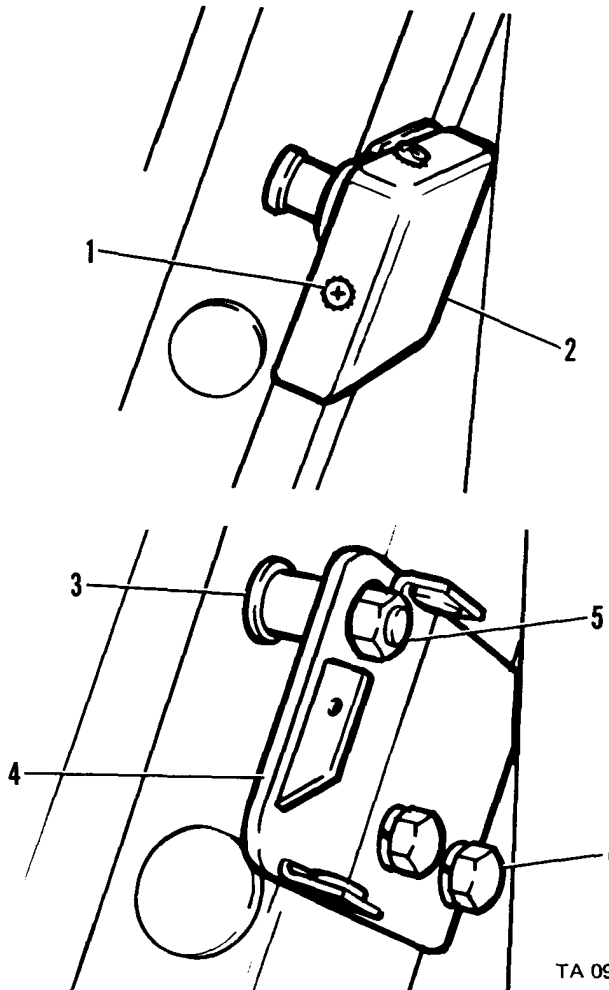
Striker adjustment, page 2-473.

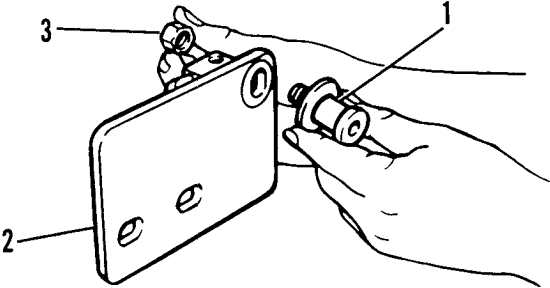
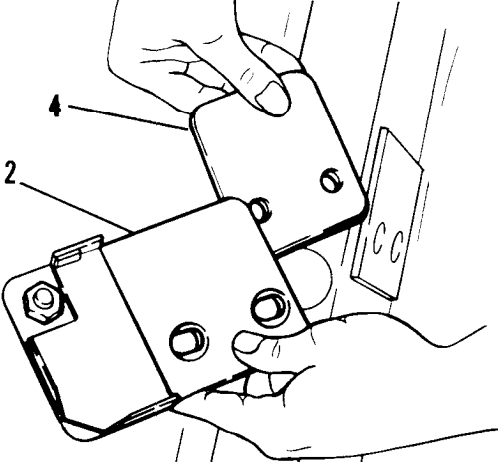
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

CAB DOOR AND STRIKER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Left handrail</p> <p>2. Door</p> <p>3. Striker</p>	<p>Remove four hex head cap screws and washers, and remove rail from platform.</p> <p>a. Remove nut from center hinge.</p> <p>b. Open door, so it will clear Roll-Over Protective Structure (ROPS).</p> <p>c. Hoist door from hinges, and place it on ground.</p> <p>a. Remove three screws and lockwashers (1).</p> <p>b. Remove cover (2).</p> <p>c. Remove hex head cap screws and lockwashers (6).</p> <p>d. Remove plate (4) and shims.</p> <p>e. Remove nut (5) and striker assembly (3).</p>	 <p>TA 098782</p> <p>Go on to Sheet 3</p>

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
<p>1. Door</p>	<p>a. Hoist door up to hinges, and lower into hinges.</p> <p>b. Remove hoist, and install the nut on the center hinge.</p>	
<p>2. Handrail</p>	<p>Install handrail with four hex head capscrews and washers.</p>	
<p>3. Striker</p>	<p>a. Install striker assembly (1) into plate (2), and install nut (3).</p> <p>b. Install shims (4) and plate (2) with two capscrews.</p>	
<p>4. Cover</p>	<p>After adjustments, install cover with three capscrews and lockwashers.</p>	<p>For adjustments, see page 2-473.</p>

SHIPPING LINK REMOVAL/INSTALLATION

This task covers: The removal and installation of the shipping link.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

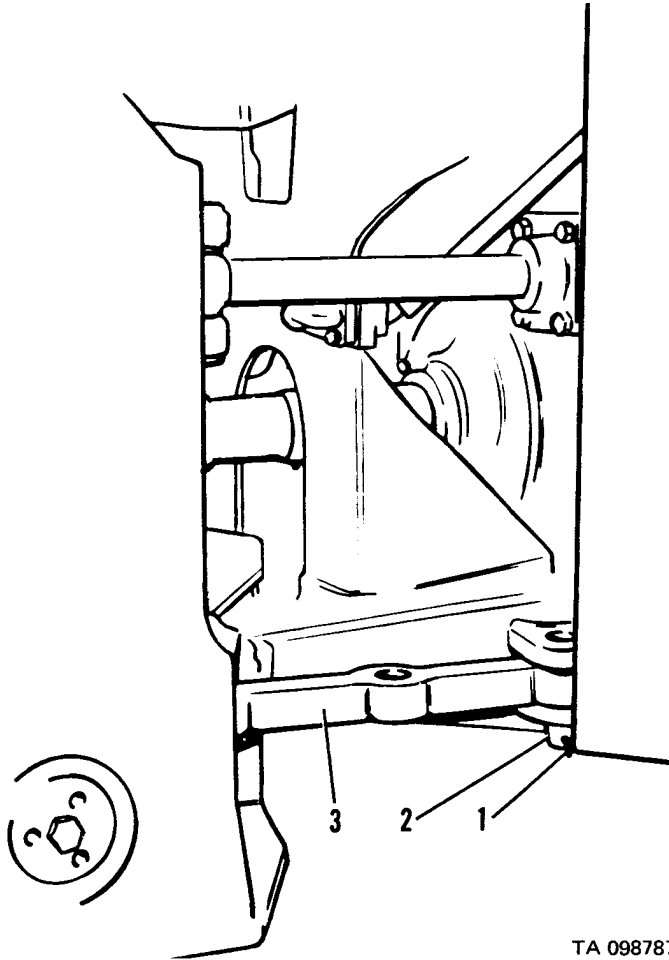
References

Shipping link installation and storage,
page 2-27

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<ol style="list-style-type: none"> 1. Cotter pin (1) 2. Retaining pin (2) 3. Shipping link (3) 4. Retaining pin (2) and cotter pin (3) 	<p>Remove.</p> <p>Remove.</p> <p>Place in storage position.</p> <p>Install.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Cotter pin (1) and retaining pin (2) 2. Shipping link (3) 3. Retaining pin (2) 4. Cotter pin (1) 	<p>Remove.</p> <p>Remove from storage position and fasten to retaining plates.</p> <p>Place in position.</p> <p>Install.</p>	

TA 098787

End

2-472

STRIKER ADJUSTMENT

(Sheet 1 of 2)

This task covers: Adjusting the striker after installation.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Shims

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

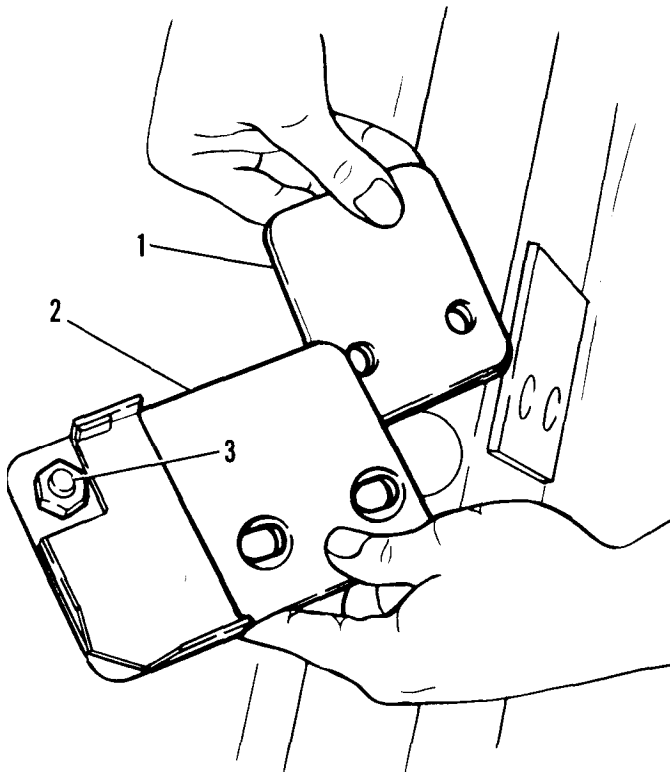
References

Cab door and striker removal/installation,
page 2-468.

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
Striker and plate (2)	<ul style="list-style-type: none">a. For forward or backward adjustments, install or remove shims (1).b. For right or left adjustments, or if door is too loose or too tight, move striker plate.c. If door doesn't close or is hard to close, loosen the striker and move up or down (3).	<p>Adjustment is done when door is next to striker so that the point where latch and striker meet can be seen.</p>  <p>The diagram illustrates the adjustment process. A hand is shown holding a rectangular plate (the striker) against a door frame. Callout 1 points to a shim being inserted between the plate and the frame. Callout 2 points to the edge of the plate being moved horizontally. Callout 3 points to a screw on the plate being loosened with a screwdriver to allow vertical movement.</p>

TA 098784

End

2-474

PLATFORM HANDRAILS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of platform handrails.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

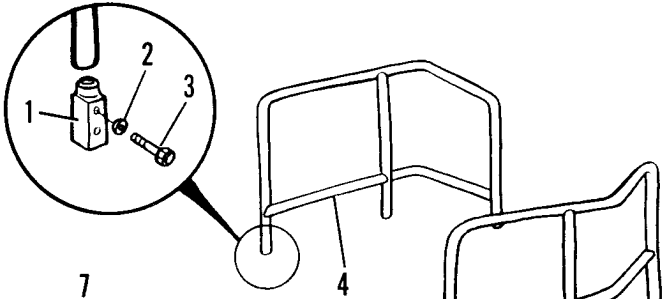
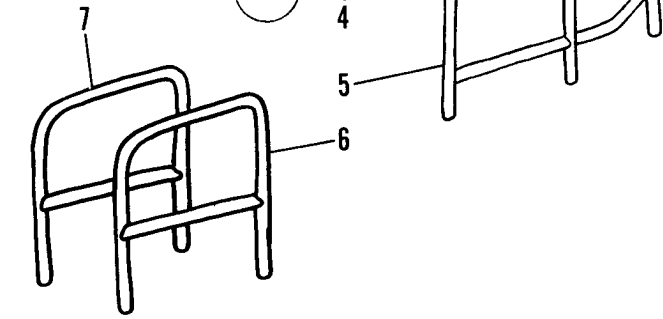
None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

PLATFORM HANDRAILS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>1. Capscrews (3) and washers (2)</p> <p>2. Handrails (4), (5), (6), (7)</p>	<p>Remove.</p> <p>Remove with support block (1).</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>1. Handrails</p> <p>2. Capscrews (3) and washers (2)</p>	<p>Place in position with support block (1).</p> <p>Install.</p>	

LADDERS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of ladders.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

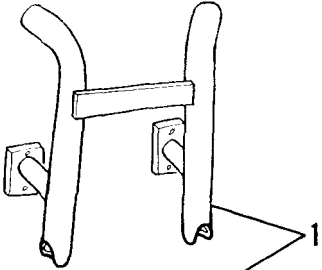
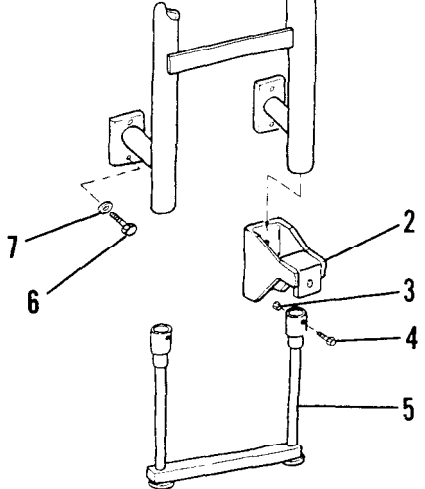
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LADDERS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Capscrews (4), (6) and washers (3), (7)</p> <p>2. Ladders (1) and (5)</p>	<p>Remove.</p> <p>Remove from brace (2).</p>	
<p style="text-align: center;">INSTALLATION</p> <p>1. Ladders (1) and (5)</p> <p>2. Capscrews (4), (6) and washers (3), (7)</p>	<p>Place in position on brace (2).</p> <p>Install.</p>	

TA 098786

End

2-478

GREASE LINES REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of grease lines.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Grease line assembly

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

GREASE LINES REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 2)

LOCATION/ITEM	ACTION	REMARKS
<ol style="list-style-type: none"> 1. Fittings (1) 2. Capscrew and washer (2) 3. Clip (3) 4. Line (4) 5. Grease fitting (5) 6. Connectors (6) 	<p>Disconnect.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>	<p style="text-align: center;">NOTE</p> <p>If a new line is to be used, attach grease fitting and fill line with appropriate grease (see LO 10-3930-641-12) BEFORE installation.</p> <p style="text-align: center;">NOTE</p> <p>Perform Step 4 if you did not use a new line.</p>	<p style="text-align: right;">TA 098788 End</p>
<ol style="list-style-type: none"> 1. Connector (6) 2. Line (4) and fitting (1) 3. Clip (3) and capscrew and washer (2) 4. Grease fitting (5) 	<p>Install.</p> <p>Install on connector (6).</p> <p>Install on line (4).</p> <p>Install on line with fitting (1).</p>	<p style="text-align: right;">2-480</p>

PINTLE HOOK REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of pintle hook.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

PINTLE HOOK REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
1. Capscrews (1), washers and nuts (2) holding pintle hook (3) to bumper	Remove.	
2. Large retaining nut (4) behind bumper	Remove from shaft.	
3. Pintle hook (3)	Remove.	
1. Pintle hook (3)	Place in position.	
2. Large retaining nut (4) behind bumper	Install on shaft.	
3. Capscrews (1), washers and nuts (2)	Install.	

TA 098886

End

CRANKCASE GUARD REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of crankcase guards.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine off.

Wheels blocked.

Special Tools

None

Personnel Required

Two mechanics

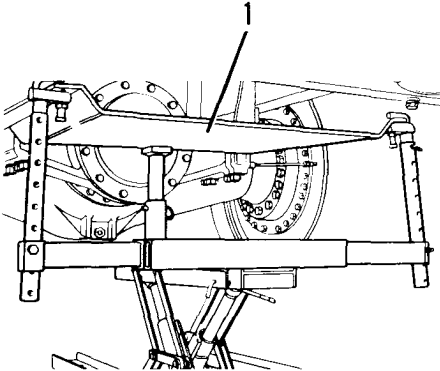
References

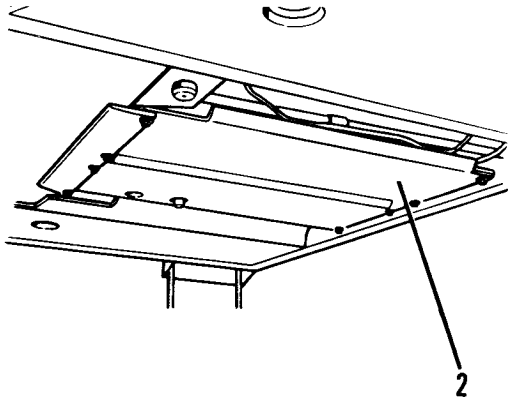
None

General Safety Instructions

Place jack under guard before loosening capscrews.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center;"> REMOVAL FRONT CRANKCASE GUARD </div> <ol style="list-style-type: none"> <li>1. Capscrews that hold front crankcase guard (1). <li>2. Capscrews <li>3. Front crankcase guard (1) 	<div style="border: 1px solid black; padding: 5px; text-align: center;"> WARNING </div> <p>Place jack under guard before loosening capscrews. Front guard weighs 70 pounds.</p> <ol style="list-style-type: none"> <li>Loosen, and install jack. <li>Remove. <li>Lower, using the jack. 	
<div style="border: 1px solid black; padding: 5px; text-align: center;"> INSTALLATION </div> <ol style="list-style-type: none"> <li>1. Front crankcase guard (1) <li>2. Capscrews <li>3. Jack 	<ol style="list-style-type: none"> <li>Place in position, using jack. <li>Install. <li>Remove. Tighten capscrews. 	

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center;"> REMOVAL REAR CRANKCASE GUARD </div> <ol style="list-style-type: none"> <li>1. Four capscrews that hold rear crankcase guards (2) <li>2. Rear crankcase guard 	<p>Place jack under guard before loosening capscrews. Rear guard weighs 130 pounds.</p> <p>Remove.</p> <p>Remove the two rear crankcase guards.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Weight of each guard is 70 lb. (32 kg).</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center;"> INSTALLATION </div> <ol style="list-style-type: none"> <li>1. Rear crankcase guard (2) <li>2. Capscrews 	<p>Position under machine.</p> <p>Install.</p>	

HYDRAULIC LIFT COMPONENTS MAINTENANCE INSTRUCTIONS

This section covers removal and installation of these hydraulic components for Organizational Maintenance personnel:

- a. Control linkage
- b. Mast lines guard

Also instructions for servicing hydraulic filter, servicing brake hydraulic system, lift cylinder test and bleeding, tilt cylinder test, and control linkage adjustment.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Hydraulic filter - service.	2-487	2-43
2	Brake hydraulic system filter - service.	2-490	None
3	Tilt cylinder test.	2-493	2-43
4	Lift cylinder test and bleeding.	2-495	2-43
5	Controls and linkage adjustment.	2-497	2-43
6	Mast lines guard removal/installation.	2-500	None
7	Hydraulic hand control removal/installation.	2-502	None
8	Tophandler guide plate mounting bolts replacement.	2-505	None
9	Tophandler limit switch adjustment.	2-507	None

End

HYDRAULIC FILTER – SERVICE

This task covers: Servicing hydraulic filter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Filter element for implement filter (two)
 Solvent cleaning compound (Item 2, Appendix C)
 Hydraulic fluid (Item 9, Appendix C)
 Cover gasket

Troubleshooting Reference

Page 2-43

Equipment Condition

Fork assembly lowered
 Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

PMCS, page 2-5

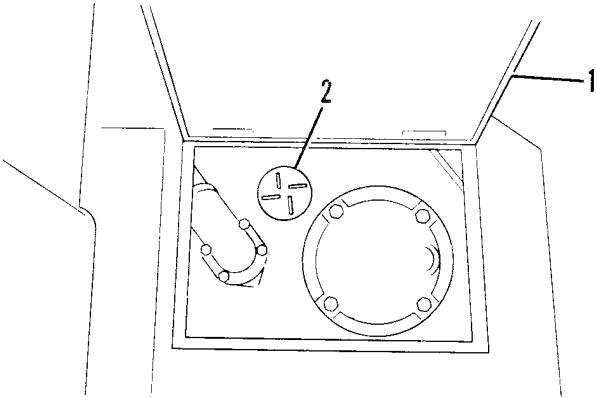
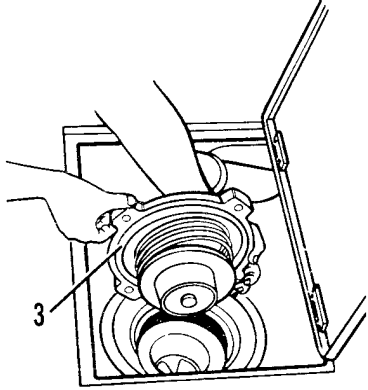
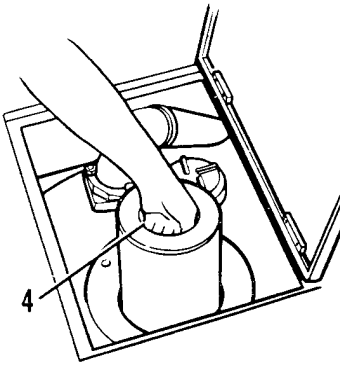
General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

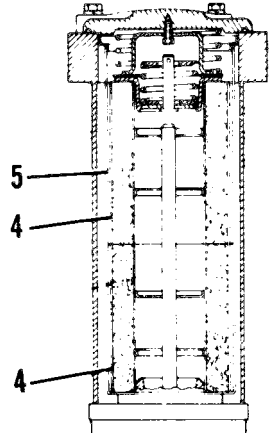
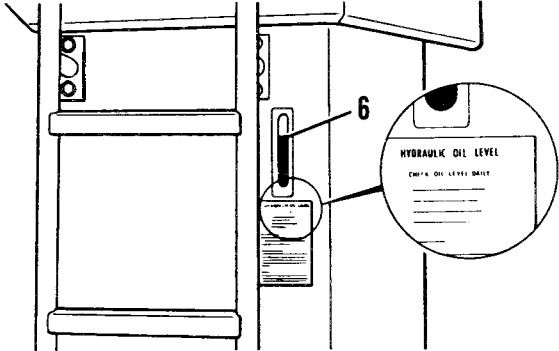
HYDRAULIC FILTER – SERVICE (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
1. Floor plate (1) (Right side of vehicle)	Unlock and raise.	  
2. Filler cap (2)	Remove slowly to relieve pressure.	
3. Four capscrews Implement filter cover (3)	Remove from implement filter cover. Remove.	
4. Cover gasket	Inspect. Replace if damaged.	
5. Two filter elements (4)	Remove and discard.	

TA 098794

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS	
6. Filter screen (5)	Remove and clean in nonflammable solvent.	 <p style="text-align: center;">FILTER ASSEMBLY</p>	
7. Cover (3)	Clean in nonflammable solvent.		
8. Screen (5)	Install.		
9. Two filter elements (4)	Replace.		
10. Cover and capscrews (3)	Replace.		
11. Engine	Start. Run at low idle. Inspect for leaks.		
12. Oil level indicator (6)	Check.		
13. oil	Add if necessary.		
14. Engine	Stop.		
15. Floor plate (1)	Close and lock.		
		<p style="text-align: right;">TA 098795</p> <p style="text-align: center;">Oil level should be above ADD COLD mark.</p>	

End

BRAKE HYDRAULIC SYSTEM FILTER – SERVICE

This task covers: Servicing brake hydraulic system filter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Filter elements for brake hydraulic system

Solvent cleaning compound (Item 2, Appendix C)

Pan to catch oil

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

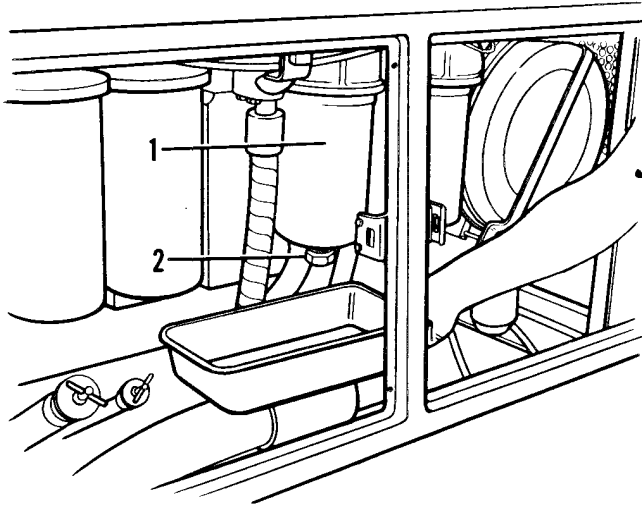
References

PMCS, page 2-5

General Safety Instructions

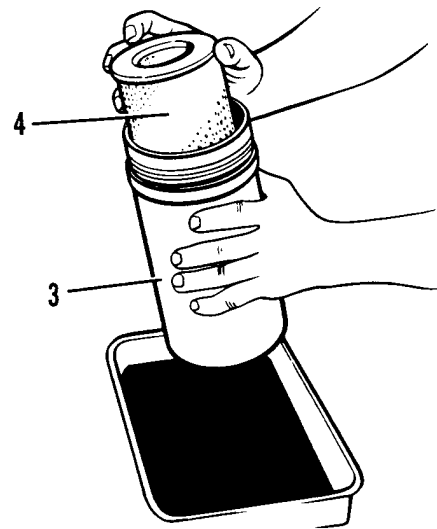
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Access doors	Open.	
2. Filter (1)	Place pan under drain plug to prevent draining oil on machine.	
3. Housing drain plug (2) Oil	Remove. Drain.	

BRAKE HYDRAULIC SYSTEM FILTER – SERVICE (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS	
4. Filter housing (3)	Remove.		
Filter element (4)	Remove and discard.		
5. Filter housing base	Clean in nonflammable solvent.		
6. Filter housing (3)	Clean in nonflammable solvent.		
7. Filter	Install new element (4).		
8. Housing (3)	Install.		
Drain plug (2)	Clean and install.		
9. Housing	To tighten housing, use nut on bottom of filter housing.		
10. Access doors	Close.		
11. Hydraulic tank	Add oil to fill.		See LO 10-3930-641-12.

TILT CYLINDER TEST

(Sheet 1 of 2)

This task covers: Drift test of tilt cylinders.

INITIAL SETUP

Test Equipment

Tape measure

Watch

Materials/Parts

None

Troubleshooting Reference

Page 2-43

Equipment Condition

Intermittent operation

Special Tools

None

Personnel Required

Two mechanics

References

PMCS, page 2-5

Lift cylinder test, page 2-495

Shipping link installation/storage, page 2-471

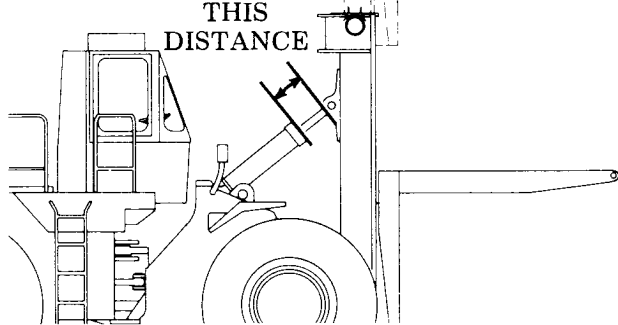
General Safety Instructions

Shipping link installed.

Parking brake ON.

Go onto Sheet 2

TILT CYLINDER TEST (CONT)

LOCATION/ITEM	ACTION	REMARKS
1. Vehicle	Lift rated capacity load off ground.	Hydraulic oil must be at normal operating temperature (110°-120°F). Mast will be vertical.
2. Tilt cylinder	Take measurement of tilt cylinder rods from nut to cylinder housing.	<p>MEASURE THIS DISTANCE</p> 
3. Mast	Operate to complete forward and complete reverse position several times.	
4. Mast	Put mast back to vertical position.	
5. Engine	Turn off engine. Wait 20 minutes and take another measurement of tilt cylinder rods.	
6. Tilt cylinder	If measurement changed from measurement taken in Step 2, then tilt system has drifted.	

LIFT CYLINDER TEST AND AIR BLEEDING

(Sheet 1 of 2)

This task covers: Drift test of lift cylinder and bleeding of air from lift cylinder.

INITIAL SETUP

Test Equipment

Tape measure

Watch

Materials/Parts

None

Troubleshooting Reference

Page 2-43

Equipment Condition

Engine running, machine operable

Special Tools

None

Personnel Required

Two mechanics

References

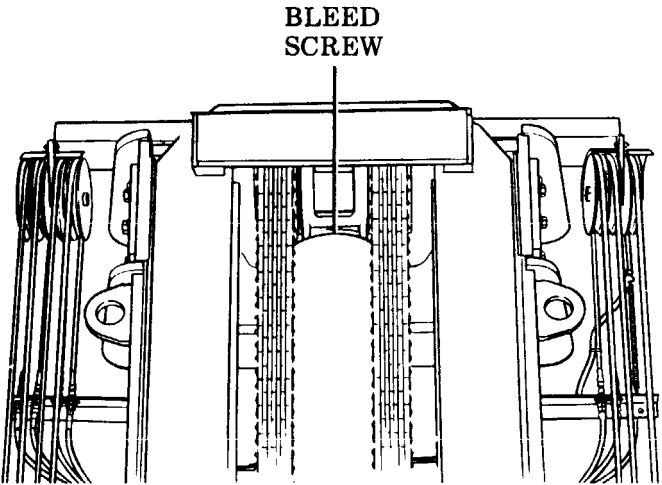
Tilt cylinder test, page 2-493

General Safety Instructions

Shipping link installed.

Go on to Sheet 2

LIFT CYLINDER TEST AND AIR BLEEDING (CONT)

LOCATION/ITEM	ACTION	REMARKS
<ol style="list-style-type: none"> 1. Vehicle 2. Hydraulic controls 3. Forks 4. Carriage 	<p>Put rated capacity load on forks.</p> <p>Operate vehicle through normal lift and tilt cycle.</p> <p>With load on forks, lift carriage so lift cylinder has hydraulic load.</p> <p>Measure height of carriage from ground.</p>	<p>Hydraulic oil must be at normal operating temperature, (110 °-1200 F).</p> <p>Mast at 0° tilt.</p> <p>Carriage must not drift more than one inch in 20 minutes.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> BLEEDING AIR FROM LIFT CYLINDER </div>	<ol style="list-style-type: none"> 1. Bleed screw <p>Loosen but do not remove.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> WARNING </div> <p>System is under high pressure. Removing bleed screw completely will cause mast and carriage to drop suddenly.</p> 2. Carriage <p>Lift approximately 2 ft. (608 mm).</p> 3. Air in lift cylinder <p>Allow to bleed through bleed screw until oil comes out with no air.</p> 4. Bleed screw <p>Tighten.</p> 5. Mast <p>Lower completely.</p> 6. Hydraulic tank <p>Check level and fill if necessary. (See LO 10-3930-641 -12.)</p> 	

TA 172226

End

2-496

CONTROLS AND LINKAGE ADJUSTMENT

(Sheet 1 of 3)

This task covers: Adjustment of hydraulic control linkages.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-43

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Shipping link installation/storage, page 2-471

General Safety Instructions

Parking brake ON.

Shipping link installed.

Go onto Sheet 2

CONTROLS AND LINKAGE ADJUSTMENT (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
1. Cotter pin (1) and washer (2)	Remove.	
2. Pin (3)	Remove.	
3. Nut (4)	Loosen.	Slide up on cable.
4. Yoke (5)	Remove.	
5. Spool	Center. (Allow spool to slide to NEUTRAL position.)	Pull spool to end of travel and release. Push spool to end of travel and release.
6. Yoke (5)	Adjust yoke (5) until retaining pin (3) can be installed in holes without removing spool.	
7. Nut (5)	Install on threads and turn until it is flush with face of yoke.	

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
8. Washer (2) and cotter pin (1)	Install.	
9. Nut (5)	Tighten against bracket.	

MAST LINES GUARD REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of the mast lines guard.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

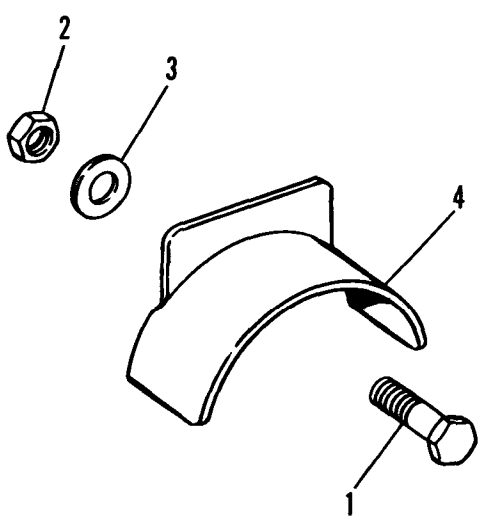
References

None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>1. Capscrews (1), nuts (2) and washers (3)</p> <p>2. Mast lines guards (4)</p>	<p style="text-align: center;">NOTE</p> <p>Use an appropriate platform to work on the mast lines guard. DO NOT climb the mast.</p> <p>Remove.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>1. Mast lines guards (4)</p> <p>2. Capscrews (1), nuts (2) and washers (3)</p>	<p>Place in position.</p> <p>Install.</p>	

HYDRAULIC HAND CONTROL REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of hydraulic hand controls.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

Controls and linkage adjustment, page 2-497

General Safety Instructions

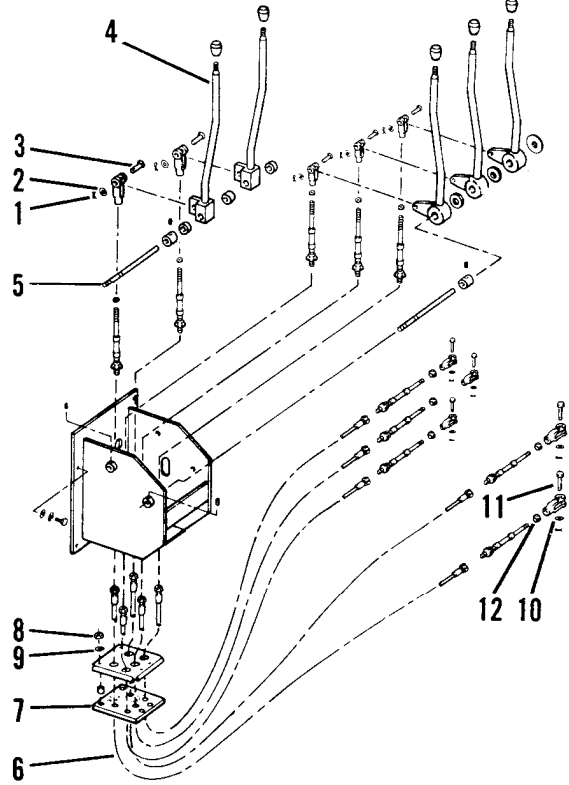
Mast lowered and tilted full forward.

Main disconnect switch OFF.

Go on to Sheet 2

HYDRAULIC HAND CONTROL ASSEMBLY REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>		
1. Capscrews, washers, three panels	Remove.	
2. Cotter pin (1) and washer (2)	Remove from clevis pin (3).	
3. Handle (4)	Remove by sliding off shaft (5).	
4. Cable assembly	Loosen at bracket assembly (7).	
5. Retainer (8 & 9) and seal	Remove and save.	
6. Rod end (10)	Remove pin (11) and disconnect at valve assembly.	
7. Rod end (10)	Loosen nut (12) and unscrew rod end (10) from cable assembly.	
8. Handle (4) and cable assembly	Adjust. (See page 2-497.)	

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION		
1. Handle (4) and cable assembly	Install.	
2. Rod end (10)	Screw onto cable assembly. Tighten, using nut (12).	
3. Rod end (10)	Install on valve assembly using pin (11).	
4. Retainer (8 and 9) and seal		
5. Bracket assembly (7)		
6. Handle (4)	Slide onto shaft (5).	
7. Cotter pin (1) and washer (2)	Install on clevis pin (3).	
8. Hydraulic hand control	Adjust. (See page 2-497.)	

TOPHANDLER GUIDE PLATE MOUNTING BOLTS REPLACEMENT

(Sheet 1 of 2)

This task covers: Removal/installation of the tophandler guide plate mounting bolts.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

One mechanic

References

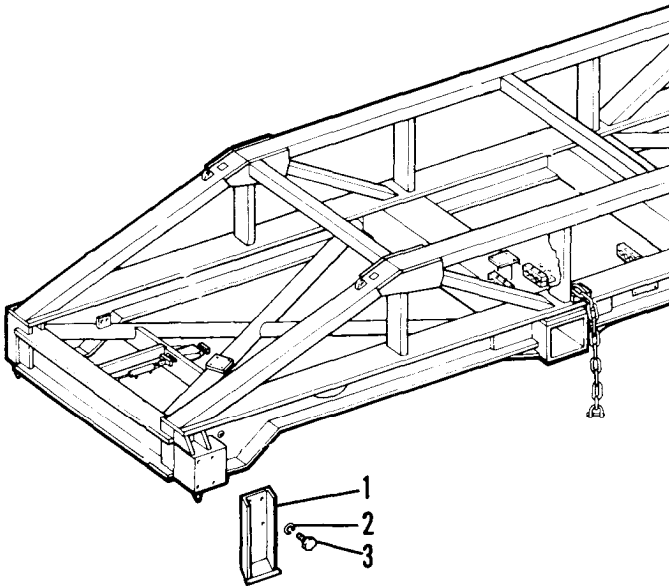
None

General Safety Instructions

Main disconnect switch OFF.

Go on to Sheet 2

TOPHANDLER GUIDE PLATE MOUNTING BOLTS REPLACEMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>1. Capscrews (3) and washers (2)</p> <p>2. Guide plate (1)</p>	<p>Remove.</p> <p style="text-align: center;">NOTE</p> <p>Excess pressure against the guide plate will break the head off the capscrew. It may be necessary for you to use a vise grips or similar tool to remove the rest of the capscrew.</p> <p>Remove.</p>	
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">INSTALLATION</div> <p>1. Guide plate (1)</p> <p>2. Capscrew (3) and washer (2)</p>	<p>Position on tophandler.</p> <p>Install.</p>	

TA 172227

End

2-506

TOPHANDLER LIMIT SWITCH ADJUSTMENT

(Sheet 1 of 3)

This task covers: Tophandler limit switch adjustment.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine running at low idle
Transmission in NEUTRAL
Emergency brake ON

Special Tools

None

Personnel Required

One operator
One mechanic

References

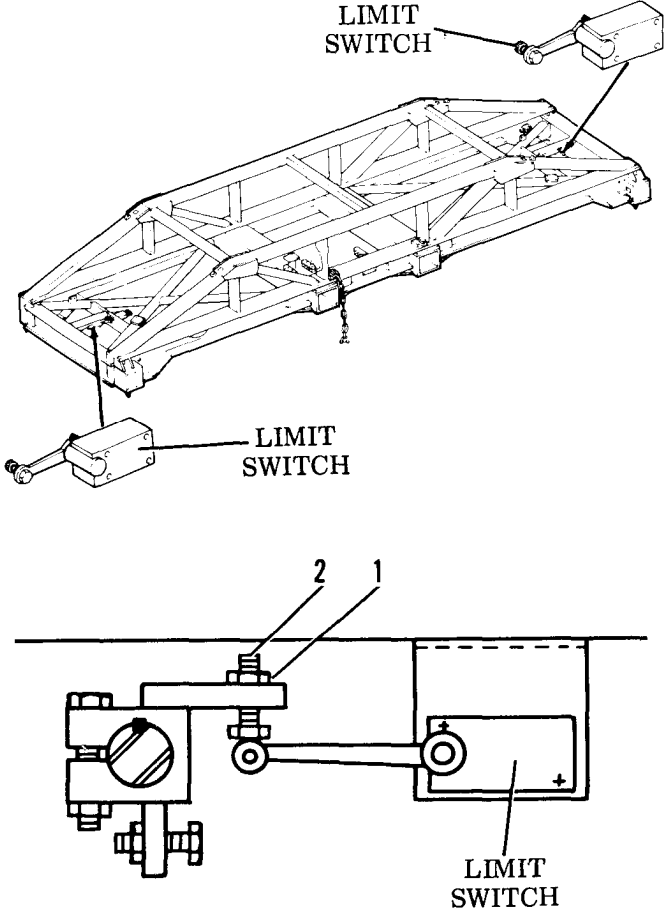
Container lock indicator panel,
TM 10-3930-641-10.

Mast controls, TM 10-3930-641-10.

General Safety Instructions

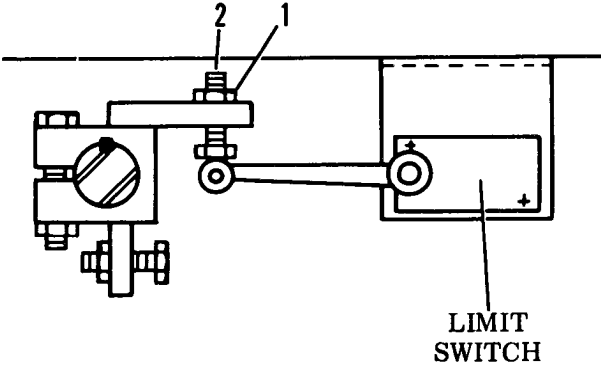
The man resetting the limit switches
must be very careful while on the
tophandler.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Mechanic</p> <p>2. Mechanic</p> <p>3. Operator</p> <p>4. Mechanic</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto; text-align: center;">WARNING</div> <p>It is critical that the operator and mechanic understand what each is to do during this procedure. All actions, steps and hand signals must be worked out and understood beforehand.</p> <p>Safely position self on container handler.</p> <p>Signal operator to push full forward on container lock control handle.</p> <p>Push container lock control handle full forward. Place hands on steering wheel.</p> <p>Loosen jam nut (1) on capscrew (2) and back out capscrew.</p>	 <p>The diagram consists of two parts. The upper part is a perspective view of a container handler's frame, showing two limit switches mounted on it. One is at the front and one is at the rear, both labeled 'LIMIT SWITCH'. The lower part is a detailed cross-sectional view of the limit switch adjustment mechanism. It shows a horizontal beam with a roller on the left. A vertical rod passes through the beam, with a jam nut (labeled '1') and a capscrew (labeled '2') on top. The rod is connected to a limit switch mechanism on the right, which is also labeled 'LIMIT SWITCH'.</p>

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Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS	
5. Operator	Signal mechanic when green indicator light on container lock control panel goes out.		
6. Mechanic	Signal operator to pull full back on container lock control handle.		
7. Operator	Pull full back on container lock control handle. Place hands on steering wheel.		
8. Mechanic	Turn capscrew (2) in.		
9. Operator	Signal mechanic when red indicator light on container lock control panel comes on and stays on.		
10. Mechanic	Set jam nut (1) firmly in place.		
11. Procedure	Repeat for other limit switch.		

Section VI. RADIO INTERFERENCE SUPPRESSION

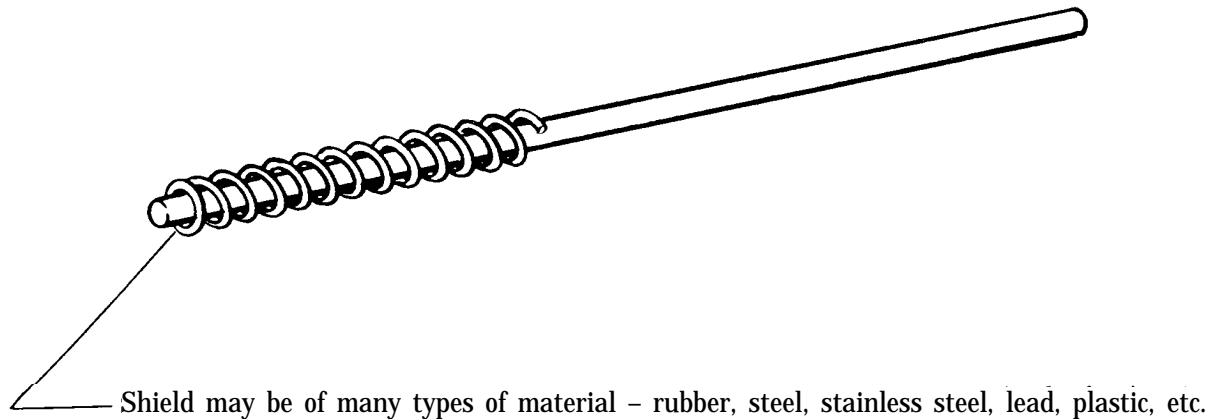
RADIO INTERFERENCE SUPPRESSION

(Sheet 1 of 3)

Essentially, suppression is attained by providing a low resistance path to ground for stray currents. The methods used include shielding the ignition and high frequency wires, grounding the vehicle with bonding straps, and using capacitors and resistors.

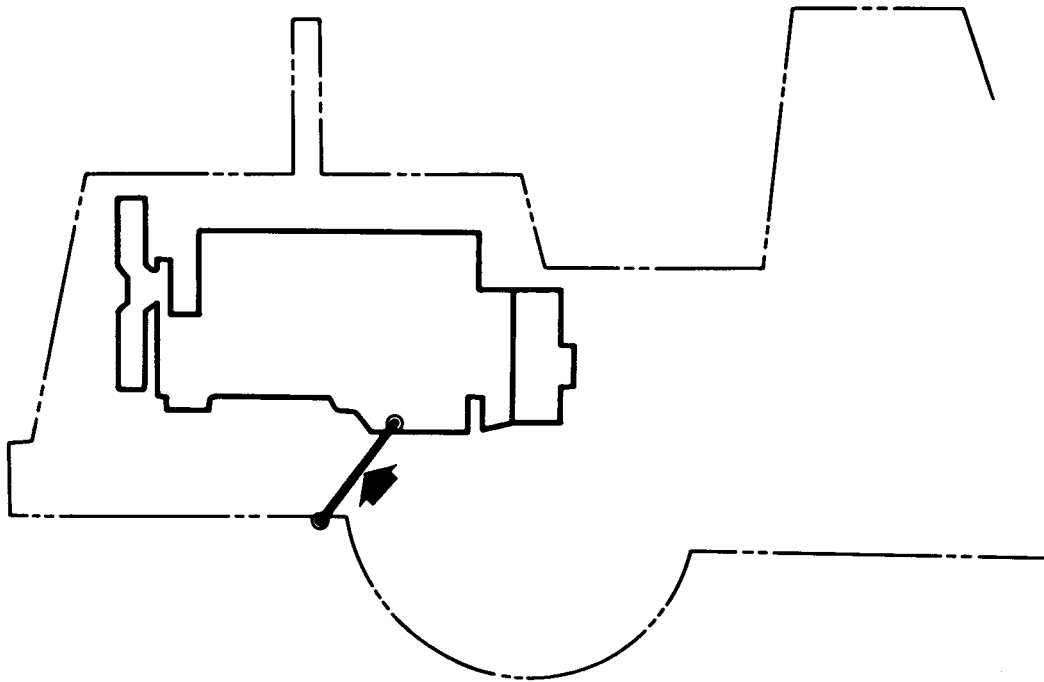
The primary components are:

Wire Shields. Some of the high voltage or frequency wires have the possibility of electrical leakage through the insulating cover. The "wire shield" is a protective covering over the wire to aid in the reduction or elimination of such leakages. These leakages, if not restrained from the radio, would cause undesirable interference.



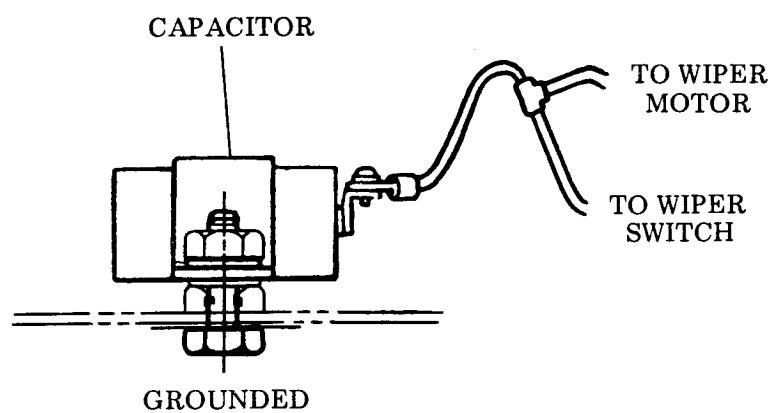
Shield may be of many types of material – rubber, steel, stainless steel, lead, plastic, etc.

Bonding Straps. Generally, the frame of a vehicle is used as the second wire (ground) of an electrical circuit. This ground is used for all the systems of the vehicle. The "bonding straps" ensure there is a definite ground between the major assemblies or components. This definite ground eliminates the possibilities of an erratic ground which would cause undesirable radio interference.



Bonding strap from the engine to the frame is one of a few major straps.

Capacitors. A capacitor is an electrical absorption chamber. When installed in the proper locations, it actually absorbs stray electrical current and keeps it from entering into the radio circuit.



A capacitor that is hooked into the positive lead to a wiper motor would absorb any undesirable static from the rotating motor.

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

SHIPMENT

This vehicle can be shipped by sea transportation, rail, or truck and is designed for minimum disassembly before shipment. Refer to the Military Traffic Management Command's Transportability Review, TR 80-1-19A.

WARNING

Be certain ether starting aid cannister is removed from vehicle before shipment or storage. Page 2-189

Seaboard transportation

Remove exhaust pipe and seal opening Page 2-211

Shipping link installed Page 2-471

Rail transportation

Remove mast Notify direct support maintenance

If necessary, remove ROPS Notify direct support maintenance

Remove exhaust pipe and seal opening Page 2-211

Shipping link installed Page 2-471

Truck transportation

Remove mast Notify direct support maintenance

Remove ROPS Notify direct support maintenance

Remove cab Notify direct support maintenance

Remove exhaust pipe and seal opening Page 2-211

Shipping link installed Page 2-471

PACKING

1. Protect the following items by wrapping or taping:
 - › Hydraulic fluid level gage
 - › Steering wheel and column
 - Instrument panels and container lock panel
 - Ž Windshield, windows and mirrors
 - Windshield wipers
 - Headlights, taillights and auxiliary lights.
2. Protect steering cylinders, rotation and sideshift cylinders by applying a layer of protective coating.
3. Install steering lock.
4. Drain cooling system (page 2-216) and fill with a fresh, clean solution of 50 percent water and 50 percent antifreeze conforming to MIL-A-46153. Tag the steering wheel to indicate the temperature to which the cooling system can be subjected before damage.
5. Be sure the crankcase is filled with oil.

MARKING

Mark shipping containers and unboxed components in accordance with MIL-STD-129.

ARMY SHIPPING DOCUMENTS

Prepare all Army shipping documents in accordance with AR 725-50.

LOADING (RAIL TRANSPORT)

Load, brace and block the equipment in accordance with requirements of the Association of American Railroads and the following:

1. Inspect all flatcars before loading to see that they are in a suitable condition to safely carry the load to its destination.
2. Prepare flatcars for loading by removing all debris, previous blocking, nails and other obstructions. Inspect flatcars for loose or broken floor planks. Do not use damaged cars.
3. Refer to Association of American Railroads "Rules Governing the Loading of Commodities on Open-Top Cars."
4. Position the vehicle as far away from the brake wheel end of the flatcar as space permits. Allow minimum clearance of 4 inches below, 6 inches above, behind and to each side of the flatcar brake wheel.

**APPENDIX A
REFERENCES**

A-1. PUBLICATION INDEXES AND GENERAL REFERENCES

Indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this publication.

- a. Military Publication Indexes
 - Consolidated Index of Army Publication and Forms DA PAM 25-30
 - Index of Graphic Training Aids and Devices DA PAM 310-5
- b. General References
 - First Aid for SoldiersFM 21-11

A-2. FORMS

Refer to DA PAM 738-750, The Army Maintenance Management System (TAMMS), for instructions on the use of maintenance forms pertaining to the material.

A-3. OTHER PUBLICATIONS

The following publications contain information pertinent to the major item material and associated equipment,

- a. Vehicle
 - Lubrication Order, Truck, Container Handler: Rough Terrain, 50,000 lb. Capacity LO 10-3930-641-12
 - Operator's Manual, Truck, Container Handler: Rough Terrain, 50,000 lb. Capacity TM 10-3930-641-10
 - organizational Maintenance Repair Parts and Special Tools List for Truck, Container Handler:
 Rough Terrain, 50,000lb. Capacity TM 10-3930-641-20P
- b. Camouflage
 - Camouflage FM 5-20
 - Color, Marking and Camouflage Painting of Military Vehicles, Construction Equipment and
 Materials Handling Equipment.....TB 43-0209

APPENDIX A
REFERENCES (CONT)

A-3. OTHER PUBLICATIONS (CONT)

c. Decontamination
Chemical, Biological, and Radiological (CBR) Decontamination ... TM 3-220
d. General
Basic Cold Weather Manual ... FM31-70
Manual for Wheeled Vehicle Driver ... FM 21-305
Northern Operations ... FM 31-71
Operation and Maintenance of Ordnance Material in Cold Weather (0° to-65°F) ... FM 9-207
Procedures for Destruction of Equipment to Prevent Enemy Use ... TM 750-244-3
Military Traffic Management Command's Transportability Review ... TR 80-1-19A
e. Maintenance and Repair
Organizational Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes ... TM 9-2610-200-20
Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries ... TM 9-6140-200-14
Description, Use, Bonding Techniques, and Properties of Adhesives ... TB ORD 1032
Inspection, Care, Maintenance of Antifriction Bearings ... TM 9-214
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems ... TB 750-651
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Material and Related Materials
Including Chemicals ... TM 9-247
Welding Theory and Application ... TM 9-237
Non-Aeronautical Equipment Army Oil Analysis Program (AOAP) ... TB 43-0210
f. Administrative Storage
Administrative Storage of Equipment ... TM 740-90-1

APPENDIX B
MAINTENANCE ALLOCATION CHART
Section I. INTRODUCTION

GENERAL

This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

INSPECT. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

TEST. To verify serviceability by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

SERVICE. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

ADJUST. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

MAINTENANCE FUNCTIONS (CONT)

ALINE. To adjust specified variable elements of an item to bring about optimum or desired performance.

CALIBRATE. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

INSTALL. The act of replacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

REPLACE. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

REPAIR. The application of maintenance services¹ or other maintenance actions² to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

OVERHAUL. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

REBUILD. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

¹Services — inspect, test, service, adjust, aline, calibrate, or replace.

²Actions — Welding, grinding, riveting, straightening, facing, remachining, or resurfacing.

EXPLANATION OF COLUMNS IN THE MAC, SECTION II

Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2.

Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

- C Operator or crew.
- O Organizational maintenance.
- F Direct support maintenance.
- H General support maintenance.
- D Depot maintenance.

Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

Column 3, Nomenclature. Name or identification of the tool or test equipment.

Column 4, National Stock Number. The National stock number of the tool or test equipment.

Column 5, Tool Number. The manufacturer's part number.

EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

Column 1, Reference Code. The code recorded in column 6, Section II.

Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly, Diesel	Inspect Test Service Adjust Replace Repair	0.1	1.0	1.0 1.0 32.0	125.0		3 1, 2 3 3 4	E B F A, D
	Trunnions	Inspect Replace Repair		0.05	0.5 0.5			1, 2 1, 2 1, 2	
	supports	Inspect Replace		0.05	0.5			1, 2	
0101	Block, Short	Replace Repair			60.0	8.0		3 4	
	Cylinder Head Assembly	Replace Repair			8.0 8.0			3 3	
0102	Damper	Replace		4.0				1, 2	
	Crankshaft	Inspect Replace				1.0 26.0		4 4, 13	
	Bearings, Main	Replace				8.0		4	
	Seals, Oil	Replace				1.0		4	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0103	Flywheel Assembly	Replace			16.0			3	
		Repair				2.5		4	
	Flywheel Housing	Replace			11.0			3	
		Repair			2.0			3	
0104	Piston	Replace				24.0		4	
		Repair				3.0		4	
	Connecting Rod	Replace				24.0		4	
		Repair				3.0		4	
	Bearings, Connecting Rod	Replace				2.0		4	
0105	Rocker Arm Assembly	Adjust			1.5			1, 2	
		Replace			8.0			3, 7	
	Rotocoil Assembly	Replace			0.5			3	
		Repair			0.2			3	
	Valves	Replace			14.0			3	
		Repair			15.0			3	
	Camshaft	Replace				16.5		4, 8	
	Timing Gears	Replace			5.5			3	
	Covers, Valve	Replace		0.5				1, 2	
0106	Oil Pan	Replace			5.0			3	
		Repair			1.0			3	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
	Engine Oil Pump	Replace Repair			8.0 2.0			3 3	B
	Oil Filter	Service Replace		0.3 1.0				1, 2 1, 2	
	Oil Filter Bypass Valves	Replace			1.0			3	
	Oil Cooler	Replace Repair			4.0 1.0			3	
	Breather	Inspect Service Replace		0.1 0.1 0.6				1, 2 1, 2 1, 2	
	Oil Filler Assembly	Replace		2.0				1, 2	
	Oil Lines and Fittings	Inspect Replace		0.1 2.0				1, 2	
0108	Manifold, Exhaust	Replace			3.0			1, 2	
0109	Accessory Drive Gears and Housing	Replace Repair			10.5 8.0			3 3	
	Tachometer Drive	Replace		0.7				1, 2	
	Adapters, Gears and Rear Accessory Drive	Replace Repair			8.5 6.0			3 3	
03	FUEL SYSTEM								
0301	Fuel Injection Nozzles	Test Replace Repair			1.0 2.5		1.0	3 3, 6 4	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0302	Fuel Injection Pump	Inspect			0.2			4	G
		Test				2.0	3		
		Replace			4.0		4, 5, 7, 9, 10		
		Repair				10.0			
		Adjust				2.0	4, 8		
0302	Fuel Pump Lines	Inspect	0.1						H
		Replace		1.0			1, 2		
		Transfer Pump		1.0			1, 2		
0302	Priming Pump	Replace		0.5			1, 2		
		Repair			2.5		3		
		0304	Air Cleaner	Service		0.1			
0304	Dust Ejector	Replace		0.5			1, 2		
		Service		0.5			1, 2		
0305	Turbocharger	Replace			6.0		1, 2, 3		
		Repair				2.0	4		
		Turbocharger Air Lines	Replace			1.0		3	
	Turbocharger Oil Lines	Replace			1.0		3		

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0306	Fuel Tank	Inspect	0.2						
		Service		0.5				1, 2	
0308	Fuel Lines and Fittings	Replace			2.0			3	
		Repair			2.0			3	
0308	Governor	Inspect	0.2						
		Replace		2.0				1, 2, 15	
0308	Fuel Ratio Control	Adjust			1.0			3, 8	
		Replace			2.0			3	
0308	Controls	Repair				3.0		4	
		Adjust			0.2			3	
0309	Fuel Filters, Primary	Replace			0.8			3	
		Repair			1.4			3	
0309	Fuel Filter, Secondary	Inspect	0.2					1, 2	
		Adjust			1.0			3	
0311	Ether Starting Aid	Replace			1.5			3	
		Service		0.5				1, 2	B
0311	Ether Starting Aid	Replace		0.5				1, 2	
		Service		1.0				1, 2	B
0311	Ether Starting Aid	Replace	0.2						
		Service		2.0				1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
04	EXHAUST SYSTEM								
0401	Muffler and Pipes	Inspect Replace	0.2	1.0				1, 2	
	Fumes Disposal Assembly	Replace		1.0				1, 2	
05	COOLING SYSTEM								
0501	Radiator Assembly	Inspect Service Replace Repair	0.1	0.5	6.0 4.0			3 3	
0502	Shrouds	Replace Repair			2.0 2.0			3 3	
0503	Water Temperature Regulators	Test Replace		1.0 2.0				1, 2 1, 2	
	Water Temperature Switch	Test Replace		1.0 2.0				1, 2 1, 2	
	Hose, Lines and Fittings	Inspect Replace	0.5	1.0				1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0504	Water Pump Assembly	Inspect Replace Repair	0.1	3.5	2.0			1, 2 3	
0505	Fan Assembly	Replace		2.0				1, 2	
	Fan Guards	Replace		0.5					
	Belt, Drive	Inspect Replace	0.1	1.0				1, 2	
	Fan Drive Mechanism	Replace Repair		0.7	1.5			1, 2 3	
	Crankshaft Pulley	Replace		0.5				3	
	Belt Tightener	Replace		1.0				1, 2	
0507	Auxiliary Cooler, Hydraulic Oil	Replace Repair			2.0 2.0			3 3	
	Oil Lines, Hydraulic Oil Cooler	Inspect Replace		0.1	2.0			3	
0508	Coolant Filter (Conditioner)	Replace		0.5				1, 2	
06	ELECTRICAL SYSTEM								
0601	Alternator	Test Replace Repair Overhaul		0.5 1.5	1.0	2.5		1, 2 1, 2 3 4	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0603	Starting Motor	Test Replace Repair		0.5 2.5		5.0		1, 2 1, 2 4	I
	Solenoid, Starting Motor	Test Replace		0.5 1.5				1, 2 1, 2	I
0606	Warning Controls, Engine	Inspect Test Replace	0.1	0.5 0.5				1, 2 1, 2	I
	Solenoid, Fuel Shutoff	Test Adjust Replace		0.2	0.2 1.0			1, 2 3 3	I
0607	Engine Wiring	Test Replace Repair		1.5 2.0	3.0			1, 2 3 1, 2	
	Instrument Panel	Inspect Replace Repair	0.5	1.0 1.0				1, 2 1, 2	
0607	Service Meter	Replace		0.5				1, 2	
	Container Lock Indicator	Inspect Test Replace	0.1	0.2 1.5				1, 2 1, 2	I
	Console Wiring	Replace Repair		1.5 1.0				1, 2 1, 2	
	Start Switch	Replace		0.5				1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR, TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0609	Headlights	Test		0.2				1, 2	I
		Replace		0.5				1, 2	
	Backup Light	Test		0.2				1, 2	I
		Replace		0.5				1, 2	
	Taillights	Test		0.2				1, 2	I
		Replace		0.5				1, 2	
	Stoplights	Test		0.2				1, 2	I
Replace			0.5				1, 2		
ROPS Lights	Test		0.2				1, 2	I	
	Replace		1.0				1, 2		
Cab Lights	Test		0.2				1, 2	I	
	Replace		0.5				1, 2		
	Lamps, Sealed	Replace		0.5				1, 2	I
0610	Sending Unit, Oil Pressure	Test		0.5				1, 2	I
		Replace		0.5				1, 2	
	Sending Unit, Engine Temperature	Test		0.5				1, 2	I
		Replace		0.5				1, 2	
	Stoplight Switch	Test		0.2				1, 2	I
		Replace		0.5				1, 2	
0611	Horn	Test		0.2				1, 2	I
		Replace		0.5				1, 2	
	Horn Switch	Test		0.2				1, 2	I
		Replace		0.5				1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS	
			C	O	F	H	D			
0612	Alarm, Backup Warning	Test Replace	0.2	0.2 0.5				1, 2 1, 2	I	
	Batteries, Storage	Inspect Test Service Replace		0.5 0.5 0.5				0.5	1, 2 1, 2 1, 2	I C
	Battery Box	Replace Repair		0.5					1, 2 3	
	Battery Cables	Replace Repair		0.3 0.3					1, 2 1, 2	
0613	Wiring Harnesses	Replace Repair	1.0	2.5	3 1, 2					
	Terminals and Connectors	Replace	1.0		1, 2					
0615	Radio Interference Suppression	Replace		0.5		1, 2				
07	TRANSMISSION									
0708	Torque Converter	Test Replace Repair	0.1		0.3	6.0 12.0	3 4 4	J		
	Torque Converter Cooler Lines	Inspect Replace			1.5	3				
0710	Transmission Assembly	Service Replace Repair Test		0.5	20.0	8.0	1, 2 3 4 3	B J		
	Transmission Controls	Inspect Replace Adjust		0.2 0.5	1.5		1, 2 3 1, 2			

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0721	Planetary Assembly	Replace				10.0		4	
		Repair				15.0		4	
	Carrier Assembly	Replace				12.0		4	
		Repair				15.0		4	
	Input Transfer Gear Assembly	Replace				2.0		4	
		Repair				10.0		4	
	Output Transfer Gear Assembly	Replace				2.0		4	
		Repair				10.0		4	
	Pump, Transmission Oil	Replace			4.0			3	
		Repair				4.0		4	
	Control Valve	Test			0.2			1, 2	
		Replace			1.0			3	
		Repair				2.0		4	
	Oil Filter	Service		0.3				1, 2	
	Replace		0.5				1, 2		
Linkage	Service		1.0				1, 2		
	Replace		1.5				1, 2		
Oil Cooler	Replace			2.4			3		
	Repair			1.0			3		

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
09	Oil Filler Assembly	Replace		1.0				1, 2	
	Oil Lines, Transmission	Inspect Replace		0.5	3.0			3	
0900	PROPELLER SHAFTS								
	Drive Shafts	Replace Repair		4.0	2.0			1, 2 3	
10	Universal Joint/Spider and Bearing Assembly	Replace			2.0			3	B
	FRONT AXLE								
1000	Front Axle Assembly	Replace Repair			5.0	4.0		3 4	
1002	Differential Assembly, Front	Inspect		1.0				1, 2	B
		Service Replace Repair		0.5		8.0 4.0		4 4	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
11	REAR AXLE								
1100	Rear Axle Assembly	Replace Repair			5.0	4.0		3 4	
	Trunnion Support Assembly	Replace Repair			5.0	3.5		3 4	
1102	Differential Assembly, Rear	Inspect Service Replace Repair		1.0 0.5		8.0 4.0		1, 2 4 4	B
12	BRAKES								
1201	Hand Brake Assembly	Inspect Replace Repair		0.1	3.0 2.0			1, 2 3 3	
	Brake Lines	Inspect Replace		0.2	3.0			1, 2 3	
	Brake Control	Replace Repair		2.0 1.0				1, 2 1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
1202	Service Brake Assembly	Replace Repair			3.0	2.0		3 4	K
1204	Service Brake Linkage	Adjust		1.5					
	Brake Control	Replace			2.0			3	
		Repair				2.0		3	
	Accumulator	Replace			2.0			3	
		Test			1.0			3	
1206	Lines, Fittings and Hoses	Inspect		0.1					
		Replace			1.0			3	
	Hydraulic Valve	Replace			2.0			3	
		Repair			2.0			3	
1206	Mechanical Brake Pedal and Linkage	Replace Repair			1.5 2.0			3 3	
13	WHEELS								
1311	Wheel Assembly	Replace		0.8				3	K
	Rims	Replace		0.8				3	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
1313	Tires	Inspect Service Replace Repair	0.1	0.5 2.0 1.0				3 3	
14	STEERING								
1401	Steering Wheel Steering System	Replace Test Service Adjust Replace Repair		1.0 0.5 0.5	1.0 3.0 2.0			1, 2 1, 2 1, 2 3 3 3	L B
	Adjustable Steering Column	Replace Repair			3.0 2.0			3 3	
	Steering Valve Assembly	Replace Repair			3.0	2.0		3 4	
1402	Articulated Hitch Assembly	Service Repair		0.2	8.0			1, 2	B
1410	Steering Pump	Test Inspect Replace Repair		1.0	1.0 5.0	3.0		3 3 4 4	B
	Steering Pump, Supplemental	Test Inspect Replace Repair		1.0	1.0 5.0	3.0		3 3 4	B

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
1411	Hoses, Lines and Fittings	Inspect Replace		0.1	3.0			1, 2 3	
	Steering Filter	Service Replace		0.3 0.5				1, 2 1, 2	
1412	Hydraulic Cylinders	Inspect Replace Repair	0.1		8.0		2.0	3 4	B
1414	Steering System Diverter Valves	Inspect Replace Repair		0.2	1.0		1.0	3 4	B
	Steering Limit Valve	Inspect Adjust Replace Repair		0.2	0.5 1.0		1.0	3 3 4	
15	FRAME AND TOWING ATTACHMENTS								
1501	Frame Assembly, Engine End	Inspect Repair		0.5			2.0	4	
	Frame Assembly, Non-Engine End	Inspect Repair		0.5			2.0	4	
	Bumper, Rear	Replace Repair					2.0 2.0	4 4	
	Platform	Replace Repair			2.0		2.0	3 4	
	Platform Guard	Replace Repair		0.5	1.0			1, 2 3	
	Ladder	Replace Repair		0.5	1.0			1, 2 3	
	Shipping Link	Replace		0.2					

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
1502 18	Platform, Right Hand	Replace			2.0			3	
	Pintle Hook Assembly	Repair				2.0		4	
	Counterweight	Replace		0.5				1, 2	
1801	BODY, CAB, HOOD AND HULL	Replace			1.0			3	
	Body	Repair			5.0			3	
	Cab	Repair			1.0			3	
1802	ROPS	Replace			25.0			3	
	Fender, Front	Replace		3.0	1.0			3	
	Fender, Rear	Repair			2.0			1, 2 3	
1806	Fender, Rear	Inspect		0.2					
	Windshield	Replace			2.0			1, 2 3	
	Glass	Replace			3.0			3	
	Seat	Replace			2.0			3	
	Seat	Replace		1.0				1, 2 3	
	Seat	Repair			1.5			3	
	Arm Cushion	Replace		0.5				1, 2	
	Seat Belts	Replace		0.5				1, 2	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
22	BODY, CHASSIS AND ACCESSORY ITEMS								
2202	Mirrors	Inspect Replace	0.1	0.2				1, 2	
	Wipers	Inspect Replace	0.1	1.0				1, 2	
	Windshield Wiper Motor	Replace		2.0				1, 2	
	Cab Heater and Defroster	Test Replace	0.2	2.0				1, 2	
	Air Filter, Cab Heater	Service Replace		0.2 1.2				1, 2 1, 2	
	Heater Lines	Replace Repair		1.0 0.5				1, 2 1, 2	
	Control Console Assembly, Heater	Replace		1.5				1, 2	
	Grease Lines	Service Replace		0.2 1.0				1, 2 1, 2	B
2400	HYDRAULIC LIFT COMPONENTS								
2401	Hydraulic Pump	Test Replace Repair			1.0 6.0			3 3 4	
2402	Control Valve	Replace Repair			4.0		3.0	3 4	
2404	Tilt Cylinder	Inspect Test Replace Repair	0.1		0.2 1.0 8.0		5.0	3 3 3	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
2405	Side Tilt Cylinder	Inspect Test Replace Repair	0.1		0.2 1.0 8.0			3 3 3	
	Side Shift Cylinder	Inspect Test Replace Repair	0.1		0.2 1.0 8.0			3 3 3	
	Mast	Inspect Replace Repair		0.1	3.0 2.0			3 3	
	Carriage	Inspect Replace		0.1	2.0			3	
	Forks	Inspect Replace	0.1		0.5			3	
	Lift Cylinder	Replace Repair			1.0 1.0			3 3	
2406	Hydraulic Lines and Fittings	Inspect Replace		0.1	1.0			3	
33	SPECIAL PURPOSE KITS								
3307	Tophandler, 20 Ft	Inspect Install Repair	0.1 0.5		1.5			3	
	Tophandler, 35 Ft	Inspect Install Repair	0.1 0.5		1.5			3	

Section II. MAINTENANCE ALLOCATION CHART FOR TRUCK, CONTAINER HANDLER (CONT)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
43 4300 4301 4305 4308 4309	Tophandler, 40 Ft	Inspect Install Repair	0.1 0.5		1.5			3	
	Force Limiter	Inspect Adjust Service Replace Repair	0.1	0.2	0.5 1.2 1.5			3 1, 2 3 3	B
	Twistlock	Inspect Adjust Service Replace	0.1	0.4	0.7 1.0			3 1, 2 3	B
	Hydraulic Cylinder	Replace Repair			0.5 1.0			3 3	B
	Tophandler Guide Plate Mounting Bolts	Replace		0.2				1, 2	
	HYDRAULIC SYSTEM								
	Hydraulic System (Complete)	Inspect Service Repair	0.1	0.5		2.0		1, 2 4	B
	Filter	Service Replace		0.5 1.0				1, 2 1, 2	B
	Control Valve	Replace Repair			4.0	5.0		3 4	
	Hydraulic Reservoir	Inspect Service Replace Repair	0.1	0.5	2.0 3.0			1, 2 3 3	B
	Controls and Linkage	Adjust Replace		1.0 2.0				1, 2	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TRUCK, CONTAINER HANDLER

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	O	SHOP EQUIPMENT, AUTO MAINT AND REPAIR : COMMON NO. 1	4910-00-754-0654	W32593
2	O	SHOP EQUIPMENT, AUTO MAINT AND REPAIR: SUPPLEMENTAL NO. 1	4910-00-754-0653	W32867
3	F	SHOP EQUIPMENT, AUTO MAINT AND REPAIR: WHEELED VEHICLE, SET B	4910-00-348-7697	T09906
4	H	SHOP EQUIPMENT, AUTO MAINT AND REPAIR: WHEELED VEHICLE, SET A	4910-00-348-7696	T09905
5	F	WRENCH, INJECTOR PUMP REMOVAL		8S4613
6	F	EXTRACTOR, INJECTOR		8S2244
7	F	TOOL SET, VALVE LIFTER		5P7433
8	F	TOOL, ENGINE TURNING		9S9082
9	H	FIXTURE, FUEL RACK BEARING		5P6217
10	H	DRIVER, FUEL RACK BEARING		5P6218
11	F	EXTRACTOR, FUEL NOZZLE ADAPTER		5P6229
12	F	PIN, TIMING		5P9697

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TRUCK, CONTAINER HANDLER (CONT)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
13	H	DISTORTER, WEAR SLEEVE		5P7312
14	H	RING, DISTORTER		5P7314
15	O	SOCKET, FUEL LINE		5P144
16	O	REMOVER, TIRE, BEAD BREAKER, HYDRAULIC	4910-00-773-9341	TO100
17	O	CONSTRUCTOR, BEAD EXPANDER	4910-00-138-1819	TC28

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Complete engine gasket kit is available
B	See LO 10-3930-641-12 for lubrication instructions.
C	Battery maintenance instructions are provided in TM 9-6140-200-14.
D	Repair time is given with engine removed from vehicle.
E	Test includes inlet manifold pressure check, compression check, oil pressure check and operational check.
F	Adjustment consists of valve adjustment.
G	Fuel injection pump test consists of timing check.
H	Fuel injection pump adjustment consists of timing adjustment and fuel rack adjustment.
I	Operational test or electrical troubleshooting as required.
J	Test consists of pressure check and performance tests.
K	Front and rear wheels, brakes and final drives are identical.
L	Steering test consists of hydraulic pressure check.

APPENDIX C
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Rough Terrain Container Handler. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

EXPLANATION OF COLUMNS

- (1) ITEM NUMBER This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 2, App. C").
- (2) LEVEL This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
- (3) NATIONAL STOCK NUMBER This is the National stock number assigned to the item; use it to request or requisition the item.
- (4) DESCRIPTION Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.
- (5) U/M (Unit of Measure) Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

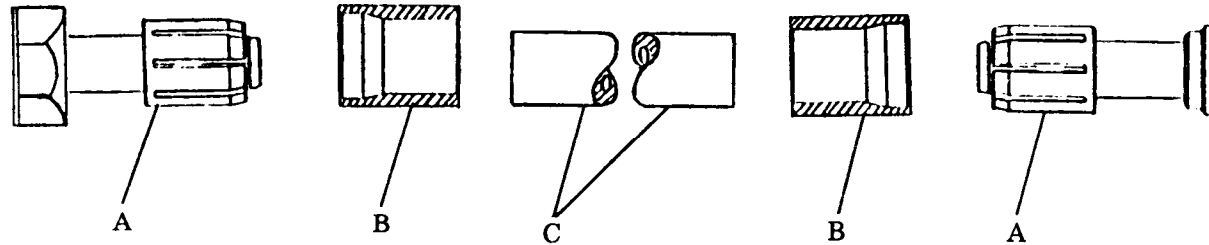
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	0	6850-00-181-7929	Antifreeze, Type I MIL-A-46153 (81349)	gal
2	0	6850-00-941-5054	Cleaning Compound, Solvent FED SPEC O-C-1889, 5 gal can	gal
3	0	9150-00-935-1017	GAA Grease, Auto/Artillery (4 oz cartridge MIL-G-10924 (81349)	ea
4	0	9150-00-190-0904	GAA Grease, Auto/Artillery MIL-G-10924 (81349)	lb
5	0	9150-00-905-9100	GO Lubricating Oil, Grade 80 MIL-L-2105 (81349)	gal
6	0	9150-00-257-5440	GOS Lubricating Oil, Subzero MIL-L-10324 (81349)	gal
7	0	9150-00-188-9858	Lubricating Oil, Engine OE 30 MIL-L-2104 (81349)	gal
8	0	9150-00-491-7197	Lubricating Oil, Engine OE 5 MIL-L-2104 (81349)	gal
8	0	9150-00-186-6668	Lubricating Oil, Engine OE 10 MIL-L-2104 (81349)	gal
9	0	9150-00-935-9807	OH T, Hydraulic Fluid, Petroleum Base MIL-H-6083 (81349)	qt

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST (CONT)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
10	O	8030-00-965-2438	Sealing Compound, Paste, 60 ft roll MIL-S-11030 (81349)	ft
11	O	8135-00-551-1245	Tape, Adhesive PPPT60 (81348)	yd
12	O	8010-00-297-0560	Enamel, Alkyd, Lusterless OD MIL-E-5556 (81349)	gal
13	O	8010-00-598-5936	Enamel, Semigloss OD, 12 oz can (pressurized) TTE8485 (81348)	ea
14	O	9140-00-286-5294	Fuel Oil, Diesel: DF2 VV-F-800 (81348)	gal
15	O	6810-00-356-4936	Distilled Water, Technical: 5 gal bottle	gal
16	C	7920-00-205-1711	Rag, Wiping: Cotton, Class 2. Grade B, 50 lb bundle DDD-R-30 (81348)	lb
17	O	6850-00-281-1985	Dry Cleaning Solvent (SD-2), 1 gal can P-D-680 (81348)	gal
18	O	7930-00-249-8036	Detergent, General Purpose: 5 lb box P-D-220 (81348)	lb
19	O	6810-00-264-6618	Sodium Bicarbonate, Technical: 1 lb box	lb

APPENDIX D
ILLUSTRATED LIST OF MANUFACTURED ITEMS

MANUFACTURED HOSES



A. Stem Assy – Assembly may have nuts on the ends or may be attached with flanges. Stem Assy 's will be listed as one per end.

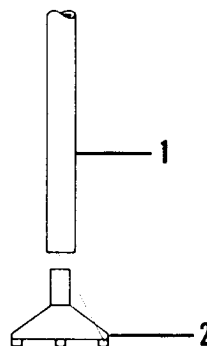
B. Sleeve Assy – Sleeves will be listed as one per end.

C. Hose – Hoses listed are in bulk length.

Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No. (Qty)	Stem Assy No. (Qty)
8N1467	5P0182	100.4 in. (2.6m)	3S7116 (2)	1P1219 (1) 3S8573 (1)
8N1468	5P0182	108.3 in. (2.8m)	3S7116 (2)	1P1219 (1) 5S3826 (1)

MANUFACTURED HOSES (CONT)

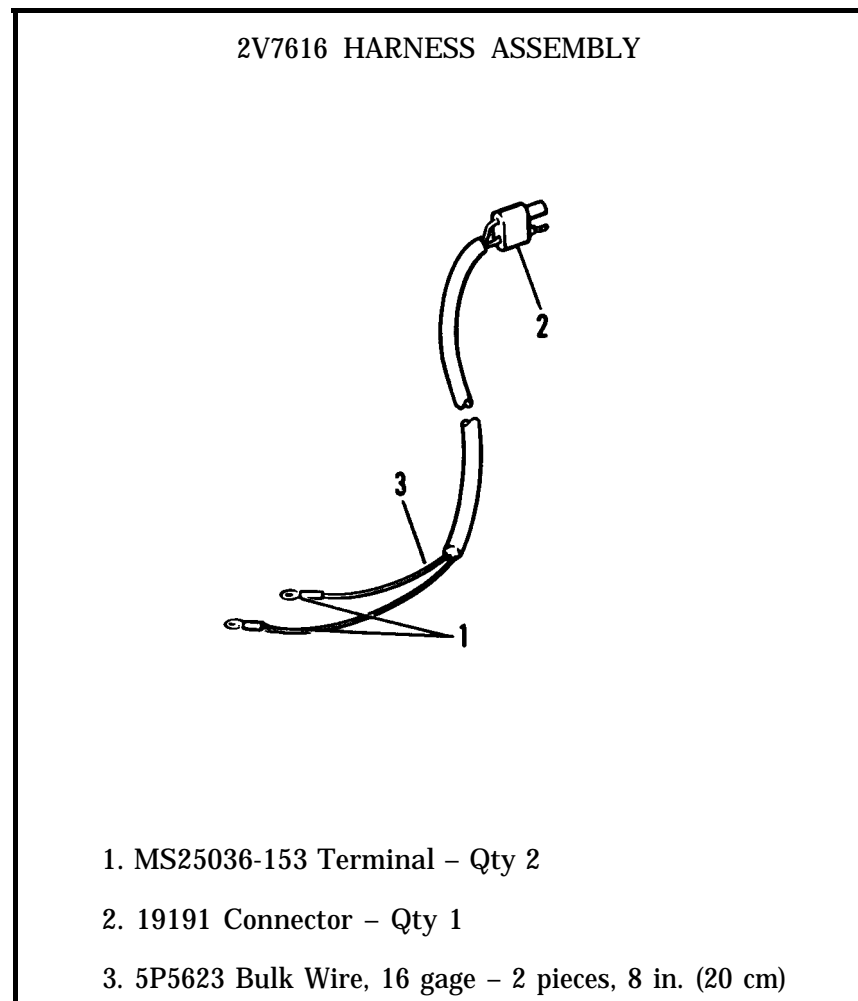
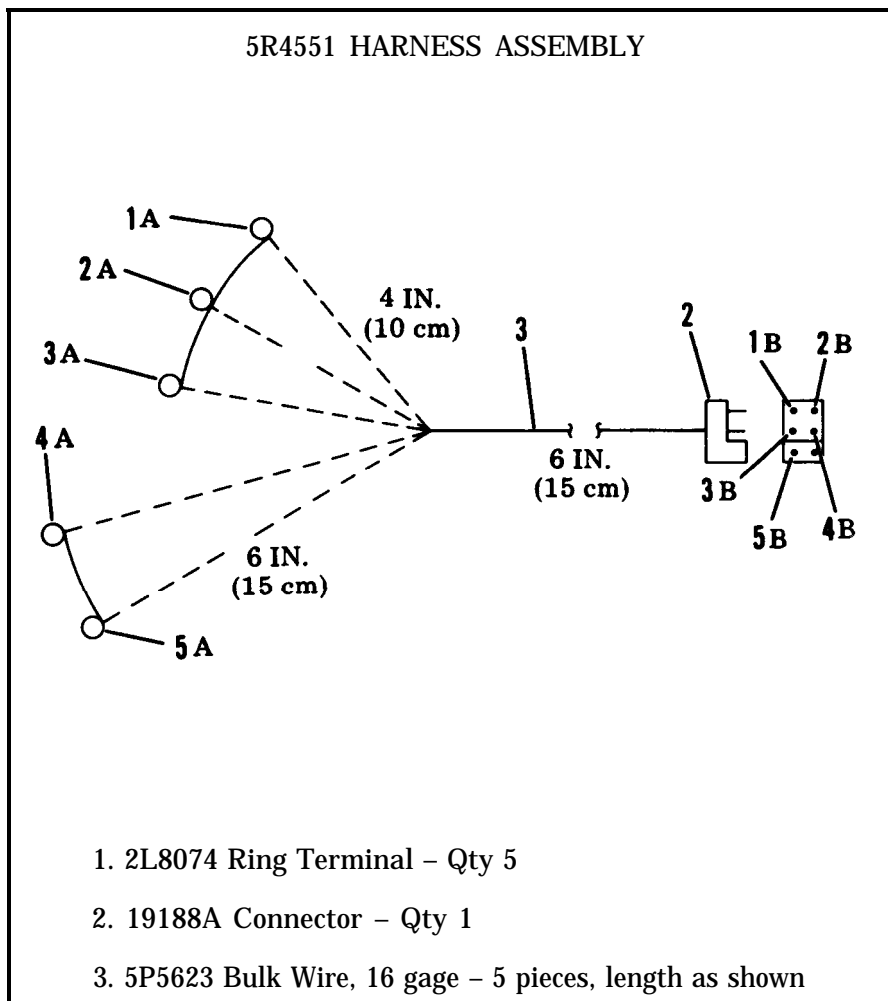
88841-28 PUMP ASSEMBLY



1. 5P5992 Hose, Bulk 8 in. (20 cm) – Qty 1
2. 87883-4 Strainer – Qty 1

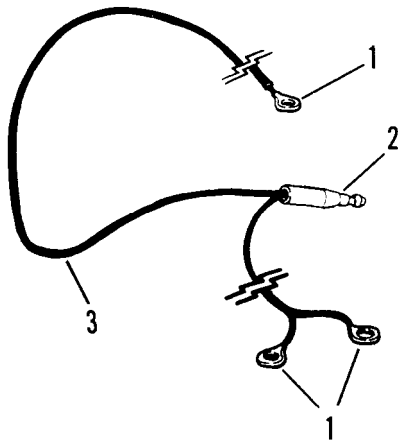
MANUFACTURED HARNESSES

Cut wire to length. Attach terminals and connectors as shown in diagram. Check for continuity (page 2-53) and shorts (page 2-54).



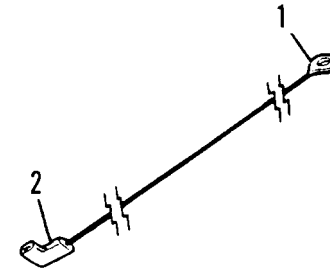
MANUFACTURED HARNESSES (CONT)

5R4490 WIRE ASSEMBLY



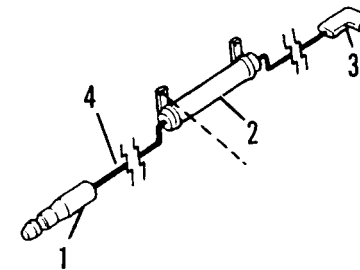
1. MS25036-153 Lug Terminal - Qty 3
2. 2863 Terminal, Quick Disconnect - Qty 1
3. 5P5623 Bulk Wire. 16 gage - 2 pieces, 40 in. (100 cm)

2V4305 WIRE ASSEMBLY



1. 2L8074 Lug Terminal - Qty 1
2. 412026 Terminal, Female - Qty 2
3. 5P5623 Bulk Wire, 16 gage - 18 in. (45 cm)

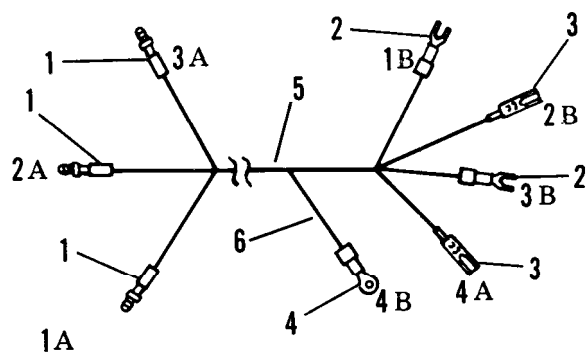
2V4306 WIRE ASSEMBLY



1. 11722 Connector - Qty 1
2. 0200R Resistor - Qty 1
3. 412026 Terminal, Female - Qty 1
4. 5P5623 Bulk Wire, 16 gage - 44 in. (110 cm)

MANUFACTURED HARNESES (CONT)

2V3020 HARNESS ASSEMBLY



- 1. 11722 Plug, Tip - Qty 3
- 2. 5P1475 Terminal, Lug - Qty 2
- 3. 7K4475 Pin, Shoulder - Qty 2
- 4. MS25036-110 Terminal, Lug - Qty 1

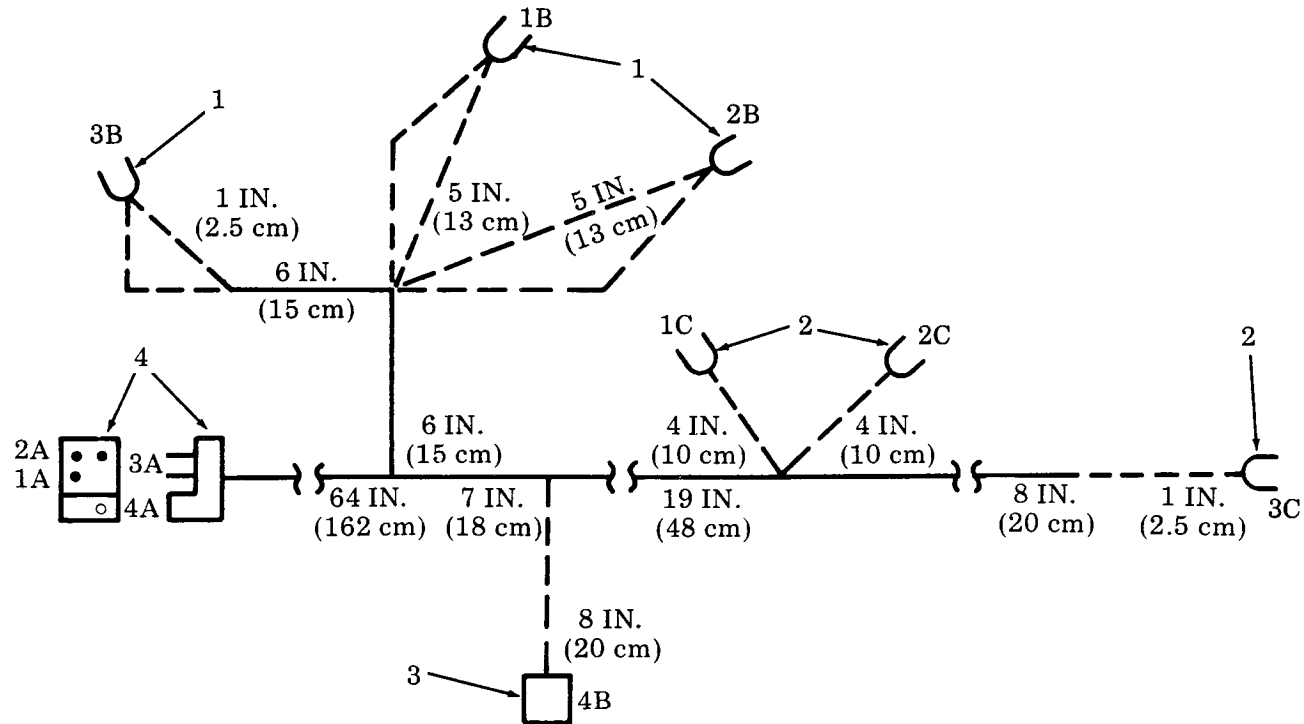
- 5. 5P5623 Bulk Wire, 16 gage -
Length as follows:

- 1A to 1B - 43 in. (110 cm)
- 3A to 3B - 43 in. (110 cm)
- 4A to 4B - 12 in. (30 cm)

- 6. 5P5624 Bulk Wire, 14 gage - from 2A to 2B - 47 in. (120 cm)

MANUFACTURED HARNESES (CONT)

2V2989 HARNESS ASSEMBLY



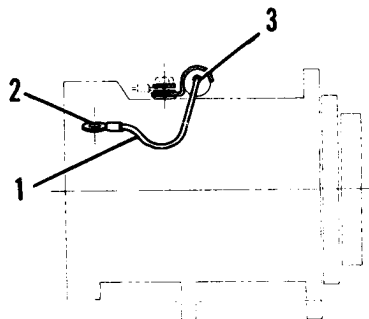
- 1. 5P1475 Terminal, Lug - Qty 3
- 2. 5P1477 Terminal, Lug - Qty 3
- 3. 17510 Jack, Tip - Qty 1
- 4. 19188A Connector - Qty 1

- 5. 5P5623 Bulk Wire, 16 gage - Length as follows:

- 1A to 1B - 75 in. (190 cm)
- 2A to 2B - 75 in. (190 cm)
- 3A to 3B - 77 in. (195 cm)
- 4A to 4B - 79 in. (200 cm)
- 1C to 2B - 41 in. (104 cm)
- 2C to 2B - 41 in. (104 cm)
- 3C to 3B - 48 in. (122 cm)

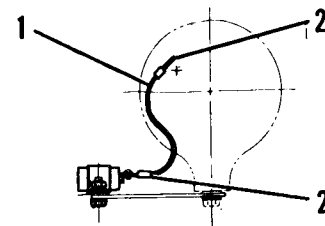
MANUFACTURED HARNESSES (CONT)

5R4686 WIRE ASSEMBLY



1. 5P5632 Bulk Wire, 10 gage – 6 in. (15 cm)
2. 2L8071 Terminal – Qty 1
3. 2L8064 Terminal – Qty 1

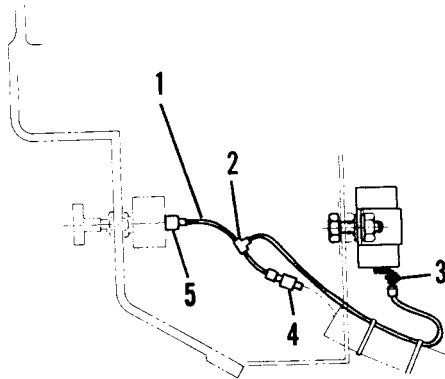
5R4687 WIRE ASSEMBLY



1. 5P5632 Bulk Wire, 10 gage – 6 in. (15 cm)
2. 2L8049 Terminal – Qty 2

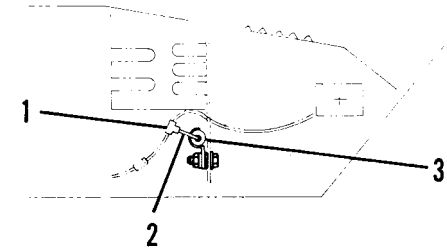
MANUFACTURED HARNESSES (CONT)

5R4689 WIRE ASSEMBLY



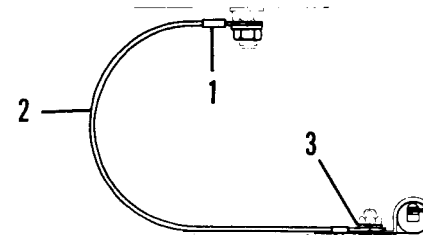
1. 5P5632 Bulk Wire, 10 gage - 2 pieces 8 in. (20 cm) and 14 in. (35 cm)
2. 5R4677 Splice - Qty 1
3. 2L8064 Terminal - Qty 1
4. 6N9018 Connector - Qty 1
5. 5P5618 Terminal - Qty 1

5R4688 WIRE ASSEMBLY



1. 5R4677 Splice - Qty 1
2. 5P5621 Bulk Wire, 12 gage - 6 in. (15 cm)
3. 2L8064 Terminal - Qty 1

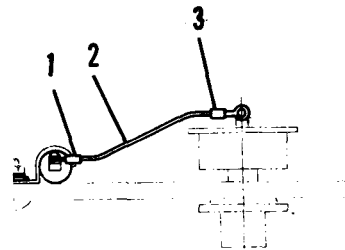
5R4690 WIRE ASSEMBLY



1. 2L8069 Terminal - Qty 1
2. 5P5632 Bulk Wire, 10 gage - 12 in. (30 cm)
3. 2L8067 Terminal - Qty 1

MANUFACTURED HARNESES (CONT)


5R4691 WIRE ASSEMBLY



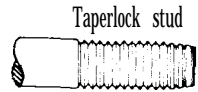
1. 2L8067 Terminal – Qty 1
2. 5P5632 Bulk Wire, 10 gage – 8 in. (20 cm)
3. 228066 Terminal – Qty 1

APPENDIX E
TORQUE LIMITS

GENERAL TORQUE FOR CAPSCREWS AND NUTS

THREAD DIAMETER		STANDARD TORQUE	
inches	millimeters	lb. ft.	N•m
Standard thread 		Use these torques for bolts and nuts with standard threads (conversions are approximate).	
1/4	6.35	9 ± 3	12 ± 4
5/16	7.94	18 ± 5	25 ± 7
3/8	9.53	32 ± 5	45 ± 7
7/16	11.11	50 ± 10	70 ± 15
1/2	12.70	75 ± 10	100 ± 15
9/16	14.29	110 ± 15	150 ± 20
5/8	15.88	15 ± 20	200 ± 25
3/4	19.05	265 ± 35	360 ± 50
7/8	22.23	420 ± 60	570 ± 80
1	25.40	640 ± 80	875 ± 100
1 1/8	28.58	800 ± 100	1100 ± 150
1 1/4	31.75	1000 ± 120	1350 ± 175
1 3/8	34.93	1200 ± 150	1600 ± 200
1 1/2	38.10	1500 ± 200	2000 ± 275
Use these torques for bolts and nuts on hydraulic valve bodies.			
5/16	7.94	13 ± 2	20 ± 3
3/8	9.53	24 ± 2	35 ± 3
7/16	11.11	39 ± 2	50 ± 3
1/2	12.70	60 ± 3	80 ± 4
5/8	15.88	118 ± 4	160 ± 6

GENERAL TORQUE FOR TAPERLOCK STUDS



1/4	6.35	5 ± 2	7 ± 3
5/16	7.94	10 ± 3	15 ± 5
3/8	9.53	20 ± 3	30 ± 5
7/16	11.11	30 ± 5	40 ± 10
1/2	12.70	40 ± 5	55 ± 10
9/16	14.29	60 ± 10	80 ± 15
5/8	15.88	75 ± 10	100 ± 15
3/4	19.05	110 ± 15	150 ± 20
7/8	22.23	170 ± 20	230 ± 30
1	25.40	260 ± 30	350 ± 40
1 1/8	28.58	320 ± 30	400 ± 40
1 1/4	31.75	400 ± 40	550 ± 50
1 3/8	34.93	480 ± 40	650 ± 50
1 1/2	38.10	550 ± 50	750 ± 70

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E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

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To be distributed in accordance with DA FORM 12-38, Organizational Maintenance requirements for Truck, Container Handler Rough Terrain 50,000 lb capacity.
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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

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

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

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

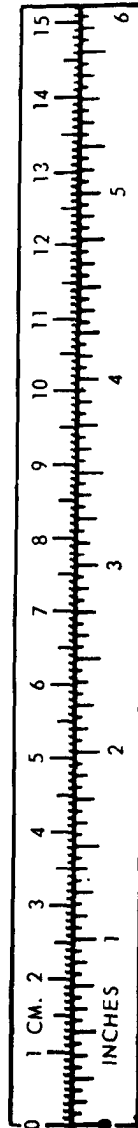
TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212^o Fahrenheit is equivalent to 100^o Celsius
 90^o Fahrenheit is equivalent to 32.2^o Celsius
 32^o Fahrenheit is equivalent to 0^o Celsius
 $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

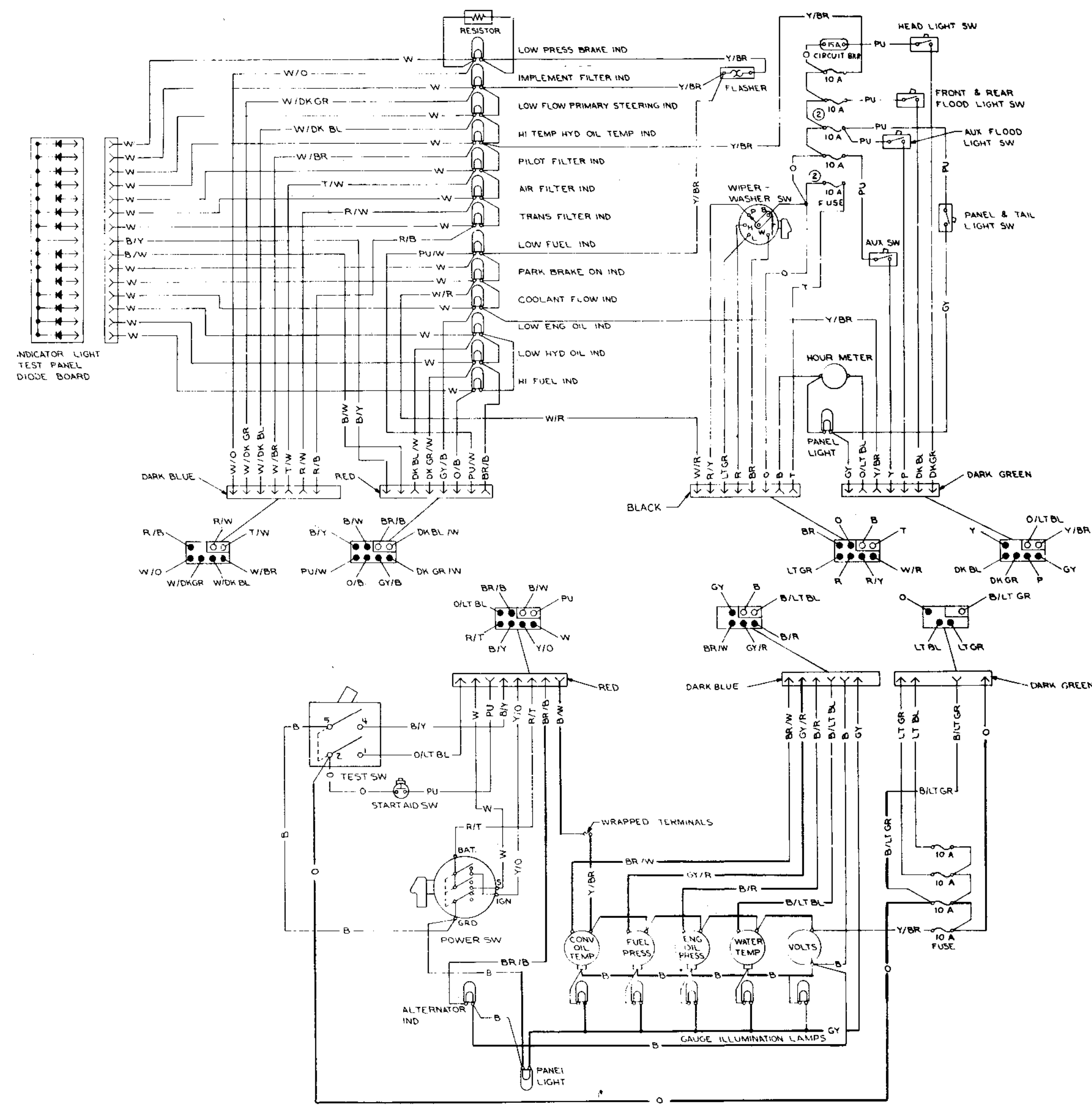
APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square 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 Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



TA089991



ABBREVIATION	COLOR
R	RED
W	WHITE
O	ORANGE
Y	YELLOW
T	TAN
P	PINK
B	BLACK
GY	GRAY
PU	PURPLE
BR	BROWN
DK GR	DARK GREEN
DK BL	DARK BLUE
LT GR	LIGHT GREEN
LT BL	LIGHT BLUE
XX/XX	BASIC COLOR/STRIPE

SYMBOL	DESCRIPTION
○	WIRE TERMINAL
•	SPLICE OR JUNCTION OF WIRES
—+—	CROSSING OF WIRES NOT CONNECTED
—+—	VISIBLE GROUNDING OF COMPONENTS
—+—	INTERNAL GROUNDING OF COMPONENTS
→	CONNECTOR

